Sinhgad Institutes

National Level Student Conference

IEEE TECHNICOKNOCKDOWN-2021

TKD-21

Organised by Department of E&TC, SIT Lonavala

Technically Sponsered by

IEEE Bombay Section and IETE, Pune Centre

supported by IEEE SIT SB & IETE, SIT Lonavla

www.sinhgad.edu

MAY 30
2021

ISBN No. 978-81-992245-3-6

GREEN TECHNOLOGY

IEEE BOMBAY SECTION
STUDENT ACTIVITIES COMMITTEE

IEEE
SIT Student Branch

IETE

TKD

National Level Student Conference

"IEEE TECHNICOKNOCKDOWN-2021 (TKD-21)"

Organized by Department of E&TC, SIT, Lonavala

Technically Sponsored by IEEE Bombay Section and IETE, Pune center and Supported by IEEE SITSB & IETE, SIT Lonavala

May 30, 2021

Theme: Green Technology

Chief Patron

Hon Prof. M. N. Navale, Founder President, STE Society, Pune
Hon Dr. (Mrs) S. M. Navale, Founder Secretary, STE Society, Pune
Hon Ms. Rachana Navale Ashtekar, Vice-President (Admin), STE Society, Pune
Hon Rohit M. Navale, Vice President (HR), STE Society, Pune

Organizing Chair

Dr. M.S. Gaikwad Director, STES Campus, Lonavala
Principal, Sinhgad Institute of Technology, Lonavala
Dr. D.D. Chaudhary, Vice-Principal & HOD, Dept. of E&TC, SIT, Lonavala, Contact: +91-9372810161

Conveners

Dr. D. S. Mantri, Professor, Dept. of E&TC, SIT, Lonavala Contact: +91-9922431612
Mrs. V. S. Baste, Asst. Prof. Dept. of E&TC, SIT Lonavala Contact: +91 9881431811

Coordinator

Dr. S . B. Gholap, Assoc. Professor, Dept. of E&TC, SIT, Lonavala , Contact: +91-9763461767
Mr. P. R. Dike, Asst Professor, Dept. of E&TC, SIT, Lonavala , Contact: +91-9422014174
Mr. D. K. Shende, Asst Professor, Dept. of E&TC, SIT, Lonavala, Contact: +91- 9011042725

Student Branch Chairs

Ashutosh Mahajan, Chair IEEE SB, Lonavala , Contact:+91- 9858176075
Mansi Dabhade, Chair IETE ISF SB, Lonavala , Contact:+91- 8806329728

Contents

A. Welcome to TECHNICOKNOCKDOWN-2021

B. About Sinhgad Institutes and SIT

C. Mission & Vision

D. Messages from Different Dignitaries

E. Organising committee

F. List of Reviewers

G. TKD-21 Schedule

H. List of Authors

I. Track wise presented Papers

J. Photo Gallery

Welcome to

TECHNICOKNOCKDOWN-2021

It is our great pleasure to welcome you all for the online "TECHNICOKNOCKDOWN-2021 (TKD-21)" National Level Students Conference for technical paper presentation on May 30, 2021. Due to pandemic situation of COVID 19, reorganizing team of TKD-21 decides to go online. The TKD-21 is organized by Department of Electronics and Telecommunication Engg, Sinhgad Institutes of Technology, Lonavala, Pune, Maharashtra. The conference is technically sponsored by IEEE Bombay Section and IETE, Pune center and supported by IEEE SITSB and IETE, SIT Lonavala. TKD-21 provides an ideal platform for exchange of ideas among researchers, students, and practitioners.

TECHNICOKNOCKDOWN-2021 received research papers from all over India. The programme committee has gone through a rigorous process of review and selection chose, TKD-21 received more than 140 papers out of which 75 regular papers are selected for the oral presentations. The registered and published papers are published in IEEE TKD-21 proceeding with ISBN No. 978-81-992245-3-6.

We hope that you will find this event interesting and thought provoking. TKD-21 will provide you with a valuable opportunity to share ideas with other researchers, students, and practitioners from institutions. We look forward to the contribution towards the event and see you online.

Team
TECHNICOKNOCKDOWN-2021

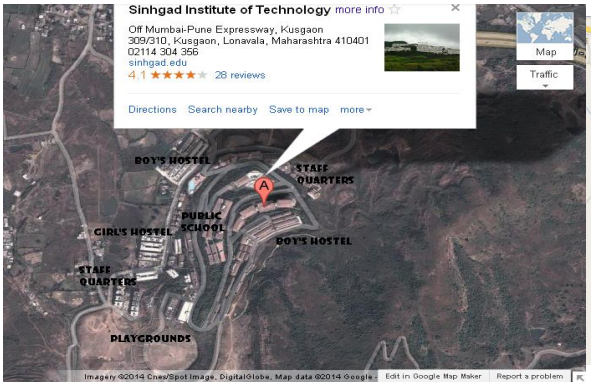
About STES:

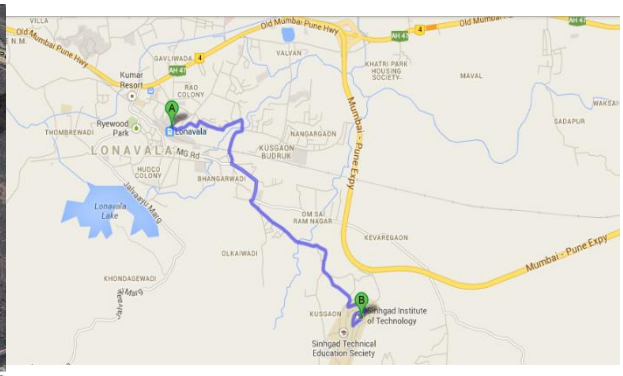
Sinhgad Technical Education Society (STES) was set up in August 1993, under the able and dynamic leadership of Prof. M.N. Navale with an objective of providing quality education in the field of Engineering, Dentistry, Management, Computer, Pharmacy, Architecture, Hotel Management and the basic school education from kinder garden onwards. There are 58 institutes under the aegis of STES offering full-fledged school education, Diploma, Graduation, Post-Graduation courses and Ph.D. programs in various branches of Engineering, Science and Management at five educational campuses ideally located in pollution free lush green and picturesque environment conducive for learning. (www.sinhgad.edu).

About SIT, Lonavala

Sinhgad Institute of Technology (SIT), Lonavala since its establishment in 2004 is involved in practicing teaching-learning methodologies of excellence to deliver quality engineering education for students all over India. The institute is housed in beautiful surroundings, fully residential campus of 200 acres on Pune-Mumbai expressway at Lonavala. Academic discipline with space for individual innovations, emphasis on life skill development of students, 'willing to work' team of faculty members and initiative for Industry interface, have been the silent activity of the college. Institute has following branches;

1. E&TC, Engineering 2. Mechanical Engineering, 3.Electrical Engineering, 4. Computer Engineering and 5.Information Technology





Vision and Mission of the Institute

VISION

उत्तमपुरुषान् उत्तमाभियंतॄन् निर्मातुं कटीबध्दाः वयम्।

We are committed to produce not only good engineers but good human beings, also.

MISSION

We believe in and work for the holistic development of students and teachers. We strive to achieve this by imbibing a unique value system, transparent work culture, excellent academic and physical environment conducive to learning, creativity and technology transfer.

Vision and Mission of the Department

VISION

The department of Electronics & Telecommunication is committed to grow on a path of delivering distinctive high quality education, fostering research, creativity and innovation.

MISSION

- The department of Electronics & Telecommunication in partnership with all stake holders will harness Talent, Potential for application based indigenous product development in future.
- Our Endeavour is to provide conductive environment for life skill development of students while exercising effective Learning Strategies.

Short Term Goals

- To improve the results of UG classes
- To implement activity plan for overall development of students.
- To establish professional bodies/students forum for life skill development and expose students and faculty to latest business environment.
- To initiate relevant value addition programs and certifications for improving employability.
- To develop Laboratories for meaningful implementation of curriculum and then for Research.
- To encourage continuous up gradation of faculty members through higher education and external interface with other universities.

Long Term Goals

- To practice Project Based Learning (PBL) approach for UG program by creating collaborations with national and International institutions of reputation.
- To create opportunities for students to expose to industry environment through value addition programs and Industry projects for practical training.
- To foster research in the field of Electronics and Telecommunication Engineering for the benefit of society.
- IEEE International conference in the area of Wireless communication.

Program Educational Objectives (PEOs)

PEO1 To develop students to achieve high level of technical expertise with Strong theoretical background and sound practical knowledge

PEO2 To inculcate research environment for enhancement of Academia – Industry collaboration through conference

PEO3 To prepare graduates to be sensitive to ethical, societal and Environmental issues while engaging their professional duties, Entrepreneurship and leadership.

PEO4 To enhance ability of students for providing Engineering solution in a global and societal context

PEO5 Pursue higher education for professional development.

Program Specific Outcomes (PSOs)

PSO1 Get solid foundation in design and development of electronics modules useful to society.

PSO2 Able to handle skills based challenges

Department Team — always ready to accept challenge

Principal's Message

Dear Friends,

I am extremely delighted to assert that Sinhgad Institute of Technology (SIT) is hosting a National level student conference "Technicoknockdown-2021" on May 30, 2021 at Sinhgad Technical Education Societies (STES) Campus Lonavala.

The TKD-21 has Theme of "Green Technology", and is very much aligned with the recent technological developments. The information and communication technology has made a profound impact on almost all sphere of life. The impact of these technologies is likely to continue unabated, therefore it is important that educators, scholars and technocrats keep themselves abreast with the latest trend of technologies. I am sure that the gap between the industry and institute will be narrowed by these initiatives enabling mutual benefits and growth I believe that this conference will be an outstanding event for thousands of decision and policy makers , academicians , technocrats and educators.

I congratulate all my participants who have come from various colleges .I assure very delegate attending this event will experience the best academic ambience ,hospitality and state of art infrastructural facilities .I am sure that the time spent by you all at Technicoknockdown-21.

Dr. M. S. Gaikwad
Director STES Lonavala campus &
Principal, SIT, Lonavala

Message from Vice-Principal & HoD EnTC

On behalf of the institution, I am very happy to publish this issue of **TECHNICO KNOCKDOWN 2021** for the academic year 2020-2021. This event is in collaboration with IEEE and IETE student's branch of our Institute. Sinhgad Institute of Technology, Lonavala is established with the aim of providing quality education at par with international standards. In the recent era of engineering technology it is necessary to have overall personality development of the students and this issue may work as a booster for the same.

This very event is the outcome of the student's consistent effort in regular curricular activities. At SIT our goal is to produce a workforce of technocrats and managers who will be globally acceptable for their technological skills, their quality of work and their hard work. We also support to develop their basic philosophy of life to live with honour and dignity. The papers presented here may lead to right path of innovation. I really appreciate the efforts taken by the all the members of organizing committee and the students for exploring the excellent quality of this issue.

Dr. D.D.Chaudhary
Vice-Principal &
HoD of EnTC Deptt.

Convener's Message

Dear All,

It gives me immense pleasure to thanks all the participants and working team contributed in the online National Level Student Conference (online mode) for technical paper presentation, "TECHNICOKNOCKDOWN-2021" on theme "Green Technology" on May 30,2021 The TKD-21 is organized by Department of Electronics and Telecommunication Engg, Sinhgad Institutes of Technology, Lonavala, Pune, Maharashtra. The conference is technically sponsored by IEEE Bombay Section and IETE, Pune center, supported by IEEE SITSB & IETE, SIT Lonavala. The organizing committee of the TECHNICOKNOCKDOWN-2021 is quite unanimous in their determination to make the mega event highly successful in terms of its benefits to the professional and academic. Department of E&TC, SIT Lonavala always aims to provide the platform for "Willing to Work" professionals and researchers.

The proceeding of "TECHNICOKNOCKDOWN-2021" has papers being presented in the event grouped broadly under eight tracks, namely

1. Internet of Things (IoT)
2. Artificial Intelligence and Machine Learning
3. Cyber Security
4. Communication Network
5. Media and Signal Processing
6. Green ICT
7. Advanced Smart Grids and Power Systems
8. Robotics and Automation

The main aim of this event is to provide a real time experience to all the authors in the field of technical area and improve the writing and presentation skills to boost the confidence. TKD-21 receives 140 papers out to that only 62 were selected for the oral presentation

This is possible only through the exchange of ideas, understanding & good team work amongst the students. I am quite pleased to mention that this event is successful in true spirit. This is only because of hard work, cooperation and dedication of all the coordinators as well as the participants, reviewers and faculties of the department. At the last, but not the least I am thankful to Management of STES, Pune and Dr M. S. Gaikwad, Director, Principle, SIT Lonavala & Organizing chairman TKD-21 for unstinting support to work as the convener of this event.

Dr. Dnyaneshwar S. Mantri
Convener TKD-21

Co-ordinators Message

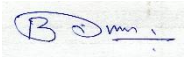
Dear friends,

On behalf of the organizing committee, I warmly welcome your participation in the National Level Students Conference TECHNlCOKNOCKDOWN-21, May 30, 2021. The main focus of this conference is to explore ideas and knowledge of under graduate and post graduate students in the field of Emerging Technologies. This conference has given an opportunity for presenting the very best research results, problem solutions, and insight on new challenges facing the field of emerging technologies. In future connect, in addition to the technical and social program at TKD21, you can also take your time to explore Pearl of Orient and discover its character, charm, and dynamism. I sincerely hope you are enjoyed TKD21 conference excellence, and make this event an unforgettable experience of yours!

Dr. Shard. B. Gholap
Coordinator TKD-21

Co-ordinator's Determination

It gives me immense pleasure that Department of Electronics and Telecommunication Engineering, Sinhgad Institute of Technology, Lonavala has taken up a great challenge of addressing the multidisciplinary aspect of learning and research through A National Level Student Conference IEEE TECHNICOKNOCKDOWN-2021 (TKD-21), technically sponsored by IEEE Bombay section and IETE,Pune Center, supported by IEEE SITSB and IETE, SIT Lonavala. The theme of the conference is not only challenging but also relevant to the present scenario in many disciplines as is evident from the range of papers which have been contributed by the students, research scholars and academicians. I hope that this volume which has been brought out by our team will be of great academic value for scholars and common readers.



Mr.Prashant Dike
Co-ordinator TKD-21

Faculty Advisor IEEE Student's Chapter

It gives me immense pleasure to present proceedings of the "IEEE TECHNICOKNOCKDOWN-2021 (TKD-21)" National level student conference on Green Technology, Technically Sponsored by IEEE Bombay section and IETE ,Pune Center supported by IEEE SITSB and IETE, SIT Lonavala on May 30, 2021, organized by Dept of E&TC, Sinhgad Institute of Technology, Lonavala.

IEEE opens the door to opportunities that will help you develop your professional identity in IEEE's designated fields of interest: sciences, technology, engineering, and mathematics. I congratulate all participants for their contribution and valuable research in different tracks of IEEE TKD-21. I am enlightened to note that students of IEEE SIT student's chapter and IETE student chapter under the guidance of faculty members have taken this massive task as a challenge and I am confident that they will meet to the expectations of participants.

We are infinitely indebted to all the esteemed members of the Advisory Committees, reviewer team, for their invaluable advice and guidance in conception and organization of the conference. I gratefully acknowledge the full support and cooperation I received from all the organizing members along with our student coordinators, without their cooperation and help, this dream could not have been realized at all.

I am thankful to Dr. M. S. Gaikwad, Organizing chairman & Principal, Dr. D.D. Chaudhary, Vice-Principal, & HOD, Dept. of E&TC, Dr. D. S. Mantri, Convener for Full support to work as the convener of this event.

With Most Respectful Regards

Mrs.Vaishali Baste.
Brach Counsellor, IEEE SITSB, Lonavala

Faculty Advisor IETE Student's Chapter

Dear All,

It gives me an immense pleasure to welcome you all at a National level TPP "TECHNICOKNOCKDOWN-2021" organised by Dept. of E&TC SIT Lonavala. The event has brought to its success by both IETE & IEEE students chapter. The objective of IETE student's chapter is to segregate the technical knowledge and ideas to give a platform to students, researchers & developers through "TECHNICOKNOCKDOWN-2021".

I am very much Thankful to all staff & student co-ordinators for their kind support throughout the event. At last but not least I am very much thankful to all the participants and wish you all the best for future

Prof. D. K.Shende
Faculty In-charge IETE

Message from, IEEE Bombay Section

The role of science and technology for human health and welfare has not been so visible and sought after ever before than during the past year or so, due to the unprecedented situation through which the whole world is going through. While many existing technologies could be quickly adapted to deliver new applications for fighting the virus, some novel technologies have emerged and deployed on phenomenal time scales. Some of the examples in this regard are the computerised tomography, novel and low power sensors for digital pathology, robotics, IoT and so on. AI/ML/DL based image processing systems are able to successfully replace the expert radiologists in patient monitoring. Much of the healthcare system has gone digital to alleviate some of the strain imposed by the coronavirus. Telemedicine and remote diagnostics are helping patients to get medical advice and diagnoses at home. It is not uncommon from the history that rapid progress in science and technology was made during periods of acute human suffering – be it is during wars or pandemics. Even though it may sound bizarre, this is also an unusual opportunity for the students to work on these technologies and produce useful products and applications for the society. In this context, it is heartening to know that the IEEE Student Branch of the Sinhgad Institute of Technology (SIT), Lonavala, in association with IETE is organising a Student National Conference on May 30, 2021. I am really glad to note that most of tracks of the Conference are very relevant to the current situation that I described above. I wish to congratulate the Organisers and the Conference a grand success.

Dr. B. Satyanarayana,
Chairperson,
IEEE Bombay Section

Message from, IETE Pune Center

Greetings!

On behalf of Institute of Electronics & Telecommunication Engineers (IETE) and IETE, Pune Centre, I welcome participants and dignitaries for National Level Students' Conference: TECHNICOKNOCKDOWN-21, organized by Sinhgad Institute of Technology, Lonavala. The conference gives opportunity for budding researchers to exhibit their talent and innovation in the areas of IoT, Cyber Security, Automation, AI and other related domains. The conference provides the platform for students to have dialogue with eminent academicians and researchers which facilitates conversion of research into innovation and products.

The IETE is India's leading recognized professional society devoted to the advancement of Science & Technology of Electronics, Telecommunication and IT. IETE is founded in 1953. Now IETE has more than 125000 members which include corporates, students and ISF members .IETE Pune Centre is one of the largest center in Western India .It has 46 ISFs and 10 organizational members.

Considering the need of Industry 4.0 and Industry 5.0 revolutions, IETE Pune Centre has been organizing workshop, conferences, FDPs and competitions in domains including Machine Learning, Solar, E Mobility, and Smart Sensors.

All of us know, we have been passing through very critical phase of COVID 19, pandemic. The digital transformation involving ICT finds application in identifying, tracing, understanding, managing, treating and perceiving the pandemics. The IETE has been actively involved in creating awareness about use of digital technology to accept the challenges of COVID 19.

The IETE members and ISFs have been trying hard to give solutions using the technology. Our Senior fellow member Capt (Retd) Rustom K. Bharucha has successfully developed Ventilator which was appreciated by medical fraternity . Our ISF students have successfully developed AI based system to assist migrant workers. The system grabbed second prize in Hackathon organized by IBM and NASCOM among 45000 + participants consisting of start-ups, working professionals and students.

I am very sure that TECHNICOKNOCKDOWN-21 will definitely result in effective outcomes which will give us great strength to pursue the digital transformation to accept the challenges of present scenario.

Once again I congratulate and extend my best wishes to organizers and Sinhgad Institute of Technology, Lonavale on taking the initiative for organization of National Students' Conference.

Dr.R.D.Kharadkar
Chairman, IETE, Pune Centre

SAC Chair, IEEE Bombay Section,

Dr. Sarika Chouhan

Dr. Sarika Chouhan is a Senior Member of IEEE. She is currently an Executive Committee member and Chairperson of Student Activities Committee at IEEE Bombay Section.

Dr. Sarika Chouhan is a Chief Academic Officer at Vidyalankar School of Information Technology in Mumbai. She is Ph.D in Computer Science, M.Phil in Computer Science, Masters in Computer Applications, and Masters of Science in Computer Science. She has nearly two decades of experience in teaching and specializes in computer programming and web technology. She is also greatly interested in the transformation of teaching-learning processes and implementation of suitable pedagogical strategies. She has published many research papers related to latest IT technologies, and digitization in education at various national and international level conferences and journals for which she has also received best paper awards. She has also guided several students at doctoral, master's and undergraduate level.

Dr. Sarika Chouhan is a core team member of AICTE approved Faculty Development Program on Digital Transformation in Teaching-Learning Process offered by NPTEL Swayam platform by IIT-Bombay. She also serves as the Branch Counselor of IEEE-VSIT Student Branch; Advisor of WIE Affinity Group, IEEE-VSIT Student Branch; Coordinator, Center of Excellence (ATS); and Owner, IQAC Criteria VI at VSIT. She is also associated with renowned organizations such as CII and BCCI. Previously, she has served as the Chairperson of Vigilance Squad Zone-E for University of Mumbai. She has been a resource person, Chief Guest, guest of honor, and a judge at several national and international events. She has been a paper reviewer for 'IEEE BSSC 2019' and 'International Multidisciplinary Conference VCMT 2019'. She was a judge at Bangladesh Section's 'Idea Contest to Mitigate Post-COVID Impact in Low and Middle-Income Countries'.

Dr. Sarika Chouhan
SAC Chair, IEEE Bombay Section

Keynote Speaker1 Details

Dr. B. Satyanarayana
Chair, IEEE Bombay Section

Dr. B. Satyanarayana did his B. Tech in Electronics and Communication Engineering from J.N.T. University, Hyderabad and Ph.D. in Physics from IIT Bombay. He is working in the Department of High Energy Physics, TIFR since 1983 – and is currently a Scientific Officer (H) and Coordinator of INO Project. He is also a Visiting Professor at the Applied Science Department of the American College, Madurai. His areas of interest include 'Detectors and Instrumentation for high energy and nuclear physics experiments'. Dr. Satyanarayana has published about 250 research papers and proceedings in national and international journals and conferences, besides scores of invited talks. His very first paper won the best paper award by Institution of Electronics and Telecommunication Engineers (IETE). Recently he was honoured with Homi Bhabha Award in Science Education (HBASE-2020) and has been selected as AICTE-INAE Distinguished Visiting Professor at the Symbiosis Institute of Technology, Pune.

Dr. Satyanarayana is a Fellow of Institution of Electronics and Telecommunication Engineers (IETE) as well as Institute of Engineers (IE). He is a Life member of the Instrument Society of India (ISOI) as well as a Member of Indian Physics Association (IPA). He guided a large number of doctoral, master and undergraduate students. He served on many of doctoral and expert committees as well as academic councils, boards of studies and advisory boards on colleges, universities and many national organisations of eminence. He is on the editorial and refereeing teams of several prestigious science and engineering journals.

Dr. Satyanarayana is a Senior Member of IEEE. He is currently an Executive Committee member and Chair of the IEEE Bombay Section. He previously served as the Vice Chair, Secretary, Chair of Technical and Professional Activities Committee of the Section as well as the Chair of its Signal Processing Society. He also served as an Executive Committee member as well as Vice Chair (Technical Activities) of the IEEE India Council. He won IEEE Bombay Section's Outstanding Volunteer Award for 2014 and IEEE Head Quarter's MGA Achievement Award for 2016.

Keynote Speaker2 Details

Mr. Chinmay Pathak is graduated in Mechanical Engineering from MIT, Pune in 2016 and received Masters from BITS, Pilani in 2019. He has working experience of 4.5 years. From 2016 he has been working in Automobile Design with various automobile giants.
During his graduation years, he was also involved in Product design working alongside John Deere Technologies and Mahindra& Mahindra as Intern.
Since 2016 he was associated with Body design team for Force Motors Ltd., Pune and there he worked as a Design engineer to Kick start his career. He was part of many exciting projects there.
Due to extensive need of an upgrade in vast field such as Design, he has also completed his Masters from BITS, Pilani in Design engineering.
After 2019 he is now associated with Tata Technologies Ltd., Pune with their extensive Door Design team. He is working as a Senior Design lead here to execute Electric and Hybrid vehicle design.
He has also been keen to share his knowledge with young Aspirants and been part of various other National conferences with BITS Goa, IIT Bombay, MIT Pune.

Details of Session Chairs

Dr. Nandkumar P. Kulkarni received Bachelor of Engineering (B.E.) degree from Walchand College of Engineering, Sangli, Maharashtra, (India) in 1996. He has been with Electronica, Pune from 1996 -2000. He worked on retrofits, CNC machines and was also responsible for PLC programming. In 2000, he received the Diploma in Advanced Computing (C-DAC) degree from MET's IIT, Mumbai. In 2002, He became Microsoft Certified Solution Developer (MCSD). He worked as a software developer and system analyst in CITIL, Pune and INTREX India, Mumbai respectively. He has 23 years of experience both in industry and academia. From 2002 onwards he is working as a faculty in Savitribai Phule Pune University, Pune. Since 2007, he is working with SKNCOE, Pune as a faculty in IT Department. He completed a Master of Technology (M. Tech) degree with computer specialization from COEP, Pune (India) in 2007 and Ph.D. from Aarhus University, Denmark in 2019. His area of research is in WSN, VANET, and Cloud Computing. He has published papers in 18 International Journals, 15 International IEEE conferences, 03 National Conferences

Mr. Pramod B. Deshmukh has completed B.E. (IT) from Shivaji University, Kolhapur in the year 2010, M.Tech.(CSE) from Jawaharlal Nehru Technological University, Hyderabad in the year 2014 and Pursuing Ph.D.(CSE) in the field of Image Processing and Deep Learning from VIT, Bhopal University from 2018. Currently working as Asst. Professor at D.Y. Patil College of Engineering, Akurdi, Pune.
He has 10.10 years of teaching experience and has published 36research papers out of which 07 IEEE, 06 International Conferences, 07 National Conferences, 14 International Journals and 2 National Journals. His research interest includes Artificial Intelligence and Deep learning.
He was awarded Krushi Mauli Award in 2020 for Innovation in Agriculture field by Shree Swami Samarth Krushi Vikas & Sanshodhan Charitable Trust, Dindori, Nashik. He was also awarded Academic Excellence Award in 2020 for excellence in teaching by Dr. D. Y. Patil Prathishthan, Akurdi, Pune. He was awarded Iconic Faculty Award in 2019 for Innovative Practices Adopted. He was also awarded as Teacher Innovation Award in 2019 for Zero Investment Innovations for Education Initiatives by The Ministry of Human Resource Development, Delhi.He is also Lifetime Member & Member of various 11 Professional Organizations like ISTE Delhi, IAENG HongKong, InSc Chennai,UACEE, SDIWC, ISRD, ISOC, CSTA, INSTICC, ISPCE, ASCAP.

Dr. Sarita D. Deshpande is graduated in Electronics Engineering from Basweshwar college of Engineering, Latur, MH and post graduated in Electronics Engineering from Government college of Engineering Aurangabad, MH. She has awarded PhD in Electronics Engineering from Dr. Babasaheb Ambedkar Marathwada University, Aurangabad,(MAH). She is Life time Member of ISTE and also a member of IEEE and CSI.

She has teaching experience of more than 26 years. Currently working as an Assistant Professor and HOD of Information Technology at PES's Modern college of Engineering, Pune since 2007. She also worked as Lecturer in Shree Tuljabhavani college of Engineering, Tuljapur (1996-2007). She has published 9 Journal papers in indexed and reputed Journals (Springer, Scopus indexed and UGC care journals) also presented papers in conferences. She has attended various FDP's, workshops and seminars at different levels. She served her duty as a reviewer of 3rd IEEE international conference on Emerging smart computing and Informatics (2021) organized by AISSMS (IOIT), Pune. She worked on various committees at University and College level. Her research area of interests are in Pattern Recognition, Forensic Imaging, Communication and Network, Machine Learning, Computer Vision**.**

Dr. Ramesh Sahadu Pawase is graduated in Electronics Engineering from Amrutvahini College of Engineering, Sangamner (MS) India in 2004 and completed M.Tech in E&TC from Dr. Babasaheb Ambedkar Technological University, Lonere in 2009. He is awarded with Doctor of Philosophy from Savitribai Phule Pune University in 2019. He was involved in funded research project and Doctor of Philosophy work in the area of Application Specific Integrated Circuit development for MEMS Sensors. He is actively contributing in the field of Engineering Education and Research with teaching experience of 16 years at Amrutvahini College of Engineering, Sangamner, Permanently affiliated, NAAC 'A' grade and three times accredited institute.

He published and presented more than 32 papers in SCI and Scopus indexed, reputed International journals and IEEE International conferences. He is reviewer of International Journals and contributed as TPC member for International Conferences. He is awarded with 'Engineering Achievement Award' by Institution of Engineers, India (IEI), Ahmednagar Centre on Engineer's Day 2020. He is active member of professional bodies like IEI, ISTE, IAENG, and IACSIT. He had worked for five years as National Social Scheme-University Section level Coordinator and Institute-Program Officer and actively coordinated Social activities.

Dr. Milind B. Tadwalkar has been graduated and Post graduated in Electronics Engineering from from Shivaji University, Kolhapur. He has awarded Ph.D. Degree in Electronics & Communication Engineering from Maharshi University of Information Technology, Lukhnow in July 2019. He has total teaching experience of 35 years. From 1986 to 2005 he was working as a lecturer in Electronics Engineering in STB College of Engg. Tuljapur (MS) India].

From 2005 he is associated with JSPM's Jayawantrao Sawant College of Engineering, Pune and presently working as Professor and NBA Coordinator in Department of Electronics and Telecommunication Engineering. He is Life Member of ISTE. He has published more than 8 papers in indexed and reputed Journals (IEEE etc.) and IEEE conferences. He is reviewer of international journals (IEEE Transaction, Communication society etc.) and conferences organized by IEEE. He worked on various committees at University and College. His research interests are in Phishing Attacks in Wireless Networks and their Remedies , Wireless Sensor Networks, Wireless and Mobile Communications and Computer Networks.

Dr. Gayatri M. Phade, Head of E&TC Department, Mentor SANDIP TBI, IEDC Cell, coordinator for Academic Research Cell SPPU, BARC AKRUTI program, Chair IEEE WIE, Branch canceller IEEE SB. President MHRD IIC, Member of Women subcommittee MACCIA, Nashik, President Institute Alumni Association, Head Women empowerment cell. I am approved guide of SPPU, Pune.

Established Women Empowerment Cell with objective empowering the women through entrepreneurship. Spreading the awareness of women hygiene through design and development of "Sanitary Napkin Vending Machine and Incinerator" for girls, Motivation through central Govt. circular No. D.O. No. 4-160(10)/2013-NCW dated on 03/09/2014. We developed five models of vending machine right from mechanically operated, push button

operated, coin based, and cashless, biometric operated, dual mode. Being Entrapreneur, motivate student to work on projects to support Atmanirbhar Bharat, Digital India, and Startup India mission of Govt. of India. I have Started Women in Engineering IEEE student chapter in the capacity of Chairman which causes all students to share international technical platform, March 2017. My exclusive interview broadcasted on community radio, 'Radio Vishwas' on Women Empowerment which was beneficiary for Women willing to grow. . I am proactively contributing in Nonprofit Techno Social, 'Maharashta Chamber of Commerce for Industry and Agriculture MACCIA, NAshik', Women wing, which emphasizes on works for Society Empowerment and entrepreneurship. Social awareness programs like World Toilet Day celebration, Women's day, Blessed to Bleed, 'Police Sakhi', 'Mazi Me'. Working for social causes in association with MACCIA and "Natarajan Education Society".

Worked on International project "Defending Biodiversity and Promoting Sustainable Agriculture in Jalgaon District (India) Integrating New Methodologies and Advanced Technologies Hotspot Geo-informatics, Remote Sensing, Geographical Information Systems, Global Positioning Systems and Smart Ground Sensors", developed for Milan City Council by JalaSRI Watershed Surveillance and Research Institute, Jalgaon (Maharashtra, India). I had developed a project Smart Flexible Pavement deflectometer, for National Highways.

- She have guided 45 UG and 22 PG scholars for dissertation. Head of the department for UG, PG and PhD program. Scientific collaboration with 10 industries for research and Development, some of those are Nashik based companies like, ESDS, Reliance Electronics, Rishabh Instrumentation, Sivanad Electronics, Crompton Greeves, TAACT, Technocrat etc.
- Fetched the consultancy of Rs 17.08 Lakh and grants of Rs 25.80 Lakh
- Published 39 papers in international journals, 18 in international conference, 9 in National conferences, 3 book chapters and 6 patents

Advisory Body and Organizing Committee

Advisory Committee

Dr. Satyanarayana Bheesette, Chair, IEEE Bombay Section
Prof. Kiran Talele, Treasurer, IEEE Bombay Section
Dr. Sarika Chouhan, Member,Chair SAC, IEEE BS
Dr. R. D. Kharadkar, Chairman IETE, Pune Center
Dr. V. V. Shete, Secretary, IETE, Pune Section
Mr. S. M. Gaikwad HOD. Mech Dept., SIT, Lonavala
Dr. S. D. Babar HOD, Comp. Dept., SIT, Lonavala
Dr. A. A. Kalage HOD, Elect. Dept., SIT, Lonavala
Dr. P. S. Patil HOD, FE Dept., SIT, Lonavala
Mr. R.S. Badodekar, HOD, IT Dept., SIT, Lonavala

Organizing Chairman

Dr. M.S. Gaikwad, Director, STES Campus, Lonavala
Principal, Sinhgad Institute of Technology, Lonavala
Dr. D.D. Chaudhary, Vice-Principal & HOD, Dept. of E&TC, SIT, Lonavala

Convener

Dr. D. S. Mantri, Professor, Dept. of E&TC, SIT, Lonavala
Mrs. V. S. Baste, Asst. Prof., Dept. of E&TC, SIT, Lonavala

Co-ordinator

Dr. S. B. Gholap, Assoc.Prof., Dept. of E&TC, SIT, Lonavala
Mr. P. R. Dike, Asst. Prof., Dept. of E&TC, SIT, Lonavala
Mrs. D. K. Shende, Asst. Prof., Dept. of E&TC, SIT, Lonavala

Session Coordinator

Mr. A. A. Labade, Asst. Prof., Dept. of E&TC, SIT, Lonavala
Mr. M. K. Bhosale, Asst. Prof., Dept. of E&TC, SIT, Lonavala
Mr. M.S. Jadhav, Asst. Prof., Dept. of E&TC, SIT, Lonavala

Publication (Editorial) Committee

Mr. V. M. Chavan, Asst. Prof., Dept. of E&TC, SIT, Lonavala
Mr. S. D. Shinde, Asst. Prof., Dept. of E&TC, SIT, Lonavala
Mr. Ashutosh Mahajan, Student Chairman, IEEE SITSB

Technical Support

Mr. V.D. Raskar, Dept. of E&TC, SIT, Lonavala
Mrs. A.R. Jadhav, Dept. of E&TC, SIT,Lonavala

Organizing committee

Ms. S.S. Patil
Dr. R.V. Babar
Mrs. P.A. Kambale
Ms. V.G. Rajeshwarkar
Mrs. S.K. More
Mr. S.A. Bhad
Mrs. D.N. Duche
Mr. D.B. Patil
Mr. P.C. Latane
Mr. M.S. Raut
Mrs. P.S. Mhetre
Ms. Mansi Dabhade
Mohit Sonl
Dhavani Patel
Omkar Kokamwar
Suraj Devda
Animesh Kumar
Priti Singh
Mohit Soni
Vhatkar Aisshwarya
Mr. Ashutosh Mahajan
Mr. Shavank Pardeshi

List of Reviewers

1. Dr. Shubhangi B. Patil. JJ Magdum COE, Ichalkaranji
2. Dr. Prasad E. Lokhande, SIT, Lonavala
3. Mrs. Shubhangi R Patil. SIT, Lonavala
4. Mrs. Vaishali S.Baste, SIT, Lonavala
5. Mr. Harshad Lokhande, NBNSCOE,Pune
6. Ms. Manisha Galphade, SIT, Lonavala
7. Ms. Vaishali Nitin Dhawas, SIT, Lonavala
8. Ms. Rupali Subhash Shishupal, SIT, Lonavala
9. Mr. Pramod B. Deshmukh, DYP Akurdi ,Pune
10. Dr. Rekha P. Labade, Amrutvahini COE, Sangamner
11. Dr. Jyoti Gangane
12. Dr. Sharad Gholap, SIT, Lonavala
13. Prof. Nanda Kulkarni
14. Dr. Milind Tadwalkar, JSCOE, Pune
15. Prof. Diba Aafreen Ansari, , PREC, Loni
16. Prof. Rajendra Bajirao Nimbalkar
17. Dr. Ramesh S.Pawase, Amrutvahini COE, Sangamner
18. Prof. A.H. Ansari, PREC, Loni
19. Dr. Anita K.Patil
20. Dr. Shyam M. Kulkarni,
21. Prof. Nitin Bhopale
22. Mr. Prashant Dike, SIT,Lonavala
23. Prof. Pramod S. Aswale
24. Mrs. Bhuvanehwari Jolad, DYP Pimpari
25. Prof. Rajendra Gharase , NBNSCOE Solapur
26. Prof. Anil Kotmale , NBNSCE Solapur
27. Prof. Manoj K. Bhosale, SIT Lonavala
28. Prof. Shashikant Hippargi, NBNSCOE Solapur
29. Dr. Giridhar Jain, Solapur
30. Dr. Ravindra .N.Duche, LTE, Mumbai
31. Prof. Nilesh Lakade, K.J.Somaiya Mumbai
32. Prof. Vinay Jokare, NBNSCOE Solapur
33. Dr. Dnyaneshwar.S. Mantri, SIT,Lonavala
34. Dr. Sachin D. Babar, SIT, Lonavala
35. Mr. Manoj S Jadhav, SIT, Lonavala

Sinhgad Technical Education Society's

SINHGAD INSTITUTE OF TECHNOLOGY, LONAVALA

Department of Electronics and Telecommunication Engineering

National level Student Conference IEEE TECHNICOKNOCKDOWN-2021 (TKD-21)

Technically Sponsored by IEEE Bombay section and IETE, Pune center supported by IEEE SITSB and IETE-SF Lonavala

Schedule - Session I,II and III

Sunday, May 30. 2021

Inauguration : 09.30 am to 09-45 am:	https://teams.microsoft.com/l/meetup-join/19%3ameeting_OGFmZWE1ZDctNDI1Yi00NjJhLTlkMmMtN2JhMzYyMmI2YmM4%40thread.v2/0?context=%7b%22Tid%22%3a%2222796e7e-c327-42e9-bef4-6f0d422b5fde%22%2c%22Oid%22%3a%22a5a0388e-b223-4364-aaab-68b6e340de90%22%7d
Keynote Speaker1: 9.45 am to 10.20 am	Dr. B Satyanarayana, Chair, IEEE Bombay Section, "Need and role of digital transformation in challenging times"

Artificial Intelligence and Machine Learning — Session-I

Session-I Link: https://teams.microsoft.com/l/meetup-join/19%3a27f3afb908e14048acb0415d485fbfe0%40thread.tacv2/1622101711286?context=%7b%22Tid%22%3a%2222796e7e-c327-42e9-bef4-6f0d422b5fde%22%2c%22Oid%22%3a%22679279f8-07d4-4ff4-88cb-ce5a3211c13f%22%7d

SN	Time	Paper ID	Title of Paper	Author Name	Coordinator/Chair
1	10.30 am to 1.00 pm	AI&ML-02	Disease Assistance and Face - Mask Detection and Social - Distancing Mode	Harsh Agrawal	https://tinyurl.com/2x7z5m5m
2		AI&ML-03	Deep Artificial Neural Network-based Clear Audio	Selin Saral Ponraj	
3		AI&ML-06	Fake News Detection using Natural Language Processing and Deep Learning.	A. M. Shinde	
4		AI&ML-07	Recommendation System for Twitter using Sentiment Analysis	Priyanka Vhatkar	
5		AI&ML-09	Wireless Industrial Security Intelligent Robot	Meghna Sinha	Student Coordinator
6		AI&ML-10	Automatic Sanitization System for Transportation and Auditorium	Dr,Sharad Gholap	Omkar Kokamwar 9130852406
7		AI&ML-11	Implementation of reliable crop insurance system for timely settlement of claims to farmer using AI.	Deokar Prajakta Y.	Session Coordinator
8		AI&ML-12	Ozone level Prediction Using Machine Learning	Frason Francis	Mrs. Vashali S. Baste
9		AI&ML-13	Laundry Aggregator System	Sachin Singh	Session Chair
10		AI&ML-14	Intelligent Sanitization Robot	Vaishali Baste	Mr. Pramod B. Deshmukh

Artificial Intelligence, Media and Signal Processing — Session-II

Session-II Link: https://teams.microsoft.com/l/meetup-join/19%3a4d44efda7ced494b83144f590c21362e%40thread.tacv2/1622109072895?context=%7b%22Tid%22%3a%2222796e7e-c327-42e9-bef4-6f0d422b5fde%22%2c%22Oid%22%3a%220675b9dc-fc56-4c64-bc3d-1c69d86059cc%22%7d

SN	Time	Paper ID	Title of Paper	Author Name	Coordinator/Chair
1	10.30 am to 1.00 pm	AI&ML-15	Chest Disease Detection Using Deep Learning	Rachel Calvin	https://tinyurl.com/2n2kufry
2		AI&ML-16	Direct speech to speech translation	Nikhil Sanjeev Nakod	
3		AI&ML-18	Intelligent Framework for Sentiment Analysis of Movie Reviews using Deep Learning Approaches	Eshwari Kulkarni	
4		AI&ML-21	Automatic Face Mask Detection System Based on Machine Learning	Adhangale Purva Pandit	Student Coordinator
			Media and Signal Processing		Mohit Soni 8562038387
5		MSP-03	Android controlled e notice board by using bluetooth technology	Davange Priti Subhash	Session Coordinator
6		MSP-07	Smart Student-Alumni Interaction System	Jaswantsing Vijaysing Patil	Dr. Prasad E Lokhande
7		MSP-08	Tele-health Application for Primary Medication using Flutter	Prof. S. T. Shirkande	Session Chair
8		MSP-09	Gesture Controlled WheelBox	Sourabh Dilip Ghatage	Dr. Ramesh S. Pawase

Communication Networks and Cyber Security and GICT — Session-III

Session-III Link: https://teams.microsoft.com/l/meetup-join/19%3ameeting_Y2M2NTcyZGEtZWRmNC00ZGRjLTlhOWQtM2FiODFkNjAwNzQ0%40thread.v2/0?context=%7b%22Tid%22%3a%2222796e7e-c327-42e9-bef4-6f0d422b5fde%22%2c%22Oid%22%3a%221e0dc61c-6951-4670-b6ec-267e773a241a%22%7d

SN	Time	Paper ID	Title of Paper	Author Name	Coordinator/Chair
1	10.30 am to 1.00 pm	CN-02	Design paper on Energy Efficient Routing Protocol for Underwater Wireless Sensor Network	Ashwini B. Gavali	https://tinyurl.com/nb8sh846
2		CN-03	Real Time Hospital Bed Tracking System	Saurabh Mishra	
3		CN-07	The job of lexical analyser in the periods of compiler plan	Mrs.Vidya Mahesh Shinde	
4		CN-08	Atmanirbhar Mahila ~Saheli Ehaat	Sanjanaa Pawar	
			Cyber Security		
5		CS-01	Cyber Security threats and measures in context with IOT	Shradha Vishnnu Pore	
6		CS-07	WEB ATTACK DETECTION AND PREVENTION IN E-COMMERCE WEBSITES	Shivangi Chamoli	
7		CS-08	Effect of added Contaminants in Lubricants by Using Wear Debris and Vibration Analysis Technique	Vikram Yendhe	Student Coordinator
8		CS-09	Secure Information Transmission Using Steganography And Cryptography	Lokesh Chatur	Animesh Kumar 8709065235
			Green ICT		Session Coordinator
9		GICT-02	Introduction To Blockchain Based E-Waste Management System	Adarsh Vernekar	Mr. Anand A. Labade
10		GICT-03	Design Simulation and Analysis of Dynamic Wireless Charging Methodology for Electric Vehicles	Sania Walunjkar	Session Chair
11		GICT-06	Forest Cover Change Detection using Satellite Images	Achal Kalwar	Dr. Milind. B. Tadwalkar

Lunch Break 1.00 pm to 1.45 pm

Keynote Session Link	https://teams.microsoft.com/l/meetup-join/19%3ameeting_MDU0YjFiNTItMzk1Yy00ZTUzLWFhYzItNzFhOTgxMjg2YmQ3%40thread.v2/0?context=%7b%22Tid%22%3a%2222796e7e-c327-42e9-bef4-6f0d422b5fde%22%2c%22Oid%22%3a%22a5a0388e-b223-4364-aaab-68b6e340de90%22%7d

Keynote Speaker 01.45 pm to 2.30 pm	Mr. Chinmay Pathak, Tata Technologies Pune , " Electric Vehicles and Future Mobility"

Internet of Things — Session-IV

Session-IV Link: https://teams.microsoft.com/l/meetup-join/19%3ameeting_MzBjZTVlNWQtOTdjYS00ZjkwLWFkM2MtMDhkOTA1N2EyMWIx%40thread.v2/0?context=%7b%22Tid%22%3a%2222796e7e-c327-42e9-bef4-6f0d422b5fde%22%2c%22Oid%22%3a%222c98da8d-963b-4296-bab7-d7b0edb56a41%22%7d

SN	Time	Paper ID	Title of Paper	Author Name	Coordinator/Chair
1	02.30 pm to 5.00 pm	IOT-09	IoT based Thief Detection and Surveillance System using Raspberry Pi	Shrutika Sorte	https://rb.gy/lxat6b
2		IOT-10	Detection and Location of Power Theft using IoT	Atharv Parsekar	
3		IOT-12	Health Kiosk System	Divya Jayant Bhamre	
4		IOT-13	Comatose Patients Monitoring System	Prof. V. S. Baste	
5		IOT-14	A SMART PRIORITIZED AMBULANCE SERVICE WITH INTELLIGENT TRAFFIC CONTROL SYSTEM	Tanya Uttam Singh	
6		IOT-15	Industrial vending Machine	Tanuja K.Rane.	Student Coordinator
7		IOT-16	Entrance Management using IoT	Shardul Tiurwadkar	Lochan Sawant 9890977925
8		IOT-17	Speed Control and Parameter Monitoring of Solar Powered Bldc Using PWM Technique.	Anagha Kharate	Session Coordinator
9		IOT-18	Smart Water Management Using IOT	Rutvik Prakash Desai	Mrs. Dipali K Shende
10		IOT-19	Fire-Extinguisher Fire Fighting Drone	Rushikesh Burute	Session Chair
11		IOT-20	IOT Based SmartyChef-Automated Electro- Meachanical Chef	Prof Dipali K. Shende	Dr. Sarita D. Deshpande

Internet of Things and Advanced Smart Grids — Session-V

Session-V Link: https://teams.microsoft.com/l/meetup-join/19%3ameeting_ZWM4ZWI3NTgtOTgzMy00YTZkLTgyMTctMzZiOWYwYmEyYmZk%40thread.v2/0?context=%7b%22Tid%22%3a%2222796e7e-c327-42e9-bef4-6f0d422b5fde%22%2c%22Oid%22%3a%2287a97f3b-e9c4-476b-a882-963e2407cc55%22%7d

SN	Time	Paper ID	Title of Paper	Author Name	Coordinator/Chair
1	02.30 pm to 5.00 pm	IOT-23	Importance of IoT on Agriculture	Sayali Sahebrao Mhaisdhune	https://tinyurl.com/ttzr7z2j
2		IOT-24	Assessment of "Covid-19" Impact in Infrastructure on Construction Growth in Nashik City	Komal Dipak Bargat	
3		IOT-29	IOT Warehouse Monitoring System	Iramsaba Mushir Shaikh	
4		IOT-30	A Survey on smart hand sabitizer dispenser with temperature measurement and mask vending with door controlling	Vaishnavi U. Deshpande	
5		IOT-31	IoT Based Model for Monitoring and Controlling Multiple Water Tank Level	Rushikesh Kamble	
6		IOT-33	Smart Garbage Management System For Smart Cities Using Internet of Things	Kedar Khotkar	
			Advanced Smart Grid		Student Coordinator
7		ASGPS-01	Convertion of single phase to three phase AC using PWM technique	AMIR JAFAR ALI KHAN	Sonali Gupta 9665164550
8		ASGPS-03	Smart Charging for Electric Vehicle using Pantograph	Darshan Dattu Kolhe	Session Coordinator
9		ASGPS-04	An Embedded Controller for power quality improvement of an inverter with electrical grid	Supriya Sunil Kadam	Mr. Vikram M. Chavan
10		ASGPS-05	OPTIMISING THE USE OF ENERGY IN A HYBRID ROOFTOP WIND PRODUCTION SYSTEM	Prajakta Ramchandra Sarvade	Session Chair
11		ASGPS-08	An Automatic Solar Panel Cleaning System	Dr. R.V. Babar	Dr. Gayatri M. Phade

Robotics and Automation — Session-VI

Session-VI Link: https://teams.microsoft.com/l/meetup-join/19%3a25d877be3ccc4811b2908239c59d4bd8%40thread.tacv2/1622114984366?context=%7b%22Tid%22%3a%2222796e7e-c327-42e9-bef4-6f0d422b5fde%22%2c%22Oid%22%3a%22e74ba49c-67ca-4d01-a76a-de31c2869cc0%22%7d

SN	Time	Paper ID	Title of Paper	Author Name	Coordinator/Chair
1	02.30 pm to 5.00 pm	R&A-01	Programmable Switching Control For Domestic and Industrial Loads	Tejas shekhar nagotkar	https://tinyurl.com/4svkdwsr
2		R&A-04	Development of Autonomous Quadruped Robot	TATHAGAT	
3		R&A-05	Robotic Arm	Kunal Arun Pohane	
4		R&A-06	Research paper for self balancing robot	Pranay Doble	
5		R&A-09	Vision based automous car	P.Siva	
6		R&A-12	Analysis of the factors causing disputes in Nashik construction company.	Mangisha Yadav	Student Coordinator
7		R&A-13	Seismic anylisis of building using stadd pro software	Anuja Devidas Ahire	Divesh Chaudhari 9552073206
8		R&A-14	Measuring and monitoring of chemical reactor using PLC	Dr. S.B Gholap	Session Coordinator
9		R&A-16	FACTORS AFFECTING SUPPLIERS SELECTION IN CONSTRUCTION INDUSTRY OF NASIK CITY	Maheshwari Sahebrao Patil	Mr. Prashant R. Dike
10		R&A-17	Innovation and Modernization in Job Safety Analysis of Labours and Public on Road Construction Site	Kajal Dipak Bargat	Session Chair
11		R&A-19	Cricket bowling machine	Megha Prasannan	Dr. Nandkumar Kulkarni

Dr. D. S. Mantri
Convener
TKD-21

Dr. D. D. Chaudhary
Organizing Chair
TKD-21

Dr. M.S. Gaikwad
Organizing Chair
TKD-21

National Level Student Conference

"IEEE TECHNICOKNOCKDOWN-2021 (TKD-21)"

Organized by Department of E&TC, SIT, Lonavala

INDEX

SR. NO.	PAPER ID	TITLE	AUTHORS	PAGE NO:
1	AI&ML-02	Disease Assistance and Face - Mask Detection and Social - Distancing Mode	Harsh Agrawal	1
2	AI&ML-03	Deep Artificial Neural Network-based Clear Audio	Selin Saral Ponraj	6
3	AI&ML-06	Fake News Detection using Natural Language Processing and Deep Learning.	A. M. Shinde	10
4	AI&ML-07	Recommendation System for Twitter using Sentiment Analysis	Priyanka Vhatkar	16
5	AI&ML-09	Wireless Industrial Security Intelligent Robot	Meghna Sinha	20
6	AI&ML-10	Automatic Sanitization System for Transportation and Auditorium	Dr,Sharad Gholap	24
7	AI&ML-11	Implementation of reliable crop insurance system for timely settlement of claims to farmer using AI.	Deokar Prajakta Y.	30
8	AI&ML-12	Ozone level Prediction Using Machine Learning	Frason Francis	34
9	AI&ML-13	Laundry Aggregator System	Sachin Singh	39
10	AI&ML-14	Intelligent Sanitization Robot	Vaishali Baste	42
11	AI&ML-15	Chest Disease Detection Using Deep Learning	Rachel Calvin	46
12	AI&ML-16	Direct speech to speech translation	Nikhil Sanjeev Nakod	51
13	AI&ML-18	Intelligent Framework for Sentiment Analysis of Movie Reviews using Deep Learning Approaches	Eshwari Kulkarni	55
14	AI&ML-21	Automatic Face Mask Detection System Based on Machine Learning	Adhangale Purva Pandit	61
15	MSP-03	Android controlled e notice board by using Bluetooth technology	Davange Priti Subhash	65
16	MSP-07	Smart Student-Alumni Interaction System	Jaswantsing Vijaysing Patil	70
17	MSP-08	Tele-health Application for Primary Medication using Flutter	Prof. S. T. Shirkande	74
18	MSP-09	Gesture Controlled WheelBox	Sourabh Dilip Ghatage	78
19	CN-02	Design paper on Energy Efficient Routing Protocol for Underwater Wireless Sensor Network	Ashwini B. Gavali	82

20	CN-03	Real Time Hospital Bed Tracking System	Saurabh Mishra	87
21	CN-07	The job of lexical analyser in the periods of compiler plan	Mrs.Vidya Mahesh Shinde	92
22	CN-08	Atmanirbhar Mahila ~Saheli Ehaat	Sanjanaa Pawar	96
23	CS-01	Cyber Security threats and measures in context with IOT	Shradha Vishnnu Pore	101
24	CS-07	Web attack detection and prevention in e-commerce websites	Shivangi Chamoli	106
25	CS-08	Effect of added Contaminants in Lubricants by Using Wear Debris and Vibration Analysis Technique	Vikram Yendhe	116
26	CS-09	Secure Information Transmission Using Steganography And Cryptography	Lokesh Chatur	122
27	GICT-02	Introduction To Block chain Based E-Waste Management System	Adarsh Vernekar	126
28	GICT-03	Design Simulation and Analysis of Dynamic Wireless Charging Methodology for Electric Vehicles	Sania Walunjkar	130
29	GICT-06	Forest Cover Change Detection using Satellite Images	Achal Kalwar	136
30	IOT-09	IOT based Thief Detection and Surveillance System using Raspberry Pi	Shrutika Sorte	141
31	IOT-10	Detection and Location of Power Theft using IOT	Atharv Parsekar	146
32	IOT-12	Health Kiosk System	Divya Jayant Bhamre	150
33	IOT-13	Comatose Patients Monitoring System	Prof. V. S. Baste	157
34	IOT-14	A smart prioritized ambulance service with intelligent traffic control system	Tanya Uttam Singh	161
35	IOT-15	Industrial vending Machine	Tanuja K.Rane.	165
36	IOT-16	Entrance Management using IoT	Shardul Tiurwadkar	170
37	IOT-17	Speed Control and Parameter Monitoring of Solar Powered BLDC Using PWM Technique.	Anagha Kharate	177
38	IOT-18	Smart Water Management Using IOT	Rutvik Prakash Desai	183
39	IOT-19	Fire-Extinguisher Fire Fighting Drone	Rushikesh Burute	189
40	IOT-20	IOT Based Smarty Chef-Automated Electro-Mechanical Chef	Prof Dipali K. Shende	194
41	IOT-23	Importance of IOT on Agriculture	Sayali Sahebrao Mhaisdhune	197
42	IOT-24	Assessment of "Covid-19" Impact in Infrastructure on Construction Growth in Nashik City	Komal Dipak Bargat	202
43	IOT-29	IOT Warehouse Monitoring System	Iramsaba Mushir Shaikh	207
44	IOT-30	A Survey on smart hand sanitizer dispenser with temperature measurement and mask vending with door controlling	Vaishnavi U. Deshpande	209
45	IOT-31	IOT Based Model for Monitoring and Controlling Multiple Water Tank Level	Rushikesh Kamble	214

46	IOT-33	Smart Garbage Management System For Smart Cities Using Internet of Things	Kedar Khotkar	218
47	ASGPS-01	Conversion of single phase to three phase AC using PWM technique	AMIR JAFAR ALI KHAN	223
48	ASGPS-03	Smart Charging for Electric Vehicle using Pantograph	Darshan Dattu Kolhe	229
49	ASGPS-04	An Embedded Controller for power quality improvement of an inverter with electrical grid	Supriya Sunil Kadam	233
50	ASGPS-05	Optimizing the use of energy in a hybrid rooftop wind production system	Prajakta Ramchandra Sarvade	239
51	ASGPS-08	An Automatic Solar Panel Cleaning System	Dr. R.V. Babar	243
52	R&A-01	Programmable Switching Control For Domestic and Industrial Loads	Tejas shekhar nagotkar	247
53	R&A-04	Development of Autonomous Quadruped Robot	TATHAGAT	252
54	R&A-05	Robotic ARM	Kunal Arun Pohane	256
55	R&A-06	Research paper for self balancing robot	Pranay Doble	260
56	R&A-09	Vision based autonomous car	P.Siva	265
57	R&A-12	Analysis of the factors causing disputes in Nashik construction company.	Mangisha Yadav	268
58	R&A-13	Seismic analysis of building using stadd pro software	Anuja Devidas Ahire	272
59	R&A-14	Measuring and monitoring of chemical reactor using PLC	Dr. S.B Gholap	277
60	R&A-16	Factors affecting suppliers selection in construction industry of Nashik city	Maheshwari Sahebrao Patil	282
61	R&A-17	Innovation and Modernization in Job Safety Analysis of Labours and Public on Road Construction Site	Kajal Dipak Bargat	286
62	R&A-19	Cricket bowling machine	Megha Prasannan	290

Disease Assistance and Face - Mask Detection and Social - Distancing Model

Harsh Sanjay Agrawal
dept. EXTC
SIES, Graduate School of Technology
(University of Mumbai)
Navi Mumbai, India
harsh.agrawal17@siesgst.ac.in

Khot Aditi Rajan
dept. EXTC
SIES, Graduate School of Technology
(University of Mumbai)
Navi Mumbai, India
aditi.rajan17@siesgst.ac.in

Malhotra Jagjeet Singh
dept. EXTC
SIES, Graduate School of Technology
(University of Mumbai)
Navi Mumbai, India
jagjeet.singh17@siesgst.ac.in

Abhishek Kumar Shreevats
dept. EXTC
SIES, Graduate School of Technology
(University of Mumbai)
Navi Mumbai, India
kumar.abhishek17@siesgst.ac.in

Abstract*— A disease becomes a pandemic when it is neglected and has a very high infection rate. Humans tend to ignore simple safety measures like social distancing and wearing a mask. Considering any highly infectious disease this is very detrimental. This paper as a solution, introduces passive and active models. The passive model consists of Face-mask detection and Social distancing model. The Face is detected using Haar Cascade Frontal face classifier and Face Mask Detection system is built with OpenCV, Keras/TensorFlow. MobileNetV2 is used in Transfer Learning. The Social-distancing is measured using simple Euclidean Distance of bounding boxes. The passive model comprises of an interactive chat-bot built using Python – Flask, collecting the user information and leading to the front-end booking page for medical assistance. Cloud-Edge IOT platform integrates all the modules or high availability.

Keywords—Face-Mask Detection, Haar-Cascade Frontal Classifier, Social Distance, Euclidean Distance, MobileNetV2, Python Flask, Cloud-Edge.

I. INTRODUCTION

A. Need of Project

Humans tend to neglect basic safety measures like practicing social distancing and wearing a mask to ensure safety of others. We tend to neglect basic hygiene like use of sanitizers, practicing human contact like handshakes without ensuring sanitary condition. Countless diseases are caused by microorganisms that persist by infecting new people. Cutting these detrimental interactions in public would enable us to eliminate ailments before they grow to be a pandemic. Such measures are essential considering the fact that even extremely common diseases like the common cold can make a perfectly healthy person ill purely based on an asymptomatic interaction that lasted a few seconds.

B. Proposed System

The proposed system has two independent parts referred to as the active and the passive part. The system has been designed in such a way to compensate for the fact that not every interaction calls for action. Only certain interactions and unhealthy practices need to be flagged to the authorities and the user itself. Hence, a CCTV camera network is used to record the human traffic in public places and detect the patterns and the proximity of one subject with another. Other than this, there are algorithms which account for the environmental conditions like temperature and humidity. Along with this, wearing a mask will account for the final "risk factor" for each individual in consideration. In case the risk factor is high for an individual, they will have to submit their reports and other medical details to a flask chatbot before visiting the doctor. If a medical consultation is deemed essential by the algorithms, only then will the person need to consult a doctor. For this, he will be given a list of authorized doctors in his locality and the timings on which they will be available for consultation. Booking an appointment and the update to the doctor along with all the reports will be sent automatically to ensure there is no added pressure on the medical fields and the system relieves pressure that medical practitioners face during a surge in patient numbers.

C. Objectives

With this project we aim at developing a self-sustaining system which helps relieve the pressure faced by medical practitioners in the long run, while ensuring that hygiene is maintained in public places. In some Asian countries like

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Japan, it is mandated to follow the rules we're trying to enforce when a person suffers from any communicable ailments. As we saw the Covid-19 virus become a worldwide pandemic, many researchers suggest that COVID could be a start to many harder to deal viruses to come. Hence it is essential that in the future, these diseases are healed before they gain enough infectivity to become a pandemic.

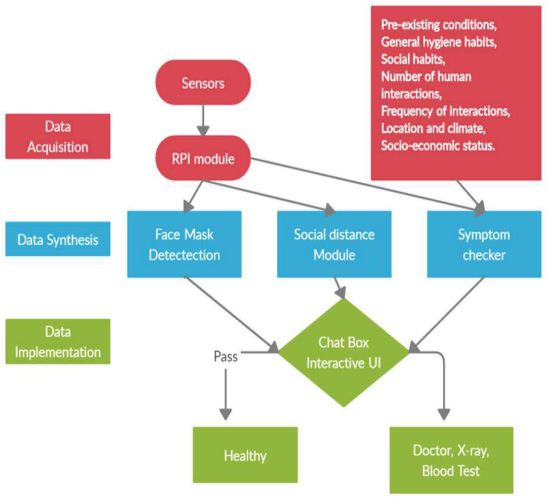
II. LITERATURE REVIEW

In recent years, the architectures based on the convolution neural network (CNN) results showed major improvements in performance which contribute to the high quality of object detection. A feasible method that consists of first identifying facial features has been proposed. The issue of occluded face detection was solved using the Multi-Task Cascaded Convolutional Neural Network (MTCNN). Extraction of facial features is then carried out using the embedding model of Google FaceNet embedded model. Eventually, the Support Vector Machine (SVM) has conducted the classification task.[1] Because the model offers better accuracy for simple masked face recognition and cannot be appeased for all forms of masks, the proposed project has a trained custom dataset model that includes complex and many more occlusion sources, including hat, sunglasses, beard, long hair, mustache, and medicine. In static images, as well as in real time video streams, it can detect face masks.

A study [2] was suggested that uses object detection and tracking models to help deal with the worsening of COVID-19 cases in the social distancing remedy. The research uses the YOLO v3 object detection model to isolate humans from the background and to monitor the detected individuals using bounding boxes and assigned IDs using the Deepsort method. The pairwise vectorized L2 standard is later determined on the basis of the three-dimensional space of the function obtained by using the centroid coordinates and the bounding box dimensions. To measure the non-adoption of the social distancing protocol, the breach index or violation index term is suggested.

A similar project suggested a deep learning solution that would warn the user as soon as social distance is breached. A video stream is taken from the CCTV camera and the individuals are detected with the PoseNet model and then a rack is maintained of the number of people in the video stream. If the difference between 2 people's frames is less, then the authorities in charge are alerted [3]. Since both approaches are highly sensitive to the spatial location of the camera and intended to be used in any working environment; accuracy and precision are highly desired to serve the purpose and to avoid discomfort and panic situations among people. The proposed project detects the social distancing and masks with a precision and confidence score that reduces the number of false positives. The passive model operates two tasks: firstly, face mask detection secondly; the detection of a social distance violation by individuals is detected continuously in threshold time by using a sliding window on a fast R-CNN to get maximum efficiency output. This solution can be used in places like temples, shopping complexes, metro stations, airports, etc.

The conflict against infectious diseases and an important role is the key problems that need to be addressed, planned and developed a dynamic risk assessment decision support framework for COVID-19 (DDC19) [4] centered on the real scenes and processes of patients using health care. The developed DDC19 consists of three components: two main mobile terminal applications (patient end & GP end), a database system with related components and a related support model underlying it. All mobile terminal devices are wirelessly linked to the back-end data center to send requests and transmit data. A multi-class logistic regression algorithm, a 10-fold cross-validation approach to evaluate and test the COVID-19 dynamic risk stratification model in various scenarios, is allocated as labels for the three groups of low risk, moderate risk and high risk.The system is still in the deployment and app stage, the relevant data of patients in the system and in-hospital visits cannot be obtained in a timely manner including the severity of symptoms and history of underlying chronic diseases and majorly does not include any real time communication to seek constant advice. While our projects aim at Python - Flask chat bot to collect essential data and seek emergency appointments at the hospital. When the risk calculation gives very high risk for a particular person, he is sent a link via mail to an AI Chatbot. The real time parameter that is symptom checker considers various parameters including temperature screening which is another key symptom of COVID-19 infection.



IEEE TKD-21/ ISBN No. 978-81-992245-3-6

III. PROPOSED MODEL

The proposed system has two independent parts referred to as the passive and the active part. The overall framework of the proposed model is shown in fig 1.

A. Hardware Specifications

An Rpi 3+ for computation (1GB ram, 40-pin extended GPIO, 4 USB2.0 ports, Full Size HDMI, Quad core 1.2GHz Broadcom BCM2837 64bit CPU, BCM43438 wireless LAN, BT and WiFi enabled). A CCTV camera network / webcam (Pixel resolution is 1280 x 1024 (like the Sony SNC-EM600 1.3 megapixel camera), or it can be 1280 x 800, 1080p cameras that have at least a 2-megapixel sensor.

B. Passive Model

Object Detection using Haar feature-based cascade classifiers is an efficient object detection method proposed by Paul Viola and Michael Jones [6]. To obtain the bounding box coordinates of faces in an image, we will be using a Haar Cascade Model trained to detect faces. Face Mask Detection system built with OpenCV, Keras/TensorFlow. We use MobilenetV2 in transfer learning. We remove the bottom few layers worth of weights from the pre-existing model and add a flatten and a dense layer with 2 output neurons specifying "with and without" masks.

The social distancing can be checked by iterating over the coordinates of faces and calculating the distance for each possible pair, if the distance for a particular pair is less than the threshold then the bounding boxes for those faces are colored red. Threshold must be manually initialized in such a way that it corresponds to the minimum allowable distance in real life (ex. 6ft in India). In addition to this, we'll use a sliding window on a fast R-CNN to get maximum efficiency output. The CNN will extract the features and the classifier - regressor stack will calculate the distance at maximum accuracy. State-of-the-art object detection networks to hypothesize object coordinates rely on area proposal algorithms. The running time of these detection networks has been reduced by developments such as SPPnet and Fast R-CNN, identifying region proposal computation as a bottleneck. The fig 2. Shows the output of the face mask and social distancing.

Detectron2.0 is an open-source model zoo for object detection and segmentation created by the Facebook AI Research team, and is used to further improve the efficiency of bird viewing. It uses the PyTorch deep learning platform, which adds more features including panoptic segmentation, Densepose, rotated bounding boxes, Cascade R-CNN, and DeepLab, as well as allowing it to train even faster. A video consequently from the camera is read and frames are saved in the folder. The model is ready for inference after downloading the pre-trained model for object detection from Detectron 2's model zoo. The predictions are drawn on the images using Visualizer. Since a picture contains a variety of objects, we only defined classes and bounding boxes for people. After specifying the bounding boxes, we chose the bottom center of a rectangle to represent each person in order to accurately calculate the distance, which is also invariant of a person's height. Defined a function to compute the Euclidean distance between each pair of points in an image, as well as a function to return the people who are nearest to each other based on the proximity distance. The proximity distance refers to the minimum distance between two individuals, and the proximity distance threshold is set to 100. Adjust the color of the closest people in each picture to red. Convert the frames back to a video after recognizing the closest people in - frame. The Fig 3. Shows the output.

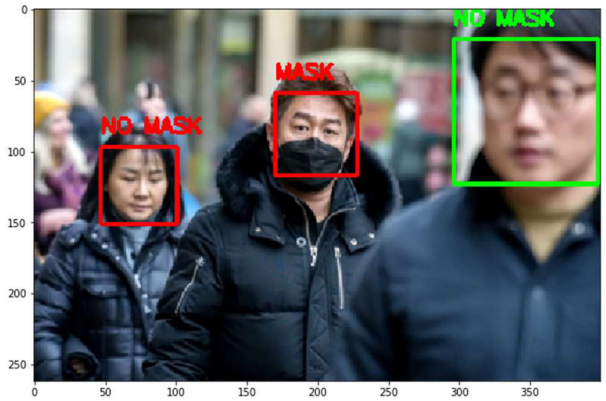


Fig 2 : Output of mask and social distancing models

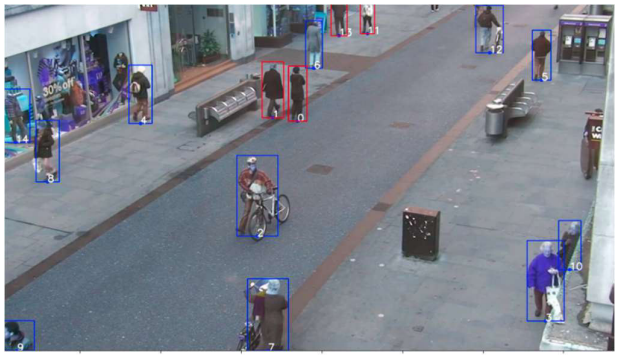


Fig 3 : Bird's eye view using Dectron 2.0

C. Active Model

In the active phase, when the passive models have calculated the most affected user, the mail will only be sent to the person with higher risk. The project is implemented in offices, schools, or colleges where the emails of the people are known and can be actively stored in Microsoft Azure cloud database. The mail sent to the infected person has the link to the chatbot with the consequent CovidDisesaseAsisistant ID CDA-ID. Fig-4 shows the output of the mail received.

The Telegram Chatbot is implemented using BotFather which is the one bot that rules them all. It will assist in the development of new bots as well as the modification of existing bot's settings. The API key is accessed from the BOTFather /newchatbot. The same API key is to configure

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

the CovidDisesaseAsisistant ChatBot. The chatbot recognises the patient with the respect to their CDA-ID and inquired for the symptoms that the patient is suffering from and consequently will provide the equivalent remedy. In case the patient is suffering from the serious illness the Book Slot Doctor's appointment website link is provided. In case there are no major symptoms an expert mail from the doctor is suggested. Fig 5 demonstrates a sample chat with a patient, where CDA-ID number "123456" has high risk factor and CDA-ID number "234567" is comparatively safe.

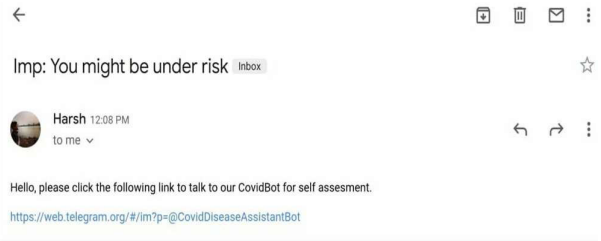


Fig 4 : Email received by high-risk pedestrian

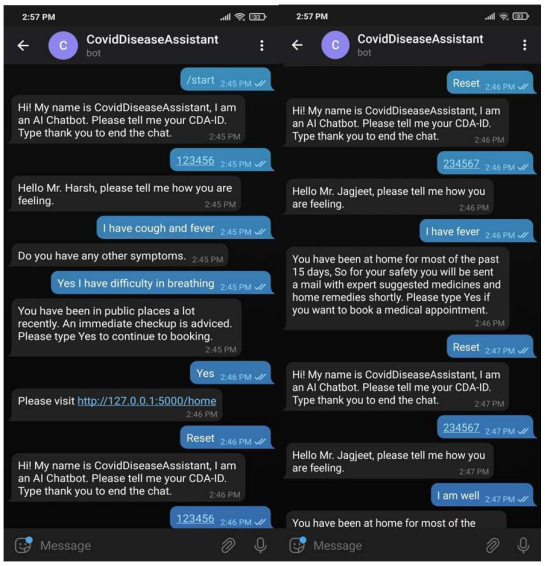


Fig 5 : CovidDiseaseAssistant ChatBot

The booking slot website Fig 6 is implemented with Bootstrap front-end framework for quicker and easy to implement web development. HTML and CSS templates are used for login, account, register, home, create booking. The back-end is created using Python Flask, a Python-based micro web platform. It is referred to as a micro framework because it does not necessitate the use of any specific resources or libraries. It doesn't have a database abstraction layer, form validation, or any other components that depend on third-party libraries to perform common tasks. The patient is required to register and login, respectively. The green slots are free and book the slot with desired timing, Fig 6 and enter the details as shown in Fig 7. After the slot is booked, it will appear in red, Fig 9 indicating that the slot is preoccupied. The admin users, presumably the doctors and medical staff have the admin rights to add more slots or change the slot back to green once the patient is attended.

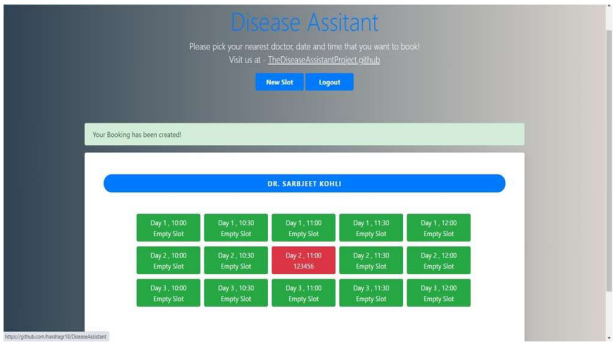


Fig 6 : Disease Assistant

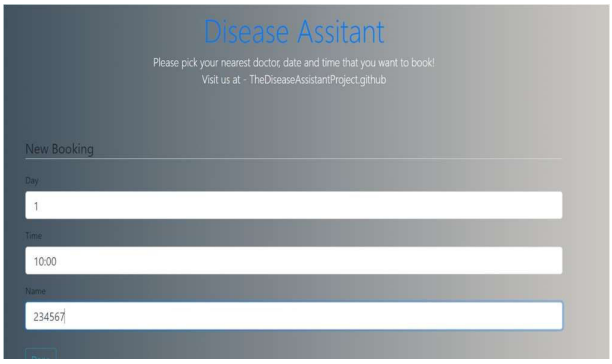


Fig 7 : New Booking Page

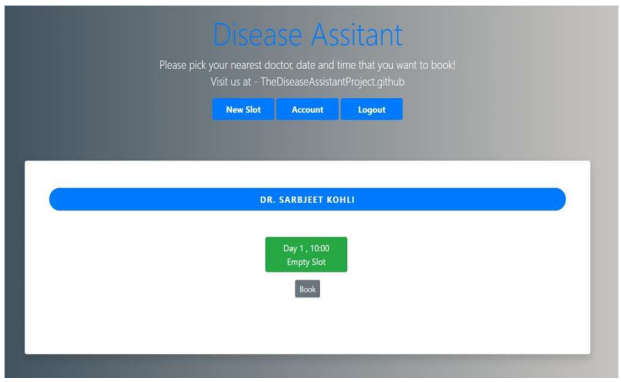


Fig 8 : Booking slot Day 1

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Fig 9 : After Booking Day1 slot by CDA-ID 234567

IV. CONCLUSION

The proposed disease assistant model is successful in eliminating social distancing as well as facial detection problems. It successfully recognized objects using the Haar Cascade trained model and gave an accurate proximity measure. The MobileNetV2 and Transfer learning used gives the best results for feature extraction. The accuracy of the system combining both the facial detection and social distancing model comes out to be high. It also consists of a passive approach used to calculate the risk factor based on various risk parameters. The flask based Chat-bot used makes the interfacing extremely user friendly. It also directs the user to an easy appointment booking software. This model will help in preventing infectious diseases, increasing general hygiene as well as prove to be extremely helpful in pandemic scenarios.

V. APPLICATIONS AND SCOPE

Disease Assistant algorithms will be applied parallely to multiple images of the same place and the results will be combined to get the most precise output as well as parallel analysis ensures no disagreement is caused between models. The system uses very less database power, as it clears memory once the object is out of scope. Day to day functions are handled by the processor on a local computation environment (EDGE technology) which helps speed up the system. The system can be controlled and edited using a very interactive UI which is simple to understand by the end user. The feedback of the effectiveness of the solution will update the database, so that our technology adapts to the changes in the pattern of spreading of diseases under different conditions.

The system can be used for targeting the common communicable ailments and ensuring general hygiene is maintained in public places where social interaction is at a peak. It can be further modified to successfully target a specific disease very easily and ensure maximum accuracy and quick adaptation since all the major parameters are accounted for in the base system. A disease becomes a pandemic upon negligence and high infectivity. This system can be successfully implemented as safety and an effective preventive system.

REFERENCES

[1] M. S. Ejaz and M. R. Islam, "Masked Face Recognition Using Convolutional Neural Network," 2019 International Conference on Sustainable Technologies for Industry 4.0 (STI), Dhaka, Bangladesh, 2019, pp. 1-6, doi: 10.1109/STI47673.2019.9068044.

[2] Monitoring COVID-19 social distancing with person detection and tracking via fine-tuned YOLO v3 and Deepsort techniques N. S. Punn, S. K. Sonbhadra, S. Agarwal, Indian Institute of Information Technology Allahabad, Jhalwa, Prayagraj, Uttar Pradesh, India; emails: {pse2017002, rsi2017502,sonali}@iiita.ac.in.

[3] Ghorai, Arnab and Gawde, Sarah and Kalbande, Dhananjay, Digital Solution for Enforcing Social Distancing (May 31, 2020). Proceedings of the International Conference on Innovative Computing & Communications (ICICC) 2020, Available at SSRN: https://ssrn.com/abstract=3614898 or http://dx.doi.org/10.2139/ssrn.3614898

[4] Liu Y, Wang Z, Tian Y, Zhou M, Zhou T, Ye K, Zhao Y, Qiu Y, Li J, Ren JA COVID-19 Risk Assessment Decision Support System for General Practitioners: Design and Development Study J Med Internet Res 2020;22(6):e19786.

[5] Viola, Paul & Jones, Michael. (2001). Rapid Object Detection using a Boosted Cascade of Simple Features. IEEE Conf Comput Vis Pattern Recognit. 1. I-511. 10.1109/CVPR.2001.990517.

[6] P. Viola and M. Jones, "Rapid object detection using a boosted cascade of simple features," Proceedings of the 2001 IEEE Computer Society Conference on Computer Vision and Pattern Recognition. CVPR 2001, Kauai, HI, USA, 2001, pp. I-I, doi: 10.1109/CVPR.2001.990517

Deep Artificial Neural Network-based Clear Audio

1st Advait Gogte
Computer Department
Fr. Conceicao Rodrigues Institute of Technology
(Mumbai University)
Mumbai, India
advaitgote9@gmail.com

2nd Shreeraj Pawar
Computer Department
Fr. Conceicao Rodrigues Institute of Technology
(Mumbai University)
Mumbai, India
shreerajpawar88@gmail.com

3rd Selin Saral Ponraj
Computer Department
Fr. Conceicao Rodrigues Institute of Technology
(Mumbai University)
Mumbai, India
selinsaral2000@gmail.com

4th Vaishnavi Jadhav
Computer Department
Fr. Conceicao Rodrigues Institute of Technology
(Mumbai University)
Mumbai, India
vaishnavijadhav424@gmail.com

***Abstract*— Noise is an inevitable problem while recording audio and video. So, speech denoising may be a long-standing problem. Given a noisy input, the aim is to filter such noise without degrading the signal of interest. For instance, if an individual wants to record audio, video and upload it on social media then the noise present within the video makes the content unclear to the viewer. During this situation, a speech denoising system has the work of removing the ground noise to enhance the speech signal. We tackle the matter of speech denoising using Convolutional Neural Networks. Given a noisy input, we aim to create a statistical model which will extract the clean signal and return it to the user. We separate the regular speech signals from ten different types of noise often found in an urban street environment.**

Keywords*— *Convolution Neural Networks

I. INTRODUCTION

When listening to music we prefer the smooth changing of overtones, loudness and notes. Noise on the other hand is just a random variation. Any unwanted sound that makes us feel unpleasant is noise. For a content-creator noise can harm the quality of the content. Say someone is taking an interview or doing a podcast, the noise from the streets, the car horns, the neighbourhood dog continuously barking can bring discomfort to the listener. So what if there is a way to reduce these unwanted unpleasant noise from any audio or video. Our application aims to do so. Our web application is based on Deep Neural Networks. Speech denoising or enhancement refers to the removal of background content from speech signals. Thanks to the ubiquity of this audio degradation, denoising features a key role in improving human-to-human and human-to-machine interaction. Speech denoising may be a long-standing problem. Distinct noises and clean voices of various ages, gender, ethnicity is compiled together and fed to a neural network. it had been trained to get rid of ground noise and leave only clean voices. Given a noisy input, the aim is to filter such noise without degrading the signal of interest. We tackle the matter of speech denoising using convolutional neural networks. Given a noisy input, we aim to create a statistical model which will extract the clean signal and return it to the user. We separate the regular speech signals from ten different types of noise often found in an urban street environment.

II. LITERATURE SURVEY

The paper "Improving Deep Speech Denoising by Noisy2Noisy Signal Mapping" presents a deep learning-based approach to enhance speech denoising in real-world audio environments by not requiring the supply of unpolluted speech signals during a self-supervised manner. A convolutional neural network is trained by using two noisy realizations of an equivalent speech signal, one used because of the input and therefore the other because of the output of the network. Extensive experimentations are conducted to point out the prevalence of the developed deep speech denoising approach over the traditional supervised deep speech denoising approach supported four commonly used performance metrics and also supported actual field-testing outcomes.[2]

The paper "A Research on Different Filtering Techniques and Neural Networks Methods for Denoising Speech Signals" intends to supply the best-suited noise removal technique for denoising and retrieving clean speech from a loud speech signal. The aim is to use different denoising techniques and compare their performance and reach a conclusion regarding which one among them is best fitted to enhance voice signals. The analysis is completed by evaluating the performance of various denoising techniques for various sorts of speech samples. This evaluation is completed by adding random noise to the speech signal then applying denoising techniques to urge the denoised speech signal. Parallelism is drawn between the first signal and therefore the denoised signal through evaluation parameters such as SNR and PSNR. The denoising methods are broadly classified as 'The Filtering Methods' and 'The Neural Network Methods'. Under filtering methods, four different denoising methods are used. The four different denoising methods are Adaptive Filter supported LMS Algorithm, Wiener Filter, Chebyshev Filter, and Kalman Filter[3] .Under neural network methods we use three different denoising methods 'ADALINE' and two deep learning methods with 'Fully Connected' and 'Fully Convolutional' neural networks. The performance estimation is completely supported by a spread of evaluation parameters (SNR and PSNR values) for various denoising techniques.[4]

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

The paper "self-supervised deep learning-based speech denoising," .It ease the requirement of clean speech which is available for training.A self-supervised deep neural network solution use a Fully Convolutional Neutral Network to map a noisy speech signal to another noisy speech signal. In ideal condition there will be not available any clean speech to train. So the noisy speech signal to another noisy speech signal to remove the unwanted noise. [5]

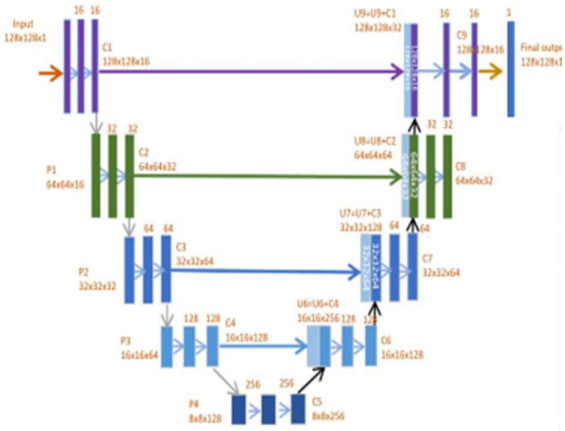
III. PROPOSED SYSTEM

Speech denoising is done with the help of Convolutional Neural Networks and deep learning. Here we input a noisy signal and aim to create a statistical model which will extract the clean signal and return it to the user. It separates the regular speech signals from ten different types of noise often found in an urban street environment.

To create a dataset we use the 'Mozilla Common Voice' dataset which contains thousands of clean audio samples. This dataset is available in many languages like English, French, Germany, Spanish etc. Noisy samples are from the 'UrbanSound8k' dataset. We generate our dataset by mixing clean samples with noisy ones.

This artificially created noisy signal is then converted into a spectrogram which is then fed as input to our deep learning model. A spectrogram is a picture of sound. It is a detailed view of audio, able to represent time, frequency, and amplitude all on one graph. The model used for the training is called U-Net, it is a Deep Convolutional Autoencoder with symmetric skip connections. The original U-Net architecture proposed by Olaf Ronneberger, Philipp Fischer, and Thomas Brox was for biomedical image segmentation. This architecture can be modified to suit our application. Keeping the base architecture the same with its skip connections and max-pooling layers, a new model was implemented.[1]

The network architecture is illustrated in Figure 1. It takes the shape of 'U' with down-sampling at each level as we move down and up-sampling as we move up the level. It consists of an encoding or contracting part (left side) and decoding or expanding part (right side). Max-pooling of stride 2x2 is applied at each level contracting the size of the input with each level. The input is a 128x128x1 size image or spectrogram. The encoding or contracting path follows repeated 3x3 convolutions followed by ReLU. After these convolutions, a max-pooling of 2x2 is applied down-sampling the image. After applying up-sampling a convolution was applied to which the corresponding level convolution was concatenated. A dropout of 0.5 was added at C4 and C5 (refer to figure 1). The output gives a 128x128x1 noise feature.



. Fig. 1: Proposed Unit model.

The U-Net has been adapted to denoise spectrograms. As input to the network, the magnitude spectrograms of the noisy voices. As output the Noise to model (noisy voice magnitude spectrogram to wash voice magnitude spectrogram). Both input and output matrices are scaled with a worldwide scaling to be mapped into a distribution between -1 and 1.

Noisy voice spectrograms are passed into the U-Net network which will predict the noise model for every window. Prediction time for one window once converted to magnitude spectrogram is around 80ms using classical CPU. Then the model is subtracted from the noisy voice spectrogram. The denoised magnitude spectrogram is combined with the initial phase as input for the inverse Short Time Fourier Transform. The denoised statistics are often then converted to clean audio.

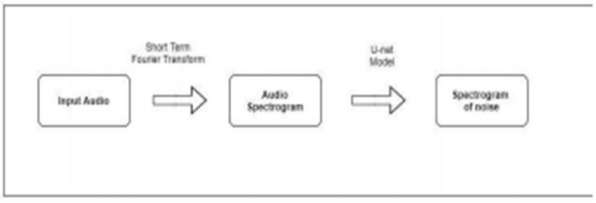


Fig. 2 Prediction of the noise model

Fig. 2 shows Noisy voice spectrograms are passed into the U-Net network that will predict the noise model for each window.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

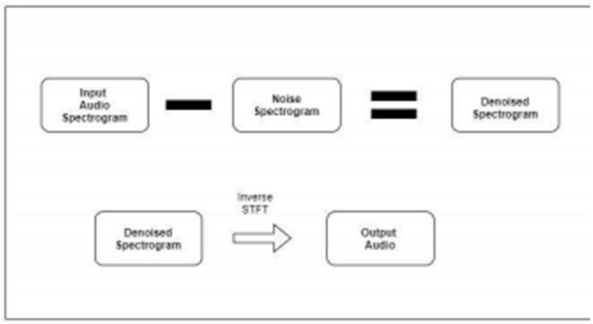


Fig. 3 Clear voice output signal

Fig. 3 The noise model is subtracted from the noisy voice spectrogram. The denoised magnitude spectrogram is combined with the initial phase as input for the inverse Short Time Fourier Transform. The denoised time series can be then converted to clear audio.

Spectograms:

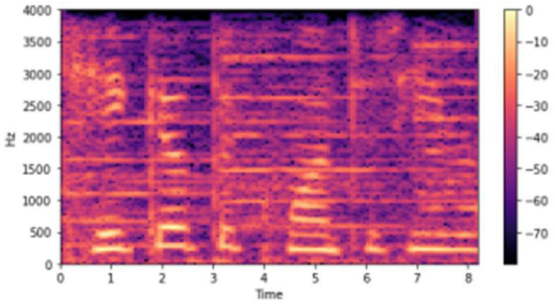


Fig. 4 Spectrogram of a noisy audio

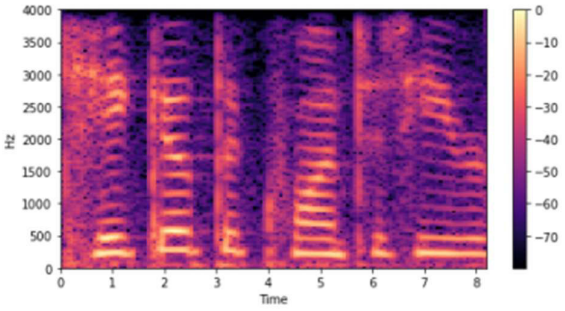


Fig. 5 Spectrogram of the denoised audio

Perfomance Evaluation

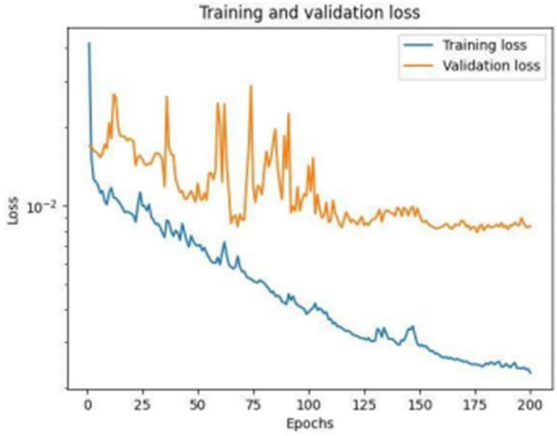


Fig. 6 Model's performance

Fig. 6 The following image is a graph of our model's performance. We obtained a training loss of 0.00229 and a validation loss of 0.00787.

Huber Loss Function

This loss function is a combination of Mean Squared Error (MSE) and Mean Absolute Error (MAE). It is quadratic for smaller errors (MSE) and linear for larger errors (MAE).

$$L_\delta(a) = \begin{cases} \frac{1}{2}a^2, & for\ |a| \le \delta \\ \delta\left(|a| - \frac{1}{2}\delta\right), & Otherwise \end{cases}.$$

Where, y = Predicted value f(x) = Observed value and δ = Threshold value (In TensorFlow, the default value for δ is 1.0).

IV. Conclusion

Deep Neural Network-based clear audio is a website where users upload noisy audio/video and download a denoised version of their audio/video. We have created the artificial noise dataset and pre-process it. We used the urban sounds as noise signals to the speech examples. We have first taken a small speech signal that can be someone speaking a random sentence from the clean voice dataset. Then, we have added noise to it such as a woman speaking and a dog barking in the background. Created the dataset for noisy audio by taking clean voices and adding noise to it and then created spectrograms of these noisy audios using the 'librosa' package. This web application can be used by anyone to denoise their audio/video and upload it on social media or use it for various purposes.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

ACKNOWLEDGMENT

Success of a project like this involving high technical expertise, patience and massive support of guides, is possible when team members work together. We take this opportunity to express our gratitude to those who have been instrumental in the successful completion of this project. We would like to show our appreciation to Mrs. Kavita Shelke for their tremendous support and help, without them this project would have reached nowhere. We would also like to thank our project coordinator Mrs.Rakhi Khalantri for providing us with regular inputs about documentation and project timeline. A big thanks to our HOD Dr. Lata Ragha for all the encouragement given to our team. We would also like to thank our principal, Dr. S. M. Khot, and our college Fr. C. Rodrigues Institute of Technology, Vashi for giving us the opportunity and the environment to learn and grow.

REFERENCES

[1] Ronneberger, Olaf, Philipp Fischer, and Thomas Brox. "U-net: Convolutional networks for biomedical image segmentation." In International Conference on Medical image computing and computer-assisted intervention, pp. 234-241. Springer, Cham, 2015.

[2] N. Alamdari, A. Azarang, and N. Kehtarnavaz, “Improving deep speech denoising by noisy2noisy signal mapping,” Applied Acoustics, vol. 172, p. 107631, 2021.

[3] M. Haque and K. Bhattacharyya, Speech Background Noise Removal Using Different Linear Filtering Techniques, pp. 297–307. 01 2018.

[4] G. K. Rajini, V. Harikrishnan, J. P. Priyadarisini, and S. Balaji, “A research on different filtering techniques and neural networks methods for denoising speech signals,” 2019.

[5] N. Alamdari, A. Azarang, and N. Kehtarnavaz, “self-supervised deep learning-based speech denoising,”

[6] S. MH. Bai, F. Ge, and Y. Yan, “Dnn-based speech enhancement using soft audible noise masking for wind noise reduction,” China Communications, vol. 15, no. 9, pp. 235–243, 2018

[7] Long, J., Shelhamer, E. and Darrell, T., 2015. Fully convolutional networks for semantic segmentation. In Proceedings of the IEEE conference on computer vision and pattern recognition (pp. 3431-3440).

[8] Badrinarayanan, V., Kendall, A. and Cipolla, R., 2017. Segnet: A deep convolutional encoder-decoder architecture for image segmentation. IEEE transactions on pattern analysis and machine intelligence, 39(12), pp.2481-2495.

[9] Lu, Xugang, Yu Tsao, Shigeki Matsuda, and Chiori Hori. "Speech enhancement based on deep denoising autoencoder." In Interspeech, vol. 2013, pp. 436-440. 2013.

Fake News Detection using Natural Language Processing and Deep Learning

Aadarsh Nashine
Information Technology
Smt, Kashibai Navale College of Engineering
Pune, India
raninashine@gmail.com

Sachin Yadav
Information Technology
Smt, Kashibai Navale College of Engineering
Pune, India
Sachin11061998@gmail.com

Suyog Vyas
Information Technology
Smt, Kashibai Navale College of Engineering
Pune, India
vyassuyog@gmail.com

Aniket Shinde
Information Technology
Smt, Kashibai Navale College of Engineering
Pune, India
Anikets13499@gmail.com

***Abstract*— The modern, ever-connected world by the aid of the Internet, has given stimulus to websites and platforms, publishing mass content and most of this, without any validation of sources. This gives growth to one of the topics of high research, Fake News Detection, which is studied to multiple aspects and approached with various solutions, which make an effort to solve this modern age problem to some extent. Though the existing methodologies have tackled the problem, there remains some scope for advancement. The following research is done to utilize that scope and provide a new, real-life, and more efficient system for Fake News Detection. The following paper proposes a combination of techniques from two disciplines of the Artificial Intelligence (AI) field viz. Natural Language Processing (NLP) and Deep Learning (DL). The system can be said as based on exclusive algorithms such Sentence-Bidirectional Encoder Representations from Transformers (SBERT) and Global Vectors for Word Representation (GloVe), which are fine-tuned and used as encoders to convert text into vector for further processes. The system is stated to be having a combination strategy as it relies on outputs from two sub-systems for producing the final output. The final output expected from the following system is in the form of the predicted class of the input news title among True and Fake. Thus the system has a broader understanding of the presented problem, which in turn has provided more reliable performance than some of the existing systems for the same.**

Keywords- NLP, DL, AI, SBERT, GloVe, API.

I. INTRODUCTION

Change being only constant thing in the world holds true in every field. This being quite evident in the shift that took place from people reading news from old and traditional news sources such as newspaper and printed Magazines to new platforms, prominently the Social media. With the increasing ease of getting connected to World Wide Web from nearly anywhere in the world, a greater number of people are consuming the news from web only. Though this advancement was beneficial in several ways, it also gave rise to many cons. Among many, Fake News topped the list. Fake News basically is the piece of information which is created by manipulating and changing the original news. This manipulation is done with the evil intention of giving a damage to any person, group or an institution. Fake News can has a great and adverse effect on the society as it can Damage the current government by destabilizing it, can spoil the Image of a person or could lead to the Crash of Wall Street in no time. Given the prevalence of this new phenomenon, "Fake news" was even named the word of the year by the Macquarie dictionary in 2016 [1]

Today, People are spending nearly 25 % of their time in their phone busy on social media. 350,000 tweets are sent per minute, indicating the involvement [2]. Hence if a News agency for instance alter any piece of news, same news will be read by large no of people at the same time, thus a single manipulation led to the transfer of a wrong information to large no people. Hence to keep check and control the spread of this manipulation, detection of such news became the need of time. The following research exploits advance technologies, for instance, Natural Language Processing (NLP) & Deep Learning (DL) which came into rescue as they can be used to build models which could be used to detect the Fake News.

A. Natural Language Processing

Concepts focused entirely on learning the language presented and converting the text form of the input into machine usable format are included in NLP. NLP techniques help to find similarity between pair of words.

B. Deep Learning

The non- linear relation between the independent variables and the dependent output is learned while training the model with Deep learning layers. Training

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

a model with Deep leaning layer help to learn patter of occurrence of specific set of inputs and the resulting target class for that input.

A piece of news article consists of 4 different things:

i. Source: Author or publisher of the news article.
ii. Headline: Title text describing the main topic of the article.
iii. Body Text: Main text elaborating the details of the news story.
iv. Media: Body content providing visual cues to frame the story. [2]

Note that the user is expected to enter the input as the News title only, in the text form. They can enter the input through the developed UI (User Interface).

II. MOTIVATION

Currently Fake News Detection is already being adapted by the social media giants such as Facebook and Twitter. The detection work is done by the independent fact checkers and not the machine. These community reviewers are not their employees but instead are hired as contractors through one of their partners. Though the final decision is not made by them. Their findings will be shared with the third-party fact checkers as additional context as they do their own official review. This Human inclusion can also lead to the the manipulation and error in the final outcome. Hence a alternative for the detection purpose is the biggest need of the hour.

A. Objectives:

i. To discuss the related study of the system
ii. To discuss the solution based on Language approach preprocess
iii. To discuss the solution based on Network approach
iv. To discuss the DL models suitable for the solution and the related functions

III. LITERATURE REVIEW

In this section, we introduce previous related work about the fake news detection.

A. Fake News Detection Using Machine Learning Ensemble Methods

Iftikhar Ahmad and their associates in this work, suggested using a machine learning ensemble method for automated news article classification in [3]. Their research looks at various textual properties that can be used to tell the difference between fake and real content. The team trained a combination of different machine learning algorithms using various ensemble methods and tested the output on four real-world datasets using those properties. The observation was performance of proposed ensemble learner approach was found to be superior to that of individual learners, according to their experimental results [3].

B. Fake News Detection on Social Media: A Data Mining Perspective

Kai Shu and team explored the fake news problem by reviewing existing literature in characterization and detection phase [1]. In characterization, they introduced the basic concepts and principles of fake news in both traditional media and social media and in detection, they reviewed existing fake news detection approaches from a data mining perspective, including feature extraction and model construction [1].

C. Fake News Detection: A Deep Learning Approach

Thota Ashwini and associate authors proposed neural network architecture to accurately predict the stance between a given pair of headline and article body in this form of study. Their model outperformed the current model architectures by 2.5 percent and achieved a 94.21 percent accuracy rate on test results. [4]

D. On the Benefit of Combining Neural, Statistical and External Features for Fake News Identification

The author Gaurav Bhatt in this research field combined the neural, statistical and external features for fake news identification [5]. They compared their proposed methodology to existing state-of-the-art models and discovered that their proposed model outperforms all other approaches, including the fake news challenge submissions. [5].

E. Fake news detection using naive Bayes Classifier

In this study Granik, Mykhailo and their associates have implemented the Naïve Bayes Classifier to detect fake news. The dataset on which the model was trained was a dataset of New Post of Facebook, in the

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

implementation they resulted in accuracy of 74%. As the users have a freedom to access news due to increased capability of Social media and Internet there are more chances of biasing of the news due public opinion. The authors have also kept an open window for the improvement of their results and stated some of the ways to do so. By referring thorough the following paper, the author implemented the model – (Rada Mihalko, Carlo Strapparava, The lie detector: explorations in the automatic recognition of deceptive language, Proceedings of the ACLIJCNLP 2009 Conference Short Papers, August 04-04, 2009, Suntec, Singapore)[6].

F. *An empirical Analysis of Classification Models for Detection of Fake News Articles*

Hrishikesh Telang and team focused on study that has an approach which has more emphasis on the data prospective [7]. It checks whether the automatic computations deducted from the approaches on NLP and DL can be used to identify the Fake nature in the given text. The papers discussed the feature extraction methods as well as the Data preprocessing steps. It also implements the Weighting techniques like Term frequency-inverse document frequency (TF-IDF) and Global Vectors for Word Representation (GloVe) [7]. Five supervised learning models are implemented and the results are presented from which the results of our interest are shown.

G. *Fake News Detection System using Article Abstraction*

In this study the researches have been able to overcome the problem of identifying Fake news which is highly unambiguous due to the traditional use of Linguistic features of the news [8]. The database used is based on facts collected by Humans. For the task they have implemented a Bidirectional Multi Perspective Matching for Natural Language Sentence (BiMPM) which is a good technique for sentence matching. The semantic sensuality of the lines are compared [8]. It then finds any relevance between the content of an input and the database (Fact database). As it is a collection of proven facts, it is easy to help detect whether the input is promising or misleading with the help of a Fact database.

IV. PROPOSED METHODOLOGY

With many pieces of research and systems established suffering at least some negative expanse, our work proposes a blend of two different domains of artificial intelligence (AI) viz. Natural Language Processing (NLP) which is based on semantic (meaningful) similarity between two sentences and Deep Learning (DL) that is based on the knowing the word patterns Both models use some of the most exclusive entities of their category viz. Sentence Transformer - Bidirectional Encoder Representations from Transformers (SBERT) and GloVe. The proposed system classifies the given user input news into one of the two classes of “True” or “Fake” and also provides links of valid news related to the input news irrespective of the predicted class of input news

A. *External dependencies of the proposed system*

For the regular functioning of the System, some external components play an essential role, these include some existing technologies, some datasets to be developed, and its dependent work. As discussed, some datasets are to be generated for the efficient operation of the models and the pre-existing technologies are to be used in the context of our problem definition.

1. *User Interface for input*

The proposed system demands an input from the user in the form of text which can consist of any news title that the user wants to check the validity for. The user should enter it in the designated search box for input. The additional functionality of this UI is also to provide links of valid news related to the input news irrespective of the predicted class of input news.

2. *Application Programming Interface to fetch True news from recognized valid news sources*

Our initial model, which addresses the problem statements with NLP solution, requires a dynamic dataset of True news, from authentic sources, for its active working. The objective of the presented requirement is also stated in the upcoming topic. For the development of this dataset, an API (Application Programming Interface) is designed. The API receives true news from various trustworthy sources (recognized news networks viz. NDTV, Times of India, etc.) and further saves each record in a json format having various valuable attributes. The dataset is named as ‘‘True News Dataset’’. Being dynamic in working, it is in the description that this dataset is constantly updating in real-time with new records.

3. *True News related to input*

Unarguably, using the entire True News Dataset for every input given is not efficient concerning the regards of time as well as space. Therefore, all the true

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

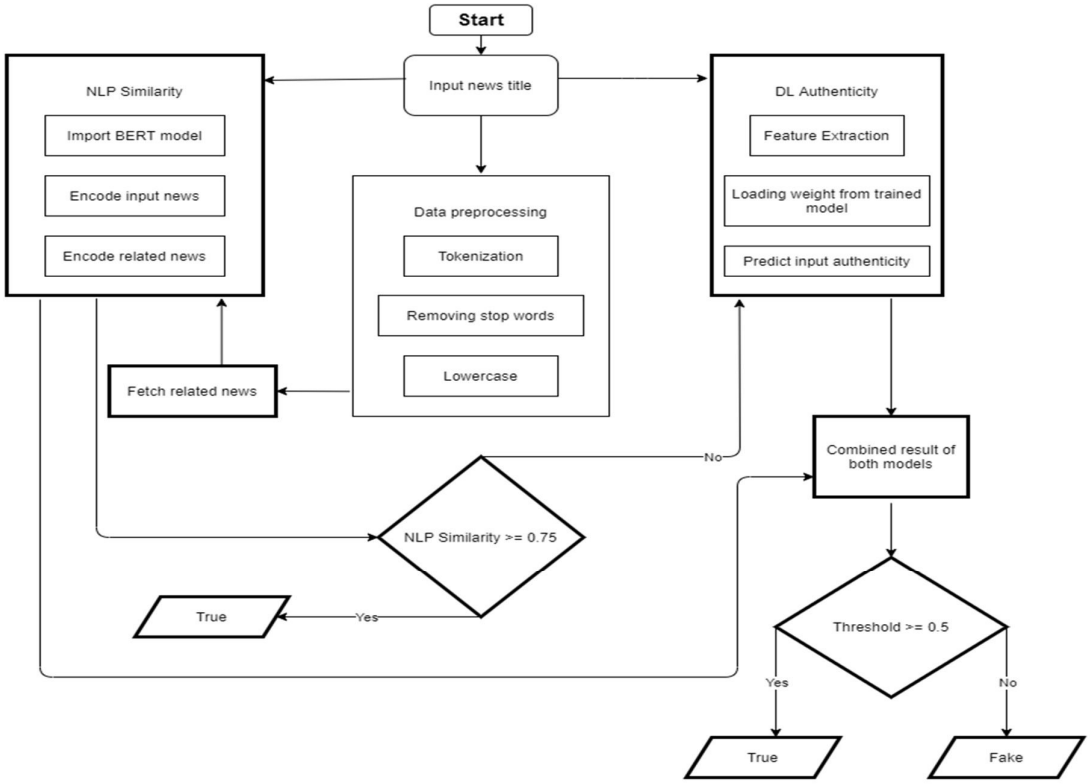


Fig 4.1: Proposed System Flow

news titles related to the input news title are extracted from the dataset using the list of words returned by the function which handles the Pre-processing of input news title. For more comprehensive results, this is done in two ways.

i. topRelated

The topRelated list consists of the news which has title phrasing similar to the input news title. This may give syntactically alike news titles, but can miss out on titles with different phrasing, but having a similar meaning.

ii. extraRelated

The extraRelated list holds news titles having at least one word similar to one of the list of words received after pre-processing the input news title. This benefits in getting an extensive database of relevant news. Thus, no concerning true news is left unvisited. Note that this step is only used to generate the Dataset containing news titles which are syntactically similar to the input news title and not as a part of any model which classifies the input

4. Sentence BERT

On sentence-pair regression tasks such as semantic textual similarity, BERT (Devlin et al., 2018) has set a new state-of-the-art output (STS). However, it obliges feeding both sentences into the network, resulting in an immense computational overhead [9]. BERT takes around 50 million deduction computations (65 hours) to find the most relevant record for an input sentence in a collection of 10,000 sentences. Bidirectional Encoder Representations from Transformers' (BERT) design renders it unfit for searching for semantic similarities. SBERT was created to address this issue [9]. This is made achievable by the Siamese network architecture. It is possible to derive fixed-size vectors for input sentences. Semantically related sentences can be detected using a similarity measure such as cosine similarity or Manhattan / Euclidean distance.

5. Global Vectors for word embeddings

GloVe is developed at Stanford University. The GloVe embeddings are used to capture the global relationship among words and the algorithm works by developing a word-word co-occurrence matrix by using a collection of pre-trained word vectors from Twitter data [10]. The GloVe embeddings are used for the embedding layer in one of our models. The fake news has some prominent patterns of words that are learned by the model during

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

training. The input news titles vectorized by GloVe helps to find such particular patterns Thus, the model predicts fake news based on the co-occurrence of some specific words which are quite prominent in fake news such as spam emails [10].

B. Methodology used in Proposed System

The flow of the proposed system is visually represented in the diagram Fig 4.1.

1. Input processing

As pointed above, the news title, that the user input through the UI. The API sends the input, by the post method, to the filterSentence function which carries out the task of NLP preprocessing, along with the steps involved in it. It returns the list of important wards in the input news title i.e., removal of stop words. Note, the input is expected to be the title of the news only in text format.

This list of words is used in generating the two lists having news titles related to input news viz. topRelated and extra output as explained in detail in the previous topic. The input news cannot be compared with all the news present in True News Dataset as it will be time-consuming thus, incompetent. Thus, the purpose of this Related News list is to narrow down the number of true news which are to be compared by the NLP model.

2. Natural Language Processing

This model is based on the SBERT (Sentence-transformer BERT) which is described in the above topic. The function is called by passing the Input news title and the Related News List. The SBERT encodes both of these text form parameters into vectors and then the cosine distance of the input news vector with every element of the related news list is calculated out. The maximum similarity value is selected. If the value is exceeding a specified threshold, it corresponds that, a piece of news, meaningfully similar to the input news, is present in the dataset having True news. Thus, the input news is detected as True news. Thus, we infer that this proposed system executes fake new detection in real time.

3. Deep Learning model

This step marks the combination strategy of this overall proposed system in tackling the discussed problem statement, which contributes to the resulting better performance. Following the execution of the NLP model, there remains a condition when the maximum similarity value for a given input is less than the specified threshold. In that case, the model won't immediately classify the input news as Fake, alternatively, it will send the input news to the developed and trained DL model. The DL model consists of GloVe, described above in detail, for vectorizing the input news title of string data type which is passed when the corresponding function is called. The string is preprocessed (tokenized, lower case, etc.) and tokenizer procedures are executed on it viz. text-to-sequence, padding. The embedding matrix containing embedding of words is developed from a dataset used in training the model.

The dataset comprises over 50,000 data points and their class (True or Fake) on an open-source website e.g., Kaggle. The model is trained with the deep learning training layers and activation function layers are added. The accuracy of this model on test data was 96 %. This function returns the probability of the input news being True.

4. Combining results of both the models

For the input news, which is transferred from the NLP model to the DL model, we produce two outputs from the two models. In this module, we will mathematically combine the two results based on the weightage of each model on determining the final output. If the value of the final output is exceeding the specified threshold, the input news belongs to the class True and if not, Fake.

V. DISCUSSION OF RESULTS

The DL model was trained on a dataset having data points covering 50,000 and with distinct values of hyper-parameters. The dataset was split in 70:30 proportion as train dataset and test dataset. Depicted in Fig 5.1, after training, the model yielded an accuracy of 98% on the test dataset as shown beneath. For more

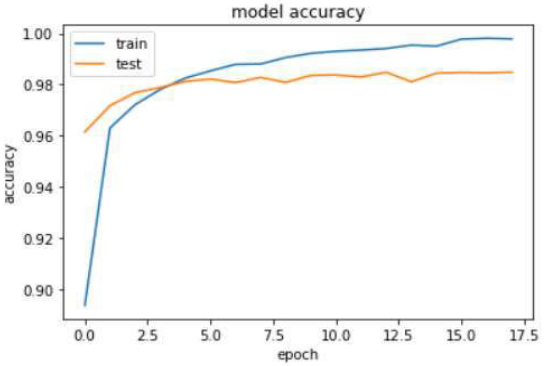


Fig 5.1: Accuracy of Classification of News by DL model

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

reliable evaluation we observed the Confusion Matrix of the predictions on the test dataset which symbolized an efficient performance by the DL model, as shown in Fig 5.2. The train dataset comprised of 35,000 inputs and test dataset has 15,000 inputs. An individual input for the model is the news title that user inputs.

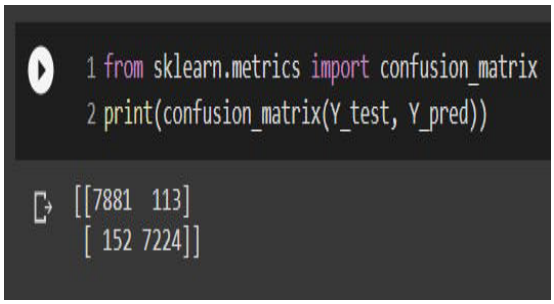


Fig 5.2: Confusion Matrix of Classification of News by DL model

The overall system was tested on a dataset having True news and Fake news making 120 records in total. The accuracy was calculated to be 89.17%.

VI. CONCLUSION

With the rise in popularity of social media, more people are turning to it for news instead of conventional news sources. However, social media has been used to spread false information, which has serious consequences on both individual users and culture as a whole. We concluded from our research that Natural Language Processing (NLP) & Deep Learning (DL) can be used to build models which could be used to detect the Fake News. Thus, we used these disciplines of artificial intelligence with some highly efficient techniques and tuned them to complete the various aspects of the system.

FUTURE SCOPE

After covering various unsatisfactory points from the previous methodology there is a future scope in the proposed methodology too. By leading some deep research, the less efficient time consumption can be made optimal. Also, the obstacle in the prediction of input news title having specific proper nouns can be overcome by training with the records having the specific proper nouns. A dataset holding a random portion of the True news present in the True news dataset with each of its corresponding Fake news, is being arranged. Consequently, this appropriate dataset will be adopted in the overall evaluation of the proposed system.

ACKNOLEDGEMENT

For the overall project we acknowledge the guidance provided by Prof. S. A. Nagtilak, Department of Information Technology, Smt. Kashibai Navale College of Engineering, Pune.

REFERENCES

[1] Kai Shu, Amy Sliva, Suhang Wang, Jiliang Tang, and Huan Liu. 2017. “Fake News Detection on Social Media: A Data Mining Perspective”. SIGKDD Explor. News l. 19, 1 (June 2017), 22–36. DOI:https://doi.org/10.1145/3137597.3137600

[2] *https://www.dsayce.com*

[3] Iftikhar Ahmad, Muhammad Yousaf, Suhail Yousaf, Muhammad Ovais Ahmad, “Fake News Detection Using Machine Learning Ensemble Methods, Complexity”, vol. 2020, Article ID 8885861, 11 pages, 2020. https://doi.org/10.1155/2020/8885861

[4] Thota, Aswini; Tilak, Priyanka; Ahluwalia, Simrat; and Lohia, Nibrat (2018) “Fake News Detection: A Deep Learning Approach”, SMU Data Science Review: Vol. 1: No. 3, Article 10. Available at: https://scholar.smu.edu/datasciencereview/vol1/iss3/10

[5] Gaurav Bhatt, Aman Sharma, Shivam Sharma, Ankush Nagpal, Balasubramanian Raman, and Ankush Mittal. 2017. “On the Benefit of Combining Neural, Statistical and External Features for Fake News Identification”, arXiv preprint arXiv:1712.03935 (2017)

[6] Granik, Mykhailo, and Volodymyr Mesyura, “Fake news detection using naive Bayes classifier”. Electrical and Computer Engineering (UKRCON), 2017 IEEE First Ukraine Conference on. IEEE, 2017.

[6] Nils Reimers, Iryna Gurevych. 2019, “Sentence-BERT: Sentence Embeddings using Siamese BERT-Networks”, arXiv:1908.10084 (2019)

[7] Hrishikesh Telang, Shreya More, Yatri Modi, Lakshmi Kurup, “An empirical Analysis of Classification Models for Detection of Fake News Articles”, © 2019 IEEE

[8] Kyeong-hwan , Chang-sung Jeong, “Fake News Detection System using Article Abstraction” , ©2019 IEEE

[9] Nils Reimers, Iryna Gurevych (2019), “Sentence-BERT: Sentence Embeddings using Siamese BERT-Networks”, arXiv:1908.10084v1 ©2019 IEEE

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Recommendation System for Twitter Using Sentiment Analysis

Priyanka Vhatkar
Information Technology
SKN College of Engineering,
Pune-41, Maharashtra.
priyankavhatkar5@gmail.com

Rhea Philip
Information Technology
SKN College of Engineering,
Pune-41, Maharashtra.
rheaphilip99@gmail.com

Laxmi Patil
Information Technology
SKN College of Engineering,
Pune-41, Maharashtra.
laxmipatil0115@gmail.com

Pradnya Patare
Information Technology
SKN College of Engineering,
Pune-41, Maharashtra.
pradnya.patare27@gmail.com

***Abstract*—Social media provides a platform for people of various ages to connect, whether it be friends, family, or people with similar interests. It allows for sharing of data such as pictures, statuses, and location. It helps people connect across various cities, countries around the globe. Twitter is a platform used by millions of people of the ages thirteen and above. This lets anyone search for their interests just by a search. A user searching for content gets access to all the data posted by various users that have posted. Due to the vast amount of data available at an instant it is difficult to filter the content according to the content viewer. Since there are children below the age of eighteen on the site too, we need to provide a filter that helps to hide content that might not be suitable for them. Strong content posted on the platform can have an influence on the adolescent's mindset, which is why it needs to be filtered to prevent them from having access to such content. Our proposed system aims to provide a filter to segregate the data and provide the appropriate data to the user. It also aims to provide a public response based on the sentiment regarding products or government schemes.**

***Keywords*—Twitter; Sentimental Analysis; Social Media; SVM; NLP; Supervised Learning.**

I. INTRODUCTION

Since social media has a large audience it gets difficult to monitor data that is being presented to the user. Anyone above the age of thirteen has access to social media and is allowed to create an account. Hence, the need for sentiment analysis is to provide the user the freedom of personalization of the content presented which gives them control over the kind of data they would like to see on their feed. Adolescents can use this feature to avoid content with strong language or violence portrayed since all these might have a hostile effect on the individual's mind. Sentiment analysis uses the polarity score which gives the right content for the user so that the user's mentality will not be affected. The input is the raw data accessed from twitter. This data is then extracted and categorized according to the sentiment. [1]

The system aims to filter the tweets based on their sentiment as well as provide a public response regarding the keyword, hashtag or statements searched.

Sentiment analysis of Twitter data is required to help the user to personalize the data visible to them and not have any unwanted content shown. It can be useful for the subsequent reasons:

1. Companies can monitor the public opinion on their products and take it as a public response.

2. This also helps the government understand public opinion related to a decision taken by them. [3]

3. Adolescents can use this feature to avoid content with strong language portrayed since all these might have a hostile effect on the individual's mind. [1]

II. MOTIVATION

Sentiment analysis within the domain of micro-blogging has been the subject of the latest research, so there is still wide scope for further research in this field. An adequate amount of corresponding prior work has been done on sentiment analysis, which includes user reviews, documents, web blogs/articles, and general phrase-level sentiment analysis. These differ for Twitter mainly due to there being a limit of 280 characters per tweet which forces the user to precise opinion compressed in an extremely short text. The best results are achieved in sentiment classification using supervised learning techniques like Naive Bayes and SVM (Support Vector Machine), but the manual labeling required for the supervised approach is extremely expensive. Some work has been done on unsupervised and semi-supervised approaches, and there's a ton of room for improvement. There is a need for proper and formal comparisons between the results arrived through different features and classification techniques to select the best features and most efficient classification techniques for particular applications. With the huge amount of data available to the user, there is a need to filter the content. This helps to recommend only the data appropriate according to the user's needs.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

The objectives are:

1. To filter the Twitter content searched for.
2. To present data in the form of a bar graph according to the polarity score.
3. To help view public responses using the hashtag, keyword or statements searched.

III. LITERATURE SURVEY

In [8], H. Watanabe, M. Bouazizi, and T. Ohtsuki, state that social media platforms help users to share their information with the people who follow them as well as people who share common interests. These sites can generally be used by users above the age of thirteen, giving a large majority of people access to them. Due to the involvement of so many users, people are often subjected to pressure by their peers without their knowledge, which is why they might underplay the risks associated. Furthermore, since the platform has users of various cultures, some people often tend to use hateful speech against those who do not follow their culture, which can lead to hurting one's feelings or in worse cases, cyberbullying. It had been reported that there were four hundred and eighty-one hate crimes with an anti-Islamic motive after the tragic event of 9/11. Hence, control needs to be established for such viewers.

In [1], Dawn Beverley Branley, Judith Covey, describe that the activity on social media can act as a means to encourage adolescents to indulge in risky activities, which could lead to harm indirectly if not directly. It also acts as a reason for the shift in decision making, since adolescents are easily influenced by their peers. They can be forced into sending data that might not be appropriate, through blackmailing, which can then be exploited or used for threatening to get work done. This also leads to peer pressure and instances of cyberbullying, which can greatly impact the individual. Therefore, a system is required to monitor and filter such data to help prevent any crimes of hate or exploiting of data for one's benefit.

In [6], Maryum Bibi, Malik Sajjad Ahmed Nadeem, Imtiaz Hussain Khan, Seong-O Shim, Ishtiaq Rasool Khan, Uzma Naqvi, And Wajid Aziz, talk about sentiment analysis being handled as a Natural language processing (NLP) at many levels of granularity. Microblog data in particular Twitter, on which users post real-time reactions to and point of view about "everything", poses newer and different challenges. They build models using Naive Bayes, Maximum Entropy, and Support Vector Machines (SVM), and they report SVM outperforms other classifiers.
A problem in sentiment analysis is due to the categorization of sentiment polarity. Given a bit of transcription, the matter is to categorize the text into one specific sentiment polarity, positive or negative (or neutral). Based upon the range of the text, there are three levels of sentiment polarity categorization, namely the document level, the sentence level, and thus the entity and aspect level. The document level examines whether a document, as an entire, expresses the negative or positive sentiment, while the sentence level deals with each sentence's sentiment categorization. The entity and aspect level then focus on what people like or dislike from their point of view.

In [4], Z. Jianqiang and G. Xiaolin, highlight the utilization of feature extraction, for reducing the amount of resources needed for processing without losing important or relevant information. Feature extraction also can reduce the quantity of dispensable data for a given analysis which involves Data Mining, Data Extraction. Further, the algorithm calculates the overall tone of the text segment by referring to the polarity assigned to each word. For feature selection, it removes objective sentences by extracting subjective ones. They proposed a text-categorization technique which is used to identify subjective content using minimum and Selected tokens generated from Twitter data, where each token is designated a sentiment score, specifically TSI (Total Sentiment Index), classifying itself as a positive token or a negative token. Compared to previous approaches in sentiment topics, additional findings showed that adding the semantic feature produces better Recall (retrieved documents) to compute the score in negative sentiment classification.

In [2], R. B. Shamantha, S. M. Shetty, and P. Rai concluded on measuring the frequency of the words being used. Word cloud is a pictorial representation of words based on the frequency occurrence of words in the text is also created. The calculation is actualized utilizing R attributable to its component rich, thorough, and expressive abilities for measurable information which is used for filtering. The system filters data based on their polarity score and the filter settings set by the users to set a filter regarding the tweets shown on their timeline, and then present it on the user's feed so that it does not affect their mindset and their mental health. Hence news related to violence on women and animals about information will not be provided to users with help of filtering. So we need to filter that news on social media platforms, for users who do not want to see those types of posts or tweets.

IV. PROPOSED METHODOLOGY

The following are the steps involved within the proposed system:

A. DATA CLEANING

Data cleaning is used to extract the relevant data from a given text segment. This is used to get rid of any unnecessary data that will not be of use while calculating the sentiment of the post. This step involves three sub-steps [4].

1. GARBAGE REMOVAL

In this step, all irrelevant data such as Non-ASCII (American Standard Code for Information Interchange) characters, URL

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

(Uniform Resource Locator) Links, Non-English characters, Numbers, Web addresses, etc. are removed [4].

2. SLANG REMOVAL

This step is used to rectify any slang errors that may be present in the tweet. It converts the slang or abbreviations to their original meaning using a predefined dictionary or map. This helps us during sentiment analysis as some slang or abbreviated words might not have any meaning while calculating polarity [4].

3. STOP WORD REMOVAL

This is used to get rid of words that might have no impact on the text. These words are generally the common words of the language such as "above", "a", etc. [4].

B. DATA PREPROCESSING

This step is used to organize the text to be then further analyzed. It consists of three sub-steps.

1. TOKENIZATION

It is the process of dividing the text segments into individual phrases, words, symbols, or other meaningful elements known as tokens [4].

2. STEMMING

It is a process of converting the reduced word to its root/base word. For this, it removes the suffix part of the word to convert it into its root word. For example, the word thinking gets rid of the suffix part and replaces it with think, which is its root word [4].

3. POS-TAGGING

This step is used to tag a word in a sentence, to its matching part of the text segment based on meaning and context of use.

After the preprocessing step, each keyword contains its tokens, stem form, and POS-Tag which is then sent to the next step in the algorithm [4].

C. CLASSIFICATION OF TWITTER SENTIMENT ANALYSIS

For classification, we use two kinds of API (Application Programming Interface), stream and search. The stream API helps us collect real-time data to be analyzed [6].

The system takes mixed data and sends it through a classifier. The classifier then categorizes data into different classes. Each class has similar kinds of words present in them which are associated with different polarities.

According to the score, it classifies the post into one of the five categories: Very Negative, Negative, Positive, Very Positive, Neutral.

1. Very Negative: -0.5 to -1
2. Negative: -0.001 to -0.49
3. Positive:0.001 to 0.49
4. Very Positive: 0.5 to 1
5. Neutral: 0

Using the above value, it calculates the total score of the post, according to which it classifies the tweet.

D. DATA FILTRATION

We use the collected results to determine whether the post should be viewed by the user. Filtering is needed because there are certain contents that some users may wish not to see, such as adult content, strong language, etc. For such light-hearted, young users this provision is provided.

Using the calculated result, we check for the score obtained, if the score obtained is not within the range then the system will not present it to the user. Otherwise, if the score is within the range the tweet will be presented to the user [3].

Figure 4.1 illustrates the flow of the proposed system which involves the above steps.

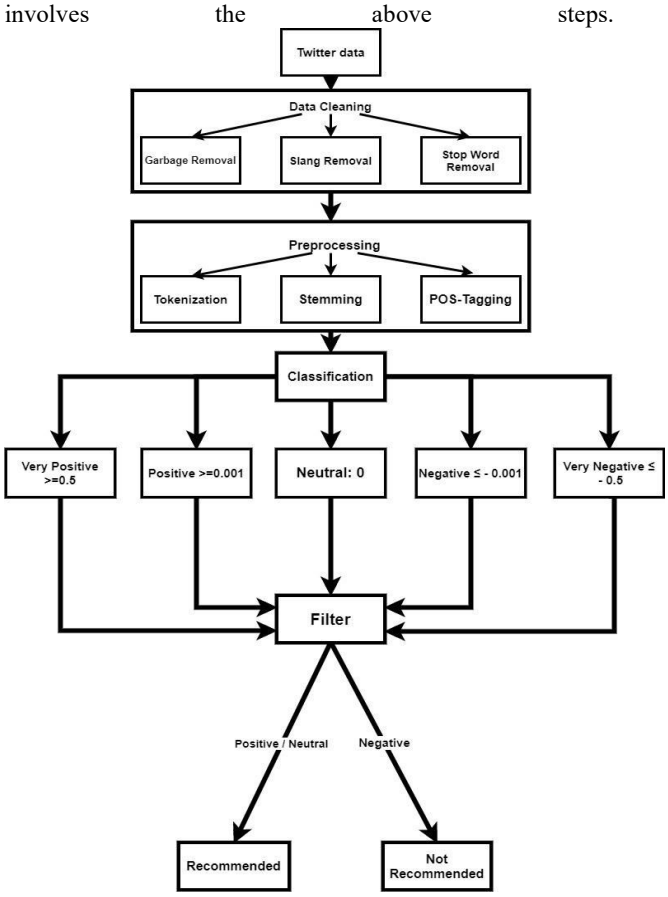


Fig 4.1: Proposed system flow diagram

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

V. Results and Discussion

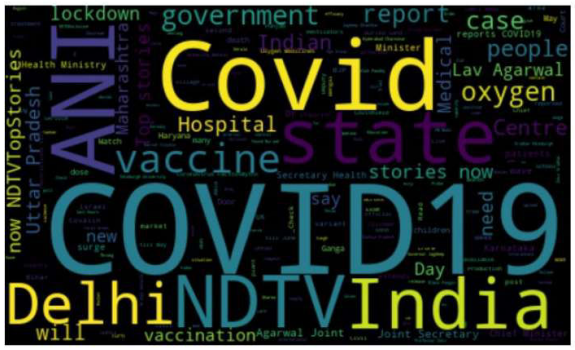


Fig 5.1: WordCloud

Figure 5.1 shows a graphical representation of the frequency of the words used when we search for the keyword “covid”. The words with higher frequency are shown larger than the words used less frequently.

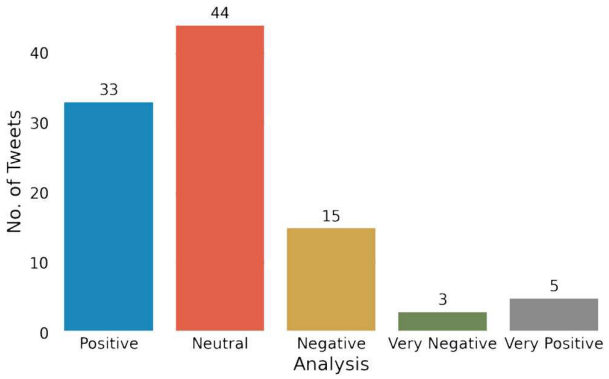


Fig 5.2: Bar Graph

Figure 5.2 shows a bar graph obtained after searching for the keyword “covid”. It shows us the classification of the tweets according to their polarity. Here, a dataset of 100 tweets is considered which have been obtained by accessing the developer account. The count is displayed on the y-axis using which the number of tweets of a particular polarity can be seen. On the x-axis, the different classifications of the sentiment analysis can be seen, which are very positive, positive, neutral, negative, and very negative which can be compared to the y-axis to check their count.

VI. Conclusion

Although there are many pros to social media usage, there are plenty of cons that can have negative effects on the user as well as his family and friends. Hence, sentiment analysis should be conducted to help control the content a user is exposed to by giving him control to be able to personalize the content to be viewed. Our system plans to filter data based on this polarity score and the filter settings set by the user and then present it to the user and also provide the public response regarding a topic along with the sentiments.

The comparative results prove that our system not only determines the sentiment of the Twitter data but also helps filter out the data and also provides public response along with the sentiment, hence, it adds additional features to the existing models.

VII. Future Scope

In the future, text analysis could be applied to personal conversations and spam to control the amount of hate being spread and also reduce cyberbullying. It could be also used to directly block spam content and messages by the system rather than by the user, which helps save time as well as not cause inconvenience.

VIII. Acknowledgment

We would like to express our deep sense of gratitude to Prof. S. A. Nagtilak, who supported us from the very beginning and contributed towards the development of the project.

IX. References

[1] Dawn Beverley Branley, Judith Covey, *“Risky Behavior Via Social Media: The Role of Reasoned and Social Reactive Pathways”*, (2017), doi: Computers in Human Behavior 10.1016/j.chb.2017.09.036)

[2] R. B. Shamantha, S. M. Shetty and P. Rai, " *Sentiment Analysis Using Machine Learning Classifiers: Evaluation of Performance",* 2019 IEEE 4th International Conference on Computer and Communication Systems (ICCCS), Singapore, 2019, pp. 21-25.

[3] D. Chauhan, K. Sutaria and R. Doshi, "*Impact of Semiotics on Multidimensional Sentiment Analysis on Twitter: A Survey*,"- 2018 Second International Conference on Computing Methodologies and Communication (ICCMC), Erode, 2018, pp. 671-674.

[4] Z. Jianqiang and G. Xiaolin, "*Comparison Research on Text Pre-processing Methods on Twitter Sentiment Analysis,*" in IEEE Access, vol. 5, pp. 2870-2879, 2018

[5] V. Rekha, R. Raksha, P. Patil, N. Swaras and G. L. Rajat, *"Sentiment Analysis on Indian Government Schemes Using Twitter data,"* - 2019 International Conference on Data Science and Communication (IconDSC), Bangalore, India, 2019, pp. 1-5.

[6] Maryum Bibi, Malik Sajjad Ahmed Nadeem, Imtiaz Hussain Khan, Seong-O Shim, Ishtiaq Rasool Khan, Uzma Naqvi, And Wajid Aziz, *"Class Association and Attribute Relevancy Based Imputation Algorithm to Reduce Twitter Data for Optimal Sentiment Analysis,"* - IEEE Access, vol. 7, pp. 136535-136544, 2019.

[7] R. D. Desai, "*Sentiment Analysis of Twitter Data*", 2018 Second International Conference on Intelligent Computing and Control Systems (ICICCS), Madurai, India, 2018, pp. 114-117.

[8] H. Watanabe, M. Bouazizi, and T. Ohtsuki, "*Hate Speech on Twitter: A Pragmatic Approach to Collect Hateful and Offensive Expressions and Perform Hate Speech Detection,*" in IEEE Access, vol. 6, pp. 13825-13835, 2018.

[9] Farkhund Iqbal1, Jahanzeb Maqbool2, "*A Hybrid Framework for Sentiment Analysis Using Genetic Algorithm Based Feature Reduction*," - Benjamin c. M. Fung3, Rabia Batool1, asad Masood Khattak1, Saiqa Aleem1, and Patrick c. K. Hung IEEE Access, vol. 7, pp. 14637-14652, 2019.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Wireless Industrial Security Intelligent Robot

[1]Suhas Shinde
Department of E&TC
Sinhgad Institute of Technology
Lonavala, India
ssuhas.sit@sinhgad.edu

[2]Meghna Sinha
Department of E&TC
Sinhgad Institute of Technology
Lonavala, India
meghnasinha88@gmail.com

[3]Shveta Suresh Patil
Department of E&TC
Sinhgad Institute of Technology
Lonavala, India
shveta.patil@yahoo.com

[4]Ashish B
Department of E&TC
Sinhgad Institute of Technology
Lonavala, India
b9.ashish@gmail.com

***Abstract*— In any industry, a huge part of the work is tedious, and the sensible use of computerization will bring about the ideal use of machines and labor. Here our ROBOT assumes a fundamental double part. They work from an overhead matrix with a rectangular work envelope. They are primarily used to perform pick and spot activities. An insight robot is created to identify risky Gas/Smoke by utilizing a 32-bit microcontroller. In our undertaking, the robot is intended to move naturally. The robot acts as per the order given by the program. It will move every one of the headings like forward, opposite, right, and left. The smoke detecting unit is accessible in the robot instrument. If specific smoke is distinguished, the robot will turn ON the Alarm Unit. The video and sound are observed at the control unit. For sending sound and video, an RF camera has been utilized.**

***Keywords*—Computerization, 32-bit Microcontroller, RF camera, Alarm Unit, Control Unit**

I. INTRODUCTION

The plan of Robotics manages information creation in various fields. Today Robots are turning into a piece of regular daily existence and these components diminish us from different risks. The Robotic framework generally comprises of two sections, for example, the automated sensor body and Intelligence unit together can be utilized in numerous utilizations of industrial facilities and goliath machine units. These frameworks are utilized in programmed painting, welding, and transport frameworks, and so forth the conduct of robots lies with Artificial knowledge for their motion. This insight helps the robot for development starting with one point then onto the next in performing complex tasks moreover. This rationale power comes from order and helps the robot wheels to move and play out a specific work doled out. The mechanical framework is a joining of equipment and programming intended to play out the particular undertaking which can likewise be characterized as an inserted framework. It is a constant framework that is intended to play out specific estimations and programmed choices expeditiously. The undertakings appointed are done with severe cutoff times in organized or unstructured conditions with human direction ceaselessly. These robots are of various sorts like independent, manual, and semi-self-governing attractive to work in any climate. Security and observation are generally utilized by versatile robots. These frameworks can be controlled through a controller for reacting naturally to upgraded climate. Servo engines are utilized in the drive framework and the sensors like ultrasonic and infrared are utilized for distance estimation and the camera put on the robot are utilized to record the sound and video and send it remotely to better places. The reconnaissance frameworks utilized in the current world are dynamic in research zones. These utilitarian robots are amazingly difficult to investigate and observing in indoor/open-air conditions. Self-governing robots are utilized to recognize and distinguish objects with a multisensory stage in different applications like air terminals and exhibition halls. They can be utilized to deal with ongoing uses of structures and security gadgets too. To forestall harms and burglary likewise, the security framework is being introduced for distant checking and can send the data through the organize and naturally identify the substance of intruders for security alerts and staying away from perils for outrageous conditions.

A. Need for Robots:

Robots are better than people in numerous angles like improving the nature of work, better adaptability, and Accuracy in saw estimations. One of the critical angles is Robots can deal with the work in risky conditions with numerous sensors based on them. In the present and future situation, robots have the biggest examination region in various fields like vehicle creation, space, and submerged investigation, business farming, and so forth The beneath figure shows the examination in coming a very long time in different applications characterized

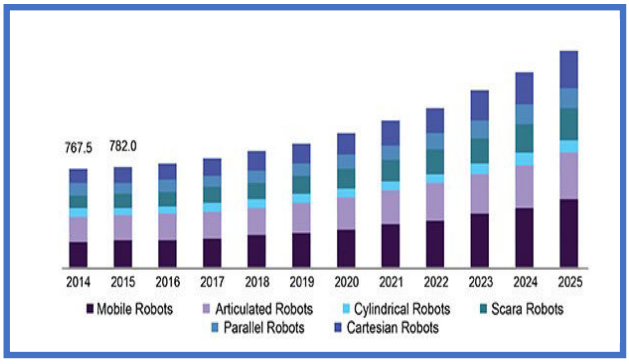


Fig. 1. U.S. warehouse robotics market size, by product (USD Million) (Grandview research)

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

II. MAJOR ISSUES

In the current world, there are different issues related to independent advanced mechanics. One of the serious issues is dynamic and knowledge frameworks. Another issue is an unexpected closure of the robot because of force disappointment. The robots are intended to perform explicit capacities and errands for security administrations like route, discovery, and management of the premises through camera vision by an organization. A portion of the significant challenges in mechanical technology is towards the dynamic and velocity of the robot. AI and its insight is as yet a test for researchers in face acknowledgment and language preparing, way arranging, ideal step, and pick and spot of the article in unstructured conditions. The mechanical framework's issues are comprehensively ordered in applications, for example, limitation and planning in obscure conditions and cognizance conduct change contingent upon the ecological conditions and robot and human connection are the most fascinating applications with regards to detecting and movement errands.

Mechanical arrangements are effective and basic, yet during the execution, they frequently give the hole of ranges of abilities and involvement with assembling the human partners. One more issue execution is the expense of innovation and spending necessities that can be spent to make mechanical technology help and ready to support the expense in the market these difficulties manage the wellbeing highlights in checking, directing, and restricting the labour force for mechanized arrangements. Thus advanced mechanics is a help to improve the innovation, quicker and more astute in the business sectors for building the financial future. Such solutions are being provided in the diagram shown in figure 2

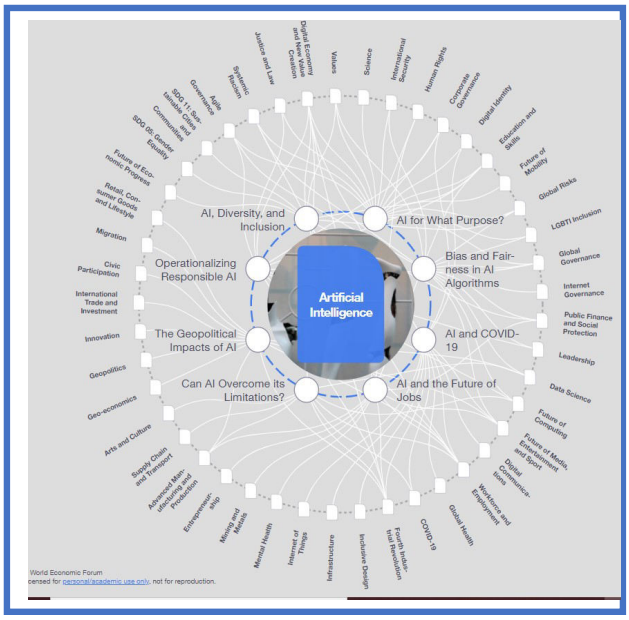


Fig. 2. Radical solutions and latest strategic trends and analysis for robotic solutions (World economic forum.com)

III. DESIGN OBJECTIVES

The self-governing robot for the ideal work is done with the accompanying targets by following plan contemplations. The Robot planned can work in risky conditions with Security and greater dependability. These Robots have repeatable exactness consistently and can be significantly more precise than people; they may have milli or miniature inch exactness. Robots planned have sensors that can have capacities past that of people and can deal with different boosts or assignments at the same time, people can just one. This Robotic framework replaces human laborers for most extreme security and reconnaissance.

The robot is planned and developed with related electronic circuits to move into an obscure area and transport the subtleties of that obscure territory to a home spot. The Robot will have inbuilt sensors and cameras to accomplish this. The framework is made more helpful by acquainting man-made brainpower with it. By man-made brainpower, we are planning the robot in such a way that in a circumstance that requires dynamic, the robot distinguishes the presence of the snag, cautions the client, and anticipates guidance from the client for an additional move or it will make activity by its own. Other condition, which the robot can decide, is the presence of fire, Humidity, smoke, high temperature, and gas. Here we are utilizing a GSM modem to get a cautioning SMS for unusual conditions around there. This task is isolated into modules for a superior comprehension of the circuit. The modules incorporate ARM 7 Microcontroller Board Humidity Sensor Gas Sensor Intruder Sensor Fire Sensing Unit ZIGBEE Transceiver GSM Modem

This project mainly contains two parts:

A. ROBOT part

B. REMOTE-PC part

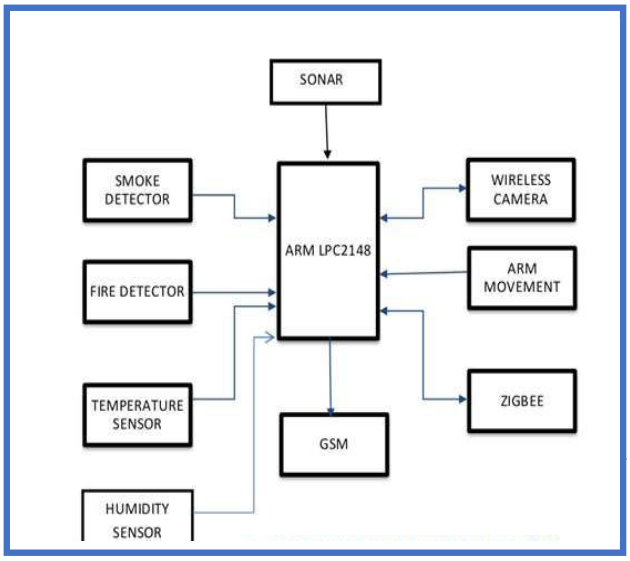
A) ROBOT part

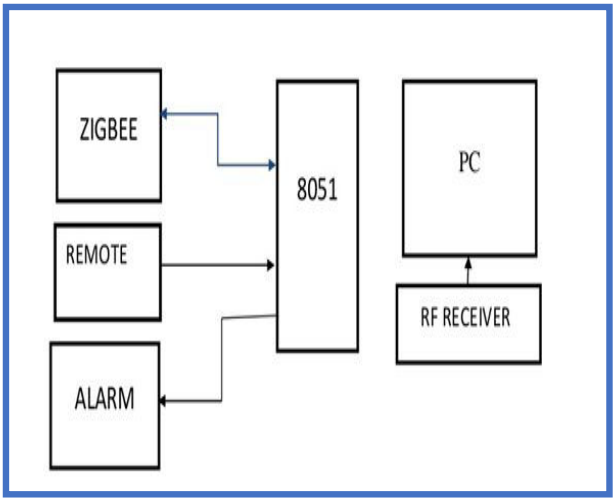
This part fundamentally contains an LPC2148 Microcontroller interfaced with 5 sensors, A GSM module, and a ZIGBEE handset. This appears in the square chart. Temperature sensor, Smoke sensor, Humidity sensor, Fire senor, and SONOR are associated with the distinctive V/O pins of LPC2148. A ZIGBEE handset is associated with LPC2148 to build up a remote association between the robot and far off A RF Audio and Video camera with an inbuilt transmitter is mounted on the ROBOT to record and live transfer the video far off pc.

B) REMOTE-PC part:

This part chiefly contains a pc and an 8051 microcontroller interfaced with LCD and press button switchboard. LCD is utilized to show the deliberate boundaries and ready messages. Switchboard is utilized to control robot development and pick and spot arm development through the ZIGBEE handset. An RF beneficiary is put at the pe to get the live video transfer and watch it on the pc screen.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6





This robot has a pick and spot Arm, camera, SONAR(ultrasonic sensor) to quantify the distance of the snag, fire detector(IR sensor), smoke detector(MQ-05), dampness sensor(RHT03), Temperature Sensor(LM-35), GSM modem(SIM-300). The Robot will send constant video in real-time, which could be seen at the distant screen, and a control move can be made as needs be to control the robot are utilizing a high-reach ZIGBEE controller. Various sensors measure the environmental factors and send the deliberate information to the 32-cycle arm 7 microcontroller which is customized to make applicable moves as indicated by estimated information. A GSM modem is interfaced with the LPC2148 is utilized to send ready messages to the supporter number. An LCD interfaced with an 8051 microcontroller is given at the far-off PC to watch the deliberate information by the client. The development of the robot is constrained by the press catches interfaced with the 8051 microcontroller at the distant PC. The I2 C has an SDL (sequential information line) and SCL (sequential clock line). The I2 C is a multi-ace correspondence Protocol, in which SCL is been constrained by the expert. I2 C is likewise bi-directional. This is executed by a "Recognize" framework. The "Recognize" framework or "ACK" framework permits information to be sent one way to one thing on the I2 C transport, and afterward, that thing will "ACK" to show the information was gotten.

IV. TOOLS USED

A. HARDWARE

- Arm 7 Microcontroller (LPC2148)
- 8051 Microcontroller
- Camera(C3038)
- Cc2500 Xbee (Zigbee Module)
- Mechanical Arm (For Pic & Place)
- Dc Motor (400rpm-12v)
- Smoke Sensor (Mq5)
- Fire Sensor (IR Sensor)
- Temperature Sensor (Lm35)
- Ultra-Sonic Sonar (Hc-Sr04)
- Humidity Sensor (Dth11)
- GSM Module (Sim 300)

B. SOFTWARE

1) Keil IDE

The Keil MDK-ARM Microcontroller Kit is a complete software development environment for the wide range of ARM, Cortex-M, and Cortex-R-based microcontroller devices.

2) Flash magic

Flash Magic is a PC tool for programming flash-based microcontrollers from NXP using a serial or Ethernet protocol while in the target hardware

V. CONCLUSION

In our venture, the robot is intended to move by our order. The robot acts as per the order given by the program. It will move every one of the headings like forward, opposite, right, and left. The video and sound are checked at the control unit. In this model venture, we plan so that this robot can be moved anyplace and it can get the data of a specific spot. This undertaking is a lot helpful in places where a human can't go into the spots like ground channels, smoke-arranged caverns, and this venture is a lot valuable in such circumstances. A cautioning message will be shipped off a recommended SIM utilizing the GSM module. If specific course we will offer as indicated by that solitary our robot will move and that development will be seen by the camera. So that it's not difficult to distinguish any deficiencies or risks in the business. It prompts a simple cycle without communication of human

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

ACKNOWLEDGMENT

This work was supported by the Department of Electronics and Telecommunication, Sinhgad Institute of Technology The authors are grateful for this support

REFERENCES

[1] Ren C. Luo, Yi T. Chou Chung T. Liao 2007, " NCCU security warrior: An Intelligent security robot system" IECON 2007- 33rd Annual conference of the IEEE industrial electronics society.

[2] Wenjiang Huang, Qingsong Guan, Juhua Luo, Jingcheng Zhang, Jinling Zhao, Dong Liang, Linsheng Huang, and Dongyan Zhang, "New Optimized Spectral Indices for Identifying and Monitoring Winter Wheat Diseases", IEEE Journal of selected topics in applied earth observation and remote sensing, Vol. 7, No. 6, June 2014

[3] P. Viola and M. Jones, "Robust Real-time Object Detection," Proceeding of IEEE Workshop on Statistical and Computational Theories of Vision (SCTV 2001).

[4] Ming-Hsuan Yang, Knegman, D.J., Ahuja, N, "Detecting faces in images: a survey," IEEE Transactions on Pattern Analysis and Machine Intelligence, Volume 24, Issue 1, Jan. 2002, pp.34 - 58.

[5] Howie Choset, Kevin Lynch, Seth Hutchinson, George Kantor, Wolfram Burgard, Lydia Kavraki, and Sebastian Thrun, "Principles of Robot Motion, Theory, Algorithms, and Implementation",(2005).

[6] Sakagami, Y.; Watanabe, R; Aoyama, C, Matsunaga, S.; Higaki, N; Fujimura, K. "The intelligent ASTMO: system overview and integration", International Conference on Intelligent Robots and System, 2002. IEEE/RSJ Volume 3, 30 Sept.-5 Oct. 2002 pp.2478 - 2483 vol.3

[7] Kaneko, K.; Kanehiro, F.; Kajita, S.; Hirukawa, H.; Kawasaki, T.; Hirata, M.; Akachi, K.; Isozumi, T " Humanoid robot HRP-2," International Conference on Robotics and Automation, 2004. Proceedings. ICRA '04. 2004 IE EE Volume 2, Apr26-May 1, 2004 Page(s): 1083 -1090 Vol.2

[8] Ren C. Luo, Te Yi. Hsu, Po Kai. Wang, and Kuo L. Su, "Multi sensors Based on Dynamic Navigation for an Intelligent Security Robot," The 8th International Conference on Automation Technology, May 2005, pp. 504-509(2005).

[9] Caldwell, D.G.; Wardle, A.; Kocak, O.; Goodwin, M, " Telepresence feedback and input systems for a twin armed mobile robot," Proceeding of Robotics & Automation Magazine, IEEE Volume 3, Issue 3, Sept. 1996 pp.

[10] Valdez, M.A.C., Valera, J.A.O., Jojutla, Ma. And Arteaga, O.P, "Estimating Soc in Lead-Acid Batteries Using Neural Networks in a Microcontroller- Based Charge-Controller," International Joint Conference on IJCNN '06. pp. 2713-2719,16-21 July 2006.

[11] Martin T. Hagan, Howard B. Demuth, and Mark Beale, Neural Network Design, International Thomson Publishing Inc. 1996.

[12] Russell, S. J. & Norvig, P. (1995). Artificial Intelligence: A Modern Approach. Prentice-Hall. Prentice Hall. ISBN 0-13-790395-2.

[13] Asada, H. and Slotine, J.-J. E. (1986). Robot Analysis and Control. Wiley. ISBN 0-471-83029-1.

Automatic Sanitization System for Transportation And Auditorium

Dr.Sharad Gholap[1], Ms. Pranita Holasmbare[2], Ms. Neha S Maity[3], Ms. Aparna Patil[4]

Associate Professor, Department of Electronic and Telecommunication, Sinhgad Institute of Technology, Lonavla, India [1].

Student, Department of Electronic and Telecommunication, Sinhgad Institute of Technology, Lonavla, India [2,3,4].

sharadgh@gmail.com [1], pholasmbare@gmail.com [2] nehamaity02@gmail.com , [3] patilaparna9994@gmail.com[4]

Abstract— The case of COVID-19 continues to increase, transmitted directly and indirectly. Hygiene and sanitation approaches are needed for prevention. The purpose of this review is to review how the transmission and the policy of COVID-19 prevention with hygiene and sanitation approaches. High population mobility, if there is a case of COVID19 without symptoms but carrier, then it can spread quickly. Especially in public transportation modes such as planes, trains, markets, religious events, and weddings. Activity in the crowd can transmit COVID-19quickly because droplets can spread and infect others. For this reason, social distancing is needed to reduce crowds, close schools, workplaces, terminals. In times of a global pandemic such as the corona virus (COVID-19), it is critical that social distance guidelines are adhered to and are effectively tracked and traced . These two aspects help significantly in controlling the spread of the virus worldwide. The ability of IoT services in providing remote data collection and monitoring has made it a critical aspect in fighting the spread of virus pandemics , Health workers and authorities need data to manage a rapidly spreading respiratory pandemic.

Keywords: Automatic Sanitization, Face mask detection, temperature monitoring, AI, BOLT IOT, transport, Covid Protocols, community health, cloud computing

I. INTRODUCTION

In the situation like Covid-19 or any pandemic the most difficult task for governance is to maintain public hygiene. This project will simplify this job to some extent. This project is a sanitization set which will ensure that people could travel in healthy and cleaned space without any human efforts. It will be capable of doing sanitization, temperature checking as well as alarming features will help to maintain social distancing and detecting people who are not wearing masks. S0 basically this project will help country's citizens to maintain basic norms for their healthy life.

People are forced by laws to wear face masks and maintain specific distance in public in many countries. As well as they are being sanitized by frontline workers. These rules and laws were developed as an action to the exponential growth in cases and deaths in many areas. However, the process of monitoring and handling large groups of people is becoming more difficult. The monitoring process involves the detection of anyone who is not wearing a face mask, looking for whether people are maintaining suitable distance or not , checking their body temperature and lastly to disinfect them with means of sanitizer.

Here we introduce a system which will monitor all the mentioned functions above without any human interruptions. It includes firstly mask face detection model that is based on computer vision and deep learning. The proposed model can be integrated with surveillance cameras to impede the COVID-19 transmission by allowing the detection of people who are wearing masks not wearing face masks. The model is integration between deep learning and classical machine learning techniques with open CV. We have used deep transfer leering for feature extractions and combined it with three classical machine learning algorithms. We introduced a comparison between them to find the most suitable algorithm that achieved the highest accuracy and consumed the least time in the process of training and detection.

Secondly this paper also discusses the design and development of a fully automatic, modular system for disinfection that will make a whole body of transportation/auditorium alike a sanitization chamber to disinfect people with high neutralizing efficiency of the COVID-19 virus. In this chamber, the person is disinfected by the spraying of the ionized mist of an approved disinfectant solution for 20s. Process will be performed autonomously, after specific interval of time mentioned in algorithm. This work can be extended to mobile disinfection tunnels for vehicles and auditorium or at all public places.The main objectives of paper are

A. To create a system to handle pandemic without human interference.
B. Real time use for temperature detection and sanitization into complete monitoring system .
C. Using technology to reducing management problem and ensuring community health at public space.
D. Reduce wide spread of virus due to public negligence with help of mask detection and temperature monitoring system.

II. HARDWARE OF THE PRESENTED SYSTE

The hardware consist of the following are

1. BOLT IOT Module
2. Temperature sensor
3. Relay

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

4. Water motor

Software components are as follows

1. Python IDE
2. BOLT cloud

A detailed explanation for each individual unit as present below

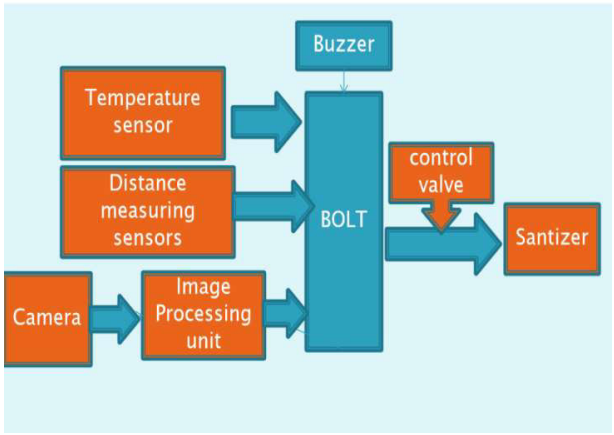


Fig.1 shows the Block diagram of the proposed system

I. BOLT IOT Module

Bolt IoT platform gives you the capability to control your devices and collect data from IoT devices safely and securely no matter where you are. Get actionable insights by deploying machine learning algorithms with just a few clicks to detect anomalies as well as predict sensor values.

Bolt is a fully integrated IoT platform for developers that helps them build IoT projects and products quickly and easily. It is a platform designed for Makers and Developers to build IoT Projects. Bolt also lets you quickly run Machine Learning Algorithms to predict your IoT Data as well as detect anomalies.

Hardware of Bolt consists of an ESP8266 chip, which is utilized for Wi-Fi communication and general-purpose input/output (GPIO) control, an SD card for local data storage and five-volt micro-USB charger connector for powering up the hardware unit.

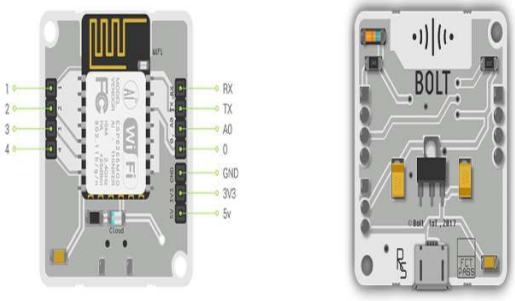


Fig.2 BOLT IOT module

II. Temperature sensor (MLX90614)

The MLX90614 sensor can measure the temperature of an object without any physical contact with it. This is made possible with a law called Stefan-Boltzmann Law, which states that all objects and living beings emit IR Energy and the intensity of this emitted IR energy will be directly proportional to the temperature of that object or living being. So the MLX90614 sensor calculates the temperature of an object by measuring the amount of IR energy emitted from it.

Fig.3 temperature sensor i.e. MLX90614

MLX90614 Temperature Sensor Specifications

- Operating Voltage: 3.6V to 5V (available in 3V and 5V version)
- Supply Current: 1.5mA
- Object Temperature Range: -70° C to 382.2°C
- Ambient Temperature Range: -40° C to 125°C
- Accuracy: 0.02°C
- Field of View: 80°
- Distance between object and sensor: 2cm-5cm (approx.)

III. Relay

Relays are most commonly used switching device in electronics. Let us learn how to use one in our circuits based on the requirement of our project.

Before we proceed with the circuit to drive the relay we have to consider two important parameter of the relay. Once is the Trigger Voltage, this is the voltage required to turn on the relay that is to change the contact from Common->NC to Common->NO. Our relay here has 5V trigger voltage, but you can also find relays of values 3V, 6V and even 12V so select one based on the available voltage in your project. The other parameter is your Load Voltage & Current, this is the amount of voltage or current that the NC,NO or Common terminal of the relay could withstand, in our case for DC it is maximum of 30V and 10A. Make sure the load you are using falls into this range.

A +5V DC supply to one end of the coil and the other end to ground through a switch. This switch can be anything from a small transistor to a microcontroller or a microprocessor which can perform switching operating. You can also notice a diode connected across the coil of the relay, this diode is called the Fly back Diode. The purpose of the diode is to protect the switch from high voltage spike that can produced by the relay coil. As shown one end of the

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

load can be connected to the Common pin and the other end is either connected to NO or NC. If connected to NO the load remains disconnected before trigger and if connected to NC the load remains connected before trigger.

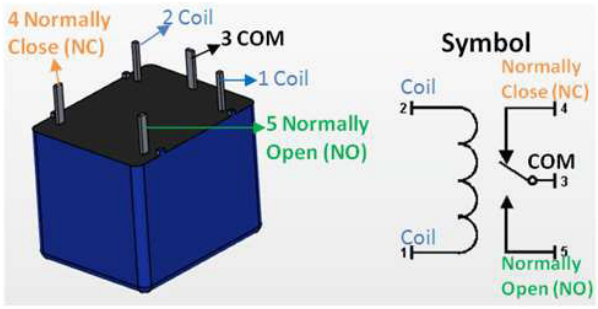


Fig.4 Relay

IV. Water motor

When talking about how pumps work, or looking over pump specifications, you will come across maximum and rated "flow". While flow rate from a tap or shower head is influenced by piping, water saving heads and aerators, the pump needs to be able to generate water flow, the output of which is represented in litres per minute (l/min).

Generally, a higher volume of water (l/min) that can be pushed through pipes by a pump, the more taps that can be serviced throughout your property and home. Yet, flow rates are also influenced by distance to the access points, pipe work and elevation. This is where "maximum" and "rated" flow rates are helpful to understanding whether a water pump is adequate for your needs.

Fig.5 Water motor

Maximum Flow Rate

The "maximum flow" represents the number of litres that a water pump can pressure immediately from itself without any need to travel up and through pipework. That is, how much water volume can be pushed directly out from the pump.

In practical applications, such pump water to where it is needed around your property or in your home, the maximum flow won't be achieved. To understand what type of flow rate you can expect after water is pressured through pipework with rises and bends, then the "normal" or "rated flow" becomes the significant value to consider.

It is also important to understand that some pumps come with controller systems that detect flow rates, boosting pressure as necessary to provide a consistent water pressure.

Rated and Normal Flow Rate

Simply understood, "rated flow" is the operating condition that the pump is designed for. Another term you might hear is "normal flow". The normal flow rate is often less than the rated flow, and represents the conditions the pump is expected to operate at most of the time.

Pumps that list both, you should pay more attention to the normal flow. The pump might support such without doing much more than simply changing the impeller size. Consult the pump manufacturer if concerned about the operational flow rates you should expect. You don't want to end up with a pump that doesn't do the job.

To make your task easier, pump manufacturers often provide a line graph to displaying the expected maximum flow rates based according to head distance (how high water needs to be pushed up to reach your desired access point/s). Selecting the right pump often requires some understanding of where your pump will be located and the network of pipes it will be attached to.

III. SOFTWARE IMPLIMENTATION

Software components are as follows:

1.Python IDE

2.BOLT cloud

A detailed explanation for each individual unit as present below

1.Python IDE with OpenCV

Python provides lots of libraries for image processing, including −OpenCV − Image processing library mainly focused on real-time computer vision with application in wide-range of areas like 2D and 3D feature tool kits, facial & gesture recognition, Human-computer interaction, Mobile robotics, Object identification and others.

The Python language has diversified application in the software development companies such as in gaming, web frameworks and applications, language development, prototyping, graphic design applications, etc. This provides the language a higher plethora over other programming languages used in the industry. Some of its advantages are-

- Extensive Support Libraries

  It provides large standard libraries that include the areas like string operations, Internet, web service tools, operating system interfaces and protocols. Most of the highly used programming tasks are already scripted into it that limits the length of the codes to be written in Python.

- Integration Feature

  Python integrates the Enterprise Application Integration that makes it easy to develop Web services by invoking COM or COBRA components. It has powerful control capabilities as it calls directly through C, C++ or Java via Python. Python also processes

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

XML and other markup languages as it can run on all modern operating systems through same byte code.

- Improved Programmer's Productivity

  The language has extensive support libraries and clean object-oriented designs that increase two to ten fold of programmer's productivity while using the languages like Java, VB, Perl, C, C++ and C#.

- Productivity

With its strong process integration features, unit testing framework and enhanced control capabilities contribute towards the increased speed for most applications and productivity of applications. It is a great option for building scalable multi-protocol network applications.

2.BOLT cloud

Bolt takes care of analysis, visualization, network connectivity, storage and scalability so that you, as a developer, can focus on the end application. Basically, it is a small chip that comes with a Wi-Fi module that lets you connect sensors and a Cloud platform to store and analyse data. Bolt's Cloud platform helps you control and monitor your products over the Internet, create personalize dashboards to visualize data, monitor device health, send text messages and more.

Hardware of Bolt consists of an ESP8266 chip, which is utilized for Wi-Fi communication and general-purpose input/output (GPIO) control, an SD card for local data storage and five-volt micro-USB charger connector for powering up the hardware unit.

It also has a power LED, a status LED to indicate hardware operation status and a Wi-Fi LED to indicate if the hardware is connected to Wi-Fi or not.

The Cloud is built using a Python based flask server and a message queuing telemetry transport (MQTT) back-end to manage devices connected to the Cloud. The developed Cloud stack provides you with a dynamic dashboard using which you can control and monitor your devices over the Internet.

Unlike most other platforms, Bolt offers a hardware chip, Cloud, storage, analysis and visualization in one integrated package.

It helps you build a customized user interface with simple scripting languages such as Hyper Text Markup Language/Cascading Style Sheets (HTML/CSS) and interface the GPIO pins using Bolt API. With Bolt's patent-pending lib discovery protocol, multiple Bolts can be controlled using a single application.

Pre-connected to Cloud. The real power of Bolt comes from its Cloud. Bolt hardware chip is pre-connected to Bolt Cloud, which lets you quickly deploy data visualization and analysis. Bolt has an excellent data visualization and analysis system because of its pre-built data visualization service that converts data into useful intelligence and gives you actionable insights from your data. Bolt has simplified API that let you set up and manage devices .

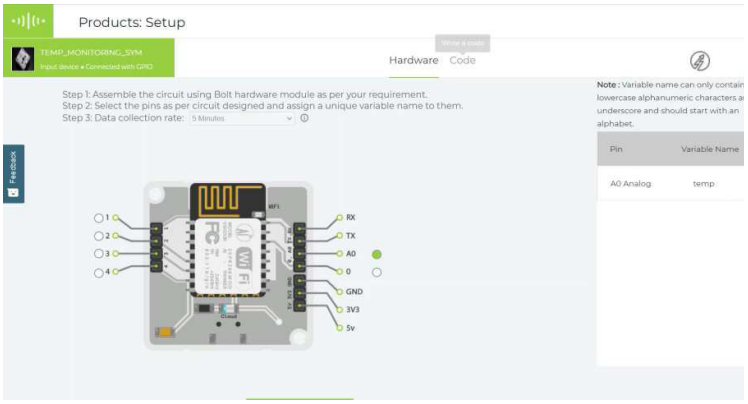


Fig. 6 configuration of Bolt module with cloud

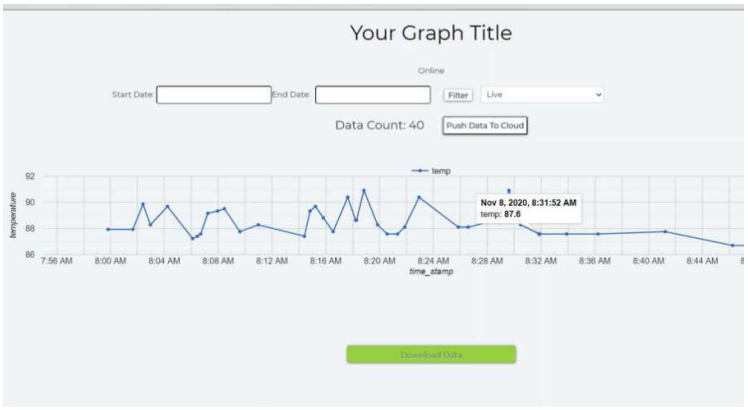


Fig.7 Data recorded and represented in graphical form of collected data

IV RESULTS

The relay accepts the pulse from BOLT and makes the pump run. The pump is 3 to 12V submersible type, the interval between two spray is around 1 hr.

For temperature sensing system the BOLT IOT Platform will get the input from the sensor and then it will send it to BOLT cloud where we can present the data in any desired format as per our requirement making the data analysis process quite easier and efficient.

For face mask detection an efficient and economic approach of using AI to create a safe environment in a manufacturing setup. A hybrid model using deep and classical machine learning for face mask detection will be presented. A face mask detection data set consists of with mask and without mask images , the system going to use OpenCV to do real-time face detection from a live stream via webcam.

REFERENCES

[1] Wells CR, Sah P, Moghadas SM, Pandey A, Shoukat A, Wang Y, et al. Impact of international travel and border control measures on the global spread of the novel 2019 coronavirus outbreak. PNAS - Proceedings of the National Academy of Sciences of the United States of America. 2020; 117 (13): 7504–9.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

[2] Prem K, Liu Y, Russell TW, Kucharski AJ, Eggo RM, Davies N, et al. The effect of control strategies to reduce social mixing on outcomes of the COVID-19 epidemic in Wuhan, China: a modeling study. The Lancet Public Health. 2020; 5 (5): 261-70.

[3] Lewnard JA, Lo NC. Scientific and ethical basis for social-distancing interventions against COVID-19. The Lancet Infectious Diseases. 2020; 20 (6): 631–3. 37.

[4] A. Mathew, F. A. Sa, H. Pooja, and A. Verma, ''Smart disease surveillance based on Internet of Things (IoT),'' Int. J. Adv. Res. Comput. Commun. Eng., vol. 4, no. 5, pp. 180–183, 2015.

[5] R. P. Singh, M. Javaid, A. Haleem, and R. Suman, ''Internet of Things (IoT) applications to fight against COVID-19 pandemic,'' Diabetes Metabolic Syndrome: Clin. Res. Rev., vol. 14, no. 4, pp. 521–524, Jul. 2020.

[6] J. Barabas, R. Zalman, and M. Kochlan, ''Automated evaluation of COVID-19 risk factors coupled with real-time, indoor, personal localization data for potential disease identification, prevention and smart quarantining,'' in Proc. 43rd Int. Conf. Telecommun. Signal Process. (TSP), Jul. 2020, pp. 645–648.

[7] R. Stojanovic, A. Skraba, and B. Lutovac, ''A headset like wearable device to track COVID-19 symptoms,'' in Proc. 9th Medit. Conf. Embedded Comput. (MECO), Jun. 2020, pp. 1–4

[8] L. McCallum and D. Higgins, "Measuring body temperature," Nursing Times, vol. 108, no. 45, pp. 20–22, 2012.View at: Google Scholar

[9] World Health Organization. Coronavirus disease (COVID-2019) situation reports. Geneva; 2020.

[10] Oon-Tek Ng, Kalisvar Marimuthu, Po-Ying Chia, Vanessa Koh P, Calvin JC, Liang DW, et al. SARS-CoV-2 infection among travelers returning from Wuhan, China. The New England Jurnal of Medicine. 2020; 382: 1476-8

[11] Nuwagaba J, Ashok DD, Balizzakiwa T, Kisengula I, N agaddya EJ, Rutayisire M, 2020. The era of coronavirus; knowledge, attitude, practices, and barriers to hand hygiene among Makerere University students and Katanga community residents. medRxiv.Google Scholar

[12] Michie S, Van Stralen MM, West R, 2011. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. Implement Sci 6: 42.CrossRefPubMedGoogle Scholar

[13] Owhonda G, Maduka O, Nwadiuto I, Tobin-West C, Azi E, Ojimah C, Alasia D, Olofinuka A-M, Agala V, Paul JN, 2020. Awareness, Perception and Practice Of COVID 19 Prevention among Residents of a State in the South-South Region Of Nigeria: Implications for Public Health Control Efforts. medRxiv.Google Scholar

[14] 26. Fan K, Wang P, Zhuang S. Human fall detection using slow feature analysis. Multimed Tools Appl. 2019;78:9101–28. https:// doi.org/10.1007/s11042-018-5638-9. 27. Saha R, Naskar S, Biswas S, Saif S. Performance evaluation of energy-efcient routing with or without relay in medical body sensor network. Health Technol. 2019;9(5):805–15.

[15] Ali NS, Alyasseri ZAA, Abdulmohson A. Real-time heart pulse monitoring technique using wireless sensor network and mobile application. Int J Electr Comput Eng. 2018;8(6):5118.

[16] Wannenburg J, Malekian R. Body sensor network for mobile health monitoring, a diagnosis and anticipating system. IEEE Sens J. 2015;15(12):6839–52

[17] Abdullah A, Ismael A, Rashid A, Abou-ElNour A, Tarique M. Real time wireless health monitoring application using mobile devices. Int J Comput Netw Commun (IJCNC). 2015;7(3):13–30

[18] Saha R, Biswas S (2018) Analytical study on data transmission in WBAN with user mobility support. In 2018 International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET). IEEE, pp. 1–5

[19] Y. Zhang, L. Zhang, E. Oki, N. V. Chawla, and A. Kos, ''IEEE access special section editorial: Big data analytics for smart and connected health,'' IEEE Access, vol. 4, pp. 9906–9909, 2016

[20] M. Ndiaye, A. M. Abu-Mahfouz, and G. P. Hancke, ''SDNMM—A generic SDN-based modular management system for wireless sensor networks,'' IEEE Syst. J., vol. 14, no. 2, pp. 2347–2357, Jun. 2020

[21]] S. Y. Tan and A. Taeihagh, ''Smart city governance in developing countries: A systematic literature review,'' Sustainability, vol. 12, no. 3, p. 899, Jan. 2020, doi: 10.3390/su12030899

[22] C. R. Pathak, ''Challenges of smart cities in India,'' in Urbanization and Regional Sustainability in South Asia: Socio-Economic Drivers, Environmental Pressures and Policy Responses, S. Bandyopadhyay, C. Pathak, and T. Dentinho, Eds. Cham, Switzerland: Springer, 2020, pp. 261–269

[23] I. T. Haque and N. Abu-Ghazaleh, ''Wireless software defined networking: A survey and taxonomy,'' IEEE Commun. Surveys Tuts., vol. 18, no. 4, pp. 2713–2737, 4th Quart., 2019

[24]] K. Ganasegeran and S. A. Abdulrahman, ''Artificial intelligence applications in tracking health behaviors during disease epidemics,'' in Human Behaviour Analysis Using Intelligent Systems, D. Hemanth, Ed. Cham, Switzerland:

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Springer, 2020, pp. 141–155

[25] Z. Allam, G. Dey, and D. S. Jones, ‘‘Artificial intelligence (AI) provided early detection of the coronavirus (COVID-19) in China and will influence future urban health policy internationally,’’ AI, vol. 1, no. 2, pp. 156–165, Apr. 2020

[26] A. Hossam, A. Magdy, A. Fawzy, and S. M. Abd El-Kader, ‘‘An integrated IoT system to control the spread of COVID-19 in Egypt,’’ in Proc. Int. Conf. Adv. Intell. Syst. Inform. Cham, Switzerland: Springer, 2020, pp. 336–346.

[27] P. James, R. Das, A. Jalosinska, and L. Smith, ‘‘Smart cities and a datadriven response to COVID-19,’’ Dialogues Hum. Geography, vol. 10, no. 2, pp. 255–259, Jul. 2020.

[28] R. K. R. Kummitha, ‘‘Smart technologies for fighting pandemics: The techno- and human- driven approaches in controlling the virus transmission,’’ Government Inf. Quart., vol. 37, no. 3, Jul. 2020, Art. no. 101481, doi: 10.1016/j.giq.2020.101481

[29] Feasibility Studies on Use of Water Mist For Plume Infrared Suppression
(Volume 5, Issue 3 [February 2016])
Investigation of Impact of IR sensor on core body temperature Monitoring by comparing measurement sites

[30] (19 May 2020)Bio industrial mechatronics Engg. Hsing university, Taiwan
Digital Image Processing-A Quick Review
(International journal of intelligent computing and technology) 2019 Jan

[31] Feasibility studies on use of water mist for plume infrared suppression (VOLUME 5,ISSUE 3 [FEBRUARY 2016])

[32] Digital Image Processing (International Journal of Intelligent Computing and Technology ,Jan 2019)

[33] COVID-19 Facemask detection with deep learning and computer vision. International Research Journal of Engineering and Technology (IRJET)Volume: 07 Issue: 08 | Aug 2020

[34] Investigation of Impact of IR sensor on core body temperature Monitoring by comparing measurement sites(19 May 2020)Bio industrial mechatronics Engg. Hsing university, Taiwan

Implementation of reliable crop insurance system for timely settlement of claims to farmer using AI.

Deokar Prajakta Y.
Department of Computer Engineering
S. B. Patil College of Engineering
Indapur, India
prajaktadeokar3199@gmail.com

Prof. Gavali A. B.
Department of Computer Engineering
S. B. Patil College of Engineering
Indapur, India
pdnyaneshwar.806@gmail.com

Wabale Pratibha P.
Department of Computer Engineering
S. B. Patil College of Engineering
Indapur, India
pratibhawabale23@gmail.com

Jori Pranali G.
Department of Computer Engineering.
S.B. Patil College of Engineering
Indapur, India
pranalihori2016@gmail.com

***ABSTRACT*— Farmers in India are exposed to large agriculture risks due to unexpected changes in nature. One of the most effective mechanism to alienate agricultural risks is to have a robust insurance system. Since 1972, crop insurance has been in the country, still it has been oppressed with several problems such as, lack of transparency, delay in conducting crop cutting experiments, non-payment/delayed payment of claims to farmers, unawareness about government schemes, less interactive platform, time consuming random surveying method, lack of e-records, unavailability of ground level data, etc. Our main goal is to provide a solution to the problems that farmers have to face due to the delayed crop loss claims. If the recent technologies are incorporated in the existing system, then problems can be solved effectively. The use of drone technology is used before for damage assessment but that was costly.**

In this project we are going to use the latest technologies like image processing using CNN for crop damage assessment. This will reduce the time required for the surveying process after damage. For farmer friendly platform we are providing voice chatbot to solve farmer's query. Basic functionalities of system are 1) Application Submission 2) Image updating of damaged crops 3) Crop assessment using images 4) Notification regarding schemes to farmers 5) Voice chatbot for farmers.

***Keywords*— Crop insurance, Deep learning, CNN, Voice Chatbot, government schemes, crop assessment, image processing**. *(key words)*

I. INTRODUCTION

Farmers are the backbone for the Indian economy. Farmers has to face many problems due to natural calamities such as draught, floods, hurricanes, etc. Due to which they may have to face many economic problems. Indian government provides the insurance to the farmers to overcome this loss. But they can't get the claims on time due to delay in process.

In this system we are going to present some features for the crop insurance system so that it can become feasible for the farmers. Our main goal is to reduce the time required for the settlements of the insurance claims to the farmers. The time required for the survey is time consuming due to random surveying method. There are many problems that farmers have to face. We are trying to minimize some of them. The recent technologies like Artificial Intelligence, Image Processing etc., are used to solve the problems. Government now trying to minimize efforts using recent technologies. We are going to provide some solutions to the problems in an insurance system. The deep learning techniques are used to do the survey of damaged crop images captured by the farmers. The interactive voice chatbot to answer queries asked by the farmers is provided. So that they can understand the information in effective way. The information regarding various schemes will be sent to the farmers through notification on registered mobile number and Email. Farmers can also update the images time to time when they face loss.

I. BACKGROUND AND RELATED WORK

The various researchers have worked in this field to enhance crop insurance using various technologies and historical data analysis. Historical data available with us is analysed to capture the key production risks in the crop insurance using various indices [1]. These indices are then used to decide the payout for crop loss. The remote sensing data is used to calculate some of the indices to design an index-based crop insurance system.[2]. The remote sensing technology is used to predict the crop yield so that it will help to compare the yield data with the damaged crop yield [3]. The deep learning technology which being popular recently is used to solve the problems in the field of agriculture [4]. There are

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

many applications which provide platform for farmers like Argo Insurance - A tool for S.C.H.E.M.E. Management [5]. This tool provides the all information related to crop insurance scheme for farmers. In one of the systems the satellite data is used to do the crop damage assessment due to overwintering [6]. There are various methods in crop insurance system to predict agricultural risk. Deep learning for prediction in agricultural crop insurance is more effective than other methods [7]. Crop can also be got damaged due to various diseases or over pesticides. Convolutional neural networks are built to do diagnosis of crop plants [8]. When crop get damaged due to natural calamities traditional survey method is used to crop loss assessment which is time consuming and labour intensive. The remote sensing observations for crop damage estimation are used before [9],[6]. Deep learning and machine learning techniques have more potential to predict, analyze, classify and detect.

Indian government provides the insurance to the farmers to overcome crop loss. But farmers can't get the claims on time due to delay in process. Agricultural insurance is a very effective mechanism to support farmers so there is need to validate genuineness of the claims made by the farmers [10]

II. PROPOSED SYSTEM

A. Problem Statement:

Implementation of reliable crop insurance system for timely settlement of claims to farmer using AI. By solving the problems related to survey method, Crop damage assessment, nonpayment or delayed payment of claims, unawareness about government schemes, less Reliable platform, lack of e-records.

B. Goals and Objective:

Following are the goals and objectives of our proposed system: Minimize Time required for surveying process as we can generate rough survey through data analysis, spread awareness about the government scheme by sending a SMS or Emails to the farmers and providing guidelines related to schemes, Lower delay in the settlement of claim due to Fast assessment of crop damage, Analysis of assessment data to generate reports and graphs, More Accuracy in records.

C. Working of the system:

Here the working of our system is discussed as shown in Figure 1. We are going to develop the application for the farmers. Farmers can register to the application through mobile number, Email, or Aadhaar number. They can login to the account using registered details. In this application they can fill crop insurance form, can upload the crop images which will be used to assess the damage and to do survey. Farmers can ask their queries using an interactive voice chatbot. The information related to schemes will be notified to the farmers. Guidelines to fill the application form are also provided in an understandable way in the application with the help of that data reports and graphs are generated. The admin or officer will analyze the application forms filled by farmers. The images uploaded by farmers are used to classify into damaged or Non-damaged classes. It will provide rough data about the damaged crops in that area. This is the one approach which can be incorporated in the existing system so that the time required for the crop damage assessment can be reduced. On basis of rough data provided by this system we can help to provide claims to the needy farmers. In this system we have presented some features for the crop insurance system so that it can become feasible for the farmers. Our main goal is to reduce the time required for the settlements of the insurance claims to the farmers.

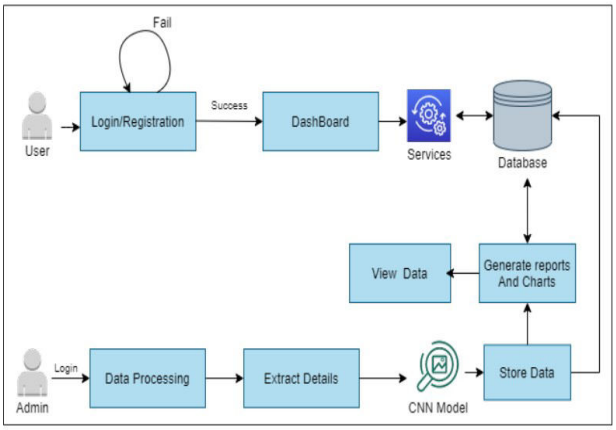


Figure 1: Working of the system

D. Features of our System

The basic features of our system are as follows: Application for crop insurance scheme can be filled. Farmers can update images time to time before and after the damage. Crop damage assessment can be done using images. Notification regarding scheme is sent to farmers using SMS or Email. Farmers can interact with system through voice chatbot to ask their queries.

III. MODULE STRUCTURE

The Figure 2 shows the module structure for the system in which overall system is presented. The user has to register to the system. Account will be created using that user can access their profile. The functionalities provided by system are described in diagram these are as follows: Fill application, analyze application, Identify and classify crop images, generate analysis reports, voice /text chatbot to solve queries, view guidelines at any time to fill form, send notification to farmers, etc. The database environment contains the files related to application data, data stores, file storage, background files to process data.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

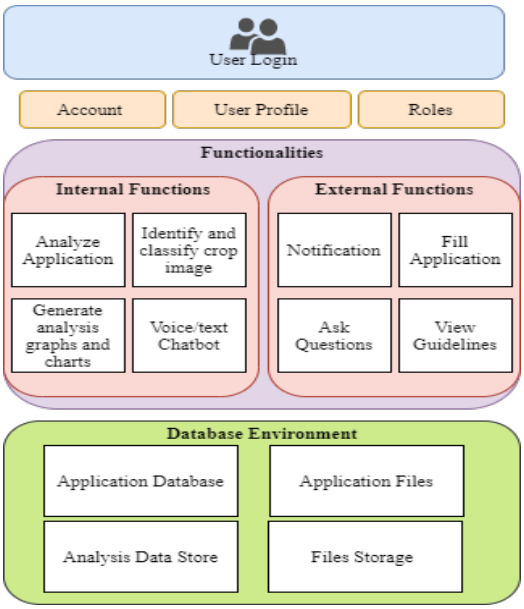


Figure 2 Module structure of System

IV. ALGORITHMS:

A. Voice-bot

Figure 3 : voice-bot

The Figure 3 describes the working of voice-bot module. For voice-bot we have used Speech Recognition library. With the Web Speech API, we can recognize speech using JavaScript. This module recognize speech in a browser and then get the text from the speech to use as user input.
After processing the voice input, it produces the response of queries in the form of voice and text.

B. Image Classification

The Figure 4 describes the working of the image processing module. For image processing we have used the pre-trained neural network Retnet50. Resnet50 gives better results for classification

Steps of Algorithm Execution:

1. First the image captured by the farmers will be uploaded to the portal
2. Preprocessing of Image stored in database is done.
3. Then the Image validation is done by checking image data like farmer's field data and image location data. If details don't match then message to re-upload is displayed.
4. After that CNN is applied on the image for crop damage detection.
5. The model will classify image into damaged or not-damaged category.
6. Image classification details will be stored in database.
7. These details will be used for crop insurance application processing.
8. The basic survey reports will be generated on the basis of image classification details.

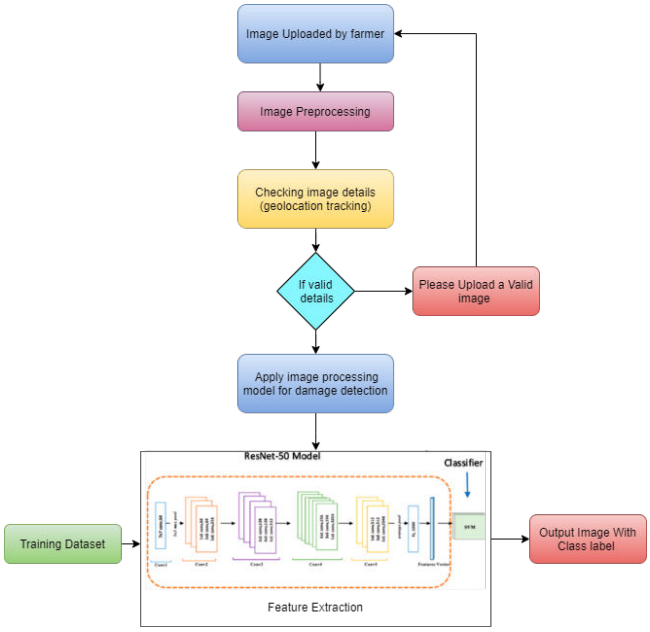


Figure 4: Image classification

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

V. ADVANTAGES AND APPLICATIONS:

Following are advantages of system: Reduction in time required for crop assessment process. Easy availability of information as all information related to schemes is available in application. Ground level data collection. Detailed insurance application status information. Faster query solving with chatbot. Time to time crop status updating. More interactive platform for farmers. Direct crop assessment with mobile based application.

The application of our system is in surveying process as on the basis of data collected, we can generate rough data for surveying process. Accurate data assembly at ground level. Strengthen insurance system. Minimizing agricultural risk.

CONCLUSIONS

The project will help to enhance the crop insurance claim settlement process by using the recent technologies and also provide farmer friendly interactive platform. The recent technologies like Artificial Intelligence, Image Processing etc. are used to assess the crop damage. Here we have used a CNN (Convolutional Neural Network) for analyzing a crop image. Using CNN crops are identified and classified into damaged or Non-damaged categories. For voice chatbot we have used a Natural Language Processing (NLP) to identify queries asked by the farmers. Thus, using a recent technology, we are trying to solve issues related to crop insurance.

REFERENCES

[1] International Conference on Agricultural Risk and Food Security 2010 Index based Crop Insurance by Kolli N Rao.

[2] Application of remote-sensing data in the index-based insurance design. Publisher: IEEE R. Bokusheva; L. Spivak; I. Vitkovskaya; F. Kogan; M. Batyrbayev.

[3] Assessing the applicability of NDVI data for the design of index-based agricultural insurance in Bihar, India. Irene Winkler, Mamta Mehra, Sarah Favrichon, Vaibhav Sharma, Nihar Jangle. Machine Learning Group, Technische University at Berlin, Germany Micro Insurance Academy, Delhi, India.

[4] Deep learning in agriculture: A survey Andreas Kamilaris∗, Francesc X. Prenafeta-Boldú Institute for Food and Agricultural Research and Technology (IRTA), Spain.

[5] Agro Insurance – A Tool for S.C.H.E.M.E. Management. Proceedings 2019: Conference on Technologies for Future Cities (CTFC).Samruddhi Khandare. University of Mumbai - Pillai College of Engineering. Sushopti Gawade University of Mumbai - Pillai College of Engineering. Date Written: December 24, 2018.

[6] Satellite based (pre-)system for assessment of lost in agriculture production due to negative overwintering. Pilot study for insurance sector in Poland. Martyna Gatkowska, Karolina Wróbel. University of Warsaw, Faculty of Geography and Regional Studies, Krakowskie Przedmiescie 26/28, 00927, Warsaw, Poland Institute of Geodesy ad Cartography, Remote Sensing Centre, Jacka Kaczmarskiego 27, 02-679 Warsaw, Poland.

[7] Deep Learning at the Interface of Agricultural Insurance Risk and Spatio-Temporal Uncertainty in Weather Extremes. Azar Ghahari, Nathaniel K. Newlands, Vyacheslav Lyubchich &Yulia R. Gel. Pages 535-550 | Published online: 17 Oct 2019.

[8] Jackfruit Fruit Damage Classification using Convolutional Neural Network Jonah Flor V. Oraño , Elmer A. Maravillas, Chris Jordan G. Aliac. Cebu Institute of Technology University, Cebu City, Philippines. Visayas State University, Visca, Baybay City, Philippines.

[9] Near Real Time Crop Loss Estimation using Remote Sensing Observations. Suryakant Sawant Tata Consultancy Services TCS Innovation Labs Mumbai. Jayantrao Mohite Tata Consultancy Services TCS Innovation Labs Mumbai. Mariappan Sakkan Tata Consultancy Services TCS Innovation Labs Chennai. Srinivasu Pappula Tata Consultancy Services TCS Innovation Labs Hyderabad.

[10] Decision Support System for Detection of False Agricultural Insurance Claims using Genetic Support Vector Machines Rajesh Budihall , Dr G Komarswamy2 1 Research Scholar, Department of Computer Science and Engineering, Jain Deemed to be University, Bengaluru, India 2 Associate Professor, Department of Computer Science and Engineering, Jain Deemed to be University, Bengaluru, India

[11] https://www-financialexpress-com.cdn.ampproject.org/v/s/ www.financial express.com/ economy/ pmfby-government -testing - modern- tech-for-assessment-of- -damage/ 1302683/ lite/? usqp= mq331AQFKAGwASA

[12]https://www.newindianexpress.com/states/karnataka/2018 /mar/09/gps-based-survey-helps-karnataka-assess-crop-loss-accurately-1784187.html

[13] https://eprints.usq.edu.au/1237/1/Young_Chandler_Apan_2004.pdf

[14]https://m-economictimes-com.cdn.ampproject.org/ v/s/m.economictimes .com /news /economy /agriculture /crop-insurance- scheme-
awareness- technology-key -for-successful- implementation/

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Ozone level Prediction Using Machine Learning

Frason Francis
Dept. of Information Technology
Mumbai University
Mumbai, India
frason.kalapurackal@gmail.com

Krishna More
Dept. of Information Technology
Mumbai University
Mumbai, India
krishnaaaxo@gmail.com

Abstract— Due to the increasing environmental issues, especially air pollution, climate change, and ultraviolet radiation from the sun, determining whether a day is polluted or not is essential to people's health. Ozone is considered one of the greenhouse gases that causes a reduction of carbon intake by plants which contributes to increased global warming [5]. The ground level ozone is also called as tropospheric ozone which is emitted directly into the air an which is created by volatile organic compounds and nitrogen in the presence of sunlight. The research has been implemented to classify the ground level-based ozone data based on complex machine learning models to solve this problem. The data has two classes as the target; here, the ozone day is represented by class one, and the non-ozone day is defined as class zero. Ground-level ozone is a hazardous pollutant that silently kills humans, animals, and plants. This type of ozone is formed when oxides of nitrogen and volatile organic compounds chemically react in sunlight and at high temperature. Aside from the reactants of ozone, several other factors such as motor vehicle emissions, fossil fuels, and particulate matter correlate with ozone. The US has a network of sensors to monitor and predict ozone levels. These forecasts, however, are chiefly based on current ozone levels. If these forecasts found their models on the sources of ozone, such as traffic (motor vehicles), their estimations would be more accurate, as ozone does not maintain a strong correlation with time.

Furthermore, the current predictions are far too complex to be implemented in local areas since they are intended for large regions. This project attempts to use past data to develop a correlation between ozone levels and ozone causes. The expectation is that supervised machine learning algorithms can be extended to accurately and efficiently model ozone levels against the causes of ozone in three different locations in Houston, Galveston and Brazoria area. Following the outlined procedure, a supervised machine learning algorithm was successfully developed. Using this algorithm, ozone levels can now be predicted with higher accuracy than before and can be predicted efficiently in local areas with the help of ozone monitors. Lastly, this algorithm could also find accurate correlations with other pollutants to create predictions for them.

Keywords-- Ozone Pollution, Classification, Logistic Regression, Random Forest, Decision Tree, K Nearest Neighbour, Logistic Regression, Gaussian NB, Support Vector Machine, Machine Learning, Time Series.

1. INTRODUCTION

Over the last few years, air pollution has become a significant issue, according to environmental studies [9]. Some of the major sources of NOx and VOCs are emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapours, and chemical solvents. Furthermore, biogenic sources (living organisms or biological processes) emit VOCs that contribute to ground-level ozone formation. The atmospheric pollutants in major urban areas are increasing rapidly, due to which there is a sudden increase in the concentration levels of various gaseous levels in the atmosphere. This has led to multiple catastrophic changes like rising sea levels, global climate change, and many more. Degradation of air quality has caused a rapid increase of pollutant concentration in the air [7]. Summer days in Texas can be favourable for ozone production because high-pressure systems dominate the local weather patterns, resulting in clear skies and stagnant winds. However, ozone forms at the highest concentrations on humid, sunny days with low wind speeds, allowing more contaminants to create and accumulate. Therefore, it is highly harmful to the people if no advance forecast is provided. A group of scientists has measured several ground-level ozone pollution factors from the Huston, Galveston, and Brazoria area, which is the dataset used in this research. In this research, eight machine learning models are trained to make binary classification predictions using the ozone level data, where ozone day:1 and nonozone day: 0 [1]. This research contributes to the field of machine learning as well as providing a precise forecasting method for people. The accuracy scores can be compared using eight different models.

The conclusion of which process is the most accurate can be drawn in a relatively simple and straightforward manner. Parameters are tuned eight times during the construction of the model to optimize each model's test scores. These scores

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

are then used to compare each method's accuracy and choose the best prediction method [1].

2. DATA DESCRIPTION AND PRE-PROCESSING

This dataset is taken from the University of California, Irvine website, which is called Ozone Level Detection Data. It includes 2536 Rows with 73 Columns. It contains date data along with 72 numeric data. Different Features like T (temperature), TT (totals: assess storm strength), U (wind in: east west direction wind), V (v wind: north-south direction wind), RH (relative humidity), HT (geopotential height), WSR (wind speed resultant), KI (k index: thunderstorm potential), SLP (sea level pressure), SLP_ (SLP changes from yesterday), Prep (precipitation), are measured each day constantly from 1/1/1998 to 31/12/2004, although there is a significant number of missing values are present in the dataset. The maximum number of missing values is from the wind speed resultant at 0^{th} day and wind speed resultant at 22^{nd} day feature, which has 299 and 300 missing data correspondingly. Most of the data is continuously missing on the first 53 attributes from the period from 7/1/2002 to 1/20/2003. The final prediction is binary classification, where 0 means that day is a non-ozone day, and 1 represent that day is polluted [1].

In this dataset, about 2300 set of occurrences is classified as non-ozone days and 200 as ozone days [1]. This result shows us that our result is imbalanced and bias towards more ozone days. To show an overview of this dataset, a few graphs of some chosen attributes are shown below (Fig. 1). Because of the large numbers of missing values and low ozone-day proportion, adding missing values were chosen instead of deleting all rows directly through the mean average imputer method [1]. Since the dataset was collected describes almost seven year of ground ozone concentration from 1998 to 2004, it's rational to fill in the data for a single row with the mean of the previous and following whole data. However, when it comes to data loss over time, they must be calculated as the average of the last year's data. Most of the attributes present in our dataset shows some kind of relation as from the Fig 4. We can observe that there is a positive correlation of 0.88 between T_PK and T85. From the correlation plot we can observe that there are no strong linear relationship with our target variable. A brief overview of this dataset, along with Bar graphs, is shown below (Fig. 2-4).

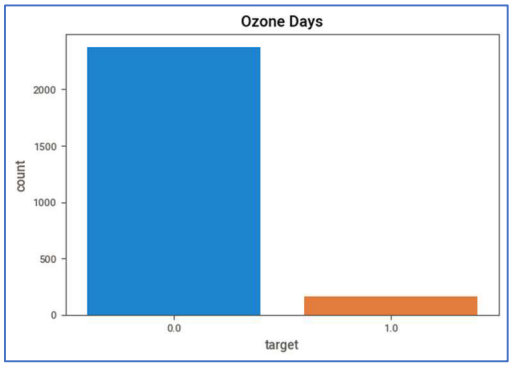


Figure 1. Shows the distribution of Target Variable

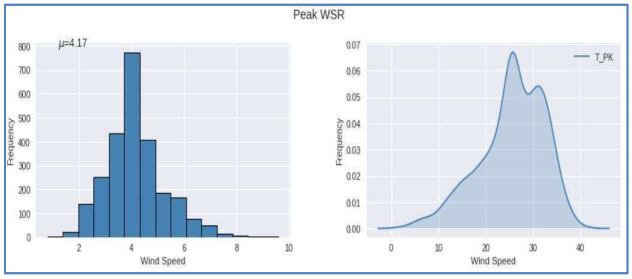


Figure 2. The mean avg. wind speed in 1 day has max freq. of 4 and low freq. as the speed gets low than 4.

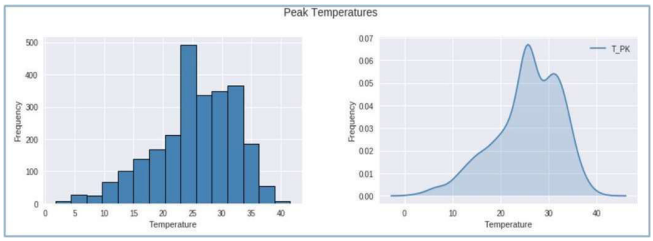


Figure 3. The avg. temperature in 1 day has freq. gradually increasing from 0 to 25 degrees, and dropping between from 26 to 40.

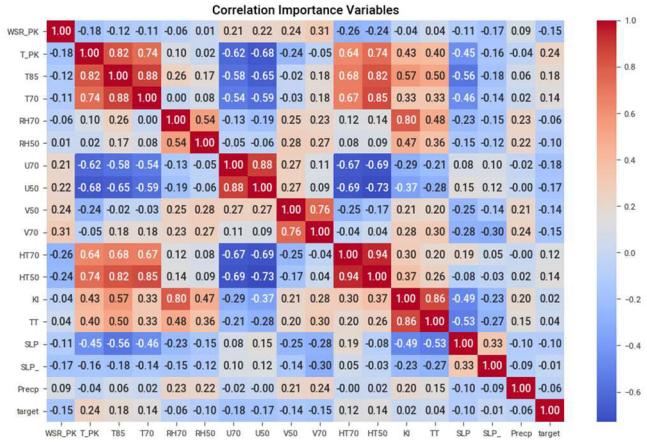


Figure 4. Correlation plot

3. EVALUATION OF DIFFERENT ML MODEL

3.1 Logistic Regression

Logistic Regression is a classification algorithm. It is used to predict a binary outcome based on a set of independent

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

variables [4]. Logistic regression becomes a classification technique only when the decision threshold is introduced into the picture. Setting the threshold is a very important aspect of logistic regression and depends on the classification problem itself. A binary result is based on where the event happens (Ozone-Day 1) or does not occur (Non-Ozone day 0). Logistic Regression has three different categories Binary, Nominal and ordinal. We have implemented a binary implementation of Logistic Regression for training our model. The logistic Regression uses the sigmoid function to bound the domain to (0, 1). We can use the Sigmoid function (commonly set to 0.5) to map values more significant than the threshold to a positive label; otherwise, it's negatively.

3.2 Decision Tree:

Decision tree algorithm is one of the most versatile algorithms in machine learning which can perform classification and regression analysis [3]. In this research we have made use of Recursive binary splitting approach which is also known as Greedy approach. It is called greedy because it does the best split at a given step at that point of time rather than looking for splitting a step for a better in the upcoming steps. For example, the process shown in the figure below is a flow chart of a typical decision tree classification. This flow chart is used to briefly whether the persons age is fit (Fig. 4). There are two type of decision tree.

- Classification tree
- Regression tree Classification tree

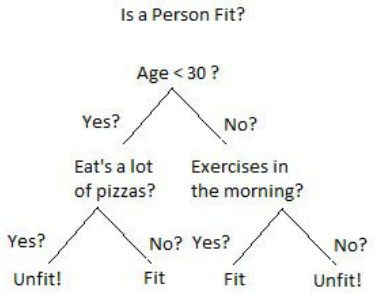


Figure 4. Example of DT

The criteria for the DT can be measured by measuring the entropy, which signifies the uncertainty of the random variables [1]. The split-based process continues until all the conditions are met, or you have to define the tree's depth manually. In our Decision Tree Model, we have passed random_state = 0, which the random seed used by the random number generator.

3.3 Random Forest:

Random Forest is an unsupervised learning algorithm it can be used for classification, clustering, and regression problem. Random forest is an algorithm that integrates multiple trees through the idea of ensemble learning. Its basic unit is a decision tree, and its essence belongs to a large branch of the machine learning-ensemble learning (Ensemble Learning) method [8]. The intuition behind RF is several weak learners are combined to provide a string learner. On each tree, each tie a split is considered, a random sample of 'm' predictors is chosen as a split candidate, out of 'p' predictors. While ensuring the classification performance of a single tree, it reduces the correlation between the classification trees, reduces the impact of noise, reduces the possibility of over-fitting, and improves the performance of the combined classifier.

3.4 Support Vector Machine:

Support vector machine is a non-probabilistic linear classifier. While other classifiers, when classifying, predict the probability of a data point to belong to one group or another, SVM directly says to which group the data point belongs to without probability calculation. We can see that there are two groups of target data having class 0 and 1. And these data can be divided using a hyperplane. The region between the support vector and the hyperplane is called max-margin. In the one-dimensional (1D) space, this classifier is called a point. In two-dimensional (2D) space, this classifier is called a line. In three-dimensional (3D) space, this classifier is called a plane. In four-dimensional(4D) or more space, this classifier is called a hyperplane [2]. The kernel variable is selected as "RBF," meaning to use kernel method instead of linear classification; the variable gamma is designated as "auto," which stands for automated choosing kernel constants [1].

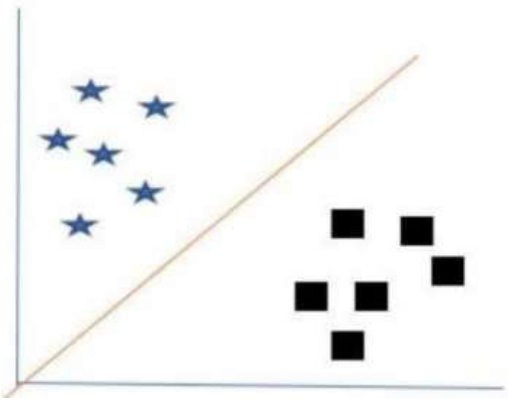


Fig. 5 Example of SVM

In the above example, classifier is a Hyperplane line separating the two class.

3.5 XGB Classifier:

Tree boosting is a highly effective and widely used machine learning method. XGBoost (extreme gradient boosting) is an extension method for gradient boosting algorithms that regularise the data even better than the standard boosted trees [16]. XGBoost objective function is the sum of loss function evaluated over all the prediction and a regularization function for all predictors. The loss function depends on the task that is being performed (classification or regression). Unlike building decision

trees algorithm, XGBoost doesn't use entropy or Gini indices. It utilizes gradient (error term) and hessian for creating the trees [10].

3.6 K-Nearest Neighbour:

KNN is a non-parametric and lazy learning algorithm. Nonparametric means there is no assumption for underlying data distribution. In other words, the model structure is determined from the dataset [9]. We are given a dataset with different classes of test data by calculating the distance between the test data and all the training points. It then selects the 'K' (k=5 in our case) points closest to the test data. The value of k affects the k-NN Classifier drastically as the flexibility of the model decreases with the increasing value of 'K.' Once the points are selected, the algorithm calculates the probability of the classes of the training points, and the class with the highest probability is set.

3.7. Gaussian NB Classifier:

A Gaussian Naïve Bayes is one of the supervised machine learning classification algorithms. It can be used to predict the likelihood that an event will occur, given evidence that's present in your data. Earlier it is used for text classification. It mainly deals with the high dimensional dataset. There are three types of Naïve Bayes Models. A multinomial model is good when your features are continuous or categorical. It describes discrete frequency counts. Bernoulli model is suitable for predicting binary features. And Gaussian model is for predicting the normally distributed feature. The predictors are independent of each other. Some of the applications are Real-time Prediction, Multi-class Prediction and Text classification.

4. TRAIN AND TEST

The process of training a model is very easy. All you have to do now is make sure that the data is consistent, concise, and plentiful. A large collection of training data helps to create a more stable and reliable classifier, which improves overall accuracy. Testing is often a very simple procedure. Ensure that your evaluation data is at least 20% the size of your training data. It's important to note that testing assesses the accuracy of your classifier and is often found to be inversely proportional to its score. The accuracy of the classifier, on the other hand, is contrary to research.

5. STUDY OF LITERATURE SURVEY

Table 1. Comparison for Literature Survey

Authors	Techniques Used	Accuracy
Zhiying Meng	Logistic Regression, Ada Boost, Decision Tree, Random Forest and Support Vector Machine	SVM Training Set = 0.984 Test set = 0.949
Maryam Aljanabi, Mohammad Shkoukani, Mohammad Hijjawi	MLP, SVR, DTR and XGboost, ANN, ARMA and LSTM	Model R^2 score 98.653% RMSE of 1.016ppb and MAE of 0.800ppb
Kun Zhang, Wei Fan, Xiaojing Yuan, Ian Davidson and Xiangshang Li	Regression Trees, Neural Network, and Parametric Regression	Recall = 0.231 and Precision = 0.4793
Aditya Sai Srinivas, Ramasubbareddy Somula, K. Govinda and S. S. Manivannan	Multivariate Adaptive Regression Splines (MARS) and Random Forest	MARS uses 8 variable and Random Forest uses all the variable.

6. RESULT AND OUTPUT

We have used various ML models like Random Forest, XGBClassifier, Kernel SVM, Decision Tree Classifier, Logistic Regression, K-Neighbours Classifier, and GaussianNB to evaluate the binary classification of the model. (Refer figure 4.) From this comparison chart, we can correlate that the lower the standard deviation the higher is the accuracy of the model. (Refer Figure 5). The mean absolute error (MSE) measures the average of the squares of the error that is the average distance between the estimated values.

	Models	Accuracy	Standard Deviation	Mean Absolute Error
6	RandomForestClassifier	0.963418	0.01	0.024
0	XGBClassifier	0.961906	0.02	0.021
4	Kernel SVM	0.952537	0.01	0.036
5	DecisionTreeClassifier	0.942863	0.02	0.058
2	LogisticRegression	0.937118	0.02	0.051
3	KNeighborsClassifier	0.932893	0.02	0.047
1	GaussianNB	0.822857	0.02	0.174

Figure 4. Comparison of 7 ML models

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

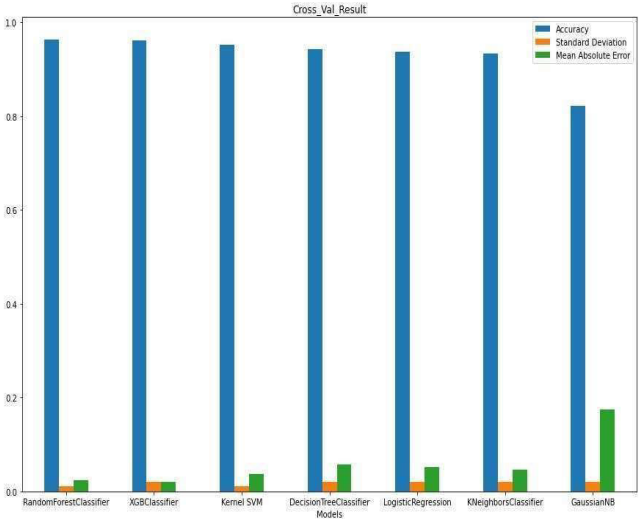


Figure 5. Bar graph of 7 ML models

Eventually the trained test scores of the various models were compared and this research reached the conclusion that the Random Forest classifier had the highest accuracy of 96.3 percent, with an Area under the curve (AUC) of 0.9588 and a Receiver Operator characteristic (ROC) area of 0.9588, after evaluating various metrics. Its AUC and ROC curves show the probability curve that plots the TPR against the FPR at different threshold values, effectively separating the signal from the noise. "The Area under the curve (AUC) is a description of the ROC curve that measures a classifier's ability to differentiate between classes" [7]. The higher the AUC, the greater the model's ability to differentiate between the positive (Ozone Day) and negative (Ozone Night) groups (Non-Ozone Day). (Refer Fig. 6)

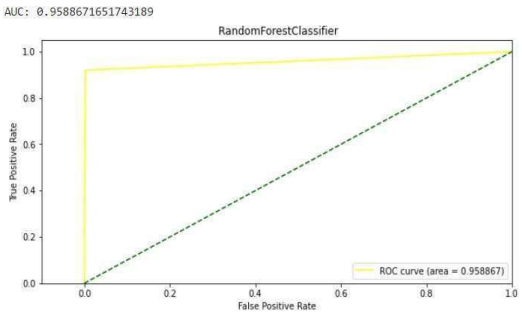


Figure 6. ROC/AUC curve on Random Forest.

7. CONCLUSION

In this research, we assessed the ability of various Machine Learning techniques to predict the ozone level concentration for a given day at Houston, Galveston, and Brazoria [5]. We have trained our model on various algorithm such as Gaussian NB, Decision Tree Classifier, Logistic Regression, SVM, Random Forest and XG-Boost. Eventually, the train and test scores of the different models are compared, and this research concluded that the Random Forest Classifier attain the highest accuracy of 96.34%. However there where many problems considering in the dataset with missing values which was resolved by mean imputer method. Still, we can achieve better accuracy with implementing the deep learning model and by using a complex imputer technique to normalize the data. Thus, how to make classification more effective is the next major content of the study.

8. ACKNOWLEDGEMENT

The authors are grateful to the Sinhgad Institute of Technology, Department of E&TC, for allowing us to present our research paper in Technico Knockdown 2021. We have gained lots of practical experience researching this fantastic topic and would like to contribute more to the betterment of the community. Thanks to all the people who provided their help and suggestions.

REFERENCES

[1] Meng, Z. (2019) Ground Ozone Level Prediction Using Machine Learning. Journal of Software Engineering and Applications, 12, 423-431. doi: 10.4236/jsea.2019.1210026.

[2] R. Katarya and P. Srinivas, "Predicting Heart Disease at Early Stages using Machine Learning: A Survey," 2020 International Conference on Electronics and Sustainable Communication Systems (ICESC), 2020, pp. 302-305, doi: 10.1109/ICESC48915.2020.9155586.

[3] Decision Tree in ML Link

[4] Modelling Probability of Default Using Logistic Regression Link

[5] Aljanabi, M., Shkoukani, M. & Hijjawi, M. Ground-level Ozone Prediction Using Machine Learning Techniques: A Case Study in Amman, Jordan. *Int. J. Autom. Comput.* **17,** 667–677 (2020). https://doi.org/10.1007/s11633-020-1233-4

[6] LogAUC - DISI. http://wiki.docking.org/index.php/LogAUC

[7] Srinivas A.S., Somula R., Govinda K., Manivannan S.S. (2019) Predicting Ozone Layer Concentration Using Machine Learning Techniques. In: Social Network Forensics, Cyber Security, and Machine Learning. SpringerBriefs in Applied Sciences and Technology. Springer, Singapore. https://doi.org/10.1007/978-981-13-1456-8_7

[8] Predicting Rainfall using Machine Learning Techniques Link

[9] Development and Validation of a Deep Learning–Based Automatic Brain Segmentation and Classification Algorithm for Alzheimer Disease Using 3D T1-Weighted Volumetric Images

[10] American Journal of Neuroradiology Dec 2020, 41 (12) 2227-2234; DOI: 10.3174/ajnr.A6848

Laundry Aggregator System

Sachin Singh
Department of Information Technology
MVPS's KBTCOE NASHIK
(SPPU)
Nashik, India
sachins2104@gmail.com

Owais Shah
Department of Information Technology
MVPS's KBTCOE NASHIK
(SPPU)
Nashik, India
owaiskhan7202@gmail.com

Abhinandan Jagtap
Department of Information Technology
MVPS's KBTCOE NASHIK
(SPPU)
Nashik, India
abhijagtap127@gmail.com

Nikhil Shinde
Department of Information Technology
MVPS's KBTCOE NASHIK
(SPPU)
Nashik, India
619nikhilshinde@gmail.com

***Abstract*— In today's scenario your clothes define your personality the way you carry your attire resembles your background. But making these clothes look perfect is the job of launderer. Our prospective is to provide laundry service to the customer as a mediator between them and laundry vendors. This aggregator system would be online service in which customer can easily book their order according to its requirement and our job is to pickup that clothes and drop it to laundry vendor, vendor will clean the clothes according to the customer need. Then delivery guy will return the clothes back to the customer and we will provide cash on delivery (COD) service as well online methods for the payment. Even our proposed idea will provide the laundry services through website or app which allow people to get information about their nearby laundry.**

Keywords—Aggregator system, Mediator, Laundry.

INTRODUCTION

Laundry Aggregator is a sort of mediator that act in between of customer and laundry shops. To clear this idea, you can take an example of swiggy or zomato which act as food aggregator, that means they don't have their own restaurant but they work as a mediator between a restaurant and customer. Now people can order food from any restaurant from their home only and respected food aggregator will deliver the food directly from restaurant. Similarly, we will try to provide this service through laundry system. We will provide an interface to customer through our app or website, customer will get to know about all laundry shops at nearby area and they can book at any laundry shop. A delivery guy will take the clothes and deliver it to nearby laundry and later it will be delivered to the customer when it's done and the customer will get all notification on their phone time to time related to their clothes. Many cleaning services systems are working manually, it is resulting in waste and inefficiency of time, data inaccuracies, errors, misplacement of the clothes etc. Especially in developing countries, this type of online laundry management system could be a game changer in coming years due to the change in the lifestyle of the people. This type of laundry service would save enormous time of the people as laundry work is considered to be boring work.

Our proposed idea will help in providing and managing the laundry/cleaning services accurately, precisely and in an efficient manner. If we implement our idea as on-demand model then it will reduce all the limitations which is facing by laundry business. Basically, an agent will get the clothes at the doorstep of a customer and give it to the laundry shop and return to the customer after it is done. The main objective of our proposed system is to build laundry aggregator service i.e "**Laundry Mate**" which will act as mediator between customer and laundry vendor. This will be an on demand laundry service where customer can easily book the service through our app or site, we will provide delivery guy who will give clothes to vendor and will return the clothes to respective customers. If we implement this idea as a business model then it will be going to create lots of employment for men and women. The other key aspects we will add would be live gps tracking feature, cash on delivery method with net banking and reasonable prices of services like washing, cleaning, ironing. Our idea is applicable to other sectors where laundry services are essential like hospitals, hotels, airlines, railways, industries etc. This is how our laundry aggregator system(Laundry Mate) is benevolent for people.

Issues such as mix-up of clothes, wrong service provided to customer, untimely delivery of clothes vary in pricing etc. are some major drawbacks of traditional laundry system that has encouraged us to develop a smart laundry aggregator system. Our proposed system has various good ideas to overcome the issues that customer is facing while using traditional services. This system has a great potential to prosper and grow in fast growing laundry industry. This idea would be on-demand app that will connect customer with different laundry services to their need.

LITERATURE REVIEW

Ashwini K, Vishwanath C R [1] have given the idea of RFID (Radio Frequency Identification) based laundry management system which can help customer to track their status of clothes

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

either through smartphone or web portal. The idea behind this RFID based laundry system is to reduce the use of barcode techniques used in laundry system. Basically, laundry shops use barcode to identify the clothes of customer through barcode but there are some major drawbacks of barcodes, only one barcode can be read at time not more than that and even the shopkeepers have to place clothes very near to barcode reader to read the barcode of the clothes. They have proposed an idea to use RFID tags and RFID readers which will overcome the problem of barcode readers. The RFID tag can be easily placed on the clothes and RFID readers can be used to track the status of clothes. These tags and readers are so efficient that you can easily scan numerous amount of clothes even at a distance of 2 meter. In addition to this RFID based IOT system can be implemented to manage and track the details od clothes of customers in real time through app or web portal. For that they have added wireless RFID hanger in which RFID reader could be placed and MFC (Microsoft Foundation Class) software to implement the laundry management system which will be effective, easy to use and efficient for customer.

Diana C. Flórez, Silebis Aguirre, Ciro-Alberto Amaya, and Nubia Velasco [2] they have proposed a delivery method of clothes to the hospital which is situated in Bogota, Colombia. They have mentioned that cluster of people with group of vehicles and warehouse is used to gather these clothes which is created so that simultaneously, dirty clothes will be given in laundry and clean clothes will be delivered to the hospital but the major flaw in this system is the distance and time factor, as the distance between hospital and laundry shops are not near in many cases so the transportation time will increase automatically. To overcome this problem. They have analysed some statical data to overcome this problem, main things they have found to sort this problem can be done by maximum amount of dirty clothes/dirty linen to be collected from the location, vehicle capacity and minimum visit frequency per area. Even they have designed split delivery method which is more efficient in delivering of clothes in the hospital.

Akanksha Gupta, Debendra Kumar Panda, Mayank Pande [3] they have proposed laundry app which is named as “MY DOOR”. The idea behind this app is to remove stereotype method by using their on-demand laundry application which will act as mediator between customer and dhobis. They have used android studio 8.0.1 with android version 7.0 or 8.0(Nougat or Oreo resp.) for developing their app. It has two main files, activity_main.xml which is used for layout purpose and content_main.xml is used to edit the content. They have used android virtual device for testing and debugging of app even they have connected device through USB to test the app by enabling USB debugging option on device. They have created 3 modules of their app that are, user side- which is for customers only, admin side- it will manage everything, driver side- which is for vendors only. Their motive is to provide help for bachelors who are living away from their home but also this app will help other people too. Even this app will create employment for people and it be will be operated in all the places not in specific area or region.

Doaa M. Bamasoud, Asma M. Alqahtani, Eman A. Aljdea, Reem A. Alshomrani, Maha S. Alshahrani, Zohoor A. Alghamdi, Ameerah M. Alghamdi, Shahd F. Almaawi, Asrar D. Alshahrani [4] there main focus was to implement mobile application for laundry service which help laundry business to grow further. As laundry business haven’t been cultivated like other business but due to increase in technology these sectors can be used as E-business (Electronic Business) in coming years. Many of the business have been operated through mobile app which is easier for customers to operate, their idea is to implement this laundry app for the growth in laundry business. Everyone thinks laundry is bore job, so they usually give their clothes to nearby vendors but their aspect s to change this method through laundry application. They have surveyed different aspects on the basis of age group, marital status, smart phone users (android or ios), employment and many more things which is analysed and different results has been from that survey. This would help to target the customer who desperately need this type of laundry app for their personal benefits as well as it will help laundry sector to grow in coming years. This type of data analysis gives an idea about people and their requirements according to their needs which can be fulfilled by this laundry app.

Yingliang Lu, Hao Yu [5] their main focus is to use RFID in laundry system. As RFID is a kind of contactless automatic identification technology, which identifies the object by radio frequency and access to the relevant data without human intervention. A rfid(radio frequency identification) tag can be used in laundry management system was proposed by Fujitsu R&D Center CO. , LTD.The rfid tag can be placed at the clothes which will help the customer to trace their clothes. A barcode can be used as a tag which provide a unique code for the customer and to the delivery guy so that clothes can be easily distinguish from other clothes or there will be no chance of mixing.This sort of tags can be washable tags which will be not affected by water.

FIGURES

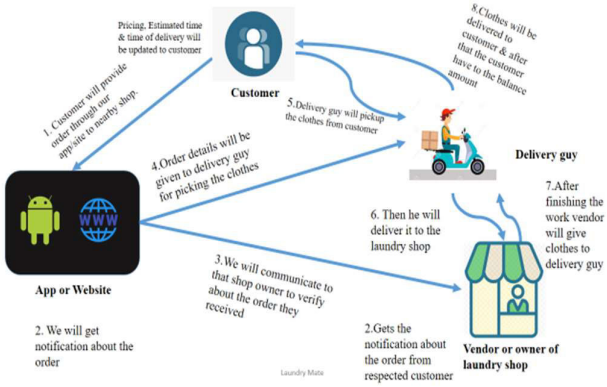


Fig. Architecture Diagram of Laundry Aggregator System

The above figure shows the architecture diagram of our proposed idea where a customer will register on our app or site to find all possible laundries and different services according to its location. After selecting a laundry vendor or shop, the customer will book the order providing his/her address for pickup and delivery of clothes. The laundry vendor will get notification about the order as well as the admin who is managing this entire system will also get notification of the order. Admin will contact to laundry vendor for cross checking whether they have got notification regarding order or not this will be ensured by the admin.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Order details will be sent to our delivery guy or launderer who is present at the nearest location of the given order. Then our delivery guy will pickup the clothes from the given location of the customer and deliver it to the respected laundry vendor. Customer and laundry vendor can track the location of delivery guy through GPS even the estimation time and time of delivery would be updated at some interval by the admin.

When the work is finished by the laundry vendor he/she will hand over the clothes to the delivery guy or launderer who will drop the clothes to the respected customer. The customer can pay the balance amount either through online payment modes like UPI or net banking or they can avail cash on delivery (COD) method, it totally depends on the customer which method they can use for paying the amount.

This is the blueprint our proposed idea how this laundry aggregator system is going to work and how we can implement this idea in near future for providing laundry services at the doorstep of the people. We will call this laundry aggregator service as "**Laundry Mate**".

Acknowledgment

We would like to express our deep gratitude to Professor Snehal Bhamre mam for her patient guidance, her advice and assistance help us in keeping our progress on schedule.

REFERENCES

[1] *Ashwini K, Vishwanath C R "RFID-Based Laundry Management System", International Journal of Scientific Research in Computer Science, Engineering and Information Technology, Volume 2, Issue 2, ISSN: 2456-3307.*

[2] Diana C. Flórez, Silebis Aguirre, Ciro-Alberto Amaya, and Nubia Velasco "Optimization of the Laundry Service in a Public Hospital in Bogotá D.C., Colombia: A Case of Vehicle Routing with Split Delivery", 2008 IEEE Systems and Information Engineering Design Symposium, DOI:10.1109/SIEDS.2008.4559694.

[3] Akanksha Gupta, Debendra Kumar Panda, Mayank Pande "Development of Mobile Application forLaundry Services Using Android Studio", International Journal of Applied Engineering Research, ISSN 0973-4562, Volume 13, Number 12 (2018), pp. 10623-10626.

[4] Doaa M. Bamasoud, Asma M. Alqahtani, Eman A. Aljdea, Reem A. Alshomrani, Maha S. Alshahrani, Zohoor A. Alghamdi, Ameerah M. Alghamdi, Shahd F. Almaawi, Asrar D. Alshahrani "An Explorative Study for Laundry Mobile Application", IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 9, No. 4, 2018.

[5] Yingliang Lu, Hao Yu, "A flexible architecture for RFID based laundry management systems" 2010 6th International Conference on Wireless Communications Networking and Mobile Computing (WiCOM), pp. 1-4

Intelligent Sanitization Robot

Prof. V. S. Baste
Dept E&TC
SIT,
Lonavala, India
Vbaste.sit@sinhgad.edu

Dnyaneshwar Baliram Tandale
Dept E&TC
SIT,
Lonavala, India
maulitandale1999@gmail.com

Darshan Surendra Wankhede
Dept E&TC
SIT,
Lonavala. India
darshansurendrawankhede@gmail.com

***ABSTRACT* — This Paper Proposes Compact AI based Sanitation robot. there se are lot of fellow disease s which will affect on human health and they are spread very easily so sanitization is important task .there are lot of techniques are available in the market but they are costly, which required human efforts to go there and sanitize manually sometimes there is chances to get that person affected and they are not give high accuracy therefore there is is need to design Artificial intelligence robot Which can be controlled by using a Laptop or Mobile Phone? xIt will assist the patient in hospital and Help them out by using AI based robots. It achieves high accuracy of killing 99.99% bacteria available in the room. Diabetes is a major Problem in 21st century it will affect vital organs of the body if not diagnosed and treated on time. Regular monitoring of blood glucose i important to avoid complications of diabetes previously it was very tedious task to go hospital and measure the blood glucose sensor therefore there is need to develop non invasive monitoring system which can measure the blood glucose without much problems...It also helps to achieve high accuracy for needle less blood glucose measurement.**

Keywords - Artificial intelligence (AI), machine Learning

I. INTRODUCTION

The current COVID-19 pandemic is clearly an international public health problem. There have been rapid advances in what we know about the pathogen, how it infects cells and causes disease, and clinical characteristics of disease. Due to rapid transmission, countries around the world should increase attention into disease surveillance systems and scale up country readiness and response operations including establishing rapid response teams and improving the capacity of the national laboratory system. With this concern Paper presents Artificial intelligence based Sanitization Robot.

The AI based UV Sanitization Robot uses the power of UV rays to kill the germs and Bacteria. The robot can also give live stream video of its surroundings. With the Help of Wi-Fi, We can control the robot and its GUI allows us to drive the robot inside the room without physically being there. The robot will be having machine learning technology. Therefore by using machine learning it will check the any human invitation is present or not. Another problem facing the people in 21 St century is Diabetes. It affects the people a lot and causes dangerous diseases, live blindness etc. So for measuring the diabetes into the blood we need to go to the doctor. But with the help of robots you can measure your blood glucose level very easily and painlessly.

II. LITERATUR SURVEY

In this paper Raspberry Pi based voice - operated personal assistant by Piyush Vashistha, Jugender Pal Singh, Jitendra Kumar [1] the problem discussed was the current system experiences the downside that just Predefined voices are convensiable and it can store just constrained commands. Subsequently ,the client can't get data lucily.[2] In this paper O.S Khali problem discussed was the Non-invasive optical Diagnostic Techniques for Mobile Blood Glucose monitoring people with diabetes need to monitor their sugar level constantly and attain health centers regularly for checkups. It was a painful and time consuming method[3]in this paper Tal-Ping Sun,Chung-Ta hung,Ping-Wing Lui,Yi-Tai Chen,Huish-Li Shieh earlier the bandwidth of UV light Was Greater .so the accuracy was low .

[4]in this paper G.-Z,B.J.Nelson disscused was the wheeled platform attaches tube on each side and underneath in the orientation.

[5]in this paper Abhishek Rai discussed about the autonomous robot which will sanitize all area around it autonomously but the problem was if some medicines get into the exposure of ultraviolet light then the medicine can get damage as on some medicine there is strongly mentioned keep away from sunlight and keep in cool place.

.

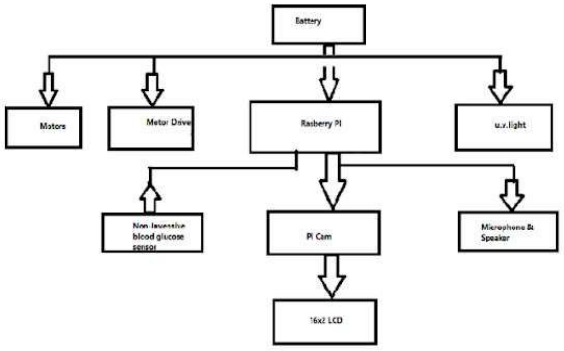
III.PROPOSED SYSTEM

block diagram of the proposed system is shown in fig1.

The AI Based Sanitization robot uses the voice control system Google Assistant. It will take the input from the user processed with the raspberry pi. And gives output. It is operated on a 15 V battery. Pi camera is used to take surrounding videos to check whether the human beings are present or not. The non invasive blood glucose sensor is used to measure the blood glucose level painlessly. Microphone takes the input from the user and fetches that information and gives desired output. Speaker is used as

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

an output. The motor is used for the movement of the robot.



IV. HARDWARE DESIGN

IC555 timer has two comparators (which are basically two op-amps), an R-S flip-flop, two transistors and a resistive network. The Resistive network consists of three equal resistors (5K Ohms each R) and acts as a voltage divider. The resistor network is designed in such a way that the voltage at the Inverting terminal of Comparator 1(Upper comparator) will be 2/3Vcc and the voltage the Non Inverting terminal of Comparator (Lower Comparator) will be 1/3Vcc. Comparator 1 – compares the threshold voltage (at pin 6) with the reference voltage + 2/3 VCC volts. Comparator 2 – compares the trigger voltage (at pin 2) with the reference voltage + 1/3 VCC volts.Tthe control voltage equals +(2/3) VCC. Upper comparator has a threshold input (pin 6) and a control input (pin 5). Output of the upper comparator is applied to set (S) input of the flip-flop. Whenever the threshold voltage exceeds the control voltage, the upper comparator will set the flip-flop and its output is high. A high output from the flip-flop when given to the base of the discharge transistor saturates
it and thus discharges the transistor that is connected externally to the discharge pin 7

$$F=1/0.8(Ra+Rb) \quad (1)$$

Where RA is resistance between the center pin of potentiometer to one end which is connected to 12v. RB is the resistance between the center pin of the potentiometer to the other end which is connected to ground.

List of Hardware

1) Raspberry pi 4
2) 15v battery
3) Pi camera
4) Non invasive Blood Glucose Sensor
5) Microphone
6) Speaker
7) Uv Light
8) Motor Driver
9) Motor
10) Laptop/Mobile

V. FLOWCHART

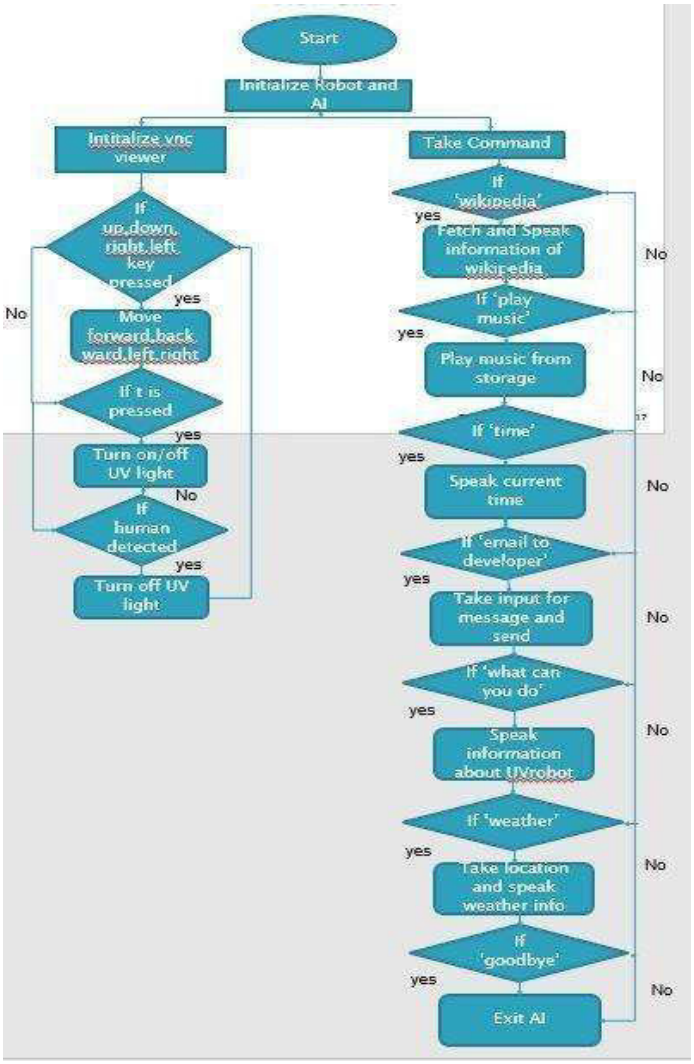


Fig.2.Flow Diagram of Voice Control

I. WORKING:-

The Raspberry pi based AI Sanitization robot comprises some fundamental modules: Voice Control and Ai Assistant
.

Voice Control:-

This assistant can be controlled by the users by explicit voice directions.Right off bat ,the speech is transformed into text by microphone .At that point the content is processed and when the order given to the assistant is perceived,the assistant will react by moving in and providing specific guidance.What we are doing is controlling the assistant with the following voice instructions

INPUT (User Speak)	OUTPUT(Assistant does)
Forward	moves forward
Backward	moves backward
Back	moves back
Right	moves right
Left	moves left
Wikipedia	fetch the information from google

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Music	Play Music from storage
Date	gives current date
Time	gives current time
Weather	gives current weather
Location	gives current location
Stop	stop doing current task

The Steps of voice control are as follows:

1. It will Take the Speech as a input through Mice
2. Coverts the speech into plain text
3. Then the query is processed based on the plain text generated in step 2.
4. Assistant will try to move in the provided direction as well as information if the path will be detected otherwise the assistant will stop.

Image Recognition[2]:-

The assistance will have capacity to capture images from the surrounding.and check the content in the database if content matches with database then it will stop the uv rays.

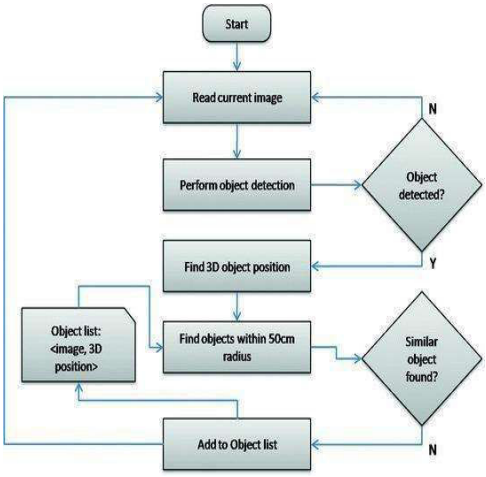


Fig.3.Flow Diagram of object Detection

Working 2:-

1) when the user gives command to the robot it will start .
2) Read the images From its surroundings with the help of Pi camera.
3) Perform Object Detection Task.
4) If Object is detected it stops and again reads the images.
5) if the object is detected then it will find its 3D position.
6) if a similar object is detected then it will find into the database.
7) if no object is detected then it will go to the first step and this will continue until and unless stop command.

Application.

- Needless blood glucose measurement
- Hospital sanitization
- AI assist in hospital
- Offices sanitization
- Shops sanitization
- Vehicle sanitization
- Houses, apartment sanitization

VII. CONCLUSION

This paper provides some important Points; it talks about the sanitization of objects using ultraviolet light. It talks about a non-invasive method of blood sugar measurement.this project mainly focuses on sanitizing the floor,objects wirelessly using ultraviolet radiation so that the germs and bacteria along with the viruses can be killed effectively and measure the blood glucose of the patient painlessly through non-invasive method.

VIII. REFERENCE

[1] PiyushVashistha,Jugindar Pal Singh,PranavJain,Jitendra Kumar,"Raspberry Pi based voice-operated personal assistant"

[2] Tal-Ping Sun,Chung-Ta hung,Ping-Wing Lui,Yi-Tai Chen,Huish-Li Shieh."Novel Measurement System for Linear Array Type UVC Germicidal System

[3] Bahereh Javid, FaranakFotouhi-Ghazivni, Fahime Sadat Zakeri, "Non invasive Optical Diagnostic Techniques for Mobile Blood Glucose and Bilirubin Monitoring

[4] S.Coster MC Gulliford PT Seed JK Powrie,R Swaminathan,"Monitoring blood glucose control in diabetes mellitus: a systematic review",Health Technology assessment,Vol.4,Nov12,2000

[5] A. Rai, C. Chaturvedi, P. K. Maduri and K. Singh, "Autonomous Disinfection Robot," 2020 2nd International Conference on Advances in Computing, Communication Control and Networking *(ICACCCN)*, 2020

[6] OAmir,DWeinstine,M.D.SilviuZilberman,M.Less,D.P erl Treves,H.Primack,A.Weinstein,E.Gabis,B.Fichte and A.Karasik,"Continuous non-invasive glucose monitoring technology based on occlusion spectroscopy," journal of Diabetes science and technology,Vol.1no4.pp.463-469,July 2007

[7] G.-Z Yang,B.J.Nelson,R.R.Murphy,H.Choset,H.Christensen, S.H.Collins,et ai.,"Combating covid -19-role of robotics in managing public health and infectious

disease",Science Robotics,vol.5,no.40,2020

[8] A.K.C School of Information Technology,University of Culcutta ,india

[9] M.Tavakoli,J.Carrience and A.Torabi,"Robotics smart wearable technologies and autonomous intelligent systems for healthcare during Covid-19 Pandamic:an analysis of state of art and future vision ".Adv.Intell.Syst.,vol.2,no.7,pp.2000071,2020

[10] Biomedical Engineering Department ,Institute of Technology Ladkrabang,Ladkrabang bangkok,Thailand"An Ultraviolet sterilization robot for disinfection."

[11] E.Topsakal,T.Karacolak and E.C Moreland,"Glucose-Dependent Dielectric Properties of Blood Plasma",2011 30th URSI General Assembly and Scientific Symposium URSIGASS 2011,

[12] Federal Institute of Education,Science and Technology Sul-rio-grandense,Pelotas,RS,Brazil'A Non-Invensive Ifrared Glucose Monitor Double Wavelength Based"

[13]]Biomedical Engineering Department,Imam Abdulrahan Bin Faisal University,48023 Damman,Eastern,saudi Arbia"Optimization of Dual -Channel Near-infrared Non-invansive Glucose Level Measurement Sensors based on Monte-Carlo Simulations

[14] Abhishek Rai AKTU,Lucknow,India "Autonomous Disinfection Robot"

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Chest Disease Detection through X-Ray using Deep Learning

1st Mr. Manish Gupta
Dept. of Information Technology
Xavier Institute of Engineering, Mumbai
Maharashtra, India
guptamanishkumar987@gmail.com

2nd Ms. Rachel Calvin
Dept. of Information Technology
Xavier Institute of Engineering, Mumbai
Maharashtra, India
rachelcalvin20@gmail.com

3rd Ms. Bhavika Desai
Dept. of Information Technology
Xavier Institute of Engineering, Mumbai
Maharashtra, India
desaibhavika699@gmail.com

4th Ms. Suvarna Bhoir
Dept. of Information Technology
Xavier Institute of Engineering, Mumbai
Maharashtra, India
suvarna.b@xavier.ac.in

***Abstract*— Chest disease has had a major impact on being's lives allover the world. Pneumonia, asthma, tuberculosis, and a variety of other respiratory illnesses are among the most common. Thesediseases can become catastrophic if they are not detected in a timely manner. Clinical examination (chest X-ray) is a cost-efficientand effective method of detecting and diagnosing a problem. However, owing to a scarcity of qualified radiologists, the method's implementation has yet to achieve its full potential. In this paper, we will look into the possibility of using deep convolutional neural networks to design a computer-aided diagnosis for chest X-rays. We can train a model from chest X-ray and natural language diagnostic reports using a real-world dataset.**

***Index Terms* — CADx(Computer-Aided Detection), CXR(Chest X-ray), CNN(Convolutional Neural Network), deep learning, image classification, VGG16, ReLU.**

I. INTRODUCTION

Medical X-rays area unit accustomed diagnose many sicknesses in an exceedingly short amount of your time. Medical professionals use this system to spot completely different fractures and abnormalities in numerous areas of the body. This is as a result of the X-ray area unit terribly effective and doesn't cause any damage to the body in any way in which. Chest diseases are often shown in CXR pictures within the type of cavitation, consolidations, infiltrates, and little generally distributed nodules. By analyzing the X-ray's the doctors will diagnose Covid and Pneumonia during this work, we have a tendency to diagnose respiratory organ diseases at a way faster pace than the medical specialist. Chest X-Ray, is one of the foremost common varieties of radiology examination for the identification of respiratory organ diseases.

However, medical specialists involve the choice underneath uncertainty so, a transparent output can't be taken out[1]. Therefore, Computer-assisted identification was developed to induce the result effectively with a straightforward and brief quantity of your time.CAD systems don't seem to be here to interchange doctors rather facilitate them to get a second opinion for the general diagnoses. Over the past few years we've got been engaged in the use of Computer-Aided identification and computing for the classification of the image and thru the classification exploit the accuracy.

The first step towards classification is to extract the options from the pictures that successively can act as input to the second step for training [2]. The accuracy is fully speedy on the coaching of the dataset. Therefore, we have a tendency to area unit exploitation the most effective model for the classification that is termed because of the Convolutional neural network in deep learning. This model provides the best accuracy once coaching the dataset. The following is achieved using a publicly available dataset called COVID- 19 Radiography Database.

The paper consists of 2 outstanding malady detection i.e. Covid and Pneumonia disease. Covid affects the sensitive parts of our lungs and has several symptoms like shortness of breath and lots of others that are still under investigation of improvement. The dataset that we've got used is named COVID-19 Radiography Database that consists of a period of time pictures of Covid affected lungs and respiratory disease such as Pneumonia still. With this, it additionally consists of traditional and healthy respiratory organ pictures. The pictures are attending to increase within the Database sporadically for more analysis. The purpose of this study was to develop a CADx system for classification between COVID, pneumonia, and traditional ancient X-ray photos that are healthy exploitation CXR photos. Since the number of

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

publicly offered CXR photos of COVID-19 disease was restricted, we tend to develop the model exploitation VGG-16 that may be correct and durable even if the employment information was very little. although this study primarily used a usually used pre-trained model (VGG16), the accuracy achieved was quite ninetieth. Finally, the model was examined to gauge whether or not or not it distinguishes COVID, pneumonia, and ancient X-rays from the dataset.

II. KEY FEATURES

- Recognize the disease of the chest by feeding the images to the model.
- The model is flexible and can be trained for number of CXR images to detect whether they are infected by either Covid or Pneumonia or whetherit is a normal introspected CXR.
- Real-time images are provided to the user interface which in turn is integrated with the model and output disease is predicted.
- Model which is built for detecting disease can be integrated with any app because the model is converted to API and requests can be made to the endpoint URL of the API.

III. DESIGN

A. Software Requirements:

Jupyter Notebook (open source web application that you can use to create and share documents)
Programming Language – Python3.
Python Libraries for machine learning(Tensor Flow, Keras)

B. Hardware Requirements:

macOS(Big Sur) Version 11.1
Windows7 or later 64-bit.
Graphics-Intel UHD Graphics 6171536 MB
Processor-1.6Hz Dual-Core Intel Core i5

IV. RELATED WORK

Using the publicly available dataset called ChestX-ray 14 data set many models have been introduced. In that they have used three different CNN models and classified there uses. Present a two-staged model with recurrent neural network acting as a decoder. While analysis is done about which function is more suitable for the working of CNN model. The feasible works of ChesXNet that tells us about DenseNet-121 on the chest X-ray images, which has a modified last fully- connected layer and that proposes a guided two-branch convolutional neural network for chest disease classification. The model consist of both the global and publicly evaluated model for the training and gives us the best result possible.VGG16 was principally used as a deep learning model for the projected methodology, and transfer learning was performed for the classification of CXR pictures of COVID, respiratory disease like Pneumonia, and also normal CXRs that are the healthy one's which supported our preliminary experiments, VGG16 while not transfer learning simply junction rectifier to overfitting and performance degradation. to look for optimum hyper parameters of the VGG16-based model and combination of information augmentation ways, random search was performed19. Publicly offered weights of VGG16 obtained by pre-training on ImageNet dataset were used for transfer learning. The layers of VGG16 were sorted within the order of image process, and every one trainable parameters of the 1st–10th layers in VGG16 was frozen for transfer learning

DEEP LEARNING WITH MEDICAL IMAGE

Deep learning's basically introduced to get the images which have scarce and recognize them. It basically uses thea large dataset to get the value and extract the desired knowledge require for the training and testing of the data.

VGG-16 WITH KERAS

VGG is a convolutional neural community with a particular structure that turned into proposed within the paper — Very Deep Convolutional Networks for large-Scale image reputation by means of a set of researchers (visible geometry organization) from the university of Oxford. The VGG institution participated in an annual computer vision opposition — ImageNet huge Scale visual recognition venture (ILSVRC) and submitted the well-known VGG model for competing in object localization (detecting objects inside an photograph coming from 200 instructions)and picture category tasks (a thousand-magnificence class). The ImageNet dataset, a primary laptop imaginative and prescient benchmark dataset that became used inside the opposition, includes extra than 14 million photographs belonging to 1000 lessons. The VGG version outperformed other fashions with 92.7% top-five take a look at accuracy and won 1st and 2d place inside the 2014 ILSVRC opposition.

VGG structure

The VGG has two different architecture: VGG-sixteen includes 16 layers and VGG-19 that carries 19 layers. In this paper, we attention on VGG-16 that especially contains three exclusive components: convolution, pooling, and fully connected layers — it starts off evolved with convolutional layers accompanied by way of pooling, then another convolutions followed by means of pooling, after that repetition of three convolutions accompanied by using pooling, and then ultimately three absolutely linked layers. The following figure 4 indicates the architecture of the VGG-16 version. The maximum interesting part of the VGG model is that the version weights are available on distinct platforms (i.e. Keras) and may be used for similarly analysis — developing fashions and programs. The idea of making use of models' weights for further duties initiates the concept of transfer learning.

So, as you to get the surely featured community we need to put off the brand new surely educated CNN model. We first want

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

to pre-knowledgeable the whole version received and begin with the schooling and attempting out of the model. This may assist us to extract the proper capabilities and accuracy very quickly. The huge statistics must be trained and tested in the sort of way the accuracy of the model ought to now not be hindered. To get the best CNN model we needed to attempt to check various schooling models consisting of ResNet [five], VGG-internet [6], and DenseNet [7]. As an end result, we selected the DenseNet-121 model which performed the dominion-of-the-art work outcomes.

After the convolution layers of VGG16, the worldwide averaging pooling layer, fully-connected layer, and dropout layer were intercalary to VGG16. For the 3-category classification, the final 3-unit fully-connected layer was intercalary after the dropout layer. Activation functions of the first and last fully connected layer were rectified long measure and softmax, severally. The input image size of VGG16 was modified to 224× 224 pixels. The network was trained to employ a batch size of 10**,** and also the range of coaching step per epochs was set to the length of training set.

V. IMAGE DATA GENERATOR FOR IMAGE - AUGMENTATION

Keras ImageDataGenerator helps you to augment your pictures in a time period whereas your model remains to coach! You'll apply any random transformations on every training image because it is passed to the model. This may not solely create your model strong however will save on the overhead memory. Data augmentation is the method of accelerating the number and variety of information. we tend to don't collect new knowledge, rather we tend to rework the already gift knowledge. So, we'll scrutinize varied ways in which to remodel and augment the image knowledge. Data augmentation in Keras uses Data augmentation victimization. Data augmentation is an integral method in deep learning, as in deep learning we want giant amounts of information and in some cases, it's not possible to gather thousands or ample pictures, thus knowledge augmentation involves the rescue. Operations in knowledge augmentation are Rotation, Shearing, Zooming, Cropping, Flipping, Changing the brightness. To achieve sturdy and generalized deep learning models, massive amounts of knowledge are needed. However, medical imaging data is scarce and labelling the dataset is expensive. we tend to apply completely different augmentation technique on the dataset. We applied image augmentation techniques resembling random rotation, breadth shift, height shift, horizontal, and vertical flip operations using the ImageDataGenerator functionality from the TensorFlow Keras framework.

VI. COMPARISON WITH THE STATE-OF-THE-ART

AlexNet comprises of 11x11, 5x5, 3x3, convolutions, max pooling, dropout, data augmentation where as VGG-16 has a different approach having large number of hyper-parameters.The confusion matrix figure 1 gives us a clear picture of the outcomes of both the models. The images are taken from the train and tested folders of the dataset which clearly shows that AlexNet has an accuracy of 67% while VGG-16 has an Accuracy of 98%.

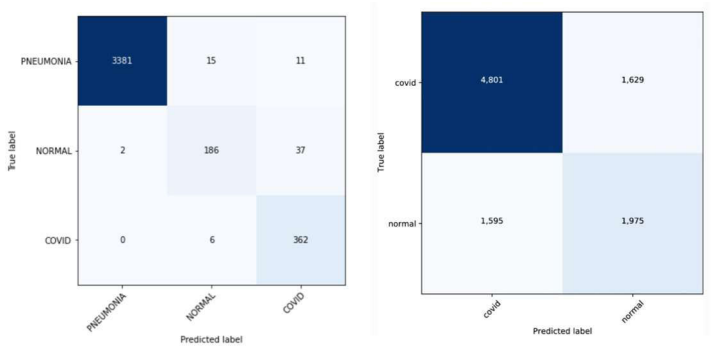


Fig 1: Confusion matrix of Comparison of VGG-16 and AlexNet

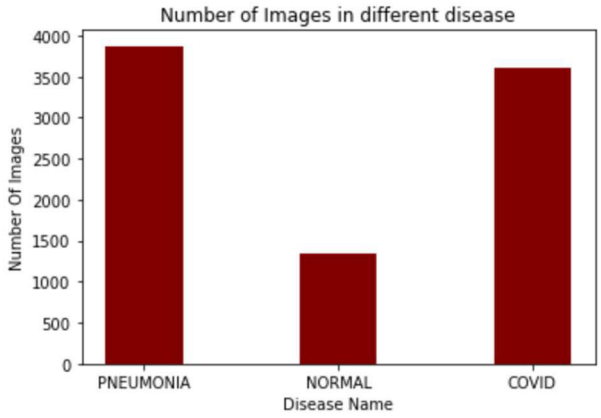


Fig 2: Bar Chart showing number of images of different disease.

VII. THE PROPOSED APPROACH

The idea behind our approach is to combine the effectiveness of CNN for image features extraction from a small image dataset and the power of the problem transformation methods in the task of image classification. The development of the proposed method consists of four parts: data description and exploration, data pre-processing, feature extraction part, and classification part.

A. Dataset used for training the Model

We have gathered a three-class dataset with labels, normal - for healthy patients; COVID-19 - for patients with COVID-19; and Pneumonia - for patients with viral and bacterial Pneumonia. Our main source of images is from the “Covid-19 Radiography Database” from Kaggle. This COVID-19, normal and other lung infection dataset is released in stages the COVID-19 class has 3616 COVID-19 positive cases along with 10,192 Normal, 6012 Lung Opacity (Non-COVID lung infection) and 1345 Viral Pneumonia images. We selected only

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

a small number of images for normal and Pneumonia as learning with an imbalanced dataset could produce a biased prediction model towards the classes with more samples. We will continue to update this database as soon as we have new x-ray images for COVID-19 pneumonia patients.The figure 2 is name representation of the same the bar chart that explains the number of images with disease

B. *Data pre-processing*

Data pre-processing is meant resize the images in the way required for the training of the model. This will help us to get the model working for the extraction which is the next stage of the process. With this we normalize the datable subtracting the images as required. Each image in the dataset is in 299x299 PNG format. All images in the dataset will be resized to 244x244 pixels to reduce computation time to maintain uniformity in the dataset.

C. *VGG design*

The VGG has 2 totally different architectures: VGG-16 contains sixteen layers and VGG-19 that contains nineteen layers. In this paper, we have a tendency to target VGG-16 that chiefly contains 3 totally different parts: convolution, pooling, and absolutely connected layers — it starts with 2 convolution layers followed by pooling, then another 2 convolutions followed by pooling, at the moment repetition of 3 convolutions followed by pooling, then finally 3 absolutely connected layers. The subsequent figure 3 shows the design of the VGG-16 model. The foremost fascinating part of the VGG model is that the model weight's area unit is accessible on totally different platforms (i.e. Keras) and may be used for any analysis—developing models and applications. The thought of utilizing models' weights for any task initiates the thought of transfer learning.

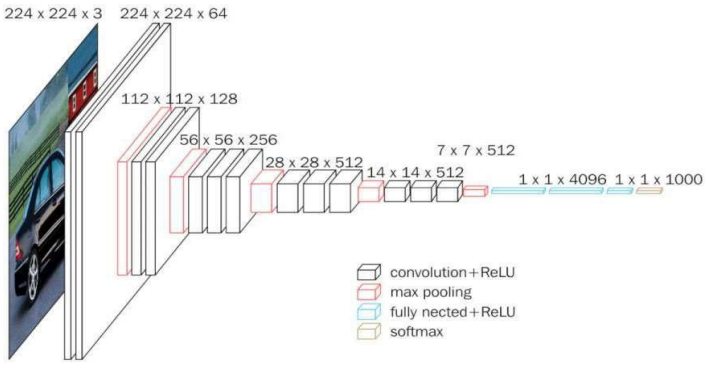


Fig 3: VGG16 MODEL

D. *Transfer Learning using VGG-16:*

We know that the coaching time will increase exponentially with the neural specification increasing/deepening. In general, it may take hours/days to coach a 3–5 layers neural network with an oversized scale dataset. Consequently, deploying VGG from scratch on an oversized scale dataset may be a slow and computationally dearly-won task thanks to the depth and variety of totally connected layers/nodes within the models' design. Another challenge is that building VGG from scratch needs significantly massive memory area and information measure since the scale of ImageNet trained VGG-16 weights is 528 MB. However, rather than building a VGG from scratch, we are able to perform transfer learning i.e. — utilizing the data like weights, and options of the antecedently trained (e.g. pre-trained VGG) models' to unravel the same reasonably drawback. as an example, we would like to develop a binary image classifier, then we are able to use a pre-trained model that trained on an oversized benchmark image dataset like VGG. Therefore, transfer learning may be a machine learning methodology wherever a model developed for a task is reused because the start line for a model on a second task. Transfer learning typically used for rushing up the coaching time and eventually improve the performance of the models'. whereas leverage transfer learning, we have a tendency to should contemplate that the advantages of mistreatment transfer learning aren't obvious.

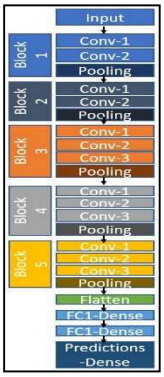


Fig 4: VGG Architecture

VIII. USER INTERFACE OF THE IMPLEMENTATION

The user interface of the model takes the input as chest x-ray image from the user and processes it using the VGG-16 model and gives the output of image by predicting whether it is infected by Covid, Pneumonia or Normal. With this the user interface also has the feature of providing the result in audio format.

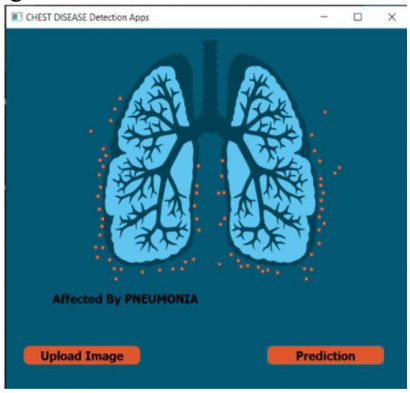


Fig 6. The UserInterface

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

IX. CONCLUSION

In this paper, we propose a new approach that combines the effectiveness of VGG-16 and the power of transfer learning in order to tackle the task of image augmentation. The evaluation process was conducted using performance metrics average AUC. The results showed that our method achieved great results and outperformed current state-of-the-art on Covid Radiography dataset. To further substantiate the results of this study, several improvements could be made, such as the use of an attention mechanism to improve CNN's work and train our classifier on a more balanced data set to avoid the problem of imbalance label distribution. The created model gave us a overall accuracy of 98%.

X. RESULT

The result gives us a proper implementation of the VGG-16 Model showing an accuracy of 98% that is obtained by importing the dataset, pre-processing the image by different factors such as rescaling and shear range, training the model with the given pre-processed image and taking out the confusion matrix by plotting, visualizing, rotating their alignment and looping over the data dimensions. Once the training is done the model is uploaded into the user interface figure 6 which takes the weight file of the model and gives the predicted model. The following figure 5 shows the 98% accuracy achieved of our model.

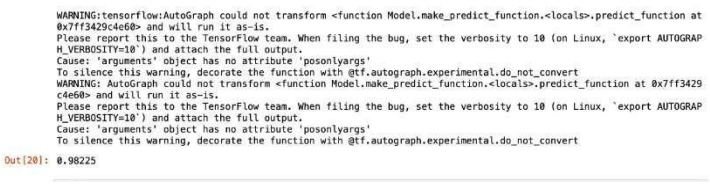


Fig 5: Accuracy of the Model.

I. FUTURE SCOPE

In the future we plan to work with different models such as the Google Net, InceptionNet, ResNet,etc With this we also aim in taking the larger dataset. Along with this a combination of different networks such as used in this model of Xception can be generated. A powerful GPU source is another factor that can be looked into. It is hosted globally so anyone can access the API and integrate it with the app.

REFERENCES

1. Brady, R. Ó. Laoide, P. McCarthy, and R. McDermott, ''Discrepancy and error in radiology: Concepts, causes and consequences,'' Ulster Med. J., vol. 81, no. 1, pp. 3–9, Jan. 2012. [Online]. Available: https://www.ncbi.nlm.nih.gov/pmc/ articles/PMC3609674/
2. W. Rawat and Z. Wang, ''Deep convolutional neural networks for image classification: A comprehensive review,'' Neural Comput., vol. 29, no. 9, pp. 2352–2449, Sep. 2017. [Online]. Available: https://www.mitpressjournals.org/ doi/10.1162/neco_a_00990
3. L. Torrey and J. Shavlik, ''Transfer learning,'' in Handbook of Research on Machine Learning Applications and Trends: Algorithms, Methods, and Techniques, E. Soria, J. Martin, R. Magdalena, M. Martinez, and A. Serrano, Eds. Hershey, PA, USA: IGI Global, 2009, ch. 11, p. 23.
4. K. He, X. Zhang, S. Ren, and J. Sun, ''Deep residual learning for image recognition,'' in Proc. IEEE Conf. Comput. Vis. Pattern Recognit., Jun. 2016, pp. 770–778
5. K. Simonyan and A. Zisserman, ''Very deep convolutional networks for large-scale image recognition,'' in Proc. ICLR, 2015, pp. 1–14. [Online]. https://arxiv.org/abs/1409.15
6. Tsoumakas and I. Vlahavas, "Random k- labelsets: An ensemble method for multilabel classification, "in Proc. 18th Eur. Conf. Mach. Learn., 2007, pp. 406–417.
7. J. Read, B. Pfahringer, G. Holmes, and E. Frank, "Classifier chains for multi-label classification, "in Machine Learning and Knowledge Discovery in Databases, vol. 5782. 2009, pp. 254–269. doi: 10.1007/s10994-011- 5256-5.
8. M.-L. Zhang and Z.-H. Zhou, "A k-nearest neighbor based algorithm for multi-label classification, "in Proc. IEEE Int. Conf. Granular Comput. (GrC), Jul. 2005, pp. 718–721.
9. Jiang, C. Wang, and Y. Zhu, "Calibrated rank- SVM for multi-label image categorization, "in Proc. IEEE Int. Joint Conf. Neural Netw. (IJCNN), Jun. 2008, pp. 1450– 1455.
10. G. Madjarov, D. Kocev, D. Gjorgjevikj, and S. Džeroski, "An extensive experimental comparison of methods for multi-label learning, "Pattern Recognit., vol. 45, no. 9, pp. 3084–3104, Sep. 2012. [Online]. Available: https://www.sciencedirect.com/science/ article/pii/S0031320312001203
11. G. Tsoumakas, I. Katakis, and I. Vlahavas, "Random k-labelsets for multilabel classification, "IEEE Trans. Knowl. Data Eng., vol. 23, no. 7, pp. 1079–1089, Jul. 2011.
12. G. Huang, Z. Liu, K. Q. Weinberger, and L. Van der Maaten, "Densely connected convolutional networks, "in Proc. IEEE Conf. Comput. Vis. Pattern Recognit. (CVPR), Jul. 2016, pp. 4700– 4708.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Direct Speech to Speech Translation

Nikhil Nakod[1],
Student,
Computer Department,
Sinhgad Institute of Technology,
Maharashtra, India

Ganesh Patil[2],
Student,
Computer Department,
Sinhgad Institute of Technology,
Maharashtra, India

Pratik Sonawane[3],
Student,
Computer Department,
Sinhgad Institute of Technology,
Maharashtra, India

Pavan Shinde[4],
Student,
Computer Department,
Sinhgad Institute of Technology,
Maharashtra, India

Abstract – **Language is crucial barrier to communicate between people, people often face language issues while communicating with a person having different language. To overcome these challenges, we are building a model that can overcome this language barrier and provides ease in communication. We are trying to follow the Google Translatotron model presented by Google AI Team in 2019. The model is based on sequence-to-sequence learning which uses encoder-decoder model with multi-head attention, which can directly translate speech from one language into speech in another language, without relying on an intermediate text representation. Which will become helpful to overcome the drawbacks of the three-step cascaded architecture (i.e., Speech to Text, Text to Text and Text to speech). The network is trained end to end, learning to map source language speech into target language speech in the form of spectrogram representation.**

Keywords - Google Translatotron, Speech Recognition, Language Translator, Speech Synthesis, Spectrogram Generation, Datasets, Multihead,Etc.

1. INTRODUCTION

We are developing direct speech to speech translation model, which will translate speech from source language to target language. The model is based on sequence-to-sequence learning which uses encoder-decoder model with multi-head attention, which can directly translate speech from one language into speech in another language, without relying on an intermediate text representation.

As we know that the traditional model for translation of speech to speech from source language to target language is composed of three main modules i.e., Automatic Speech Recognition (Speech-To-Text), Machine Translation (Text-To-Text) and Text-To-Speech. So, to convert a speech from source language to speech of target language, it requires to go through all these three-step modules. For that it needs to build three separate modules and train them separately on different dataset format. And after that the modules need to be merge to predict the required output. To avoid the implementation of all these different tasks, the ambiguity and error produced due to merging the different modules, Google proposed a Translatotron model which uses end to end sequence to sequence learning, so by taking the reference of translatotron model we have tried to build a simpler version which consist of sequence-to-sequence encoder-decoder with multihead attention.

However, solving the Direct Speech to Speech Translation task is a new concept in machine learning and which also causes so many new challenges while implementing it. As our model follows supervised learning in which it predicts the speech of target language by taking source language speech as input. So to train the model precisely it requires large amount Input-Output dataset. As we are working on speech format we require to collect the bilingual speech dataset which is very difficult to collect as there is no any availability of such kind of dataset. So by decomposing it into smaller tasks will help in minimize the training data requirement.

For our model we are working on English-Hindi speech Translation, in which the model will take English speech spectrogram as input and will predict the Hindi speech spectrogram as output. So, for that we have to train our model Onto the English-Hindi speech spectrogram dataset. So basically, model takes spectrogram of source language as input and predicts spectrogram of target language as output.

The model we have implemented is follows very basic architecture which consist of sequence-to-sequence learning encompasses of Encoder-Decoder with Multihead Attention. As specify above it requires large amount of dataset to train it precisely and the model follows very basic architecture, so it will predict the required output but not as precise as the other cascaded architectures but it gives the new conceptual view towards the direct speech to speech translation and it can be achieved with more precision in future by making model more robust and precise with the required amount of dataset.

2. LITERATURE REVIEW

The research paper [1] gives in detail view of how to perform Direct speech to Speech translation without any intermediate text representation. In this paper Google has proposed a Translatotron model, But the model is too complicated to implement so we refer a research paper [2] which has

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

proposed three sequence to sequence encoder decoder models from that we have referred the third model which uses multihead attention with bidirectional layers which provides better output from rest of the models. The research paper [3] gives insights of how to use multihead attention in encoder decoder model for better output result. The research paper [4] provides the information about the one of the popular ways of spectrogram reconstruction which is the Griffin Lim algorithm.

3. PROPOSED SYSTEM

Proposed system follows the Google's Translatotron architecture which uses end to end sequence to sequence learning, which takes spectrogram of source speech language as input and will predict the spectrogram of target speech language as output. For data preprocessing part we have used padding to standardize the shapes of all spectrograms and Min-Max Normalization for better learnability of model. The main model encompasses of Encoder-Decoder with Multihead Attention.

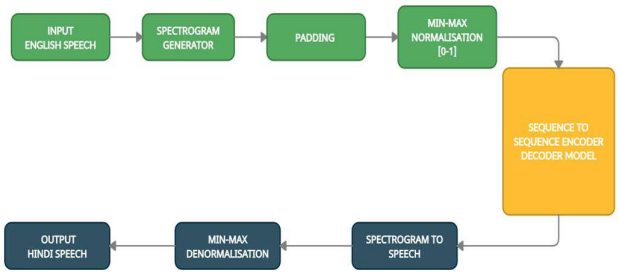


Fig.-1. System Architecture

3.1 DATA SOURCES:

As the proposed model takes speech from source language as input and produces direct speech in target language as output, so we required large amount bilingual data in the form of speech corpus. As we are working on only English to Hindi translation, we require English-Hindi bilingual speech corpus, as there is lack of parallel speech corpus data, but the bilingual English-Hindi text data is available in a huge amount, so we have used Google Text-To-Speech API to convert this text data to bilingual speech corpus. For bilingual English-Hindi text data we have used IIT Bombay English-Hindi dataset. Which consist of around 4 Crore of English-Hindi Parallel sentences. But for the simplicity of our project, we refine the data by taking sentences of less than 8 words. So, from that we have created 160k English-Hindi Parallel speech sentences corpus.

3.2 DATA PRE-PROCESSING:

3.2.1 TEXT TO SPEECH:

As we have collected only English-Hindi Text data, so to convert it into speech we have used Google Text-To-Speech API. And converted Text data into speech format. We have chosen the sentences having word length 8 or less, from the main dataset to convert it into speech. After Converting Text data to Audio data in .wav format we stored the audio dataset onto the Google drive.

3.2.2 FEATURE EXTRACTION:

The first step in any speech translation system is to extract features i.e. identify the components of the audio signal that are good for identifying the linguistic content and discarding all the other stuff which carries information like background noise, emotion etc.

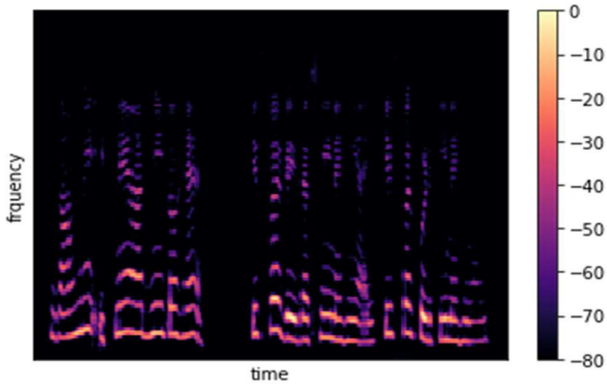


Fig.-2. Spectrogram

As audio signal basically represented in Amplitude-Time domain but the frequency of audio signal is also important parameter to take into consideration for feature extraction, so the Frequency-Amplitude-Time domain representation of audio signal is fulfilled by spectrogram representation. Spectrogram of audio signal is achieved by following the steps like Framing, Windowing, Fast Fourier Transform.

Spectrogram of any audio signal is 2-dimentional array of shape [Frames, Features], where frames are the number of timesteps or the total divisions of audio signal which are different for different length of audio signal. And features are the actual spectrogram values per frame. For our model input/output in this project we have used spectrograms of both English and Hindi audio clips for training and testing our model.

3.2.3 PADDING:

When the audio data is converted to spectrogram, the spectrogram contains the 2-dimentional array of shape [Timesteps(frames),Features] the feature length of all Frames is same i.e.128 but the number of timesteps (frames) are different for different audio file, it is depends on the length of the audio file and the hopping length used for the spectrogram generationso to maintain the equal shapes of all spectrograms of Input/Output audio files to train the model we have created a 3-dimentional array dataset of shape [Samples,Timesteps,Features] where Samples is the total number of audio files and standardized the shape of each audio

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

spectrogram vectors to [200,128],for that we have taken 200 timesteps /frames per audio file where 200 is total number of frames of spectrogram of each audio clip and 128 is the number of features per frame. The audio clips which have number of frames greater than 200 are discarded and the which have less number of frames than 200 are padded with 0 to maintain the standardize shape of all dataset.

3.2.4 MIN-MAX NORMALIZATION [0-1]:

For better learnability of model, we have used Min-Max Normalization [0-1] to the input and output spectrogram values of dataset, due to which our model learns quickly and get rid of complicated calculations. By applying Min-Max Normalization [0-1] to our dataset , we're allowing the network to learn the optimal parameters more quickly for each input node which increases model accuracy.We have used the following formula for Min-Max Normalization from[0-1].

$$x' = [x - \min(x)] / [\max(x) - \min(x)]$$

3.3 MODEL ARCHITECTURE:

The model architecture is based on Google's Translatotron model, but the model is complicated to implement, so we have derived a simpler version of the translatotron model which is referenced from the research paper [2]. The model is sequence to sequence Encoder-Decoder with Multihead Attention. As it is based on End-to-End learning which takes spectrogram of source speech as input and predicts spectrogram of target speech. As speech is the sequential time series data, we require sequence to sequence architecture to map the output sequence with input sequence precisely. Encoder-Decoder architecture helps in mapping the variable input-output sequential data of different context. As we have used padding of zeroes to the data vectors to standardize the shapes of all data vectors, so to avoid the model to learn the padded sequence of zeroes we have added masking layer before the encoder module. So, the model will skip all the timesteps/frames which having all the values zero.

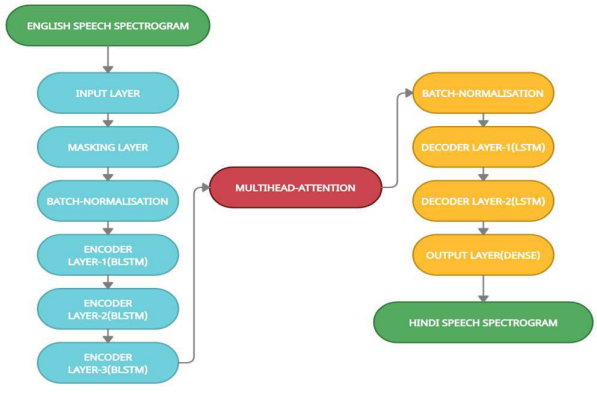


Fig-3. Model Architecture

3.3.1 ENCODER:

The encoder reads the entire input sequence. In our case, spectrogram of source speech and encodes it into an internal representation and this sent further to multihead attention. In our model encoder consist of 3-stacked Bidirectional LSTM which encodes the input spectrogram and return the output sequence to multihead attention module.

3.3.2 MULTI-HEAD ATTENTION:

Multihead attention is a module for attention mechanism which runs through an attention mechanism several times in parallel. Our model uses 4 different attention heads. Multihead attention takes the output of the encoder as input and calculates its 4 different attention heads and concatenate individual output and linearly transform to fit to the input layer of decoder.

3.3.3 DECODER:

Decoder reads the encoded input sequence from the encoder and generates the output sequence. In our case we have used multihead attention between the encoder and decoder so the decoder takes aggregated output from the multihead attention. the decoder consists of 2 lstm's which consists double the neurons as compared to encoder BLSTM to match the shape of encoder output.
The decoder is followed by dense output layer which is a simple well connected neural network.

4. RESULT AND CONCLUSION

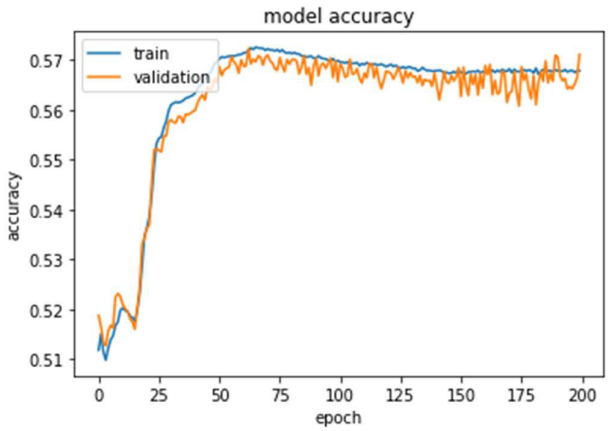


Fig-4. Model Accuracy

In this proposed system we have implemented a sequence-to-sequence encoder-decoder model with multihead attention for direct speech translation from English language to Hindi language. As we know that to train supervised model, we require large amount of data but in direct speech to speech translation case, the model have to learn the linguistic pattern of two different languages with respect to each other with help of their respective speech's spectrogram so to achieve this it requires huge amount of data to train the model to give higher

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

precision and also the model follows very basic architecture so it will predict the required output but not as precise as the other cascaded architectures but instead of insufficient data set and with the simpler model architecture the model gives accuracy in the range of 55-57% on training and validation dataset as shown in figure no.4so, to achieve a perfect translation of speech data from one language to the other some more enhancement is need to be done in the architecture of the model for better prediction and also the data set is need to be large and it can be achieved with more precision in future by making model more robust and precise with the required amount of dataset.

5. REFERENCES

[1] Ye Jia*, Ron J. Weiss*, Fadi Biadsy, Wolfgang Macherey, Melvin Johnson, Zhifeng Chen, Yonghui Wu." Direct speech to speech translation with sequence-to-sequence model" {jiaye, ronw}@google.com25 June 2019

[2] Sireesh Haang Limbu,"Direct Speech to Speech Translation Using Machine Learning"DiVA, id: diva2:1540841, December 2020..

[3] Ashish Vaswani∗, Niki Parmar∗ Jakob Uszkoreit∗ Llion Jones∗ Aidan N. Gomez∗ Łukasz Kaiser∗ Illia Polosukhin∗ , "TAttention Is All You Need", arXiv:1706.03762v5 [cs.CL] 6 Dec 2017.

[4] Ankit Sharma a · Puneet Kumar a · Vikas Maddukuri b* · Nagasai Madamshettib · Kishore KGb · Sahit Sai Sriram Kavurub · Balasubramanian Raman a · Partha Pratim Roy a,"Fast Griffin Lim based Waveform Generation Strategy for Text-to-Speech Synthesis "arXiv:2007.05764v1 [eess.AS] 11 Jul 2020.

Deep Learning Approaches for Intelligent Sentiment Analysis in Movie Reviews

Eshwari G. Kulkarni
CSE dept., Walchand Institute of Technology, Solapur, 413006, India
Email: Kulkarni.eshwari73@gmail.com

Prof Anita M. Pujar
CSE dept., Walchand Institute of Technology, Solapur, 413006, India
Email: arkulkarni10@gmail.com

Abstract- The film has a distinct personality. When anyone expresses their opinion on a film, they include not just the plot of the film, but also the characters in the film. Ordinary movie opinion published in social media, mainly Twitter. A mood analysis is needed to determine if a view on the film is possibly favorable, negative, or neutral. This research aims to identify the sentiment as favorable, negative, or neutral based on opinions expressed in an Indonesian language film and to determine the consistency, precision, recall, and f-measure of the process used, which is CNN and RNN. The test results on a constructed framework indicate that the Recurrent Neural Network algorithm produces more reliable results than the Convolutional Neural Network approach, with an accuracy of 91, 89 %, precision of 89,83 %, and recall of 90,00 %, while the corresponding accuracy of the Recurrent Neural Network algorithm was 93,89 %, precision of 91.28 %, and recall of 90,00 %.

Keywords: Approaches focused on sentiment analysis, Natural Language Processing, and machine learning; Lexicon-based approaches

I. INTRODUCTION

Watching films is one of the things that a person or a group of people may do to spend the day boring. As a result, it is essential to search for details about the film. The Internet Movie Database (IMDB) is one of the sites which give movie reviews that help people to see a movie.
Sentiment analyses were required to help the spectator pick a film [1]. Analysis of feelings seems to categories film ratings as favorable or negative [2]. Positive feeling may be conveyed by optimistic thoughts, and pessimistic feeling by hate.

In this example, we will create an overview of the sentiment of IMDB film reviews using the Tokenization and Lemmatization extraction functions, then identify the films using a CNN and RNN method, and test device reliability. The SVM classification was selected because it is one of the best methods to machine learning.

The word2vec and word bag were combined with different classification systems, such as random forest, SVM and logistics regression [1], Naive Bavaria [2][3], SVM[4][5] and the Neural Network. The words and word2vec models were combined with the numerous classifiers. Neural networks are one of the best answers to this challenge, according to several papers [1].

II. BACKGROUND AND RELATED WORK

A. The Origins of Sentiment Analysis

In early years, emotion analysis experiments were also focused on cognitive psychological studies that quantitatively analyzed human intelligence [30]. Many of the current studies concentrate on developing mathematical and machine learning models based on a large labelled dataset, backed by in-house access to texts with ratings for different products and services. In addition to the sound of the post, Yu created an online news model which also predicts the feeling of each sentence in the message. Several studies tried to optimize success by using handmade elements or different machine-learning systems.

B. Deep Neural Networks for SA

Recently, deep learning has been the subject of machine learning [5]. Deep learning benefits from increased calculation and data efficiency to deliver amazing results for a wide range of diverse activities. In [12], Le-Cun et al. suggested computer vision convolutionary neural networks (CNNs). It is outstanding for computer vision tasks and recently has proven to be useful for other NLP tasks, such as POS tagging, sentence modelling and sentence labelling [15], to name a few. In the presentation of latent components, CNN has shown excellent results. Another common profound learning model, the RNN [13], will keep track of all previous texts in a number of hidden states. As a result, it will more effectively capture word-to-word relationships and syntax in

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

lengthy documents. RNN was effectively used for tasks like text creation, automatic translation, etc.

C. Background

A convolutionary neural network (CNN) comprises convolutionary filters (kernels) with various geographic inputs. These filters are also followed by a subsampling layer to minimize filter performance spatial sizes [6].Initially used in computer vision, this kind of network has now been used in natural language treatment such as sentence-level recognition [7] and emotion detection [8].

Because of their normal nature, recurrent neural networks is used for sequential data retrieval [9]. On the other side, classic persistent networks cannot store long-term knowledge due to a degrading backflow of error. As a result, a long-term short-term memory (LSTM) [9] and gate recurrent unit [10] were developed to overcome this problem and improve storage capacities of recurrent networks.

D. Related work

The mood of Chinese film critics was predicted by profound learning [12]. The algorithm that determines whether a review is good or negative. According to this study, the recidivist neural deep model outperforms other models including CNN, RNN and BRNN by a wide margin.

III. LITERATURE REVIEW

Eissa M.Alshari et al. (IEEE-2018) proposed a method for broadening the range of views through learning the polarity of non-opinion words in SentiWordNet-based vocabulary. The Internet Movie Review Dataset is used to assess system efficacy. The results show that the suggested Senti2Vec solution could be more reliable than the lexical method SentiWordNet.
Dataset: - Internet Movie Review Dataset (IMDB) - The dataset contains 100,000 movie reviews, 50,000 of which are labeled.
Method: - Senti2Vec method
Accuracy: - The accuracy of the Senti2Vec method is 85.4%
Key Observation: - From our observation we can conclude that the proposed method's success is promising, indicating that it could be more successful than the traditional SentiWordNet.
Future Scope: - In future work the more research is focused on the effect of the various distance measures employed in the Senti2Vec on the success of sentiment analysis

Rachana Bandana (IEEE-2018) focuses on the scheme established for a hybrid solution for sentiment orientation in the comments text document. The hybrid method implies a blend of machine learning and a Lexicon approach. The device model has been developed with supervised study algorithms including Naive Bayes (NB) and Linear Support Vector Machine (LSVM). A precise sentimental research method comparing to other baseline systems may be used with the suggested heterogeneous features and a mixed solution.
Dataset: - Dataset is generated and labeled manually using various sources such as BookMyShow, IMDB, Rotten Tomatoes, Netflix, etc.
Method: - Machine learning and Lexicon-based (knowledge-based) approach.
Accuracy: - Hybrid Approach 89%
Key Observation: - we can obtain greater outcomes by utilizing these heterogeneous features instead of just using machine learning or lexicon-dependent functions. The Naive Bayes algorithm often achieves tremendous accurate results also with a limited number of training details.
Future Scope: - To build a more reliable method, we may deal with numerous elements like various preprocessing approaches, heterogeneous elements, supervised and unsupervised algorithms. To handle large amounts of data, we may add some extra deep learning features as Word2Vec, deep neural network algorithms such as Recursive Neural Network (RNN), and Convolutional deep neural networks (CNNs) respectively

Cahyanti et al. (IEEE-2020) address the need to categories film reviews or commentaries as constructive and/or derogatory. Machine learning models including Support Vector Machine are used for classification of emotion analyses since they have the most powerful results (SVM). The research also used Term frequency – Inversive Document Frequency (TF-IDF) as a weighing tool, then further combined with the Latent Dirichlet Allocation (LDA) function extraction as a modeling method that can resolve SVM limitations.
Dataset: - Internet Movie Review Dataset (IMDB)
Method: - It will use Term Frequency - Inverse Document Frequency (TF-IDF) and Latent Dirichlet Allocation (LDA) to extract features before classifying with Support Vector Machine (SVM)
Accuracy: - The accuracy of the lexicon-based method is 82.16%
Key Observation: - The fusion of TF-IDF and LDA extraction with 240 topics and 82.16 percent effective results was the outcome of the best performance solution based on the whole test scenario. It is

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

therefore simpler to increase system performance by integrating TF-IDF and LDA feature extraction.
Future Scope: - Future analyses can be expanded by introducing new feature extraction variants or by combining TF-IDF and LDA features to reduce processing time.

Hameed Zabit (IEEE-2019main)'s focus in this paper was to address publicly available film analysis datasets, namely Movie Review and Stanford Sentiment Tree (SST2), in a computationally efficient way to classify sentiment into positive and negative respectively. We only used one bidirectional long-term memory layer (BiLSTM) solution with a global max-pooling layer.
Dataset: - Pang and Lee [14] introduced the movie review (MR) dataset in 2005. It's a well-balanced dataset of 10662 binary movie ratings.
Stanford Sentiment Treebank (SST2) is an expansion of the MR Dataset that was implemented by R. Socher et al. [15] in 2013. It is an unbalanced dataset that contains 9613 binary movie ratings.
Method: - Bidirectional Long Short-Term Memory (BiLSTM)
Accuracy: - The accuracy of this method is 80.21%
Key Observation: - We concluded that our experiments, with complex structures, are comparable with recently published complex frameworks. Also, our solution needs minimal computing costs and may aid in general opinion categorization in real-time applications.
Future Scope: - This study's potential directions involve multilingual and multi-label view labeling correlated with real-time application of our enhanced framework.

IV. PROPOSED APPORACH

A. System Analysis

This research begins by aggregating film feedback by scraping reviews with the hashtag # definition of the perfect film. The IMDB website collected this material. The review data collected primarily includes the review's loss, film name, film id, review, year, date, and period.
Next step is to mark responses centered on predetermined sentiments like enthusiastic feeling for positive film views, pessimistic feeling for negative film views, and moderate feeling for neutral film views.
After all of the data has been collected, each class is divided into three parts: training data, data validation, and data checking. In addition, the third component is subjected to a preprocessing procedure. The below are the steps of preprocessing:

- Remove #@
- Remove Step words
- Remove any URL link

After the analysis of training, validation and testing data then next stage is perform where an attempt is made to applying NLP and Sentiment Dictionaries to the each review:

- POS Tagging wise
- Word Tokenization
- Word Lemmatization
- Word and Sentence Similarity

For more details, step research can be seen in following figure;

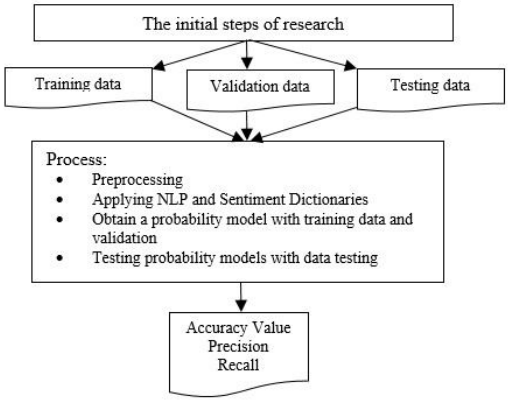


Fig. 1: - Flow Research

Following the completion of the NLP step, we proceed to the implementation of dynamic convolution neural networks and RNN algorithms on the training process to construct the likelihood model of training and validation results. The classification model sentiment developed during the training phase is then tested using new data reviews (data testing). Equation is used to measure the importance of its precision

$$accuracy = \frac{the\ no.of\ sentiments\ is\ correct}{the\ no.of\ test\ data} * 100 \quad (1)$$

In addition to measuring accuracy, the precision, recall, and f-measure are used to assess classification results. Equation (2) can be used to determine the accuracy value, and Equation (3) can be used to calculate the recall value (3)

$$precision = \frac{true\ positive}{true\ positive + \quad positive} \quad (2)$$

$$recall = \frac{true\ positive}{trur\ positive + false\ negative} \quad (3)$$

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

B. System architecture

In total, this method consists of five components: data retrieval, movie review preprocessing, NLP use, emotion classification of movie reviews, and sentence consistency performance. The accompanying architecture diagram depicts the system's architecture configuration.

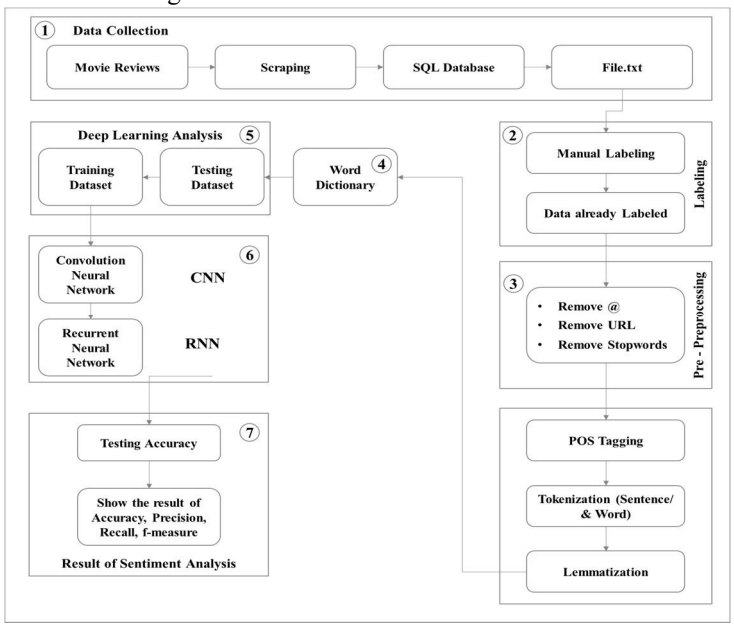


Fig. 2: - System Architecture

- **Data Collection and Data Classification**

The received movie reviews primarily have the hashtag # movie names. This information was gathered from the IMDB website. The review data obtained primarily consists of the rid, movie name, movie id, review, year, date, and time of the review.
As many as 1245 sentences were used in the data. The data were split into three emotions: Optimistic feelings for favorable film comments or views, depressive feelings for negative film comments or opinions, mild feelings for neutral reviews or film opinions.

- **Information Modeling**

Data modelling is done to measure the consistency of device forecasts based on previously generated model data. In order to construct the probability model in this study, training and validation data were needed. Furthermore, using movie review data to evaluate the sentiment model generated during the training phase (data testing).

- **Data Preprocessing**

After collecting all data, each class is divided into three parts: training data, data validation, and data checking. The third aspect is often subject to preprocessing. Below are preprocessing steps: Remove all #@, stage names, or URLs.

- **Use NLP**

After testing, verifying and evaluating outcomes, the next step included applying NLP and Sentiment Dictionaries to each analysis. Word Tokenization, Word Lemmatization, Word Similarity, POS Tagging

- **Neural Network Approach**

CNN and RNN are development algorithms that alternate broad convolution layers with complicated pooling layers. The width of the interface chart in the middle layer varies from the length of the input statement (CNN or RNN)

V. RESULT AND ANALYSIS

Following completion of both designs and architecture setup, the next move is to use the system to construct training and validation data probability models, validate the accuracy of the probability model with data testing, and play with the same data with other implementations, comparing the accuracy of outcomes with the created framework.

A. Count of Testing Epochs

The first phase in research is to choose an epoch figure. Due to finite finances, not all values are considered, and only three are selected: 10, 20, and 30. For this epoch examination, other parameters such as filter width, filter count, and k-top are assigned at random. To calculate precision, the average of k-fold cross-validation is used. Table 1 displays the epoch test data.
Table 1 indicates that at epoch 20, accuracy decreased from 88.78 % to 88.14 %, but when the epoch was revised to 30, 40, and 50, the influence of accuracy improved and the value was equal to epoch 10, 91, 89 percent, but time taken for a longer phase when compared to epoch 10. The greater the number of epochs, the longer it takes to process them.

TABLE I. EPOCH TESTING

Epoch	Time (minutes)	Accuracy (%)	Precision (%)	Recall (%)
10	3,45	88,78	86,00	88,00
20	6,91	88,14	88,00	88,00
30	10,22	89,88	87,00	89,00
40	13,58	90.01	89,00	89.95
50	16.48	91.89	89.93	90,00

A. Comparison of the results of opinion sentiment movies.

The aim of this analysis is to categories the optimistic, negative, and neutral feelings expressed in movie reviews. The system's interpretation of this emotion would be measured accuracy. After obtaining the precision, it can be compared to the RNN intelligent neural network algorithm. Table 2 shows a comparison of precision using test data and k-fold division equal to the convolutional neural network algorithm.

TABLE II. COMPARISON OF ACCURACY RESULTS

	CNN				RNN			
k-fold	Time (minutes)	Accuracy (%)	Precision (%)	Recall (%)	Time (minutes)	Accuracy (%)	Precision (%)	Recall (%)
k1	3,45	88,78	86,00	88,00	2,45	90,98	88,00	89,00
K2	3,05	88,14	88,00	88,00	3,89	87,14	87,00	87,00
K3	10,22	89,88	87,00	89,00	8,91	91,01	89,00	91,00
K4	13,58	90.01	89,00	89.95	9,25	92.67	90,00	90.79
K5	16.48	91.89	89.93	90,00	10.48	93.89	91.28	92,43

Based on the findings of the above comparative study, it is possible to infer that the approach of Recurrent Neural Network algorithm with Convolutional Neural Network is superior. With movie ratings research data from the IMDB dataset, RNN outperforms CNN.

VI. CONCLUSION

Sentiment analysis seeks to elicit the viewpoint hidden behind the user's statement and to define the user's desires, goals, and opinions on a given subject. Via a summary and interpretation, this essay identifies and analyses opinion analysis methodologies.

The proposed method provides crucial stages for deciding if a text's sound is optimistic or negative. Academics working in the areas of sentiment analysis and perception mining will find this article valuable.

CNN and RNN are neural networks that are used to train the device on the optimized features. Optimistic and negative emotions are detected by comparing the text sent with the data saved. The suggested classifier classifies emotions with greater precision than other classifiers, such as Nave Bays and SVM (Support Vector Machine).

REFERENCE

[1] *Eissa M.Alshari, Azreen Azman∗, Shyamala Doraisamy, Norway Mustapha and Mostafa Alkeshr "Effective Method for Sentiment Lexical Dictionary Enrichment based on Word2Vec for Sentiment Analysis" 2018 IEEE-Fourth International Conference on Information Retrieval and Knowledge Management*

[2] *Rachana Bandana "Sentiment Analysis of Movie Reviews Using Heterogeneous Features" IEEE 2018*

[3] *Azilawati Azizan, Nurul Najwa SK Abdul Jamal, Mohammad Nasir Abdullah, Masurah Mohamad, Nurkhairizan Khairudin "Lexicon-Based Sentiment Analysis for Movie Review Tweets" IEEE 2019*

[4] *Fitri Eka Cahyanti, Adiwijaya, Said Al Faraby "On the Feature Extraction for Sentiment Analysis of Movie Reviews Based on SVM" IEEE 2020- 8TH International Conference on Information and Communication Technology (ICoICT)*

[5] *Zabit Hameed, Begonya Garcia-Zapirain, Ibon Oleagordia Ruiz "A computationally efficient BiLSTM based approach for the binary sentiment classification" IEEE- 2019.*

[6] *Nguyen KhaiThinh†, Cao Hong Nga†, Yuan-Shan Lee§, Meng-Lun Wu§, Pao-Chi Chang*, Jia-Ching Wang† "Sentiment Analysis Using Residual Learning with Simplified CNN Extractor" IEEE 2019*

[7] *Rosy Indah Permatasari, M. Ali Fauzi, Putra Pandu Adikara, Eka Dewi Lukmana Sari "Twitter Sentiment Analysis of Movie Reviews using Ensemble Features Based Naïve Bayes" IEEE 2018*

[8] *SEUNGWAN SEO1, CZANGYEOB KIM1, HAEDONG KIM2, KYOUNGHYUN MO3, AND PILSUNG KANG "Comparative Study of Deep Learning-Based Sentiment Classification" IEEE 2019*

[9] *Yong Zhang∗, Meng Joo Er∗, Rajasekar Venkatesan∗, Ning Wang† and Mahardhika Pratama‡ "Sentiment Classification Using Comprehensive Attention Recurrent Models" IEEE 2016*

[10] *Mais Yasen, Sara Tedmori, Amman, Jordan "Movies Reviews Sentiment Analysis and Classification" IEEE 2019 Jordan International Joint Conference on Electrical Engineering and Information Technology (JEEIT)*

[11] *Charu Nanda, Mohit Dua, and Garima Nanda "Sentiment Analysis of Movie Reviews in Hindi Language using Machine Learning" 2018- IEEE- International Conference on Communication and Signal Processing, April 3-5, India*

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

[12] *Y. LeCun, L. Bottou, Y. Bengio, and P. Haffner, "Gradient-based learning applied to document recognition," Proceedings of the IEEE, vol. 86, no. 11, pp. 2278–2324, 1998.*

[13] *Malini R, Dr.Sunitha M.R, "OPINION MINING ON MOVIE REVIEWS" IEEE- 2019 1st International Conference on Advances in Information Technology.*

[14] *Suhariyanto, Ari Firmanto, Riyanarto Sarno "Prediction of Movie Sentiment based on Reviews and Score on Rotten Tomatoes using SentiWordnet" IEEE-2018 International Seminar on Application for Technology of Information and Communication (semantic)*

[15] *Esha Tyagi AND Dr. Arvind Kumar Sharma "An Intelligent Framework for Sentiment Analysis of Text and Emotions – A Review" IEEE 2017 International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS-2017)*

[16] *Tejaswini M. Untawale1, Prof. G. Choudhari2 "Implementation of Sentiment Classification of Movie Reviews by Supervised Machine Learning Approaches" IEEE-2019 Third International Conference on Computing Methodologies and Communication (ICCMC 2019)*

[17] *Yin Fulian, Wang Yanyan, Pan Xingyi, Su Pei "A Word Vector-based Review Vector method for Sentiment Analysis of Movie Reviews Exploring the applicability of the Movie Reviews" IEEE-2018 3rd International Conference on Computational Intelligence and Application*

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Automatic Face Mask Detection System Based on Machine Learning

Prof. H. H. Kulkarni[1], Darshana Mohadkar[2], Pragati Bhadane[3], Purva Adhangale[4]

Gokhale Education Society's R.H. Sapat College of Engineering, Nashik, Maharashtra 422005, India

Department of Electronics and Telecommunication

hemangi.kulkarni@ges-coengg.org

darshana.mohadkar25@gmail.com

pragatibhadane123@gmail.com

purvaadhangale2405@gmail.com

Abstract*— A terrible Covid19 pandemic has completely disrupted the human life. During the first wave of this epidemic in 2020, everyone had to work from home, many co-operative, private and even public sectors had to face financial losses, many people lost their jobs and even some of the companies were shut down. Meanwhile situation seemed to be gradually improving the second wave has taken a toll into people's lives. Even so, one may have to go out to buy essentials and someday we all have to resume to our work by taking all necessary precautions. So in this paper we have attempted to present one of the best possible solution of automatic face mask detection in artificial intelligence and Machine Learning domain. We have used convolutional Neural Network (MobileNet) to deploy deep learning architecture and after training the model obtained absolute satisfactory results for correctly detecting the face mask.

Keywords*— python, jupyter notebook, deep learning, HaarCascade, real time mask detection.

I. INTRODUCTION

India is found in the throes of Covid 19 deadly virus since two years. Due to the existence of second wave,many of the people lost their lives. As this virus is infectious, it spreads from person to person because of sneezing and coughing, hence it is said to be contagious. Therefore, in this pandemic period it is extremely significant to avert visiting crowdy places and make an adequate use of facial mask. If in case there is urgency one must meticulously wear a mask in a proper way. We can combat with Covid 19 deadly virus with the help of advance technologies like artificial intelligence, Machine learning, Big data. However, the process of monitoring and controlling the mob in Public places is very essential. As a result it is necessary to implement Automatic Face Mask Detection using machine learning technology, so that people are averted to beware of wearing a mask,and easily recognized whether a person has wear a mask or not This task can be achieved using face mask detection model that is based on computer vision and deep learning algorithms. The proposed model can be integrated with Surveillance Cameras to impede the COVID-19 transmission by allowing the detection of people who are wearing masks not wearing face masks. The model is combination of deep learning and classical machine learning techniques with Open cv, Tensor flow and Keras. Our objective is to implement the system that could impart to predict the person without mask is achieved with highest accuracy and with consumption of least time.

II. LITERATURE SURVEY

In face detection method, face has been considered one of the significant part of the body with the help of which detection and recognition of a person has wore a mask or not is easily possible[2] .The method of Deep learning framework detect face mask from video footage proposes an approach to detect a person has wear the mask or not and is predicted in video using deep learning method. It mainly focuses on MTCNN face detection model to identify the faces alongwith their corresponding facials landmarks present in video frames[2]. The neotric classifier uses MobileNetV2 architecture to process image of faces

In [4] The authors have proposed framework as a collection of videos capturing the activity of people in public places.They have demonstrated the effectiveness for detecting facial mask by achieving high precision and accuracy. From [7]Utilizing Viola jones Object detection algorithm to detect masked faces and eyes portion captured in the video.

According to [6] Mask surveillance system to combat Covid 19 like pandemics methodology focuses on the activity whether a person has worn a mask adequately or not. At an initial stage it would train the model using proper dataset. With the help of SSDMNV2 (single shot multibox detector) model in [8] have illustrated how to classify mask and unmasked person. The task to examine the accuracy of face mask detection is achieved.

Face recognition technology is a biometric technology, which identifies facials features of a person[9]. They have discussed the challenge how an image in real time application, web introduce general evaluation standards and general databases of face recognition. These are widely used in attendance access control system, security application etc. According to[10] Haarcascade classifiers captures features of an image.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Haarcasade is a machine learning algorithm, it reflects grayed level changes of an image. With the help of haarcasade algorithm system can easily capture only portion of face rather capturing other parts of the body.[9]
In[5] The Authors have determined that Computer vision consists of various categories such as Object detection, image recognition and generation. In that Object detection is widely used for face detection, vehicle detection to get accurate counts of pedestrians. In order to achieve high accuracy the supervised models like YOLO and SSD modules are recognized.[5] We can detect each and every object in an image by highlighting rectangular boxes and by identifying and assigning tag to the particular object. [5]

III. PROPOSED SYSTEM

Transfer learning addresses cross-domain learning problems by executing useful information from the data in related domain and transferring them for being used in target task. There are different transfer learning method such as VGG19, GoogleNet, AlexNet, RestNet, MobileNet etc. The proposed system uses MobileNet architecture. For this, all the images in the dataset are down sampled to 224x224. Haarcascde frontl face classifier is used.

A.Dataset :

The purpose of this architecture is to detect whether a mask is correctly worn or not by a person regardless of his/her age, ethnicity or gender. That means, model should have similar and correct predictions for a baby, an adult or an elderly. So, in
order to deploy such deep learning architecture, dataset such as MaskedFace-Net based on Flickr-Faces-HQ dataset is used [15]. The dataset used to train our model has two files in it; one file has total 951 images of faces wearing a mask and another file has total 1000 images of same faces without a mask. The images of people "mask" dataset are also present in "no_mask" dataset. However, some extra images of unknown faces are also added in "no_mask" dataset. The dataset "mask" and "no_mask" are shown in following figures.

Fig. 1. Images from "mask" dataset.

Fig. 2. Images from "no_mask"

B. Algorithm :

1. Install all the necessary dependencies to achieve the target output.
2. Download the appropriate dataset for your model.
   - Samples of masked images into one folder
   - Samples of no mask images into another folder.
3. Perform data augmentation, data cropping and reshaping.
   - Cv2 plots images by default in the form of BGR
   - Convert it into RGB using command cv2.COLOR_BGR2RGB
4. Read the images and convert them into array
   - Shuffle images in the dataset so that model does not learn the sequence
5. Deep learning model for training model.
6. Perform the Transfer Learning.
   - Start the tuning and weights from last checkpoint
   - Modify the layers of MobileNet such as final output activation as 'sigmoid'
7. Set up the binary classification for face mask and no face mask.
   - Compile model using command:
     (loss= "binary crossentropy" ,optimizer = "adam", metrics = ["accuracy"])
   - Set up the epochs
8. Check network for predictions
   - Check if algorithm is working for images present in dataset as well as for dynamically chosen images
9. Show results.

IV. RESULTS

The language used for implementing the model is python and the IDE is Jupyter Notebook under Anaconda(64 bit) environment. When the epochs which is trained on 1175 and validated on 196 samples is set to 1, the model provides 63% accuracy and goes on increasing for more number of epochs. In our experiment, we take epochs=10 which provides 95.77 % accuracy. Accuracy for each epochs value from 1 to 10 is shown in figure 3.

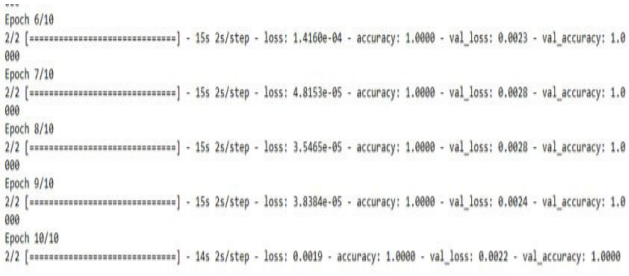


Fig. 3

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

It is expected that, for any image from dataset, the model should accurately provide output ‘0’ for facemask image and ‘1’ for no mask image. Thus, Network predictions are carried on two sets of images. An image of a person wearing a facemask outputs into negative image and wise versa. To validate the model, the dataset tested for 4 parameters with the help of MobileNet image classifier having total parameter: 3,229,889, trainable parameter: 3,208,001 and non-trainable parameter: 21,888 for tuning weights etc. Based on the overall results, we understood that using transfer learning in detecting the mask on the faces is simply an effective approach. However, some challenges faced by this approach are varying angles, lack of clarity and mainly unsteady pictures captured from real time video i.e. moving faces makes it difficult for model to process.

V. Discussion and Challenges

The proposed new idea of face mask detection scheme is discussed in detail at the previous SEC (III) Even though many case studies enrolled to show off the real time scenario of COVID-19 situation, it is quite challenging in terms of implementation of the systems in real time. Developing the system that is flexible for all the environments, adaptable changes are become challenge. The proposed model could be installed in major public places to keenly monitor the human beings. We are suggesting the cloud based approach that host the current level of followers and number of peoples failed to follow, regardless of age, location etc. will be reflected globally. [13],[12] IoT implementation will create awareness to global users and increasing the system accuracy and monitoring span will improve the situation. The analysis results should be publicly available to access so that the system is tenable to future expectations.

VI. Conclusion

In this situation of pandemic, serving the society through advance technological solution is the purpose of implementing this system. Protecting oneself and the society from the critical virus is most important. Here image processing based Mask detection framework with deep learning neural network for analysis is implemented. This system provides good results in terms of detecting presence of mask at proper position on the face. Also this system checks the liveliness of face before detecting the mask. The research would be further extended by implementing the robust prediction system for social distance monitoring and real time monitoring of face mask detection system with large data size. The proposed model also needs to be implemented in large coverage area to evaluate and enhance the accuracy of the prediction model.

REFERENCES

[1] M. Cristani, A. D. Bue, V. Murino, F. Setti and A. Vinciarelli, "The Visual Social Distancing Problem," in IEEE Access, vol. 8, pp. 126876-126886, 2020, doi: 10.1109/ACCESS.2020.3008370.

[2] A. H. Ahamad, N. Zaini and M. F. A. Latip, "Person Detection for Social Distancing and Safety Violation Alert based on Segmented ROI," 2020 10th IEEE International Conference on Control System, Computing and Engineering (ICCSCE), Penang, Malaysia, 2020, pp. 113-118, doi: 10.1109/ICCSCE50387.2020.9204934.

[3] C. T. Nguyen et al., "A Comprehensive Survey of Enabling and Emerging Technologies for Social Distancing—Part I: Fundamentals and Enabling Technologies," in IEEE Access, vol. 8, pp. 153479-153507, 2020, doi: 10.1109/ACCESS.2020.3018140.

[4] S. Sharma, M. Bhatt and P. Sharma, "Face Recognition System Using Machine Learning Algorithm," 2020 5th International Conference on Communication and Electronics Systems (ICCES), COIMBATORE, India, 2020, pp. 1162-1168, doi: 10.1109/ICCES48766.2020.9137850.

[5] Farzaneh Azadipourghahestani and Esmat Rashedi, "Object detection in images using artificial neural network and improved binary gravitational search algorithm", 4th Iranian Joint Congress on Fuzzy and Intelligent Systems, 2015.

[6] H. Filali, J. Riffi, A. M. Mahraz and H. Tairi, "Multiple face detection based on machine learning," 2018 International Conference on Intelligent Systems and Computer Vision (ISCV), Fez, 2018, pp. 1-8, doi: 10.1109/ISACV.2018.8354058.

[7]Farzaneh Azadipourghahestani and Esmat Rashedi, "Object detection in images using artificial neural network and improved binary gravitational search algorithm", 4th Iranian Joint Congress on Fuzzy and Intelligent Systems, 2015.

[8] M. Hatt, C. Parmar, J. Qi and I. El Naqa, "Machine (Deep) Learning Methods for Image Processing and Radiomics," in IEEE Transactions on Radiation and Plasma Medical Sciences, vol. 3, no. 2, pp. 104-108, March 2019, doi: 10.1109/TRPMS.2019.2899538.

[9] Pulung Nurtantio Andono, Muljono and T. Sutojo, Digital, 2017.' Face mask detection using Haarcasade in different illumination '

[10] . K. D. Indonesia, DKI Jakarta Provinsi dengan Tindak Kriminal Terbanyak, pp. 2015, 2015.' Analyzing of different features using Haarcasade classifier

[11] O. Jukić, I. Špeh and I. Heđi, "Cloud-based services for the Internet of Things," 2018 41st International Convention on Information and Communication Technology,

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Electronics and Microelectronics (MIPRO), Opatija, 2018, pp. 0372-0377, doi: 10.23919/MIPRO.2018.8400071.

[12] W. Tärneberg, V. Chandrasekaran and M. Humphrey, "Experiences Creating a Framework for Smart Traffic Control Using AWS IOT," 2016 IEEE/ACM 9th International Conference on Utility and Cloud Computing (UCC), Shanghai, 2016, pp. 63-69.

[13] M. Aleisa, A. A. Hussein, F. Alsubaei and F. T. Sheldon, "Performance Analysis of Two Cloud-Based IoT Implementations: Empirical Study," 2020 7th IEEE International Conference on Cyber Security and Cloud Computing (CSCloud)/2020 6th IEEE International Conference on Edge Computing and Scalable Cloud (EdgeCom), New York, NY, USA, 2020, pp. 276-280, doi: 10.1109/CSCloud-EdgeCom49738.2020.00055.

[14] Sohan, M.F. (2020). So You Need Datasets for Your COVID-19 Detection Research Using Machine Learning? ArXiv, abs/2008.05906 [15] Vaid, S., Kalantar, R. & Bhandari, M. Deep learning COVID-19 detection bias: accuracy through artificial intelligence. International Orthopaedics (SICOT) 44, 1539–1542 (2020). https://doi.org/10.1007/s00264-020-04609-7

[15] Cabani, Adnane, karim Hammaudi, Halim Behnabiles, and Mahmoud Melkemi, "MaskedFace-Net—A Dataset of Correctly/Incorrectly Masked Face in the Context of COVID-19", arXiv preprint arXiv:2008,08016(2020).

Android Controlled E-Notice Board By Using Bluetooth Technology

Sandip Turkane
Department of Electronics And Telecommunication
Pravara Rural Engineering College
Loni, Maharashtra,India
sandipturkane@gmail.com

Karishma Shaikh
Department of Electronics And Telecommunication
Pravara Rural Engineering College
Loni, Maharashtra,India
karishmarajshaikh@gmail.com

Priti Davange
Department of Electronics And Telecommunication
Pravara Rural Engineering College
Loni, Maharashtra,India
pritidavange@gmail.com

Abstract—
With the arrival of Digital Technology, it is efficient to represent the information on digital devices. The project is an electronic notice board that is controlled by an android device and displays message on it. usually, there were notice boards where any information or notice had to be stick daily. This becomes tedious and requires daily maintenance. Now a days internet is the primary mode of communication everywhere. Notice board plays a vital role to convey the message in any organization. The project overcomes this problem by introducing an electronic display notice board interfaced to an android device through internet connectivity. The receiver device receives the message from the android device that is sent to a arduino. The arduino displays the message on LED dot matrix rolling display. This scheme can be used in colleges, offices, railway stations or airports for displaying any information.

Keywords— Arduino , LED dot matrix rolling display , Bluetooth module, Android application, etc.

I. INTRODUCTION

Notice board is generally utilized in elementary schools and significant associations to pass on messages on the loose. A great deal of paper is been utilized and which just squandered. This prompts a great deal of deforestation that prompts a dangerous atmospheric deviation. Little creative decisions in utilizing innovation for ordinary purposes would positively affect the earth's issues which we are by and worried about. The crux of the venture is designing a structure of a notification driven scheduled notice Board that will supplant the current methods[1]. The fundamental target of the task is to develop a remote notification system that showcases any note which is transmitted by the client's android application gadget. While the client sends the text from the mobile gadget and is recovered by a Bluetooth gadget on the receiver end[2]. The secret is known to the administrator then it can be delivered to the arduino that shows the notification sent from the client on the notice board which will be furnished with a LED display. It utilizes an arduino to control its activity. Bluetooth will deal with the remote piece of the corresponding interface that is transmitted and get information between the two devices. While a mobile is currently in excess of a telephone now a days, various Applications are being based on a hagioscope of stages for cell phones is a stounding.

Commonly, there were notice boards where any information or notice had to be stick daily. This becomes tedious and requires daily maintenance. The purpose of this project is to develop a wireless notice board that displays notices when a message is sent from the user's android application device. Android Controlled Notice Board is an electronic based project. This automated system can reduce the manual work. The idea of this project is to design a Internet driven automatic display board. It is put forward to design receiver cum display board which should be programmed from an authorized mobile phone. This electronic device is a combination of software and hardware. In this paper, to design a model messages are sent through an Internet from an authorized transmitter and then message is transmitted to the arduino and the message is read and sent to digital display board.

II. LITURATURE SURVEY

Bluetooth based notice board is an android based application. In this application, user sends the message from the android application device, and then the message is received and retrieved by the Bluetooth device at the display unit. The Bluetooth access password will only be known to the user. It is then sent to the Arduino that further displays the notice sent from the user on to the electronic notice board which is equipped with a LED dot matrix rolling display. It uses a Arduino.

Taking into consideration, it tends to be inferred that, there exists a need for an electronic notice board that empowers a proficient direction to the client for showing notice. By thinking about increasing the smallness of electronic frameworks, there is a need of installing at least frameworks together. This venture is a usage of the possibility of remote correspondence among a mobile cellphone and an arduino controller. In this challenge work, we need to shape an inserted framework that incorporates display unit. The unit incorporates a show off that may be interfaced with arduino.

2.1. Message displayed on LCD Screen using GSM and Bluetooth Technology.(September2015)

Savan ShahIn this paper a project model for electronic notice board is described which uses two different technologies, GSM and Bluetooth for displaying on LCD screen. Here the main part is Microcontroller 8051. The microcontroller is interfaced with GSM Modem via MAX232 level convertor. It is used to convert RS232 voltage levels to TTL voltage level and vice versa. The hardware also has a 64K EEPROM. This EEPROM is used to store the timings and messages to

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

be displayed. While using Bluetooth technolgy, Bluetooth modem fetch thje message and sends it forward to the display board.When using GSM technology, GSM module is used.[1]

Android Based Wireless Notice Board and Printer.(December 2015)

Prof. Sudhir Kadam, Abhishek Saxena, Tushar Gaurav. This project deals about an advanced Hi-Tech wireless Notice Board. This system is enhanced to display the latest information through an Android application of smart phones or tablet. While user sends the message from the Android application device, it is received and retrieved by the Bluetooth device at the display unit. The Bluetooth access password password will only be known to the user, it is then sent to the microcotroller that further displays the notice sent from the user on the electronic notice board which is equipped with a LCD Monitor display. It uses an Arduino system system(AVR microcotroller) to control the operation. Bluetooth wireless technology is becoming a popular standard in the wireless technologies. "Wireless printers" refers to printers to printers in which a radio frequency (RF) connects the printer to the network, a controlling PC, a handheld computer or both. [2]

GSM Based Wireless Notice Board.(March 2016)

Prof. Ravindra Joshi, Abhishek Gupta, Rani Borkar, Samita Gawas, Sarang Joshi.

This paper describes the design and construction ofE-notice board using GSM technology. The system cosists of four basic units: GSM modem,Raspberry pi board, LCD monitor and Mobile device. The operation of the system is centered on Raspberrypi Board. The operation of system is such that the notice which is to be displayed is send by the mobile device to the GSM modem and displayed on the LCD monitor using Raspberry Pi board.The system is based on real time process and saves lot of resources i.e. human effort. The main objective of this paper is to develop a wireless e-notice board that displays message sent from the user and to design asimple, easy to install, user friendly system, user friendly system. Wi-Fi provides higher data rates for multimedia access as compared to bluetooth which provides lower data transfer rates. Bluetooth are intended for communication (about 10m), while Wi-Fi is designed for WLAN about 100m.[3]But when using GSM we cannot display message without Network connectivity.

Android Controlled Digital Notice Board(May-2016)

Prof. Madhavi Repe, Akshay Hadoltikar, Pranav Deshmukh, Sumit Ingle This paper presents a model about advanced wireless notice board. The project is build around ARM controller, Raspberry-pi which is most important in this system.Display is obtained on LCD monitor display. Remote control is the most popular system nowadays. The main objective of this project as described in the project is to develop a wireless notice board which can receive anddisplay message sent from the user. The project aims atdesigning A LCD monitor based message display controlled fom an Android mobile phone. The proposed system has a provision to communicate from Android phone to LCD display board. Range of communication is large. Android contains a full set of tools that have been built from the ground up alongside the platform providing developers with high productivity and deep insight into their applications.[4].As the Android applications is command centre of the notice board and this application is built around Android OS platform it will not support other Os such as IOS, Windows, Blackberry, etc.

Remotely Controlled Android Based Electronic Notice Board

Prof.P.Yakaiah,Bijjam Swathi, M.Jhansi, B.Nikhala,K.ShivaPrasadThis project is dealing with hitch wireless electronic notice board. The main aim of the project is to have an electronic notice board where the least information can be shorted by the faculty to the students using Wi-Fi through connection terminalapp. This message can be sent from any Smart phone with Android OS upon GUI based on touch screen operation. Here 8051 Microcotroller is used. As the Wi-Fi module has its own IP address and port number that will be known only to the user the system becomes more secure.When the user is sending the message from android application device will be received by the Wi-Fi module. Along wih the notice messages, date and time,breaking news can be flashed timely.[5]

III.PROPOSED SYSTEM

The block diagram shows the different component used in the Android controlled Notice Board like Power Supply,Bluetooth module,Shift registers,LED dot matrix display,Arduino,etc

The arduino starts. A test message is displayed on the led matrices. if not anything happens on the bluetooth module, the stored message stays on the screens. in the meantime, the arduino program check the serial port (where the bluetooth module is connected). If nothing is on the buffer, the same message keeps "turning". if several data is available on the virtual serial port, the message is downloaded, and replaces the previous message.

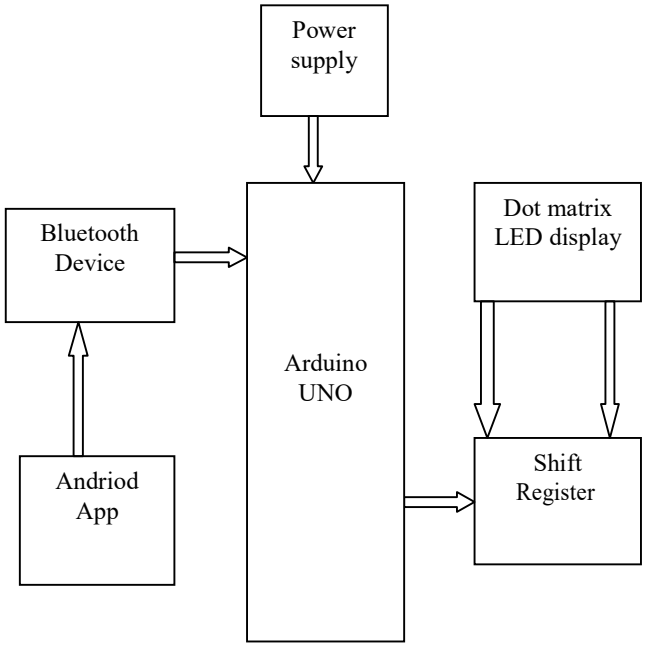


Fig.1.Block Diagram of the System

The Bluetooth modules acts as a serial client. All the uninteresting connecting/security aspects are handled by the module. In fact, the bluetooth module is connected by two TX/RX signals, and acts as a serial port, just like a computer. A bluetooth client terminal on the phone handles the connection, and allow the user to send and receive text.

A. ARDUINO UNO(ATmega328p):

Arduino Uno is a microcontroller board based on the ATmega328P (datasheet).

It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button.

- The operating voltage is 5V
- The recommended input voltage will range from 7v to 12V
- The input voltage ranges from 6v to 20V
- Digital input/output pins are 14
- Analog i/p pins are 6
- DC Current for 3.3V Pin is 50 mA
- Flash Memory is 32 KB
- SRAM is 2 KB
- EEPROM is 1 KB
- CLK Speed is 16 MHz Power Supply

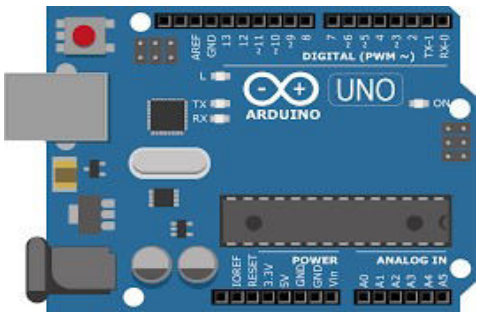


Fig.2:Arduino(ATmega328p)

B.BLUETOOTH MODULE HC-05:

The Bluetooth module HC 05 is used in this project which is the most popular module in the Indian market and this module is mostly used in the embedded projects. The HC 05 Bluetooth modules are easy to use and simple, its price is low and these types of modules are interfaced with Arduino, Rasberry Pi, and Microcontroller through the serial UART interface. This wireless connection setup and it is very easy to use in the Bluetooth serial port protocol. The serial port Bluetooth module is highly qualified Bluetooth with the version of V2.0+Enhanced Data Rate of 3Mbps. The modulation has completely 2.4GHz radio transceiver and baseband. These serial port Bluetooth modules use the CSR Bluetooth 04-extrenal single chip Bluetooth system by using the CMOS technology and also with the Adaptive Frequency Hopping Feature. The footprint of this Bluetooth module is as small as 12.7mm ×27mm. Hence, it will help in the overall design and development cycle.

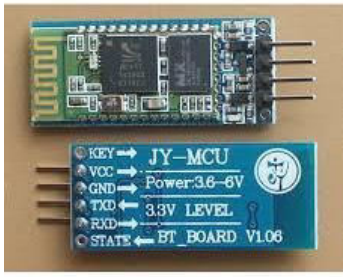


Fig.3:Bluetooth HC-05

C. MAX7219 IC:

MAX7219 is a common-cathode display driver IC with serial inputs and output pins. In addition to that, it has a four-wire serial interface that can be easily connected to all arduino. It can drive 64 individual LEDs connected at its output pins using only 4 wires by using Arduino.

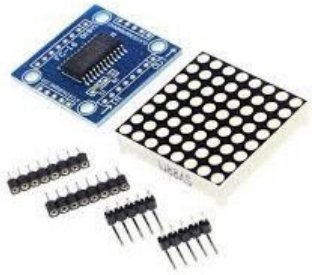


Fig.4:MAX7219 IC

- The 64 LEDs are driven by 16 output pins of the IC.
- The maximum number of LEDs light up at the same time is eight.
- The LEDs are arranged as 8×8 set of rows and columns. So the MAX7219 activates each column for a very short period of time and at the same time it also drives each row.
- So by fast switching through the columns and rows the human eye will only notice a continuous light.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

D. ANDROID APP:

- E-Notice Board Android Application helps to get online notices present on the physical devices. It is a Mobile notice board where students can easily access the application via their login credentials and view the virtual notices. This notice includes text as well as images as a information to the users.
- Mobile is approximately used for everything these days form calling, messaging to shopping and paying bills on-line. when everything is done on- line why to depend on the conventional notice boards to receive the innovative information. so we have developed an android application that notifies the user whenever a new post is added. even if the user is not on-line, our cloud messaging service makes sure of delivering the information when the user comes on-line the next time. also for colleges, we provide marks tracker, attendance tracker, gpa calculator and also one-touch calling lecturers' calling aspect.

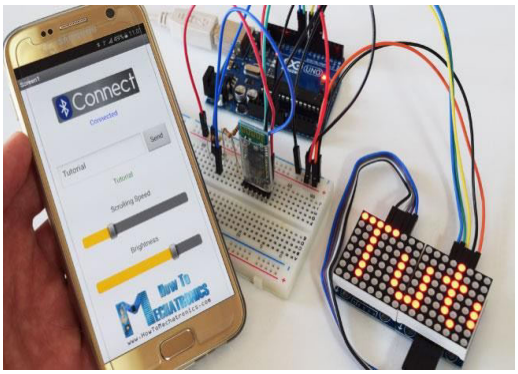


Fig.5:Android App

As people generally use the manual process to update the notices, they need to update every time manually which is a tedious process. Following are the modules associated with our android application which helps an individual to easily update notice.

A. Login

User wishes to get logged in for uploading the notice. By means of this module the user can be able to update the notice directly from android phone that will be automatically updated on the digital notice board.

B. Authentication

The idea of authentication is to see whether the user who logged in is the one who has been given the user oard.id and password by admin. verification is used so that only the faculties of the college or an individual who is responsible for updating the notice is able to update the notice on digital notice board.

C. Displaying Notice on Notice Board

To display a notice, first user will have to enter it in an android application which will be displayed directly on a digital notice board. This occurs with the combination of software and hardware. The notice is pass in a software device and displayed on a hardware device. The interface in between software and hardware will be arduino. The message to be displayed is sent through a distant place from an authorized transmitter. The microcontroller receives the notice and displays the required information.

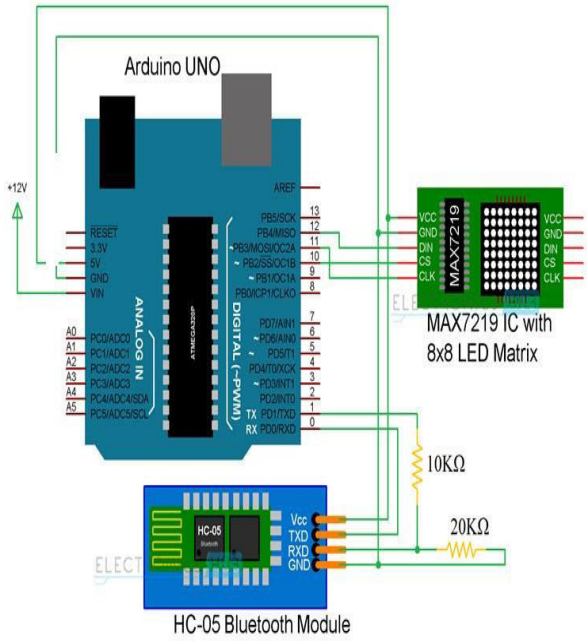
D. Clearing Notice Board

There's an another module called clearing notice board where notice board is being made vacant so that an additional notice can be updated.

E. Logout

When the notice updating work has been finished, users can logout.

CIRCUIT DIAGRAM:



ADVANTAGES:

-It has distant application achieved by any smart phone or tablets.

-This plan reduces Human work for maintaining the Notice Board.

-It also saves the printing as well as paper expenditure.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

-Because of Wi-Fi access password will only be acknowledged to the user such as Principal, HOD or Head Person, It is private and consistent.

-Due to the use of Wi-Fi system which is the fastest usage of internet, it will give high performance and it will be cost valuable.

AP P LICATIONS

- It can be used in domestic, industrial, offic ial and colleges.
- The big shops and the shopping centers use digital displays now.
- Also, in trains and buses the informat ion like platform number, ticket information is displayed in dig ital boards.

CONCLUSIONS:

As the skill is advancing every day the display board systems are moving from Normal hand writing display to digital display. Further to Wireless display units. This paper develops a photo type laboratory model wireless notice board system with BLUETOOTH connected to it, which displays the desired message of the user through an SMS in a most populated or crowded places. This planned system has many upcoming applications in educational institutions and organizations, crime prevention, traffic management, railways, advertisements etc. Been user friendly, long range and quicker means of conveying information are major bolsters for this application. By using this planned methodology we can enhance the security system and also make awareness of the emergency situations and stay away from many danger.

Result:

Now our world is moving towards digitalization ,so if we want to do some changes in the previously used system ,we have to use new techniques. Bluetooth Technology provides fast transmission .It saves time,cost of cables and size of system. User name and password type authentication system is provided for adding securities. Previously the notice board using black board was used**.**

REFERENCES:

[1] Gowtham. R 1, Kavipriya. K "Multiuser Short Message Service Based Wireless Electronic Notice Board", International Journal Of Engineering AndCo mputer Sc ience ISSN:2319-7242 Volu me 2 Issue 4 April, 2013 Page No. 1035 -1041

[2] Pawan Kumar, Vikas Bharadwaj, "GSM based e-Notice In ternation alJourn alofEngineerin gS ciencean dCom puting,April201710224http://ije sc.org/Board: Wireless Communication", International Journal of Soft Co mputing and Engineering (IJSCE) ISSN: 2231-2307, Vo lume-2, Issue-3, July 2012. N. Jagan Mohan Reddy, "Wireless Electronic Display Board Using GSM Technology", International Journal of Electrical, Electronics and Data Co mmunicat ion, ISSN: 2320-2084 Vo lu me-1, Issue-10, Dec- 2013.

[3] J. S. Lee, Y. W. Su, and C. C. Shen, "A Comparative Study of Wireless Protocols: Bluetooth, UWB, ZigBee, and Wi-Fi", Proceedings of the 33rd AnnualConferenceoftheIEEEIndustrialElectronicsSociety(I ECON),p p. 46-51, November2007.

[4] Mr.Praveenraj, Dr.I.Gerald Christopher Mr.S.Selvakumaram, Mr.P.SoundarRajan ``Lab view based wireless noticeboard",\emph{International Journal of Engineering and Applied Sciences IJEAS}, vol. 3, no. 11,.2016.

[5] Ajinkya Gaikwad, Tej Kapadia, Manan Lakhani, Wireless Electronic Notice Board, Volume-2, Issue-3, ISSN No. 2319 2526, 2013.

[6] Nivetha S. R, Pujitha R, Preethi Selvaraj, SMS based Wireless Notice board with Monitoring system, International Journal of Advanced Electrical and Electronics Engineering, (IJAEEE), Volume-2, Issue-3, ISSN No. 2278- 8948, 2013.

[7] Foram Kamdar, Anubbhav Malhotra, Display Message on Notice Board using GSM, Advance in Electronic and Electric Engineering, Volume 3, ISSN No,2231-1297 Number 7 -2013.

[8] Mr. Ramchandra K. Gurav, Mr. Rohit Jagtap, Wireless Digital Notice Board Using GSM Technology, International Research Journal of Engineering and Technology (IRJET), Volume: 02 Issue: 09, e-ISSN: 2395 -0056, Dec-2015.

[9] Saloni Sahare, Rajat Kadwe and Sheetal Garg, A Survey Paper on Android Controlled Notice Board, International Journal of Trend in Research and Development, Volume 4(1), ISSN No. 2394-9333, jan-2016.

[10] Prof. Madhavi Repe, Akshay Hadoltikar, Pranav Deshmukh, Android Controlled Digital Notice Board, International journal of Advance Foundatation and Research in computer, Volume 3, Issue 5, ISSN No. 2348-4853, May- 2016

Smart Student Alumni Interaction System

Jaswantsing Patil
Department Of Information Technology
MVPS's Karmaveer Adv. Baburao Ganpatrao Thakare College of Engineering
Nashik, India
jaswantpatil10@gmail.com

Atharva Langhe
Department Of Information Technology
MVPS's Karmaveer Adv. Baburao Ganpatrao Thakare College of Engineering
Nashik, India
alanghe21@gmail.com

Nikhil Rahane
Department Of Information Technology
MVPS's Karmaveer Adv. Baburao Ganpatrao Thakare College of Engineering
Nashik, India
nikhilrahane112@gmail.com

Rohit Khairnar
Department Of Information Technology
MVPS's Karmaveer Adv. Baburao Ganpatrao Thakare College of Engineering
Nashik, India
rohitkhairnar42@gmail.com

***Abstract*—Students and Alumni are the pillar of any institution. In a way, students represent the future of the institution while Alumni represent the past of the institution. But alumni are ahead of students because many of them have successfully started their career and fulfilling their dreams with the help of the education they have received in the institution. There are a lot of things that students can learn from alumni. This project is made keeping that in mind. The goal of this project is to enhance the communication and interaction between students and alumni. On this system, anyone can post doubts, achievements and others will respond to these posts. This will increase the interaction between students and alumni. Alumni can also post about various job opportunities which will be helpful for final year students.**

Keywords— Alumni, Students, Social Media.

Introduction

Any Institution is usually not recognized by its infrastructure or playgrounds or events, it is always recognized by the quality of its students and its alumni. Its Students and alumni represent the institution in the real world. This system will act as a bridge of communication between alumni and students. Students and alumni will get to interact with each other. This system is useful for students as they will be able to post their issues at institute level where other students, alumni and faculty will be able to guide them .Guidance of alumni will be much helpful for their fellow students because of the industry exposure and experience they have. Every institute has a big role in the success of its alumni hence it is a duty of every alumnus to contribute towards the growth of students and the institute itself. On our system students and alumni and faculty members would be able to interact with each other. Students will be able to post queries related to their projects, research work, etc. and alumni along with faculty members will get to answer these queries. This will be really helpful for students as it will solve their problems quickly.

Literature Survey

In the previous years, alumni interactions or meetings tended to be treated as a specific activity different from fundraising and remaining advancement activities. All Alumni Web Applications were developed using static page system rather than dynamic page system. And also in the existing system, maximum work goes on manually and it is an error prone system, it takes time for any changes in the system.

Disadvantages of Existing System:-

- No connection between alumni system and college system for current students.
- Neither unidirectional flow of data from ex-students to current students.

No new SMS or email notification in case of any events posted, thus alumni had to login to portal to know about new events or updates. While doing Literature survey on the topic we found some of the previously published papers by different students are as follows:

Alumni Tracking System

The paper created by Mihir Jayavant , Shashank is based on Creating a mobile and web application for monitoring and updating the current status of alumni and to get notified about the college activities. The alumni information was going to be stored in the database server and was accessible only through a web portal to faculty and in charge of the college. They separately developed a mobile application just for college graduates to update their current job status and to get notifications about current activities of college [1].

Flaws in the system:

- This system is just a peculiar case which shows the transition of the college alumni database from File to Computer
- The main flaw of this project was that they focused only on updating their college graduates and alumni's current activities.
- The student could only login to read and update their current educational and personal data.
- This system did not allow them to showcase or allow direct interaction of their students with alumni.

Alumni Interaction System

The paper by Subashini.S , Sowndarya.A especially focuses on creating a centralized database system which would

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

overcome the flaws of previously developed systems and yet lacks in providing other functionalities .This system just focused on creating a web Interface where alumni and student will solely be responsible for updating their own information on the system [12].

Alumni Tracking System

The paper had the same objective as of building an interaction system between alumni and the students, but does not provide accessibility for all other employees of the organization while lacking a centralized database [8].

Proposed system

Modular Description

1) Admin: This module has privileges to update the system, circulate college news or notice, create or suppress any groups. Also the Admin can register, delete and maintain users of the system.

a) Send Invitation to Alumni.
b) Maintain User Database.
c) Retrieve/View User details.

2) Student, Alumni: Both modules would have the same privileges like to search and post queries, articles and comment on any other post. Also Students can create Groups/Clubs related to their interest and academic background and read other users posts.

a) Create Post.
b) Search Queries.
c) Create or Join Groups/Clubs.
d) Maintain self-user profile.

Architecture of System

- Home Page Module.
- Profile Module.
- Groups Module.
- Search bar Module.
- Recent Notice Module.

2) Home Page Module: This Module will contain other users' posts, articles. Component to create posts for users, Comment on other posts. This Module will be real-time updated at user's discretion.

3) Profile Module: This module will contain all details of the user and the user can update those details whenever it wants. This module will display "user name", "year of study", "branch", "user posts".

4) Groups Module: This module will show which groups the user has joined. Also the posts on this module will be distinct from the home page module. Users will get Suggestions to join a group based on ML model and his/her interests.

5) Serch bar Module: This module can be used to search queries or articles. This component will be placed above the Home page. Search component will enable autocomplete of queries.

6) Recent Notice Module: This module will be placed with Home Page and will contain all the recent Notices or News from colleges and job postings updated by alumni.

Technical Architecture

The Proposed System would be an Interaction platform for students, alumni and staff. The Users would be able to upload Questions, Information and Guidance in the form of Posts and comments. System would also include User's Profile and Search Component. The Search Component would be used to search any type of post in the database by user. System would also have a Recent Notifications space which would only be altered by the admin to provide the recent notice or updates for college.

The Centrally accessible database would be "Firebase" which would be used by the system to store all the data Regarding Posts i.e. Text, images, etc.. Firebase manages all data in a real-time database so the exchange of data to and fro from database is real quick and easy ,it is also equipped with a real easy Authentication System. Technologies used for development of the system would be React JS library Flutter and Firebase. React JS and Flutter would be the core components of System's UI and Firebase of System's Backend.

7) Web Application: To change the default, adjust the template as follows.

a) API Access: Users can access the posts via Web or App. All the requests made by a web user would be handled directly by the Backend API. If it is an app user then Cloud Firestore Client libraries would come in picture. Firestore Client libraries could be considered as an intermediary which would transfer all in-app requests made by the user to Cloud Firestore API. Mainly there would be two types of requests used by Firebase API to communicate with Framework i.e GET or POST. This is an alternative to Feature 'Functions' provided by most of the cloud service providers. We can use these client libraries to set up privileged server environments. In this environment, requests are not evaluated against your Cloud Firestore security rules. Privileged Cloud Firestore servers are secured using Identity and Access Management (IAM).

b) Front-end: The system will majorly use the RECT JS library for frontend development and Firebase will be used for deployment and maintenance of the project. So the project built in REACT JS and JavaScript will be Hosted on Firebase Cloud Storage and API and will return and store pages and posts. Firebase serves React as a collection of static files when someone visits a URL.

c) Storage: As Firebase is a Real-time database, Every time data is stored in the form of JSON objects. We can think of this database as a way of cloud-hosting in the form of a JSON tree. There are no tables and records, which means it is a NoSQL database. Data stored can be represented as certain native types in the database that correspond to available JSON types to help us write more maintainable code.

Eg :.

```
{
  "Users": {
    "Student":{
       "name":"Shubham Rastogi",
       "contacts":{ "Faculty":true} ,
       } ,
```


IEEE TKD-21/ ISBN No. 978-81-992245-3-6

```
    "Faculty":{ ?} ,
    "Staff":{ ?}
  }
}
```

Unique Features of System

- A minimum of one author is required for all conference articles. Profile Module. This system provides a unique functionality of uploading posts. This system combines post functionality of both apps i.e. LinkedIn and Quora. On LinkedIn you could use post to showcase your achievements, while on Quora you could use the same post to gain and display information in the form of Question and answer. In this system we plan to use post to achieve both of these functionalities.
- The Cool function which makes this system stand out is the Hashtags created while writing captions which are generated automatically by the ML Model hosted on Django server. These hashtags are used by the system to identify and classify the post based on tags. You may search the post based on a hashtag or classify it for a specific group.
- We plan to use a trending cloud **Firebase** that is a platform developed by Google for creating beautiful mobile and web applications. Firebase is easily scalable, Reliable, fast and also provides Free Multi-Platform Firebase Authentication.

Flowcharts for System

Use Case Diagram

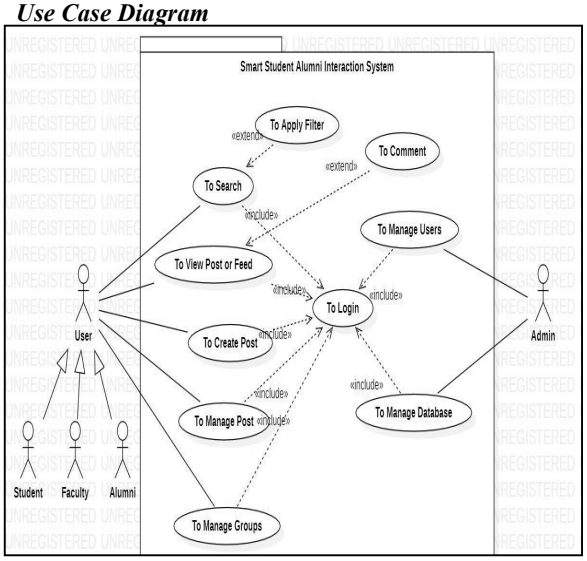


Fig. 1. Use Case Diagram.

It shows how distinct users will interact with the system and their relationship with different use cases in which the user is involved. The logged in user can be of any type i.e. Student Faculty Alumni , after logging can go to either of these use case like searching for a specific user , view home feed ,create post or manage groups In such a way we could admin could one of the use case like managing database or managing users.

Sequence Diagram

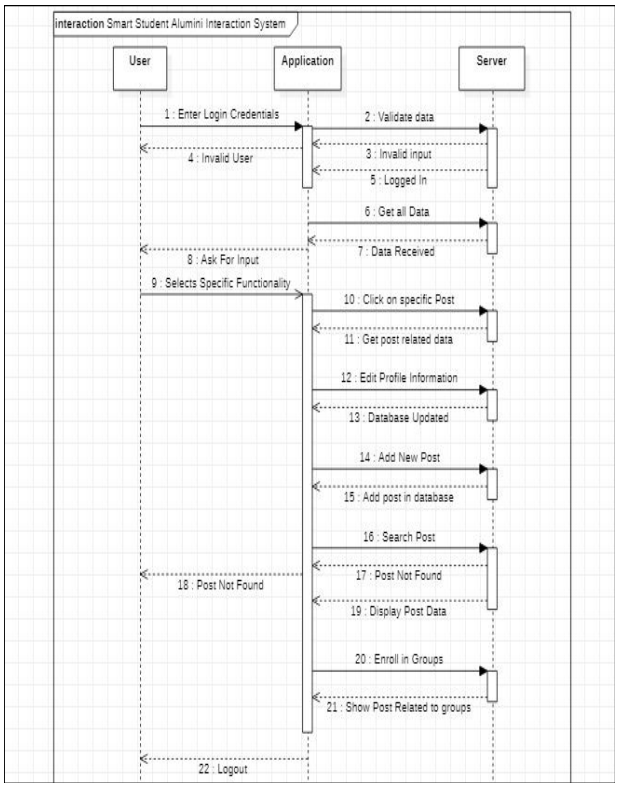


Fig. 2. Sequence Diagram

It is an interaction diagram because it describes how and in what order a group of objects would work together. It depicts in detail how the operations would be carried out in presence of different objects. Above Diagram will show which steps a user would need to follow to achieve a specific functionality . As after logging in users would be performing a unique functionality like getting information on a specific post would need a collaboration of the web with the database to retrieve the data regarding the post. This diagram also provides us with different types of messages like return, create, synchronous, asynchronous etc.

Conclusion

Any Student-Alumni Interaction System is an online Web application system where its use is not just confined to the alumni but is also extended towards the current students and the teachers associated with the college. In the current paper, the proposed system is far more useful and expandable than traditional systems which were designed and implemented in previous years. This proposed system has reflected that those traditional systems can be re-developed with using different aspects of social networking while keeping in mind the potential advantages and on-going love towards social media and thus helps in gathering users' sight and participation. Taking into the mind how users function in social media, a system for Student-Alumni Interaction System is outlined.

Every stakeholder is classified in different user sub -groups of a different kind where permissions and all functionalities are predefined. Users of different kinds are allowed to interact among themselves and also with users from different sub-groups in order to achieve common objectives

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

or mutually beneficial tasks. Finally, the Student-Alumni Interaction System can be made more readily accessible on desktop, mobile phones and handheld devices by developing exclusive applets for this purpose.

REFERENCES

[1] *Rattanamethawong, Vittavas and Sinthupinyo, Sukree and Chandrachai, Achara, "An innovation system that can quickly respond to the needs of students and alumni.", Procedia - Social and Behavioral Sciences. vol. 182, pp. 645-652, 2015.*

[2] *B. Ali, "Alumni system", Majmaah University, 2017.*

[3] *D. Dai1, Y. Lan, "The alumni information management model based on the internet", Proceedings of the 7th International Conference on Education, Management, Information and Mechanical Engineering (EMIM 2017), 2017.*

[4] *Chi, Hongmei and Jones, Edward and Grandham, Lakshmi, "Enhancing mentoring between alumni and students via smart alumni system", Procedia Computer Science, vol. 9, pp. 1390-1399, 2012.*

[5] *M. Medhe, R. Rapelli, S. Mahadik, A. Shirke, S. Barahate, "Student alumni system", International Journal for Scientific Research & Development (IJSRD), vol. 3, issue 01, 2015.*

[6] *M. Jayavant, S. Kawle, P. Khergamkar, S. Gurale, Reena Somani, "Alumni tracking system", International Conference on Innovative and Advanced Technologies in Engineering, vol. 8, pp. 80-86, 2018.*

[7] *P. Patil, A. Naik, M. Randhir, R. Kolhe, S. C. Vidhate "Alumni portal", International Journal of Scientific Development and Research (IJSDR), vol. 4, issue 6, pp. 59-60, June 2019.*

[8] *T. Kumar, Y. Prateek, P. Atharga, Rajashekarappa, V. K. Parvati, "Alumni database management system", International Journal Of Engineering Research & Technology (IJERT), vol. 7, issue 10, 2019.*

[9] *R. G. Luciano, G. M. Alcantara, R. Bauat, "Design and development of alumni tracking system for public and private HEIs", International Journal of Scientific and Technology Research vol. 9, issue 6, June 2020.*

[10] *S. Q. Sabri, A. M. Ahmad, Maiwan, "Design and implementation of student and alumni web portal", Science Journal of University of Zakho, vol. 5, pp. 272, 2017.*

[11] *S. Shanthi, G. Divya, H. Bhuvaneshwari, P. Amirthavalli, "Optimised alumni data management system", International Journal of Computer Science and Mobile Computing, vol. 6, issue 3, pp. 110-113, March 2017.*

[12] *S. Subashini, A. Sowndarya, "Alumni interaction system", International Journal of Computer Science Trends and Technology (IJCST), vol. 5, issue 2, 2017.*

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Tele-health Application for Primary Medication using Flutter

Prof. S.T. Shirkande[1], Mhaske Shivam Shashikant[2], Gandhi Sanjana Sanjay[3], Tonape Anjali Ravindra[4]
[1]Professor, Department of Computer Engineering, S.B.Patil College of Engineering, Indapur, India
[2,3,4]Students, Department of Computer Engineering, S.B. Patil College of Engineering, Indapur, India

***Abstract*--- Nowadays patients are unable to travel to hospital in person, often because they live too far or due to their busy lifestyles. Thus, we are providing a solution to this by creating a Tele-health application for primary medication, so that patient does not have to be always present at the hospital for diagnosis and treatment of minor health issues. Using our application patients can book the appointment with doctor of their choice and get consultation through video calls. Also, patients arriving at a primary care services sometimes need to wait for a long time before being advised by a doctor. So we are making a primary care chatbot for automating the patients intake process, understanding their health issues in natural language, and submitting reports to the doctors for further analysis of those issues.**

***Keyword*--- Chatbot; AI and healthcare; Tele-health; Natural language**

I. INTRODUCTION

Tele-health is a type of medical care used to provide Heath related services to patients for getting treatment without physically visiting to a doctor's office. This includes consultation through video calls, sending images or test results online for further diagnosis, using apps or Bluetooth enabled devices to trace the patient treatment.In the same way, we are creating a Tele-health application for primary medication, which will enable user to book an appointment with doctor as well as to choose medical practices and the suitable time for consultation. Then, medical consultation will be carried out through video calls or chats and necessary prescriptions will be given.

Also, we are creating a medical care chatbot system for primary medication and to help healthcare staffs by automating the patient intake process. The chatbot will interact with patient through an inquiry for understanding their health issues in natural language, and will submit reports to the doctor for further analysis.

A chatbot is a computer system, which may interact with end-users by using natural language. A users can easily use it without any prior knowledge. Also, chatbot can serve many people at the same time without getting bored. The goal is to extend the service capability and reduce the operational cost of medical consultation service by using the chatbot.

II. RELATED SYSTEM

In the existing system healthcare chatbots are used to perform various tasks such as scheduling appointments, organizing admissions and discharges, scheduling patient consultation, reminding patients to take medication, follow diets and also keeping track on health status of patients, etc. However, still there is lots of room for enhancement in the healthcare industry when it comes to AI. The healthcare chatbot is just an infant technology and security measures are still being established. According to Nudtaporn Rosruen and Taweessak, the medical consultant system called "Med-bot" was developing by using dialog flow powered by Google's machine learning [1]. The 16 diseases with their treatment are given in this paper by using dialog flow. The IM, i.e. instant messaging, is used to develop a chatbot. The AI based approach is used to train the dataset which consists of natural language.

Also, according to the Krishnendu Rarhi, Abhishek Bhattacharya, Abhishek Mishra, Krishnasis Mamdal system proposes a virtual doctor's in users hand, with 24/7 consultancy with doctor [2]. This application use AIML to detect the patterns of input messages. Most useful for elderly and physically disabled peoples.The system stores data of patients, which can be used for efficient functioning of chatbot. As mentioned by Lin Ni, Chenhao Lu, Niu Liu and Jiamou Liu, the chatbot is an automated system, which works intelligently on the patient input data [3]. It uses a word2vec NLP algorithm to train a model. This is a doctor-patient chatbot application, which is cost-effective and reduces time of patients. As stated by the Jack Cahn, the proposed system consists of SMT in generation of responsive chatbot [4]. The DA recognition is used to meaning extraction of natural language. It also used text-to-speech for generating response. As chatbots are widely used in applications, the security issues are considered while development of chatbots.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

According to Sonal G Shelwante, Anshuli Thakare, Karishma Sakharkar, Akshta Birelliwar and Karuna Borkar, the system is an online association for doctors and patients [5]. This is a brilliant arrangement for patients to interact with specialists, according to their need. The user interface is very effective and user friendly where the patients can have detailed information. As per the opinion of Md. Abdul Majid, Mohammad Jahangir Alam and Md. Nurul Mustafa, the system contains online interaction of doctor and patients [6]. That stores patient's data and gives appointment and prescription according to diseases. This saves time and money of patients by booking virtual appointments. Patients easily interact with system due to user-friendly interface provided. This system meets the requirement of modern era. The Noorsyahira Ismail, Shahreen Kasim, Yusmadi Yah Jusoh, Rohayanti Hassan and Ayu Alyani proposes the system, which is a web, based application, build by using android [7]. That reduces number of calls and rush of patients for appointments. Enable user for suitable appointment timing and also help to avoid difficulties while a booking of appointments. Then it provides notification for booked or rejected appointments. The system proposed by Fayezah Anjum, Abu Saleh Mohammed Shoaib, Abdullah Ibne Hossain and Mohammad Monirujjaman Khan, gives general hospital management system for a hospital which provides digital healthcare services that can be accessed anywhere in the country [8]. It contains the list of already registered doctors that provides free medical consultations to patients along with prescription of medicines. The system works efficiently and in a cost effective manner.

According to Xiuju Zhan and Xiufeng Liu, the system provides online appointment registration system with doctor having some data operation as well as data backup [9]. The system provides learning and experimental program for students in computer science, who wants to work with medical informatics. As given by Juliana Hogan, Derrecka Boykin, Christopher D. Schneck, Anthony h. Ecker, Terri L. Fletcher, Jan A. Lindsay and Jay H. Shore, the system provides video to home for patients, which gives training and consultation [10]. The system engages with patients which are far away from clinics. The system provides satisfaction to the user and cost effective which is feasible and safe. According to Luona Yin, Aiqing Zhang, Xinrong Ye and Xiaojuan, the system consists of secure online appointment registration system, which suggests doctors according to symptoms [11]. Also allow patients to search desired doctors on the basis of what they required. It provides security to the patient's data with less computational cost.

III. PROPOSED SYSTEM

In our proposed system as shown in figure 3, user can register as a patient or doctor and fill their necessary information. Then the system needs to collect patient medical information and understand the symptoms through the inquiry carried out by chatbot with patient.

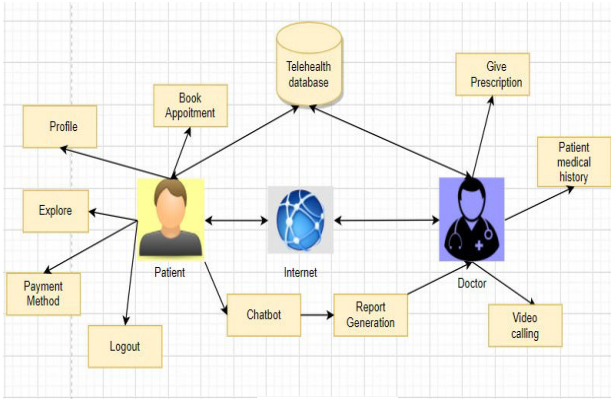


Fig 1: Architecture

A brief report should be generated as an outcome of this inquiry and the doctor with whom the appointment is booked will access that report. Then consultation will do through virtual session and necessary prescription will be given to that patient. The system provides an interface for the patients to make an appointment request and to interact with chatbot, a diagnostic unit, and a doctor's interface for accessing patient records and video consultation. The diagnostic unit consists of three main modules: First, is an analysis engine for understanding the patient's symptom descriptions, second will be symptom-to-cause mapped for reasoning about potential causes of the respective issue and third a question generator for deriving further interview questions.

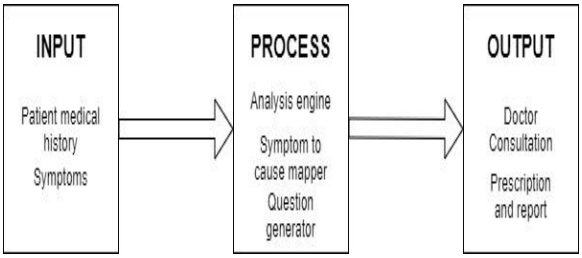


Fig 2: Block diagram

The fig.3 is a Flowchart which gives idea of a formalized graphic representation of a logic sequence.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

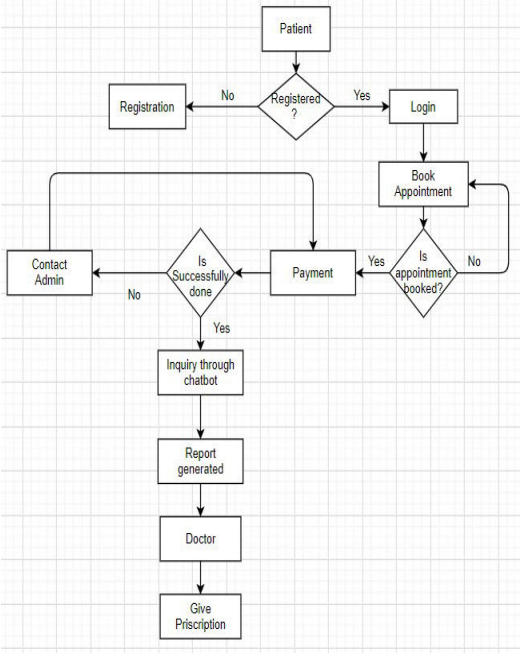


Fig 3: Flowchart of proposed system

Following are the goals and objectives of our proposed system:

- To minimize the efforts of doctor to perform diagnosis.
- To help elderly or disabled people who want to live at home but still need their health to be monitored.
- To make healthcare services available at lower cost and provide in most efficient manner to everyone.
- To automate the patient intake process using chatbot.

Features of proposed system are as follows:

- Provide timely, cost effective, and personalized healthcare services to everyone at lower cost.
- Enable user to choose their desired doctor as well as medical practices and the suitable time of an appointment.
- Virtual appointment and video consultation.
- Automate the patient intake process and helps to keep their medical history.

IV. CONCLUSION

Health Care is a very important sector in every society and it is the basic right of every individual to get access to proper health care. Hence, our proposed system ensures that it will be also helpful for elderly or disabled people who want to live at home but still need their health to be monitored and to patients who live too far away and are unable to travel to a hospital in person. It is an integrated system that provides a range of functionalities. The major goal of this application is to make an online interaction between doctors and patients efficient and simple. It meets most of the functionality to manage appointments and prescription for doctors and patients accordingly. As well as it ensures to reduce the workload of medical staffs by automating the patient intake process and providing initial reporting to doctors. Thus, at the end patients will receive timely, cost-effective, and personalized healthcare services.

REFERENCES

[1]. *N. Rosruen and T. Samanchuen, "Chatbot Utilization for Medical Consultant System," 2018 3rd Technology Innovation Management and Engineering Science International Conference (TIMES-iCON), Bangkok, Thailand, 2018, pp. 1-5, doi: 10.1109/TIMES-iCON.2018.8621678.*

[2]. *Rarhi, Krishnendu and Bhattacharya, Abhisek and Mishra, Abhishek and Mandal, Krishnasis, Automated Medical Chatbot (December 20, 2017).*

[3]. *Ni L., Lu C., Liu N., Liu J. (2017) MANDY: Towards a Smart Primary Care Chatbot Application. In: Chen J., Theeramunkong T., Supnithi T., Tang X. (eds) Knowledge and Systems Sciences. KSS 2017. Communications in Computer and Information Science,vol780.Springer,Singapore.* https://doi.org/10.1007/978-981-10-6989-5_4

[4]. *Jack Cahn, "CHATBOT: Architecture, Design and Development ", 2017*

[5]. *Sonal G Shelwante, Anshuli Thakare, Karishma Sakharkar, Akshta Birelliwar and Karuna Borkar,"Smart Health Doctor Appointment System", International Journal of Scientific & Technology Research, Volume 8 - Issue 9, September 2019.*

[6]. *Md. Abdul Majid, Mohammad Jahangir Alam and Md. Nurul Mustafa, "Smart Doctors Appointment and Prescription System" Journal of informative system, volume-6, 2017.*

[7]. *Noorsyahira Ismail , Shahreen Kasim , Yusmadi Yah Jusoh , Rohayanti Hassan , Ayu Alyani , "Medical Appointment Application" .Acta Electronica Malaysia, 1(2) : 5-9, 2017.*

[8]. *F. Anjum, A. S. M. Shoaib, A. I. Hossain and M. M. Khan, "Online health care," 2018 IEEE 8th Annual Computing and Communication Workshop and Conference (CCWC), Las Vegas,*

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

NV, USA, 2018, pp. 580-583, doi: 10.1109/CCWC.2018.8301617.

*[9]. Zhan, Xiuju, Liu, Xiufeng, "Design and Implementation of Clinic Appointment Registration System".Engineering, **5**, 527-529, 2013, doi: 10.4236/eng.2013.510B108.*

[10]. Hogan J, Boykin D, Schneck CD, Ecker AH, Fletcher TL, Lindsay JA, Shore JH. Clinical Lessons from Virtual House Calls in Mental Health: The Doctor Is in the House. Psychiatr Clin North Am. 2019 Dec;42(4):575-586. doi: 10.1016/j.psc.2019.08.004.

[11]. L. Yin, A. Zhang, X. Ye and X. Xie, "Security-Aware Department Matching and Doctor Searching for Online Appointment Registration System," in IEEE Access, vol. 7, pp. 41296-41308,2019, doi:10.1109/ACCESS.2019.2904724.

[12]. Shrinivas Shirkande, G.G. Sayyad, Bhausaheb Salve, "Conversion Methods of Automata Theory Model", JOURNAL OF APPLIED SCIENCE AND COMPUTATIONS, VOLUME VI-ISSUE II, FEBRUARY 2019-20, DOI:16.10089.JASC.2018.V6I2.453459.050010274.

[13]. V. Yadav, S. Borate, S. Devar, R. Gaikwad and A. B. Gavali, "Smart home automation using virtue of IoT," 2017 2nd International Conference for Convergence in Technology (I2CT), Mumbai, India,2017,pp.313-317. doi:10.1109/I2CT.2017.8226143

[14]. Ahmad, F., Hogg-Johnson, S., Stewart, D.E., Skinner, H.A., Glazier, R.H., Levinson, W.: Computer-assisted screening for intimate partner violence and control a randomized trial. Ann. Intern. Med. 151(2), 93–102 (2009)

[15]. Bengio, Y., Ducharme, R., Vincent, P., Jauvin, C.: A neural probabilistic language model. J. Mach. Learn. Res. 3(Feb), 1137–1155 (2003)

[16]. Shirkande S., Lengare M. (2021) A System Design for Combined Approach of WCID and Wavelet Transformation to Optimize the Underwater Image Enhancement. In: Gao XZ., Kumar R., Srivastava S., Soni B.P. (eds) Applications of Artificial Intelligence in Engineering. Algorithms for Intelligent Systems. Springer, Singapore.

Gesture Controlled Wheel Box

Shital Dawane
Faculty
Electronics & Telecommunication
Government College Of Engineering Karad, Satara, Maharashtra, India 415124
shitaldawane379@gmail.com

Aniruddha Joshi
Student
Electronics & Telecommunication
Government College Of Engineering Karad, Satara, Maharashtra, India 415124
aniruddhaaj12@gmail.com

Sourabh Ghatage
Student
Electronics & Telecommunication
Government College Of Engineering Karad, Satara, Maharashtra, India 415124
ghatgesourabh171298@gmail.com

Sanket Malave
Student
Electronics & Telecommunication
Government CollegeOf Engineering Karad, Satara,Maharashtra, India 415124
sanketmalave@gmail.com

***Abstract*— The motto behind this project is to provide the facility to move object or a person from one place to another place. To achieve this we are using gestures. Gesture is a technology which is widely used now days. Several approaches are adopted for sensing and controlling objects. One of the techniques called glove technique is well known mean to analyse hand movements. It uses sensor attached to glove which recognizes hand gestures and it is most commonly used technology. Also with some shape advancements we can lace same technology to use head gestures. So to achieve the same thing we are developing different approach which uses IR sensors. In this project, a mobile wheel Box that is controlled by the gestures made by the hand or head, is designed**

***Keywords*— Gestures, IR Sensors, Arduino Uno, Wheelbox, Motion, Motor**

I. INTRODUCTION

Recently, strong efforts have been done to develop different to communicate between user and computer with the help of different sets of gestures. Gestures derives an intuitive interface to both human and computer. Thus, these gesture-based interfaces can't just out source common interfacing devices, but can also be exploited to extend their functionality. Today in this modern era around world's 10 %, around 650 million people are suffering from physical disability[1]. In order to make their life bit easier we decided to make a gesture controlled wheel Box which will be working on the gesture of their hand or head.

The disabled people always finds it difficult to move from one place to another and for this purpose they need to be dependent on someone else[2]. Now with the Gesture Controlled Wheel Box the handicapped person is independent and he will not need any help from person to move his wheel Box. Just with the movement of his hand or head the handicapped person is able to move from one place to another without needing anyone's assistance which also makes him self-dependent[9].

This project is focusing on IR sensor based hand or head gesture controlled semi-autonomous bot[1].

II. NEED OF PROJECT

The percentage of disabled or specially gifted people has increased in both rural and urban part of India [1]. The disability could be by birth or due to some medical, trauma based or accidental reason [1]. The aim of this paper is to make a hand or head gesture controlled wheel Box using IR sensor to help the physically disabled people in moving from one place to another just by giving direction from the hand or head. Today in India many people are suffering from different disabilities, there are people whose lower half of the body is paralyzed. This Wheel Box will add on to the comfort and make the life of people bit easier. Around 5436604 people are affected from movement disability[1]. Maximum disabilities are of movement related. Also beside that the same wheel box can used to move different packages or heavy things which can be bearable by wheel box from one place to another controlling with only simple gestures and without applying any set of forces.

III. LITERATURE SURVEY

A wheel Box is an electro-mechanical system that is operated by a computer program. wheel Boxs can be autonomous or semi-autonomous. An autonomous wheel Box is not controlled by human and acts on its own decision by sensing its environment. Majority of the industrial wheel Boxes are autonomous as they

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

are required to operate at higher speeds and with great accuracy [2]. But some applications require semi-autonomous or human controlled wheel Boxes. Some of the most commonly used control systems are voice recognition, tactile or touch controlled and motion controlled. One of the frequently implemented motion controlled wheel Box is a Gesture Controlled wheel Box [2].

IV. PROPOSED METHOD

In this project, a mobile wheel Box that is controlled by the gestures made by the hand or head, is designed. The working of the wheel Box is explained here. When the wheel Box powered on, IR sensors will check which of them is blocked, based on the Which IR Sensor is blocked the micro controller will make decision to move motor either in forward or backward direction based on code dumped in micro controller.

IR sensor based gesture controlled wheel Box moves according to the movement of hand or head as we place the IR Box on hand and when we lean our hand in front direction with blocking an IR in front direction of gesture Box. Then the wheel Box starts moving forward until the next movement is given. When we lean our hand blocking backward IR sensor, then the wheel Box starts to move backward. Then it starts moving in backward direction until the next signal is given. Similarly when we block in right or left side IR sensor, then the wheel Box moves right or left side based on which IR is blocked. Similar leaning of head can be done by the head so if we place IR box on head it will produce similar results. Schematic of proposed model is shown in Fig 1.

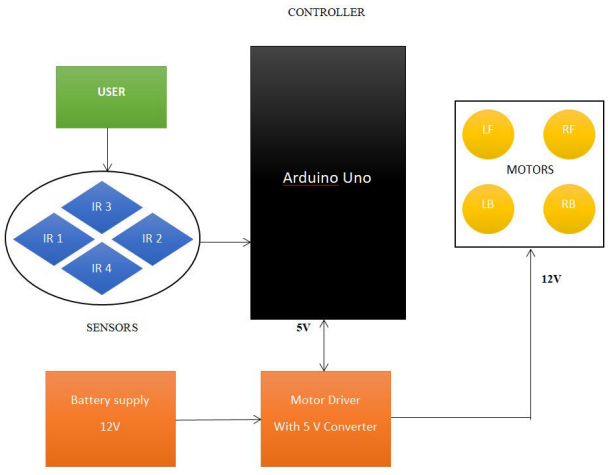


Fig. 1 Schematic of proposed model

Based on which IR is closed or blocked Motors start to rotate forward or backward direction. If front IR is closed then Motors rotate in forward direction, if back IR is closed motors rotate in backward direction, if left IR is closed left motor will move in backward direction and right motor will move in forward direction giving whole wheel box a left turn. Similarly when right IR is closed right motor will move in backward direction and left motor will move in forward direction giving whole wheel box a right turn. These things are coded to execute same commands by microcontroller. Flow chart of the code is shown in Fig 2.

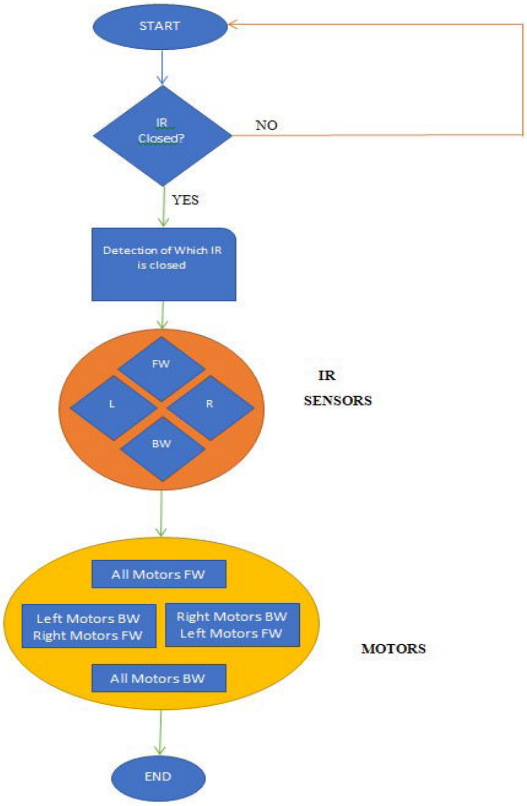


Fig. 2 Flow Chart

V. RESULT DISCUSSION

The Gesture Controlled Wheel Box project work resulted in the development of the cheapest semi-autonomous combination of trolley and wheelchair ever, capable of moving from one place to another with movement or turn in desired directions as predicted. The speed of motors is controlled by microcontroller. The gestures are also sensed by the IR sensors by sensing the blocking of particular IR sensor which is capable of moving the wheel box in

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

different directions. Based on which IR is closed or blocked Motors start to rotate forward or backward direction. If front IR is closed then Motors rotate in forward direction, if back IR is closed motors rotate in backward direction, if left IR is closed left motor will move in backward direction and right motor will move in forward direction giving whole wheel box a left turn. Similarly when right IR is closed right motor will move in backward direction and left motor will move in forward direction giving whole wheel box a right turn. These things are coded to execute same commands by microcontroller which works exactly as predicted. After testing load bearing capacity it is nearly 60 Kg but with more strong material it can be increased. W performed simulation as shown in Fig. 3 on proteus and created 3D model as shown in Fig. 4.

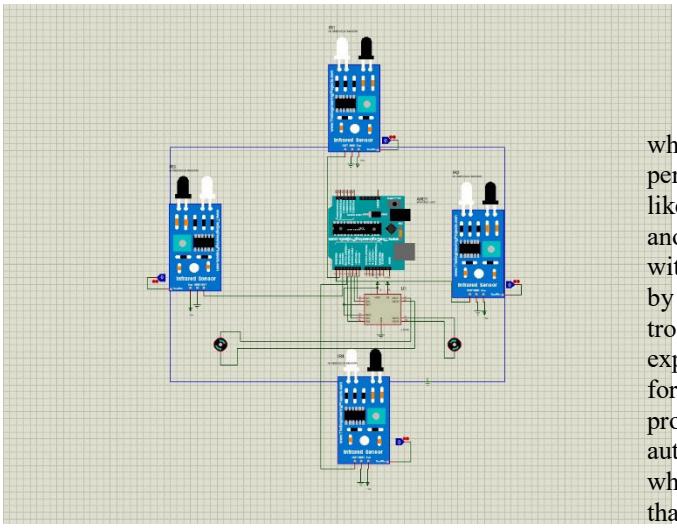


Fig. 3 Simulation Circuit

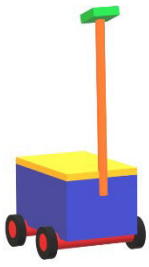


Fig. 4 3D Model

A. Advantages

1) Easy movement with semi-automatic functionalities
2) Low cost.
3) It can be useful for handicapped person

B. Disadvantages

1) Can not bear heavier objects than its capacity
2) Can't be used in uneven area or on staircase
3) Should be charged time to time

C. Applications

1) Movement of any box, package or sack or thing which can be bearable by the Box from one place to another
2) Easy movement of handicapped or normal person from one without any external force applied by a person

VI. CONCLUSIONS

As a result, we created Gesture Controlled wheel box that allows handicapped person or normal person or anything that can be bearable by wheel box like packages sacks to move from one place to another place without using any extra force but only with the help of certain set of simple gestures made by hand or head. Currently wheelchairs as well as trollies that carry packages or sacks are very expensive also they are fully manual which require forces to move from one place to another. But our project wheel box is low cost(economic) semi-autonomous bot which is combination of trolley and wheelchair which is able to move whichever thing that can be bearable by it from one place to another with negligible force or efforts.

VII. ACKNOWLEDGMENT

It gives us a great pleasure in bringing out the project report entitled "Gesture controlled wheel box". This project is something that could not have been implemented without the co-operation of many people who have involved in this project. We take this opportunity to express our thanks for all the people who had helped us in the completion of this project. We sincerely thank to Prof. S.P. Dawane & Prof. A.N.Shaha with his help and guidance this project would not be in its present form. The keen interest taken by the guide in our project helped us to solve difficulties. We are thankful to our respected H.O.D. Dr Prof. A.M.Sapkal who provided us the opportunity to work on this project and helped us a lot by providing valuable suggestions

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

VIII. REFERENCES

[1] *Prof. Vishal V. Pande, "Hand Gesture Based Wheelchair Movement Control for Disabled Person Using MEMS" et al Int. Journal of Engineering Research and Applications Vol. 4, Issue 4(Version 4), April 2014, pp.152-158*

[2] *Amundson JS, Amundson SG,"A joystick controlled wheelchair",Biomed Sci Instrum .1991; 27:131-3.*

[3] *A new technique for fully autonomous and efficient 3D robotics hand/eye calibrationR.Y. Tsai;R.K. Lenz Sukkarieh;E.M. Nebot;H.F. Durrant-Whyte Publication Year: 1999*

[4] *Mahaboob Ali Shaik M.Prathyusha, K. S. Roy, "Voice and touch screen based direction and speed control"*

[5] *Measurement and modeling of McKibben pneumatic artificial muscles Ching-Ping Chou;B. Hannaford*

[6] *Modeling and control of formations of nonholonomic mobile robots, J.P. Desai;J.P. Ostrowski;V. Kumar*

[7] *Robot sensor calibration: solving AX=XB on the Euclidean group F.C. Park;B.J. Martin Publication Year: 1994*

[8] *A high integrity IMU/GPS navigation loop for autonomous land vehicle applications S.*

[9] *New potential functions for mobile robot path planning S.S. Ge;Y.J. Cui Publication Year: 2000*

[10] *Direct calculation of minimum set of inertial parameters of serial robots M. Gautier;W. Khalil Publication Year: 1990*

[11] *Flexible PCB Vertical Thermopile IR Sensor Mikael Lindeberg;Hanna Yousef;Henrik Rodjegard;Hans Martin;Klas Hjort TRANSDUCERS 2007 - 2007 International Solid-State Sensors, Actuators and Microsystems Conference Year: 2*

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Design paper on Energy Efficient Routing Protocol for Underwater Wireless Sensor Network

Ashwini B. Gavali
Research Scholar
J J T University
Rajasthan, India
dnyane.ash@gmail.com

Dr. V. M. Vaze
Professor
J J T University
Rajasthan, India
dnyane.ash@gmail.com

Dr. S. A. Ubale
Professor
J J T University
Rajasthan, India
dnyane.ash@gmail.com

***Abstract*—In today's era due to technological advancement in the field of IOT and Wireless sensor network (WSN) it is possible to build affordable and portable IOT devices for underwater wireless sensor network (UWSN). These devices are helpful for various aquatic applications like life imaging, collection of data, Ocean sampling , disaster prevention, geological processes supervising, under water equipment monitoring etc., which are used for monitoring purpose. For making these applications feasible there is need of underwater devices communication within less time. Keeping all this as a base here in this paper, various aspects of routing protocol for UWSN are reviewed. And as per review study there is introduction of new proposed energy efficient routing protocol which will achieve good quality of service.**

Keywords— routing protocol, energy efficient, UWS

I. INTRODUCTION

Due to various under water activities and water current, under water sensors remains moving. For Such activities where network topology keeps on changing as time passes our traditional routing is not sufficient. For that purpose in protocol designing, network topology plays an important role. As the USWN faces many design challenges like low battery life, error rate is high, attenuation is high, and consumption of energy is more. Therefore to elongate the lifetime of UWSNs, many energy efficient routing protocols have been proposed. In this paper there is a brief review of routing protocols related work carried out in the field of UWSN.

To design energy-efficient routing scheme for UWSNs and efficient data routing mechanisms WSN consist of low cost nodes with limited battery power and the battery replacement is not easy for WSN with thousands of physically embedded nodes, so there is need of employing routing protocol which is energy efficient and can offer a long life work time. As per need

Ssection II describes the existing work of various routing mechanisms. Section III , IV, V and VI describes about proposed system.

II. RELATED WORK

Here in this section we are going to review few of the existing work carried out in the field of routing protocols for under water wireless sensor network.

As per paper [1], the first dynamic, close loop distributed transmitted protocol that holds CDMA properties to attain multiple accesses to the inadequate underwater bandwidth is UW-MAC. It achieves the high network output, energy efficiency, low channel access delay in deep water communication. UW-MAC protocols adapted to work for different environments with different aarchitecture scenarios and simulation settings.

Unlike in the terrestrial positioning, the global positioning system (GPS) cannot work efficiently underwater. The underwater equipment cost, bandwidth limitation and damaged channel makes the localization problem very challenging. Therefore authors proposed a new DET based hierarchical localization scheme in the paper [2]. The new scheme inherits the merits of DNR scheme, such as simplicity and high localization ratio, but can significantly decrease cost of the system, and increase scalability and localization performances thanks to the hierarchical design.

Authors have introduced [3] energy efficient depth based routing (EEDBR) protocol which uses depth and residential energy of sensors for routing which overcomes the problem of improving energy efficiency under water and the replacement of underwater sensors batteries which may be very expensive.

In [4], author introduced a hybrid algorithm to improve the life of sensor nodes in WSN. Here, the hybrid technique combines two routing methods, namely, flat multihop routing and hierarchical multihop routing.

There is occurrence of end to end routing delay in an underwater environment as well overhead for consumption because of the large data routing path. Authors have introduced [5] Diagonal and Vertical Routing Protocol (DVRP) for handling routing issues in UWSNs.

In paper [6], dynamic, low energy consumption, general self-Organized Tree-Based Energy Balance routing protocol (GSTEB) is introduced for prolonging the lifetime of WSN. It works in four different phases like initial phase, Tree construction phase, Self-Organized Data Collecting and Transmitting Phase, Information Exchanging Phase.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

To transfer data towards receiver efficiently without limited energy. Authors have used routing method EAF-EBRM based on forward aware factor, balances energy efficiency, increases lifetime [7].

Paper [8] introduces a cooperative routing scheme which transfer data to the sink situated on the surface of sea from the source with reliability which allows more frequent data gathering due to support of neighboring nodes where least data loss is expected. For UWSNs it is crucial to get any efficient routing protocol for delivery of data packet. Due to acoustic channel characteristic communication becomes a challenging task for UWSN. For solving this problem authors have introduced GPNS a routing protocol which is based on partial network and geographic coding. These protocols make use of partial network coding for delivery of data with reduced count of sending packets and collision reduction between packets [9].

The SPARCO routing scheme [10] is proposed to improve period of stability with reduced path loss and less consumption of energy for underwater networks. It is based on source to destination data transmission.

In [11] authors introduced balanced energy adaptive routing (BEAR), for solving the problem of imbalanced and inefficient energy utilization with improved lifetime of UWSNs. Efficient energy utilization and balanced energy consumption in the network is also possible with BEAR. It works in three phases namely initialization, tree construction and data transmission phase.

As per paper [12], there is introduction of EECR protocol for wireless – assisted IoT. This protocol works in different phases like initialization, Selection of First cluster head, rotate, use of centroid algorithm scheme and protective mechanism. Also there is introduction of energy consumption model required for EECR protocol. Solution to the problem of cluster forming is based on distance to energy centroid. There is introduction of optimized algorithm based on simulation result.

In this paper [13], energy efficient routing protocol based on layers and unequal clusters (EERBLC) is given which is a localization-free routing protocol. This protocol is useful for solving the problems of high error rate, long end-to-end delay and high energy consumption.

Challenges to replace and increase lifespan of sensor node having limited battery. Paper [14] has proposed, underwater energy harvester that is capable of utilizing and harvesting energy, improve life time and end-to-end delay of nodes.

Energy is affected due to square measured nodes, which losses their energy as time passes. Performed better energy consumption due to less circuitry in sensor node also the link between the nodes are less noisy [15].

Here in [16] another recent hybrid clustering protocol for WSN has been proposed. This hybrid scheme makes use of common characteristics of HSA and PSO algorithm which are useful for energy efficient cluster head selection. The proposed algorithm exhibits high search efficiency of HSA and dynamic capability of PSO which improves the lifetime of sensor nodes. High dimensional optimization limitation faced by PSO was overcome due to use of HSA by utilizing its high searching computational capability. HSA works in a particular region which was its limitation which was overcome by use of PSO as PSO can move from one region to another so as to find optimum solution. However the hybrid solution leads to complexity and clustering overhead in network.

In [17], the recent approach for PSO (Particle swarm optimization) based clustering is proposed. PSO-UFC is fault tolerant and unequal clustering protocol.This protocol is introduced to address the problem of fault tolerance and imbalanced clustering issues in the existing energy-balanced protocol for enhancing the lifetime of the network operation. Authors have introduced a clustering mechanism based on PSO for solving the issues of hot spot in WSN. However, using the PSO may take longer convergence time as well as poor accuracy of optimum solution estimation.

[18] As there is big challenge of reducing energy consumption and to improve packet delivery ratio in case of underwater wireless networks due to deploying of multi hop scheme. Keeping this in mind authors have introduced routing scheme for underwater called as AUV-aided Underwater Routing Protocol (AURP). This is an Autonomous Underwater Vehicle AUV-aided Underwater Routing Protocol (AURP) with autonomous underwater vehicles as relay nodes with short range and huge value of data rate for transmissions in underwater channel. As per result it is a good protocol for routing to achieve less energy consumption and high data delivery ratio. Also it is practically applicable for highly reliable data transmission in large quantity. However, the extra energy cost involved by AUV makes this protocol unsuitable for UWSNs.

In [19] an energy efficient routing protocol has been proposed for underwater wireless networks .It is based on the forwarding criteria of depth, residual energy and optimal distance from the source. The source node provides flexibility in transmission power according to the destination so that the signal reaches with the same transmitted power. The protocol uses courier nodes which are similar to Autonomous Underwater Vehicle (AUV) and in turn increases the excess energy cost rather than focusing on internetworking with sensors.

In [20], Authors have introduced a state of art routing protocol for UWSN which is geographic and opportunistic called as GEDAR. This protocol is based on void nodes depth adjustment within controlled network topology. For routing data to the destination it uses the mechanism of greedy opportunistic routing. The problem with this type of approach was increasing the communication range also increases the interference from other nodes.

In [21], Weighting Depth and Forwarding Area Division DBR (WDFAD DBR) protocol with multi-sink architecture and anchor nodes, relay nodes and sink nodes has been discussed. The relative coordinates of nodes are being available based on the RSSI (received signal strength indicator). It uses the criteria of depth of the present forwarder and then anticipates depth of the adjoining hop of forwarding node with lower depth. Here communication is location free which is based on nodes hop count and confidence level.

In [23], novel routing protocol for underwater networks proposed to solve the routing problem voracious routing systems as a basis. They achieved new routing by VBF algorithm improvement, where route pipe radius is considered as base. This algorithm uses radius of routing pipe as function. There is consideration of various parameters like number of

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

nodes and range in this function. If any of parameter is changed routing pipe radius also get changed. Proposed method assumes that sender's node energy required for packet receiving is less than that of recipient node then consumed energy can be reduced. There is chance to get selected as guiding node if radius of routing pipe get reduced for other nodes.NS2 simulator is used for result comparison with other protocols like HHVBF ,VBVA and original VBF protocol. The parameters used for comparison are delivery of nodes and consumption of energy if network size. The proposed system achieves better performance in case of less energy consumption for more size of network and successful delivery of packets.

In [24], this paper there is proposal of EECOR protocol which is helpful to improve consumption of energy. As per proposed system data packets are forwarded to sinks on the surface. Based on forwarder local information, source node first determines the forwarding relay set. Then by considering probability of packet delivery and consumption ratio of energy there is selection of best relay is done. This selection is done by use of FLRS ie. Fuzzy logic based relay scheme. The lifetime of network can be improved. As a future work authors have suggested to make use of fixed and mobile nodes ie. hybrid network with various ML based algorithms for getting better performance.

In [25] Here authors have introduced a routing protocol called as BEAR(Balanced Energy Adaptive Routing) . Main objective of this protocol is to enhance the lifetime of UWSN with energy efficiency. They have introduced concept of IOT enabled devices concept in BEAR. The problem of inefficient and imbalanced utilization of energy is solved with the use of this protocol. However the problems with this are: (a) this protocol consider only two parameters such as residual energy and location of nodes while forming the tree; however the other parameters such as packet delivery probability and nodes degree not considered which may create the data loss problem and unreliable communications. (b) The UWSNs are large-scale and may consist of 1000s of sensor nodes, the BEAR protocol may failed to achieve the efficiency for such networks due to their complex steps of data transmission.

In this paper for randomly deployed and grid based UWSNs authors have introduced two multimodal acoustic-RF adaptive routing schemes. They have taken into consideration about reliability and end to end packet latency. For selection of forwarding node in next hop, algorithms discussed here are balancing the routing channel quality, distance of that node to sink and residual energy. As a future work authors have mentioned to work in real test beds for improvement of protocols performance [26].

As per study of shadow zones are responsible for reducing the routing protocols performance. To address this problem here in this paper authors have introduced SZAR protocol [27]. To control the mobility of node the deployment of nodes is done in lower and upper depths. As per name this protocol avoids the shadow zones by back routing acknowledgement method along with selection of forwarding nodes with optimal route. As per result analysis when it is compared with VARP and VHGOR it performs well.

There is biggest issue of energy consumption while at the time of designing a routing protocol. This issue is addressed here by author with introduction of EE-OR protocol for UWSN [28]. Consumption of energy and delivery ratio of packets are the attributes used for checking the performance of this protocol. Here the main focus was given on said attributes while at the time of selection of candidate set. By comparing with DBR protocol which is standard protocol, this gives better result.

Main focus of this paper [29] is to address the problem of improving node link quality and battery lifetime.CMSE2R works in four different phases like setup of network, formation of the cluster, for related cluster development of multipath and at last to forward the data. By keeping courier nodes fixed node link quality can be improved. Also it reduces the consumption of energy by cumulative distance calculation. As per author they have compared this protocol with CBE2R and EMGGR for addressing said problems and it is observed that proposed protocol gives better performance.

AUV based one more energy efficient routing protocol ie. ARPA is introduced here [30]. Here this protocol works in two stages like forming network layer and transmission of data. AUV act as destination node. Vertical and horizontal mechanisms are taken into consideration for selection of forwarding node. As per comparison with attributes like transmission of data, delay in network this protocol give better efficiency and stability.

III. PROPOSED SYSTEM

As per literature review study there is need to propose novel energy efficient routing protocol. So here there is introduction of such a protocol for small and large UWSNs with goal of achieving the energy efficiency with guaranteed QoS performance using the mechanism of optimal data forwarding algorithms by exploiting the optimization algorithms.

Objectives of proposed system are as follows :

A. To design the various IoT enabled UWSNs with and without sensors mobility with multiple surface sink nodes

B. To propose algorithm of data forwarding based on GA and PSO optimization algorithms individually using the sensor nodes local parameters for cost computation

IV. METHODOLOGY

Here there is attempt to design novel energy efficient routing protocol for IoT enabled UWSNs using the optimization method such as Genetic Algorithm (GA) and Particle Swarm Optimization (PSO) to select the best relay node by considering the various key parameters such as residual energy, node degree, packet delivery probability, and distance from source node to the sink node. The optimization methods previously already used in WSNs, MANETs, and VANETs, thus by considering its advantages we aim to design the routing methods to solve the problems of energy efficiency and quality of service for UWSNs. To the best of our knowledge, this is first time optimization techniques will be used to design UWSNs opportunistic routing protocol. The proposed protocol is hybrid combination of Genetic Algorithm and Particle Swarm Optimization for UWSNs. The hybrid optimization is nothing but the optimization technique designed using GA and PSO.

V. ARCHICTURE OF PROPOSED SYSTEM

Here in this section there is introduction of proposed system architecture.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Figure 1 show the proposed system architecture which consists of following steps:

1) The sensor node sense the periodic data in ocean and event rise to transmit the sensed data towards the surface sink node. The sensor node with data to transmit is considered as the source node.

2) The source sensor node initiates the process of forwarding path discovery by finding its neighbours nodes and broadcasting the request packet.

3) All the sensor nodes discovered as neighbours of source will act as the particles in case optimization method.

4) For each particle/sensor node, the cost function evaluation performed using own local properties.

5) The local properties such as energy availability, packet delivery probability, distance from sink node, and node degree. The optimization algorithms (GA, PSO or Hybrid) compute the cost of each particle.

6) After computation of all particles cost, the cost evaluation performed to select the particle with optimal cost value among other particles, i.e. the node/particle with efficient cost value will selected as next data forwarder node..

7) The process is repeated until the intended sink node discovered.

8) After discovering the opportunistic path, the data transmission initiated and periodically the stability of selection relay nodes checked based on the cost values computation.

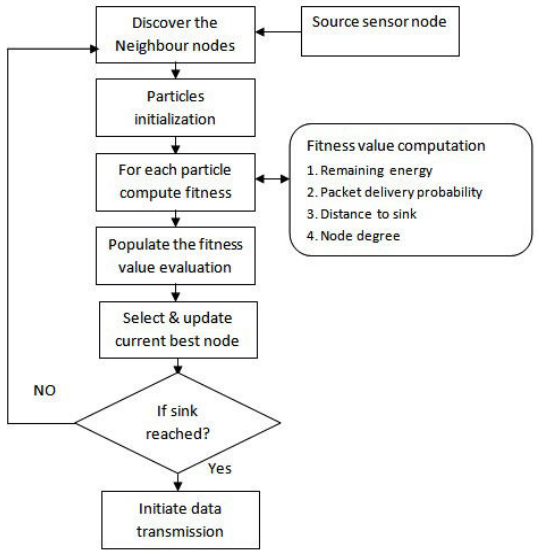


Figure 1. Proposed architecture of HOCOR protocol

VI. Comparative Analysis

As per review we have seen that there is need of an energy optimized routing protocol which covers the limitations of various existing routing protocol for UWSN. The issues need to be solved are consumption of energy, prolonged network life, high packet delivery ratio, maximized throughput etc. Proposed system tries to cover all these limitations of existing system with guaranteed QOS with hybrid approach. We have carried out simulation based experiment with above said proposed system and it is found that proposed system is better than existing protocol/ algorithm in said category. When we compare proposed system with existing protocols like IEBR [16], LEER [17], BEAR [12] our simulation result shows that proposed routing protocol gives better result in terms of the consumption of energy. As a sample herewith provided result for energy consumption comparison in figure 2.

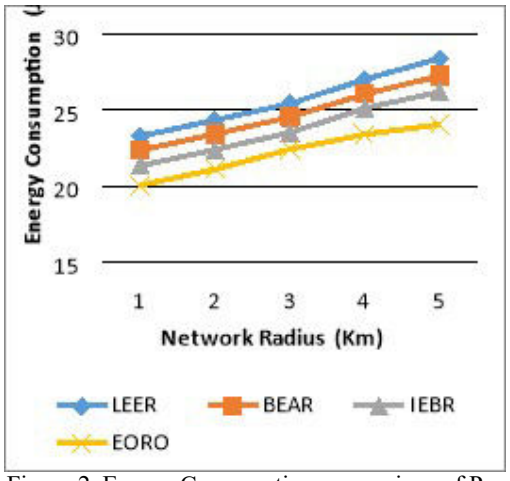


Figure 2. Energy Consumption comparison of Proposed System (Radius is considered in range of 1 KM to 5 KM)

VII. Conclusion

Thus we have seen various existing routing protocol for UWSN. These protocols are getting more and more better performances as compared to previous system. In today's era there is need to work on such a routing protocol which gives better performance and can be applicable for all situations. There can be use of new technologies like Machine learning algorithm, AI or IOT in the area of UWSNs for getting better performance. So by study of literature review and need of new technologies, here is introduction of novel energy efficient routing protocol for IoT enabled UWSNs using the optimization method such as Genetic Algorithm (GA) and Particle Swarm Optimization (PSO) with guaranteed quality of service.

References

[1] *Pompili, Dario, Tommaso Melodia, and Ian F. Akyildiz. "A CDMA-based medium access control for underwater acoustic sensor networks." IEEE Transactions on Wireless Communications 8.4 (2009): 1899-1909.*

[2] *Chen, Kai, Yi Zhou, and Jianhua He. "A localization scheme for underwater wireless sensor networks." International Journal of Advanced Science and Technology 4 (2009).*

[3] *Wahid, Abdul, and Dongkyun Kim. "An energy efficient localization-free routing protocol for underwater wireless sensor networks." International journal of distributed sensor networks 8.4 (2012): 307246.*

[4] *Abdulla, Ahmed EAA, Hiroki Nishiyama, and Nei Kato. "Extending the lifetime of wireless sensor networks: A hybrid routing algorithm." Computer Communications 35.9 (2012): 1056-1063.*

[5] *Ali, Tariq, Low Tang Jung, and Ibrahima Faye. "Diagonal and vertical routing protocol for underwater wireless sensor network." Procedia-Social and Behavioral Sciences 129 (2014): 372-379.*

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

[6] *Han, Zhao, et al. "A general self-organized tree-based energy-balance routing protocol for wireless sensor network." IEEE Transactions on Nuclear Science 61.2 (2014): 732-740.*
[7] *Zhang, Degan, et al. "An energy-balanced routing method based on forward-aware factor for wireless sensor networks." IEEE transactions on industrial informatics 10.1 (2013): 766-773.*
[8] *Ahmed, Sheeraz, et al. "Co-UWSN: Cooperative energy-efficient protocol for underwater WSNs." International Journal of Distributed Sensor Networks 11.4 (2015): 891410.*
[9] *Hao, Kun, et al. "An efficient and reliable geographic routing protocol based on partial network coding for underwater sensor networks." Sensors 15.6 (2015): 12720-12735.*
[10] *Ahmed, Sheeraz, et al. "SPARCO: stochastic performance analysis with reliability and cooperation for underwater wireless sensor networks." Journal of Sensors 2016 (2016).*
[11] *Javaid, Nadeem, et al. "Balanced energy consumption based adaptive routing for IoT enabling underwater WSNs." IEEE Access 5 (2017): 10040-10051.*
[12] *Shen, Jian, et al. "An efficient centroid-based routing protocol for energy management in WSN-assisted IoT." Ieee Access 5 (2017): 18469-18479.*
[13] *Zhu, Fang, and Junfang Wei. "An energy efficient routing protocol based on layers and unequal clusters in underwater wireless sensor networks." Journal of Sensors 2018 (2018).*
[14] *Khan, M. Nouman, et al. "EH-DBR: Energy Harvesting Depth Based Routing for Underwater Sensor Networks." EAI Endorsed Transactions on Energy Web 5.17 (2018).*
[15] *Islam, Md, et al. "LBRP: A Resilient Energy Harvesting Noise Aware Routing Protocol for Under Water Sensor Networks (UWSNS)." International Journal in Foundations of Computer Science & Technology (IJFCST) Vol 8 (2018).*
[16] *Shankar, T., S. Shanmugavel, and A. Rajesh. "Hybrid HSA and PSO algorithm for energy efficient cluster head selection in wireless sensor networks." Swarm and Evolutionary Computation 30 (2016): 1-10.*
[17] *Kaur, Tarunpreet, and Dilip Kumar. "Particle swarm optimization-based unequal and fault tolerant clustering protocol for wireless sensor networks." IEEE Sensors Journal 18.11 (2018): 4614-4622.*
[18] *Yoon, Seokhoon, et al. "AURP: An AUV-aided underwater routing protocol for underwater acoustic sensor networks." Sensors 12.2 (2012): 1827-1845.*
[19] *Geethu, K. S., and A. V. Babu. "Optimal hop position-based minimum energy routing protocol for underwater acoustic sensor networks." The Journal of Engineering 2015.5 (2015): 187-196.*
[20] *Coutinho, Rodolfo WL, et al. "GEDAR: geographic and opportunistic routing protocol with depth adjustment for mobile underwater sensor networks." 2014 IEEE International Conference on communications (ICC). IEEE, 2014.*
[21] *Yu, Haitao, et al. "WDFAD-DBR: Weighting depth and forwarding area division DBR routing protocol for UASNs." Ad Hoc Networks 37 (2016): 256-282.*
[22] *Rani, Shalli, et al. "Energy efficient chain based routing protocol for underwater wireless sensor networks." Journal of Network and Computer Applications 92 (2017): 42-50.*
[23] *Mazinani, Sayyed Majid, Hadi Yousefi, and Mostafa Mirzaie. "A vector-based routing protocol in underwater wireless sensor networks." Wireless Personal Communications 100.4 (2018): 1569-1583.*
[24] *Rahman, Md Arifur, Youngdoo Lee, and Insoo Koo. "EECOR: An energy-efficient cooperative opportunistic routing protocol for Underwater acoustic sensor networks." IEEE Access 5 (2017): 14119-14132.*
[25] *Javaid, Nadeem, et al. "Balanced energy consumption based adaptive routing for IoT enabling underwater WSNs." IEEE Access 5 (2017): 10040-10051.*
[26] *Luo, Hanjiang, et al. "Multimodal Acoustic-RF Adaptive Routing Protocols for Underwater Wireless Sensor Networks." IEEE Access 7 (2019): 134954-134967.*
[27] *Ahmed, Mukhtiar, et al. "SZAR: Shadow Zones Avoidance Routing Protocol for Underwater Wireless Sensor Network." INTERNATIONAL JOURNAL OF COMPUTER SCIENCE AND NETWORK SECURITY 19.1 (2019): 68-73.*
[28] *Kamaruddin, Azlina, et al. "Energy Efficient Opportunistic Routing Protocol (EE-OR) for Underwater Wireless Sensor Network." JPhCS 1174.1 (2019): 012010.*
[29] *Ahmed, Mukhtiar, et al. "CMSE2R: Clustered-based Multipath Shortest-distance Energy Efficient Routing Protocol for Underwater Wireless Sensor Network." Indian Journal of Science and Technology 12 (2019): 8.*
[30] *Ding, Yuying, et al. "Adaptive routing protocol for underwater wireless sensor network based on AUV." International Conference on Artificial Intelligence for Communications and Networks. Springer, Cham, 2019.*

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Real time Hospital Bed Tracking System

Saurabh Mishra, Ravikant Kumar,
Kumar Aabhas, Surbhi Rani
Department of Computer Engineering
Sinhgad Institute of Technology
Pune, India
saurabhmishra6179@gmail.com ,
ravikantkumar7654@gmail.com ,
kumaraabhas.98@gmail.com ,
surbhisharma20142015@gmail.com

Abstract*— It is seen that since the end of February 2020 a severe diffusion of COVID-19 has affected the world, resulting in a high demands of hospitalizations in particular in the availability of beds. Lack of up-to-date information of hospitals beds, specifically in emergencies, is a significant problem. Hospitals are suffering the high degree of patients to be treated and the majority of health structures are or are at the risk of saturation. We have seen a lot of cases of mismanagement of resources and bed unavailability. From the latest data reports, more then 1,57,000 patients have died from COVID-19 in India Only. It is pretty clear that Technology was not used upto its full potential during this pandemic. Need of the hour is a central system that can give life-saving Information at finger tips on a website like no of beds available in the hospitals around you. Knowing precisely the number of beds in real-time is very important to estimate the health system collapse and to create strategies for the government to provide new beds for patients. Therefore, the aim of this study is to analyze the availability of beds.

***Keywords*— Web-App, hospital, ICU beds, real-time**

VIII. INTRODUCTION

One of the major problems within a hospital environment is dealing with the availability of beds. Through increased public scrutiny there is also a greater degree of accountability required from health care professionals with regard to facilities available and information administration. Our hospitals are running at peak capacity which almost guarantees queuing in the emergency department for available beds. Bed availability is significant as a bed can be viewed as "one of the most fundamental inputs in the provision of acute healthcare".

Covid-19 was declared as a global pandemic by the world health organization on 11th March 2020. While all countries are working hard to cope with the sharp rise in infections, the existing healthcare capacity even in developed countries appears to be falling short of the real need. India, home to over 1.3 billion people, has a fragmented health infrastructure and a large and growing private sector. The availability of data on inpatient care and critical care capacity in India is limited, creating uncertainty surrounding whether the country can accommodate mass hospitalization at the peak of the Covid-19 pandemic.

Moreover, the reasons for variations in hospital admissions, severity, and mortality rates point to different population structures, hospital norms, hospital capacities, testing practices, data collection methods, implementation of infection prevention measures, time taken to provide care , as well as risk factor among infected people.

In all these above context, the accurate knowledge of the number of ICU beds and Semi-ICU beds are available in specific area and also in real-time essential to estimate the collapse of the health system as we shown in 2020 all over the World.

To speed up patient transfer, and to create government strategies to provide new ICU and semi-ICU beds in that specific area as per the population.

Researchers at CDDEP India and Princeton University estimated the current number of hospital beds, intensive care unit (ICU) beds across 37 states of India. The researchers estimated that India has approximately 1.9 million beds, 95 thousand ICU beds. Most of the beds in India are concentrated in seven states- Uttar Pradesh (14.8%), Karnataka (13.8%), Maharashtra (12.2%), Tamil Nadu (8.1%), West Bengal (5.9%), Telangana (5.2%) and Kerala (5.2%).

This scenario becomes even worse under the reported high demand for ICU beds in Covid-19 cases.

Considering these aspects, combating the Covid-19 pandemic or unfortunately upcoming epidemic or pandemic is more critical in poor and emerging states since they usually have fewer hospital and ICU and semi-ICU beds per capita.

Thus this article presents the methodology and strategies used for the development and implementation of a system through which we can check and book the ICU and semi-ICU beds and also the management of beds allocated to patients suspected of having Covid-19.

The rest of the article is structured as follows: Section II presents the literature survey; Section III presents the system analysis; Section IV presents the system architecture; Section V presents the future work; Section VI presents the conclusion and Section VII presents the references.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

IX. LITERATURE SURVEY

Ren Zongwei, Liu Chuanqing, Guo Haini studied the Strategy on Doctor Resource Sharing among Hospitals Composed Regional Medical Association Based on Game Theory. They concluded that the healthy development of medical alliance has been affected by a lot of problems and the most important of them is how to improve the sharing of doctor resource, then promote the doctor resource flow into general hospitals and ultimately raise the level of diagnosis in the whole society.

Itamir de Morais Barroca Filho, Silvio Costa Sampio, Anderson Paiva cruz, Victor Hugo Freire Ramalho, Jefferson Augusto Rodrigues de Azevedo, Atila Caetano da Silveira studied the web based information system for the Management of ICU Beds During the Coronavirus Outbreak. They concluded that with the world pandemic generated by Covid-19, many places in the world are not able to rapidly measure the number of intensive care unit (ICU) beds existing and available in a city, state, or country.

III. SYSTEM ANALYSIS

1. Existing system:

The current manual system has a lot of paper work. To maintain the records of sale and service manually, is a Time-consuming task. With the increase in database, it will become a massive task to maintain the database. Requires large quantities of file, which are huge and require quite a bit of space, which can be used for storing records of previous details. The retrieval of records of previously registered data will be a tedious task. Lack of security for the records, anyone disarrange the records of your system. All this work is done manually and lot of papers are needed to be handled and taken care of.

Advantages:

1. No extra training required.
2. Easy to implement.
3. Can be stored anywhere.
4. Requires minimum effort.

Disadvantages:

1. Needs lots of paper.
2. Problem with maintenance.
3. Volumes of data becomes problem.
4. Once data is burned it cannot be reproduced easily.
5. Data handling is problem.

2. Implemented system:

To overcome drawbacks of existing system, we implemented a unique system of "Real Time Hospital bed Tracking System". We want to reduce the time and effort required to manually visit each and every hospital website and get these information at a place. By using the system, the users are able to book a bed in his/her nearest hospital very efficiently in very short time. We are able to reduce the time previously required to check manually each hospital's website and book the bed.

Goals of system:

1. The working will be well planned and organized.
2. The level of accuracy in the system will be higher.
3. The reliability of the system will be high due to proper storage of information.
4. Provide quick and efficient retrieval of information.

Advantages:

1. Saves time.
2. Easy to handle.

Disadvantages:

1. Create problem of hospital don't update the correct data on portal.
2. People who don't know how to use internet may not get benefitted.

Applications:

1. Useful for patients as they will not face any inconvenience.
2. Reduces death rate due to lack of facilities.
3. Saves life especially in current Covid-19 situation.

IV. SYSTEM'S ARCHITECTURE

A brief outline on how the system works is shown in figure 1. Figure 1 refers to the architecture of a Three-Tier Client/ Server. In overview, the flow of the system can be described as follows. When a user enters the URL to access the system in the web browser to fetch an HTML page. It uses database to access the system database tables and sends dynamically generated pages back to the client's browser.

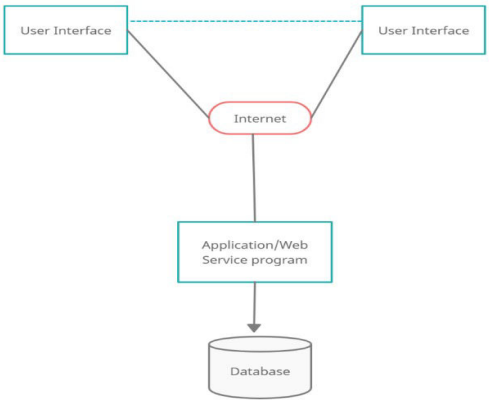


Fig. 1. System architecture

In Figure 1, System architecture is ordered into three tiers: the user interface in the client browser, the Web server, and the database server. The functional description of each tier in the system is as follows:

- First Tier: The Interface

As viewed from the client's web browser, the interface is build by HTML pages with Java Script support.

- Second Tier: Web Server

For this system, a web server is used with the nodejs module to support the back ends in third tier. The javascripts will process the user input, access the database and then the web server will compile and execute the output in dynamically generated pages.

- Third Tier: Database Server

In the third tier, the database server will receives requests from the second tier to execute database statements. The server accesses the database files to retrieve the stored data and then sends the queried data back.

After lot of Consultation to the various hospital teams we identified that the system has two main actors: 1. Administrator and 2. Health Units.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

It had to have the following functionalities for the administrators:

- Create, delete, visualize and update hospitals or health units.
- Create, delete, visualize, and update users. These users associated with one or more health units.
- Real-time reports of suspected, confirmed, and discarded cases and death.
- Real-time bed usage (free, occupied, or blocked), patients, diagnoses.

  Concerning the Users in hospital or Health units (clinical staff), they have the following features:
- Create, delete, visualize and update hospitals or health units beds. These beds can be free, occupied or blocked (due to renovation, lack of equipments etc).
- Create, delete, visualize, and update patients in health units.
  - Create, delete, visualize, and update patient's admission, discharge, and death records.

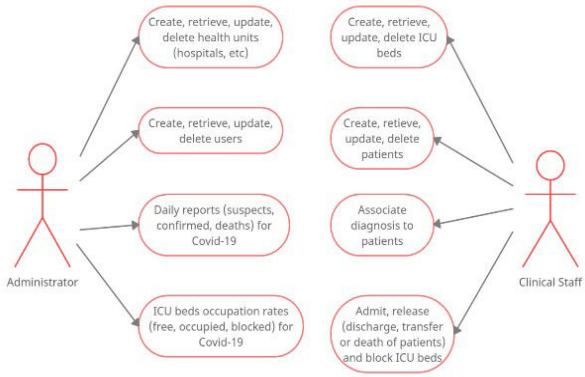


Fig. 2. Use case diagram

The actors and features are presented in the use case diagram in Figure 2. With the definition of the application's functional requirements and also through meetings, it was possible to elicit the functional requirements related to security, patient information privacy, availability and performance of the application, and traceability of the data inserted, altered, and removed. Thus, the application provides encryption, authentication, and authorization strategies to access its features. Besides, it allows the access of multiple users simultaneously and records log data (date and user) regarding the operations of inserting, changing, and removing information from the system. After eliciting the functional and non-functional requirements, we structed the client module for bed tracking system. This module contains five functions i.e., search function, register function, booking function, refund function, and unregister function. These functions are introduced for the client. The client can perform the functioning as per his/her requirement. This diagram is shown in Fig. 3.

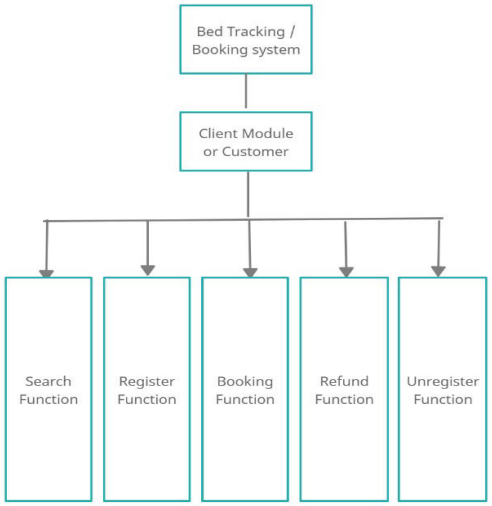


Fig.3 Client module for bed tracking system

We structed the client module for application booking also. This module contains five functions i.e., search function, register function, booking function, refund function, and unregister function. These functions are introduced for the client. The client can perform the functioning as per his/her requirement. This diagram is shown in Fig.4.

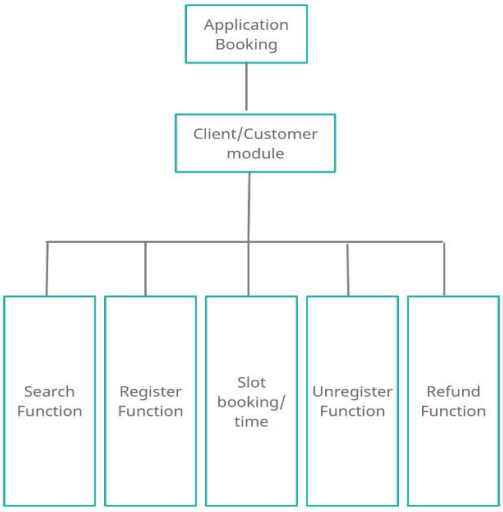


Fig.4 Client module for application booking

We use the best of the industry technologies like React JS, Node JS, JSON Server to build the fast portal. Our team has 3 professors and 4 students.

During the development, we used the Waterfall model as SDLC model. In software development, it tends to be among the less iterative and flexible approaches, as progress flows in largely one direction ("downwards" like a waterfall) through the phases of conception, initiation, analysis, design, construction, testing, deployment and maintenance.

1. Real-Time Web Based Application

Web-Based Applications have become increasingly popular much due to the fact that they offer extended capabilities, no need for variation from one user platform to other and a much wider reach than the traditional mobile applications.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

1.1 Real-Time Web Application Development Technologies

Below is a list of some of these most popular tools and frameworks for our use.

Node JS, React JS, JSON

Node JS is a Javascript-Based Runtime Environment which is fast, efficient and highly scalable.

React (also known as React.js or React JS) is an open-source, front end, JavaScript library for building user interfaces or UI components.

JSON stands for JavaScript Object Notation. JSON is a lightweight format for storing and transporting data. JSON is often used when data is sent from a server to a web page.

2. Data Analysis

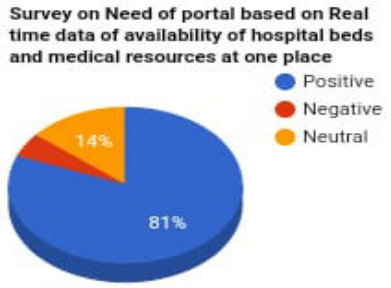
India has a pluralistic healthcare system with both public and private health sector playing important roles. This study estimates the existing hospital capacity of India's public and private health sector in terms of number of hospital beds, Intensive Care Unit (ICU) beds, and ventilators, across States and Union Territories (UTs) § Estimates suggest approximately 19 lac hospital beds, 95 thousand ICU beds and 48,000 ventilators are available in India § Most of the beds and ventilators in India, are concentrated in seven States - Uttar Pradesh (14.8%), Karnataka (13.8%), Maharashtra (12.2%), Tamil Nadu (8.1%), West Bengal (5.9%), Telangana (5.2%) and Kerala (5.2%). Existing bed capacity is mostly saturated at government hospitals. Accommodation of influx of COVID 19 patients, will require rapid expansion of current capacity or modifications in admission policy for routine patient care.

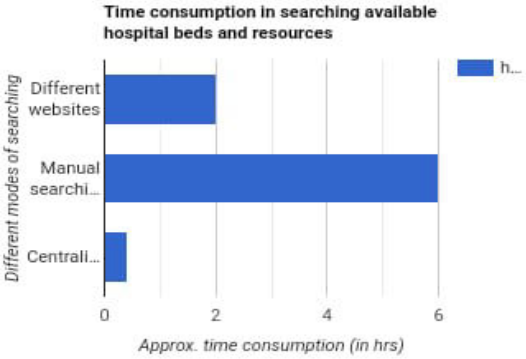
State	Public ICU Beds Per 100,000	Private ICU Beds per 100,000	Total ICU Beds per 100,000	Public Ventilators per 100,000	Private Ventilators per 100,000	Total Ventilators per 100,000
All India	2.59	4.29	6.88	1.29	2.15	3.44
Daman & Diu	8.70	36.96	45.65	4.35	18.12	22.46
Chandigarh	17.03	8.51	25.54	8.51	4.26	12.77
Karnataka	5.21	14.37	19.58	2.60	7.19	9.79
Puducherry	12.90	5.80	18.70	6.45	2.90	9.35
Sikkim	14.13	3.62	17.75	7.07	1.81	8.88
Andaman & Nicobar Island	13.04	2.66	15.70	6.52	1.21	7.73
Lakshadweep	10.87	4.35	15.22	5.80	2.17	7.97
Goa	9.12	4.77	13.89	4.53	2.36	6.88
Kerala	4.85	7.81	12.66	2.42	3.91	6.33
Arunachal Pradesh	10.87	1.00	11.87	5.43	0.54	5.98
Telangana	2.48	9.35	11.83	1.24	4.67	5.92
Dadara & Nagar Havelli	7.49	3.86	11.35	3.62	1.93	5.56
Mizoram	9.06	2.26	11.32	4.53	1.09	5.62
Himachal Pradesh	8.32	2.44	10.76	4.16	1.22	5.38
Uttarakhand	3.76	6.78	10.54	1.88	3.38	5.27
Punjab	3.01	7.22	10.23	1.50	3.61	5.12
NCT of Delhi	6.01	3.72	9.73	3.01	1.86	4.87
Tamil Nadu	4.36	4.38	8.74	2.18	2.19	4.37
Maharashtra	1.92	6.73	8.65	0.96	3.36	4.32

3. Result Analysis

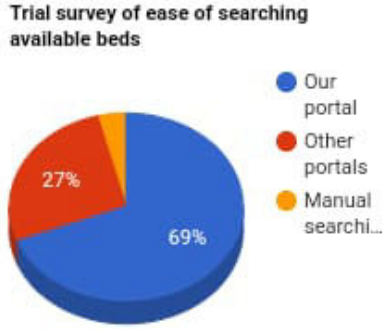
Various technologies have been used in the current systems, which have led to the reduced error rate, costs and increased speed of providing the healthcare services. This system also consumes less time to search the facilities. Also resources wastage is less. Users get a diverse option since they don't need to visit different websites to search for different facilities. After implementing our website, we tested our website and conducted a survey on some people to get the responses. Below are the graphs and charts which shows the responses of the survey we conducted.

This pie chart shows the responses of the survey on need of portal which have all the resources at one place. Maximum of the reviewers agreed that they need a portal which have all the facilities available at one place so that they don't need to search for different facilities on different websites and also it will be convenient for them





This graph shows the responses of the survey on time consumed in searching different facilities. It clearly shows that time consumed in manual searching on this system is much less than the time consumed on searching the facilities on different websites. This wastage of time of users can also lead to delayed treatment and thus resulting in very bad conditions and sometimes worse.



This pie chart shows the responses of the survey on ease of searching the facilities on the website. Maximum of the reviewers agreed that our portal is much easier to operate on after comparing with other portals. They agreed that the portal is easy to search the facilities on. Also people who don't have much knowledge of technologies can easily operate and use this system.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

V. FUTURE WORKS

The system is Real Time Hospital Bed Tracking system. We identify that the work done both in terms of analyzing and implementing the system is by no means complete. So there is clearly future work to be done on exploring the system more and the applications of the system. This section provides an overview of some areas of future interest.

The first is the essential feature of the system and plays a crucial role in this system i.e., updation of data in the system. A future work of the system will provide automatic updation of data in the system. It is possible to implement IOT in such a way that will be able to update at runtime their data so that the data searched is accurate.

The second is the one of the possible application of system i.e., searching the data in the system. A future work of the system will provide optimized data in the system. It is possible to implement AI in the system as it will optimize the competition. After using search optimization using AI, the results are fast, actionable and effective.

The third is also one of the feature of the system i.e., prediction of the best matched data after searching and then providing the suggestions accordingly. It is possible to implement ML in such a way that will be able to predict the best matched data according to the search. This will be done by training the system by giving data sets using ML and then it will provide suggestions according to the search done and thus making the results reliable.

Finally, a future implementation of the system will increase the accuracy, efficiency and performance of the system. These features using latest technologies can help the users in future. These features can be easy to be accessed so that a person with little knowledge can easily take care about this system, as it is very clear and plain to understand and can be done without any inconvenience.

VI. CONCLUSION

In this work, we presented the strategies and methodology used to develop a web based real-time bed tracking system to monitor the ICU and semi-ICU beds.

In current situation, we need a system which keeps records of the availability of beds and additional features of the hospital which will make it easier for the patients for their treatment. Thus we studied some technologies and deployed that in our project so as to make this project successful.

Finally, we are developing an application to enable the integration of the system developed with other systems, such as automatic bed availability sensing, also we are trying to make this available to an open source to help other locations, states.

VII. REFERENCES

1. *Itamir de Moris Barroca Filho, Silvio Costa Sampio, Anderson Paiva Cruz, Victor Hugo Freire Ramalho, Jefferson Augusto Rodrigues de Azevedo, Atila Caetano da Silveira Digital Metropolis Istitute*
2. *Federal University of Rio Grande do Norte – 2020.*
3. *https://firebase.google.com/docs?gclsrc=aw.ds&&gclid=CjwKCAjwgOGCBhAlEiwA7FUXkm4Vsogw6_rSX1vRSufg9oALARsQz-WPG7_oJImfxvICbndMd6zR7BoCEuIQAvD_BwE*
4. *https://reactjs.org/docs/getting-started.html*
5. *https://docs.npmjs.com/*
6. *https://docs.npmjs.com/cli/v7/commands*
7. *https://wiki.ihe.net/index.php/Bed_Management#:~:text=Bed%20management%20is%20the%20ability,of%20the%20bed%20turnover%20process.*
8. *https://pubmed.ncbi.nlm.nih.gov/25160159/*
9. *https://pubmed.ncbi.nlm.nih.gov/25822477/*
10. *https://www.infosys.com/industries/healthcare/documents/hospital-bed-management.pdf*
11. *https://www.cronj.com/blog/hospital-bed-management-system/*

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

The job of lexical analyser in the periods of compiler plan

Mrs. Vidya Mahesh Shinde
Department of Computer Engineering
Sinhgad Institute of Technology and Scince, Narhe, Pune
vidya.shinde.sits@sinhgad.edu

Abstract—A compiler translates a program written in a high-level programming language into the low-level machine language that is required by computers. On the other hand, programs that are written in a high-level language and automatically translated to machine language may run somewhat slower than programs that are hand-coded in machine language. Hence, some time- critical programs are still written partly in machine language. A good compiler will, however, be able to get very close to the speed of hand-written machine code when translating well-structured programs. During this process, the compiler will also attempt to spot and report obvious programmer mistakes. A typical way of doing this is to split the compilation into several phases with well-defined interfaces. Conceptually, these phases operate in sequence. It is common to let each phase be handled by a separate module. We are presenting a review; of working of the very first and important phase of the compiler known as lexical analyzer. The lexical analysis programs written with Lex. Lex source is a table of regular expressions and corresponding program fragments. The table is translated to a program which reads an input stream, copying it to an output stream and partitioning the input into strings which match the given expressions. As each such string is recognized the corresponding program fragment is executed. The recognition of the expressions is performed by a deterministic finite automaton generated by Lex. The program fragments written by the user are executed in the order in which the corresponding regular expressions occur in the input stream. The final outcome of this paper is to present working of lexical analyzer in a simplest way to provide depth knowledge about lexical analyzer phase which is very crucial phase of the compiler design.

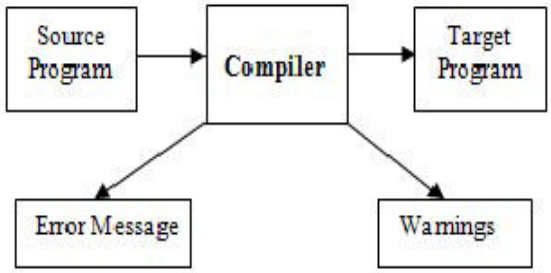
Keywords— Lex, Yacc Parser, Parser-Lexer,

I. INTRODUCTION

A compiler is system software that converts a high- level programming language program into a target language equivalent to low-level (machine) language program. It validates the input program and shows the error message or warnings if there is any. Obviously, it attempts to mark and detail the mistakes done by the programmer [1]. Many of the techniques used to construct a compiler are useful in a wide

Variety of applications involving symbolic data. In particular, every man-machine interface is a form of programming language and the handling of input involves these technologies.

The term compilation denotes the conversion of an algorithm expressed in a human-oriented source language to an equivalent algorithm expressed in a hardware-oriented target language. The very basic diagram for compiler is shown in figure 1.



II.PHASES OF GENERAL COMPILER

.

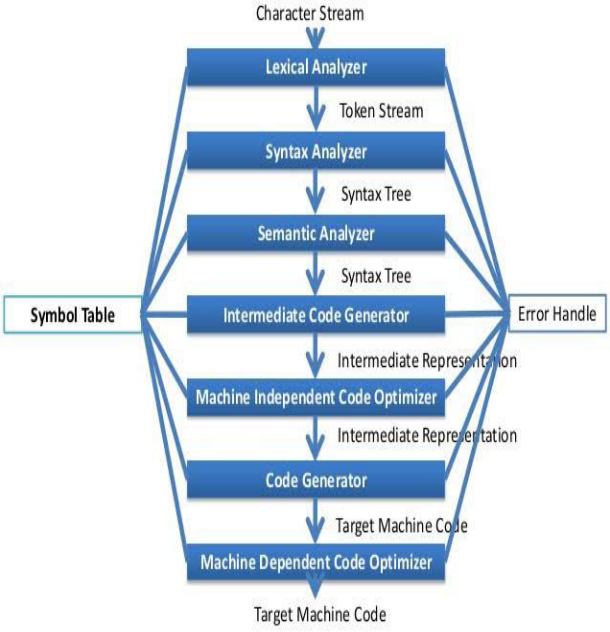


Fig.2. Phases of complier

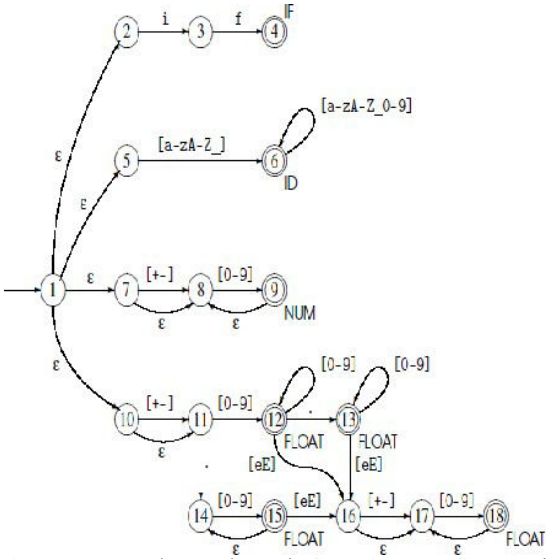
IEEE TKD-21/ ISBN No. 978-81-992245-3-6

The compiler is made up of different modules or phases. Starting with token recognition, it runs through generation of context free grammar, parsing sequence, checking acceptability, machine independence intermediate code generation to finally target code generation state. These act as a basis for communication interface between user and processor [1, 3]. The first phase of the compiler is lexical analysis. The word "lexical" in the traditional sense means "pertaining to words". In terms of programming languages, words are objects like variable names, numbers, keywords etc. Such words are traditionally called tokens. The main phases of a compiler include and undergo through Lexical Analysis, Syntax Analysis, Semantic Analysis, Intermediate Code Generation, Code Optimization, and Target Code Generation.

The various phases of the compiler is shown in figure 2

III. WORKING PRINCIPLE OF LEXICAL ANALYZER

A lexical **analyser** or lexer **for brief**, **can** as its input take a string of individual letters and divide this string into tokens. **in addition**, **it'll separate no matter** separates the tokens (the **questionable** white-space), i.e., lay-out characters (spaces, newlines etc.) and comments. **the most** purpose of lexical analysis is **to create** life easier for **the next** syntax analysis **part**. Lex and yacc were **each** developed at Bell.T. Laboratories **within the Seventies**. Yacc was **the primary** of **the 2**, developed by **Sir Leslie Stephen** C. Johnson. Lex was designed



by **microphone** Lesk and Eric **Schmidt to figure** with yacc. **each** Lex and yacc **are customary UNIX** utilities since **seventh** Edition **UNIX**. Lex takes raw input, **that may be a** stream of characters and converts it into a stream of tokens, **that area unit** logical units, **every** representing one or **a lot of** characters that belong **along**." Typically,

1. Every keyword may be a token (eg. then,begin,integer)
2. Every symbol may be a token (eg.a,b,abc)
3. Every constant may be a token (eg. 1,12.34.13.Eb)
4. Every sign may be a token (eg.<,==,=>,<=,!)

7A. Approaches **to assembling** Lexical Analyzers The lexical **analyser is that the solely part** that processes input character by character, **therefore** speed is **crucial**. Either write it yourself; **management** your own input buffering, or use a tool that takes speculations of tokens, **usually within the** regular expression notation, and produces for you a table-driven LA. Lexical Analysis **cluster** the stream of refined input characters into tokens.

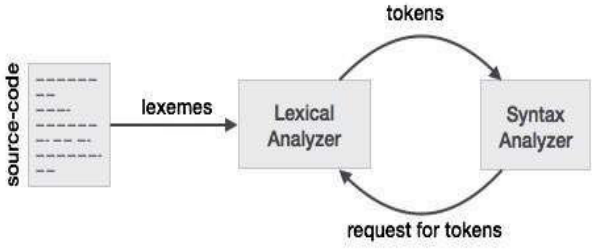


Fig. 3. Phases in Lexical Analysis

A lexer (Lexical Analysis) has to distinguish between several different types of tokens, e.g. numbers, variables and keywords. A lexer does not check if its entire input is included in the languages defined by the regular expressions. Instead, it has to cut the input into pieces (tokens), each of which is included in one of the languages. If there are several ways to split the input into legal tokens, the lexer has to decide which of these it should use.

The simplest approach would be to generate a DFA for each token definition and apply the DFAs one at a time to the input. This can, however, be quite slow, so we will instead from the set of token definitions generate a single DFA that tests for

all the tokens simultaneously. This is not difficult to do: If the tokens are defined by regular expressions r1, r2. . . rn, then the regular expression r1| r2| . . .| rn describes the union of the languages r1; r2; : : : ; rn and the DFA constructed from this combined regular expression will scan for all token types at the same time. However, we also wish to distinguish between different token types, so we must be able to know which of the many tokens was recognized by the DFA [4].

A. Splitting the input stream

As mentioned, the lexer must cut the input into tokens. This may be done in several ways. For example, the string if17 can be split in many different ways:

- As one token, which is the variable name if17?
-As the variable name if1 followed by the number 7.
-As the keyword if followed by the number 17.
-As the keyword if followed by the numbers 1 & 7.
-As the variable name i followed by the variable name f17.
-And several more

Fig.4. combined NFA for several tokens.

A common convention is that it is the longest prefix of the input that matches any token which will be chosen. Hence, the first of the above possible splitting of if17 will be chosen. Note that the principle of the longest match takes precedence over

the order of definition of tokens, so even though the string starts with the keyword if, which has higher priority than variable names, the variable name is chosen because it is longer.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

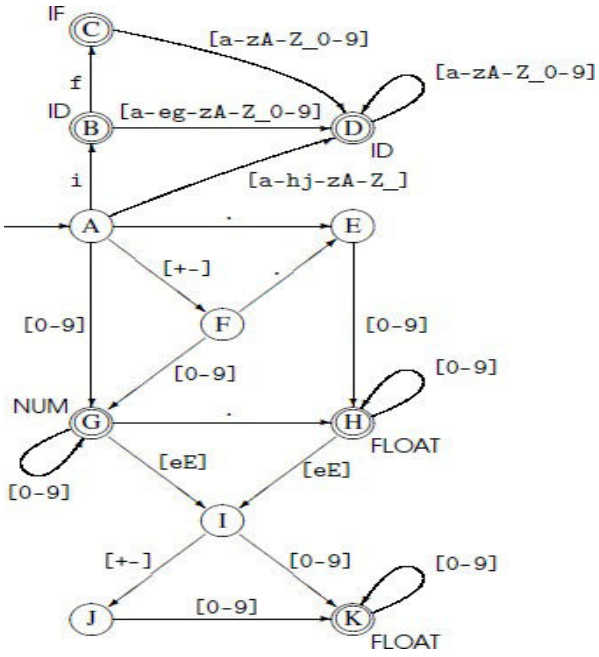


Fig.5. Combine DFA for several tokens

To illustrate the precedence rule, figure 4 shows an NFA made by combining NFAs for variable names, the keyword if, integers and floats. When a transition is labeled by a set of characters, it is a shorthand for a set of transitions each labeled by a single character. The accepting states are labeled with token names as described above. The corresponding minimized DFA is shown in figure 5. Note that state G is a combination of states 9 and 12 from the NFA, so it can accept both NUM and FLOAT, but since integers take priority over floats, we have marked G with NUM only.

Let us discuss this with the help of an example, suppose the pseudo code:

```
if (x*y<10)
  {
Z = x;
}
```

Let's consider the first statement of the above code.The corresponding token stream of pairs <type, value>

is shown in Figure 6. Lex and input systems together constitute layers of Lexical Analyzer [5].

X. LEX PROGRAM TO COUNT NUMBER OF WORDS

XI.

```
%{
#include<stdio.h>
#include<string.h>
int i = 0;
%}
%%
([a-zA-Z0-9])*    {i++;}
"\n" {printf("%d\n", i); i = 0;}
%%
int yywrap(void){}
int main()
{
yylex();
return 0;
}
```

The words [a-zA-Z] can consist of lowercase characters, uppercase characters and digits. The rule [0-9]+ recognizes strings of digits,The Program to count number of words.

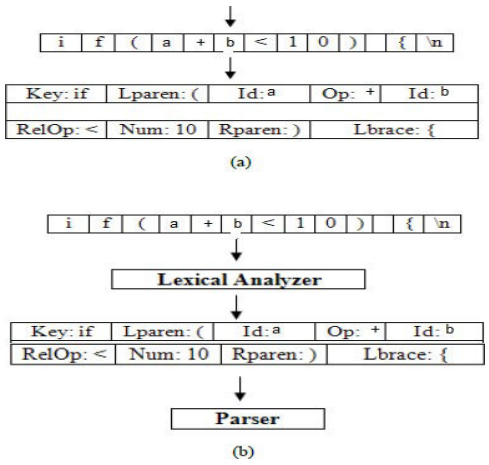


Fig.6. output stage of Lexical Analyzer

A. Parser-Lexer Communication

When you use a lex scanner and a yacc parser together, the parser is the higher level routine. It calls the lexer **yylex()** whenever it needs a token from the input. The lexer then scans through the input recognizing tokens.

As soon as it finds a token of interest to the parser, it returns to the parser, returning the token's code as the value of **yyfex().** Not all tokens are of interest to the parser-in most programming languages the parser doesn't want to hear about comments and white space. The lexer and the parser have to agree what the token codes are.

B. Left Context Sensitivity

Sometimes it is desirable to have several sets of lexical rules to be applied at different times in the input. For example, a compiler preprocessor might distinguish preprocessor statements and analyze them differently from ordinary statements. This requires sensitivity to prior context, and there are several ways of handling such problems. The ^ operator, for example, is a prior context operator, recognizing immediately preceding left context just as $ recognizes immediately following right context. Adjacent left context could be extended, to produce a facility similar to that for adjacent right context, but it is unlikely to be as useful, since often the relevant left context appeared some time earlier, such as at the beginning of a line. Consider the following problem: copy the input to the output, changing the word magic to first on every line which began with the letter a, changing magic to second on every line which began with the letter b, and changing magic to third on every line which began with the letter c. All other words and all other lines are left unchanged.

These rules are so simple that the easiest way to do this job is with a flag:

```
int flag;
  %%
  ^a{ flag = 'a'; ECHO;}
  ^b{ flag = 'b'; ECHO;}
  ^c{ flag = 'c'; ECHO;}
```


IEEE TKD-21/ ISBN No. 978-81-992245-3-6

```
\n     { flag = 0 ; ECHO;}
 magic {
       switch (flag)
        {
     case 'a': printf("first"); break;
case 'b': printf("second"); break;
case 'c': printf("third"); break;
default: ECHO; break;
        }
              }
```

C. Error Handling

The error handling in the Lexer is basically concerned with the errors in the compiler or its environment, design errors in the program being compiled, an incomplete understanding of the source language, transcription errors, incorrect data, etc. The tasks of the error handling process are to detect each error, report it to the user, and possibly make some repair to allow processing to continue. It cannot generally determine the cause of the error, but can only diagnose the visible symptoms. Similarly, any repair cannot be considered a correction (in the sense that it carries out the user's intent); it merely neutralizes the symptom so that processing may continue. The purpose of error handling is to aid the programmer by highlighting inconsistencies. It has a low frequency in comparison with other compiler tasks, and hence the time required to complete it is largely irrelevant, but it cannot be regarded as an 'add-on' feature of a compiler. We distinguish between the actual error and its symptoms. The diagnosis always involves some uncertainty, so we may choose simply to report the symptoms with no further attempt at diagnosis. Thus the word 'error' is often used when 'symptom' would be more appropriate. A simple example of the symptom/error distinction is the use of an undeclared identified LAX. The use is only a symptom, and could have arisen in several ways:

- The identifier was misspelled on this use.
- The declaration was misspelled or omitted.
- The syntactic structure has been corrupted, causing this use to fall outside of the scope of the declaration.

Most compilers simply report the symptom and let the user perform the diagnosis. An error is detectable if and only if it results in a symptom that violates the definition of the language. This means that the error handling procedure is dependent upon the language definition, but independent of the particular source program being analyzed. For example, the spelling errors in an identifier will be detectable in LAX (provided that they do not result in another declared identifier) but not in FORTRAN, which will simply treat the misspelling as a new implicit declaration.

We shall use the term anomaly to denote something that appears suspicious, but that we cannot be certain is an error. Anomalies cannot be derived mechanically from the language definition, but require some exercise of judgment on the part of the implementers. As experience is gained with users of a particular language, one can spot frequently-occurring errors and report them as anomalies before their symptoms arise.

CONCLUSIONS

This paper outlines a novel approach to lexical phase in compiler construction. Furthermore, expressiveness is barely sacrificed; the compiler can be boot strapped provided there is enough run-time support. In spite of the scope of data storage is limited and symbols used are a few, the main aim has been just cleared conception and application of efficient look up table approach in finite states generation for lexical analysis. The next phase of compilation is just introduced to represent its utility, for the sake of completion and better understanding. Further study on extending this model with parser generation to generate language constructs as well as error recovery in lexical analysis is in progress.

The compiler has been used, for example, to study advanced topics such as the implementation of first- class continuations and register allocation.

ACKNOWLEDGMENT

Author acknowledges the support rendered by the Management and colleagues of parent institutes "**SINHGAD INSTITUTE OF TECHNOLOGY AND SCIENCE** (under Savitribai Phule Pune University), Pune,India".

REFERENCES

[1] *Alfred V.Aho, Ravi Sethi, Jeffery D. Ullman, Addison-Wesley, 2007. Compilers- Principles, Techniques, and Tools.*

[2] *Torben Ægidius Mogensen, May 28, 2009. Basics of Compiler Design", lulu, Extended Edition.*

[3] *David Galles, 2005. Modern Compiler Design, Addison-Wesley.*

[4] *Torben Ægidius Mogensen, May 28, 2009. Basics of Compiler Design", lulu, Extended Edition*

[5] *International Journal of Computer Applications (0975 – 8887) Volume 6– No.11, September 2010*

[6] *William M. Waite Department of Electrical Engineering University of Colorado Boulder, Colorado 80309USAemail: William.*

[7] *Aho, Alfred V. and Ullman, Jeffrey D. [1972]. The Theory of Parsing, Translation, and Compiling. Prentice- Hall, Englewood Cliffs.*

[8] *Aho, Alfred V. and Ullman, Jeffrey D. [1977]. Principles of Compiler Design. Addision.*

[9] *Ross, D. T. [1967]. The AED free storage package. Communications of the ACM, **10**(8):481492.*

[10] *Sale, Arthur H. J. [1971]. The classification of FORTRAN statements. Computer Journal, **14:1012**.*

Atmanirbhar Mahila ~Saheli Ehaat

1 Ms. Sanjana Pawar
2 Ms. Ankita Shringare, 3 Ms. Shweta Nimbolkar , 4 Mrs. Vandana Dixit
.1,2,3 Student Information technology, Savitribai Phule Pune University
4 Project-guide, Assistant Professor, Information technology department,
PES Modern College of Engineering
Savitribai Phule Pune University, PES Modern College of Engineering,
Pune, India
1 sanjiandbubby@gmail.com

Abstract— To strengthen the economy of women from all strata of the society after facing COVID-19 pandemic situation leading to economic crisis all over. One should take inspiration of 'Atmanirbhar Bharat 'viz. self –dependent India [7], concept of our honorary PM. Shri Narendra Modiji. So, to make a try, like bud in huge garland we would like to make a project to strengthen the economy of women [7]. Our motive is to promote women empowerment. Hence, we are creating online digital platform for Mahila Bachat Gats (Self-Help Groups) of under-privileged and any strata's of society, urban or rural women to empower them by giving opportunity to market their own products and services and enhance their talent and skills to strengthen economy. Also developing Menstrual Period Tracker and Information related to Menstruation; hence create awareness about feminine health and hygiene. We are using a balance of gamification concepts to maintain the encouragement and modern social-enhancement interface.

***Keywords*— Uploading product and details, viewing the products, skill development, social media, responsive, subtitles, user-friendly, image, motivation encouragement, computer, strengthen economy, menstrual period tracker, pdf download, HTML, CSS, Python-Flask.**

I. INTRODUCTION

The COVID-19 pandemic has been a hurricane to India, especially since many sectors and industries has faced heavy loss when the virus storm hit Indian sector very tidily. The Micro, small and medium enterprises (MSMEs) the backbone of all Indian sectors and are engaged in manufacturing and export activities[7]. Due to lockdown, all MSMEs are shut and are in a pause mode leading to affecting the Indian economy[7]. Considering the background of social-distancing due to corona (Pandemic) situation the physical exhibitions cannot be arranged full-flesh, so to provide Mahila Bachat Gat, we are creating this website. This website will provide online platform to the Mahila Bachat Gat to sell and exhibit their products to the purchasers and individuals. And also illustrate the various services. Not only it will provide digital platform for marketing and sales but also enhance their skills and showcase their talent, where in it will provide the links to various courses to enhance their skills. This website will provide information and guidance for self-dependent women. It's a dream to make all literate and illiterate women to earn their own money. So that they can enhance girl child for education for better India.

This Project is aimed for developing a web application that represents online shopping of products and services made and offered by group women's savings. Using this website, the Bachat Gats can increase the efficiency of their services. This will be one of the applications to improve the marketing of mahila bachat gats products. This web application will involve all the features of online shopping as well as assist in all the fields related to empower women. It is also aiming to create awareness about feminine health and hygiene hence we have also introduced InSite period tracker.

This software will help customer to find different products, their features, and new updates easily. The customers will register first. Products will be uploaded by any on-site registered mahila bachat gat having government registration. Admin will have to manage products stock, price of products discounts, events, stories(status), posting products which are uploaded by mahila bachatgat to social media page of website etc. The web based software will help in not only marketing products but empower the women's as website provides all the information about the women like personal hygiene, anatomy of females, laws and schemes in India for women, bank facilities available. Through period tracker, one can download pdf for period cycle schedule of 12 months.

II. LITERATURE SURVEY AND REVIEW

- E-commerce means electronic commerce. It means dealing in goods and services through the electronic media and internet [1]. E-commerce involves

carrying on a business with the help of the internet and by using the information technology like Electronic Data Interchange (EDI) [1].

- ECommerce relates to a website of the vendor on the Internet, who trades products or services directly to the customer from the portal [1].
- The customers who are going for online shopping are very much concerned about the important things for online shopping. 31.28% people gives importance to security for online shopping,27.37% people give importance to privacy for online shopping ,12.29% people give importance to trust for online shopping and 29.05% people gives importance to all of the above for online shopping.

Literature survey				
SR No.	Sources	Seed Idea	Problems found	Your solution
1	Ebachatgat.com	This website provide platform to sell their product	1.Less user-friendly GUI. 2.. Limited in-site authentication for mahila bachatgat enrolling. 3.only in English	1.Develop user friendly GUI. 2.Not just providing platform but also empowering them. 3.providing Marathi/Hindi subtles.
2	Mahila E~haat	It is government site its globally for all entrepreneur	1.Globally for all women entrepreneur. 2.No in-site launching/ uploading of products by vendors.	1. launch and upload products directly on website, no need of travelling to other websites is required. 2.marathi/Hindi subtles.

TABLE I
Literature survey

- Indian E-Commerce portals provide goods and services during a sort of categories like apparel and accessories for men and ladies , health and wonder products, books and magazines, computers and peripherals, vehicles, collectibles, software, consumer electronics, household appliances, jewellery, audio/video entertainment goods, gift articles, land and services, business and opportunities, employment, travel tickets, matrimony etc [4].Examples:www.indiayplaza.com, www.thebestofindia.com,www.khoj.com,www.sify.com,
- We came across many sites but there is lack of websites which would showcase products of Mahila bachatgats. We found two websites which are as follows who have same motive like our but has few limitations: - a: e-bachatgat.com, b: mahila ehaat (government site)
- Less user-friendly GUI.
- Limited in-site authentication for mahila bachat gats enrolling.
- Less information provided about scaling and empowering.
- No in-site launching /uploading of products by vendor
- No paper on particular topic referring to the E-Commerce portal website research paper. Survey can be tabulated as below:-

III. PROBLEM DEFINITION

To create online digital platform for Mahila Bachat Gats (Self-Help Groups) of under-privileged and any strata's of society, urban or rural women to empower them by giving opportunity to market and sell their own products and services and enhance their talent and skills to strengthen economy.

IV. METHODOLOGY

A. Path Flow and Features of Software:

- In system we are implementing sign up/registration page for Mahila bachatgats as well as customers, where they will be registered and then they will have a login id and password available for them.
- Customer will view the products and services on this website and can directly view the details and contact the subtlest on our website's social media pages named" Atmanirbhar Mahila~ Saheli Ehaath".Also all other features are available for customers like viewing the details of various events, grooming lectures online n around them ,also they can upload events information which will be displayed after verification by admin, viewing information, learning various skills from in-site YouTube videos, adding review, placing order directly via contacting owner or online wallet and

cash on delivery etc. .

- This system keeps all records of products services and in its users. Admin will have to manage products and services, price of products and services (Using ML) discounts, events verification etc. through registered account.
- The website will help in easy maintaining and updating products in the website for the administrator. User can search for required different categories of products. User can give his/her review about product, improvement of product. Admin can give reply to those reviews easily.
- Unauthorized user cannot add product first it needs to be registered and then can add.
- This System gives an automated output from resulting algorithm for price increment for the best reviewed products and services so Mahila bachat gats would get more profit margin.
- Very user-friendly graphical user interface with dual language subtitles and responsive design as mobile friendly.
- Covers each category of products produced and manufactured by Self-help groups. website intended for both customers and Mahila Bachat Gats.
- We have created InSite Menstrual period tracker; in which user need to enter date and days according to their cycle and get schedule for 12 months, where in they can keep check on their menstruation and consult doctors if any abnormalities

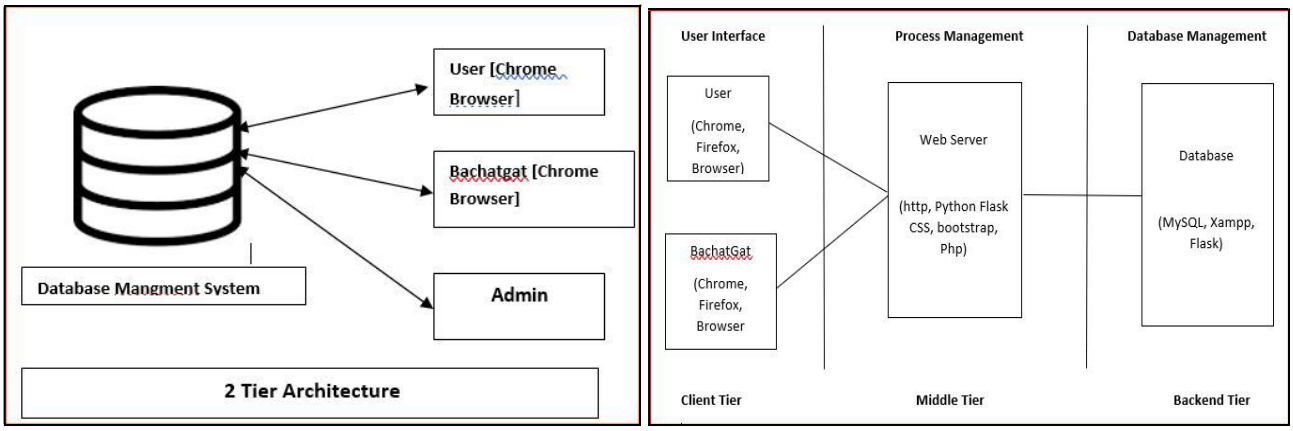


Fig. 1 Architecture diagram (Two Tier, Three Tiers)

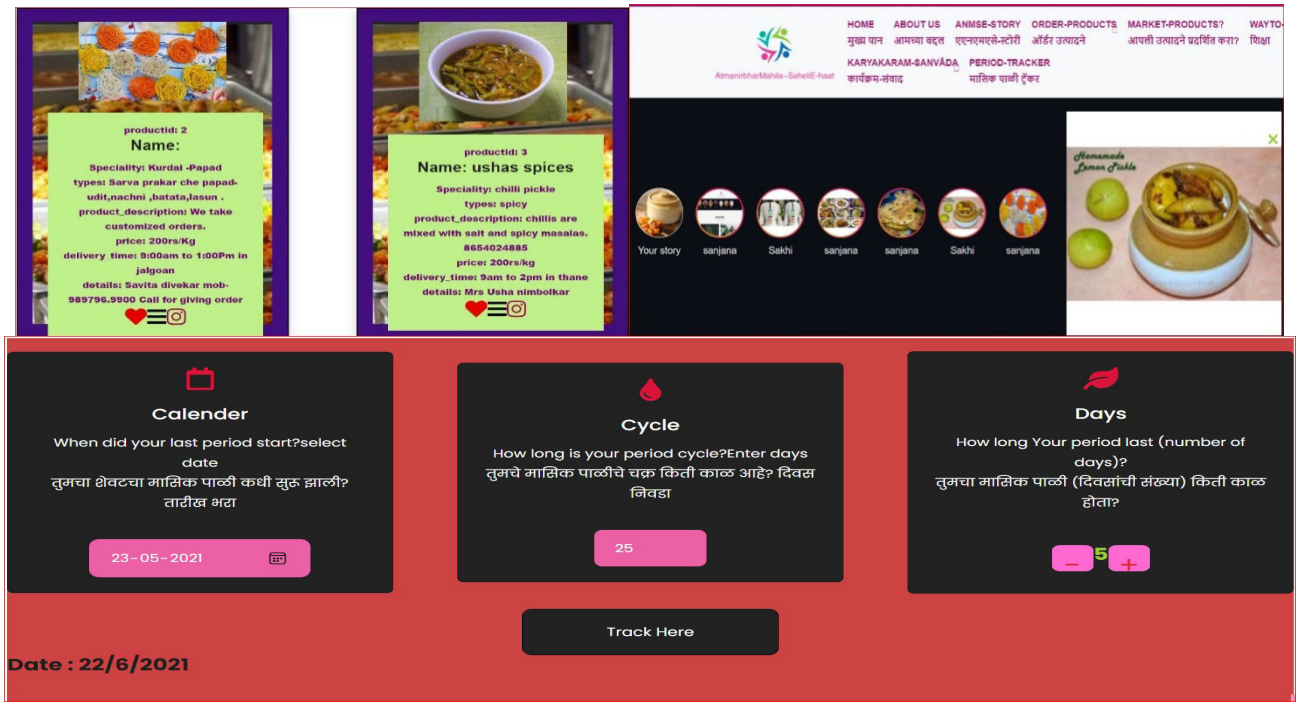


Fig. 4 Trending features (marketing products, Insta-story, menstrual tracker)

B. MENSTRUAL PERIOD TRACKING AND PDF GENERATION USING FLASK

The menstrual cycle starts when the lining of your uterus sheds, followed by the follicular phase when the follicles in your ovaries mature and get ready for the prime time: ovulation, then ovulation phase wherein the egg is released, followed finally by the luteal phase when the egg makes its way down your fallopian tubes and gets ready to bleed [8]. Generally, this takes about 22-28 days. After 22-28 days, women experience bleeding for about 4-7 days normally. So, period tracker works on calculation of duration of your menstrual cycle and bleeding period.

Females are unaware about the menstrual disorders. Our motive is to let women track their menstrual period dates for 12 months by simply entering the date and days and to check whether they are on time or not. Females should consult their doctor if any delay or advance periods occur, as it might be injurious to health. So, to make our motive successful we have introduced concept of generating and downloading pdf format of schedule.

To generate pdf, we were finding for best way amongst different options. As our frontend is in HTML and Python Flask; we had to find libraries in order to convert html to pdf. Python Flask have option namely as Pdfkit. We need to install this library with addition of 'wkhtmltopdf'library. Wkhtmltopdf is opensource tool to render html in pdf using Qt web Kit rendering engine.[9]

One can install it with commands: -

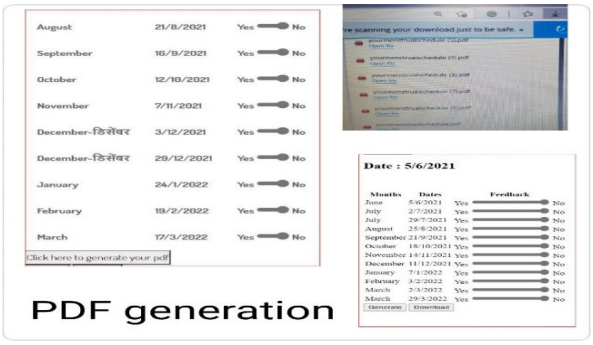


Fig. PDF generation

```
sudo pip install pdfkit
sudo apt-get install wkhtmltopdf
Create the html page.
Import the libraries in python flask.
And generate the pdf using python code.
pdf = pdfkit. from string(rendered,False)
        response = make_response(pdf)
        response.headers['Content-Type']=
'application/pdf'
        response.headers['Content-Disposition']=
'inline; filename=yourmenstrualschedule.pdf'
        return response
```

VI. ADVANTAGES

- It will provide digital platform for marketing and sales .
- This website will provide information and guidance for self-dependent women.
- Attractive and modern interface with inbuilt dual language subtitles to avoid further confusions of translating page.
- Information about Laws and women rights, Personnel hygiene and care, Inspiring stories and achievements etc for grooming.
- Skill-development videos hence visitors would get inspired and start their own businesses
- Responsive web design is a modern need. our website is responsive website i.e., changes its layout to fit the device and any browser size.
- Create Awareness About Feminine Hygiene and Health. Overcome the taboos of menstruation.

VII. SCOPE OF THE FUTURE

Social mobilization- (organizing poor in small groups)

*website will provide the information. Training-(capacity building) . Finance- (bank credits and government subsidy)

Leaderboard, rewards, bonus points may be introduced to increase motivation and have engagement according to gamification

[5].Should get easy collaboration of gamification and the website's motto. There should not negative engagement and demotivation among the customers and self-help groups [5].

Daily reminder and alarm system for menstrual period tracker.

VIII. SPECIFICATION AND TEST CASES

TABLE I – Specifications

Function/Event	Result
Environment type	Real world, Real time
	Web portal
State of Background	Social welfare
Requirement	Device with internet facility
Types of user	Mahila bachat gat, customer

TABLE III

Test case 1: Launch and display product

	Project Name:	**Atmanirbhar Mahila Saheli Ehaat**	**Test Designed By:**	**Sanjana**
	Module Name:	Launch Product	**Test Designed Date:**	10/11/2020
	Test Execution Date:	12/12/2020	**Test Execution By:**	Shweta
Pre-Condition:	A valid user account			
Test Cases	**Test Title**	**Test Window**	**Test Steps**	**Test Data**
Create Bachatgat Account	Registration	Website Home Page	Create account by adding correct information	[Shweta 13/12/2020 11.00 PM] Successful
Launch Products	Launch	Bachatgat Account Page	Add product picture and description to launch	[Shweta 13/12/2020 11.05 PM] Successful
Display products	Display	Order product page	Launched product is displayed.	[Shweta 13/12/2020 11.07 PM] Successful

	Project Name:	**Atmanirbhar Mahila Saheli Ehaat**	**Test Designed By:**	**Sanjana**
	Module Name:	Menstrual tracker and pdf generation	**Test Designed Date:**	10/04/2021
	Test Execution Date:	12/04/2021	**Test Execution By:**	Sanjana
Pre-Condition:	A valid user account			
Test Cases	**Test Title**	**Test window**	**Test Steps**	**Test comments**
Enter date, menstrual cycle days, menstruation days.	Tracking	Menstrual period tracker	Enter date, menstrual cycle days, menstruation days.	[Sanjana 12/04/2021 10.00 AM] Successful
Track and get schedule for 12 months	Schedule	Menstrual period tracker Page	Track the date for next month as well as obtain schedule for 12 months	[Sanjana 12/04/2021 10.02 AM] Successful
Generate and download pdf	PDF generation	Menstrual period tracker	Generate or download pdf for your 12 months schedule.	[Sanjana 12/04/2021 10.03 AM] Successful

IX. CONCLUSION

This study shows that we are doing this project to create online digital platform for Mahila Bachat Gats (Self-Help Groups) of under-privileged and any strata of society, urban or rural women to empower them by giving opportunity to market and sell their own products and services and enhance their talent and skills to strengthen economy.

They can market their different types of products through this site and increase their clients. This website is intended for females mainly to outbreak the taboos.

Here, I have to conclude that this website will not only be E-commerce website but a social welfare website genuinely meant for WOMEN

EMPOWERMENT and ATMANIRBHAR BHARTIYA MAHILA [7].

REFERENCES

[1] "A Review paper on E-Commerce" Dr. Shahid Amin Prof. Keshav Kansana, Jenifur Majid.

[2] "Evolution of online shopping: E-commerce" Anand Upadhyay, Ambrish Pathak, Nirbhay Singh.

[3] "Electronic Commerce: A Study on Benefits and Challenges in an Emerging Economy" research paper By Abdul Gaggar Khan.

[4] "Emerfing trends of e-commerce in India: an empirical study" Dr. (Smt.) Rajeshwari M. Shettar.

[5] "For the Win: How Game Thinking Can Revolutionize Your Business": book by Dr Kevin Werbach

[6] "Machine learning and Application": book by Sanjay Rajendra mate, Khyati Nirmal

[7] "aatmanirbharbharat.mygov.in" source

[8] https://en.wikipedia.org/wiki/Menstruation

Cyber Security Threats and Measures in Context with IOT

Shradha Vishnu Pore
Department of Electrical Engineering,
Aissms College of Engineering, University of Pune, India.
shradhapore53@gmail.com

Abstract- **The Internet of Things (IoT) has grown by bounds and leaps in just an ample amount of time. With the creation of everything from smartwatches to interconnected washing machines, more and more appliances and electrical devices are interconnected with the backbone network that enables its control from a remote location. However, IOT devices might provide a backdoor into a corporate network for cyber attacks as not only more data being shared through IOT but more sensitive data is being shared. According to recent research, about 6.6 billion IOT devices are connected to the internet and this count can double in the next few years. Hence security concern has been an alarming issue in most Big Data Application as IOT services becoming pervasive. This paper presents a framework for calibrated security measures for IOT expedients.**

Keywords- Cyber Attacks, Internet of Things, Privacy, Security

I.INTRODUCTION

In the era of advanced internet communication, Internet Of Things **(** IoT) devices are the target of increasingly sophisticated cyberattacks and innovators must protect their assets and their consumers from emerging threats. Every device is interconnected with a backend network that enables its control from a remote location. Of course, IoT security is a collective responsibility between consumers who seek all type of connections and companies that want to use connectivity to create a higher rate of customer. This is the trend in most industrial applications as there is a backbone network that controls physical and cyber systems. To build an end-to-end protection system in a smart industrial application, it is required to have the calibration of the security requirement for different sub-systems. This calibration provides a unique integration of the security with existing protocols of IoT thus making robust security for the entire system. Security must provide integrity, confidentiality, non-repudiation and authentication of the information flows This is achieved through vulnerability identification of the protocol interfaces at the IoT layer and at the traditional network. The messaging system used in IoT applications uses the traditional TCP/IP network at the backend for sending control commands to various control systems. The focus is on developing calibrated security measures for smart IoT device which will be the base for other IoT applications such as Industrial Control Systems(ICS).

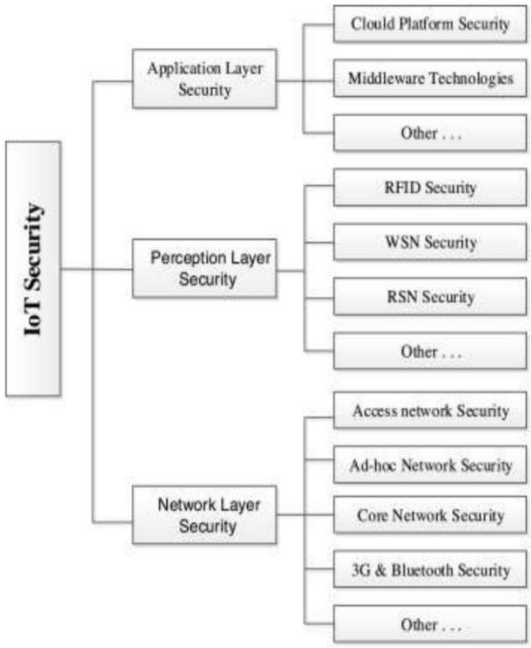


Figure 1: Threat Analysis

II.IoT THREAT EXPLORATION

Cybercriminals can easily attack IoT devices due to the default software configuration, irregular updates

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

of software installed, a long gap between patch release and its installation. Cybercriminals can have access to each device due to the default login credentials' vulnerability [11-13]. The BOTNET, Mirai hacked many devices in this way. The risk can be decreased by changing the factory default name and password. Another security issue.
in BOTNET is a ransomware infection. It locks a device through encryption and can be accessed only with an agreement to pay a ransom. Intrusion detection systems also play a remarkable role by protecting IoT devices from DDOS. Most of the IoT devices are connected via telnet which is the main perpetrator. An unprotected internet protocol using internet scanning tools such as Zmap, Nmap. Information can easily be obtained. An intrusion detection system can be used to decrease cyber attacks[12]-[14].

TABLE 1:Types of Cyber Crime In India

Numbers	Types of Incident	No. of cases
1.	Phishing	11
2.	Abuse/ Privacy	16
3.	Scams	12
4.	Malware	9
5.	Defacements	21
6.	Unauthorised Access	8
7.	DOS Attacks	1
8.	Fake Accounts	756

III.SECURITY ISSUES IN IOT NETWORK

Internet is the key infrastructure of IoT hence there is a possibility for some prominent security issues [5]. IoT is a collection of physical objects connected to the internet; hence many security issues may occur. Some of the security issues are:

1) Security issues in the wireless sensor networks (WSNs):

WSN is a network of nodes that sense and control the environment. It also enables the interaction between persons or computers and the surrounding environment. WSN includes sensor nodes, actuator nodes and so on. WSN is a collection node hence there is a possibility of security issues.

i. Attacks on secrecy and authentication
ii. Silent attacks on service integrity
iii. Attacks on network availability
iv.

2) Security issues in RFID technology:

In IoT, RFID technology is mainly used as RFID tags for the automated exchange of information without any manual involvement. The RFID tags are vulnerable to various attacks from outside due to the incorrect security status of the RFID technology [5]. The four most common types of attacks and security issues of RFID tags are as follows:

i. Unauthorized tag disabling: In this DoS attacks the RFID tags will become incapable temporarily or permanently. Such attacks make RFID tag available to malfunction and misbehave under the scan of a tag reader. These attacks can be done remotely, allowing the attacker to manipulate the tagging behaviour from a distance.
ii. Unauthorized tag cloning: Capturing the identification information through the manipulation of the tags by dishonest readers falls under this category. Once the identification information of a tag is compromised, replication of the tag is made possible which can be used to bypass fake security measures as well as introducing new vulnerabilities using RFID tags automatic verification steps[5].
iii. Unauthorized tag tracking: The dishonest readers can trace the tag, which results in giving sensitive information, for example, a person's address. Thus from the viewpoint of the customer, buying a product which is having an RFID tag guarantees them no confidentiality regarding the purchase of their chase and in fact, endangers their privacy.
iv. Replay attacks: In Replay attacks, the attacker uses a tag's response to a dishonest reader's challenge to impersonate the tag. In these attacks, the communicating signal between the reader and the tag is intercepted, recorded and replayed upon the receipt of any query from the reader at a later time, thus faking the availability of the tag.

4)Security issues in the Application layer:

The application of IoT is the result of close integration between communication technology, computer technology and industry professional who can be able to find applications in many aspects. The security issues in the application layer include eavesdropping and tampering [8]. This layer carries out the responsibility of traffic management. It also provides software for different applications which carries out the translation of data into a comprehensible form or helps in the collection of information by sending queries [5]. A path-based DoS attack is initiated in the application layer by stimulating the sensor nodes to create huge traffic in the route towards the base station.

IV. CASE STUDY OF CHANCES OF FRAUD

Step 1: Let A be a person who wants to access a social networking site or social media. For example,

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Facebook. Before getting access to any online website A has to sign-up using his credentials. Query Box will take information about:

• AADHAR NUMBER
• AGE
• PAN
• FATHER'S NAME
• ADDRESS

Here, sign up will include the basic details like name, phone number, birth date, country and city while intrinsic details will include aadhar card number, age, permanent account number, father's name, address. All the details mentioned above are sufficient to identify the person. Face book (website) sends these details to the legal portal (which will be governed by the government) and will check these details of the person from the database [10].

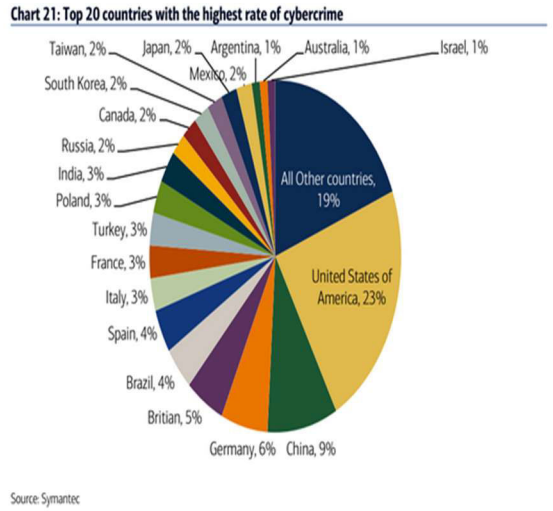


Figure 2: Cybercrime in top 20 country

Case-2: If the legal portal finds False/incorrect information or crime record against that person then, it will send a disapproval message to Facebook and Facebook will no allow him/her to go ahead.

Step 2: If A person gets involved in wrong activities such as spamming. Then the website will report this to the legal portal and the account will be deactivated/banned for some time (30 days) and the culprit has to pay compensation amount and this information is sent to the website and the culprit. The Complete execution of step 2 is given in Fig

Step 3: If A person wants to start using that website again or the other websites, then, he/she has to form an id once again after some time (Step 1 repeat). But now legal portal finds fraud record against A Now, the notification will be generated for the culprit as well as for the websites (accessed before or any other accessed website), this notification will alert the website with crime details of the user (compensation details, date, charges levy, type of crime et). Then it rests upon the security protocols of the accessed website, if it has any issues with the criminal record and the website considers him/her as
a potential threat then it will not allow him/her to go ahead otherwise allow him /her. Also, on the other end of the criminal fails to pay the required compensation amount and also does not complete the ban duration and tries another heist, then, his/her database will be blacklisted and his account will be frozen for further use [11]. The Complete execution of step 3 is given in Fig.11. After the compensation has been paid and charges are taken off by that person, his history will not be available for

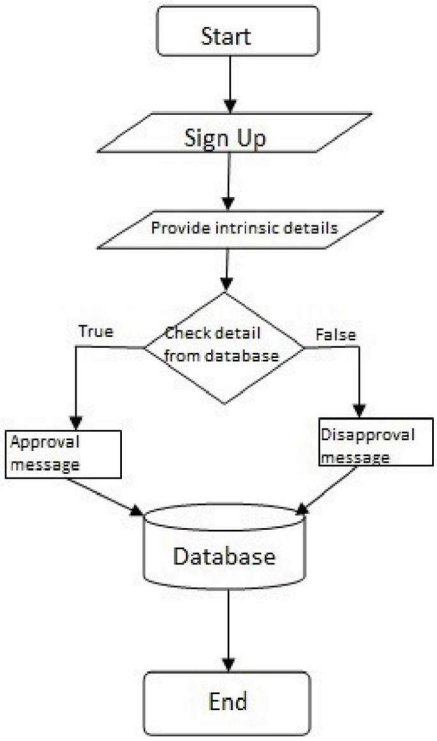


Figure 3: Flow Chart of Security Solution

V.POSSIBLE SOLUTION FOR CYBERCRIME:

1) STORAGE: Cloud Computing provides three services through which massive data can be analyzed and store The three services are:

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

a) Infrastructure
b) Platform services
c) Software services

2)TRANSFER: New protocols and algorithms are Required for big data challenges. FTP and SECURE COPY (SCP) is not sufficient. Current Innovations are aimed at tackling the massive flow challenges including
a)GRID FTP
b) GLOBUS

3) PRIVACY AND SECURITY: It is one of the important issues of today's era. Privacy refers to an in which one is not observed or disturbed by another whereas, security refers to a state of being free from danger or threat. But in today's world, one does not feel secure while sharing their personal information on the internet due to an increase in the number of frauds, spam, malicious URLs and many more. India is in 11th position in cybercrime among the top 19 countries.

4) Cyber Security Operation Centre:
Cyber Onboarding is a specialist technical process of setting up and configuring systems and services to generate proper events, logs and metrics which are monitored through the CSOC security monitoring and incident management platform. First, logging must be computed on the systems and applications, second, they must produce the right set of computing and security logs, events, traps and messages which are analysed eventually by the detection controls, security analytics systems and security event monitoring systems such as SIEM, and sensors etc.; and further, network-wide information e.g. flow data, heartbeats and network traffic information is collected and analysed, and finally, threat intelligence data are ingested in real-time to detect, or be informed of threats which are out in the wild. While setting up a CSOC could be straightforward, unfortunately, the 'people' and 'process' aspects that underpin the CSOC are often challenging, complicated and occasionally unworkable. In this paper, CSOC and Cyber Onboarding are thoroughly discussed, and the differences between SOC vs SIEM are explained. Key challenges to Cyber Onboarding are identified through the reframing matrix methodology, obtained from four notable perspectives – Cyber Onboarding Perspective, CSOC Perspective, Client Perspective and Senior Management Team Perspective. Each of the views and interests is discussed, and finally, recommendations are provided based on lessons learned implementing CSOCs for many organisations – e.g. government departments, financial institutions and the private sector.

VI. ACKNOWLEDGEMENT:

The author acknowledges Aissms COE, Pune; PVG COET Pune; Dr Aishwarya Apte; Newtons Apple for the support extended during this work.

VII CONCLUSION:

Government websites, financial systems, news and media websites, military networks, as well as public infrastructure systems are the main targets for cyber-attacks. The security development process requires a thorough understanding of a system's assets, followed by identifying different vulnerabilities and threats that can exist. The overall goal was to identify assets and document potential threats, attacks and vulnerabilities faced by the IoT. It was concluded that much work remains to be done in the area of IoT security, by both vendors and end-users. We hope this survey will be useful to researchers in the security field by helping identify the major issues in IoT security and providing a better understanding of the threats and theirattributes originating from various intruders like organizations and intelligenceagencies. We hope this survey will be useful to researchers in the security field by helping identify the major issues in IoT security and providing a better understanding of the threats and their attributes originating from various intruders like organizations and intelligence agencies.

VII.REFERENCES:

1. R. Anderson, Security Engineering: A Guide to Building Dependable Distributed Systems (Wiley Computer Publishing, 2001).
2. P. Bresciani, A. Perini, P. Giorgini, G. Giunchiglia, and J. Mylopoulos, Modelling early requirements in Tropos: A transformation-based approach, in Agent-Oriented Software Engineering II, eds. M.Wooldridge and G.Weiss, Lecture Notes in Computer Science, Vol. 2222, Springer-Verlag, 2002.
3. P. Giorgini, F. Massacci, J. Mylopoulous, and N. Zannone, Requirements engineering meets trust management: Model, methodology, and reasoning, in Proc. 2nd Int. Conf. on Trust Management (iTrust

2004), Lecture Notes in Computer Science, Vol. 2995,
Springer-Verlag, Heidelberg, 2004, pp. 176–190.

4. Y. Cheng, M. Naslund, G. Selander, and E. Fogelstrom, "Privacy in machine-to-machine communications a state-of-the-art survey," in Communication
Systems (ICCS), 2012 IEEE International Conference on. IEEE, 2012, pp. 75–79.

5. M. Abomhara and G. Koien, “Security and privacy in the internet of things: Current status and open issues,” in PRISMS 2014 The 2nd International Conference on Privacy and Security in Mobile Systems (PRISMS 2014), Aalborg, Denmark, May 2014.

6. E. Bertino, L. D. Martino, F. Paci, and A. C. Squicciarini, “Web services threats, vulnerabilities, and countermeasures,” in Security for Web Services and Service-Oriented Architectures. Springer, 2010, pp. 25–44.

7. W. Jansen, Countermeasures for mobile agent security, Computer Communications,
Special Issue on Advanced Security Techniques for Network Protection, Elsevier Science, 2000.

8. A. Perini, P. Bresciani, P. Giorgini, F. Giunchiglia, and J. Mylopoulos, Towards an agent oriented approach to software engineering, in *Proc. Workshop DagliOggettiAgliAgenti: Tendenze Evolutive deiSistemi Software*, Modena, Italy, 4–5 September 2001.

9. B. Schneier, *Secrets & Lies: Digital Security in a Networked World* (JohnWiley, 2000).

10. K. Dahbur, B. Mohammad, and A. B. Tarakji, “A survey of risks, threats and vulnerabilities in cloud computing,” in *Proceedings of the2011 International conference on intelligent semantic Web-services and applications*. ACM, 2011, p. 12.

11. F. Li, A. Lai, and D. Ddl, "Evidence of advanced persistent threat: A case study of malware for political espionage," in *Malicious and UnwantedSoftware (MALWARE), 2011 6th International Conference on*. IEEE, 2011, pp. 102–109.

12. Cybersecurity analysis for the USA", the National Initiative for Cybersecurity Education. [online]. available: https://www.cyberseek.org/heatmap.html

13. ImaneKhaouja, Ibrahim Rahhal, Mehdi El Ouali, Ghita Mezzour, Kathleen M. Carley, and Ismail Kassou.Analyzing the Needs of the Offshore Sector in Morocco. IEEE Global Engineering Education Conference (EDUCON), April 2018.

14. S. Cass, The 2017 Top Programming Languages, July 2017 [online] Available:https://spectrum.ieee.org/computing/software/the-2017- top-programming-languages

14. Potter, L. E., & Vickers, G. 2015. What Skills do you Need to Work in Cyber Security? A Look at the Australian Market,

.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Web-Attack Detection and Prevention in E-Commerce Websites

Harshwardhan Patil[1], Shivangi Chamoli[2], Atharva Gulwe[3], Kanchi Gupta[4], Nandkumar Kulkarni[5]
SKNCOE, Pune
{harshwardhanptl[1] ,shivangichamoli28[2],atharvagulwe4[3],sakshi.kanchi[4], npkulkarni.pune[5]}@gmail.com

Abstract- **Cloud Computing has made storing, managing or processing data on a local server and retrieving it on demand easier than ever before. It's increased accessibility, on-demand scalability, pay-per-use facility has opened doors for many businesses online, and E-commerce is one such business. As the E-commerce business is booming day by day, a threat to its security is a major concern. The continuous cyber-attacks on the system can result in great loss and also destroy the brand image of the company, thereby reducing revenue. The current E-commerce websites existing system uses only key validation in the middle layer preventing any attack on the front-end. This makes easier for the attacker to crack into the system and make manipulations to the back-end without being able to detected by the system as whether the change was done by the seller or attacker. Thus, apart from the front-end, a secured back-end is a must. In this context, the paper proposes a dual security mechanism for e-commerce websites, to detect and prevent any unauthorized manipulation. For data security we will use the message digest algorithm, an in-built web server of windows platform, with database My SQL Server. The proposed system monitors both web request and database requests. Thus, whenever an attack happens the dual security system uses md5 algorithm for detecting database tempering attack and prevents it by restoring the initial values.**

Keywords: Database tempers detection; Dual security; MD5 algorithm; three-tier web application; data leakage detection.

I. INTRODUCTION

Databases are widely used by organisations for storing data but the security of database is a major concern for them. Any business cannot afford the risk of an unauthorized user observing or changing the data in their databases. The increased use of internet and most of the services provided by organisations going online has raised concern for growing security on web. Web services and applications have become more and more popular and also their complexity has increased. Most of the task such as banking, social networking, and online shopping are done and directly depend on web. As we are using web services which is present everywhere for personal as well as corporate data they are being attacked easily. Attacker attacks backend server which provides the useful and valuable information thereby diverging front end attack. Data leakage is also a big issue for industries & different institutes. It is very hard for any system administrator to find out the data leaker amongst the system users. It is creating a serious threat to organizations. It can destroy company's brand and its reputation. In this paper, we have designed a basic approach that determines whether data stored in database is tampered or not.[1]

For this, we are using the MD5 algorithm, which is a widely used hash function producing a 128-bit hash value. Although, MD5 was initially designed to be used as a cryptographic hash function, it has been found to suffer from extensive vulnerabilities. It can still be used as a checksum to verify data integrity, but only against unintentional corruption.[2-3]

Also, as SQL injection is being (a code injection technique) used to attack data-driven applications, in which nefarious SQL statements are inserted into an entry field for execution (e.g., to dump the database contents to the attacker), it exploits a security vulnerability in an application's software, for example, when user input is either incorrectly filtered for string literal escape characters embedded in SQL statements or user input is not strongly typed and

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

unexpectedly executed. SQL injection is mostly known as an attack vector for websites but can be used to attack any type of SQL database.

This attack allows attackers to spoof identity, tamper with existing data, cause repudiation issues such as voiding transactions or changing balances, allow the complete disclosure of all data on the system, destroy the data or make it otherwise unavailable, and become administrators of the database server.

As most people are shifting towards online selling and purchase, these attacks have become more frequent and makes it difficult to prevent if the system has only one-way security mechanism. E-commerce is expanding its reach day by day and thus challenges to sites security are also increasing. When such attacks happen on system, it not only affects the organisation but also customers who suffer financial losses.

Thus we are proposing a two-way security system for E-commerce websites in which we create a system for intrusion detection on static and dynamic web pages (creating session ID's for each user containing the web front end [HTTP] and back end [SQL server]) and also make it able to prevent those intrusions from attacking the web pages and it should be able to find out the perpetrator.[4-6]

II. LITERATURE SURVEY

The security issues in web applications are majorly in areas of Health Care Units and E-commerce transactions, by comparison of popular algorithms of page rank and trust rank and more security through XML in web services via WS-Security framework by exploring XML signature and its verification and occurrence suggests major security attacks. The problem is that data encryption is done only on single column and can't be performed on whole record as it makes difficult to handle keys. [1]

Also, a parallel and creative trust computing technique has been suggested, based on big data analysis for the trustworthy cloud service platform environment. Firstly, a distributed and modular perceiving architecture for large-scale virtual machines' service behaviour is proposed, relying on distributed monitoring agents. Then, an adaptive, lightweight, and parallel trust computing scheme is proposed for big monitored data. This technique is the first to use a blocked and parallel computing mechanism, the speed of trust calculation is greatly accelerated, which makes this trust computing technique suitable for a large-scale cloud computing platform. Performance analysis and experimental results has verified the feasibility and effectiveness of the scheme. But no fast response for a large number of users' service requests poses a challenging problem. In this process of implementation of the proposed trust computing mechanism, the problem of trust value updating must be considered. [2]

The other proposal is of a privacy-aware public auditing technique for shared cloud by using a homomorphic verifiable group signature. This requires at least group managers to recover a trace key cooperatively, that avoids the abuse of single-authority power and provides non-frame ability. It also ensures that group users can trace changes in data through designated binary tree; Moreover, the security analysis and experimental results indicate that this scheme is provably secure and efficient. The problem is that, if data is not properly divided in blocks, then recovery is not possible. [3]

Also, we can develop a model of notion of verifiable database (VDB). By using VDB resource-constrained client can securely outsource a large database application to an untrusted server so that it could later retrieve a database record and update it by assigning a new value. Also, any attempt by the server to tamper with the data will be detected by the client. A new VDB framework from vector commitment based on the idea of commitment binding can be developed. The construction is public verifiable and secure under the FAU attack. Furthermore, there is proof that the construction can be achieved with the desired security properties. However, necessary authentication process is missing between the auditor & cloud in most existing public auditing schemes. [4]

III. EXISTING SYSTEM

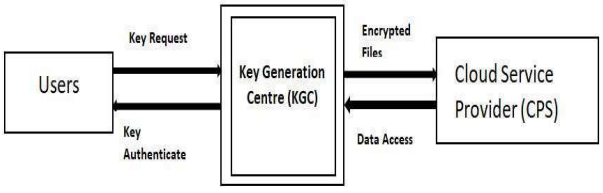


Fig 1. Existing System architecture

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

TABLE I. LITERATURE SURVEY

Sr. No	Title of Paper	Author	Advantages	Disadvantages
1.	Fast and Parallel Trust Computing Scheme Based on Big Data Analysis For Collaboration Cloud Service - 2018	Xiaoyong Li , Member, IEEE, Jie Yuan, Member, IEEE, Huadong Ma, Senior Member, IEEE, and Wenbin Yao	Enhanced Security: Different from traditional authentication mechanism in cybersecurity, trust mechanism can provide dynamic behavior perceiving capability. Enhanced Quality of Service (QoS). Through perceiving and mining the real-time service behavior, trust mecha-nism can dynamically perceive QoS of VMs.	Not fast response for a large number of users' service requests becomes a challenging problem. In the process of implementation of the proposed trust computing mechanism, the problem of trust value updating must be considered.
2.	New Publicly Verifiable Databases with Efficient Updates - 2016	Xiaofeng Chen ; Jin Li ; Xinyi Huang ; Jianfeng Ma ; Wenjing Lou	Prove that proposed construction can achieve the desired security properties. Propose a new VDB framework from vector commitment based on the idea of commitment binding.	Necessary authentication process is missing between the auditor and the cloud in most existing public auditing schemes
3.	Solution to Web Services Security and Threats - 2018	Muhammad Tayyab, Iqra Ilyas, Aliza Basharat	XML encryption of data provides confidentiality and To maintain integrity as a main goal to achieve and XML signatures are used in different chunks for maintain data integrity during verification and encryption.	The problem is that data encryption is done on single column only and can't perform on whole record as making difficult to handle keys.
4.	NPP: A New Privacy-Aware Public Auditing Scheme for Cloud Data Sharing with Group Users 2017	Anmin Fu, Shui Yu, Yuqing Zhang, Huaqun Wang, Chanying Huang	Recover the latest correct data block when the current data block is damaged	The problem is that, if data not properly divided in block then recover not possible.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

In the existing system (Ref. Fig. 1) we often face the problems with the privacy of the network system and private data. As there are some security issues like data modification can be done by attackers using unauthorized access. It will be a loss for the organisation because restore facility for modified data is not available. Also, the existing system takes more time to detect and prevent the data tempering attack.

IV. PROPOSED SYSTEM

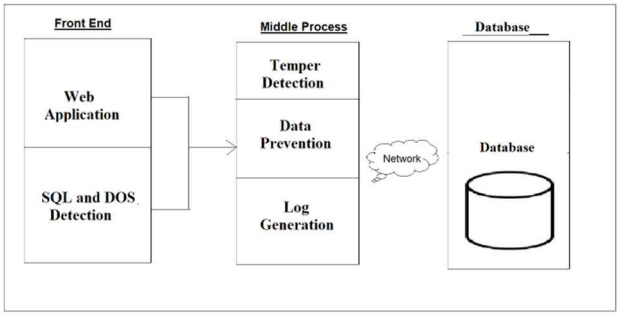


Fig 2. Proposed System architecture

A. System Overview:

Our aim is to enable strong data detection and protection for web applications while at the same time we try to minimize the false positive rate. Our objective is to secure three tier web applications for detecting and preventing different types of attacks, by detecting the tempering attack for database activity and provide both side security- front-end and back- end.

Existing systems are providing one way security for the web applications protecting a web application in terms of interface but proposed system designs new model to provide the security of the ecommerce web applications along with its database in every step, securing database end with proper recovering options and is best part of the system. The proposed system designs idea in breakdown model to evaluate security of the web applications along with its database in every step is shown in the above Fig 2.

B. Front End Module:

User Module:

User can authorize login access. He can update all personal information. He also can give authority to generated secure encryption process.

Sales Department:

Sales department allows the seller to update their product price. Here hacker can change the value in the database without authentication.

Admin Module:

Admin is the authorized person, he checks all the user activity records as well as profile. He also watches the tempering, if changing the values from data base.

Summary:

First of all, normally database engines are started and tampering detection is initialized as soon as attack is performed a pop up value is generated at the admin's panel and the data value is restored successfully.

V. EXISTING AND PROPOSED SYSTEM COMPARISION

TABLE II. COMPARISON OF EXISTING & PROPOSED SYSTEM

No	Existing System	Proposed System
1.	In Existing System we often face the problems with the privacy of the network system and private data.	In Proposed System we minimize the privacy issue using the SQL injection attack detection.
2.	There are some security issues like data modification can be done by attackers	In Proposed System we minimize the modification attack based on detection

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

	using unauthorized access.	and prevention technique (MD5).
3.	It will be the loss of business person because restore facility for modified data is not available.	In proposed System we implement the restore facility when data temper attack is generated.
4.	Existing system take more time to detect and prevent for data temper attack.	Proposed work not takes time instant system will detect and prevent data.

VI. ALGORITHM STEP

The main MD5 process consist of five steps that is used to convert plain text into cipher text which are as follows in algorithm 1:

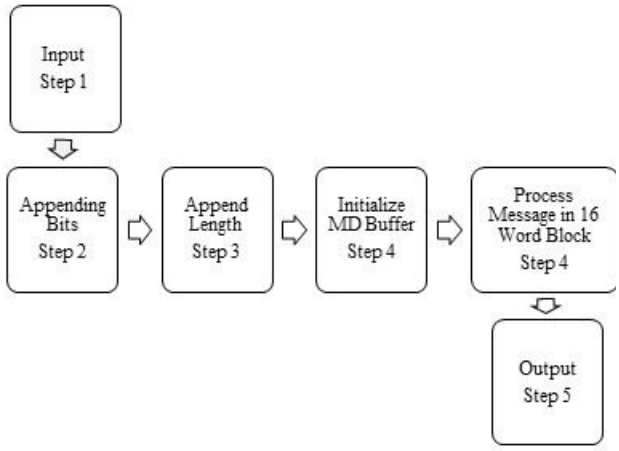


Fig 3. MD5 algorithm step

Algorithm 1: MD5

Step 1: Append padding bits

The message is padded so that its length is congruent to 448, modulo 512. The message is extended so that it is just 64-bit shy of being a multiple of 512 bits long. So, "1" bit is appended to the message and then 0 is appended so that the length is congruent to 448.

Step 2: Append length

A 64-bit representation of length of message before padding bits were added is appended to the result of the

previous step.

Step 3: Initialize MD buffer

A four-word buffer is used to compute the message digest where each of the 32-bit register is initialized in hexadecimal, low-order bytes.

Step 4: Process message in 16-word bits

The four auxiliary function is then processed with various steps to produce the desired output.

Step 5: Output

The message digest is produced as an output. The plain text is converted into cipher text or hashed form.

VII. APPLICATIONS

The proposed system can be used in data care centres to prevent data theft by insiders, any web application where login is required to prevent SQL injection attack, E-Commerce websites to prevent data manipulation of product price, web application where user is allowed to upload any file to prevent XSS Attack and hospital database to protect patient's privacy.

VIII. RESULTS

The following are the proposed system implementation fig 4 shows the admin login page, from where the admin can keep a watch at the system . Also there are different tabs for customer and seller.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

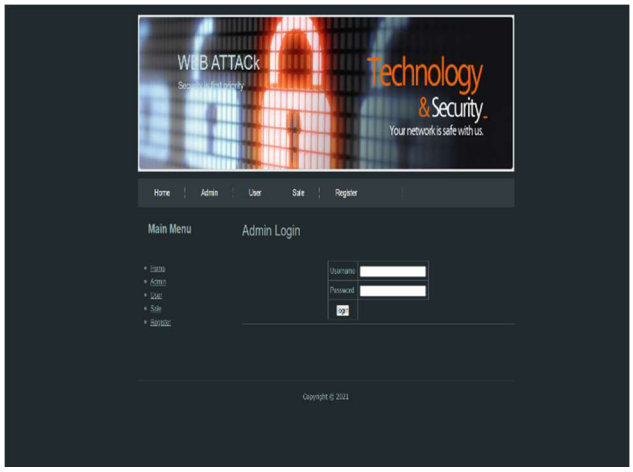


Fig 4. Admin Login Page

The admin mode page shown in fig 5, shows 2 modes active and passive. The active mode is used when the admin is away from the server and passive is when the admin himself tries to make change in the site, thus avoiding changes made by admin to be detected as an attack.

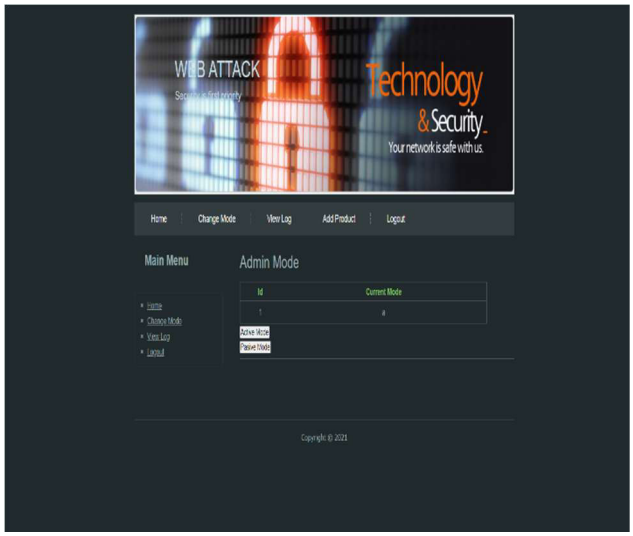


Fig 5. Admin Mode Page

The fig 6 shows the user home page from where the user can login to the ecommerce website to access it.

Fig 6. User Login Page

User home page is the main page of website as shown in fig 7, here the various products available on the website for selling are shown, the user can choose from the available products.

The database temper attack detection system is used to check if any attack occurred or not. The admin can enter the credentials to run it.(fig8)

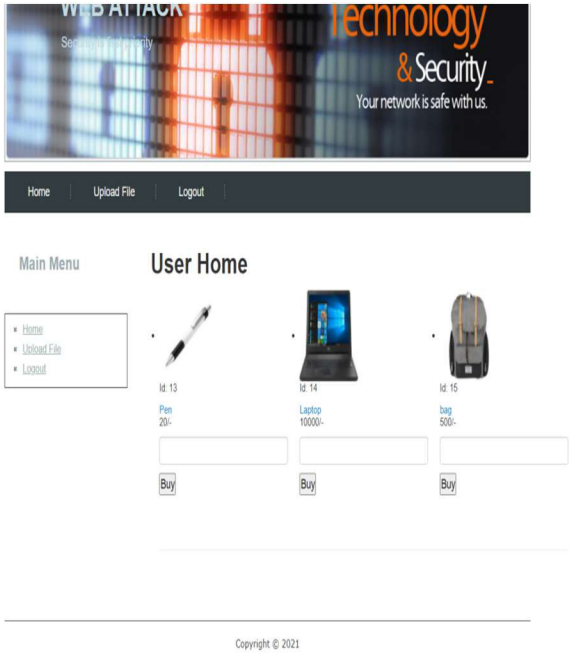


Fig 7. User Home Page

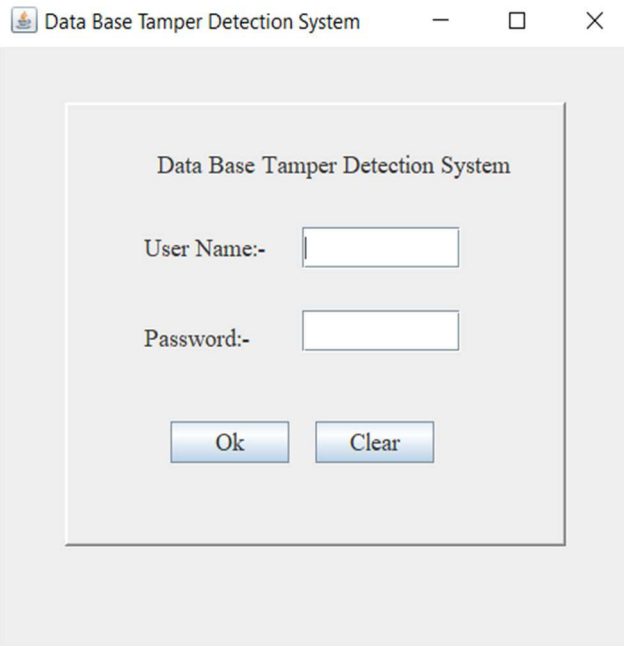


Fig 8: Database Temper Detection System

After the admin logs in the main page of temper attack detection will be shown. (fig-9)

The admin settings tab allows the admin to change his username and password(fig-10). The logout tab takes the admin out and back to the data base tamper detection system's login page. The start engine tab then takes to the database selection page.

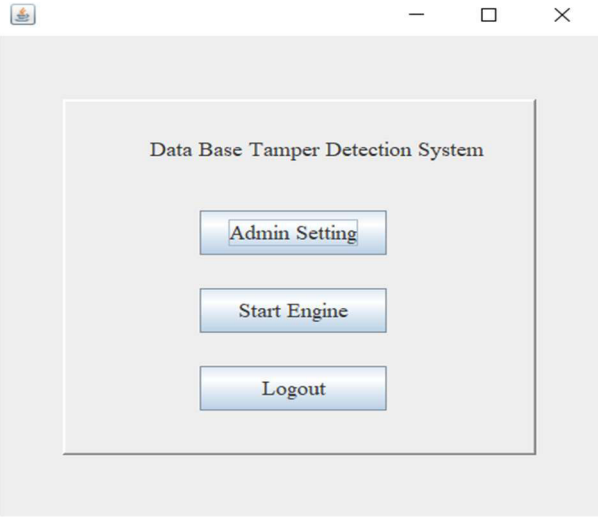


Fig-9: Database Temper Detection System main page

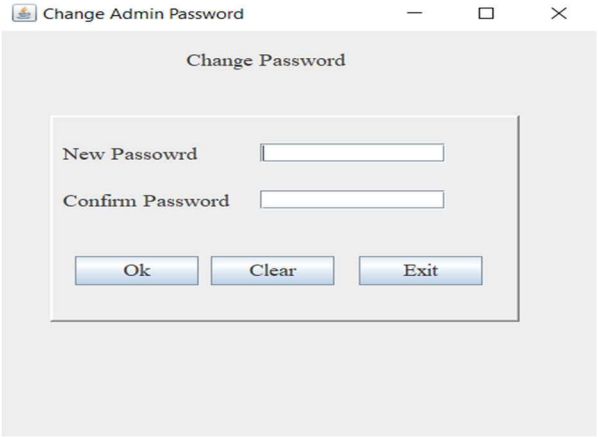


Fig 10 – Change Admin Password

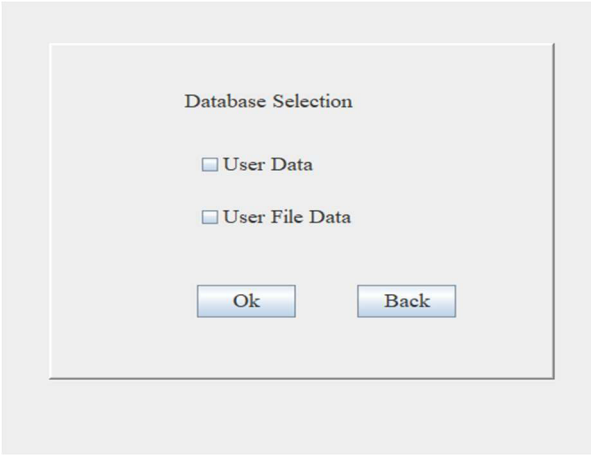


Fig 11 – Database selection page

Once we check the boxes in fig 11, we are taken to the forensic ser.

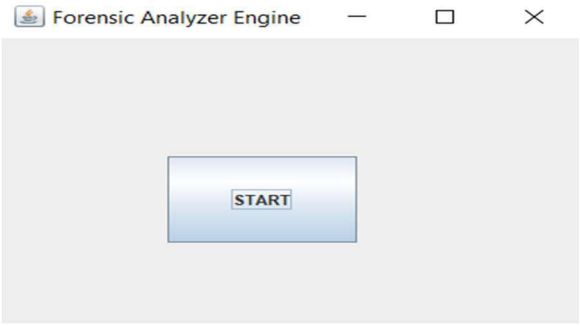


Fig-12 Forensic Analyzer Engine

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Once we start the forensic analyzer engine the tampering detection and prevention process starts. If there is no tampering detected, the tamper result dialog box will be empty.(fig13).

Otherwise, the tampering details will be displayed as in fig 14.

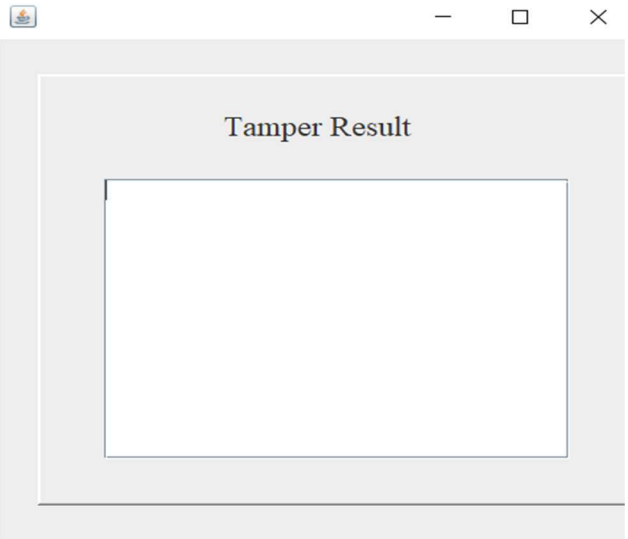


Fig 13- Tamper result dialog box(no tampering detected)

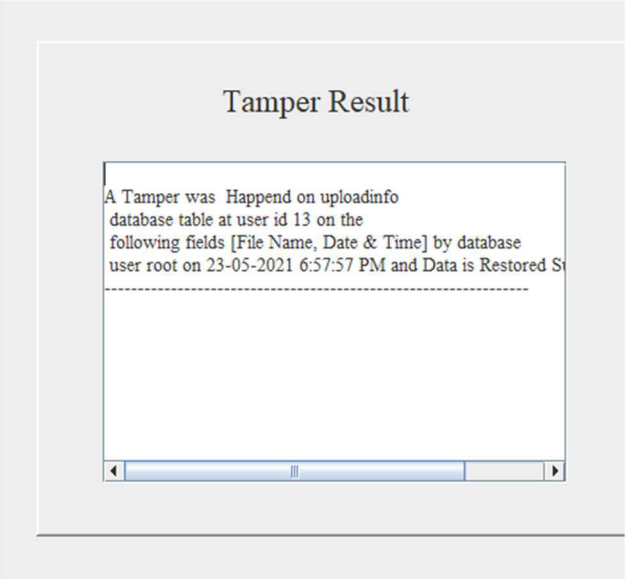


Fig 14- Tamper result dialog box(tampering detected)

The codes related to the above system are shown below

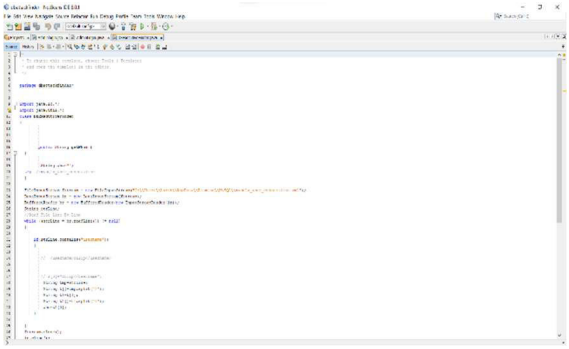


Fig 15- Forensic analyzer functioning code

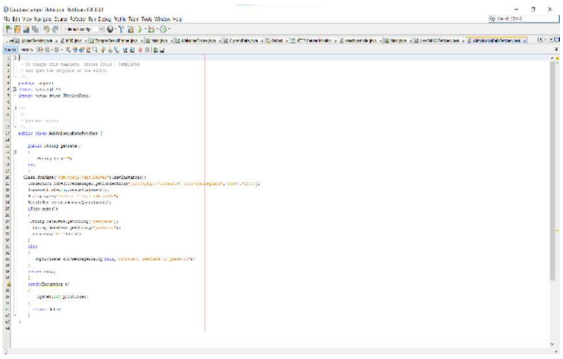


Fig 16- Admin login info code

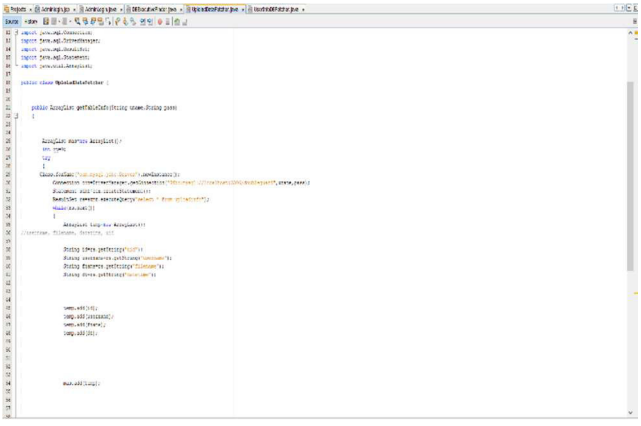


Fig 17- Data fetcher that the attacker manipulated

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

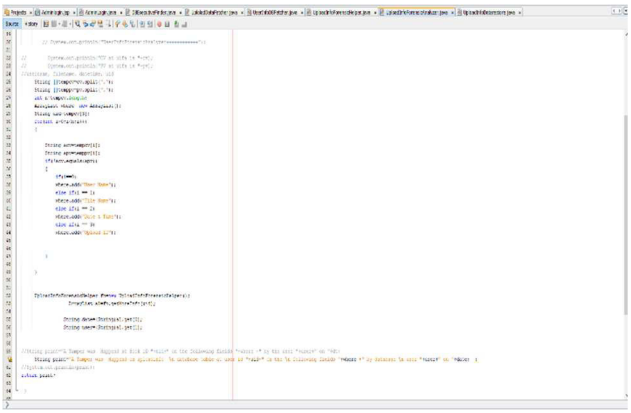


Fig 18- Detection and prevention data upload code to show in tamper detection dialog box

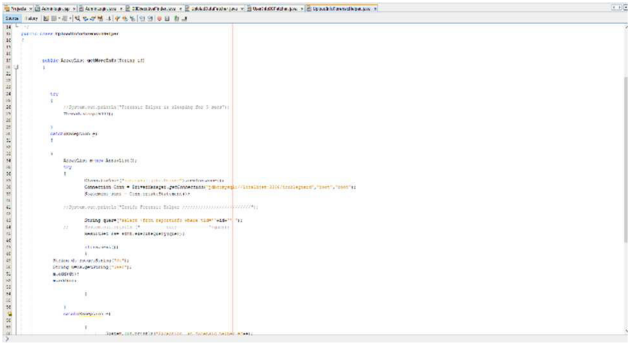


Fig 19- Tamper result dialog box(no tampering detected)

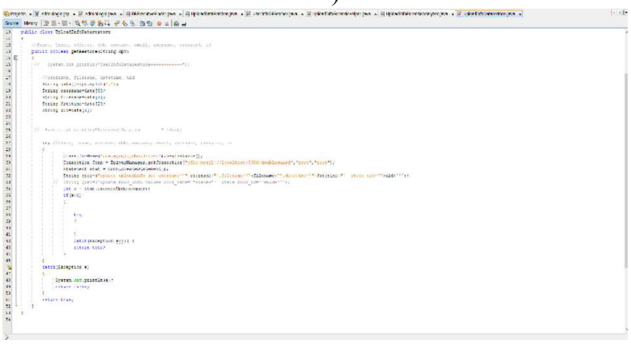


Fig 20- Data restoration code when manipulation happens

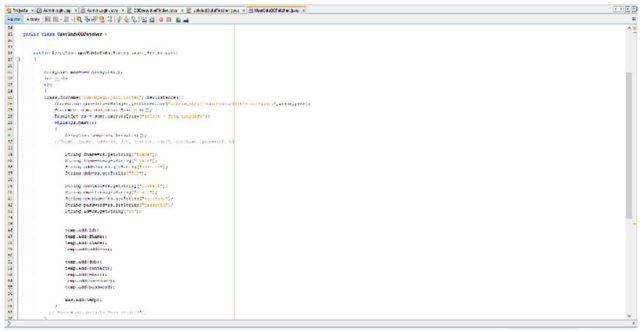


Fig 21- User information gathering codes

IX. CONCLUSION

The proposed system helps to detect and prevent unauthorized modification and manipulation of data in E-Commerce website from front end and back end. By using MD5 algorithm, we detect any attack taking place and the original value is restored from the database, thus preventing loss for the company. This two way security system not only protects the front end but also the backend database keeping it safe and secured and avoiding any permanent damage by the attacker.

X. REFERENCE

[1] Muhammad Tayyab, Iqra Ilyas, Aliza Basharat" Solution to Web Services Security and Threats"2018.

[2] Xiaoyong Li , Member, IEEE, Jie Yuan, Member, IEEE, Huadong Ma, Senior Member, IEEE, and Wenbin Yao." Fast and Parallel Trust Computing Scheme Based on Big Data Analysis For Collaboration Cloud Service"2018.

[3] Anmin Fu, Shui Yu, Yuqing Zhang, Huaqun Wang, Chanying Huang." A New Privacy-Aware Public

Auditing Scheme for Cloud Data Sharing with Group Users"2017.

[4] X. Chen, J. Li, X. Huang, J. Ma, and W. Lou,New Publicly Verifiable Databases with Efficient Updates,

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

IEEE Transactions on Dependable and Secure Computing, In press, 2015.
[5] NIST. “Top 10 cloud security concerns (Working list).”http://collaborate.nist.gov/twiki-cloud computing/bin/view/Cloud Computing. Accessed February 2017.
[6] M. O’Neill. “SaaS, PaaS, and IaaS: a security checklist for cloud models.” http://www.csoonline.com /article/660065/saas- paas-and-iaas-a-security-checklist-for-cloud-models. Accessed August, 2015.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Effect of added Contaminants in Lubricants by Using Wear Debris and Vibration Analysis Technique

Vikram Yendhe
Lecturer, Mechanical Engineering
P.Dr.V.V.Patil Institute of Technology and Engineering ,Loni, India
vyendhe@gmail.com

Rajendra Belkar
HOD, Mechanical Engineering
P.Dr.V.V.Patil Institute of Technology and Engineering, Loni, India
rkbelkar19@gmail.com

Vishal Lawande
Lecturer, Mechanical Engineering
P.Dr.V.V.Patil Institute of Technology and Engineering Loni, India
lawande.vishal@rediffmail.com

Sandip Sinare
*P.Dr.V.V.Patil Institute of Technology and Engineering,*Loni, India
sinare1981@gmail.com

***Abstract*—Condition monitoring of machines is determination of condition of machine and its change with time. Working condition of machines may be analyzed by measuring physical parameters like: vibration, noise, wear debris, temperature, oil contamination etc. Wear debris and vibration condition monitoring have great importance in machinery maintenance and fault diagnosis. This paper deals with effective analysis of both combined vibration condition monitoring and wear debris in machinery maintenance and fault diagnosis. Both techniques have their own merits and demerits associated with monitoring and fault diagnosis of machinery. However, it is seen from the past practical experience that using this techniques independently gives a small portion of machine faults diagnosis. But by combining both the techniques in a machine fault diagnosis it can provides most reliable information. The objective of paper is to analyses the co-relation between both techniques, which is achieved by experimenting worm gear box at different operating conditions, which is driven by electric motor. The worm gear box initially runs with normal conditions of working. A number of tests have performed with different contaminant particles added to various lubricants. Wear debris and Condition monitoring techniques were studied and results obtained are Compared.**

Keywords*—*Wear debris analysis, Vibration analysis, Machine condition monitoring, Contaminant particles, Lubrication.

I. INTRODUCTION

Condition Monitoring sometimes referred to as Condition-Based Predictive Maintenance as its name suggests it is a condition based preventive maintenance program. Due to the high thermal and mechanical stresses worm gearbox lubrication oil is subject to degradation including corrosion, water and particle contamination that affect the efficiency of the worm gearbox and hence the overall performance. Vibration analysis has been widely applied to condition monitoring of rotating machines to identify incipient faults and facilitate root cause failure analysis in order to enhance the life cycle of rotating machinery.. Wang and McFadden investigated the use of vibration analysis as an early detection technique Tan *et al*, investigated the capabilities of the acoustic emission, vibration and spectrometric of lubrication oil for spur gears and how it affects the worm gearbox aging life cycle.. Fischer *et al*, state that lack of proper condition monitoring technique may lead to major failure to the whole system, thus, identifies and corrective actions to the main failure cause as well as a proper maintenance strategy selection will improve reliability of the wind Oil degradation leads to high thermal stress within the worm gearbox of wind turbine that increases bearing temperature and accelerates oil aging. Oil quality can be assessed through the measurements of some parameters such as level of oxidation, acidity, viscosity, water content, temperature and dissolved particles.

A. Wear Debris Analysis Vibration Analysis

Wear particle analysis (WPA) is a technology that utilizes microscopic analysis to identify the composition of materials. WPA is a non-invasive examination of the oil-wetted components of machinery. The particle's size, shape and composition allow a process of elimination in which the abnormal wear of specific components can be identified. A lubricant sample is diluted with a solvent like tetrachloroethylene (TCE) and allowed to flow down a specially prepared low-gradient inclined slide while passing across a bipolar magnetic field. The force that attracts the particles is proportional to their volume, whereas the viscous resistance of the particles to motion is proportional to their surface area. When the ferrogram has dried, the wear particles and solid contaminants are stuck on the slide surface and are ready for examination under a microscope.[2]

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

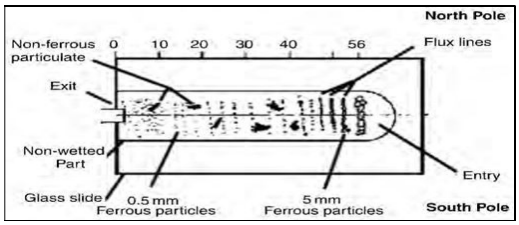


Fig.1 Ferrogram.

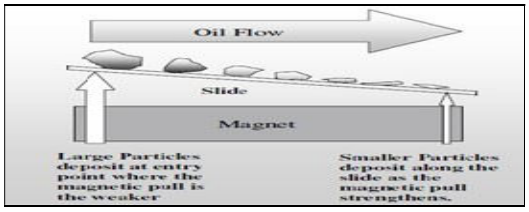


Fig.2 Ferrogram – Schematic diagram

B. Vibration Analysis

Vibration measurements are widely used tools that have been around for decades for the monitoring variety of machines and their component. In general machines do not typically fail without some type of advanced warning, which in this case is measured as increased vibrations. Changes in both the speed and load of machinery will have a direct effect on the overall vibration levels of a machine. Most common methods for vibration analysis include measure the overall vibration of the system and spectrum analysis. Overall vibration readings are taken by examining the raw signal data from the transducers and acquiring the peak, peak-to-peak values of the signal. While this approach is simple it tends to be insensitive to considerable amplitude differences in amplitude of particular frequencies, although they make up only a small portion of the overall signal.

Uusing Fast Fourier signal processing software, the natural frequencies of specific structural components can be identified. Modal parameters are extracted from frequency data domain which is used to produce modal domain data. It also convert time domain to modal domain. While vibration monitoring used for providing quick and cost effective information, it is limited to monitoring the mechanical condition of the equipment, and not other critical parameters. Also, it is often difficult to apply monitoring at low speed machinery (less than 5 rpm).

II. EXPERIMENTAL SETUP

Experimental setup used for the experimentation consisted of electric motor driven worm gearbox and loaded by agitating water within a reservoir tank via a paddle. It is consisting a screw worm which is driving member, that meshes worm wheel which is larger in size.[4]

Fig.3: Experimental set up

Above figure shows experimental set up with assembly motor, worm gearbox, and shaft.

EXPERIMENTAL METHOD

Five tests were conducted. First test relates to normal lubrication that is recommended oil to lubricate worm gearbox with normal working conditions. First test provides good comparison test with proceeding four tests. In Second Test, special operating conditions for worm gearbox have been created relating to the lack of lubrication. Here oil was changed with one forth viscosity that is recommended for test first. Third test introduces the contaminants to worm gearbox with normal operating lubrication conditions. Fourth test is involved in adding contaminants particle to recommended lubricants. In test five MH300.29 iron powder added to worm gearbox working under lack of lubrication [4]

For the entire test worm gearboxes were run for four weeks. In tests first and Second, worm gearbox was running continuously for full 4-week period, but for tests three to five involving in addition of contaminants in the lubricating oil, the system was running for 48 hours, after that it was flushed and cleaned.[4]

Table.1 Experimental analysis- Test Results

Test No.	Lubricating oil	Contaminant particles
1	ISO VG 320 cSt	No
2	ISO VG 68 cSt	No
3	ISO VG 320 cSt	SiO_2 abrasive sand particles, Rockwell hardness of~700HRC.
4	ISO VG 320 cSt	NC 100 Iron powder, Rockwell hardness less than 10HRC.
5	ISO VG 68 cSt	MH300.39 Iron powder, Rockwell hardness less than 10HRC

III. RESULTS USING WEAR DEBRIS ANALYSIS

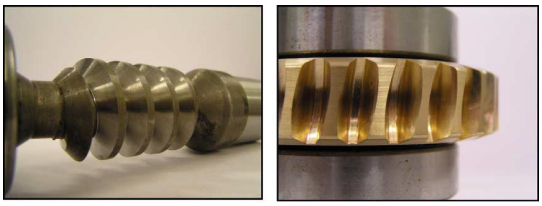
For to detect wear mechanisms and wear modes of the tests in detail particles were examined with standard optical microscope and then a confocal laser scanning microscope (CLSM). Particle type, all surface characteristics and colors were studied by using optical microscope. The CLSM facilitates to acquire sequential images for varying depths. Both boundary and surface definition of particles were obtained with CLSM. Surface roughness (Ra) is a numerical

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

parameter used to describe surface roughness of the particles..

C. *Wear debris analysis of test 1*

The ISO VG 320 cSt oil especially recommended for these applications which were used in test 1 on new worm gearbox. In test first, four slides were made from oil samples collected weekly for 4 weeks. Oil collected throughout test 1was clean and light in color. The Three major types of the wear particles correspond to rubbing, cutting and laminar wear were found in oil sample on first slide. Both crown gear and worm screw gear generates small rubbing and laminar particles. Few particles were found in slide 2 and decrease was because of few cutting particles. This indicate that there was an appropriate lubrication layer existed between two gear surfaces, and wear process was stabilized during the test.



(a) (b)

Fig.4. (a) The new worm screw gear (b) the new crown gear.

D. *Wear debris analysis of test 2*

In test 2, the recommended oil was replaced with a general purpose ISOVG68 cSt oil. To avoid every possible cross contamination and compatibility issues, worm gearbox used in test first was completely cleaned and flushed. The oil samples were again collected on weekly basis for 4 weeks. Careful examination of slides from test second revealed that 5 types of wear particles rubbing, cutting, laminar, sliding, and fatigue particles were present on all slides. The decrease in particle size and number of slides four indicate that the surfaces were becomes smooth. The debris analysis shown in Table 2. The sliding particles constantly decreasing in the size during test Second, indicates that there is a lubrication problem that caused a significant amount of metal to metal contact. Substantial surface sliding contact broke away particles, and gradually smoothed the surface until the particle size was greatly reduced. Scratches caused from the worm screw gear's contact with the crown were evident. This indicates sliding and abrasion caused by high levels of metal to metal contact due to inadequate lubrication breakdown.

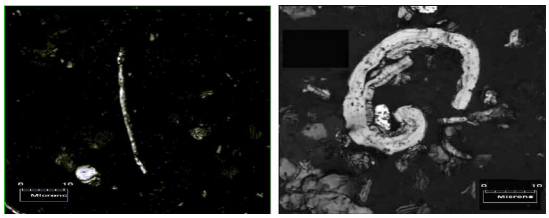
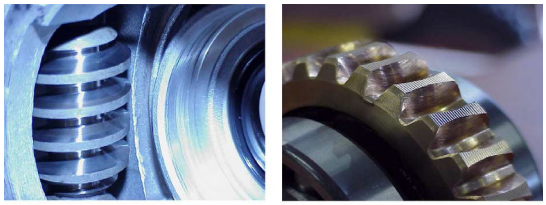


Fig.5. Images of two typical cutting particles from test Second.



(a) (b)

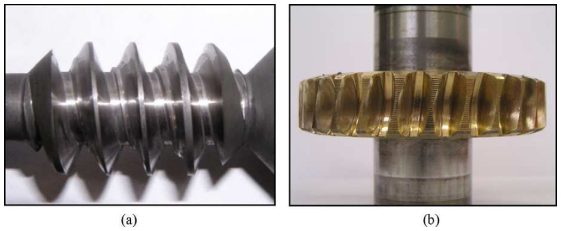
Fig. 6 (a) Worn surface of the worm screw gear after test Second

(b) Worn surface of the crown gear after test Second.

Because of machining process, considerable particles on slide 4 have a straight or regular edge. Follows the trend explained above, the particles surfaces becomes rougher from slide 1 to slide 3, and then smoother in slide 4.

E. *Wear debris analysis of test 3*

In test third, 1 gram of SiO2 abrasive sand particles was added to new worm gearbox with normal lubrication conditions by using ISO VG 320 cSt oil. The new oil and a measured quantity of contaminants particles were then added to worm gearbox. Inspection reveals that the significant wear has been occurred. Scratches along with the direction of contact the screw gear makes with worm crown. It can be linked to sliding and abrasion caused by the high levels of metal to metal contact. It was concluded that large particles were involved in the wear process and were thus broken down into numerous small particles, and larger particles sunk of the bottom of worm gearbox and was not get collected or have any connection with overall wear process. The contaminant particles were observed rather smooth, round and were reflective. Results of wear debris analysis for test three shown in Table 2



(a) (b)

Fig. 7 (a) Worn surface of the worm screw gear after test Third; (b) worn surface of the crown gear after test Third.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

F. Wear debris analysis of test 4

In test four, 0.5 gram of NC100 iron powder was added to the new worm gearbox under normal operating lubrication conditions by using the ISO VG 320 cSt oil. As compared to test first, size of the particles in test four is slightly larger. However, As compared to the wear debris analysis results from test three, there is significantly less wear of the worm gearbox by using the iron powder in test four, as compared to by using abrasive wear sand particles in test three. Posttest inspection of that gear surfaces have confirmed that the outcome of that wear test using the iron particles. The iron particles were observed to be somewhat clear and non-reflective. It was also noticed that the size of iron particles after each of test phase has decreased as that particles were breaking up during the running of the worm gearboxes. The summary of wear debris results for test four is given in Table.

G. Wear debris analysis of test 5

In test five, 1 gram of MH300.29 iron powder is added to the new worm gearbox with the lack of lubrication condition by using the ISO VG 68 cSt oil. The similar procedure used in test three for oil sampling, and worm gearbox cleaning and flushing it was repeated for test five.

Fig. 8 Representative laminar particle from test five.

The chunky particles were similar to the fatigue particles, but it is also possessed with variety of features which are more common because of rolling contact between that teeth due to iron particles contaminated. Less wear of worm gear surfaces had been occurred as compared to test two, and there is significant life remains in worm gearbox. Vibration measurement was taken on the DE and NDE both of the worm screw and worm crown gears using a PCB ICP® accelerometer (PCB which is the manufacturer). Integrated circuit piezoelectric (ICP) sensors have built in, signal conditioning electronics which converts entire high-impedance charge signal generated by using piezoelectric sensor into the usable low impedance voltage signal. Hence, the ICP® accelerometer is a very suitable for the use in any dirty field of high temperature environments with the little degradation of signal.

Fig. 9 (a) Worn surface of the worm screw gear after test Fifth; (b) worn surface of the crown gear after test fifth

When manufactured, gears tend to be imperfect in the profiles of those teeth's. During these first few hours of the operation, high amplitudes and evidence of the wear generally subside, as this period is typically is the run-in period. As the gears wear, with the amplitude of the vibrations is observed in the frequency spectrum increases at similar frequencies. These peaks then broaden and develop sidebands. This presence of these sidebands is also provides an indication to the wear of gears.

IV RESULTS USING VIBRATION ANALYSIS

H. Vibration analysis of test 1

It was run at normal operating condition. In first test, the worm gearbox was comparatively worn free. Examinations of both time and the frequency domain plots are recorded over the whole duration of test one indicated that the worm gearbox is operating with minimum wear.

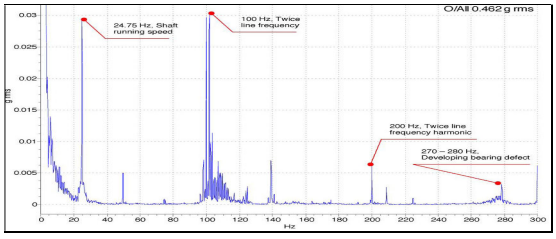


Fig. 10 Acceleration–frequency spectrum of the crown drive end Vibration analysis- results of test no. Second

The developed bearing defect was consistent with the inadequate lubrication, resulting into the increase in metal to metal contact with the formation of the scratches along with direction of the contact between the worm screw and crown gears.

I. Vibration analysis of test 3

Fig.11 shows that the acceleration frequency spectrum is obtained at crown DE at completion of the testing. The frequencies which are present include the shaft speed peak, line frequency and twice the line frequency along with the harmonics, and outer race bearing frequency. This is the fact that the outer race bearing frequency which is present indicates a developing bearing problem. In addition to that, the region of increasing energy content and broadband noise in the frequency range of 220 to 340 Hz indicates that both have increased the wear and a\the bearing defect with the

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Wear debris analysis	Test 1	Test 2	Test 3	Test 4	Test 5
Particle number	low	high	Very high	Very high	Very high
Particle size (µm)	Several microns ~50	Several microns ~100	Several microns ~20	Several microns ~50	Several microns ~30
Particle types	Rubbing, cutting and laminar	Rubbing, cutting, laminar and sliding	Rubbing, cutting	Rubbing, laminar	Laminar Rubbing and other small particles
Surface characteristics	Smooth surface 0.06	Rough surface 0.26	Smooth surface 0.48	Smooth surface 0.13	Smooth surface 0.18
Overall observation	90-95% ferrous, 5-10% bronze particles	20% ferrous, 80% bronze	30-35% ferrous particles, 65-70% bronze particles	30-35% ferrous particles, 65-70% bronze particles	30-35% ferrous particles, 65-70% bronze particles

energy levels which are not significant or raised from baseline compared to test third.

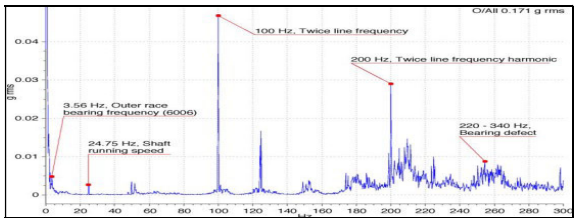


Fig. 11 Acceleration–frequency spectrum of the crown drive end. Vibration analysis- results of test no. Third

This region represents that the bearing defect and mound of energy indicates the increased wear.

J. Vibration analysis of test 4

During test four, vibration amplitudes were shown aa slight increase in shaft running speed, which indicating an increase in wear rate.

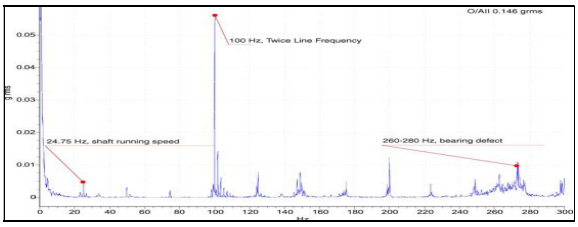


Fig. 12 Acceleration–frequency spectrum of the crown drive end.

Vibration analysis results of test no. Fourth

The harmonics of shaft running are also present. Fig. shows that narrowband region of the increasing energy content around 260 to 280 Hz, Narrowband region of the increasing energy content which is around 260 to 280 Hz, though the energy levels are not that much significant or raised from the baseline as compared to the test 3. Shafts running speed are also rises.

K. Vibration analysis of test 5

Fig. shows that the acceleration frequency spectrum obtained at the worm crown DE at completion of test fifth. The specific frequencies which are present include the shaft speed peak and the line frequency, and twice the line frequency along with the harmonics. Now line frequency and its harmonics have observed due to the fact that the drive end of the worm gearbox which is directly fastened to the motor causing all vibrations that are directly transmitted through the shaft and housing.

Table.2 Wear debris analysis- Test Results [4]

Result Using Vibration Analysis [4]

Fig.13 also shows that numerous smaller harmonics of the running speed, which are attributed to the mechanical looseness within the worm gearbox. Even under the lack of lubrication conditions, there is no any noticeable bearing. fault that is developing from the vibration spectra that is attributed to anti wear properties of MH300.29 iron powder. Now the vibrations data have consistent with both wear debris analysis and posttest visual inspections

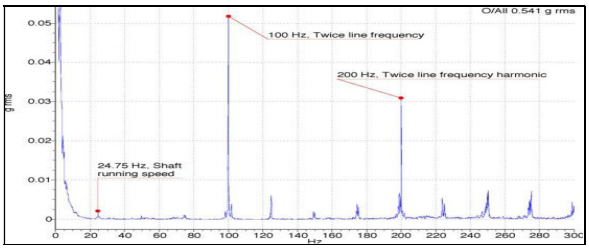


Fig. 13 Acceleration–frequency spectrum of the crown drive end. Vibration analysis- results of test no. Fifth

V. CONCLUSION

- Both the wear debris and vibration analysis techniques were used to assess the condition of the worm gearbox and diagnose if any problems.
- Wear particle analysis provides most conclusive results Presence of these sliding particles due to metal to metal sliding is better indicator of the lubrication breakdown.
- The inclusion of the abrasive sand particles greatly accelerated the gear wear rate.
- Vibration analysis concluded that there is considerable damage of bearings due to motor problems.
- Three-body abrasive cutting is major contributor for abnormal wear results into catastrophic failure..

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

- Vibration and oil analysis are most effective techniques for monitoring of machinery.
- Wear debris include the calculation of wear rate, metal in contact, and lubrication breakdown at boundary.
- Both the techniques are used to monitor the performance of worm gear under different working conditions.
- Both the techniques are used to monitor the performance of worm gear shows similar results.
- After comparison of results of both techniques, most appropriate analysis of condition of the experimental setup can be possible.

REFERENCES

[1] Heidarbeigi Kobra, Hojat Ahmadi, M. Omid, Adaptive Vibration Condition Monitoring Techniques for Local Tooth Damage in Worm gearbox, Modern Applied Science, July 2010, 4(7), pp. 104-110.

[2] Govindarajan N. and R. Gnanamoorthy, Ferrography-A procedure for measuring wear rate, Indian journal of engineering and material sciences, October 2008, 15, pp. 377-381.

[3] Ebersbach S., Z. Peng, N. J. Kessissoglou, The investigation of the condition and faults of a spur worm gearbox using vibration and wear debris analysis techniques, Elsevier Science direct, Wear 260 (2006), pp.16–24.

[4] Peng Z., N. J. Kessissoglou, M. Cox, A study of the effect of contaminant particles in lubricants using wear debris and vibration condition monitoring techniques, Elsevier Science direct, Wear 258 (2005), pp.1651–1662.

[5] Sondhiya Om Prakash and Amit Kumar Gupta, Wear debris analysis of automotive engine lubricating oil using by Ferrography, International journal of engineering and innovative technology (IJEIT), November 2012, 2 (5), pp. 46-54.

[6] Yarrow A.S., An overview of mechanical condition monitoring by wear debris analysis, Proceedings of Australian society of sugar cane technologists, 1993, pp. 83-88.

[7] Girdhar P., Practical machinery vibration analysis and predictive maintenance, an imprint of Elsevier, 2004, pp. 88-224.

[8] Singh S. K., Acoustics Based Condition Monitoring, IIT Guwahati.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Secure Information Transmission Using Steganography and Cryptography

FatehrajSuthar
I.T Dept.
Sinhgad Academy of Engineering
Pune, India
fatehrajsutar504@gmail.com

KunalSalunke
I.T Dept.
Sinhgad Academy of Engineering
Pune, India
kunal922000@gmail.com

LokeshChatur
I.T Dept.
Sinhgad Academy of Engineering
Pune, India
lokeshchatur@gmail.com

SmitMune
I.T Dept.
Sinhgad Academy of Engineering
Pune, India
munesmit07@gmail.com

***Abstract*—Information security is an important factor during transmitting secret information between two objects. Generally, we use cryptography for information hiding and sending secret messages in the form of text. Nowadays, there are many techniques by which we can hide data in any media.One such technique is steganography. In this technique, digital images are used for hiding information and the information is in the form of text, digital image, video or audio file may be used as a secret message. Using LSB Steganography Technique we can implement a high level of information security without any damage to the cover image. In this system we are using the combination of two technologies i.e. cryptography and steganography. So,our system has a higher security level than existing systems.**

Keywords—Steganography, Stego-image, cryptography, encryption, decryption.

I. INTRODUCTION

Information security is an important factor during transmitting secret information between two objects. The idea of information hiding is nothing new in history. There is evidence that says that attempts were made to hide a message in trusted media to deliver it across the enemy territory, as early as in ancient Greece. Generally, we use cryptography for information hiding and sending secret messages in the form of text. In the modern world of digital communication, there are several techniques of steganography in which digital media, mainly digital images, are used as a medium for hiding information and the information in the form of text, digital image, video or audio file may be used as a secret message.

Using LSB Steganography and AES algorithm Technique we can implement a high level of information security without any damage to the cover image.

Here, we are using the Least Significant Bit (LSB) technique. In this technique the last bit of each pixel is modified and replaced with the secret messages data bit [6].

AES allows a degree of future proofing against the ability to perform exhaustive key searches as it contains built-in exibility of key length[3]. For example, it is 256 bits long,

Meaning, AES operates on 256 bits of plain-text to produce 256 bits cipher-text.In this proposed system we use to provide security and hide information using following technology:

1. STEGANOGRAPHY

Steganography is the technique for hiding data. It aims to hide data in such a way that any other person other than the two in a conversation cannot observe any changes in the original media [1][6]. Data hiding has two main branches, steganography and watermarking [5]. The present work focuses on steganography and uses images as the cover for hiding secret data. Steganography conceals the secret data inside the cover image in such a way that no one can even know there is secret data there. Image steganography is common and has a variety of uses with the comparison of other types of steganography. There is popularity around this technology because images have a large amount of redundant data and this redundant data can be used to hide secret data easily, and because images take into account the advantages of the limited power of the Human Visual System (HVS). In image steganography, the original image is called the cover image, the stego image is the image that results from embedding secret data inside the original image. The cover and stego images should be similar, so that it gets harder for the unauthorized person to know the stego image.

2. CRYPTOGRAPHY

Cryptography is a method of protecting sensative information and secret communications through the use of codes, so that only those for whom the information is intended can be able to read and process it. It is proved in situations where communication is established

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

between two parties over an insecure medium which can be easily caught by other parties.

Cryptography as a pool of cryptographic techniques comprising encryption and decryption frameworks, integrity, check functions, and digital signature frameworks [4][9]. Encryption frameworks are used to alter secret messages into a certain format which is not clear enough to read for an unauthorized person while certain decryption frameworks are used to decipher the disarranged message by authorized person.

The encryption aspect of cryptography is mainly for the protection of confidentialinformation and uninvited alterations. It involves the encryption of the stored data and encryption of the information to ensure a secure transfer over public channels. If an encrypted message is successfully intercepted by any uninvited party, it will be useless to the attacker because an encrypted message canbe decrypted only by an authorized person.

The value of the classified data obtained from a system is the most important thing to the attacker. The data may be compromised, distorted, or even deployed for future attacks by the attacker. A perfect way of solving these problems would be to make use of the advantages of cryptographic and steganographic techniques to develop a combined system which can be stronger than the individual strengths of the component techniques[3].

A. Objective

1) Implementing high security to hide secret information using steganography
2) Developing Encoding software
3) Developing Decoding Software
4) Information hiding in multiple images
5) AES cryptography implementation

B. Motivation

Information security plays a major role in any data transfer. Security can be obtained by information hiding that focuses on hiding the existence of secret messages. Steganography is a data hiding technique aimed at hiding the existence of the communication, to make other parties unaware of the contribution of stenographic exchange[7].

C. Need of System

1) It is extremely important to have high level security in daily information exchange for national security.
2) Nowadays we are using lots of online ecommerce websites so it is the requirement of the modern world to have safe transactions.
3) To maintain the confidentiality of files.

II. PROBLEM STATEMENT

To create a system which implements high security transmission of secret information using steganography for online transmission nowadays. Also Use cryptography for hiding messages and creating secret messages.

Use LSB technique to achieve steganography for images with high security and less damage of information. LSB Steganography is used for an attempt to develop a system which provides multi-layered security for secure data transfer.

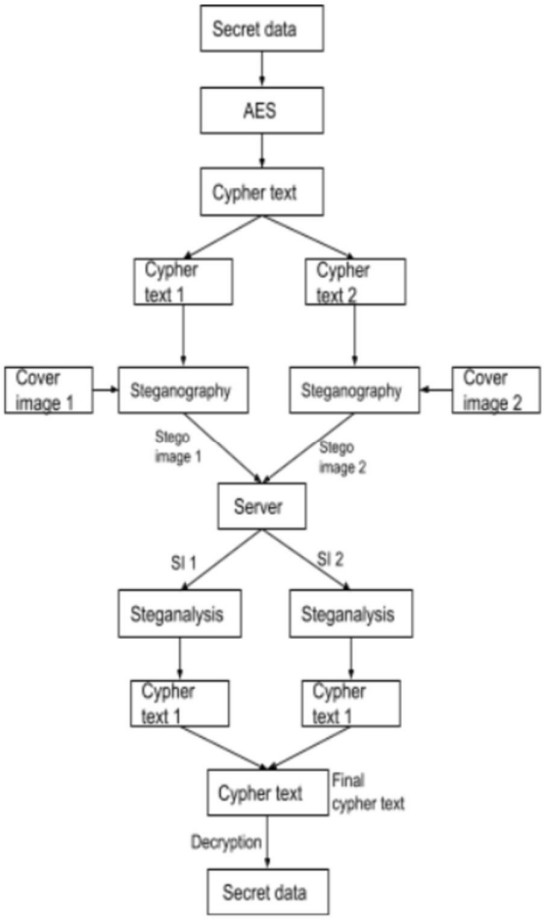


Fig. 1 Architecture of System

III. METHODOLOGY

In this system, users give secret data as input. After receiving a secret data system will encrypt secret data and

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

divide cipher text into two parts. After that two cipher text embedded with cover images i.e. take from user/apply default images and create stego images for respective cipher text. Then send those images to the receiver. At the receiver end, the user will unsteg the stego images. After an unstegoingimage, decrypt the cipher text and merge plain text. we get secret data then display the secret data.

- In LSB Steganography, hidden information is stored at a specific position of the LSB of image.
- Take the binary representation of the hidden information and overwrite the LSB of each byte within the cover image[7]
- Formula: cover image + secret key + hidden message = stego image [2]
- Improved LSB method for hiding secret information written in text file into color image.
- Each character of the secret image is converted into its equivalent ASCII value and then each code is converted into 8 bit binary, and each bit is inserted into the last LSB of each pixel of the cover image[8].

Method that system follow is:

1) At 1st stage we apply AES cryptography to shuffle secret information using some key. Which will produce ciphertext.
2) At 2nd stage we divide the cypher text in two parts and we hide the 1st part in the first cover image and 2nd part in the second cover image using LSB Steganography, which will generate stego-Image 1 & 2.
3) At the receiving end we extract cypher text from stego images.
4) Finally secret information is extracted from ciphertext using Inverse LSB operation & AES Algorithm.

Algorithms used in System are LSB Encoding (steganography), LSB Decoding (steganalysis), AES algorithm cryptography, Linear inverse cryptography.

Mathematical Modeling

1) *For Encryption:*
   a) Cypher_text = secrete_text + key
   b) Binary_stream = to_bits(cypher_text)
   c) For i = 1:row
      For j = 1: column
      stego_image(LSB) = binary_stream(i)
      End
      End
2) *For Decryption:*
   a) For i = 1:row
      For j = 1: column
      binary_stream(LSB) = stego_image(i)
      End
      End
   b) Cypher_text = to_string(binary_stream)
   c) Secrete_Info = cypher_text – key

IV. PROPOSED SYSTEM

Proposed System is achieving all the aspects that are considered for secure data transmission. Proposed systems provide secure information transmission using steganography for online transmission nowadays. Proposed System uses AES algorithm Cryptography and LSB Steganography technique to achieve secure data transmission.[4]

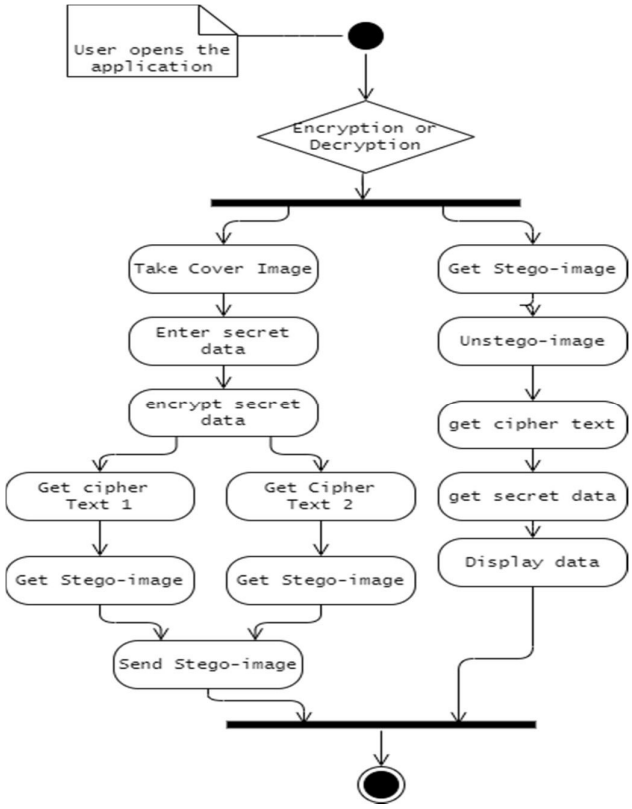


Fig. 2 Activity Diagram

The Cryptography system performs the encryption and decryption method that was used to create the secret text message. Cryptography is a method of protecting information and communications through the use of existing information, so that only those for whom the information is intended can read and process it.[8]

Using LSB Steganography technique, the systemperforms image steganography. LSB insertion is a common and simple approach to embed information in a cover file. Digital images used as cover files are mainly of

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

two types- 24-bit images and 8-bit images.[6] After applying the LSB algorithm the image obtained by having a secret message is called stego-image.

V. ADVANTAGES

1) To provide security to your messages without knowing it to a third party.
2) It is Reliable.
3) Easy to use.
4) System has been secured by stego-image authentication.

VI. DISADVANTAGES

1) Images can have attacks like diluting, nosing, contrast changes and so on.
2) Only unintended users may know the actual working of software.
3) Intruders may penetrate suspecting images to get hidden data.

VII. CONCLUSION

In this project, we are implementing a high level of information security without any damage to cover images using LSB technique.

It will be almost impossiblefor hackers to attack the stego Image as the cover image and stego image looks similar.

In the proposed system, with steganography we have also used cryptography i.e. we have first encrypted our text message and divided the cipher text and then embedded it into the two image file i.e. two stego images. This approach helps us to achieve more security, in case anyone intercepts our transmission. Moreover two image files are used as a cover medium because we can embed more data into it as compared to other cover mediums.

ACKNOWLEDGMENT

The authors would like to express our special thanks to our teacher and guide Mr. Shriram Kulkarniwho gave us the opportunity to do this project “Secure Information Transmission Using Steganography and Cryptography”.

REFERENCES

[1] Dalia Nashat* and LoayMamdouh, “An efficient steganographic technique for hiding data”, JEMS 2019.

[2] Hussein L. Hussein, Ahmed A. Abbass, Sinan A. Naji, Salam Al-augby and Jasim H. Lafta, “Hiding text in gray image using mapping technique”, IOP Publishing 2018.

[3] Prateek Kumar Singh, PratikshitTripathi, Rohit Kumar, Deepak Kumar, “Secure Data Transmission”, IRJET, Volume: 04 Issue: 04 | Apr- 2017.

[4] Mustafa Sabah Taha, MohdShafryMohd Rahim, Sameer Abdulsattarlafta, Mohammed Mahdi Hashim, Hassanain Mahdi Alzuabidi, “Combination of Steganography and Cryptography: A short Survey”, ICSET, 2019.

[5] Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Jessica ridrich, Ton Kalker, “Digital Watermarking and Steganography”.

[6] DeepeshRawat and Vijaya Bhandari, “Steganography technique for hiding text information in color image using improved LSB method”, IJCA 2013.

[7] Mehdi Hussain, “A Survey of Image Steganography Techniques”, International Journal of Advanced Science and Technology, 2013.

[8] Hamad A. Al-Korbi, Ali Al-Ataby, Majid A. Al-Taee and Waleed Al- Nuaimy, “Highly efficient image steganography using Haar DWT for hiding miscellaneous data”, JJCIT 2013.

[9] Nitin Jirwan, Ajay Singh, Dr. Sandip Vijay, “Review and analysis of cryptography techniques”, IJSER 2013.

[10] M. Karolin, Dr. T. Meyyappan, SM. Thamarai, “Encryption and decryption of color images using visual cryptography”,IJPAM 2018.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Introduction to Block chain Based E-Waste Management System

Adarsh.G.Vernekar
Department of Computer Science and Engineering
SVERI's College of Engineering
Pandharpur, India
avernekar111@gmail.com

***Abstract*—The realm of innovation and change is a lone steady. Each adjustment of innovation gets better than older gadgets and old technologies. Old gadgets are supplanted by the new technologies. Therefore changes are important for a developing society. The replacement in older gadgets to new ones makes older ones useless which led to generation of E-waste. E- Waste is becoming a major problem in current digital society. Current e-waste management systems include multiple issues and lack in multiple security requirements with no proper data of waste disposal and waste management. Hence a proper electronic waste management system has become an intense need that provides proper non alterable data of overall waste management. In this paper, we propose a blockchain based methodology for Electronic waste management using smart contracts. Blockchain is the innovation that empowers us to compose smart contracts. Smart contracts are the immutable agreements and self-executing codes that cannot be altered by external sources. They also provide limitation on the actions of the participants in the network. In this paper we propose a blockchain based electronic waste management system that introduces multiple participants like producers, distributors, collection centers and recycling unit. The smart contract carries out proper coordination between these participants performs action when certain states are reached. Using this system government can collect and recycle the electronic waste as per the requirement and bring transparency between organized and unorganized sectors in the society.**

Keywords—blockchain,e-waste,smart contract,ethereum

I. INTRODUCTION

The human populace is developing and growing along with urbanization in a large scale. Due to rising urbanization there is a rise in the generation of the electronic waste. Moreover the problems increase with improper management of this electronic waste in the society. The electronic waste includes many hazardous chemicals and materials that cannot be exposed free in the environment. The disposal of such electronic waste in rivers, lakes or in nature can cause serious problems. The electronic waste includes multiple precious elements like gold, silver, platinum and other important elements [4]. Inappropriate techniques are used by the unauthorized people illegally to extract these elements that can cause dangerous accidents [4]. Many nations handle their e-waste by unlawfully trading it to agricultural nations which led to degradation of the soil and increase in landfills. The practices of burning of such e-waste can cause emission of hazardous chemicals like carbon monoxide (CO), Sulphur dioxide (SO),and other hazardous gases[5].Blockchain based electronic waste management system is the way toward disposing of e-waste in a harmless way to the ecosystem. The current e- waste management system does not maintain proper data regarding the e-waste management and its processing. Comparing with the systems that maintain records of e- waste management they do not include use of blockchain technology.

Blockchain is a decentralized, distributed ledger technology that provides immutability to the data. The data once added into the blockchain cannot be altered or manipulated. Blockchain maintains each record of every transaction that is carried out in the system. It was initially introduced by Satoshi Nakamoto in 2009 in a cryptocurrency called as Bitcoin to eliminate third parties or intermediaries in the bank transactions [1]. In our paper we propose use of ethereum network along with smart contracts to carry out the internetwork transactions. We propose a technique using blockchain to carry out proper waste management and maintain its records that are immutable. Our system provides advantages of transparency, security and decentralization over the traditional ones. Blockchain based E- waste management would be a boon to the modern society.

II. NEED OF BLOCKCHAIN IN E-WASTE MANAGEMENT

The current e-waste management system has become a serious issue in the society. Hence the following points display the need of blockchain in e-waste management.

- E-Waste management is a major problem with rise in urbanization. In the year 2019-20 India generated e-waste of 1 million tones (approx.) [2]. Hence if the waste is not properly processed then it creates pollution and cause harm to life and environment.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

- A large amount of E-waste is disposed without recycling hence using blockchain based e-waste management system we can put the waste in good use by verifying the category of the waste.
- The system must maintain proper records of actions taken on the waste.
- E-waste Management system should not be traceable and alterable in aspect of data.
- The system must ensure decentralized environment.
- The current E- waste management system does not provide data security and peer to peer networks.
- The E-waste management should not be expensive.

The electronic waste management system ensures to be the best system that can be implemented as it fulfills all the requirements for a waste management system.

III. PRELIMINARIES IN E-WASTE MANAGEMENT

Before implementation of any idea we need to understand the preliminaries in the system that is to be implemented. In our system we use a consortium blockchain to provide limited access between the participants. Blockchains can be classified into three categories like public, private and consortium. In public blockchain every user has the read write access. Eg. Bitcoin. In private blockchain all participants have limited access to the network, while consortium gives partial decentralized environment [7]. We use a partial decentralized environment in our system. The blockchain was initially used in crypto currency hence hashing algorithms are used to provide more security between the network transactions. We use SHA 256 cryptographic hashing algorithm to provide more security in the network [6]. In our system we use ethereum network for implementation of smart contracts. Ethereum is an open source blockchain that provides smart contract functionality [3]. Smart contracts are the immutable codes that act as agreement between the nodes in the network [3]. In our system smart contracts play a vital role to enact coordination between the participants in the network. It provides self-verification and self-administration between the networks. The participants in the network can directly trust the network in the system due to the smart contracts. The smart contracts are written in solidity language. Solidity is a programming language that is used to develop smart contracts. We can use Remix IDE to compile our smart contracts.

IV. EXISITING SYSTEMS AND CASE STUDIES

The blockchain technology has created a revolution in every field of its implementation. Many countries and organizations have already started implementing blockchain technology in various sectors including e-waste management. Our idea had a great motivation from the following existing system. It also created an ease in foundational study of implementation of a proper e-waste management system and made it much easier.

- Agora tech Labs implemented a system maintaining e-waste transaction records on blockchain in Netherlands to integrate e-waste management system [11].
- SCNF from France has also initiated a concept of smart bins. In which the collection of waste is monitored by IoT devices and the records of the devices is maintained on the blockchain network.[12]
- Dutch ministry of infrastructure has also initiated use of blockchain to improve waste management policies.[11]
- Swachhcoin is a blockchain based waste management system implemented in eastern part of India near Kolkata. It mainly focuses on ecofriendly techniques of waste management using blockchain. It also focuses on conversion of waste into high valued products and dramatically increases the profits on them [13]. They implemented their system using ethereum blockchain framework with smart contracts as logic analyzer code. We also deploy our e-waste management system on ethereum blockchain along with smart contract code.

V. METHODOLOGY OF PROPOSED SYSTEM

While implementing a blockchain based E- waste management system we need to consider the current and previous waste management systems in action. Hence use of blockchain in waste management system can create much better changes than that of the previous ones.

Initially we declare the participants that are going to take part into the system. These participants will perform the task assigned to them as per their schedule. We have five stakeholders in our system they can be listed in Table. I. The table displays brief overview of participants in the network. It also provides details regarding the respective tasks that they have to perform in the system. Every stakeholder has his own importance in the system. The coordination between these participants can only led us to successful implementation of the system. We have enacted decentralized environment through blockchain hence single entity control must be avoided. To avoid workload on single entity we have fragmented the stakeholders into five.

A. Government Authority:

This is the most important participant in the network as it provide authorization to all stakeholders in the network. The government authority has multiple roles in the system. It provides authorization to participants to carry out their tasks and gives instructions as per requirement. It also maintains the liquidity in the system and acts as an administrator of the system. It provides decisions to the respective participants regarding the waste and checks the financial measures in the system.

B. Producer:

the primary stakeholders in the system are producers. Producers are the generators of the e-waste, in other words citizens, electrical stores, industries and all other sources of e-waste can be included in the producer category. The producer plays important role as they bring the e-waste to the distributors and get paid for the waste they have submitted according to its price.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Table.I. participants in the system

Sr. No.	Participants and their Roles	
	Participants	***Roles***
1	Government Authority	Basic Stake holder that provides authorization to all the participants to perform their respective activities and provide respective instruction
2	Producers	Producers are none other than generators of the e-waste. They can be considered as citizens or any e-waste producers.
3	Distributors	This unit handles retailing of the e-waste that is generated by the producers.
4	Collection Unit	Collection unit is important unit that handles storages and segregation of the e-waste
5	Recycling Centres	Deals with recycling of waste that is provided by the collection unit.

C. Distributors:

Distributors are the next participants after the producers. They act as retailers in the system. When producers bring e-waste to the distributors the distributors sell the e-waste as per waste provided by the producers. The distributors can use smart bins to segregated the e-waste that is important than that of the rest [14]. The amount of money is decided by consulting the government authority. The distributors then submit all the e-waste to collection unit for further processing and segregation of the e-waste.

D. Collection Unit:

Collection unit is the important unit in the system. They collect all the e-waste supplied by the distributors. The collection unit stores all the e-waste and keep records regarding the amount of garbage stored. The collection unit has to be established away from residential areas to avoid it side effects and pollution. The collection unit also performs the task of segregation of the e-waste using smart bins [14].These smart bins use IoT devices to segregation of the e-waste. The collection Unit separates the e-waste such that the e-waste that can be recycled and can be given to the recycling unit and rest of waste is send to the industries for the processing and other purposes.

E. Recycling Centers:

It is the final phase of the system which performs recycling of the e-waste which is provided by the collection centers. The recycling centers are very important in spite of environmental aspects. The recycling reduces the e-waste and provides raw material for production of new gadgets. It also reduces the exploitation of the natural resources.

The blockchain based E-waste management system works on cycle. The flowchart representation of the following is given in Fig.1.

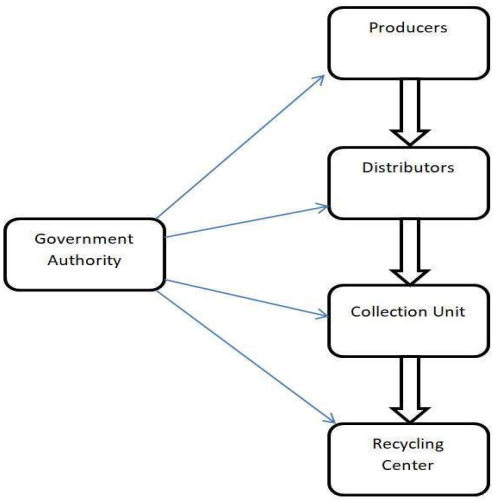


Fig.1. *Flowchart*

Here Government authority manages the activities of all the participants in the network. Hence they have access to every participant. Participants provide e-waste to distributors. Distributors then submit to the collection unit and recyclable waste is further provided to recycling center. All these activities are performed under supervision of government authority.

VI. ADVANTAGES

This decentralized waste management system provides many advantages over the traditional system.

- This e-waste management system is much secured than that of traditional ones.
- Maximum security is provided by the network to all the participants in the network.
- In the blockchain based E-waste management system we avoid single entity control.
- No any participants cannot alter the blockchain data and reject regarding their action they performed.
- The e-waste management eliminates health problems faced by civilians due to pollution.
- The blockchain based E-waste management enacts regularity and transparency in processing activities of the waste.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

VII. SECURITY ISSUES

The security is the most important requirement for any system that is to be implemented. Hence system must ensure total security of all the data that is to be added into the system. Our system ensures maximum security such that

- Use of blockchain ensures complete security of the system as every transaction has its cryptographic hash and every transaction is noted in the blockchain [7].
- No data can be deleted or altered hence this ensures complete data security.
- We can use Proof of Elapsed Time consensus algorithm for our blockchain than that of the traditional proof of work algorithm to reduce computation [8].
- It also ensures security from 51% attacks and double spending attacks by defensive mining [9].
- The system can be also secured from Sybil attacks or denial of service attacks by implementing node auditing techniques [10].

VIII. CONCLUSION

The main motive of introducing blockchain based E-waste management system is to avoid the harmful effect caused due to garbage pollution. E-waste has hazardous chemicals that can create health problem to people if they are exposed open in nature. The current waste management system does not have adequate data security and management regarding the waste generation and processing activities. We use blockchain based E-waste management system to avoid all the discrepancies in the traditional system. Block chain based e-waste management is boon to the modern society.

REFERNCES

[1] S. Nakamoto, “Bitcoin: A peer-to-peer electronic cash system,” 2008.

[2]https://www.downtoearth.org.in/news/waste/india-collected-just-3-e-waste-generated-in-2018-10-in-2019-cpcb-report75072

[3] D. Vujičić, D. Jagodić and S. Ranđić, "Blockchain technology, bitcoin, and Ethereum: A brief overview," in INFOTEH-JAHORINA (INFOTEH), IEEE, 2018.

[4] Mahesh C. Vats1, Santosh K. Singh2, "Status of E-Waste in India - A Review",International Journal of Innovative Research in Science, Engineering and Technology ,Volume 3, Issue 10, October 2014(ISSN: 2319-8753)

[5] Vandana Bharti, Jaspal Singh, A.P. Singh (2017) A Review on Solid Waste Management Methods and Practices in India. Trends in Biosciences 10(21). 4065 – 4067

[6] Hoai luan pham [1], Thi hong tran [1], tri dung phan[1], vu trung duong le[2],Duc khai lam[2], and yasuhiko nakashima[1],"Double SHA-256 Hardware Architecture With Compact Message Expander for Bitcoin mining", IEEE Volume 8,Year 2020

[7] Saurabh singh [1] ,S. M. Sanwar hosen[2], and Byungun Yoon[1],"Blockchain security attacks, challenges, and Solutions for the future distributed iot network", IEEE access, year 2021

[8] M Ashok Kumar,V.Radhesyam,B SrinivasaRao,"Front-End IoT Application for the Bitcoin based on Proof of Elapsed Time (PoET)"International Conference on Inventive Systems and Control (ICISC 2019) IEEE 2019

[9]https://bitcoinexchangeguide.com/ethereum-classic-iohk-team-up-to-%1Cnd-solutions-to-prevent-51-attacks-on-the-blockchain/

[10] L. Er-Rajy, A. El Kiram My, M. El Ghazouani, and O. Achbarou,`` Blockchain: Bitcoin wallet cryptography security, challenges and countermeasures,"J. Internet Banking Commerce, vol. 22, no. 3, pp. 129,2017.

[11]https://www.ibm.com/blogs/blockchain/2019/08/revolutionizing-the-waste-supply-chain-blockchain-for-social-good/

[12]https://www.frontiersin.org/articles/10.3389/fpos.2020.590923/

[13] http://swachhcoin.com/whitepaper.pdf

[14] K. C. Saranya, Vijayaraj Sujan, Balasubramanian Abivishaqand, K. Nithish Kanna "Smart Bin with Automated Metal Segregation and Optimal Distribution of the Bins” ,Springer, Year 2020

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Design Simulation and Analysis of Dynamic Wireless Charging Methodology for Electric Vehicles

Author 1: Sania Walunjkar
Depatrment of Electrical Engineering
Pune Vidyarthi Griha's College of Engineering & Technology
Pune, India
email: san.walunjkar@gmail.com

Author 2: Prathamesh Tagare
Depatrment of Electrical Engineering
Pune Vidyarthi Griha's College of Engineering & Technology
Pune, India
email:prathameshtagare13@gmail.com

Author 3: Aditya Nawale
Depatrment of Electrical Engineering
Pune Vidyarthi Griha's College of Engineering & Technology
Pune, India
email: adinawale23@gmail.com

Author 4: Anuja Patil
Depatrment of Electrical Engineering
Pune Vidyarthi Griha's College of Engineering & Technology
Pune, India
email: anujabpatil04@gmail.com

***Abstract*— This paper includes detailed design simulation for a 60 kW wireless power transfer charging system for electric vehicles operating at the resonant frequency of 85 kHz. The study includes details about the resonant inductive wireless power transfer system, coil shapes and compensation topologies required in the wireless power transfer setup. A brief about the DDP type coil design in the Ansys Maxwell software and the fabrication of the LCC compensation network in the Ansys Maxwell Simplorer is mentioned. Through the AC and Transient (TR) Analysis, the system parameters viz. voltage, current and power transfer is simulated to achieve optimum system efficiency of 90%.**

Keywords*— *Dynamic wireless power transfer (DWPT), coil shapes, DDP pad, aluminum shielding, coupling coefficient, compensation topologies, LCC type compensation, misalignment

I. Introduction

The transportation industry consumes 29% of the energy out of which gasoline amounts for 56% of the transportation fuel. To reduce the pressure on conventional fuels, Electric Vehicles (EVs) are the best alternative. However, the major challenge in implementing the EVs is limited range. The range can be outstretched by bracing up the battery capacity which eventually ends up giving bulky, expensive battery architecture. The possible solution to this is to charge the vehicle while moving and this is referred to as "Dynamic Wireless Power Transfer (DWPT)"[1]. For a battery operated electric vehicle (BEV), there are various wireless charging methods viz. capacitive wireless power transfer(CWPT), magnetic gear wireless power transfer(MGWPT), traditional inductive power transfer (IPT) and the most efficient Resonant Wireless Power Transfer(RIPT) method. DWPT can be implemented either with long tracks or with small segmented coils laid on the roads, the later requiring less complex circuit and having overall high efficiency. There are various coil types viz. circular, square, hexagonal, double-D pad (DDP), double-D quadrature pad (DDQP) and bipolar pad (BP), etc.[2] The coil shape least tolerant to misalignment is DDP and the same has been discussed briefly . The frequency range for DWPT is between 10 kHz to 150 kHz and the operating principle is based on Ampere's Circuital law and Faraday's law of induction which explains the interrelation between current carrying conductor and time varying magnetic flux. The ratio of mutual flux to the total flux, which is the coupling coefficient k lies between 1 to 3% in case of EVs. For improving the coupling and compensating the inductive leakage, capacitive compensation is provided on both the coils. Compensating networks consisting of capacitors are made to resonate with the coil inductance, thus forming a resonant inductive link. Depending upon the positioning of capacitors and inductors with the self inductances of the ferrite coils, there are different types of compensations viz. Series Series(S-S), Series Parallel(S-P), Parallel Series (P-S), Parallel Parallel (P-P) and LCC compensation. The variation in the efficiency for LCC with the variation in mutual inductance is very steady over long ranges and therefore this compensation topology has been preferred.

II. BLOCK DIAGRAM OF DWPT

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

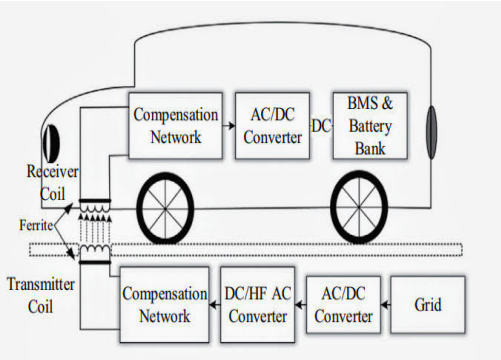


Fig 1 Typical EV wireless charging system conceptual diagram [Source:-"Review of static and dynamic wireless electric vehicle charging system" by Chirag Panchal]

As shown in Fig 1, the setup mainly includes the transmitting coil which is embedded in the charging pads fixed along the road and the receiving coil which is present in the vehicle. At the transmitting side, the supply from the grid is converted into DC using the AC/DC converter and then this DC is converted to high frequency AC signal by means of high frequency AC converter. At the receiving side of the coil, the oscillating magnetic flux is converted to High Frequency AC signal and the AC to DC converter converts this signal to stable DC supply which is then used to charge the battery pack. Ferrite coils of different shapes are present on transmitter and receiver coils to avoid harmful leakage flux and promote uniform flux distribution with tolerable misalignment [3].

III. Resonant Inductive Power Transfer

The working principle of RIPT is based on the Ampere's circuital law and Faraday's law of induction [4]. The primary and secondary coils are linked by inductive coupling. The subscript P and S refers to primary and secondary coils, respectively. When a time varying current is applied to the primary coil, a time varying flux of the same frequency is produced in the region surrounding the primary. The strength of the magnetic field around a closed path is directly proportional to the current carried by the coil and is given by Ampere's law as

$$\oint_l H \cdot dl = \int_s J \cdot ds \qquad (1)$$

If the currents are carried by wires in a coil with N turns, then the simplified equation is

$$\oint_l H \cdot dl = N_p I_p \qquad (2)$$

where 'H' is the magnetic field strength, N_P is the number of turns while I_P is the current flowing in the primary coil, and l is the length of the circumference of the closed path. An emf get induced in the secondary coil, when the time varying flux links with is and is given by Faraday's law of electromagnetic induction as,

$$e_s = N_s \frac{d\phi m}{dt} \qquad (3)$$

The coupling coefficient k relates common flux to total flux and is given by,

$$k = \frac{\Phi_m}{\Phi_m + \Phi_{lp}} \qquad (4)$$

Where $Ø_P = Ø_m + Ø_{lP}$ is the total flux produced by the primary coil, $Ø_m$ is the mutual flux and $Ø_{lP}$ is the leakage flux. Thus, the induced emf in the secondary coil in terms of coupling coefficient is given by

$$e_s = kN_s \frac{d\phi p}{dt} \qquad (5)$$

The systems are of two types- loosely and tightly coupled, based on values of k [1]. To allow the inconsistencies on the road, better clearance between road and vehicle becomes mandatory. This large air gap eventually results in large leakage flux thus reducing the coefficient of coupling to maximum 3% for the EV application. Such a system is a loosely coupled system and leads to poor transfer of power. To improve coupling and compensate leakage inductance, capacitive compensation in primary and secondary winding is required.

IV. Double-D Pad (DDP)

Planar coils are of two types- Polarized Pads (PP) and Non-Polarized Pads (NPP) [1]. NPPs are single coil pads which can couple and generate only perpendicular components of the flux. NPP's are the traditional shaped coils, such as circular, square, rectangular, hexagonal. PP's are multiple coil pads which can couple and create the parallel, perpendicular or both the component of flux. However, PPs also generate flux at the back of the pad. Thus, when an aluminum backing plate is added it generates more loss, in the form of eddy current [4]. As a solution to this; single sided multiple coils polarized pads were modeled and the types were: double-D pad (DDP), double-D quadrature pad (DDQP) and bipolar pad (BP).

The DDP pad combines the advantage of both flux pipe as well as circular pad. The coils are placed on the top of the ferrite and the Aluminum shielding is given beneath the ferrite so that the quality factor remains unaffected [1]. Thus, the DDP design has higher coefficient of coupling, low losses in Aluminum shielding and lower leakage flux and also the flux height is proportional to half the length of the pad. Another advantage is, when coupled with another DD pad, each section of the primary coil is linked with the corresponding section of the secondary coil, and the voltage at the pick-up terminals is the sum of the voltages induced in the two sections.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

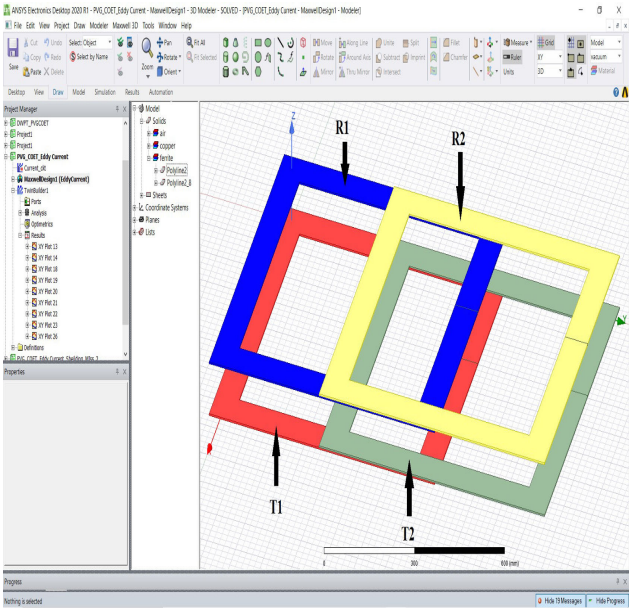


Fig 2 DDP coil modeled in the Ansys Maxwell RS 3D

As shown in Fig 2, the coils at the top, blue and yellow are receiving coil R1 and R2 respectively. Similarly, the coils at the bottom, red and green are transmitting coils T1 and T2 respectively. The dimensions for the coil designed are 800 x 800 mm. Height for each coil is 4mm and the width of the strip is 80mm. Material used for the coil is Copper and the boundaries are insulating. The turn's ratio for transmitter pad to receiver pad is 7:5. An air gap of 120 mm is maintained in between the transmitter and receiver pad.

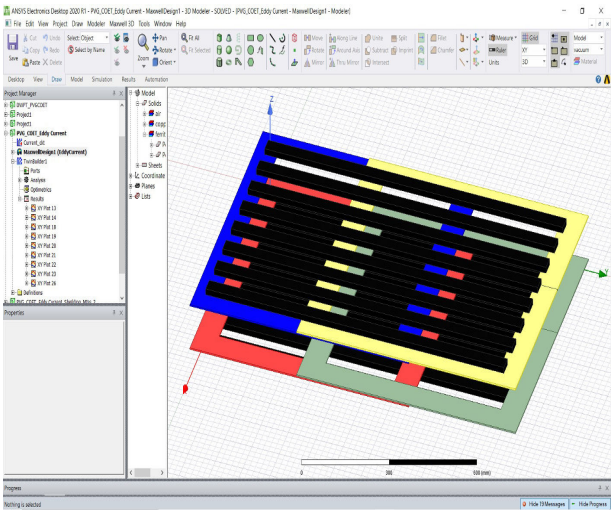


Fig 3 DDP coil with the ferrite bars modeled in the Ansys Maxwell RS 3D

Fig 3 shows the ferrite bars in black. There are total 16 such bars used, 8 on the transmitting side and 8 on the receiving side. Length of each bar is 1090mm, width is 40mm and height is 16mm.

Thus by simulating the coil design, for a DWPT system excited by 230 V AC supply operating at 85 kHz resonance frequency; using the 3D Transient Magnetic Analysis, the values for self-inductance, resistance, mutual inductance and coupling coefficient provided directly by the Ansys Maxwell software are as follows-

TABLE I. VALUES OBTAINED FOR SELF INDUCTANCE AND RESISTANCE

Parameters	R1-R1	R2-R2	T1-T1	T2-T2
Self Inductance (μH)	65.63	66.78	130.89	127.41
Resistance (mΩ)	3.81	3.81	7.45	7.45

TABLE II. VALUES OBTAINED FOR MUTUAL INDUCTANCE AND COUPLING COEFFICIENT

Parameters	T1-R1	T2-R2
Mutual Inductance (μH)	49.60	49.79
Coupling Coefficient	0.5351	0.5397

V. COMPENSATION TOPOLOGIES

Compensation method is essential because of its functions of adjusting resonant frequency, minimizing the volt-ampere rating of power supply, improving coupling and power transfer capability and achieving high efficiency [5]. Four basic compensation topologies, namely, series–series (SS), SP, PS, and PP, are widely adopted for EV applications. They are named by the way the compensated capacitors are connected to the primary and secondary coils. Among these four topologies, only the SS compensation topology has the characteristics that the resonant frequency is independent of the coupling coefficient and load [6]. This feature is essential for dynamic charging as the coupling coefficient varies along with the change in the relative position between primary and secondary coils.

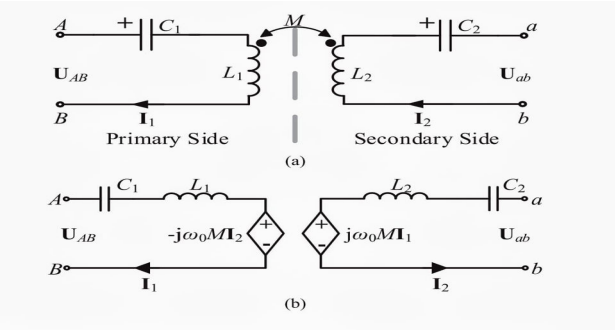


Fig 4 (a)SS compensation topology. (b) Dependent voltage equivalent circuit model. [Source:- Weihan Li, Student Member, IEEE, Han Zhao, Junjun Deng, Member, IEEE, Siqi Li, Member, IEEE, and Chunting Chris Mi, Fellow, IEEE, "Comparison Study on SS and Double-Sided LCC Compensation Topologies for EV/PHEV Wireless Chargers "

In fig 4(a) & 4(b), U_{AB} is taken as reference input voltage and is in phase with current I_1.Whereas U_{ab} is equivalent battery voltage and is in phase with current I_2.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

SS-compensated wireless charger is a constant current source and can be controlled by the input voltage in practice. SS-compensated wireless charger system with ideal components has no reactive power in the system, and the power factor P F is unity. The output and input real power can be obtained is given as [6]-

$$P_{out_tuned} = P_{in_tun} = R_e(U_{AB}I_1^*) = \frac{1}{\omega_0 M} U_{AB}U_{ab} \quad (6)$$

where I_1* is the complex conjugate of I_1 and M is the mutual inductance. Thus, the output power is inversely proportional to mutual inductance M. Mutual inductance will reduce when the primary and secondary coils are misaligned. And thus position detection becomes very important to ensure that mutual inductance M is maintained within a certain range.

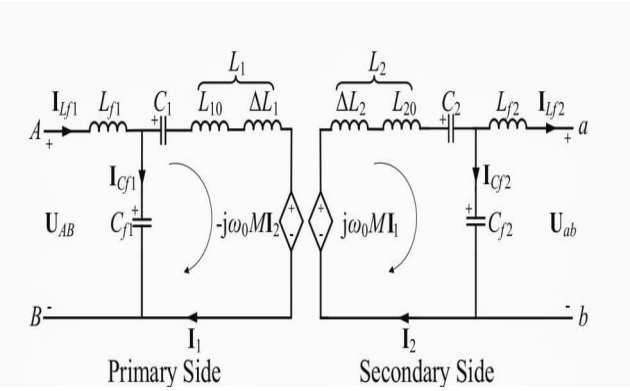


Fig 5 Double sided LCC compensation topology equivalent circuit model. [Source:-Weihan Li, Student Member, IEEE, Han Zhao, Junjun Deng, Member, IEEE, Siqi Li, Member, IEEE, and Chunting Chris Mi, Fellow, IEEE, "Comparison Study on SS and Double-Sided LCC Compensation Topologies for EV/PHEV Wireless Chargers"]

The double sided LCC compensation topology has an additional series inductor and an additional parallel capacitor for both transmitting and receiving sides compared with the SS compensation topology.

The input-output power equation is obtained as [6]-

$$P_{out-tuned} = \frac{M \cdot U_A \cdot U_{ab}}{\omega_0 L_{f_1} L_{f_2}} \quad (7)$$

where M is the mutual inductance .Thus, for a double-sided LCC compensation topology, Lf_1 or L_{f2} can be used as another consideration to design the system with desirable efficiency and this is an advantage over the SS topology.

The efficiency of SS topology is higher when the mutual inductance is higher, whereas the efficiency of LCC topology is higher at minimum values of mutual inductance. The variation is the efficiency with the variation in mutual inductance is steady over a long range for LCC topology because the losses on the compensation network increase while those at the primary coil decrease when the mutual inductance increases [6]. Thus, even though the efficiency of LCC is less than SS for higher values of mutual inductance, it is the preferred configuration due to its steadily varying percentage efficiency as variation in mutual inductance is obvious for any electric vehicle owing to the irregularities on the road surface.

VI. LCC Compensation

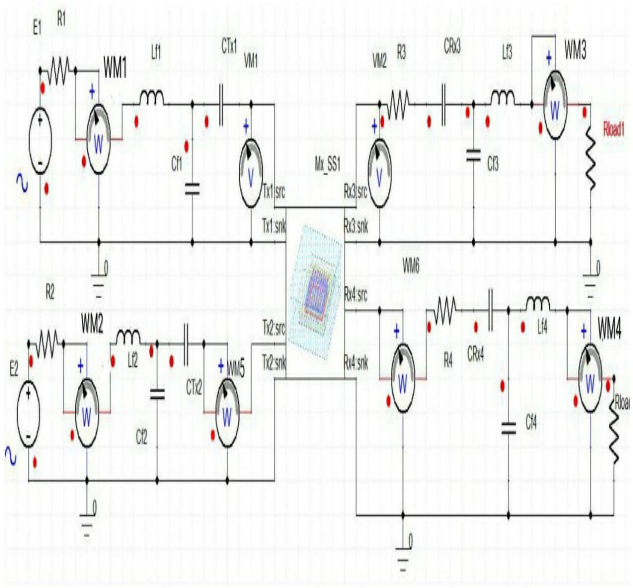


Fig 6 LCC Compensation designed in Ansys Maxwell Simplorer

As shown in Fig 6, L_{f1} and L_{f2} are the inductors on the transmitting side and L_{f3} and L_{f4} are the inductors on the receiving side. All these inductors are assumed to be 10 µH each (L_f). L_1 and L_2 are the self inductances of transmitting coils T_1 and T_2, whereas L_3 and L_4 are the self inductances of the receiving coils R_1 and R_2 respectively. These values are directly provided by the Ansys Mawell software after simulating the coil design and are mentioned in Table I.WM1 and WM2 are transmitter side wattmeter and WM3 and WM4 are receiving side wattmeter Following relations are used to calculate the remaining parameters in the LCC compensation network. [4]. All the calculations are performed the resonant frequency of 85 kHz.

$$L_{(1,2)} \quad L_f = \frac{1}{\omega_0^2 C_{Tx(1,2)}} \quad (8)$$

$$L_{(3,4)} - L_f \quad - \frac{1}{\omega_0^2 C_{Rx(1,2)}} \quad (9)$$

$$L_f C_f = \frac{1}{\omega_0^2} \quad (10)$$

Thus by using the above relations the values actually calculated for the compensating capacitors on the transmitting side (C_{Tx1}, C_{Tx2}) and receiving side (C_{Rx1}, C_{Rx2}) are mentioned in Table III.

TABLE III. VALUES CALCULATED FOR COMPONENTS IN THE LCC NETWORK

Components	Values Calculated
Lf	10 µH
Cf	3.51 nF
C_{Tx1}	2.9 nF
C_{Tx2}	2.986 nF

C_{Rx1}	6.30 nF
C_{Rx2}	6.17 nF

Thus for the system modeled, using the LCC compensation, a coupling coefficient of 0.53 is achieved.

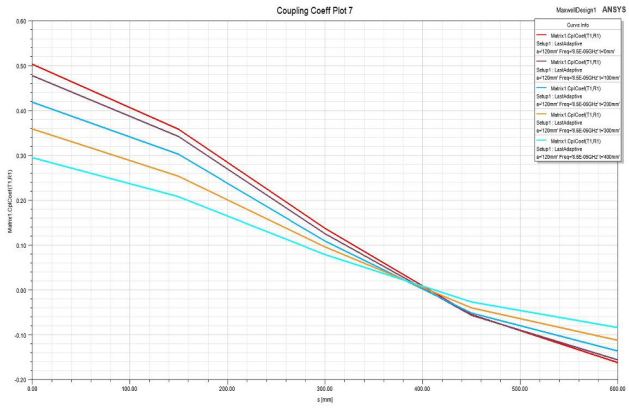


Fig 7 Graph of variation of coupling coefficient for various misalignments

Fig 7 shows the graph of variation in the coupling coefficient obtained for the system designed at various misalignment levels. At 120 mm air gap, for a perfectly aligned system, the coupling coefficient obtained is 0.53 as shown by the red line. The purple, blue, yellow and cyan blue line show the variation of coupling coefficients when there is a horizontal misalignment of 100mm, 200mm, 300mm and 400mm between the transmitter and receiver track. Thus for 400mm misalignment, i.e. when the vehicle is partially on 800mm wide track, the coupling coefficient and is least approximately equal to 0.3.

VII. PARAMETERS FOR THE SYSTEM DESIGNED

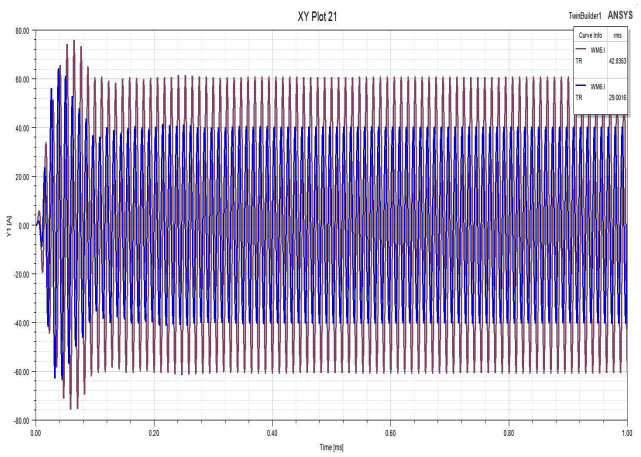


Fig 8 Plot of Input and Output Current obtained using Transient (TR) Analysis

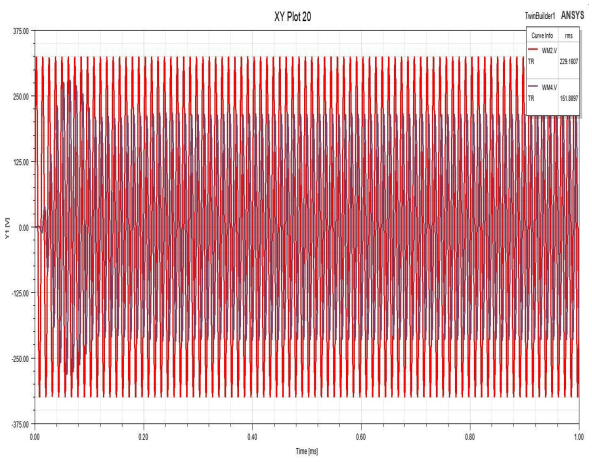


Fig 9 Plot of Input and Output voltage obtained using Transient (TR) Analysis

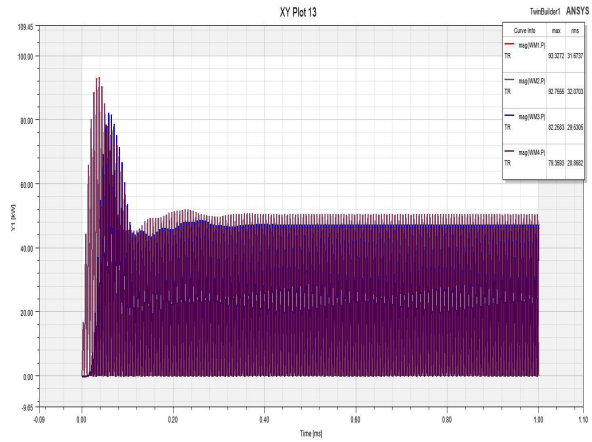


Fig 10 Plot of Input and Output Power obtained using Transient (TR) Analysis

TABLE IV. VALUES FOR VOLTAGE AND CURRENT

Sr. no	Parameter	Transmitter Side	Receiver Side
1	RMS Voltage(V)	229.16	151.89
2	RMS Current (A)	42.85	29.00

TABLE V. VALUES FOR TRANSMITTER AND RECEIVER SIDE POWER

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Power	RMS value in kW	RMS value in kW	Net power in kW
Transmitter side	WM1-31.67	WM2-32.67	WM1+WM2=64.34
Receiver side	WM3-29.53	WM4-28.87	WM3+WM4=58.4

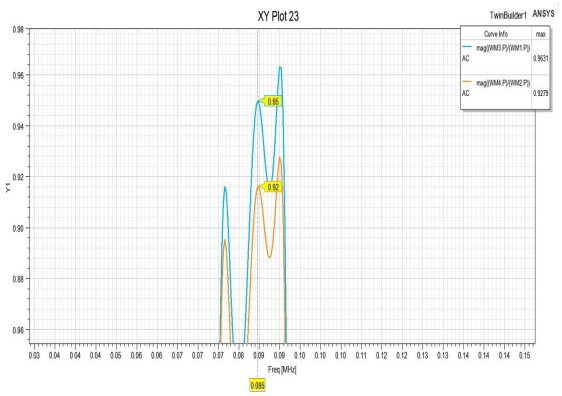


Fig 11 Plot for power transfer efficiency between T1-R1 and T2-R2 obtained using AC analysis

CONCLUSION

Thus, power transfer efficiency achieved for the modeled system operating at 230 V AC supply and 85 kHz resonance frequency is 95% between coils T1-R1 and 92% between coils T2-R2.

ACKNOWLEDGEMENT

This paper and the project work behind it would not have been possible without the exceptional support of our guide, Prof. Omkar Pawaskar, PVG's College of Engg & Technology, Pune. His knowledge and exacting attention to every minute detail has been instrumental in helping us keep the right track. We express our gratitude to the Electrical Engg Dept of BVDUCOE also for allowing us to access the Ansys Maxwell software at their laboratory.

References

[1] Kunwar Aditya, "Design Implementation of Inductive Power Transfer system for wireless Charging of Future Electric Transportation," a thesis submitted to Faculty of the Graduate study through the department of electrical, computer and software engineering at the university of Ontario Institute of Technology, Oshawa, Ontario, Canada

[2] X. Shi, C. Qi, M. Qu, S. Ye, G. Wang, L. Sun, et al., Effects of coil shapes onwireless power transfer via magnetic resonance coupling, J. Electr. Waves Appl., 28 (2014) 1316–1324

[3] Chirag Panchal, Sascha Stegan, Junwei Lu, "Review of Static and Dynamic Wireless Electric vehicle charging system," Griffith School of Engineering , Griffith University, Nathan Campus, Brisbane 4111, Australia

[4] Saumitra Pal Choudhori "Design of Wireless Power Transfer Coil useful in High Power Charging of Electric Vehicle", , candidate from School of Industrial and Information Engineering.

[5] S. Li and C . Mi, "Wireless power transfer for electric vehicle applications," IEEE Trans. Ind. Electron, vol 60, no. 1, pp. 318-28, Jan 2013.

[6] Weihan Li, Student Member, IEEE, Han Zhao, Junjun Deng, Member, IEEE, Siqi Li, Member, IEEE, and Chunting Chris Mi, Fellow, IEEE, "Comparison Study on SS and Double-Sided LCC Compensation Topologies for EV/PHEV Wireless Chargers

Forest Cover Change Detection using Satellite Images

Achal Kalwar
Information Technology DepartmentXavier Institute of Engineering Mumbai, India
achal.kalwar13@gmail.com

Rohan Mathur
Information Technology DepartmentXavier Institute of Engineering Mumbai, India
mathurrohan04@gmail.com

Shubham Chavan
Information Technology DepartmentXavier Institute of Engineering Mumbai, India
shubhamchavan1999@yahoo.in

Chhaya Narvekar
Professor, Information Technology DepartmentXavier Institue of Engineering Mumbai, India
chhaya.n@xavier.ac.in

***Abstract* - Deforestation, which has contributed toadverse effects on the natural environment, is one of the challenges to reducing biodiversity and global climate change. Thus, early detection of deforestation is of utmost importance. Inspired by the above situation, this work provides an examination of the automated deforestation detection method. Change detection is used to figure out whether or not the changes occurred using remote sensing images at two different times. This work proposes an idea of effective method for detecting relevant changes in the equivalent scene between twotemporally different images. This research analyzes image data from a remote sensing satellite calledLandsat-8 in order to track changes in forest cover overa period of time. The findings of such a study will lead totaking steps to conserve the environment.**

Keywords – Remote Sensing, Multi-temporal, Landsat-8, QGIS, Change Detection, NDVI

I. INTRODUCTION

Forests are the guardians of humankind. Forests provide us with essential ecological and economic services like clean water and air, soil conservation, climate modulation, timber, food, and shelter for the animals. Forest cover changes are dynamic, expedite, and extensive process [25]. Owing to climate change and man-made factors, the forest cover regions in many parts of the world have been forced to degrade. Development in a metropolitan city like Mumbai comes at the cost of degradation of forest covers. Many forest areas of Mumbai have been forced to deteriorate due to the development of infrastructure. Mumbai's economic development poses a danger to the ecological balance of the forests. Many scientists have predicted that in the coming few decades, the city will lose its green lungs.

Remote Sensing is acquiring information about objects or areas without making physical contact with the object [4]. One of the commonly used applications of remote sensing is tracking of the forest covers. Remote sensing forms to be an economic tool for forest mapping as it is cheaper and also faster compared to other methods of surveying. Change detection using remote sensing technique is based on a series of multi-temporal satellite images which uses various classification algorithms along with Geographic Information System (GIS) tool that provides a suitable platform for data analysis.

The paper mainly focuses on studying and monitoring the pattern of forest cover change using temporal satellite data from different time periods. The assessment and mapping of green vegetation in urban areas play a critical role in observing trends in vegetation and urban organisation. The impact of vegetation on the urban ecosystem is important. Vegetation is significant because it demonstrates an adaptable resource for effectively managing and moderating a number of urbanization-related issues [22].

II. PROBLEM DEFINITION

Around 3.4 billion hectares of the world is covered by forest. For development purposes, 15,000 sq km of forests have been diverted in the past three decades [5]. There is not any continuous monitoring system for forest cover change which includes forest inventory or geographical information system which keeps track of land use which can give actual figures. This lack of the system and great concern involved in the increased destruction of forest cover change has led to the need to propose a system for the proper forest, management, and decision improvement [10].

From the above context, the following problems are identified -
- Decline in the area under forest.
- Loss of biodiversity and habitat.
- Transformation of the reserved and protected forest areas into developed and agricultural areas [3].

The proposed system is designed to tackle the above-mentioned problems by studying the change cover detection of forest areas over the past few years. Remote Sensing (RS) based tools are used toclassify the multi-temporal Landsat 8 images. Understanding vegetation dynamics, transitions, and relationships between human activity and natural phenomena is critical for proper forest management and decision enhancement, as suggested in this study.

The main objective of the proposed system are:
- Pattern of forest cover change.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

• Determine whether or not there has been any change in the region under study.

III. DATA AND STUDY AREA

The research area is Sanjay Gandhi National Park, a protected area spread over approximately 87 sq km in Mumbai. It covers a geographical location between 19 ° 8 'N 72 ° 53' E and 19 ° 21 'N 72 ° 58' E. The park occupies the majority of the northern suburbs of Mumbai. The suburbs Goregaon, Malad, Kandivali, Borivali, and Dahisar lie to the west. Bhandup and the Mulund suburbs lie to the east [10]. To the south lies Aarey Milk Colony. The forest enters Thane City in the north.

The Sanjay Gandhi National Park is home to more than 270 bird species, 35 mammal species (including leopards) and 1,300 plant species [15].

Fig. 1. Study Area

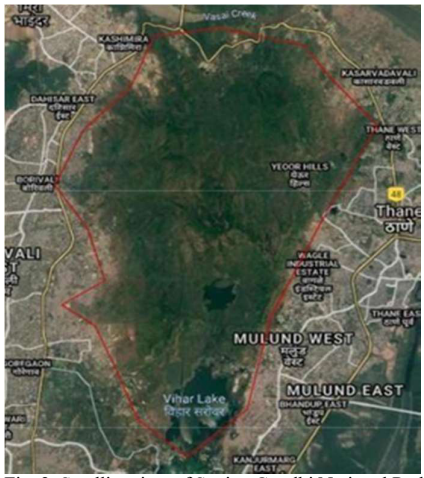


Fig. 2. Satellite view of Sanjay Gandhi National Park

Landsat 8 OLI multi-temporal remote sensing data for November 2013 and November 2018 has been acquired. The remote sensing data was gathered from the Geological Survey of the United States (USGS) archives [7,21]. Table 1 provides the details of satellite data used.

TABLE I. SATELLITE DATA DETAILS

Date	Satellite/Sensor
19 November 2013	Landsat 8 OLI
01 November 2018	Landsat 8 OLI

III. LITERATURE SURVEY

Usually, current change detection techniques adopt one of two ways, using either post classification analysis or analysis of difference image. Owing to the high-resolution nature of satellite images, these approaches are also resource-intensive and time-intensive. The post classification method would first classify the two temporallydistinct images of the equivalent scene and then compare them to determine the changes. The second approach is comparative study, which produces a difference image (DI). In order to determine the extent of the changes, further DI research is then undertaken [2, 20].

Deep Learning (DL) methods have recently been successfully applied to the image processing of Remote Sensing (RS). It is possible to learn several layers of data representation using Deep Neural Networks (DNNs) and extract more robust and abstract features, which typically offer more useful knowledge than hand-crafted ones. In this context, variants of DNNs are possible candidates for automatic deforestation detection, such as Convolutional Neural Networks (CNNs) and Siamese Networks [9, 17].

In remotely sensed data, the prevalent approaches to change detection can be classified into two main classes; low-level local approaches and object-based approaches. Low-level approaches allow use of statistical indexes extracted from spectral image pixel values. Object-based methods take qualitative information into account by focusing on homogeneous pixels, which are typically clustered together on the basis of their appearance, position and/or temporal properties [12].

Before detecting the change, the feature extraction stage isnecessary when using machine learning algorithms. The feature extraction step is used to improve multispectral image precision. But, when using deep learning algorithms, no separate feature extraction process is necessary. The accuracy of the classification is dependent on the algorithmsused to classify the changes, as well as the resolution of the images. We also concluded that deep learning algorithms have provided higher accuracy than techniques for machine learning [14].

Image Processing Techniques, image fusion, Fuzzy clustering, Difference Image (DI) are the earlier methods of change detection. The traditional methods are not very accurate in detecting the changes from the satellite images. Change detection methods can be classified as either supervised or unsupervised. To derive an appropriate training set, the supervised approach requires a ground truth. The unsupervised method, by allowing a simple comparison of multi-temporal images without adding any additional detail, performs change detection [5, 24].

In general, relative to other machine learning approaches, the drawbacks of deep learning are the need for large and high-quality training data, as well as hardware restrictions related to GPU computing capacity. The most notable benefit of deep learning is the degree of automation and the high ability to generalize by using large quantities of representative training data, which, however, may not always be available; particularly with regard to ground-truth

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

labels that might be scarce or not exist at all [1, 19].

IV. METHODOLOGY

A. Extraction of Study Area

The initially downloaded multi-temporal satellite images were clipped and the area of Sanjay Gandhi National Park was extracted with the help of QGIS Clipper tool [13]. QGIS is a free and open-source cross-platform desktop geographic information system (GIS) program that facilitates accessing, editing, and analyzing geospatial data[6].

The clipped images were further processed to make several atmospheric corrections. Clipped images were the input source for the QGIS Semi-Automatic Classification Plugin tool, which generated reflectance images as its output [13]. Reflectance images typically contain spectral details of the specified area and are used for image classification or image processing. Fig. 4 shows the raw satellite image of the study area which is clipped using the QGIS Clipper tool.

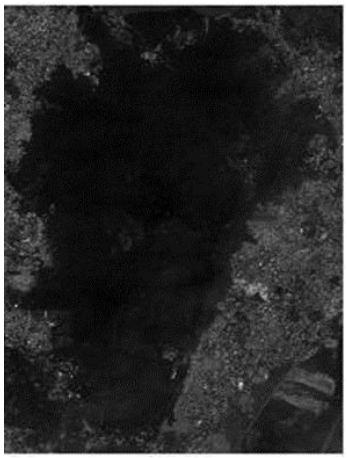


Fig. 4. Clipped Image

B. Study of Spectral Bands

A spectral band is a matrix of points identified by three dimensions, their coordinates, and their radiance-related strength [8]. In different combinations, the multispectral image bands were combined and applied to the obtained reflectance images. To get the final processed image, the band combination 5-4-3 was used. The 5-4-3 band combination uses the near-infrared band (NIR), which is more useful for showing and distinguishing land coverfrom urban and agricultural areas [11,18].

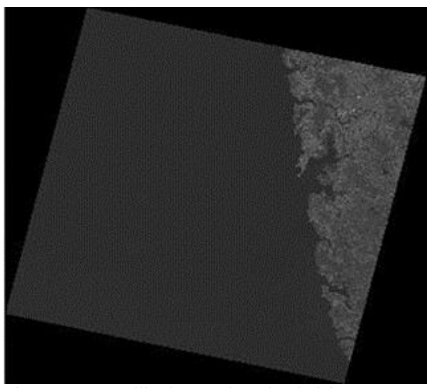


Fig. 3. Raw satellite image downloaded from USGS

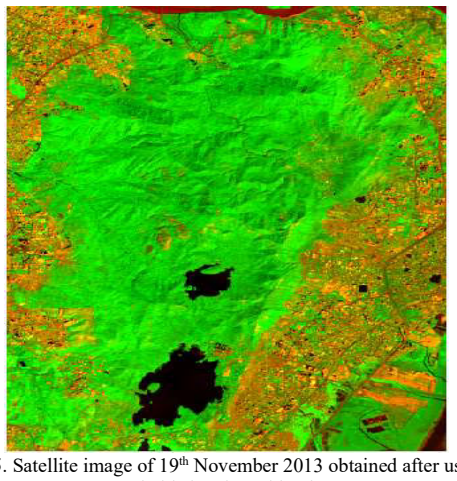


Fig. 5. Satellite image of 19th November 2013 obtained after using a suitable band combination

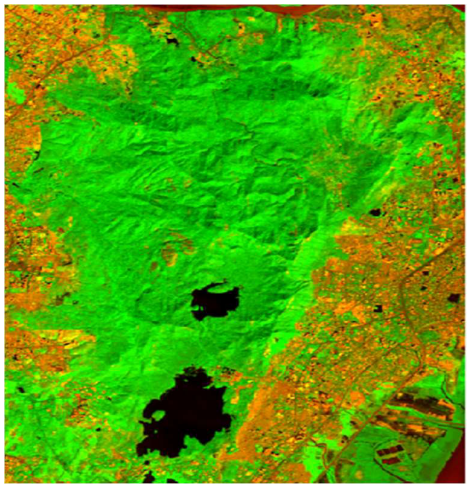


Fig. 6. Satellite image of 01st November 2018 obtained after using a suitable band combination

A. NDVI Calculation

An object can be characterized by its spectral reflectance pattern. The key feature of vegetation's spectral signature is its high reflectance in the near infrared region and red band absorption. A vegetation index (VI) is an algorithm for detecting vegetation in multispectral data using the different bands. In recent years, a number of vegetation indices have been developed and validated. One of the most commonly used indices for tracking vegetation dynamics at regional and global scales is the NDVI [18]. The Normalized Differential Vegetation Index (NDVI) was used in this research

The normalized difference vegetation index (NDVI) is a basic graphical metric that can be used to determine whether or not the object being analysed includes live green vegetation using remote sensing measurements, often from a space platform. The NDVI is calculated as follows:

$$NDVI = (NIR - Red) / (NIR + Red) \quad (1)$$

where RED and NIR denote the spectral reflectance measurements in the red (visible) and near-infrared regions respectively [26].

The value of NDVI ranges between − 1.0 and + 1.0. The NDVI

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

values near zero and decreasing negative values represents the non-vegetated area such as water, barren land, snow [16]. The NDVI values closer to positive one indicates the vegetated areas such as forest.

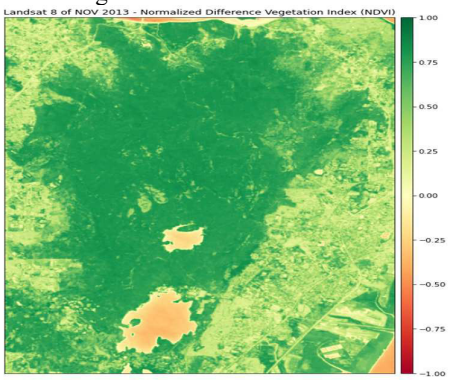


Fig. 7. NDVI calculation for the 19th November 2013 image.

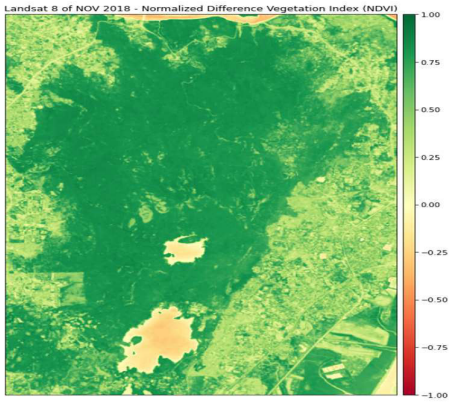


Fig. 8. NDVI calculation for the 01st November 2018 image.

B. NDVI Classification

The image of the study area was classified into 5 classes namely water area, land area, low vegetation, moderate vegetation and forest. The NDVI threshold value approach was used to identify this vegetation cover. The NDVI threshold value can be used to classify different types of vegetation in a city.

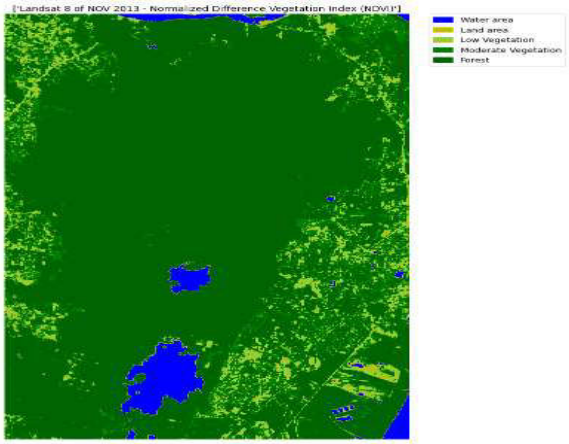


Fig. 9. NDVI classification for the 19th November 2013 image.

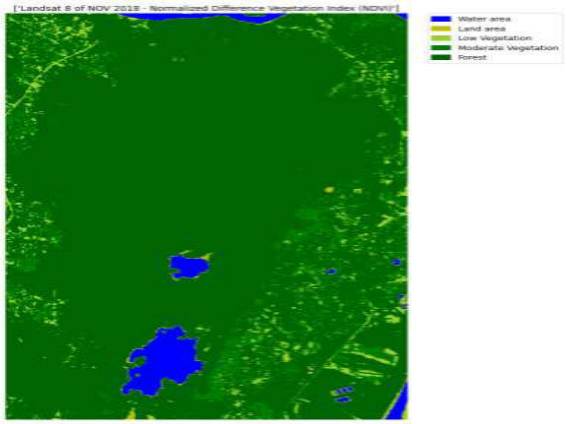


Fig. 10. NDVI classification for the 01st November 2018 image.

C. Change Detection

The Change Detection analysis is a useful tool for describing the changes that have occurred in the forest. Firstly, a stack of two images from different years was generated and then a histogram was plotted which represents the similarity of the two images. As in the histogram, the spike is near 0.0 which means that the two images are similar, minor changes are present.

Fig. 11. Stack of two images from different years.

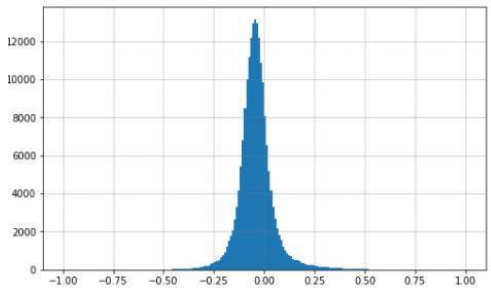


Fig. 12. Histogram representing similarity of two images.

A threshold value is defined and then applied to highlight the change detection. The pixels having value greater than the threshold has undergone changes over the years and no change is observed for the pixels having values lesser than threshold. In Fig.13, the while pixels indicate no changes and the green pixels indicate that they have undergone change.

IEEE TKD-21/ ISBN No. 978-81-992245-3-6

Fig. 13. Output of the change detection.

V. CONCLUSION

The dataset has been acquired successfully from the USGS website. We have performed pre-processing on the data and have successfully extracted the area of study by clipping the initially acquired images for the year 2013 and 2018 and also applied a band combination 5-4-3 using QGIS. The change in vegetation cover of Sanjay Gandhi National Park was compared using remote sensing and image processing. This study tests the technological potential of satellite imagery to quantify and monitor forest cover by classifying multi-temporal satellite images to assess if there has been some change in the forest cover being analyzed. It is possible to monitor forest cover changes using satellite images [23]. This research will help to take precautions to conserve forests. Government agencies should take adequate steps to conserve the environment in Mumbai and not allow it to be sacrificed at the cost of urban development.

REFERENCES

[1] Zayd Mahmoud Hamdi. Melanie Brandmeier and Christoph Straub, "Forest Damage Assessment Using Deep Learning on High Resolution Remote Sensing Data", MDPI, 22 August 2019.

[2] Kevin Louis de Jong, Anna Sergeevna Bosman, "Unsupervised Change Detection in Satellite Images Using Convolutional Neural Networks", 21 March 2019.

[3] Abyot Yismaw, Birhanu Gedif , Solomon Addisu , Ferede Zewudu, "Forest cover change detection using remote sensing and GIS in Banja district, Amhara region, Ethiopi", International Journal of Environmental Monitoring and Analysis, 23 December 2014.

[4] https://en.wikipedia.org/wiki/Remote_sensing (accessed Feb. 11, 2020).

[5] https://www.encyclopedia.com/environment/energy-government-and-defense-magazines/forest-resources (accessed March 13, 2020).

[6] https://en.wikipedia.org/wiki/QGIS (accessed May 16, 2020).

[7] https://earthexplorer.usgs.gov/ (accessed April 11, 2020).

[8] https://www.sciencedirect.com/topics/earth-and-planetary-sciences/spectral-band (accessed June 2, 2020).

[9] M. X. Ortega, J. D. Bermudez, P. N. Happ, A. Gomes2, R. Q. Feitosal, "Evaluation Of Deep Learning Techniques For Deforestation detection In The Amazon Forest", ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume IV-2/W7, 2019.

[10] https://en.wikipedia.org/wiki/Sanjay_Gandhi_National_Park (accessed April 25, 2020).

[11] https://openweather.co.uk/blog/post/satellite-imagery-landsat-8-and- its-band-combinations (accessed June 1, 2020).

[12] Salman H Khan. Xuming He, Fatih Porikli and Mohammed Bennamoun, "Forest Change Detection in Incomplete Satellite Images with Deep Neural Networks", IEEE Transactions On Geoscience And Remote Sensing, August 2018.

[13] https://plugins.qgis.org/plugins/SemiAutomaticClassificationPlugin/ (accessed June 11, 2020).

[14] T. Vignesh, K. K. Thyagharajan, K. Ramya, "Change Detection using Deep Learning and Machine Learning Techniques for Multispectral Satellite Images". UJITEE, ISSN: 2278-3075, Volume-9 Issue-IS, November 2019.

[15] https://mumbaimirror.indiatimes.com/mumbai/cover-story/park-in-peril/articleshow/62773396.cms (accessed Aug. 11, 2020).

[16] https://www.sciencedirect.com/topics/earth-and-planetary-sciences/normalized-difference-vegetation-index (accessed March 6, 2021).

[17] Lior Bragilevsky, Ivan V. Bajic´, "Deep Learning for Amazon Satellite Image Analysis", IEEE, 2017.

[18] Hamish Dsouza, Sudha Gupta, "A Study in Change in Vegetation Cover in an Urban Environment: A Multi-spectral, MultiTemporal analysis of Mumbai Suburban District using Remote Sensing", Journal of Agroecology and Natural Resource Management. Volume 3, Issue 2, July-September 2016.

[19] Abhishek Bhatt, S.K. Ghosh, Anil Kumar, "Automated Change Detection in Satellite Images Using Machine Learning Algorithms for Delhi, India", IGARSS, 2015.

[20] Shyam Boriah, Varun Mithal, Ashish Garg, Michael Steinbach, Vipin Kumar, "Automated Detection of Forest Cover Changes", Igarss, 2010.

[21] https://www.usgs.gov/core-science-systems/nli/landsat/landsat-8-data-users-handbook (accessed Dec. 11, 2020).

[22] Haslina Hashim, Zulkiflee Abd Latif, Nor Aizam Adnan, "Urban Vegetation Classification with NDVI Threshold Value Method with Very High Resolution (VHR) Pleiades Imagery", The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume XLII-4/W16, 2019.

[23] POL R. COPPIN, MARVIN E. BAUER, "Change Detection in Forest Ecosystems with Remote Sensing Digital Imagery", 1996.

[24] Jessica Henderson, Joseph Piwowar, "Analysis of Changes in Vegetation Condition in Grasslands National Park Using Remote Sensing", IEEE, 2006.

[25] http://www.fao.org/3/XII/0586-C1.htm (accessed Oct. 23, 2020).

[26] https://en.wikipedia.org/wiki/Normalized_difference_vegetation_index (accessed April 14, 2021).

IoT based Thief Detection and Surveillance System using Raspberry Pi

Shrutika Sorte[1], Aman Kumar[2], Rahul Gupta[3],Dr. D. S. Mantri[4]

Professor, Department of Electronic and Telecommunication, Sinhgad Institute of Technology, Lonavla, India[4].
Student, Department of Electronic and Telecommunication, Sinhgad Institute of Technology, Lonavla, India[123].
shrutika.lgmnd17@sinhgad.edu[1],aman.dcnmf17@sinhgad.edu[2],rahul.egfndl17@sinhgad.edu[3],
dsmantri.sit@sinhgad.edu[4].

ABSTRACT:*Security has becomethe most challenging task. In order to keep our property safe from thieves and from getting destructed, it is necessary to safeguard the property. In our absence, we propose the theft detection and monitoring System using IOT and Raspberry Pi to secure and guard our house. The older methods used for surveillanceinclude CCTV cameras but it becomes costly as it needs computers and manpower for monitoring. Compare to the actual System, Raspberry Pi is much reasonable with better resolution and low power utilization features. The system keeps tracking the entire floor for movement. One single step anywhere on the floor is tracked and the user is alarmed through the mail over IoT. The images are captured and sentthrough email to the owner which providing real-time alerting and better security.*

Keywords:IoT, HTTPProtocol,PIR Sensor, Raspberry Pi, GMAIL, Camera.

I. INTRODUCTION

In the current scenario security is one of the most challenging tasks. We keep our capital and other valuable belonging in our house, but there is no assurance of their safety, many systems are designed to keep track of their properties but still, it is difficult to obtain a hundred percent security in real-time [1-3]. The security systems nowadays include CCTV surveillance. Although it is used on a large scale but continuous manpower is required for its secure results. Along with that CCTV surveillance is very costly. To overcome this, we have built IoT based thief detection and alerting system using raspberry pi[4-5], it is a system that tracks the movements in your house in your absence and alerts you through email. By sending real-time images and also provides live video streaming and also reduces the manpower required for keeping a constant eye on the surveillance. The system alsoprovides automatic control over the door which can be done remotely,which provides a highly secure and controlled environment. Some Applications areHome Security, Used at Bank, and Can be used at jewelry shops and Malls. The main objectives of the paper are

A. To create a surveillance system with the leastmanpower.
B. To get real-time alert messages when an intruder arrives.
C. To reduce high storage requirements in CCTVsurveillance systems.
D. To demonstrate HTTP protocol.

The Complete paper has been organized in different sections as
Section 2:introduces the block schematic.
Section 3: proposes the algorithmic flow.
Section 4: explains the hardware requirements with Sensors.
Section 5: Software Requirements are given
Section 6: Discusses implemented result and finally the paper is concluded in section 7

II. BLOCK DIAGRAM

The proposed block diagram of the system is shown in Fig.1. It has a PIR sensor, Servomotor and Camera interfaced to take real time images, which are processed by RPI3B+, and indication is given to the owner using email.

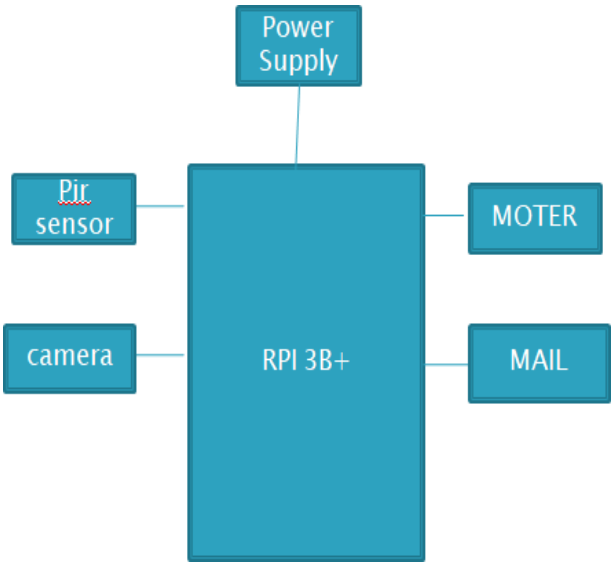


Fig 1. Block diagram.

The surveillance system has a PIR sensor that is used to detect movement. The Camera is interfaced with raspberry pi which captures the images. The PIR sensor is placed at the

entrance from where thieves can enter the house. Once the doors are locked, we must turn on the system. Whenever a thief enters the house, the motion is detected by PIR sensors and it sends the data to the Raspberry pi. The camera is turned on and images are captured and sent to the owner through email, now the owner can control the gate.

III. PROPOSE ALGORITHM FLOW

The proposed flow of the algorithm is given in Fig 2.

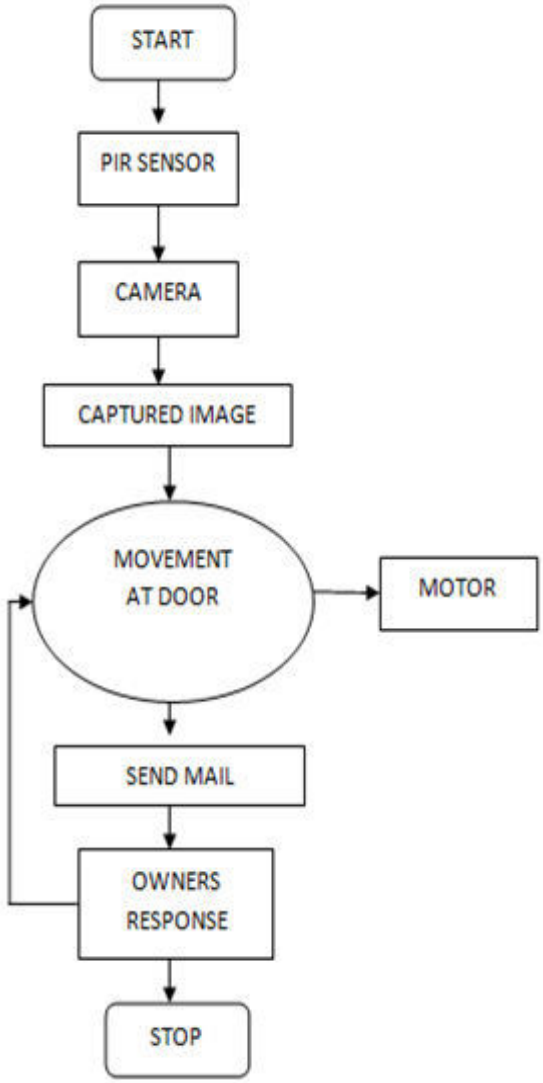


Fig.2 Flow chart of a designed system

Step1: System is started when the power supply of 5V is applied and is connected tothe internet.
Step 2: If any object enters in range of the PIR sensor, it will sense the motion and high digital pulses are sentto controller.
Step 3: The Camera is triggered and activated,it will capture the images. The images are stored in .jpg format. The camera is controlled and managed by an openCV , it is a computer vision library tool [6].
Step 4. The captured image is sent to the owner through Email, which is done by using SMTPlib.The text and attachments are encoded into base64.
Step 5: When the owner receives the mail, it provides the link to a webpage that can be accessed by the owner by login Id and password.
Step 6: A Servo motor is fixed at the door which enables the door to rotate for 90 degrees. The owner has control over the motor and the door can be controlled remotely.

IV. HARDWARE REQUIREMENT WITH SENSOR

The proposed circuit diagram is shown in Fig 3

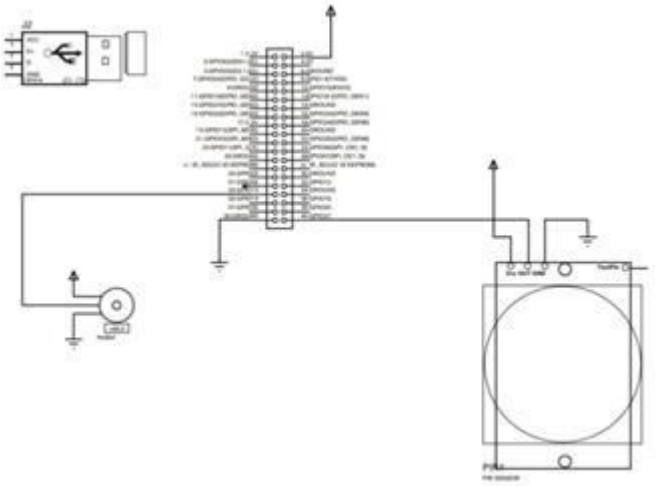


Fig.3 Circuit Diagram

It has various Hardware Components as

1. Raspberrypi 3B+2. PIRsensor
3. Camera
4. Servo Motor

A. RASPBERRYPI

Raspberry pi is a Quart core 1.2 GHz Broadcom BCM2837 64bits ARMv7 powerful processor Shown in Fig4. It has Inbuilt features: -

- 1 GBRAM
- 40 GPIOpins
- 4 USB 2ports
- CSI cameraports
- BCM43143 WIFI onboard.

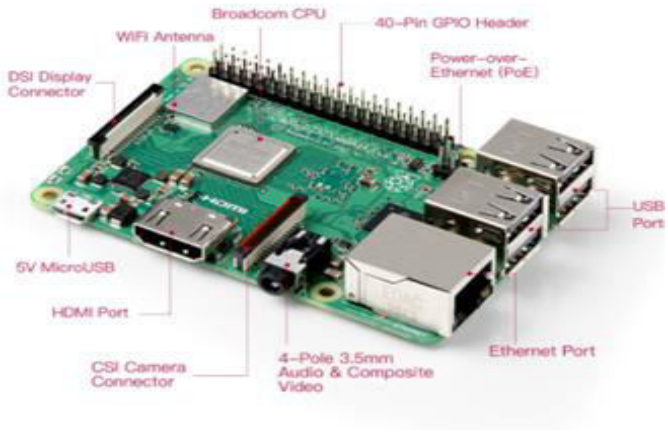


Fig 4. Raspberry pi 3B+

B. PIRSENSOR

The PIR sensor stands for Passive Infrared sensor. It is used for detecting the presence of Human beings or animals. This sensor has three output pins 1. Vcc,2. Output and3. Ground Shown in Fig 5. Along with Pin details in Table 1

Fig 5.PIR Sensor

Table1: Pin configuration of PIR sensor

pins	Pin name	Description
1	Vcc	Input voltage Can range from 4.5V-12V
2	Output	Digital pulse high (3.3V) when triggered digital low(0V) when no motion detected.
3	Ground	Connected to ground of circuit

Features of PIR sensor: -

- The input voltage varies from 4.V to 12V (+5V recommended)
- Output voltage is High/Low (3.3VTTL).
- Human movement and object movement can be detected.
- Total distance around 120° and 7 meters can be covered.
- Operating temperature from -20° to +80°Celsius.

C. CAMERA

UVC (Universal Video Class) Driver Camera is appliedto all devices or functions. Inside the composite devices, which are related to all video functionality. Ituses USB for connection which allows high-speed datatransfer. The Camera structure is shown in Fig 6.

D. MOTOR

Using PWM pins of the Raspberry pi servo motor is attached. The Servo motor used is SG90 it is a small servo motor that does not require any motor controller it can be controlled by any servo code.Specifications of servo motor shown in Fig 8 are

- Rotation:0°-180°
- Gear Type:Plastic
- Operating Voltage is +5Vtypically
- Torque:2.5kg/cm
- Operating speed is0.1s/60°

Fig 6. Camera

Fig 7. Servo motor

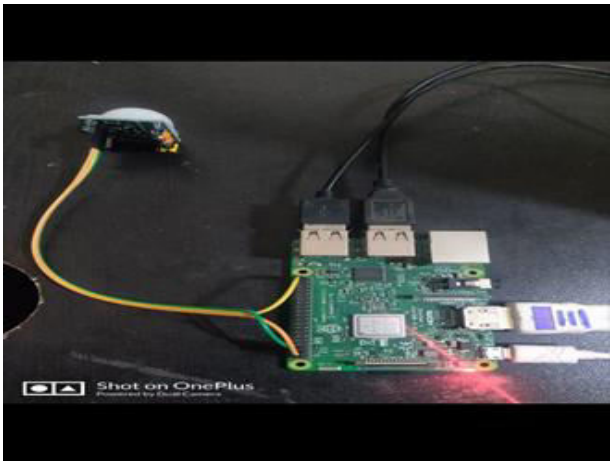


Fig 8. Hardware Implementation

As shown in Fig.8, The PIR sensor is interfaced with raspberry pi at pin no.21, Raspberry pi has four PWM pins out of which servo motor is connected to pin no.3.UVC camera is interfaced with raspberry pi at its USB port. Power supply of 5V is given to raspberry pi and device is connected over internet through HTTP protocol [7].

V. SOFTWAREREQUIREMENTS

A. Raspbian OperatingSystem

Raspberry pi requires an operating system. Itis a freeOS supportedDebian optimized for the Raspberry Pi hardware. Raspbian provides smoothandfaster performance for applications that include heavy use of floating-point arithmetic operations. Although Raspbian iscreated by Mike Thompson and Peter Green, it has also been benefited greatly from the community members of RaspberryPi [8-10].

B. Python

Python is high level, object-oriented programming language. Python is simple to learn it has very simple syntax it is highly readableand easy for maintenance. Python is generally usedfor

- Back end in web application and mobile app development
- Desktop app and softwaredevelopment
- Processing bigdata
- Performing mathematicalcomputations
- Writing systemscripts

Python is an open-source programming language, which means it is free to use and enables users to modify or create extensions for the Python languageas it is open- source so it allows other programming languages to have frameworks, libraries and, other tools that keep the Python language relevant and adaptable over time. It is highly readable and easy-to-uselanguage.

VI. RESULTS AND DISCUSSIONS

The surveillance system is created which requires the least manpower which gives alerting messages in real time whenever an intruder arrives. Fig 10.Shows a message is sent through an email which contains image captured by the camera.The surveillance system has successfully reduced the high storage requirements which are required in CCTV surveillance.The HTTP protocol is successfully demonstrated in this system. Fig.9 shows website, where user can sign in using user id and password, after successfully login user can see live streaming. Website provides the functionality of controlling servo motor remotely.

Fig.9 Websites

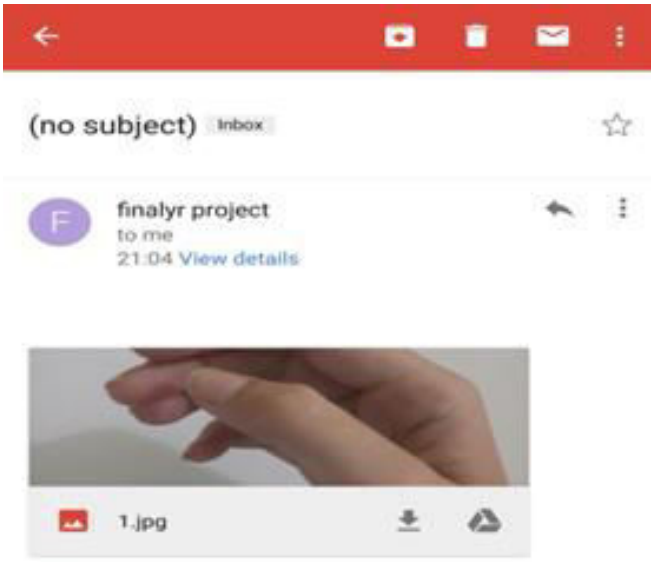


Fig 10. Email sent to the owner

VII. CONCLUSION

The proposed surveillance system in the paper provideseffective security and real-time data analysis. It is cost-effective and many numbers of PIR sensors can be added to the system for increasing its efficiency. The variety of images can be captured and used as evidence. Hence the proposal is highly efficient and low-cost.

REFERENCES

[1] Ajay Vikram Singh and Siham Al Hinai, "IOT: Architecture Security challenges and Solutions", (ICTUS'2017), At Amity University Dubai on (Trends and Future Directions), pp. 202-205, 18 – 20 December 2017.

[2] Manju Jose, Fatma Al Shuhaimi and Ajay Vikram Singh, "Software based Network as Solution to Overcome Security Challenges in IoT", (Trends and Future Directions) (ICRITO) at AUUP pp. 491-496, September 07-09, Year 2016.

[3] Punam Mohite, Nikita Meshram and Pratiksha Nazirkar, Home Automation and Security using MSP430, International Research Journal of Engineering Technology, vol. 06, no. 04, April 2019.

[4] M Surya, Deveshit Gupta, Vamikrishna, Pachwa and Virginia Menezea," Surveillance and Raspberry Pi" and Simple CV system Using Green Computing the Internet of Things (ICGCIoT), 2016.

[5] Sadhana Godbol, Shivani Deshpande, Neha Barve and Sakshi, Anti-theft system using raspberry pi and PIR sensor, International Journal of advance research in Computer science Applications and Communication engineering, (0975 - 8887), Volume 155, No. 11, December 2016.

[6] Priya B. Patel, Viraj M. Choksi, Swapna Jadhav and M. B. Poddar, Smart Motion Detection Using Raspberry Pi, International Journal of Applied Advanced Information Systems, Computer Science FCS ISSN: 2249-0868, Vol. 10 no. 5, February 2016.

[7] Subranil Som ,and Sunil Kumar Khatri, Nishank Shakti, "Security Implications in IoT Using Authentication and Access Control","7th International Conference ICRITO 2018". Published IEEE Xplore: 01 July 2019, 2018, 29-31 August 2018.

[8] Chinmay Kaundanya, Onkar Pathak, Akash Nalwade and Sanket Parod, Using the Smart Surveillances System using Raspberry Pi and Face Recognition, Advanced Research in Computer and Communication Engineering, April 2017.

[9] S. Javed Hussain, Archana, Iske Jilani, Smart thief detection System to Speak Things and on Raspberry, International journal of Research in Computer Applications and communication engineering Vol. 4, no. 7, July 2015.

[10] Saurabh Singh Rajwat, s. Som, A. Rana Computer Science 2020 8th International Conference on Credibility, (Trends and Future Directions) Info COMM Technologies and Optimization (ICRITO) 2020.

Detection and Location of Power Theft using IoT

Atharv Parsekar
Department of Electrical Engineering
Atharva College of Engineering
Mumbai, India
parsekaratharv2107@gmail.com

Neeraj Gupta
Department of Electrical Engineering
Atharva College of Engineering
Mumbai, India
gneeraj970@gmail.com

Nimesh Wankhede
Department of Electrical Engineering
Atharva College of Engineering
Mumbai, India
nimeshw8@gmail.com

Sumukh Padalkar
Department of Electrical Engineering
Atharva College of Engineering
Mumbai, India
sumukh.padalkar@gmail.com

***Abstract*— Electrical systems suffer from various problems, one of which is power theft. Thus, power monitoring becomes important. A large amount of energy is lost due to power theft and improper management. We integrate IoT with the existing system that helps us detect the power theft and the area/location of power theft. The approach is efficient and cost effective to solve the problem of power theft in overhead transmission lines. We take the source voltage and source current from the secondary side of the transformer and the voltage and current readings from the load side. All four readings are sent wirelessly to the cloud. After calculations, power theft is determined and hence the location is sent to the concerned authority. The testing of the same is done on MATLAB software. Hence, by using IoT we provide a cost-effective solution to a very common problem of power theft.**

Keywords*— *power theft, theft location, IoT, simulation

I. INTRODUCTION

In India, 27% of the power generated is lost due to stealing or theft. This is one of the main reasons for transmission and commercial (AT&C) loss. Even after the Electricity Act, 2003 was enacted, we still see that the utility reports for a large amount of unaccounted power. Power theft causes the utility to suffer economic losses in the form of additional lost power. This leads to load shedding in many places and thus the consumer also suffers.

According to a survey conducted by the Northeast Group, the power sector of India loses around $16.2 billion to theft every year. Out of which, Mumbai losses $2.8 billion per year. The transmission and distribution losses in the states range from 23% to 50%. [4]

Power theft in India causes the GDP to drop by 1.5%, states the World Bank. [5]

Power theft mostly occurs at two places:

- Distribution lines
- House hold energy meter

Losses in electrical energy sector can come under two sets:

- Technical Losses
- Non-technical Losses

The major cause of technical losses is the reliability of the equipment used from generating station to the distributing station.

These are the losses that occur due to unidentified, misallocated or inaccurate energy flows. They can be thought of as electricity that is consumed but not billed Non-technical Losses occur mainly due to following reasons: [3]

- Tampering of energy meters.
- Defective meters.
- Errors in meter reading.
- Ignoring unpaid bills.
- Delay in meter readings and bills.
- Tapping of wires on LT lines.

There are already solutions for power theft that use Fuzzy Logic System [8], IoT and Neural Network [7], IR Sensor based [6], Bluetooth technology [9], etc. These methods are either cost ineffective or inefficient.

The proposed system will resolve the problem of power theft by providing an efficient and reliable solution. Here, using the required data from distribution transformer and load, we determine the location of the power theft. This location will be sent to the authority via email.

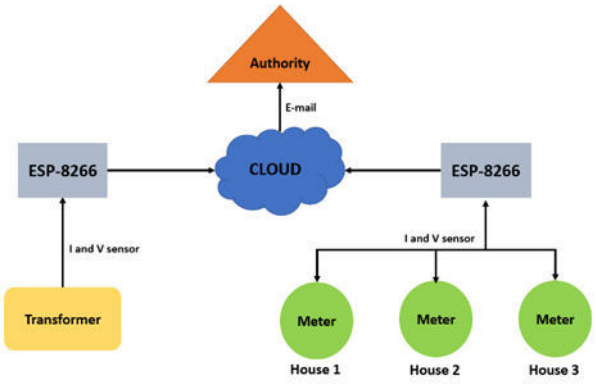


Fig. 1. Block diagram of proposed system

II. METHODOLOGY OF PROPOSED MODEL

The proposed model consists of a distribution transformer, a transmission line and numerous loads. The transmission line is represented by a series of resistances. These resistances divide the line into five equal parts. [1] Here, the houses are represented by loads. We take the current and voltage readings from the distribution transformer and the individual houses. [2] These readings are to be taken by “ACS712” and “ZMPT101B” sensors. These readings will be sent remotely to the cloud using nodemcu esp8266.

A program is fed in the cloud which is running at all times. The program performs the calculations given below and determines whether the theft has occurred or not. This is achieved using a python code. If not, then the program keeps on running in background and continuously checks if any theft has occurred. If a theft is detected, the distance of theft from the distribution transformer is calculated. Using this value, we calculate the coordinates of the theft location. These coordinates are then plotted on a map. The concerned authority is then alerted about the occurrence of the theft and the location of the same is sent to him/her via email. Thus, the theft is detected automatically without any human intervention with the help of IoT.

This ensures that the utilities are well informed and are keeping a check on the power thefts occurring in their area.

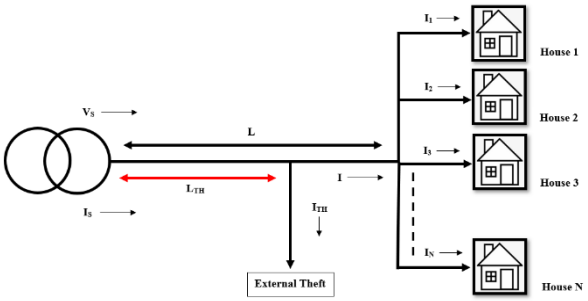


Fig. 2. Diagrammatic representation of transmission line during theft

III. CALCULATIONS

V_S = Source Voltage.

V = Terminal Voltage.

ΔV = Potential Difference during non-theft condition.

ΔV_{TH} = Potential Difference during theft condition.

I_S = Sending End Current.

I = Sum of Individual Load Currents.

I_{TH} = Theft Current

Z = Impedance of Transmission Line.

Z_{TH} = Impedance of line during theft.

L = Length of transmission line.

L_{TH} = Length of theft from the distribution transformer.

ρ = Resistivity of the conductor.

a = Area of conductor.

$$\Delta V = V_S - V$$

$$I = [I_1 + I_2 + I_3 + \ldots\ldots\ldots + I_N$$

During non-theft condition:

$$I_S = I$$

During theft condition:

$$I_S = I + I_{TH}$$

$$I_S = [I_1 + I_2 + I_3 + \ldots\ldots\ldots + I_N] + I_{TH}$$

$$Z = \Delta V / I_S = \rho.L / a$$

$$a = \rho.L / Z \qquad \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

$$\Delta V_{TH} = V_S - V$$

$$V_{TH} = \Delta V_{TH} - \Delta V$$

$$V_{TH} = I_{TH} * Z_{TH}$$

$$V_{TH} = I_{TH} * (\rho.L_{TH} / a)$$

$$L_{TH} = (V_{TH} * a) / (I_{TH} * \rho)$$

From (1)

$$L_{TH} = (V_{TH} * L) / (I_{TH} * Z)$$

Assuming area of existing conductor and theft conductor to be same.

IV. ALGORITHM

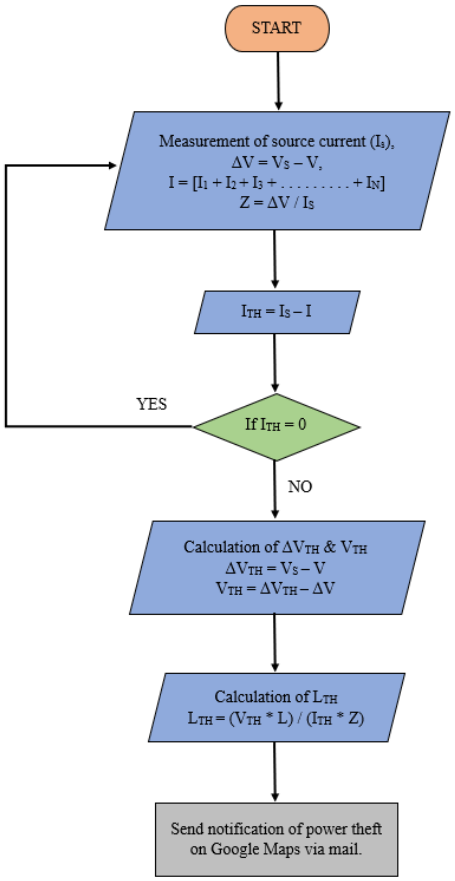


Fig. 3. Working flowchart of the system.

The above flowchart guides us through the step-by-step process followed by the system to detect and send the location of the power theft. The first block calculates the potential difference, which is the difference between source voltage and the load voltage. It also calculated load current and the impedance. Following block calculates the theft current, which is the difference between the source current and the load current. If the theft current is zero, then the same process is repeated. If not, then it calculates the theft potential difference and the theft voltage. After this, we calculate the length of the transmission line to the point where the theft has occurred. This length is sent to our python code, which pinpoints the location of theft on a map. The same is sent to the authority through email.

V. SIMULATION

We have simulated our model using MATLAB Simulink. Here, the transmission line is divided into five parts and four loads are connected to represent houses.

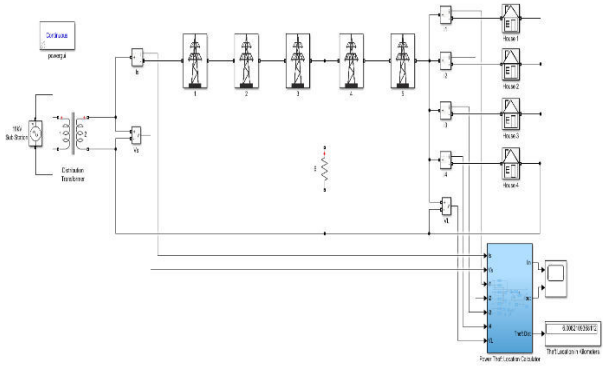


Fig. 4. Simulation model of Power theft location detection system on MATLAB software.

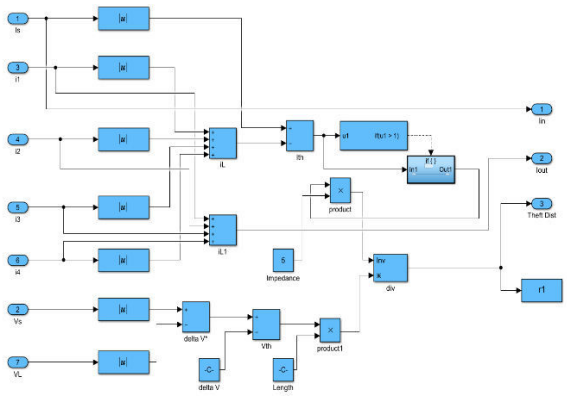


Fig. 5. Design of the subsystem in our simulation

Fig. 5. shows the Power Theft Location Calculator. Here, we take the values of Source Current and Source Voltage to perform calculations. We have also incorporated the “abs” blocks to take the absolute value of the same. A “to workspace” block is added to send our calculated length of theft to the workspace which is then sent to Excel for plotting on the map.

Sr. No.	Components used	Value
1.	Sub-station	11 kV
2.	Distribution transformer	11 kV / 230 V
3.	Length of transmission line	11.432 km
4.	House 1	100 Ω
5.	House 2	100 Ω
6.	House 3	200 Ω
7.	House 4	300 Ω
8.	Theft resistance	100 Ω

Table 1. Simulation Parameters.

Table 1. shows us the parameters of the equipment used in our simulation. We have assumed our houses to be resistive loads with the values mentioned in the table. The theft is also assumed to be a resistive load which can be inserted at any point on the transmission line.

VI. SIMULATION RESULTS

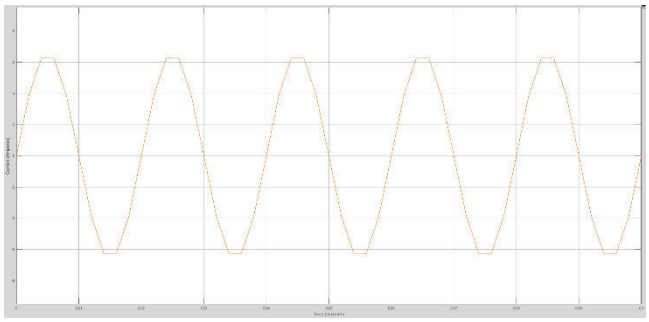


Fig. 6. Graph during non-theft condition.

From Fig. 6., we observe that the source current and the load current are almost equal since there is no theft. Hence, the graph coincides with each other.

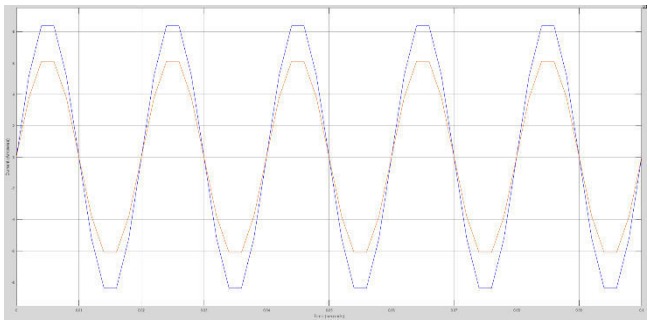


Fig. 7. Graph during theft condition.
Blue – represents source current
Orange – represents load current

In Fig. 7., we can see that the source current is much more than the load current. This indicates that power theft has occurred. Therefore, two distinct graphs are visible to us.

Condition	V_S (in V)	I_S (in A)	V_L (in V)	I (in A)	I_{TH} (in A)	L_{TH} (in km)
No Theft	230	5.708	201.5	5.708	0	N.A.
Theft (1,2)	230	7.874	199.5	5.653	2.221	2.0027
Theft (2,3)	230	7.747	197.7	5.602	2.145	4.0054
Theft (3,4)	230	7.625	196.0	5.554	2.071	6.0082
Theft (4,5)	230	7.509	194.5	5.510	2.000	8.0109

Table. 2. Observation Table.

From Table 2., we see that as we change the location of power theft on the transmission line, the corresponding length is obtained in the display box.

VII. OTHER RESULTS

Here, we can see the result which is obtained on email. The email notifies about the occurrence of power theft and sends a location on map.

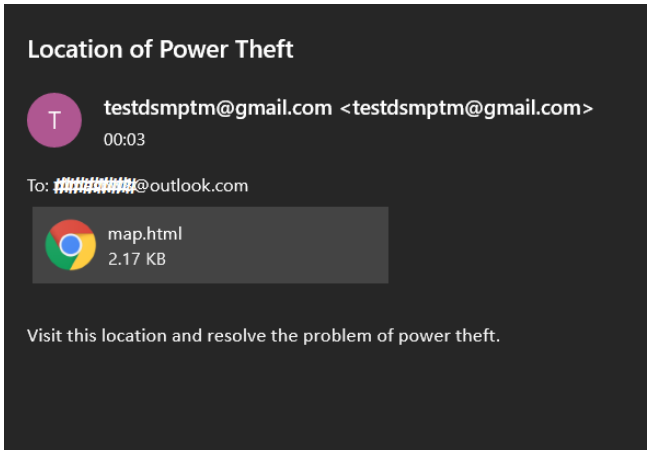


Fig. 8. Email notification of power theft with location.

Using the length of power theft stored in Excel, we find out the coordinates of theft with the help of a python code. This location is sent to a specified email address as seen in Fig. 8.

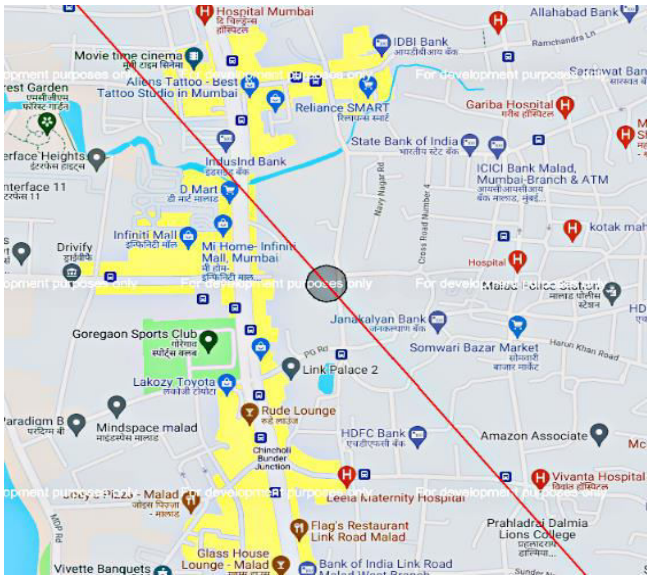


Fig. 9. Location of power theft on Maps.

The map which is received as an attachment in the email is shown in Fig. 9. We can see the exact location of theft and hence it is convenient for the authority as well.

VIII. SOFTWARE USED

A. *MATLAB R2018a*

We have used MATLAB Simulink which enabled us to simulate our model with minimal effort and maximum precision.

B. *Python 3.8.5*

We have used Python 3.8.5 to automate the process of plotting and sending the location of theft to the concerned authority.

C. *Atom 1.56.0*

We have used Atom to write our python code.

IX. CONCLUSION

The proposed system calculates the values of current and voltage from the distribution transformer and various households. After performing calculations, it determines if the power is being stolen or not. If theft has occurred, coordinates of the location of power theft are generated. These coordinates are also plotted on Google Maps and sent to the concerned authority to take action. This helps in minimizing power theft and reducing AT&C losses.

REFERENCES

[1] Uvais, M. "Controller Based Power Theft Location Detection System", 2020 International Conference on Electrical and Electronics Engineering, pp. 111-114. doi: 10.1109/ICE348803.2020.9122940

[2] N. Mucheli, U. Nanda, D. Nayak, P. Rout, S. Swain, S. Das, S. Biswal. "Smart Power Theft Detection System", 2019 Devices for Integrated Circuit (DevIC), 23-24 March, 2019, Kalyani, India, pp. 302-305. doi: 10.1109/DEVIC.2019.8783395

[3] P. Chandel, T. Thakur, B. Sawle, R. Sharma "Power Theft: Major Cause of Non Technical Losses in Indian Distribution Sector", 2016 IEEE 7th Power India International Conference (PIICON), doi: 10.1109/POWERI.2016.8077253

[4] S. Asthana. (2019, June 1). Punishments for Electricity Theft In India. Retrieved from https://blog.ipleaders.in/electricity-theft-punishments-india [Accessed 08th May, 2021]

[5] D. Rai. (2019, October 15). Electricity Theft – A Primal Concern. Retrieved from https://blog.ipleaders.in/electricity-theft-a-primal-concern/ [Accessed 08th May, 2021]

[6] A. Singhal, A. Tomar, N. Kumari, S. Kausar and C. Singh, "A Survey Of Iot For Power Theft Detection, Fault Identification And Location Tracking", International Journal of Science, Engineering and Technology Research (IJSETR), vol. 5, no. 5, pp. 1662-1665, 2016.

[7] P. Leninpugalhanthi, R. Janani, S. Nidheesh, R. V. Mamtha, I. Keerthana and R. S. Kumar, "Power Theft Identification System Using Iot," 2019 5th International Conference on Advanced Computing & Communication Systems (ICACCS), Coimbatore, India, 2019, pp. 825-830. doi: 10.1109/ICACCS.2019.8728361

[8] M. Shlibek. "Prevention of Power Theft and Reduction of Excessive Power Usage Using Fuzzy Logic for Residential Consumers" 2019 European Journal of Engineering Science and Technology. doi: 10.33422/EJEST.2019.08.20

[9] Salik, M., Zia, M. F., & Ali, F., "An efficient electricity theft and fault detection scheme in distribution system", Science International, vol. 28, no.-4, pp. 3531-3534, 2016.

HEALTH KIOSK SYSTEM

Divya Jayant Bhamre
Dept. of Information Technology
MVP'S KBTCOE,Nashik
Nashik,India
divyabhamre30@gmail.com

Pranjal Anil Pingle
Dept. of Information Technology
MVP'S KBTCOE,Nashik
Nashik,India
pap9798@gmail.com

Madhuri Shankar Sanap
Dept. of Information Technology
MVP'S KBTCOE,Nashik
Nashik,India
madhurisanap97@gmail.com

Roshani Dadaji More
Dept. of Information Technology
MVP'S KBTCOE,Nashik
Nashik,India
roshanimore1708@gmail.com

Abstract-. Wireless Sensor Network technologies have become the latest research area in health care industries due to rapid maturity in improving the quality of life of a patient. Wireless Sensor Networks when working in the medical field provide continuous monitoring of vital health parameters which over a long period provide doctors much-needed help to make an accurate diagnosis and giving better treatment. We propose a model which monitors various health parameters like heart rate (BPM), body temperature, blood pressure (mm Hg), height, and weight of an individual. The collected data through the system is then transferred over the internet to a smartphone application of the patient. This data is transferred to the registered doctors on their smartphone applications as well as standalone computers. The doctor can then prescribe the medication based on the data results shown by the system. The designed prototype will reduce the burden on patients to visit the doctor every time for monitoring of these health parameters.

Keywords- WSN, Heart Rate (BPM), Blood Pressure sensor, Temperature sensor, BPM Algorithm, Arduino Uno.

I. INTRODUCTION

Health care systems are highly complex. People in need of continuous health care are increasing day by day. Medical staff faces more and more challenges. This raises serious questions in the domain of medical which must be answered in the best possible ways.Problem-solving must include a detailed analysis of the current state to form a functional system that resolves the satisfying number of issues that are to be faced in the future. In medical WSNs can offer this kind of solution. The primary aim of our system is to gather the information of individual health parameters based on WSN and to provide physicians with clear data and readings which can be used to monitor the diagnosis of health parameters through mobile communication. This can be utilized for the individual investigation to help with rolling out conduct improvements and to share with parental figures for early detection and treatment.

IL LITERATURE SURVEY

Paper1:"Building an IoT-aware healthcare monitoring system":

In recent years, the development of patient monitoring systems has emerged as an area of research. Now a days a lot of research has been carried out in this field. In this article we proposed a patient monitoring system. The proposed system framework integrated web services with multiple sensors controlled by Arduino Uno. We proposed a model which monitors various health parameters like heart rate (BPM), body temperature, blood pressure (mmHg), height, and weight of an individual. The collected data through the system is then transferred over the internet to a smartphone application as well as standalone computers. The doctor can then prescribed the medication based on the data results shown by the system. The designed prototype will reduce the burden on patients to visit the doctor every time for monitoring of these health parameters

Paper 2:"Health Kiosk: A Family-Based Connected Healthcare System for Long-Term Monitoring"

In this paper, a family-based health care system is introduced. It provides rich contextual information
and alerting mechanisms for continuous monitoring of health conditions. Family-based healthcare services give the patient full freedom at home, which dramatically reduces the need and waiting time for face-to-face contact with the care professionals, where the healthcare providers remotely monitor the patient's physical conditions 24/7, even when the patient is mobile.
This paper represents a family-based healthcare monitoring system that bridges the data centers and biomedical sensors. Biomedical sensors collect personal data of their health conditions and other vital signs, and report them to the sensor proxy, where the latter serves as a bridge between the sensor network (e.g. via WiFi, Bluetooth) and the kiosk controller. Sensor proxy will also maintain some data processing logic, like correlating the blood pressure data with the patient's social security card metadata. Then, the developed kiosk system automatically connects to a variety of backend servers like a clinical supporting system in major hospitals via a wide area network for further treatments. For instance, after receiving the personal medical data, the application may decide to remeasure the blood pressure, and the sensor proxy will command the sensor accordingly. The proposed solution provides a universal research asset to enhance the clinical process for streaming line interactions among care professionals and patients.

Paper3:"Modular Health Kiosk for Health Self-Assessment"2016

This paper describes the architecture, problems, and lessons learned from building a Health Kiosk from commercial, off-the-shelf Personal Health Devices, and a computer with a touchscreen interface. The kiosk is used autonomously by patients to measure vital data before a consultation, in the scope of a population screening, or for routinely monitoring.
Fulfilling the growing demand for more and better health care services without incurring an excessive budgetary burden will require more cost-effective methods of performing health care procedures and more widespread use of preventive health care. This paper explains a health assessment kiosk where patients can measure some of their vital signs before a consultation or on a routine basis, to be deployed in health care centers or public places. Such measurements are usually taken by health care professionals, having non-trivial costs in terms of human resources. The automation of these procedures may free up human resources for other tasks and allow wide-scale screenings in the population at very low marginal costs. Paper represents that Health Kiosks will be to health monitoring what ATMs are to banking.

In this paper, the current prototype is built from a touchscreen PC and commercial off-the-shelf personal health devices, but evaluating even more affordable options (e.g., replace the PC with a Raspberry Pi) for the next prototype. Operational costs are also a concern to us. Continue compliant Bluetooth devices are affordable and easy to integrate, but usually run on batteries that need to be replaced. This paper explains the working in collaboration with health professionals on the improvement of the instructions for current exams and the creation of instructions for new ones. One aspect is that even though the kiosk provided desirable ranges for all measured parameters (both on-screen and in print), at the end of the session it was common for users to ask the observer how was their health. This is a non-issue in some use cases (e.g., pre-consultation), but can be very important in others (expanding healthcare access). A module for web-based videoconference is being added to our next prototype, allowing the subjects to talk to health professionals in a call center to discuss the results and obtain advice. This article is a result of the project NanoSTIMA Macro-to-Nano Human Sensing: Towards Integrated Multimodal Health Monitoring and Analytics, NORTE-01-0145-FEDER-000016, supported by Norte Portugal Regional Operational Programme (NORTE 2020), through Portugal 2020 and the European Regional Development Fund.

Paper 4: "Healt hkiosk :ISSK-An Integrated Self Service Kiosk for Health Monitoring and Management"

This section discusses the recent works of Electronic Health Records (EHR) and automated health care monitoring and management in recent years. Electronic Health Records (EHR) is the methodical way of collecting patients' information and storing it in a digital form. This information can be shared via a network connection, internet to all health care centers around the world for monitoring and managing. EHR may include a range of information such as patient demographics, medical history, allergies, laboratory test results, medical images, etc. In olden days EHR's are meant only to maintaining the quality of health care, but nowadays they are used to increase the quality of health outcome by taking appropriate measures. A medical practitioner can make use of multiple clinical data stored in the EHR to identify and stratify the cause of illness. EHR also eliminates the use of paper

records which results in data replication and medical errors, captures the state and activities of the patient in real time, since it is in the digital form, data analyst can use data mining techniques to analyze the cause and effect of the ill caused to the patient and take appropriate measures to overcome. Several studies indicated that EHR improves the qualities of health care coordination by cutting down the guessing of patients history, analyzing multiple parameters with its relations, and allows to take decisions in emergency situations.

Paper 5:"Android Based Health Care Monitoring System"

This paper describes the critical case patients are supposed to be monitored continuously for their SPOZ, Heart Rate as well as temperature. In the earlier cases, the doctors need to be present physically or in several cases SMS will be sent using GSM and the history of the patient cannot be displayed, only current data is displayed. In this paper, we are using a idea for continuous monitoring patient's health . We focus on the measurement and Monitoring various biological parameters of patient's body.

We measures heart rate, oxygen saturation level in blood and temperature using a web server and android application, where doctor can continuously monitor the patient's condition on his smart phone using an Android application. The patient history will be stored on the web server and doctor can access the information whenever needed from anywhere and need not physically present.Health monitoring systems are gaining their significance as the Fast-growing universal elderly population increases demands for caretaking. In ICU there is needed to continuous monitoring there health conditions. In so many cases patients released from the hospital still they are strongly advised to be under rest and observation some period time then these cases the system is very much helpful.

III. DATA FLOW DIAGRAM

Level-0 (DFD)

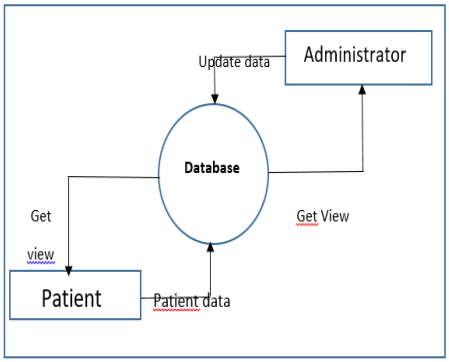


Figure: DFD 0 Level Diagram

The figure shows two entities, the first is patient and another is administrator .login the patient if the patient is registered in the kiosk. if the patient is not registered then the patient fills in detail on the registration form, after that log in to the patient. the resulted output store in the database as well as through the system is then transferred over the internet

Level-1 DFD

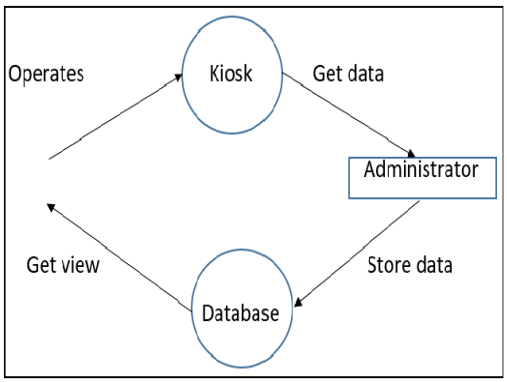


Figure: DFD 1 Level Diagram

The figure shows two entities, the first is patient and another is administrator, and two process blocks are used. the first process is a kiosk which is used as a patient entity through this kiosk patients calculate their body parameters .collected data of the patient is store in the database process.

Level-2 DFD

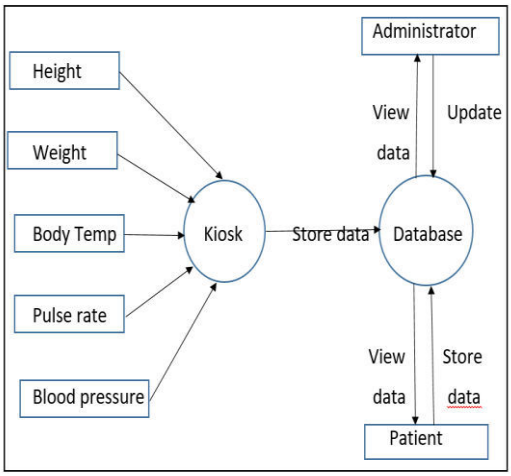
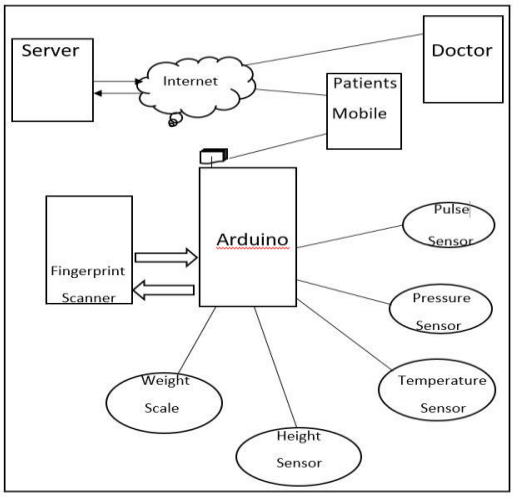


Figure: DFD 2 Level Diagram

IV. PROPOSED SYSTEM

The proposed system provides a better solution over traditional methods. It increases the quality of service as well as accuracy. The application of this system is not limited to hospitals, it may extend as a portable health monitoring device for older people (who live alone) as well as monitoring vital parameters. The proposed system presents a distributed set of sensors that will mimic the work of individual elements by sensing the data captured by them. The proposed system highlights the use of different wireless sensors to demonstrate how to check various health parameters of the user using various sensors like Pulse Sensor, Blood Pressure Sensor, Temperature Sensor, and an ultrasonic sensor which we will use to monitor the person. All the sensors are connected to an Arduino Uno board. Arduino Uno board.



• **Arduino Uno**

Our proposed system utilized Arduino Uno version R3 as a a control unit that incorporated with e-health shield. The Arduino Uno as appeared in figure 3 is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be utilized as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB association, a force jack, an ICSP header, and a reset button. It includes everything expected to bolster the microcontroller; basically, interface it to a PC with a USB link or power it with an AC-to-DC connector or battery. The Arduino empowers electronic procedure in multidisciplinary projects to be more open. The Arduino connectors permit to CPU board to be associated with a wide assortment of tradable extra modules known as shields.

- **Temperature Sensor**

For measuring the temperature of the human body we used the DS18B20 sensor. This is the latest DS18B20 1-Wire digital temperature sensor from Maxim IC. Reports degrees C with 9 to 12-bit precision, -55C to 125C (+/- 0.5C). Each sensor has a unique 64- Bit Serial number etched into it - allows for a huge number of sensors to be used on one data bus. This is a wonderful part that is the cornerstone of many data-logging and temperature control projects.

• **Heart Rate Sensor**

The sensor name is SEN-11574. Pulse Sensor is a well-designed plug-and-play heart-rate sensor for Arduino. It can be used by students, artists, athletes, makers, and game & mobile developers who want to easily incorporate live heartrate data into their projects. The sensor clips onto a fingertip or earlobe and plugs right into Arduino with some jumper cables. It also includes an open-source monitoring app that graphs your pulse in real-time.

• **Height and Weight Sensor**

For measurement of height and weight, we used HC-

SR04 The Arduino Uno has various facilities for communicating with a computer, another Arduino, or different microcontrollers. The ATmega328 gives UART TTL (5V) serial connection which is accessible on digital pins 0 and 1 of the board. There are numerous determinations of the Arduino Uno, for example, flash memory 32 KB of which 0.5 KB utilized by bootloader, clock speed 16 MHZ, length 68.6 mm width 53.4 and weight 25g. ultrasonic sensor and HX711 load cell sensor respectively. The HC-SR04 ultrasonic sensor uses sonar to determine the distance to an object like bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package. From 2cm to 400 cm or 1" to 13 feet. Its operation is not affected by sunlight or black material like Sharp rangefinders are (although acoustically soft materials like cloth can be difficult to detect). It comes complete with an ultrasonic transmitter and receiver module.

This module uses 24 high-precision A/D converter chips HX711. It is specially designed for the high precision electronic scale design, with two analog input channels, the internal integration of 128 times the programmable gain amplifier. The input circuit can be configured to provide a bridge type pressure bridge (such as pressure, weighing sensor mode), is of high precision, low cost is an ideal sampling front-end module

.

- **Blood Pressure Sensor**

This medical sensor has been designed to help researchers, developers, and engineers m e a s u r e data for experimentation and test purpose It is a low-cost and open-source solution as opposed to expensive and proprietary medical device.

V. IMPLEMENTATION

We all know that day by day people in need of continuous health care and health care systems are very complex. Medical staff faces more and more challenges. Wireless sensor network technology has become the latest research area in the health care industry. Here, we are focusing on measuring the health parameters of the patients like weight, height, body temperature, pulse rate, and blood pressure with maximum accuracy. Then this collected data transferred from the system to a smartphone application of the patient over the internet and this data transferred to register doctors on their smartphones and using this data doctor can prescribe the medication. So overall this model will reduce the burden on patients to visit the doctors every time for monitoring of these health parameters.

At user interface there will be Three modules:

1. **Admin**
2. **Patient**
3. **Doctor**

1. Admin

1. To Register the Health Kiosk System.
2. To Login the Health Kiosk System.
3. Verify that after patient checkup based on the requirement the details are updated in the patient details database.
4. Verify the details of Doctor.
5. Verify that the new details of new patients can be added to the system.
6. Verify that the doctor's record can be deleted from the system.
7. To Logout the Health Kiosk System.

2. Patient

1. Patients can help make their healthcare experience safer by becoming active, involved, and informed members of the healthcare team.
2. When the body of patients is in contact with the sensor it should be detect the temperature of the patient body
3. To Come with you to doctor appointments.
4. To Stay with you in the hospital.
5. To Ask questions of healthcare professionals.
6. To Follow your doctor's directions and take medication exactly as prescribed.
7. To Know all your medications, what they are for, the dosage, and how to take them appropriately
8. To receive information about the arthritis diagnosis through up-to-date and easy-to-read educational materials and programs.

3. Doctor

1 To give the diagnosis to patient
2 To give the medical advice to patient
3 To examine the calculated body parameters of the patient
4 To check the patient's profile on application
5 To check the patient's data on his profile
6 Integrated chat feature for follow up
7 Web & mobile application to consult with patient

VI. RESULTS

Here developed an an android application for Calculating the medical parameters and displayed on android mobile. In Fig.1 this is the homepage of Project application. In that the patient have register or login the application.

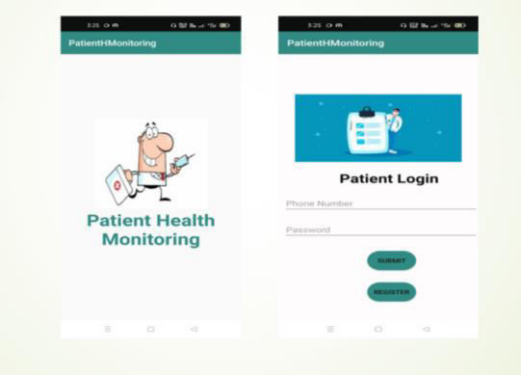


Fig.1 Login page

In Fig.2 this is the Register page of Patient. If not register then fill all the details and register. After register the patient have login the application. Then 2 forms are there first is personal information of patient and second is medical information of patient.

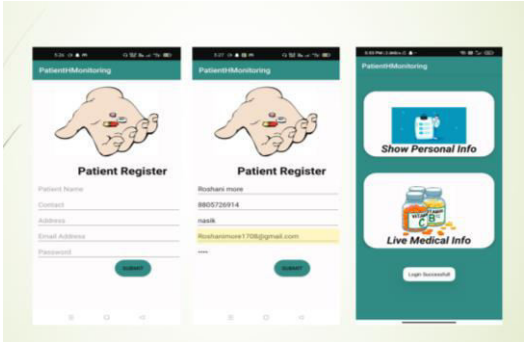


Fig.2 Register page

In Fig.3 After login successfully our application shows personal information and medical information. Then click on the Show personal info button then shows the personal information of patient.

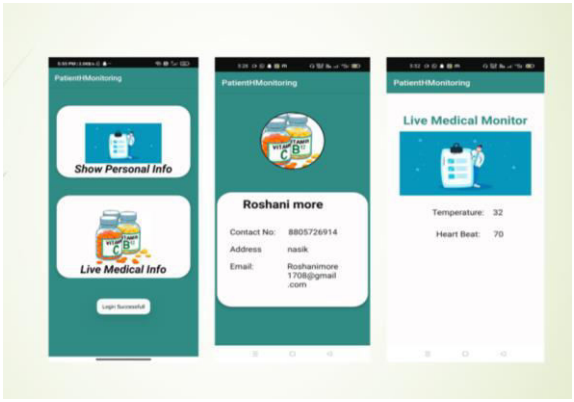


Fig.3 Show Personal and Medical Info

VII. CONCLUSION

The calculation of medical health parameters using Wireless Sensor Networks is not a new idea, but rather this paper concentrates on calculating various parameters like Heartbeats, Body temperature, Height, Weight, and Blood Pressure Monitoring altogether in a Kiosk which poses to the user as a single system when interfaced with android smartphone application providing higher usability both to doctors as well as patients. The system will eliminate the problems observed in the manual and conventional machine-based monitoring system as the real-time data monitoring demand increases because of the rise of health issues which will vary from person to person. With the right information at the right time, the sensor-based medical system can help the medical patient to easily track and monitor their health record.

VIII. ACKNOWLEDGEMENT

With all respect and gratitude, we would like to thank all the people who have helped us directly or indirectly for the completion of the project t" Health Kiosk System". We express our gratitude towards Prof. S.P. Jadhav for guiding us to understand the work conceptually and also for her constant encouragement to complete the project. Our association with her as a student has been extremely inspiring. We would like to give our sincere thanks to Dr. V. R. Sonawane, Head of the Department of Information Technology for his technical support and constant encouragement. We would also like to extend our sincere thanks to our Principal Dr. S. R. Devane for his help and support in all respects. We would also like to thank all our staff members and colleagues who helped us directly or indirectly throughout our dissertation work.

IX. REFERENCES

[1] http://searchhealthit.techtarget.com/feature/Can-we- expect-the-InternetofThings-in-healthcare, retrieved by 20 Feb 2015.

[2]A. J. Jara, M. A. Zamora-Izquierdo, and A. F. Skarmeta, "Interconnection Framework for mHealth and Remote Monitoring Based on the Internet of Things," Selected Areas in Communications, IEEE Journal on, vol. 31, pp. 47-65, 2013.

[3] Niranjana, Balamurugan, "Intelligent E-H.

[4] Media Aminian and Hamid Reza ,"A Hospital Healthcare Monitoring System Using Wireless Sensor Networks ",Journal Of Health & Medical Informatics .

[5] Aminian M, Naji HR (2013) A Hospital Healthcare Monitoring
System Using Wireless Sensor Networks. J Health Med Inform 4: 121. doi: 10.4172/2157-7420.1000121 .

[6] Mir Sajjad Hussain Talpur, "The Appliance Pervasive of Internet of Things in Healthcare Systems" IJCSI Journal, Volume 10, Issue 1, No I, January 2013 .

[7] Valerie Gay, Peter Leijdekkers, "Around the Clock Personalized Heart Monitoring Using Smart Phones", https:!lopus.lib.uts.edu.au/bitstreamll 045311990/1 12006004767.

[8] Mukhopadhyay, S. c., "Wearable Sensors for Human Activity Monitoring: A Review", Sensors Journal, IEEE Year: 2015, Volume: 15, Issue: 3 Pages: 1321 - 1330, DOl: 10.ll09/JSEN.2014.2370945.

[9] https:!len.wikipedia.orglwiki/lnternet_oCthings. Internet source www.iraj.in

[10] Felipe Fernandez and George C. Pallis, Opportunities and challenges of the Internet of Things for healthcare Systems engineering perspective, International Conference on Wireless Mobile Communication and Healthcare (Mobihealth), 2014, pp 263-266.

[11] Catarinucci, L.; de Donno, D.; Mainetti, L.; Palano, L.; Patrono, L.; Stefanizzi, M.; Tarricone, L., "An IoT-Aware Architecture for Smart Healthcare Systems," in Internet of Things Journal, IEEE, vol.PP, no.99, pp.1-1

[12] A. Redondi, M. Chirico, L. Borsani, M. Cesana, and M. Tagliasacchi, An integrated system based on wireless sensor networks for patient monitoring, localization, and tracking, Ad Hoc Networks, vol. 11, pp. 39-53, 2013.

[13] Sowmyasudhan S and Manjunath S, "A wireless based real-time Patient monitoring system", International Journal of Scientific Engineering Research, vol. 2, no. I I, Nov. 20 I 1 .

Comatose Patients Monitoring System

Prof. V. S. Baste
Dept E&TC
SIT,Lonavala
Vbaste.sit@sinhgad.edu
Mayuri Deshmukh
Dept E&TC
SIT,Lonavala
dmayuri928@gmail.com

Vaishnavi Hedau
Dept E&TC
SIT,Lonavala,
vaishnavi190698@gmail.com.
Vishwas Suryawanshi
Dept E&TC
SIT,Lonavala
vishwassrwnsh15@gmail.com

ABSTRACT

This paper explains about multi-parameter wearable sensor system in conjunction with an IOT to enable a real-time unobtrusive monitoring of core body temperature, blood pressure sensor, and ultrasonic sensor and PIR sensor on patients. Clinical research illustrating those continuing accurate measurements of core body temperature (CBT) is crucial to investigate human thermoregulation in ambulatory environment and during activity. On the other hand, Blood pressure test remains the mainstay test for primary diagnosis and survival analysis of heart diseases. Implement a wireless multisensory system that measures both the tympanic temperature inside the Blood pressure inside the human body. The behind device makes desirable to blood pressure movement and temperature without any heavy belt and allow the patient to move around freely. The proposed device is wirelessly connected to a computer for data transmission and displaying. This device not only gives access to the core temperature and movement data in real time, but also the device can be controlled – removed and reapplied – by the patient at any time, thus increasing the performance of personal health applications.

***Keywords*:** Wireless Body Area Networks (WBAN), Movement, Core Body Temperature, PIR Sensor, Sensor Fusion, Wearable Computing

I. INTRODUCTION

Coma is a state of unconsciousness in which patient cannot feel or respond to the pain, light or sound, it does not initiate volunteering any actions. Patients in a coma state need to have a continuous update of Blood pressure, temperature, humidity, and urine level. Doing this manually can become almost impossible to keep updates of multiple patients at the same time. In order to address this situation, This system comes to the rescue; the system will collect the information of patients with the help of sensors. These sensors use WIFI to communicate this information to the internet. This system is powered by the Raspberry Pi it includes a blood pressure monitoring unit and an ultrasonic sensor to check urine, temperature sensor, motion sensor, and an LCD display. Whenthe system turn on, it gets.connected to the website using WIFI; System monitor shows four signs namely heart rate, temperature, humidity, and urine output. While testing heart rate function of the system, the heart rate and blood pressure value get updated over IOT and LCD display. As the patient who is in comatose cannot urinate on their own so a rubber tube is inserted into their bladder to remove urine. This system tests urine level and also updates the value over IOT and LCD, when the patient urinates. In case if the patient regains consciousness and attempts to move, the sensor will detect the motion and update it over IOT and LCD. In this way,system monitors the comatose patients.

A.OBJECTIVE

Now a day's Healthcare system can be analyzed and discovered with respect to the application areas in medical practice. Some of the applications areas are as follows along with the usage of IOT concept and their benefits to humans

B.PROBLEM DEFINITION

Coma is defined as a state of unconsciousness and lack of response to noxious stimuli. The physiopathology of consciousness and coma is not entirely understood. On the other hand, clinical examination does not give enough information in all types of coma states. In this chapter, some types of comas and their definition, the necessity of coma monitoring and what can use for coma monitoring in ICU, algorithms for EEG monitoring are described. Burst suppression state new theories and cortical connectivity and reactivity during coma as a tool for coma prognosis will be on focus. For continuous monitoring of Coma patient state design system.

II. LITERATUR SURVEY

As Gautam [1] presented in the paper, IoT (Internet of things) devices are highly used in medical sector. In this paper, the project is about health monitoring system. Especially, for Cardiac patient, High Blood pressure patient, hypertension problem, diabetic patient etc. in rural area because in rural area number of doctors is less than urban area. In rural area, medical equipment is not available except government hospital. So, the number of patients is higher than government hospital. Also, the equipment is expired in many cases. So, if any emergency call needed, this hardware device will immediately send the report to the doctors or intern doctors. Doctors will do their rest of works by their reports.The Internet of Things digitizes physical assets sensors, devices, machines, gateways and the network. It connects people to things and things to things in real time. A typical IoT network can grow rapidly, resulting in an experimental increase in the variety, velocity and the overall

volume of data. This data opens opportunities for significant value creation and revenue generation. But the real challenge for IoT environments is how to analyze the large volume ofinformation from all sources and take action in real time. But the real challenge for IoT environments is how to analyze the large volume of information from all sources and take action in real time.

As gathered information from Ovidiu Apostu [5] Of many chronic illnesses, hypertension has become a common major disease that remains the route cause for cardiac/stroke mortality. But in present time, no remote HRV (Heart Rate Variability) analysis systems for hypertension patient available to help the doctors to track down the progression of the patient's condition or critical events in rural area. IoT is nothing but an advanced concept of ICT (Information Communication Technology). Raspberry pi component is more costly than Arduino component device. Technologies are broadly expanded in web based or on-line system. Now- a -days collecting real time is vital. When the critical condition, patients are discharging from the hospital, patient needs to check up in regular basis. That is why IoT based heath monitoring system is best option for rural area.

As per Vivek Pardeshi, Saurabh Sagar [5] The complexity of IoT combined with the high expectations created by the Internet, Mobile, and 24x7 IT environments has made the need for new analytics approaches and technologies more urgent. Achieving desired business objectives requires the ability to act in real-time to take advantage of opportunities and address problems quickly. In the pre-IoT era, an issue in a typical supply chain scenario could be addressed in 2-3day cycles for satisfactory results. But in IoT, time to action is in minutes, seconds, or microseconds – 30 minutes to provision electric service, 30 seconds to act on information from devices, 5 milliseconds to address a security breach. This explosion of data and the high expectations in the IoT environment means the value of data will slip away quickly.

According to Dr. H N Suma [4] with research from WHO, 4.9 million people died from lungs cancer, over weight 2.6 million, 4.4 million for elevated cholesterol, 7.1 million for high blood pressure. Patients who need a regular monitoring by doctors to discuss the state of health condition, IoT based patient monitoring system is useful for them. The main concept of IoT is defined as the integration with electronic devices that connect with doctors or health monitoring persons. IoT the term was first mentioned by Kevin Ashtor in 1998. IoT can bedivided in three sections.

1. Internet – Oriented Middle ware.
2. Things Sensors Oriented.
3. Knowledge Oriented Semantics.

First as hardware layer which allow the interconnection by using sensors and technologies. Sensors are used

III. BLOCK DIAGRAM

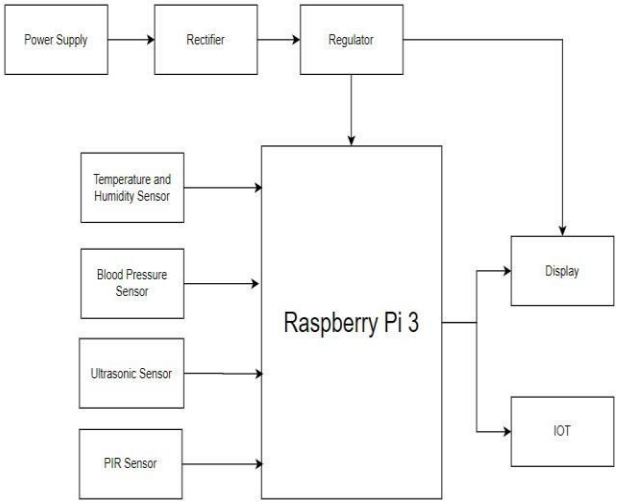


Fig1: Block Diagram

IV.SENSORS WORKING

The system consists of six major embedded electronics.

1. Blood pressure sensor
2. PIR Sensor
3. Raspberry pi 3
4. Power supply
5. Ultrasonic sensor
6. Temperature sensor

For power on, 12-volt adapter is using with Raspberry pi and 5-volt adapter attached with wearable sensors externally.

1) Blood pressure sensor:

Patient will touch the Blood pressure sensor, and then the IR sensor's ray will count the pressure from blood flow. The result will upload and the Blood pressure value will show in LCD display.

2) PIR Sensor:

In this case motion is detected by means of PIR sensor, a Passive Infrared Sensor. This sensor detects emitted infrared energy from patient in form of heat. In general differences around 5-10 degree Celsius compared with the ambient temperature in the field of view and within a 10m range.

When the patient come out from coma means being conscious, any small movement will defect by PIR sensor and send to Raspberry pi immediately.

3) Raspberry Pi 3:

Raspberry pi 3 is used as a data aggregator also as processor. This system consists of several sensors connected to a patient and they communicate the data through the processing unit. The patient and doctor smartphones/computer used as a monitoring system. The signals provided through patient for processing to Raspberry pi, which is the IOT module. The Raspberry pi then displays the information on a monitor and also stores the information over the cloud. This information can be accessed by the doctor on their phone/computer and get the information.

4) Ultrasonic sensor:

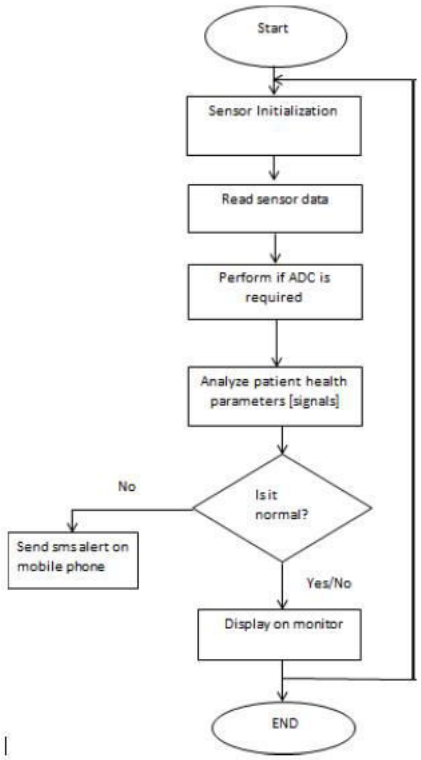
Ultrasonic sensor which is operating at 5v effective

angle 15 degrees, ranging distance 2cm-400cm which is used to measure urine level of patient.

5) Temperature Sensor:

The temperature sensor communicates over a 1-wire bus that requires only one data line for communication with a Raspberry pi and display over LCD.

V.FLOWCHART



VI.MERITS & DEMERITS

A.MERITS

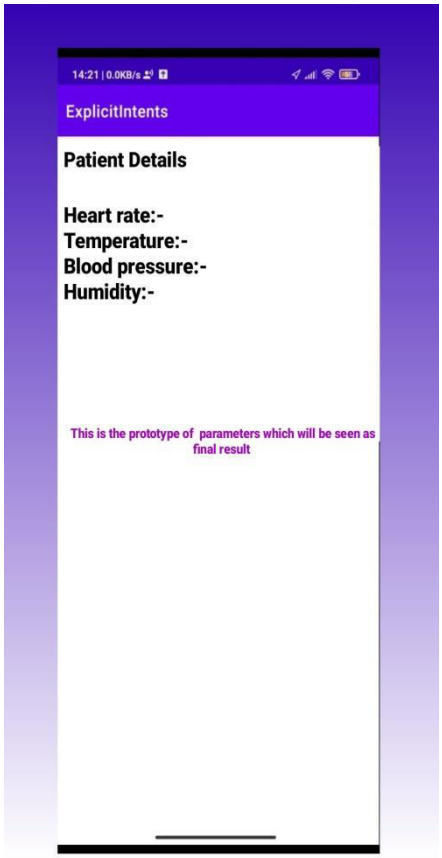
- Easy to use
- Portable
- Continuous monitoring is possible
- Allow to move patient any where
- 24 * 7 monitoring of coma patient.
- Continuous recording of patient data after particular time period.
- Cost is low.
- Power consumption less.
- No need of human attention for continuous observation of coma patient.
- High speed communication between doctor and patient through Thing speak cloud as well as Twilio.
- The doctor can easily control on the patient through worldwide, anywhere any time.

B.DEMERITS

- Movement sensor should be more sensitive.
- Blood pressure sensor requires approx. 60+ sec to detect and display.
- Require to reset system when treatment is done.
- On input side internet facility is compulsory required.

VII.RESULT

This is the prototype used by doctor to fill in unique ID and password of the patient. After login , the doctor will know each and every information about the patient which is easy for doctor to look patient for 24*7 and to record their progress.



VIII. CONCLUSION

This project work will help comatose patient to have precise monitoring and would lead into proper medications and immediate medical action if any issue is noticed. The

continuous monitoring is the crucial part that improves the medical system from early aged medical system

IX. FUTURE SCOPE

This proposed system monitors the patient condition especially for the ICU or cardiac patients but in the future, the system will be able to upgrade both hardware and software part. In hardware part, for temperature measurement of the patient so for this need temperature sensor. Also, it will monitor the whole ward room or patient room from far places by Wi-Fi module. Therefore, person fall detection feature will be added which would be beneficial to older people Moreover, blood pressure sensor will be given. In software segment will upgrade the Website as well as the Apps.

User friendly feature in the website which will show the patient's name, date and time description in the ECG segment automatically. Similarly, Apps will be upgraded and uploaded in the Play store.

X. REFERENCE

1. Dr. R. JosphineLeela ,M.E , P K. Hamsageetha , P. Monisha, S. Yuvarani, “Body Movement and Heart Beat Monitoring for Coma Patient Using IoT”, International Journal of Innovative Research in Science, Engineering and Technology, Vol. 7, Special Issue 2, March2018. Citied ‘in press’
2. Geethanjali R., Majidha Fathima K. M., Harini S., Sabitha M., “Health monitoring for coma patients”, International Journal of Emerging Research & Development, Volume 2, Issue 3,2019.
3. S. Sandeep, Dr. P. Esther Rani, G. Sumalatha, “Monitoring of Health Parameters by Using Raspberry Pi”, International Journals of Advanced Research in Computer Science and Software Engineering, (Volume-8, Issue-4),2018.
4. Sneha ChowdaryKoganti, Dr. H N Suma, Appaji M. Abhishek “Analysis and Monitoring of Coma Patients using Wearable Motion Sensor System”, International Journal of Science andResearch (IJSR), Volume 4 Issue 9, September2015.
5. EmnaMezghani, Ernesto Exposito, and Khalil Drira.,“A Model Driven Methodology for the Design of Autonomic and Cognitive IoT-Based Systems: Application to Healthcare”, IEEE transactions on emerging topics in computational Intelligence, VOL. 1, NO. 3, JUNE2017.
6. ImanAzimi, Arman Anzanpour, Amir M. Rahmani, PasiLiljeberg, TapioSalakoski, “Medical Warning System Based on Internet of Things Using Fog Computing”.
7. Vivek Pardeshi, Saurabh Sagar, Swapnil Murmurwar, Pankaj Hage, “Health Monitoring Systems using IoT and Raspberry Pi.
8. S.Lavanya, Lavanya, J. Divyabharathi, “REMOTE PRESCRIPTION AND IHOME HEALTHCARE BASED ON IoT”.
9. R.N. Kirtana, Y.V. Lokeswari, “An IoT Based Remote HRV Monitoring System for Hypertensive Patients”. 11.Ruhani Ab. Rahman, NurShima Abdul Aziz, MurizahKassim, Mat IkramYusof, “IoTbased Personal Health Care Monitoring Device for Diabetic Patients”
10. Dhvani Parekh, “Designing Heart Rate, Blood Pressure and Body Temperature Sensors for Mobile On-Call System”.

A Smart Prioritized Ambulance Service With Intelligent Traffic Control System

Tanya Singh
Electronic And Telecommunication
Sinhgad Institute ofTechnology
Lonavala,India
tanusingh.0309@gmail.com

Kaushal Pandav
Electronic And Telecommunication.
Sinhgad Institute of Technology
Lonavala, India
kaushalpandav007@gmail.com

Srushti Hole
Electronic And Telecommunication.
Sinhgad Institute of Technology
Lonavala, India
holeshrush17@gmail.com

Dr. D.D. Chaudhary
Electronic And Telecommunication.
Sinhgad Institute of Technology
Lonavala, India
dchaudhary.sit@sinhgad.edu

***Abstract* - With increasing industrialization and population in this fast-paced world, many emergency services get delayed particularly in massive cities. Ambulance service is majorly affected by this and often patient condition worsens before reaching to the hospital to get desired medical attention. This paper proposes a solution to make such services easily available on one tap at doorstep. It consists of a website which includes database of hospitals so that a person can choose a hospital according to their preference and track the booked ambulance. This is achieved by implementing RFID technology which would automatically control the traffic signals in the path of ambulance thus minimizing the time required to reach the destination with implementing intelligent traffic control.**

I. INTRODUCTION

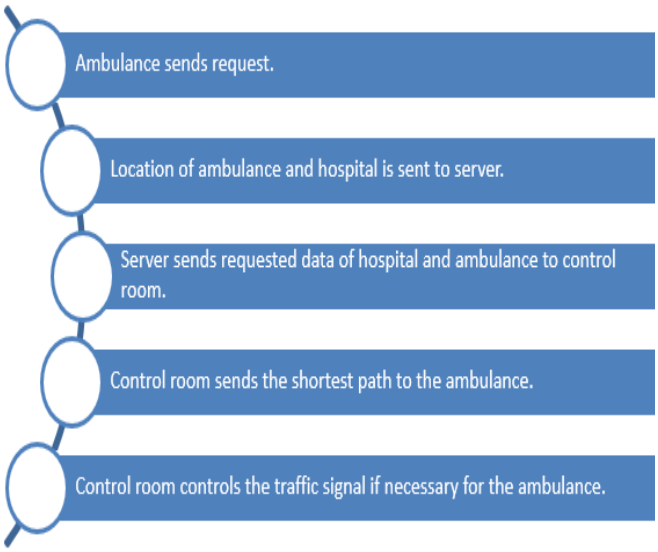
Increase in population is significantly contributing in exponential growth of vehicles which causes traffic congestions. These traffic congestions majorly effects emergency vehicles such as ambulances, fire brigades and etc.We can determine is that smooth and unhindered movement of emergency vehicles is crucial. In such circumstances we look for a promising and smooth system for getting over these difficulties. Therefore, taking this into serious consideration, since trafficcondition affects the Ambulance service, where time being crucial in emergencies as to get the patient to the hospital before severities; hence we are proposing an ambulance service booking and tracking easily available on one tap of patient with providing a green corridor for the ambulance with smart traffic control. Proposed system consists of website through which the user can book and track the ambulance with one tap, we also provide an uninterrupted flow for ambulance to reach the desired destination i.e. by providing shortest path to the ambulance with a traffic and signal free road. The resulted system can be artificially setup using Arduino and LEDs. The system automatically changes the traffic signal to green in the path of ambulance thus minimising the time required to reach the destination with the help of control room and also provides the shortest path available for the ambulance to reach the hospital within stipulated time.

II. METHODOLOGY

The following three systems are combined in this system

- *Traffic control*
- *Tracking and booking (website module)*

Both of the systems will work simultaneously. Patient's health parameters are monitored and at the same time driver of the ambulance can request the control room to manipulate the traffic signals. The ambulance first sends a request to the control room, the request consists of the current location of the ambulance accessed using RFID and the location of the desired hospital is sent by the ambulance driver. Now, the server sends all the data of all ambulances that have requested for traffic control to the Control room. The control room side of the application now displays the requests of all ambulances. The ambulances are displayed in order of their distances. The control room operator can now choose which ambulance it chooses to navigate by selecting it. Now a map is displayed which shows the current location of the ambulance as well as the location of the hospital. The route between the ambulance and the hospital and the live data of traffic is displayed on the map. The shortest route between theambulance and hospital is displayed as well as the traffic at various junctions. With the help of this data, the control room can control the traffic signals at various junctions.



Flow chart

Fig. 1. Flow chart

III. SYSTEM ARCHITECTURE

A. *Traffic control module:*

To develop the website for this system, the software used is Android Studio. The Google Maps API Key is used to deploy the features of google maps in the application. AWS Parse Server is used as the server for this website.

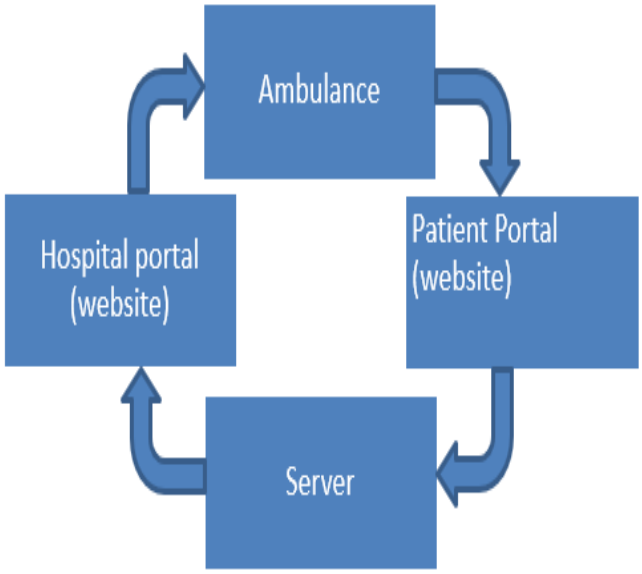


Fig. 2. Process cycle

It is an intelligent traffic controlling system. There are four lanes and four traffic signals in the below diagram. Every signal has an RFID reader and a controller unit.

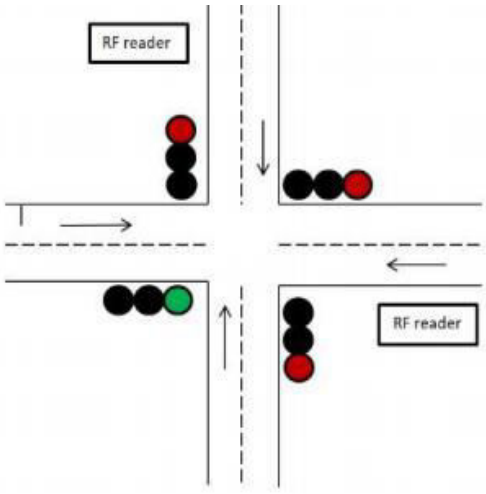


Fig. 3. Road diagram

Whenever an ambulance is within the range of RFID reader of the traffic signal, RFID reader scans the RFID tag which is attached to the ambulance and the control unit automatically changes that signal to green and all other signals in the circle to red.

B. *Website module:*

a) *Server*-It is the brain of the website since communication of all the modules takes place from here. Some functions of server are to accept user request, communicating with nearby ambulance, storing user, ambulance and hospital data in database and etc.

b) *DynamoDB*- DynamoDB is a fully managed proprietary NoSQL database service that supports key–value and document data structures and is offered by Amazon.com as part of the Amazon Web Services portfolio. We use DynamoDB to store user, ambulance and hospitals data. Once the ambulance is assigned to the user, the user id, their location, ambulance id and its initial location is stored in the database for future reference.

c) *Google Maps*- The Google Maps API allow for the embedding of Google Maps onto web pages of outside developers, using a simple JavaScript interface. Some of the APIs used in our applications are Maps JavaScript API, Distance matrix API and Directions API. Server sends the location of all nearby ambulance to the Google Maps which finds the nearest ambulance using distance matrix API and sends it back to the server. After the ambulance assignment ambulance request for the navigation, which shows the shortest distance to reach its destination i.e. the user and hospital.

d) *User and ambulance*- This is where user requests an ambulance after registration with their unique identification number. Then when user presses theGet Ambulance button, a unique ID is generated for the user. This ID and the location of the user is sent to server. Once the ambulance is assigned to the requested user, the real time location of the ambulance is sent to the user so that they can track the location of the

ambulance.Ambulance sends its request location to the server and waits till it gets assigned to the user, once the user is assigned using navigation it reaches the location.

C. *Hardware*

Hardware to be used for the project representation will be:

a) Arduino Atmega 2560

b) RF module

c) 16*2 LCD display

d) LEDs

e) Power supply

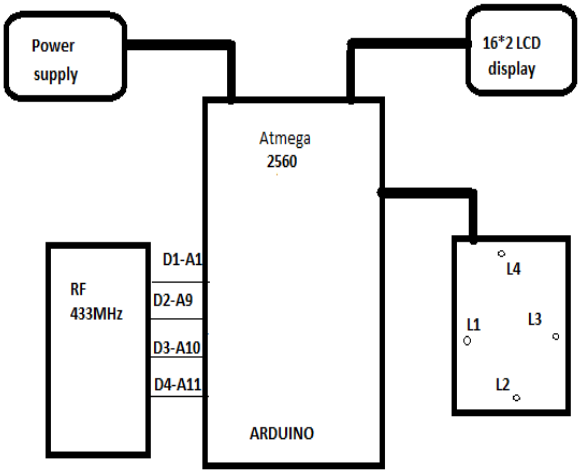


Fig.4. Block diagram

IV. ADVANTAGES

1) Traffic control for emergency vehicle.
2) Shortest path for reaching the destination.
3) Website for easy booking/availability and tracking of ambulance
4) Database of nearby hospitals for patient to select.

V. APPLICATIONS

1) Useful for defence emergency vehicles.
2) Useful in ambulance.
3) Useful for fire brigades.

VI. FUTURE SCOPE

This system can further be extended by adding a health monitoring system in order to send patient's health condition after pickup hence it will make it easier for the doctors to prepare for the patient and provide on the go assistance in order to treat patients also it will help doctors to prepare according to patient's health for the treatment before time.

VII. CONCLUSION

The proposed SMART PRIORITIZED AMBULANCE SERVICE WITH INTELLIGENT TRAFFIC CONTROL SYSTEM is based on easy availability of ambulance and traffic clearance using google maps API and website. Using this application, the ambulance will be able to reach the hospital without encountering traffic on the way with minimum delay. As the ambulance is available with traffic and signal free road with the shortest path provided by control room it doesn't require to wait in the traffic. This will save many lives and critical patients as ambulance will be able to reach its destination on time with the provided shortest path and signal free road which will ensure treatment of patient to take place within stipulated time.

VIII. REFERENCES

[1] IOT BASED SMART AMBULANCE SYSTEM Shruthi U1, Sindhu N1, Supriya R Aithal1, Swati Shripad Bhat1, Bhavani K2 1Information Science and Engineering, Dayananda Sagar College of Engineering, Bengaluru, Karnataka, India 2Assistant Professor, Dept. of Information Science and Engineering, Dayananda Sagar College of Engineering, Bengaluru, Karnataka, India.

[2] Traffic Control System for Smart Ambulance Bhakti Prabhu, Ruta Deshpande, ShraddhaBhavsar, ShailjaJha TY B.Tech, Department of Electronics and Telecommunication Engineering, Vishwakarma Institute of Technology, Pune, India.

[3] T. Naik, R. Roopalakshmi, N. Divya Ravi, P. Jain, B. H. Sowmya and Manichandra, "RFID-Based Smart Traffic Control Framework for Emergency Vehicles," *2018 Second International Conference on Inventive Communication and Computational Technologies (ICICCT)*, 2018, pp. 398-401, doi: 10.1109/ICICCT.2018.8473001.

[4] A. Raman, S. Kaushik, K. V. S. R. Rao and M. Moharir, "A Hybrid Framework for Expediting Emergency Vehicle Movement on Indian Roads," 2020 2nd International Conference on Innovative Mechanisms for Industry Applications (ICIMIA), 2020, pp. 459-464, doi: 10.1109/ICIMIA48430.2020.9074933.

[5] R. S. Krishnan, S. Manikandan, J. R. F. Raj, K. L. Narayanan and Y. H. Robinson, "Android Application based Smart Bus Transportation System for Pandemic Situations," 2021 Third International Conference on Intelligent Communication Technologies and Virtual Mobile Networks (ICICV), 2021, pp. 938-942, doi: 10.1109/ICICV50876.2021.9388625.

[6] Venkatesh, Nazneen. (2015). Smart Traffic Control System for Emergency Vehicle Clearance. International Journal of Innovative Research in Computer and Communication Engineering. 3. 7242-7246. 10.15680/IJIRCCE.2015.0308016.

[7] DYNAMIC TRAFFIC SIGNAL CONTROL ALGORITHM IN INTELLIGENT TRANSPORTATION SYSTEM THROUGH WIRELESS SENSOR NETWORKS Monika Johri1 , Anurag Goel*1 , Ashutosh Kr. Tiwari1 1Department of Computer Science & Engineering, SRM University, NCR Campus,

Industrial Vending Machine

Tanuja k. Rane[1]
Department of E&TC, SIEMSandip Foundation's
Nashik, India
tanujarane8206@gmail.com

Yamini A. Waghulde[2]
Department of E&TC, SIEMSandip Foundation's
Nashik, India
yamini3959@gmail.com

Mayuri S. Sonawane[3]
Department of E&TC, SIEMSandip Foundation's
Nashik, India
mayurisonawne473@gmail.com

Prof. Pramod Aswale[4]
Department of E&TC, SIEM Sandip Foundation's
Nashik, India
pramod.aswale@siem.org.in

***Abstract*—Industrial vending machine just also emerged as the latest industry standard for MRO category managers. It reduces human efforts ,money, and give proper details about stoke. In this machine system we are using Raspberry pi, Lunar motor, RFID, Display, Key.**

Using RFID tag we gain information about worker who issue the item, by selecting item option or quantity worker get there specific item . After using same item worker have to return item in same machine by again showing RFID tagif required .

In this system we also implement advance technology that is we recorded all data of workers and items from day one after successfully installing vending machine using SD card

.Because of this we does not require to enter serial wise data in excel sheet or any kind of other documentary for industrial inspection level this process automatically done by raspberry pi. This paper offers items such as nuts, locks, sections of the bracket, etc.

Keywords— Raspberry pi 3, RFID, Lunar motor, Display, Key, Led, Automation.

I. INTRODUCTION

A seller is an automated system which supplies the customer with goods, including snacks, drinks, alcoholic beverages, cigarettes and lottery tickets after inserting money or credit cards into the machine. In the early 1880s the first new distributors were designed in England. In several countries there are machinery for sale and more recently specialist distributors have been produced and supplied to customers, who provide less popular products than conventional distributors. Coin-driven tobacco-dispensing devices were already operated in England in 1615. The mobile robots were made of metal. The Thomas Adams Gum Company, selling gum on train platforms in New York City, was founded in 1888. In 1897, when the Pulver Manufacturing Company introduced small figures to add games to the instruments, as a further reward for buying them, if anyone purchased gum from their machinery. This idea created a modern mechanical system called "trade stimulators" This sort of device The main aim of this project is to create a daily distributor to solve realistic problems such as usability, high cost etc.

To stay sustainable in the aftermath of a succession, businesses across industries must become operational price, etc., that the general public is confronted with.

Companies across industries must become operationally efficient whilst optimizing efficiency, customer experience, and product/service offerings in order to stay competitive in a post-recession period. Inventory regulation and organizational performance are all dependent on inventory management.

To achieve the above objectives, an industrial vending machine is a viable alternative. A provider is responsible for designing a replenishment schedule focused on the customer's utilization patterns in an IVM environment. The supplier must keep track of the client's inventory and make decisions on order sizes, packaging, and deliveries. As a result, the burden for buying decisions has shifted. Proactive response to demand changes would be the transfers from the customer to the seller and solution providers.

We have in the business and even in the hospital or other social media to use this IVM machine device.[6]

A. Need of Project

1. Reduces the man power.
2. Inventory management.
3. Proper system assembly.
4. Proper tool management.
5. Increases the tool efficiency.

B. Objective

1. Have an RFID-enabled tool vending machine.[1]
2. To include tools at a low cost.[2]
3. To build models and simulations.[3]
4. Using basic tools, plan and construct a portable computer.[7]
5. To use a basic programming mechanism that is easy to manage.[2]
6. Encouragement of Local Entrepreneurs..[5]

C. problem statement

On the basis of our survey it is found that the present vending machine is only distributed.

Only one atom which is present in vending machine and they do not keep records of worker and tools ,also there system is huge and occupy more space so on this problem we are giving a solution hence we choose our project and its title as Industrial Wending machine .

D.significante and scope

Due to the fact that many businesses depend on access tools easily, they are mostly used to deliver sweets, beverages, snacks and other foodstuffs that require no intervention of a sales agent[4]on this basis this idea also use full for in industry also for dispense tools industry higher store supervisor so by implementing this vending machine no need to supervisor. These machines cater for needs of workers whenever they need them. Considering the pace at which the world is working in today, it is important to have fast paced machine that dispense what worker need. This computer vends the instruments mechanically, reducing human effort and time.

This type of machine is preferred by many traders because of the many benefits they have.

1. Saves time.[3]
2. Choice of product available at any time of day.[3]
3. Also keep all data of which worker take which tools or they replace or not. No need to make different documentation to supervisor

II. LITERATURE SURVEY

1. In Automatic Chocolate Vending Machine by using Arduino-Uno, Prof.S.S.Desai, Sayali Maruti Jadhav, Priya Shivaji Patil, Giri Neeta Sambhaji Conducted that, the Arduino based vending machine that sales different types of chocolates from machine. Once the RFID is to be reached then user can select the product after card is scanned and collect the product at output unit.[3]
2. In Automatic Paper Vending Machine, Kamalnathan.P, Irshath Ahmed.R, Mohamed Aamir.M, Kalaiselvan.P Conducted the Proposed to deliver the paper to the public by using sensor and microcontroller based on mechatronics principal. This will be more cheap and economic for the bulk production and deliver the product [4]
3. In Smart Ration Card System using RFID and Embedded System Prof.Kanchan Warke, Miss.Gaikwad Snehal Sunil, Miss.Attar Sultana Mahamad, Miss.Gardare Swati.S, Miss.Nchal Bhagyashri Sudhir Conducted RFID Tags are introduced, the RFID card are used instead of ration cards, which consists of all the details about card holder like family details, type of card and its validity. The automatic ration distribution system implemented for the automatic ratio distribution [10]

III. SYSTEM DEVELOPMENT

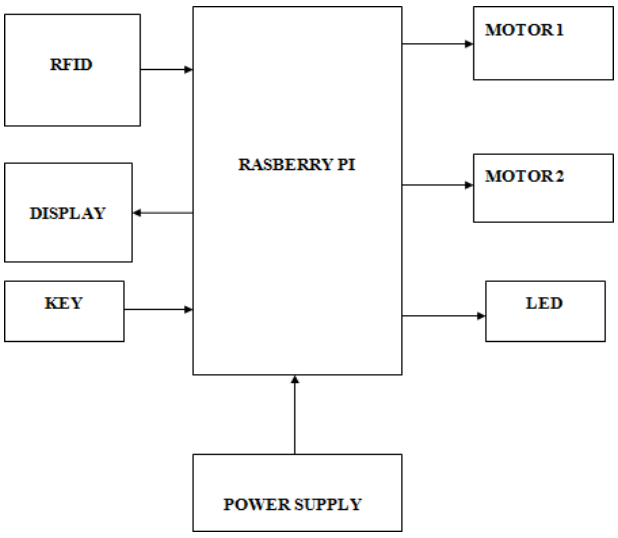


Fig: 3.1 Block Diagram of Implemented System

- Raspberry pi 3

4. Model Raspberry pi 3 10 times quicker than the preceding model Raspberry pi. It has not only Wi-Fi but also Bluetooth networking, which makes it the perfect option for a versatile wired design.[7]
5. The Raspberry pi 3 model improves power control and supports versatile USB accessories, by using green switch power up to 2,5 AMPS.[7]
6. Two USB port is available in Raspberry Pi 3 form. There is one LAN port with a USB microphone & 5v. [7]There is also an HDMI port and CSI port for the camera. [7]The 4 pole video & audio sock is composed of 3.5mm.[7]
7. The GPIO pin has 40 pins. GPIO and 8 pin are field with 40 pin 26 pin[7]
8. The speed of the clock is 1.2GHZ.[7]
9. Because of its efficient method, Rasberry PI 3 SBC can perform multiple tasks[7]

- RFID

RFID is active device .It used to read information. Information store in tag or in no. form .RFID read the tag transmit information to microprocessor .RFID working: Antenna consist of internal or external which continuously emit radio wave so RFID tag can responded to it by send back their information to microprocessor[8]

Features of RFID:-

A. RFID module at 13.56 MHz[8]
B. 2.5V to 3.3V operating voltage[8]
C. SPI, I2C protocol, and UART are used for communication.[8]
D. 10Mbps is the maximum data rate available.[8]
E. 5cm reading range[8]
F. 13-26mA is the current consumption.[8]
   A. 10uA consumption in power down mode (min)[8]

- DC Motor(Lunnar):

Brushed DC ironless motors are found in a large variety of products and applications such as medical, robotics, factory automation, security and access, civil aviation and aerospace products.[1]
Here this is lunar motor .lunar is not any kind of type it is company which makes this dc motor because simple motor routed in 360 degree but after 10 rotation simple motor get varies in 360 degree.
But lunar gives perfect 360 degree continuously that's why this motor most of he use in industry.
Its speed is 20 RPM,Torque is 17Kg-cm,
Power is 4 watt, and voltage is 12v/24 v[9]

- LCD display:

By using LCD display we display components of list also details of authorized person

- HDMI to VGA Converter :

By using HDMI to VGAC converter we converts HDMI optical signal into a VGA analogue video signal. It supports analogue video output in 1080p

A. Hardware & Software Requirements

1. Raspberry pi 3
2. RFID reader
3. Motor
4. Motor driver
5. Display
6. Relay
7. key
8. LED
9. HDMI to VGA converter cable
10. Cables & Connectors
11. SD card
12. Power supply
13. Power adapter
14. Software: Python 3.7
15. Programming Language :Python

IV. METHODOLOGY AND ALGORITHMS

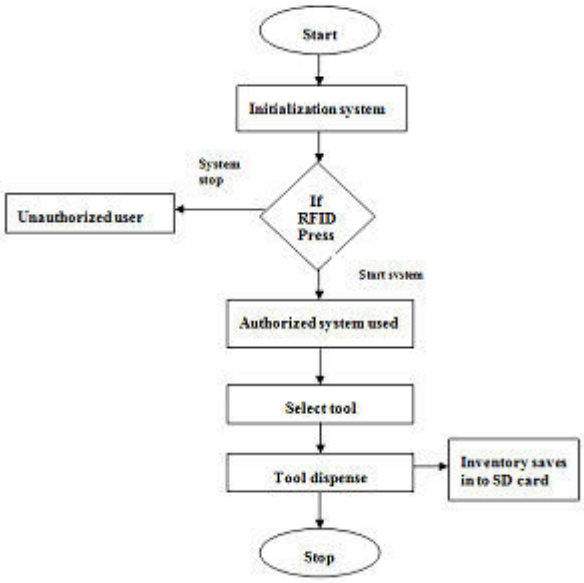


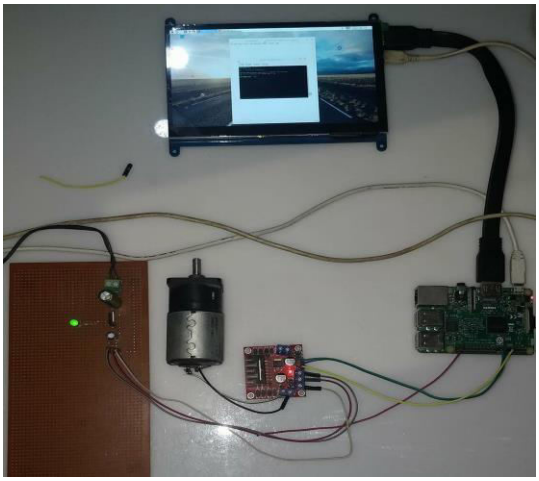
Figure 4.1 Flow Chart

Algorithm :

1. Stop
2. Initialization system.
3. RFID read the tag.
4. Allow to authorized person otherwise it get stop.
5. displaying various tool name those are available.
6. Select tool.
7. Tool distributed.
8. Data save in SD card.
9. Stop.

V. PERFORMANCE ANALYSIS

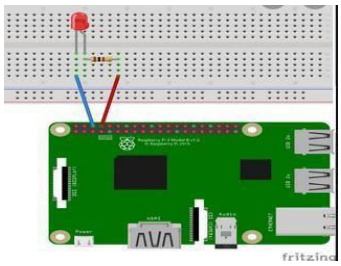
STEP 1:
A machine that converts DC power into mechanical power is known as a DC motor. In this, we are using brushless DC motor with 200rpm, 12v.



Program:
import RPi.GPIO as GPIO

```
from time import sleep
GPIO.setmode(GPIO.BOARD)
Motor1A = 16
Motor1B = 18
Motor1E = 22
GPIO.setup(Motor1A,GPIO.OUT)
GPIO.setup(Motor1B,GPIO.OUT)
GPIO.setup(Motor1E,GPIO.OUT)
print "Turning motor on"
GPIO.output(Motor1A,GPIO.HIGH)
GPIO.output(Motor1B,GPIO.LOW)
GPIO.output(Motor1E,GPIO.HIGH)
sleep(2)
 print "Stopping motor"
GPIO.output(Motor1E,GPIO.LOW)
GPIO.cleanup()
```

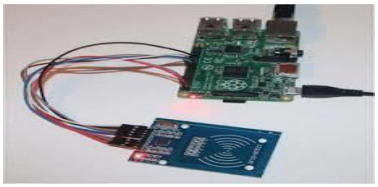
STEP 2:
By using led we indicated here machine get start or off.



Program:

```
import RPi.GPIO as GPIO
import time
GPIO.setmode(GPIO.BCM)
GPIO.setwarnings(False)
GPIO.setup(18,GPIO.OUT)
print "LED on"
GPIO.output(18,GPIO.HIGH)
time.sleep(1)
print "LED o_"
GPIO.output(18,GPIO.LOW)
```

STEP 3:
By scanning RFID tag through RFID reader we can give authority to access tools to author .All information about author and which tools they access in which quantity we able to store in sd card



Program:

```
import time
import RPi.GPIO as GPIO
import MFRC522
# Create an object of the class MFRC522
MIFAREReader = MFRC522.MFRC522()
# Welcome message
print("Looking for cards")
print("Press Ctrl-C to stop.")
# This loop checks for chips. If one is near it will get the
UID
try:
while True:
# Scan for cards
(status,TagType) =
MIFAREReader.MFRC522_Request(MIFAREReader.PICC
_REQIDL)
# Get the UID of the card(status,uid) =
MIFAREReader.MFRC522_Anticoll()
# If we have the UID, continue
if status == MIFAREReader.MI_OK:
# Print UID
print("UID:
"+str(uid[0])+","+str(uid[1])+","+str(uid[2])+","+str(uid[3]))
ime.sleep(2)
except KeyboardInterrupt:
GPIO.cleanup()
```

VI. CIRCUIT AND SIMULATION DIAGRAM

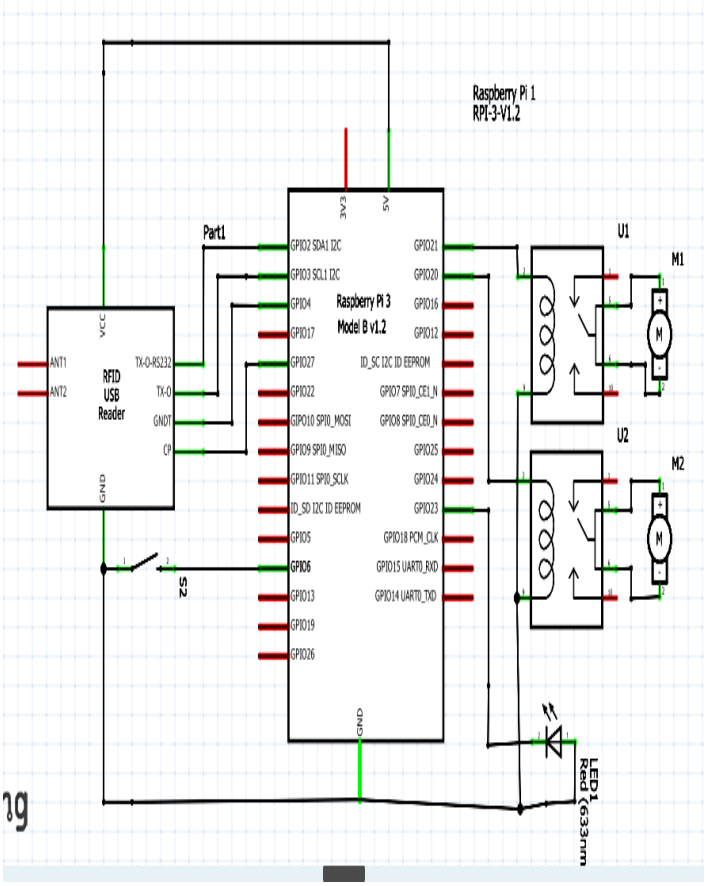


Figure 5.1: Circuit Diagram of System

The **Raspberry Pi** is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.

Here the key is used to start the machine. All the workers had their own RFID tag. By scanning this tag we get overall information about that worker.

After scanning the RFID tag it gives all information to the raspberry pi. As before it enters into excel sheet all the data of employee. Raspberry pi runs next program. After that it displays the list of tools serial wise on display or on a screen. The employee has to select the tools and its quantity. This will be recorded in SD card along with employees name and whatever tools he get from machine. Then we have to select run option according to list lunar motor moves in upward and downward direction to get that quantity of tools to that employee.

After finishing all the work, worker had to return all the tools to the machine if its required. It will recorded in SD card again and all the process done vise a versa.

VII. CONCLUSION

1. Due to their precision and feasibility, the use of Conclusion Digital increases day after day. Because of time savings, people in busy areas are selling machines, like the bank office at the airport etc. This system is compact, inexpensive and less powerful, such that the consumer is free to use the system every time.[3]
2. While the sales press is now commonly used. In the industry where employees have to wait in long queues, Industrial vending machine is important. This computer style eliminates human effort and delivers precise results

Advantage

1. Daily update– Since the vending machine did not need any workers; there was no need to pay any additional salaries.
2. Less manpower required
3. Vending machines are straightforward to operate- after installed, vending machines need less than no servicing. Operating better, not harder- vending machines allow you to work in a way that is more comfortable for you.
4. Chemical storage safety – many manufacturing applications use chemical materials that, if poorly handled, can pose a serious risk to employee health

.

Application

1. System used in hospitality
2. Milk vending machine[2]
3. Paper vending machine [4]
4. Food vending machine[5]
5. Chocolate vending machine[3]

REFERENCES

[1] Integrated Point of Sales and Snack Vending Machine based on Internet of Things for Self Service Scale Micro EnterprisesJuly 2019Journal ofPhysicsConferenceSeries 1179:012098DOI:10.1088/1742-6596/1179/1/012098

[2] Development of low cost portable automatic milk vending machine 1M. Dinesh Kumar, 1Assistant Professor, Department of Mechatronics, Bannari Amman Institute of Technology, Sathyamangalam, Erode - 638401,Tamilndu,India. Volume 119 No. 18 , 2018, 2639-2648

[3] Automatic Chocolate Vending Machine By Using Arduino Uno Prof. S. S. Desai, Sayali Maruti Jadhav, Priya Shivaji Patil, Giri Neeta Sambhaji ISSN: 2347-5552, Volume 5, Issue 2, March-2017

[4] Automatic Paper Vending Machine- Ijsetr, Volume 4, Issue4, April 2015

[5] See discussions, stats, and author profiles for this publicationhttps://www.researchgate.net/publication/265079551 The commodity vending machine Article · February 2005

[6] Related:https://en.wikipedia.org/wiki/Vending_machine vending machine background

[7] Raspberry Pi Compute Module 3+Copyright 2019 Raspberry Pi (Trading) Ltd. All rights reserved.

[8] https://components101.com/wireless/rc522-rfid-module

[9] hwww.indiamart.com/proddetail/vending-machine-motor-18007281733.html

[10] Prof.Kanchan Warke, Miss.Gaikwad Snehal Sunil, Miss.Attar Sultana Mahamad, Miss.Gardare Swati.S, Miss.Nchal Bhagyashri Sudhir “Smart Ration Card System using RFID and Embedded System”. ISSN 2454-4248 190-194 Volume 4 Issue 3I73-6972 Volume.

Entrance Management using IoT

Shardul Tiurwadkar
Dept. of EnTC Engg
PCCOE
Pune, India
sdtiurwadkar@gmail.com

Prathamesh Karandikar
Dept.of EnTC Engg
PCCOE
Pune, India
kpmhp2206@gmail.com

Prathamesh Jog
Dept. of EnTC Engg
PCCOE
Pune, India
prathameshjog1999@gmail.com

Mrs. S. A. Patil
Dept. of EnTC Engg
PCCOE
Pune, India
sapatil1912@gmail.com

…..……..…….....***……..……..

Abstract*—The health and hygiene aspects has been gaining a quite more attention since COVID-19 has become a global pandemic. It is quite natural that even when the situation comes under control, people become more aware to treat health and hygiene as a security aspect. It would be necessary for people to have a domestic level prevention policy under which a visitor will be allowed in only if he doesn't show any epidemic symptoms. In the vision of such cases, we have proposed a home safety entrance management system that uses face recognition to identify the visitor along with the interfaced sensors that measure the health statistics of the visitor. The system will pass on the identity and health stats of visitor to the owner by and decide whether to allow the visitor in or not. The proposed system uses IR temperature sensor to measure the body temperature, camera module interfaced with the Raspberry Pi controller for face recognition, communication over the internet using IoT between the system and the owner and a motor which controls the opening or closing actions of the door

***Keywords*—health and hygiene, face recognition, IoT, communication, entrance management**

I. INTRODUCTION

The proposed system can be introduced as a combination of three systems. Each of them is designed to perform a specific tasks, namely- face recognition, measurement of body temperature, communication using IoT and operating the door.

A. Face Recognition

One of the main feature of an entrance management is system is to identify the visitor. In professional systems, a hardcore secured platform can be designed using technologies like RFID coded cards but in a vision of the domestic level applications, face recognition will be enough The system must identify the visitor on the door correctly provided that necessary dataset is already fed to the system.

B. Measurement of Body Temperature

When people start considering health and hygiene as a security aspect, the home security systems should also be upgraded to a design that allows only the people who are well defined as a harmless i.e. the one who is completely free of epidemic symptoms. This can be verified by using the sensors who detect the health stats of the visitor by measuring various health parameters of the visitor's body.

Here in our proposed system, we have chosen body temperature as a parameter. The system is expected to measure the body temperature of visitor and decide his health status based on the preset limiting value.

C. Communication over the internet using IoT

Being a semi-automated, the system needs his owner as its master. The master should be able to monitor (and control if needed) the functions of the system. Thus, the system and the user are planned to be bridged through communication link using IoT. As soon as the system reaches its decision, the owner should be informed with the dataset that contains identity and health status of the visitor. The owner should be able to command the system to help the system take decisions, if necessary, through the same communication link.

D. Operating the Door

Based on the results of face recognition and temperature measurement modules, and, if needed, the commands from the owner, it is supposed to be possible for the system to control the opening and closing of the entrance door.

To represent the proposed idea into a fundamental system model, AWS cloud service provider can be used for better implementation of system as a cloud source [1]. We decided to use Raspberry Pi and Camera Module for face capturing [2]. Also we concluded that running code on cloud is efficient than running it on board for speed results [3]. There are different algorithms for facial detection and recognition that can be used for the system [4]. The IoT and Wi-Fi based door access can be designed and provided the decision factors based on results of our system as well as the owner's command [5].

II. PROPOSED SYSTEM

The system will consist of a microcontroller (Raspberry Pi), an IR temperature sensor, a camera module, a communication network, a motor driver module and a motor. The system schematic is shown in fig-2.0.

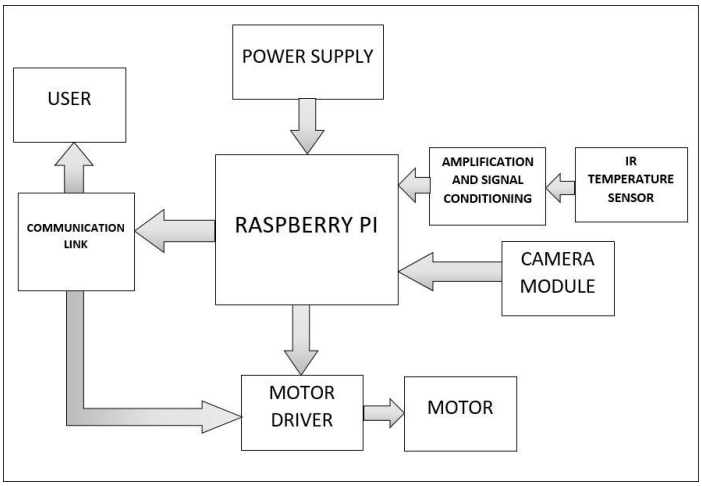


Fig-2.0: System schematic diagram.

A. *Camera Module*

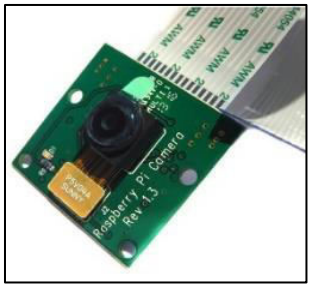


Fig -2.1: Camera Module

Fig-2.1 shows the camera module OmniVision OV5647. The OmniVision OV5647 is a camera module which provides direct interface with Raspberry Pi via the CSI2 bus using ribbon cable. It features a 5MP CMOS type sensor with fixed focus providing 2592x1944 maximum resolution.

B. *IR Temperature Sensor*

Fig -2.2: IR Temperature Sensor

Fig-2.2 shows the IR temperature sensor MLX90614. It is a digital contactless sensor, capable of measuring temperature of a certain object in a range from -70° C to 382.2°C. The IR radiations are used to measure the temperature of the object and communicates to the microcontroller using the I2C protocol. The IR rays emitted by an object is focused onto one or more photodetectors, which convert them into proportional electrical signals. The IR temperature sensor module MLX90614 is used in various industrial as well as household applications. It can also be used to measure and monitor the temperature of moving bodies due to its high accuracy and precision.

C. *Raspberry Pi 3B plus*

Fig -2.3: Raspberry Pi 3B plus

The Raspberry Pi 3B+ model is shown in Fig -2.3. It consists of a 64 bit quad processor which functions at 1.4GHz, faster Ethernet, PoE via separate PoE HAT, Bluetooth 4.2/BLE and dual-band wireless LAN (2.4 GHz and 5GHz) with modular compliance certification. This makes the board capable to be designed into end products, improving both cost and time to market.

III. 3. METHODOLOGIES USED

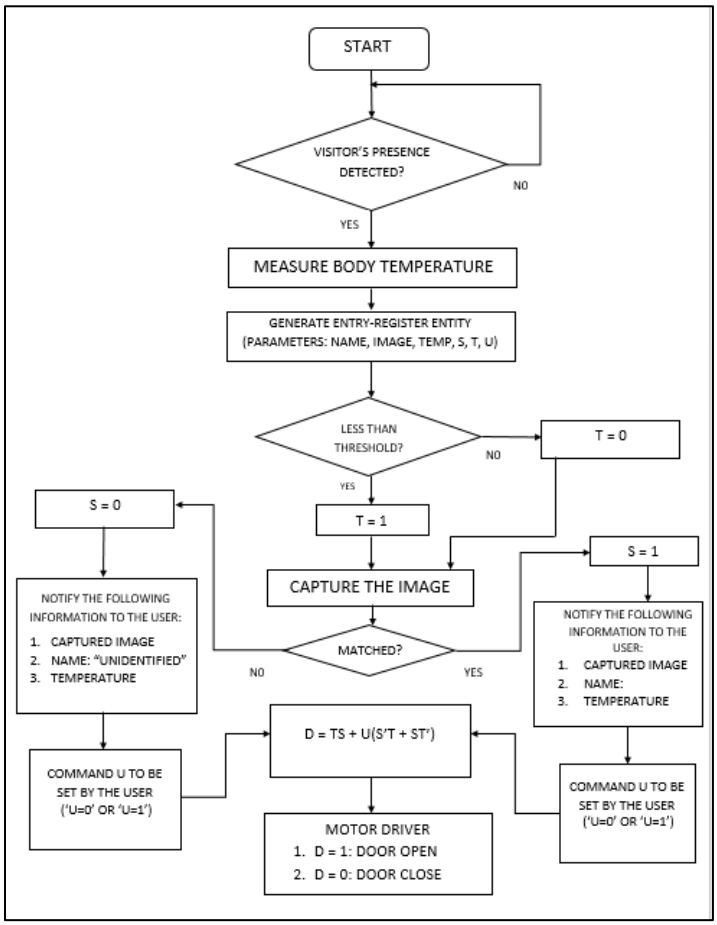


Fig-3.1: Flow Chart

The flowchart of working of the system is as shown in Fig -3.1.Once the system is activated, the body temperature of the visitor will be measured using IR temperature sensor and it will

be compared to the threshold limit. After that the Camera module will scan the visitor's face and pass it to Raspberry pi. The visitor's face will be compared to the image database to recognize his identity. If the match is found, then the name of the visitor with his/her body temperature will be sent to the owner's mobile device through email.

After checking the body temperature and identity of visitor, the owner will decide whether to grant the entry to the visitor. If the owner wishes to grant the entry, he/she will open the door by means of DC motor by sending the appropriate command to raspberry pi over the internet.

The estimated time for the purposed system is very less as we are using raspberry pi 3B+. Because of its specified features capturing, detecting, and sending mails to the respective owner is fast. Also after implementing this proposed system in mass, the total upfront cost can be reduced. For a Society System, as there will be a single server at the entrance hence it is affordable for society, and as we are using very few, mainly 2 to 3 components it will be affordable to the common man as well for single house owners too.

IV. SPECIFICATIONS

A. *Camera Module OmniVision OV5647*

This module is suitable to capture the visitor's image with pixel quality good enough for face recognition. It is a 5MP camera with 2592 x 1944 still pic resolution. The camera module can also be used if the system is designed for real time mode with video support of 1080 pixels at frame-rate of 30fps, or 720 pixels at the frame rate of 60fps.The module OmniVision OV5647 provides 15-pin MIPI serial interfacing and hence it can be plugged in directly to Raspberry Pi.

B. *IR Temperature Sensor MLX90614*

Supply voltage: 3.3V to 5V, Temperature range (surface/surrounding): 40°C to 85 °C, Temperature range (object): -70°C to 380.2 °C, Accuracy: upto 0.02°C, Precision: ±0.5°C for 0 to 50°C, Field of view (FOV): 35°.

C. *Raspberry Pi 3B plus*

The board consists of BCM2837B0 chip by Broadcom, A 64-bit system-on-chip Cortex-A53 processor (ARMv8) working at 1.4GHz, SDRAM of 1GB (LPDDR), IEEE 802.11.b/g/n/ac wireless dual band LAN (2.4GHz and 5GHz), Bluetooth 4.2/BLE and Gigabit Ethernet over USB 2.0 with maximum throughput of 300 Mbps. It also features CSI camera port to connect the camera module, port for Micro-SD in order to load the operating system and store the regarding data and PoE i.e. Power-Over-Ethernet provided that PoE HAT is made available externally.

D. *DC Motor*

Standard 130 Type DC motor; Supply: 4.5V - 9V; No load current: upto 70mA; RPM at no-load: 9000 rpm; current rating: 250mA for 10g*cm.

V. SIMULATION AND TESTING

Upto this point it is certainly clear that the system needs three programming modules to be working as per the designed workflow. These three modules are namely-

1. Face- Recognition
2. Body Temperature Measurement
3. Communication between the system and the owner over the internet.

To reduce the complexities, rectify the errors, observe and handle all sort of exceptions, we will test each module separately, i.e. in three different parts. The platform used for testing is "visual studio code" as a python IDE and the "console terminal window" to display the output results.

- *TROUBLESHOOTING:*

  While running the above mentioned tests, we come across a few troubles and situations. Following points include a detail description of all the situation and the strategy or plan we followed to deal with each of them.

1. While testing the face-recognition module, we observed that it is not possible for the module to work effectively fast enough if the dataset stores a considerable number of entries. It took a very considerable time (approx. 25 to 30 seconds) to encode every image each time when the program is initiated and even so, the results were inaccurate for some test cases. Hence, to troubleshoot this situation, we designed the python program that will encode the dataset, and save the encoded data in a pickle file, before the time of utility. This has eliminated a need of encoding the dataset at the runtime of the program and hence made the designed face-recognition module to work faster. The execution time is reduced to few milliseconds and apparently, doesn't depend upon the number of entries in dataset
2. For interfacing IR temperature sensor module mlx90614 to the raspberry pi, we used the recommended open source library 'mlx90614'. But we found the need of several dependencies to be installed on raspberry pi to make it read the data gathered by the sensor.
3. The requirement of some dependencies were found while running 'encoder.py' on raspberry pi, too. The 'encoder.py' makes use of 'haar-cascade.xml' file for the encoding and serializing the encoded data into '.pickle' format. The dependencies were found and installed and the code is tested to be working as required.

A. *TESTING OF FACE RECOGNITION:*

1) Building the dataset: To prepare an editable dataset by using images of different people, save their correspondence with their names and encode it for face recognition module.

- *Create a new entry in the database:*

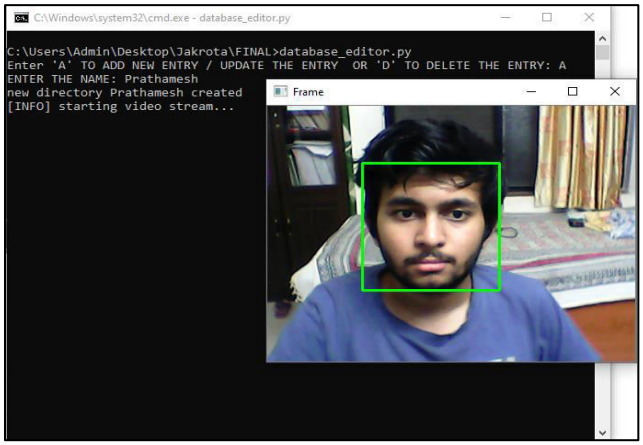


Fig-5.1.1.a: database_editor.py

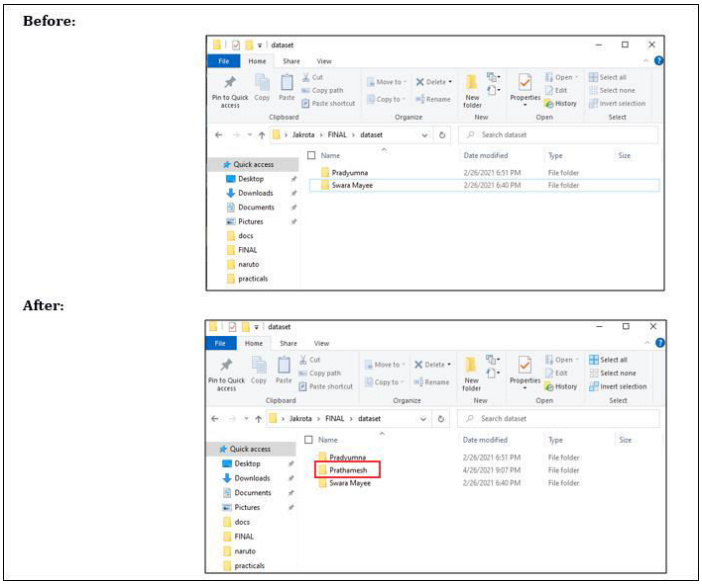


Fig-5.1.1.b: creating an entry in dataset

- *Delete entry from the dataset:*

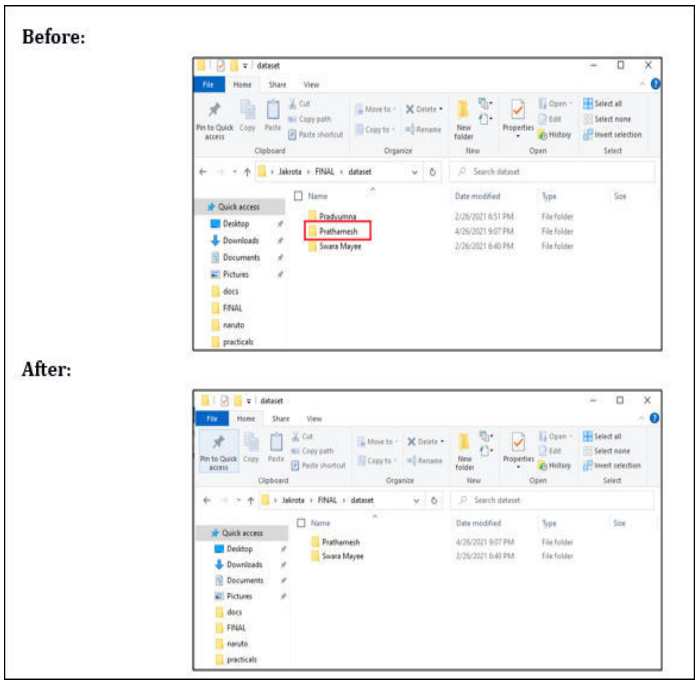


Fig-5.1.1.d: deleting an entry in dataset **-** result

The python code ‘database_editor.py’ is found to be capable of creating, editing as well as deleting the entries in the dataset. The fig 6.2.1.c and fig 6.2.1.d show that the directory named as ‘Pradyumna’ is successfully deleted

- *Create a pickle file:* It is always advisable to store the encoded data in the form of pickle file for face recognition module to work faster

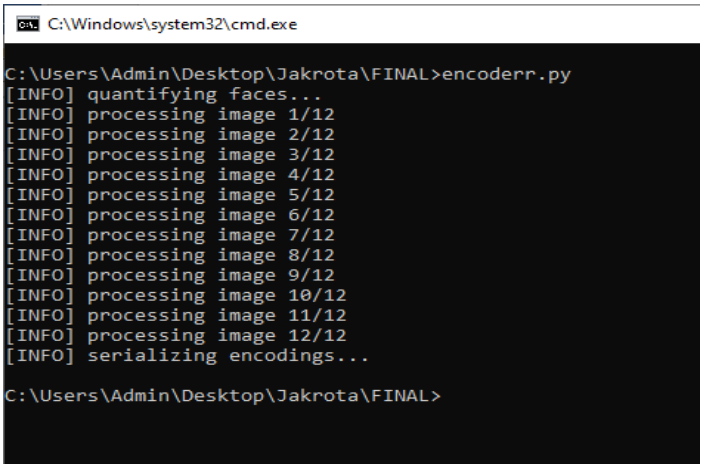


Fig-5.1.1.e: encoder.py

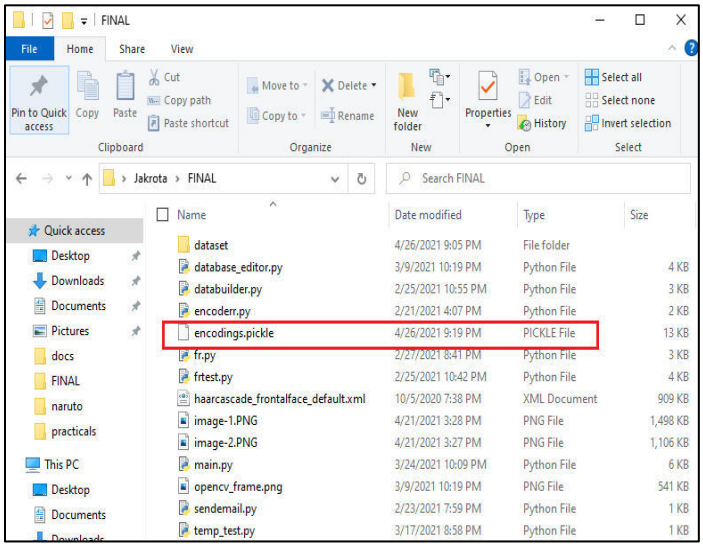


Fig-5.1.1.f: encodings.pickle file

From fig 6.2.1.e and fig 6.2.1.f it is clear that the python code ‘encoderr.py’ is tested to be capable of encoding images of all the entries in the dataset, along with the correspondence of each of the entry with his/her name. The encoded data is stored in ‘encodings.pickle’ file as shown in fig 6.2.1.f

2) Face-recognition: To recognize the person in front of the camera module using face recognition module and print his/her name on the terminal.

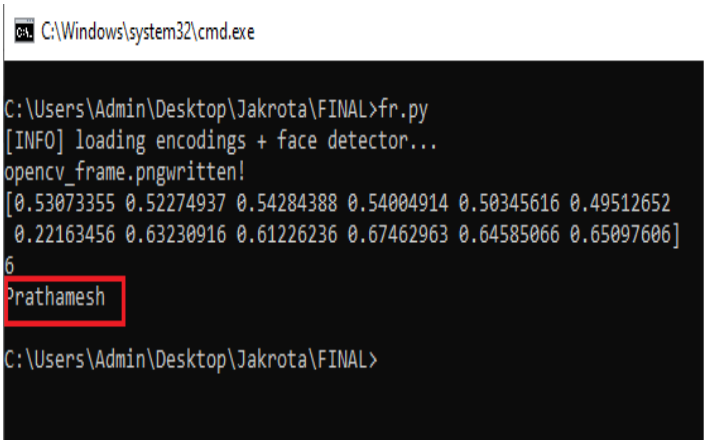


Fig-5.1.2: Deleting an entry in dataset – result

Fig 6.2.2 shows the result of face-recognition module designed particularly for the system. Refer the screenshot of the terminal window, a list of numbers showing the difference between visitor's face encoding and each of the encodings we have in the database, stored in 'encodings.pickle' file. The 7th element from the list is having the minimum distance, which corresponds to the directory named as 'Prathamesh', which matches with the exact result printed on the terminal Hence, the face-recognition module is tested to be working as per the expectations. The image of visitor is stored as "opencv_frame.png" in the database for further usage.

B. TESTING IR TEMPERATURE SENSOR:

To measure the body temperature by using IR temperature sensor module mlx90614 interfaced to the raspberry pi and print the result in deg-celcius and deg-Fahrenheit format.

C. TESTING OF THE COMMUNICATION OVER THE INTERNET:

In this test, we will check and verify whether the system can communicate to the ownerby the means of e-mail generated by the system itself and receive the commands sent by the oner by the means of http server request

Here, the email-id used by system is: jakrota2021@gmail.com And the owner's email id was selected to be: kpmhp2206@gmail.com

TEST CASE-1: Visitor is known and healthy:

Fig-5.3.a: Visitor is known and healthy

TEST CASE-2: Visitor is known but unhealthy:

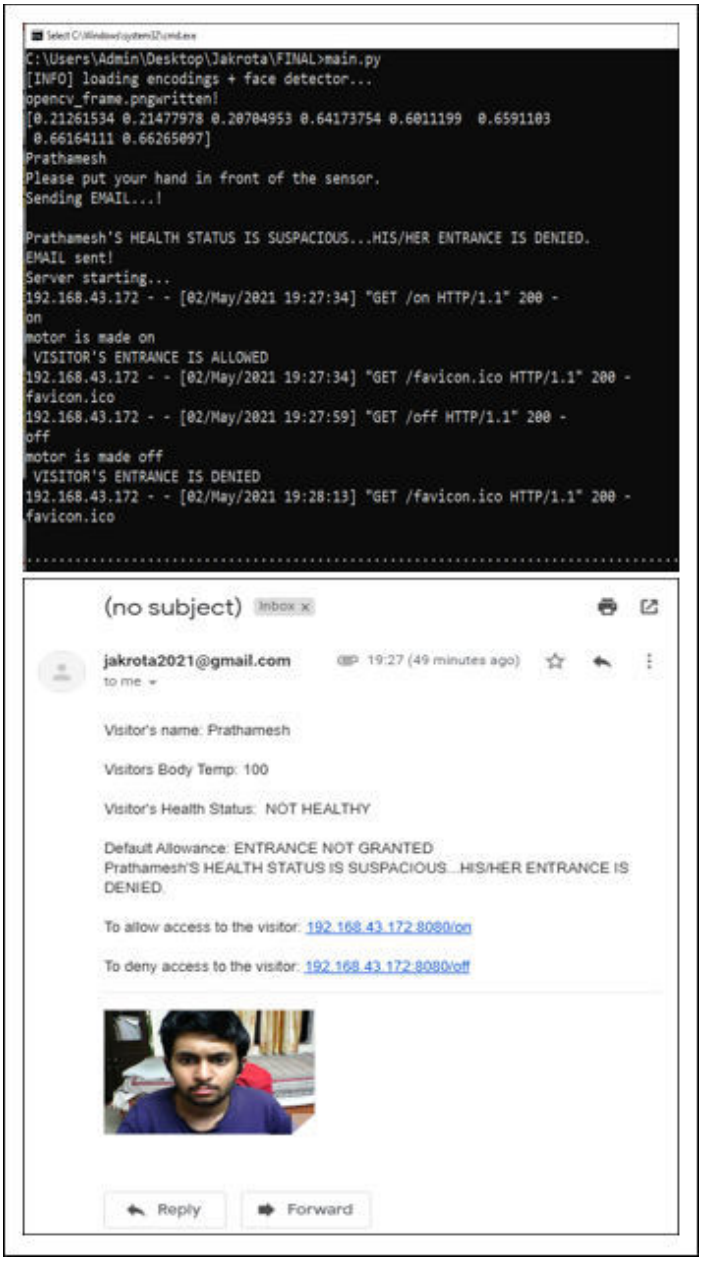


Fig-5.3.b: Visitor is known but unhealthy

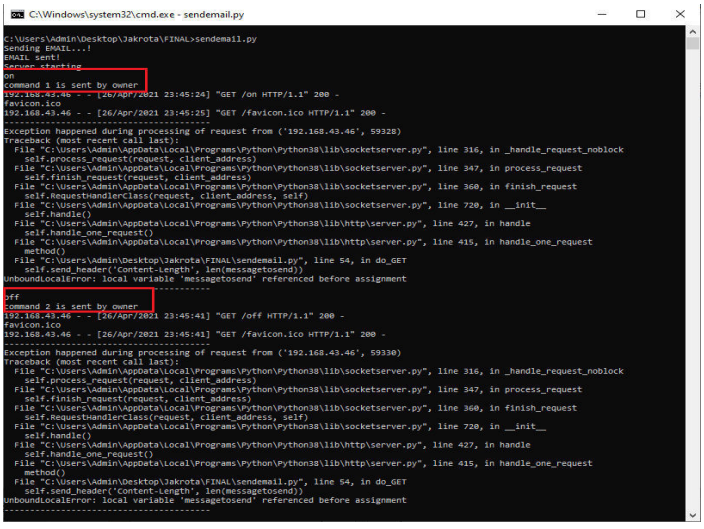


Fig-5.3.b(1): Commands received by the system

TEST CASE-3: Visitor is unknown but healthy:

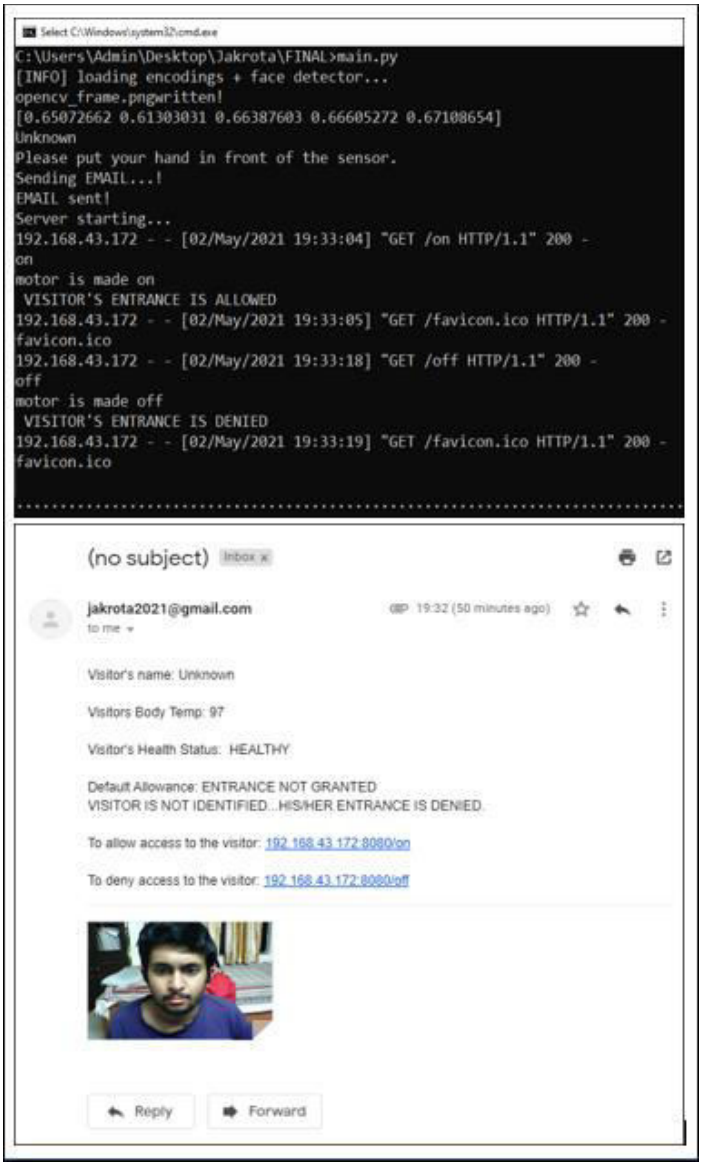


Fig-5.3.c: Visitor is unknown but healthy

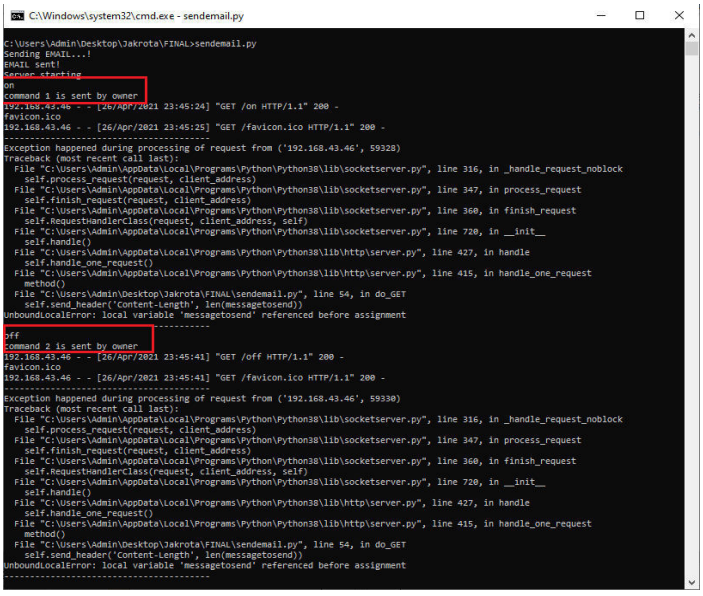


Fig-5.3.c(1): Commands received by the system

TEST CASE-4: Visitor is unknown and unhealthy:

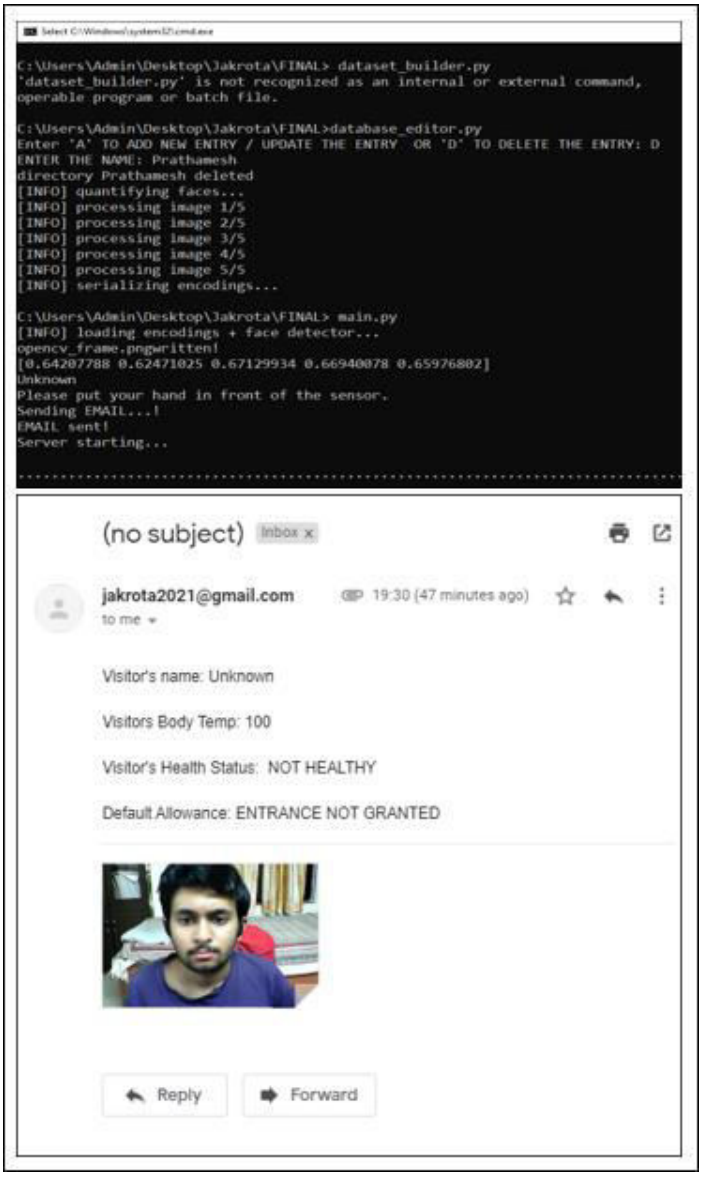


Fig-5.3.d: Visitor is unknown and unhealthy

VI. 6. CONCLUSION:

The system is able to efficiently and accurately measure the visitor's body temperature and maintain proper records. The system can detect and recognize the visitor's face with great extent of accuracy. It is also able to form a communication link between system and the owner to notify the owner about visitor's identity and health status immediately through IoT communication platform.

The estimated time for the purposed system is very less, merely in seconds. It is observed that image capturing, face-detecting and recognizing, mail sending, and decision making algorithms and protocols can be executed fastly.

It is possible to operate the door controlled by either the commands from owner or by the system based on visitor's identity and health status. The system provides easy database updating facility i.e. to add, delete or modify entries; to the owner or the authorized members.

The overall cost is centered mainly at the installation of the system. Since the communication is happening through internet by sending emails and receiving commands in the form of HTTP requests sent by the owner. Hence, the communication cost can be said to be negligible Also after implementing this proposed system in mass, the total upfront cost can be reduced. For a housing society system, it is more affordable as there will be a single server at the entrance, and as we are using merely 2 to 3 components it will be affordable to install, for the common man as well for single house owners too.

VII. REFERENCES:

[1] M. Mehra, V. Sahai, P. Chowdhury and E. Dsouza, "Home Security System using IOT and AWS Cloud Services," 2019 International Conference on Advances in Computing, Communication and Control (ICAC3), Mumbai, India, 2019, pp. 1-6, doi: 10.1109/ICAC347590.2019.9089839.

[2] Nag, J. N. Nikhilendra and M. Kalmath, "IOT Based Door Access Control Using Face Recognition," 2018 3rd International Conference for Convergence in Technology (I2CT), Pune, 2018, pp. 1-3, doi: 10.1109/I2CT.2018.8529749.

[3] K. Lakshmi and A. S. Pillai, "Ambient Intelligence and IoT Based Decision Support System for Intruder Detection," 2019 IEEE International Conference on Electrical, Computer and Communication Technologies (ICECCT), Coimbatore, India, 2019, pp. 1-4, doi: 10.1109/ICECCT.2019.8869327.

[4] N. R. Borkar and S. Kuwelkar, "Real-time implementation of face recognition system," 2017 International Conference on Computing Methodologies and Communication (ICCMC), Erode, 2017, pp. 249-255, doi: 10.1109/ICCMC.2017.8282685.

[5] R. R. Deepty, A. Alam and M. E. Islam, "IoT and Wi-Fi Based Door Access Control System using Mobile Application," 2019 IEEE International Conference on Robotics, Automation, Artificial-intelligence and Internet-of-Things (RAAICON), Dhaka, Bangladesh, 2019, pp. 21-24, doi: 10.1109/RAAICON48939.2019.09.

Speed Control and Parameter Monitoring of Solar Powered Bldc Using PWM Technique

Anagha Kharate
Department of Electrical Engineering,
Atharva College of Engineering,
Mumbai, Maharashtra, India
kharateanagha@gmail.com

Prathamesh Deshmukh
Department of Electrical Engineering,
Atharva College of Engineering,
Mumbai, Maharashtra, India
prathameshd0199@gmail.com

Omkar Lamkhade
Department of Electrical Engineering,
Atharva College of Engineering,
Mumbai, Maharashtra, India
omkarlamkhade04@gmail.com

Shubham Ghule
Department of Electrical Engineering,
Atharva College of Engineering,
Mumbai, Maharashtra, India
shubablughule@gmail.com

***Abstract*— nowadays, the BLDC motor is effectively replacing other motors due to its less power consumption and simpler speed control techniques. If this motor is controlled remotely by using current trending technology called IOT, it will reduce lots of human efforts. This project aims to make a cost-effective and remotely controlled solar-powered circuit for the BLDC motor. This can monitor the motor parameters such as speed, temperature, voltage, and power using an android application. These all functions can be integrated using Arduino Uno (Atmega 328P Microcontroller). The speed control can be achieved through ESC Driver by using the Pulse Width Modulation technique, and the parameters such as speed and temperature can be sensed by LM35 Temperature Sensor and A3144 Hall Effect Sensor. Also, the voltage sensor and current sensor ACS712 are used to measure voltage, current, and power. These all generated data can be stored to ThingSpeak cloud server using Node MCU (ESP8266) and can be fetched and controlled through a mobile application. Due to many advantages and extensive applications of BLDC motor, this project can be effectively implemented in irrigation, robotics, and various industrial applications.**

Keywords*— *ESC Driver, LM35 Temperature Sensor, current sensor ACS712, ThingSpeak, Node MCU (ESP8266).

I. INTRODUCTION

After the invention of the electric motor in the 19th century, lots of human efforts and time required to perform various types of work was reduced. After that, different types of motors were developed by various scientists, and each motor was having its different characteristics, advantages, response, and wide varieties of applications. Constantly new motors are replacing old ones because of new technology and research. And now it is an era of Brushless Direct Current Motor due to its various advantages such as high power-to-weight ratio, high speed, nearly instantaneous control of speed and torque, high efficiency, and low maintenance.

Similar to a permanent magnet synchronous motor in construction the BLDC motor can also be a switched reluctance motor or an induction motor. They may likewise utilize neodymium magnets and be out runners (the stator is encircled by the rotor), in runners (the rotor is encircled by the stator), or axial (the rotor and stator are flat and parallel). Brushless engines find applications in such places as PC peripherals (plate drives, printers), hand-held power instruments, and vehicles going from model airplane to cars. In modern washing machines, brushless DC motors have allowed the replacement of rubber belts and gearboxes by a direct-drive design.

In Industries, most of the motor used are conventional motors such as an induction motor. In case of an induction motor, as time passes they become unreliable and inefficient and they consume more energy (due to losses). Induction motor doesn't have much dynamic speed control and for their speed control we have to use special device such as VFD.

Overall maintenance cost is high. Other than that monitoring is expensive using software like SCADA.

As we are upgrading to the digital age our devices will be connected to the internet, remote controllability and inexpensive monitoring of these devices should be possible.

This paper describes a simpler way to control the speed of BLDC motor using PWM control method. The performances of the BLDC system are found from the hardware implementation.

In our project, we have designed the remotely controlled and parameter monitoring circuit for the BLDC motor. The BLDC motor is powered by solar power to reduce energy consumption. However, the sunlight is only available for the daytime, and the intensity of sunlight is variable throughout the day. To control the output voltage of the solar converter to a fixed 12v battery voltage, MPPT solar charge controller algorithm is used, which increases the life and efficiency of the batteries. The solar power is stored in a 3s LiPo battery, so it can be used as per our need to run the motor. The speed control of the BLDC motor can be easily done by the PWM output pin of the Arduino Uno (Atmega 328P Microcontroller), and this output is given to ESC (Electronic Speed Controller). Delivered by an electrical signal, the method of reducing the average power by effectively chopping it up into discrete parts is known as Pulse Width Modulation (PWM).The parameters such as speed and temperature are monitored using the A3144 Hall effect sensor and the LM35 Temperature sensor. The voltage and ASC712 current sensors are used to measure the power consumed by

the motor. An android mobile application can monitor all these generated parameters by using IOT.
This project can be successfully implemented for various applications. Such as in irrigation for feeding water to the field by controlling the operation and speed of the motor from a remote location and can be done at any time as per our convenience due to use of solar-powered batteries, and can also be used for robotics, household fans, etc.

II. LITERATURE REVIEW

"Brushless DC Motor Speed Control Using Microcontroller" *By* G.Santhosh Kumar, S.Arockia Edwin Xavier.Thiagarajar College of Engineering, Electrical and Electronic Engineering Madurai, Tamil Nadu.
In this paper, a BLDC motor is described and its speed control is achieved by varying duty cycles (PWM technique) from the microcontroller. The % duty cycle input is given through a matrix keypad which is interfaced to the microcontroller and the output if the microcontroller delivers the desired output to change the speed of the motor. [1]
"Speed Control of a BLDC Motor Using PWM Control Technique"- By Arjun V, Akhilesh H Nair, Balakrishnan, Vishnu T, Vidya Sojan. UG Scholar, Dept of Electrical &Electronics Engineering, College of Engineering Munnar, India.
This paper describes a simpler way to control the speed of BLDC motor using PWM control method. The performances of the BLDC system are found from the hardware implementation. [2]
"Microcontroller Based Speed Control Scheme of BLDC Motor using Proteus" -By K. Soumiyaa, R.Vishnu Priya. Department of Electrical and Electronic Engineering IFET College of Engineering, Villupuram Tamil Nadu.
In this paper, the motor model has been designed in Proteus VSM simulation software for direct implementation of the program code. Method to reduce speed oscillations and to run the motor at exact entered speed. This is achieving by using the microcontroller programming. [3]
"Brushless DC Motor Controlled by using Internet of Things" -By Ms.C.Hemalatha, Mr.R.Nagarajan, P.Suresh, G.Ganesh Shankar ,Department of Electrical & ElectronicsEngineeringGnanamani College of Technology Namakkal, Tamilnadu, IndiaGnanamani College of Technology Namakkal, Tamilnadu, India
This paper proposes a new architecture for control the BLDC motor, which uses a versatile industrial based android smartphone at a relatively reasonable price and implemented by Ethernet shield and Arduino UNO also using web domain for system control. A 3G or 4G connection can be used to access the Web page on hosting server using an android app or web domain. [4]

"Speed Control of Brushless DC Motor Using Different Intelligence Schemes" -By Rubi Batham, Rameshwar Singh MTech Scholar, Electrical Engineering Department, NITM, Gwalior, India Assistant Professor, Electrical Engineering Department, NITM, Gwalior, India.
In this paper, this dissertation focuses on speed control of BLDC motor using fuzzy logic technique. The goal is to determine which control strategy delivers better performance with respect to BLDC motors speed these methods are compound on the basis of output response, less rise-time, less setting-time etc. Thus the performance comparison between fuzzy logic controller, PI-controller and I-controller is done. The FLC has minimum transient, minimum overshoot and steady state parameters, which shows that it is more effective and efficient than conventional PID controller. [5]

III. CIRCUIT DIAGRAM

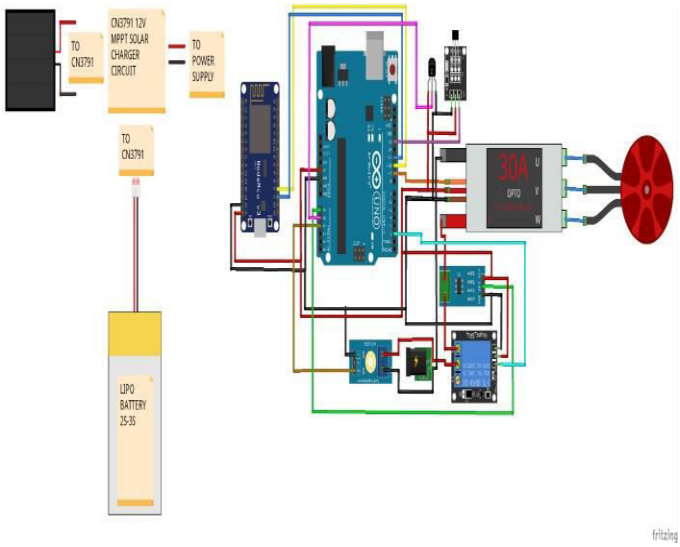


Fig. 1 represents the circuit diagram of the system.

A. *SOLAR PANEL*

A solar panel has a collection of photovoltaic cells which converts light energy into electrical energy. In our project, we use a 12V solar panel whose output is given to the MPPT module which charges the battery efficiently.

B. *MPPT SOLAR CHARGER*

The algorithm included in charge controllers that are used to extract maximum available power from a PV module is called Maximum Power Point Tracking (MPPT).This MPPT solar charger provides the power to urge the foremost possible power out of a solar array or other photovoltaic device and into a rechargeable LiPo battery.

C. POWER SUPPLY

In this project, the power supply we use is an 11.1 volt 3 cell Lithium Polymer battery with a capacity of 2200mAh. Li-Po battery is used because these batteries deliver the full rated capacity at a price everyone can afford. Li-Po batteries work best with the ESC driver.

D. RELAY

An electrical switch that is operated by an electromagnet is known as a relay module. The microcontroller activates the electromagnet by a separate low-power signal. At the point when initiated, the electromagnet pulls to open or close an electrical circuit. The relay used here is a single channel Single-Pole Double-Throw High-level trigger, and this relay board can be controlled directly via the Arduino Uno and can perform switching up to 10A at 250 V AC.

E. ESC DRIVER

An Electronic Speed Regulator (ESC) is an electronic circuit that directs and controls the speed of a motor. Reverse operation of the motor is also possible. Here we have used an ESC driver to control the speed of a BLDC motor. This 30A BLDC ESC can drive a motor that consumes current up to 30A. It works on 2S-3S LiPo batteries. This variant of the ESC also incorporates backward polarity protection on the 5V receiver line. This means that if we accidentally attach a battery backward, it will not destroy the motor controller.

F. BLDC MOTOR

A Brushless DC electric motor is a synchronous motor that uses a direct current (DC) electric power supply. It utilizes an electronic closed- loop controller for changing DC currents to the motor windings which produce magnetic fields that rotates, and the permanent magnet rotor follows. The motor used is a high-speed brushless motor explicitly designed for Quadcopters, Drones, or toy planes. The motor is OUTRUNNER type where the outer case rotates while the inside stays fixed. It is one of the popular models in the market because of its low cost. It is preferred for small drones and planes. This motor is a 1400KV motor. This means that the speed of the motor is 1400 rpm when 1 volt is applied to it. It can operate in between 7.2V to 12V.

G. ATMEGA 328P MICROCONTROLLER

A micro controller is an integrated circuit gadget utilized for controlling different pieces of an electronic framework, through a microprocessor unit, memory, and so on. The microcontroller used in this project is the Atmega 328P microcontroller, commonly known as “Arduino Uno.” The codes are embedded in the Arduino Uno to perform the required tasks like controlling, communicating with the other electronic components which are used in this project.

H. NODE MCU

The Node MCU board has ESP8266 which is a profoundly incorporated chip intended for the necessities of internet -connected world. It offers a total Wi-Fi arrangement, permitting it to either host the application or to offload all Wi-Fi networking capabilities from another application processor. In our project, this Node MCU will act as a link between Arduino Uno and the cloud server from which the commands are passed through the application.

I. HALL SENSOR

A Hall Sensor is a type of sensor that detects the presence of a magnetic field. Hall Effect sensors are used for positioning, proximity sensing, speed detection applications, etc. The A3144 Hall Effect Sensor Magnet Detector Switch for Arduino used in our project is a sensor that will turn ON or OFF in the presence of a magnetic field. This hall sensor will be used to measure the speed of the bldc motor.

IV. PROPOSED METHODOLOGY

This paper presents the speed control and parameter monitoring of Solar-powered BLDC Motor using the PWM technique. Generally, Brushed drive have short lifetimes due to the wear of brushes and commutator and the brushes need to be replaced and requires regular maintenance. Whereas in brushless motor, they do not use commutation parts; hence it will have a longer life because there will be no brush erosion. It has higher reliability and reduced maintenance.

This project uses Atmega328P as the microcontroller. Along with Atmega328P, a Node MCU ESP12E is used to add Wi-Fi capabilities.

The BLDC motor used in the system is a 1400 KV motor, which means for every volt, it provides 1400 RPM speed. An ESC is used to drive the BLDC Motor. The ESC used in the system is a 30 Amp Electronic Speed Controller.

There are various parameters such as Current, Voltage, Power, Temperature, and Speed of the motor, which are monitored in this project. A Current Sensor (ACS712) is used to monitor the current through the device, while Voltage Sensor is used to monitor the voltage across the device. Then the power is calculated by considering the current and voltage. Another sensor called Hall Sensor is used to measure the RPM or speed of the motor. A temperature sensor (LM35) will be used to monitor the temperature of the BLDC Motor.

Controlling of BLDC motor is possible in this system. The speed of the BLDC motor is controlled using PWM Signals, and switching on/off of the BLDC Motor can be done remotely using Relay that activates/deactivates a signal from Mobile Phone.

The monitoring parameters and controlling parameters of the device are stored on Thing Speak Cloud Server. It has a Write and Read API Key to write data and read data from the cloud server.

An Android App is also designed for Monitoring and Controlling the BLDC motor.

The system is made solar-powered using solar panels that work on the MPPT Algorithm to provide the best efficiency.

The flowchart of the developed system is shown in Fig.2 represents the workflow of the developed system.

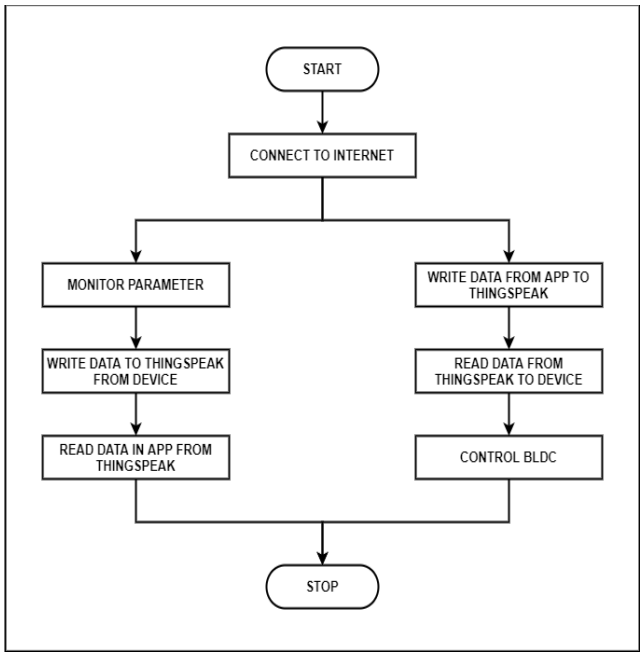


Fig.2 Flow Chart

V. SIMULATION RESULTS FOR VARIOUS PWM PULSES

The speed control technique used here is the Pulse Width Modulation (PWM).The duty cycle decides the speed of the motor. The speed to be achieved can be obtained by varying the duty cycle. The duty cycle is controlled by the PWM pulses given from the microcontroller.

Average voltage = D * Vin

The average voltage obtained for various duty cycles is also mentioned and as the duty cycle percentage decreases average voltage also decreases from the supply voltage.
Duty cycle is defined as the percentage of time the motor is ON. Therefore, the duty cycle is given as,

Duty Cycle = 100% x Pulse Width/Period
Where,
Duty Cycle in (%)
Pulse Width = Time the signal is in the ON or high state (sec)
Period = Time of one cycle (sec).

A. PWM PULSES at 25%, 50% and 100% RATED SPEED

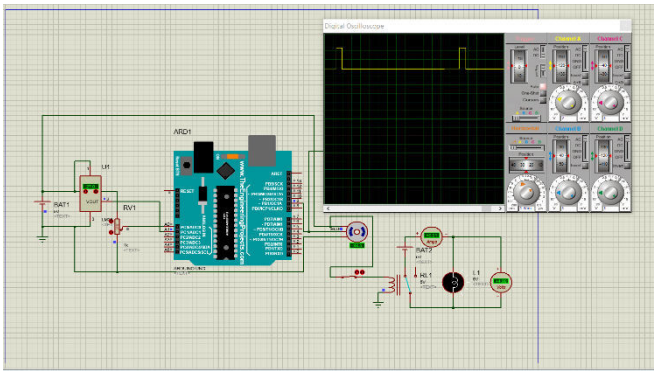


Fig.3 At 25% rated speed

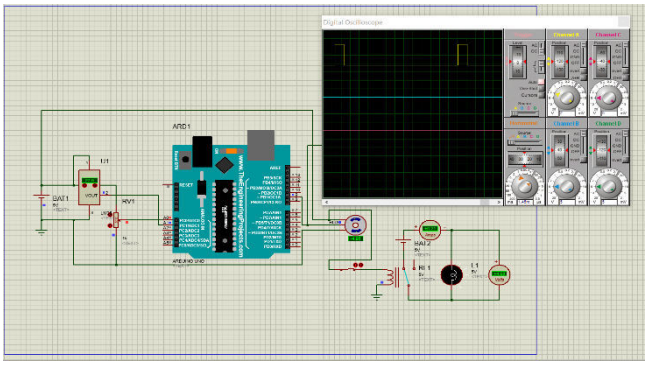


Fig.4 At 50% rated speed

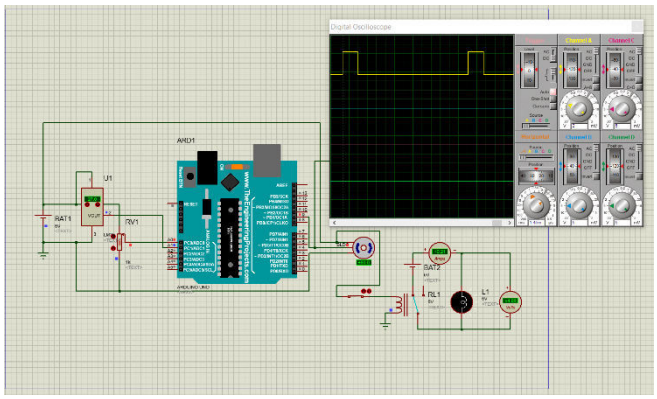


Fig.5 At 100% rated speed

B. HARDWARE IMPLEMENTATION

The hardware and the operation is done as the program written in the Arduino and the speed is also controlled by using PWM technique. The hardware implemented for the project is given below.

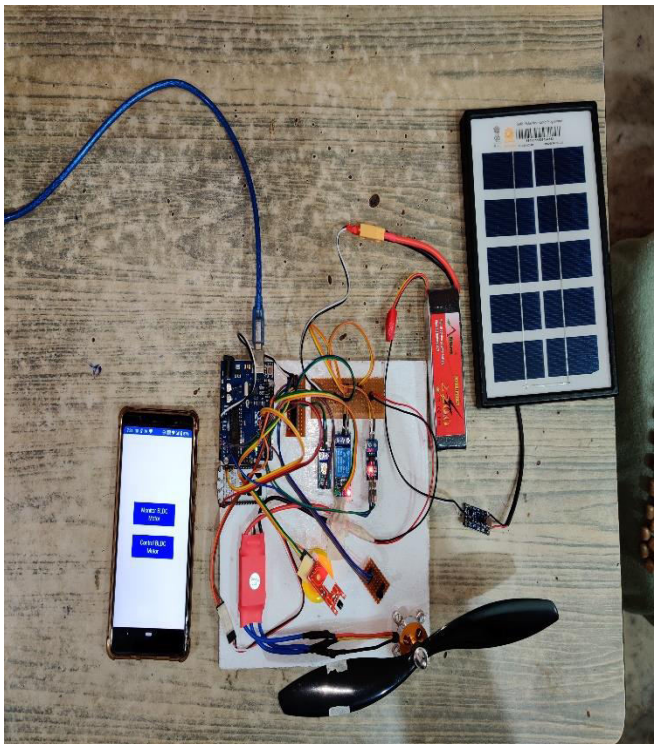


Fig. 6 Hardware Model

C. APPLICATION INTERFACE

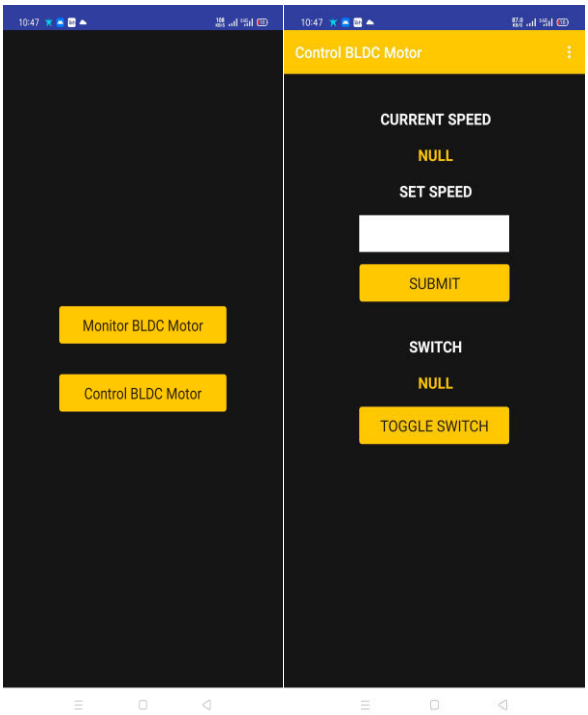


Fig.7 Application Interface

D. RESULTS

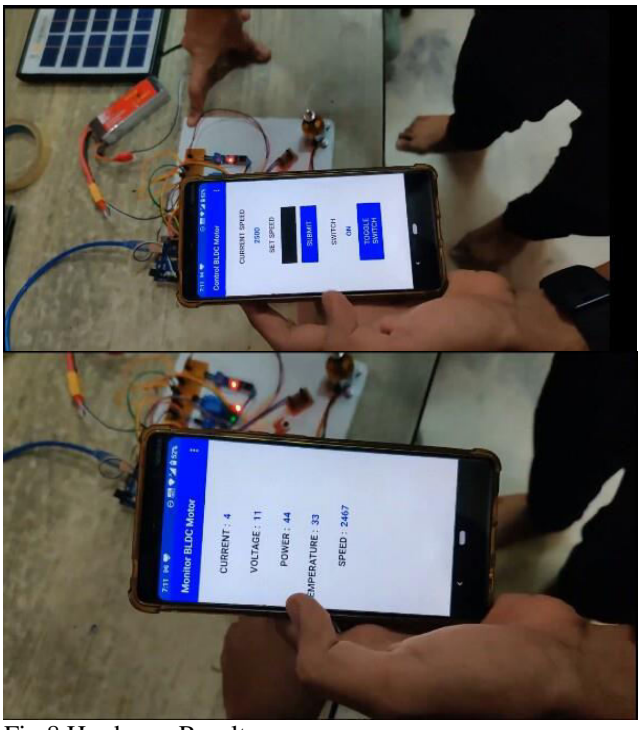


Fig.8 Hardware Results

E. OUTPUT RESPONSE

INPUT DUTY CYCLE IN %	OUTPUT VOLTAGE	OUTPUT SPEED IN RPM
25%	3V	4200
50%	6V	8400
100%	12V	16800

VI. CONCLUSION

The proposed system will help the Industrial people to monitor the BLDC motor from their remote location itself. The speed of the motor is controlled with the help of PWM technique and it is made to run at the required or desired speed. Monitoring is done with the help of Internet of Things (IoT).Internet of Things (IoT) plays major role in this system. The communication is made healthier and stronger with the help of this communication module. This brings advantages and has a good scope for Industries. Thus the proposed method is very well suited for Industrial applications.

This setup has some good advantages over the conventional system. The Mobile app is useful in controlling the speed of the BLDC motor and real time monitoring using IOT .As it is a BLDC motor it good life expectancy with less maintenance compared to other motor as a result reducing operation cost. BLDC motor is a better choice for different applications because of higher efficiency, higher power density and higher speed ranges as compared to other types. The Output characteristics and less complexity of model make it adequately valuable in plan of BLDC motor drives with diverse control algorithms in various applications.

VII. ACKNOWLEDGMENT

We would like to express our sincere thanks to Prof. Garima Gurjar for taking time from her busy schedule to provide us with great deal of help, support and encouragement to work diligently at every aspect of our project.

We are thankful to our college Principal Dr. Shrikant Kallurkar, ELEC HOD Mrs. Sangeeta Kotecha and all staff members of Electrical department for providing us various facilities and guiding us whenever required.

Finally, we would like to thank our parents and our friends for constantly supporting and encouraging our efforts.

REFERENCES

[1] G.Santhosh Kumar; S.Arockia Edwin Xavier, "Brushless DC Motor Speed Control Using Microcontroller", Volume: 2, Issue: 2,2015

[2] Arjun V ,Akhilesh H Nair,Balakrishnan ,Vishnu T , Vidya Sojan "Speed Control of a BLDC Motor Using

PWM Control Technique" International Journal Of Innovative Research In Electrical ,Electronics ,Instrumentation And Control Engineering Vol. 4, Issue 6, June 2016.

[3] K.Sowmiya;R.VishnuPriya, "Microcontroller Based Speed Control Scheme of BLDC Motor Using Proteus", International Journal, Volume: 5, Issue: III,2017.

[4] Ms.C.Hemalatha, Mr.R.Nagarajan ,P.Suresh,, G.Ganesh Shankar "Brushless DC Motor Controlled by using Internet of Things". IJSTE -International Journal of Science Technology & Engineering | Volume 3 | Issue 09 | March 2017.

[5] Rubi Batham, Rameshwar Singh "Speed Control of Brushless DC Motor Using Different Intelligence Schemes" International Research Journal of Engineering and Technology (IRJET) Volume: 04 Issue: 10| Oct-2017.

Smart Water Management System Using IoT

Dept. of Electronics and Telecommunication Engineering, Government College of Engineering, Karad -415124.

1Professor, 2-4 Students.

1) Prof. Amruta Mohite
Government college of engineering,karad.
Electronics And TelecommunicationEngineering
Satara,India
amrutamohite888@gmail.com

2) Rutvik Desai
Government college of engineering,karad.
Electronics And Telecommunication Engineering Satara,India
rutvik979797@gmail.com

3) Rohit Dhaware
Government college of engineering,karad.
Electronics And Telecommunication Engineering
Solapur,India
rohitdhaware54@gmail.com

4) Pooja Pawar
Government college of engineering,karad.
Electronics And Telecommunication Engineering
Satara,India
pawar28pooja@gmail.com

***Abstract*—In rural areas water pumps may get damaged due to the low water level in the tank as well as the three phase supply is not available. Such problems can be avoided by using "IOT". Due to frequent power cuts and abnormal voltage conditions in India, it is necessary to distribute water efficiently to the field during normal conditions. This is carried out by exchanging the information between the user phone and IOT in the form of messages. This paper presents an IoT device which helps to manage and plan the use of water. This system can be easily installed and maintained for a long time. The Laser sensor is placed on the tank which continuously monitors the water level. This information will be updated in the cloud and users can analyze the amount of water. According to the level of water in the tank, the motor functioning is automatically controlled. When the water level falls below the threshold level the motor will be again turned on automatically**

***Keywords*—IoT, LASER Sensor, HC 12 module, Relay, motor, automation, ESP8266 Wi-Fi module.**

I. INTRODUCTION

Water is one of the most important basic needs for all living beings, but unfortunately, a huge amount of water is being wasted because of uncontrolled use and exploitation of water resource. One of the main reasons for the shortage is poor management of water. Overflowing water tanks in residence, schools, colleges, Municipal overhead tanks, Hospitals etc. can contribute to the massive amount of water wastage. If we can control this we can save large amounts of water. Conventional water tanks can neither monitor nor control the water level in the tank. As of now, the water level has to be manually checked and refilled according to the requirements. So in this paper, we solve all the above-mentioned problems with automatic water level detection and refilling of water storage systems with the help of Internet of Things (IoT).

Nowadays, most of the farmers use water from the wells and underground water resources for their farms and for this they need water pumps. To start and control this water pump user requires a DOL starter. Presently the DOL starter is operated manually, but in 2014 GSM DOL starter are available in the market. In some places the network connection is not available and there is another drawback in GSM based DOL starter and automatic starter if the water level is decreased below the required level then also water pumps are not turned off automatically this will damage the water pump. The Internet of Things (IOT) refers to the ever-growing network of physical objects that feature an IP address for internet connectivity, and the communication that occurs between these objects and other Internet-enabled devices and systems. The Internet of Things extends internet connectivity beyond traditional devices like desktop and laptop, computers, smartphones and tablets to a diverse range of devices and everyday things that utilize embedded technology to communicate and interact with the external environment, all via the Internet.

II.SYSTEM OVERVIEW

Presented here is a Water Management System using IoT. Water level indication, automatic water pump on/off, etc. are carried out by this project. Laser sensor used in this project is VL53LOX for precise level indication. The issue of water scarcity is becoming more prevalent. The IoT enabled water management solutions like this use sensors to

collect data and share data to the cloud Transmitter section. The transmitter section consists of an Arduino, HC12 transmitter, laser sensor, and NodeMcu. In the automatic water level detection and refilling of water storage systems, the sensor used is Laser sensor which is a replacement of ultrasonic sensor because of its accuracy and small size. The Laser sensor is used to detect the water level. The Laser sensor is placed above the tank which continuously monitors the water level in real time. This information will be updated in the cloud and users can analyze the amount of water. These sensor values are sent to the water pump via the HC12 transmitter to turn on/off the pump. The sensor values are also forwarded to NodeMCU which is used for the IoT purpose. NodeMCU connects the system to cloud storage. Here we use Blynk cloud platform. The platform is designed in such a way that it will show the instantaneous value of current status of water. Water level measured by sensors is sent continuously to NodeMcu and forwarded to Blynk cloud, it gives a graphical representation of water level from which we can analyze our water usage.

Receiver-section: The receiver section consists of Arduino Uno, relay, HC12 receiver and a motor. According to the value received from the sensors about water level to HC 12 receiver, the motor will automatically turn on/off to pump the water to the tank.

Conditions of water level	Motor status
When the water level is below a minimum level	ON
When the water level is above the maximum level	OFF
When the water level is in between maximum and minimum level It can be controlled by a user using Blynk cloud platform	

Depending on the water levels, as described above, the status of the motor will be automatically controlled. If the water level is in between maximum and minimum level set, then the user can control the status of the motor from the Blynk cloud platform. Buttons ON and OFF have been provided for the same.

III. METHODOLOGY

In this project, we are presenting the idea of a smart water tank management system which is operated with Arduino microcontroller. By using this microcontroller, we are preventing manual intervention for continuous water supply. It can be also used for other industries. The main focus of this project is to provide the optimal water distribution, and it also reduces the manpower which is involved in operating the water management manually. We can easily see that many water resources are wasted because of inefficient and poor water allocation and lack of integrated water management systems. Measuring the level of water manually is a big task for government and residential people.

Our project helps us to automatically measure the level of water in the tank and prevent the wastage of water resources available. We all know that water is very essential for each and every living creature in this world, so wasting water is not good for anyone. So monitoring the water management system automatically helps us to reduce the wastage of water. The system is made using the laser sensor which will sense the accurate level of water and according to that we can smartly manage our system through the mobile app which is used by each and every person in today's world. We are dealing with a system, i.e., water tank monitoring system which has only one water tank and one pump. The procedure to implement this system is very easy. But what we have to deal with the monitoring system consists of many valves, tanks, and pumps. Managing this type of system is a challenging task with existing resources and technology available. Also we are living in an era where everything is controlled with mobile application or we can say ubiquitous computing systems. Also the main challenge is to control and monitor this system remotely through Web application or mobile application. Here we are using a mobile application to control and monitor the system remotely. The water tank system can be loaded with a bunch of sensors on all three components, i.e., tank, valve, and pump. The data from each sensor is stored in the form of tables in the database. The database consists of three tables. The first table is for the sensor value of the tank. The second and third tables consist of input and output values of sensors which control signal. The mobile application fetches the data from a database which is stored on the cloud. The mobile application fetches the data and does the calculation based on tables. Then it shows the user current status of the system. Also it shows the user whether the system is in safe state or the system needs some set of operations to be performed to bring the system in safe state. The sensors are placed to detect the humidity, temperature, pressure, and sound detection around the leakage areas of the tanks using
Arduino microcontrollers and sensors.

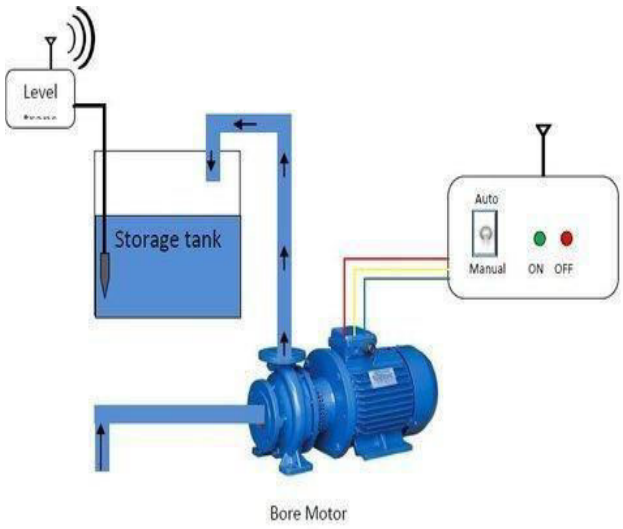
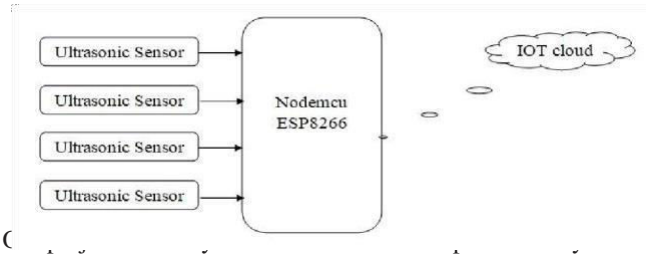


Fig: Overview of project



C

1.Water level detection using laser sensor.

2.The laser sensor value transmission through HC12 Transceiver.

3.Based on a laser sensor, the value motor is controlled using a relay module.

4.Upload sensor value to a cloud platform called Adafruit via ESP8266.

The main components are :1. Laser sensor:

Image In the automatic water level detection and refilling of water storage system, the sensor used is Laser sensor which is a replacement of ultrasonic sensor because of its accuracy and small in size. The sensor is placed on top of the tank facing downwards. The Laser sensor is used to detect the water level.

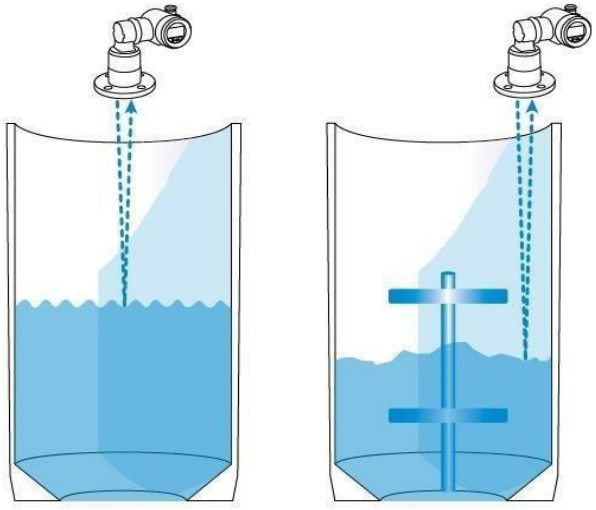


Fig - 4: Laser sensor working.

The Laser sensor offers several features that help to

2. HC 12 Transceiver:

The HC-12 is a half-duplex wireless serial port communication module with 100 channels with working

achieve these goals. The special features include:

- Fully integrated miniature module.
- 940nm Laser

VCSEL •

VCSEL

driver.

- Ranging sensor with advanced embedded microcontroller.
- 4.4 x 2.4 x 1.0mm.
- Fast, accurate distance ranging.
- Measures absolute range up to 2m.
- High infrared light levels are ambient for operation.
- Advanced embedded optical cross.
- Talk compensation to simplify cover glass selection.

frequency range of this transceiver is 433.4-473 MHz and multiple channels can be set with the stepping of 400 KHz with transmitting range of up to 1KM. The MCU inside the module doesn't need to be programmed separately by the user. The transparent transmission mode is only responsible for receiving and sending data in the serial port. So, it is easy to use.

Features:

- Long-distance wireless transmission (1,000m in open space/baud rate 5,000bps in the air)
- Working frequency range (433.4-473.0MHz, up to 100 communication channels)
- Maximum 100mW (20dBm) transmitting power (8 gears of power can be set)
- Three working modes, adapting to different application situations
- Built-in MCU, performing communication with external device through serial port
- The number of bytes transmitted unlimited to one time
- Update software version through serial port

3. Wi-fi Module:

The ESP8266 WiFi Module is an integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions.Specifications:

- 802.11 b/g/n
- Wi-Fi Direct (P2P), soft-AP
- Integrated TCP/IP protocol stack
- Integrated TR switch, LNA, power amplifier and matching network
- Power down leakage current of <10uA
- 1MB Flash Memory

• Integrated low power 32-bit CPU could be used as application processor

• Wake up and transmit packets in < 2ms
• Standby power consumption of < 1.0mW (DTIM3)

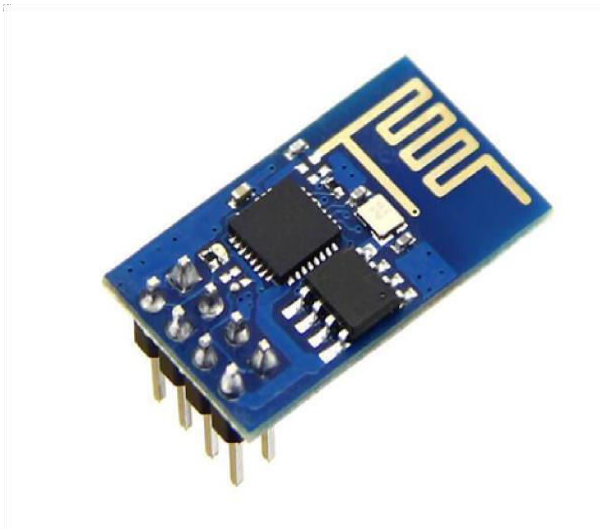


Fig:Wifi Module

4. Relay Switch:

220v alternating current (AC) powers the AC devices. Arduino cannot control such high voltage and amperes. For that purpose a relay is used. Arduino controls this relay to control AC devices according to the program. So we are using a relay as a switch to control high power devices (here water pump). Here we use the relay for controlling the motor. According to the water level, the receiver section gets a command to turn ON/OFF the water pump. As the water pump works on AC, this AC has to be controlled to automatically turn ON/OFF according to our system requirements. So, we use a relay in order to achieve this need.

Fig: Relay

5. Submersible Motor

A submersible pump is a device that contains a closed motor attached to the pump body, basically tries to push fluid to the flat area as opposed to other pumps having to pull fluids.

Fig: Submersible Motor

Software used Arduino:

The Arduino Uno is used as the microcontroller in this system. It has 14 digital input/output pins, from which we are using 2 pins for connecting sensors- Laser sensor, HC12Transceiver, a USB connection, a power jack and a reset button is also present. We are using NodeMcu which contains a Wi-Fi module ESP8266 for giving the system an Internet-based approach.

IoT IMPLEMENTATION USING THINGSPEAK

.

Microcontroller (Arduino Uno) communicates with NodeMCU via SPI communication. We configured NodeMCU as master and microcontroller as a slave. The sensor values received to the slave will send it to the master. NodeMCU has an ESP8266 Wi-Fi module which helps in connecting to a local router. This router then connects to the internet and uploads these sensor values to the Adafruit cloud platform. We can access this .

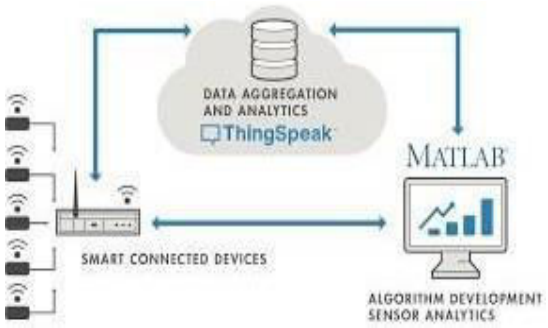


Fig:Thingspeak IOT

IV. SOFTWARE PART

USING TINKERCAD TO THINGSPEAK

Tinkercad is used for designing our ideas on a platform to provide you with Electronic components and also Matlab ,C,C++,Java languages to write the code.Also we send our sensed data by sensor on iot platform like Thingspeak and Adafruit.

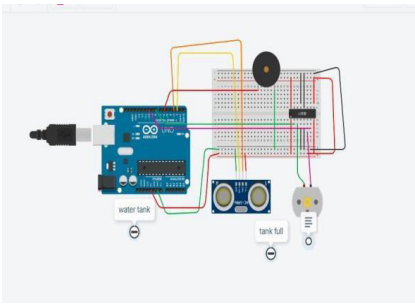


Fig:Simulation Circuit on Tinkercad

Program:

```
// C++ code
//
int waterlevel = 0;

long readUltrasonicDistance(int triggerPin, int echoPin)
{ pinMode(triggerPin, OUTPUT); // Clear the
  trigger digitalWrite(triggerPin, LOW);
  delayMicroseconds(2);
   // Sets the trigger pin to HIGH state for 10 microseconds digitalWrite(triggerPin, HIGH); delayMicroseconds(10); digitalWrite(triggerPin, LOW); pinMode(echoPin, INPUT);
  // Reads the echo pin, and returns the sound wave travel time in microseconds return pulseIn(echoPin, HIGH);
}
void setup()
{
  Serial.begin(9600);

  pinMode(8,
OUTPUT);
pinMode(10,
OUTPUT); pinMode(6,
OUTPUT); }

void loop()
{ waterlevel = 0.01723 * readUltrasonicDistance(3,
  2); Serial.println(waterlevel); if (waterlevel > 200)
  { digitalWrite(8, HIGH); digitalWrite(10, LOW); }
  if (waterlevel < 100)
  { digitalWrite(8,
  HIGH);
  digitalWrite(10,
  HIGH); digitalWrite(6,
  HIGH); }
  digitalWrite(6, LOW);
  delay(10); // Delay a little bit to improve simulation performance
}
```

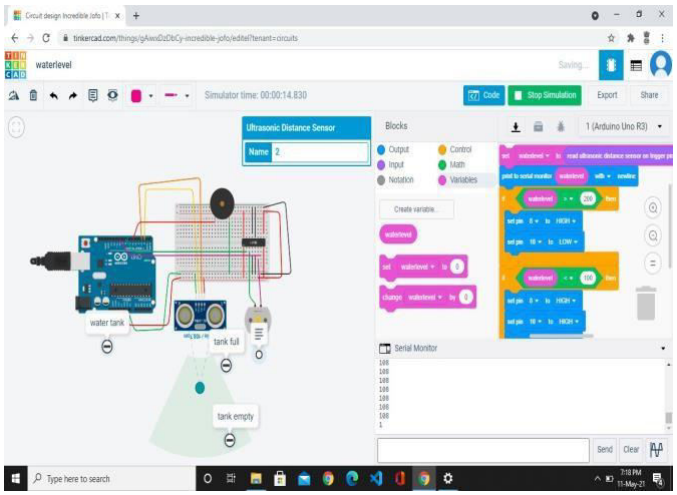


Fig:Simulation Output

V .CONCLUSION

Our intention of this research work was to establish a flexible, economical, easily configurable and most importantly, a portable system which can solve our water wastage problem. It is a robust system and small in size.

Our proposed system for water level monitoring comes under the field of Internet of Things (IoT). Our main objective was to design a smart system for approximating the water level in the tank and prevent overflow or analyze the water usage. This analyzing feature can also help us in finding whether there is any leakage in the tank or not.

Nowadays liquid level monitoring is vital in many industries too like oil, automotive etc. Using our smart system we can analyze the usage and also detect the leakage in the tanks of these industries.

VI. ACKNOWLEDGMENT

We are using this opportunity to express our gratitude to everyone who supported us for writing this research paper. We are thankful for their guidance and invariably advice during this work. We are sincerely grateful to them for sharing their truthful and illuminating views on a number of issues related to this paper.

We express our warm thanks to Prof. Amruta Mohite for her support and guidance at the Department of Electronics and Telecommunication Engineering; Government College of Engineering, Karad, Maharashtra, India.

VII. REFERENCES

1) Paul, S., Das, M., Sau, A., & Patra, S. (2015). Android based smart water pump controller with water level detection technique. International Journal of Advanced Research in Computer and Communication Engineering, 4(12). ISSN 2278–1021. An IoT-Based Smart Water Microgrid and Smart Water Tank … 431

2) Adsul, S., Mevekari, R. G., & Sharma, A. K. (2016). Leakage detection system development. In IEEE International conference on Automatic Control and Dynamic Optimization Technique (ICACDOT), 978-1-5090-2080-5/16/31.00. IEEE 2016.

3) Verma, S.,& Prachi. (2012).Wireless sensor network application for water quality monitoring in India. In the National Conference on Computing and Communication Systems (NCCCS), Publisher IEEE. Date of Conference 21–22 November 2012. (pp. 1–5).

4) Water Quality Monitoring for rural areas-A sensor cloud based economical project by Nikhil Kedia

5) Sensor-Network based Intelligent water quality monitoring and control by Li Zhenan, Wang Kai, Liu Bo

6) GSM based water tank level monitoring and pump control system by B.Dhivya, Priya, S.P Maniprabha, Dr.V.Chandrasekharan, G.Kandasamy

7) Real time water quality monitoring system by Mithila Barabde, Shruthi Danve

8) Water tank control by Divya Kaur.

9) Real time wireless monitoring and control of water systems using Zigbee 802.15.4 by Saima Maqbool, Nidhi Chandra.

10) Industrial sewage water quality monitoring system by Akila U, Elakkiya Selvi R, Maheshwari R, Shanmugavalli K, Mrs. T.Prathibha.

Fire-ExtinguisherFire-FightingDrone

*

1st BuruteRushikesh
*deptofComputerEngineeringS.B.PatilCollegeOfEnginnering*Indapur,Indiarushikeshburute1998@gmail.com

2nd Prof.A.B.Gavali
*deptofComputerEnginneringS.B.PatilCollegeOfEnginnering*Indapur,Indiapdnyaneshwar.806@gmail.com

3rd NanavareSnehal
*deptofComputerEnginneringS.B.PatilCollegeOfEnginnering*Indapur,Indiananavaresnehal115@gmail.com

4th PhadtareHarshada*deptof ComputerEnginneringS.B.PatilCollegeOfEnginnering*
Indapur,Indiaphadtareharshada999@gmail.com

***Abstract*—In the way of future, The Drones will play majorroles. They can take the risk to do some critical work. The Fire-fightershavesamecriticalworkandtheywillsavelives.So,tolowerdowntherisk,wewilldesignaFireFighterDronewhich is very useful in some kind of difficult situation. In thispaper, The design of a fire fighter drone is presented. Unmannedaerial vehicles(UAV's) have been around for years, they presentcharacteristics that a loud them to be used for different purposes.In Thus days, there are many devices have became more popularandthemapplicationhasincreasesrapidlyinvariousfields.**

***Index Terms*—Drone/Quad copter, transmitters Remote, ElectricMotors,FireExtinguisher.**

I. INTRODUCTION

Toprotectandsavelivesandproperties,extinguishfiresarethemaingoalsoffirefighters.UntilRecentlytrucks,ladders, and hoses such a low or insufficient technologies arein use at many of places. But now fire- fighting drones arereplacing this low tech machines. As compared to the oldmethodsdronesaremorehelpfulltoovercomefire.Duetoincreasedurbanization,traffic,tallerbuildings,andnewdangerous substances being used in construction, firefightersare looking at drone technologies to help them in achievingtheirgoals[1].

Fighting a raging fire is one of the toughest uphill battleswithin the public safety world. People will used us drone tosnuff out the fire. Also at the time of operation fighters maylose their life as they are doing that do not have a transparentview. The main aim of our project is to overcome these prob-lems and make it easier and safe. So We are developing thefirefirefightingdroneswiththefireextinguisher.Inthispaper,weproposeanapproachforfiredetectionandlocalizationwith a thermal cameras and the flame sensors mounted on anUnmanned Aerial Vehicle (UAV). Also extinguishing of fireusing drone and fire extinguishing ball.In contrast to manyotherpapers[2].

II. BACKGROUNDWORK

There is a growing need to use drones with diverse capabilities and various civilian and military applications includingsearch and rescue missions, environmental protection, mailingand delivery, active weapon engagement, space and marinedrones,etc.[4].Thispaperspecificallyemphasizestheuseof drones in firefighting applications. The time to suppress aforest fire is critical with regards to the fire burden consistingofeconomic,environmental,andsociallosses[9].

Every year millions of acres of forest are lost because offorest fires. The forest fires can be divided into two broadclasses;wildfiresandprescribedfires.Wildfiresareeitherca used by accidental or malicious acts of humans[10].Fightinga raging fire is one of the big challenge for Firefighters. Theytry to put off the fire with very little information, but have noidea of the size and scope of the fire. But fire-fighting droneshelp to overcome this problem by providing better informationaboutrangeoffire,totaltrappedpeoplesandmanymore.[5].

III. LITERATURESURVEY

Sr. No.	Paper Title	Author	Year OfPublica-tions	ProbleminExistingSystem	SolutiontoEx-istingSystem
1	Vision-basedForestFire De-tectioninAerialImagesforFirefightingUsingUAVs	ChiYuan,Zhix-iang LiuandYouminZhang	2016	Vision-basedForestFire De-tectioninAerialImagesforFirefightingUsingUAVs	In this paper,a vision based forest firedetectionapproachusingcolour decisionruleandopticalflow analysisisproposedforapplicationofUAV-basedfirefighting1r
2	Vision-basedForestFire De-tectioninAerialImagesforFirefightingUsingUAVs	ChiYuan,Zhix-iang LiuandYouminZhang	2016	Vision-basedForestFire De-tectioninAerialImagesforFirefightingUsingUAVs	In this paper,a vision based forest firedetectionapproachusingcolour decisionruleandopticalflow analysisisproposedforapplicationofUAV-basedfirefighting1r
4	AConceptual DesignofaFirefighterDrone	AlonsoCervantes,PaolaGarcia,CesarHerrera,ElizabethMorales	2018	ToConceptual DesignofaFireFighterDrone.	Assisting Fire-fighters during Fire events. Drones areusedinvariousareassuchassearch andrescue,security,surveillance,science andresearch.
5	UseofFire-Extinguishing BallsforaConceptualSystemofDroneAssistedWildFireFighting	BurchanAydin, EmreSelvi ,JianTaoandMichael J.Starek	2019	To studytheproblemofFire-ExtinguishingBallsforaConceptualSystemofDroneAssistedWildFireFighting	Theconceptualdesign is basedonFireextinguishingballs beingreleasedfromasmallunmannedaircraft system(UAS)
6	DesignandDevel-opmentofSemi-Au-tonomous Fire-Fighting Drone	ManujC, AdarshMRao,RahulS,SuhasC N, VismayKG	2019	DesignandDevel-opmentofSemi-AutonomousFireFightingDrone In this paper,weproposea new Fire	FightingDronetocontrolandsupplyasolutionusinganAutomatedFiresOF Ball and anysuchmechanismFittedonaDrone. Fire Fighting is harmful jobthatinvariablyplace thelifeofahearthFireFighteratrisk.DronethathavethefunctionalityofthescreencapturingremotecontrolWaterspraying.
7	FireFightingDroneUsingExtin-guisherBomb	RupaliPatil,TejasPatil,NiteshSawant,HrishikeshThakur,DhirajSurve	2020	To studytheproblemofFireFightingdroneusingextin-guisherbombThisnewconceptof	FireFightingDroneprovidedtoreducethetime to clearabuildingorFind a distressedinhabitant.Thisis alsousefultohelptheFire-fightersaswellastosavetheirlives.Thecomponentsthatare being used tomake
8	DesignandDevel-opmentofHeavyDronefor FireFightingOpera-tion	VimalkumarR, KaranKumarShaw	2020	DesignandDevel-opmentofHeavyDronefor FireFightingOpera-tion.	This paper describes the importance ofthe Drone inFire FightingOperation.TheDrone has designed in such a way that carries a maximum of 20 Kg payloadwith14minutesbatteryEndurance.Itreducesthe risktothepersonnelinvolved Fireaccident

IV. PROPOSEDSYSTEM

A. ProblemStatement

Firefightingisharmfuljobthatinvariablyplacethelifeofafire fighter in danger. If tall Buildings catches fire, fire fighterwon't get a clear shot and it takes time to reach a certainheight. While rescue operation they have minimal informationabout the fire and also people in danger because they do notgetaclearview

B. GoalsandObjectives

While drones continue to get much smaller, more powerful,and have better payload options, one thing that will stay thesame is its ability to quickly reach a vantage point wherehumanscannoteasilygetaccessto.Thisremotecontrolledor even autonomous flying platforms can be used to makepeople's jobs easier and more efficient through better infor-mation gathering and surveying. Firefighter Drones are sent tofire locations as scouts, using cameras with thermal imagingtechnologytohelpfirstrespondersintheirrescueefforts.

The paper [11] also mentions that usage of drone for fireemergency situations around the world becomes a key elementforreducingofresponsetime,increasesafetyforpeople,as setsandrescuers,improveeffectivenessonrepressionoperations andbringsavingsoninterventioncosts.InEuropetheusageof drones in emergency and fire departments is still at thebeginning, but it is supposed to grow fastly in the comingyears.WithfacilitateofsuchDrones,firemenworkisgoingt o be easier and effective regardless of security. It'll producehumanliveseasier.Themostdiscussedareasofapplication of drones are related to inspecting industrial infrastructure,patrolling of pipelines and transferring live video-feed fromemergencysitestofirefightersandpoliceforces[7].

C.SystemArchitecture

A system architecture is the conceptual model that definesthe structure, behavior, and more views of a system. An archi-tecture descriptionis aformal descriptionand representationof a system, organized in a way that supports reasoning aboutthestructuresandbehaviorsofthesystem.

InthissystemFirst,itneedstohandlealloftheinaircontrol.Secon d,itneedstocreateausableGraphicalUser Interface to allow a user on the ground to control thesubsystem. It needs to manage the communication betweenthesetwosystems.

As per the System Architecture,If fire detected Drone con-troller will start to operate and will lift the drone .If fire isdetected to the system it will send the image to the operator.Operator will release the capsule and blowout the fire again itchecks for the fire if fire is detected it will reload the capsuleandreleasethecapsuleandiffireisnotdetectedthedronewil lgotoitsdesireplace.

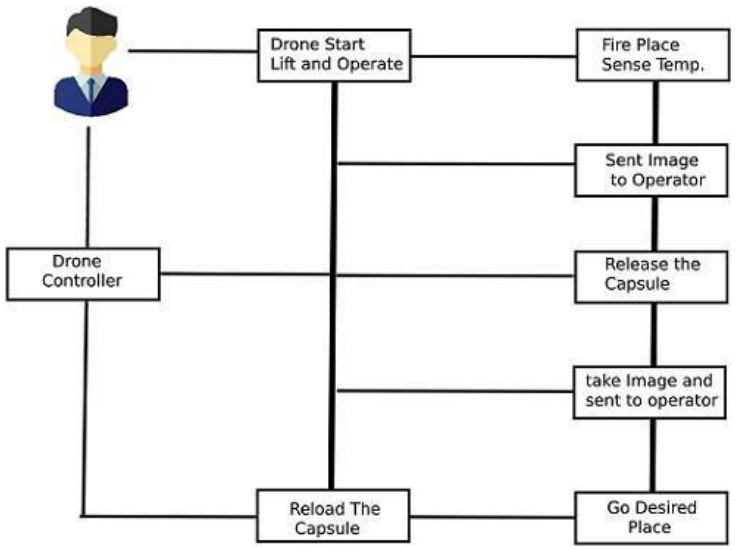


Fig.1.SystemArchitecture

V. MATHEMATICALMODEL

A.*Input:*

Theinputfromthevisualandinfraredsensoranddrone.LetIbethe setofactivities.
I=IN.in,VT.in,DO.in,VC.in,LD.in,CG.in,II.in,RC.in, FI.in,AO.in,RD.inQ=Q0,Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,QF.
where,

- I=IN.in,VT.in,DO.in,VC.in,LD.in,CG.in,II.in,RC.in,FI.in ,AO.in,RD.inWhere,
- IN.in=Inserttheextinguishingspheresintothedispense
- VT.in=Verifytransmissionofthecamera.
- DO.in=Turnonthedrone
- VC.in=Verifycommunicationwiththedispensercontrol
- LD.in=Liftthedrone
- CG.in=Controlandguidanceatthedesiredplace
- II.in=Takeaninitialimagecaptureofthefire
- RC.in=Releaseofthecapsules
- FI.in=Takeafinalimagecaptureofthefire
- AO.in=Keepthedroneinthefireareatoobserve.
- RD.in=Returnthedronetotheuser'splace.

B. *Output:*

Ifthecapsuleexplode,thefirewillblowout.LetQbethesetofactiv ities.
Q=Q0,Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,QF.
Where,

- Q1=successfullyinsertedtheextinguishingspheresintothedi spense
- Q1=successfullyverifiedtransmissionofthecamera.
- Q2=Turnonthedrone
- Q3=successfullyverifiedcommunicationwiththedis-pensercontrol
- Q4=Liftthedrone

- Q5=Controlandguidanceatthedesiredplace
- Q6=Tookaninitialimagecaptureofthefire
- Q7=Releasedthecapsules
- Q8=Tookafinalimagecaptureofthefire
- Q9=Keepthedroneinthefireareatoobserve.
- QF=successfullyreturnthedronetotheuser'splace

C. Algorithm

1) Start.
2) Iffiredetected.
3) Inserttheextinguishingspheresintothedispense.
4) Verifytransmissionofthecamera.
5) Turnonthedrone.
6) Verifycommunicationwiththedispensercontrol.
7) Liftthedrone.
8) Controlandguidanceatthedesiredplace.
9) Takeaninitialimagecaptureofthefire.
10) .Releasethecapsules.
11) Takeafinalimagecaptureofthefire
12) Keepthedroneinthefireareatoobserve.
13) Iffirenotdetected.
14) Returnthedronetotheuser'splace.
15) Stop.

D. Flowcha

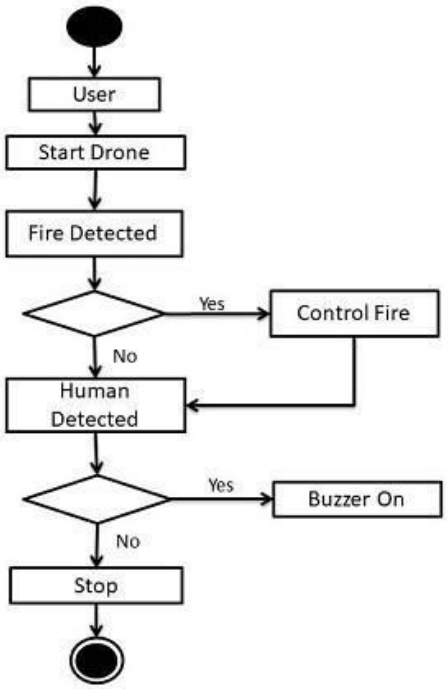


Fig.2.Flowchart

E.Application

Followingaretheapplicationsofoursystem

1) BigForest.
2) HigherBuildings.
3)School,Colleges.

.

F.SoftwareRequirement

FollowingaretheSoftwareRequirements.

1) **OperatingSystem:**OperatingSystemrequiredisRaspberryPi.
2) **IDE:**AdrianoThisIDEishelpfulforustowritetheprogram

.

G.HardwareRequirement

FollowingaretheHardwareRequirements.

1) **ThermalCameras:**TheThermalcameraprovidestheessentialabilityforfirefighterstoseethethroughthesmoke.Thermalcamerasdetecttemperaturebyrecognizing and capturing different levels of infraredlight. This light is invisible to the eye, but can be felt asheat if the intensity is high.the thermal camera capturestheimageisasshowninthefig. Forexample:-Intheimageatthetopofthispost,you'll notice the person is covered in shades of red,orange,andyellow,whileotherareasareblueandpurple. That'sbecauseperson'sradiatingmoreheatthansurroundingobjects.Thermalcameragivestheimagelikeasshowninthefollowingfigurefig.3.

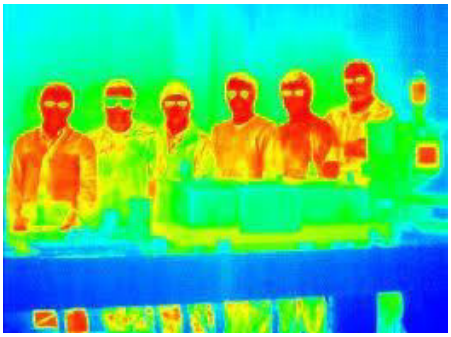


Fig.3.ThermalImaging

2) **FlameSensor:**WeareusingtheFlamesensorfordetecting the fire.This sensor detects flame otherwisewavelength within the range of 760 nm – 1100 nm fromthelightsource.Theflamedetectioncanbedonefroma 100cm distance and the detection angle will be 600.The output of this sensor is an analog signal or digitalsignal. These sensors are used in fire fighting robots likeasaflamealarm.
3) **Fire Extinguisher:** Fire Extinguisher is used for controlthefire

4)**Drone:**Droneisusedforcontrol,PickuptheDesignedCircuit.

.

VI. FIGURESANDTABLE

A. BLOCKDIAGRAM

Ablockdiagramisadiagramofasysteminwhichtheprincipalparts orfunctionsarerepresentedbyblocksconnectedbylinesthatshowtherelationshipsoftheblocks.

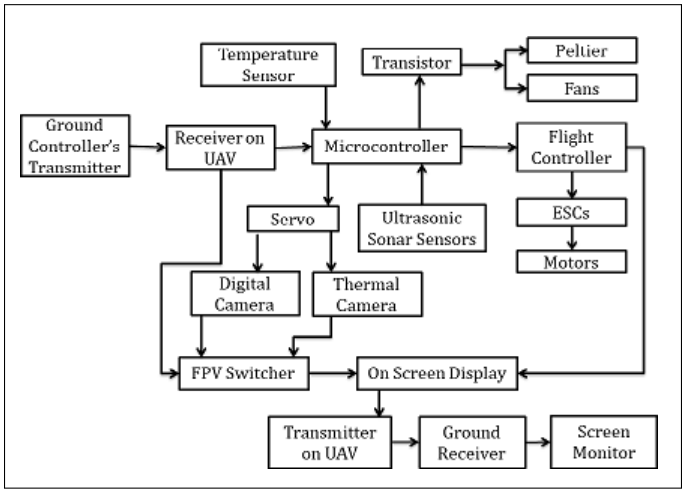


Fig.4.BlockDiagram

B. ComponentDiagram

Component diagram is a special kind of diagram in UML.Thepurposeisalsodifferentfromallotherdiagramsdiscussedsofar.

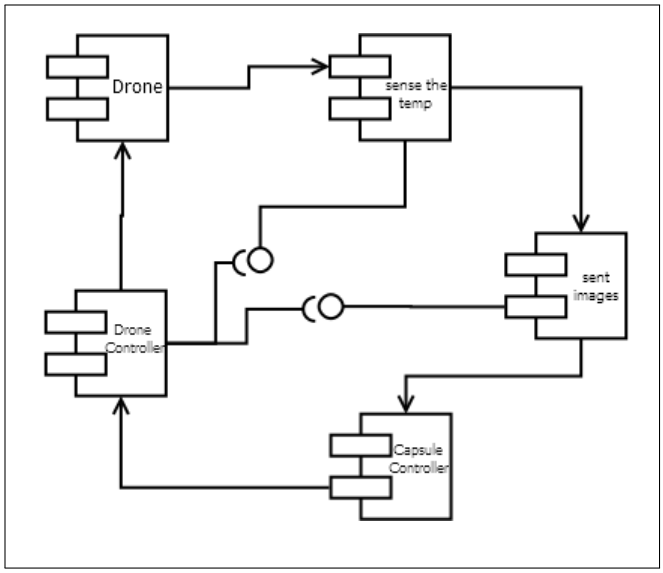


Fig.5.ComponentDiagram

CONCLUSIONS

This new concept of firefighting drone is useful to help theFire-fightersaswellastosavetheirlives.Thecomponentsthatare being used to make this drone cost effective. Firefightingactivities it was generally accepted as being the next hightechnology tool to be implemented in this sector that couldbring a lot of improvements with the final purpose of savinglivesandmoney.

REFERENCES

[1] "FIREFIGHTINGDRONE",Abinesh.D.V,Deepak.A.K,Chandraprakash.K,Gowtham.M,Ananthi.KSriKrishnaCollegeofEngineer-ing and Technology, International Journal of Innovative and EmergingResearchinEngineeringVolume4,SpecialIssue1,NCIAR2k17

[2] "Low Resolution Person Detection with a Moving Thermal InfraredCamera",byHotSpotClassificationMichaelTeutsch1,ThomasM¨uller1,Marco Huber2,andJ¨urgenBeyerer1 1FraunhoferIOSB,Karlsruhe,Germany2AGTInternational,Darmstadt,Germanymichael.teutsch,thomas.mueller,juergen.beyerer@iosb.fraunhofer.demarco.huber@ieee.org,2017

[3] Use of Fire-Extinguishing Balls for a Conceptual System of Drone-Assisted Wildfire Fighting. BurchanAydin 1,Emre Selvi 2,Jian Tao 3andMichaelJ.Starek

[4] ElideFireExtinguishingBall.Availableonline:http://www.elidefire.com/products.htm(accessedon7December2017).

[5] "AutomaticCO2ExtinguisherFireFightingDrone",byEtharaBalaVyshnavi,AmareswariAmbati,GorantlaChamundeswari,GarreVineethaDr.Sk.Khamuruddeen, Faculty Dept.of ECE, in (IJERECE) Vol4,Issue12,December2017

[6] R.RyanMcCunea,GregoryR.Madeya(2013),ThecooperativehuntersEfficientandscalabledronesswarmformultipletargetsdetection, SwarmsandNetworkIntelligenceinSearch,pp.187-205

[7] SESARJointUndertaking,"EuropeanDronesOutlookStudy,"no.November,pp.1–93,2016.

[8] Galle,Jonas,andVerhelst,S.(2013).Designofafastrespondingstart-up mechanism for bi-propellant fueled engine for miniature UAVapplications. SAE technical paper series. Presented at the AeroTechCongressandExhibition(SAE-2013).

[9] Yuan, C.; Zhang, Y.; Liu, Z. A survey on technologies for automaticforest fire monitoring, detection, and fighting using unmanned aerialvehicles and remote sensing techniques. Can. J. For. Res. 2015, 45,783–792.[GoogleScholar][CrossRef]

[10] WildfireCauses.FireandAviationManagement,NationalParkServiceU.SDepartmentofInterior.Availableonline:https://www.nps.gov/fire/wildland-fire/learning-center/fire-in-depth/wildfire-causes.cfm(accessedon6December2017)

[11] VladTiberiuRadu.Useofdronesforfirefightingoperations.[2019]

IOT Based Smarty-Chef-Automated Electro-Mechanical Chef

Prof. Dipali Shende[1] More Sainath[2] Deshmukh Kushna[3] Raut Sagar[4]

Professor, Department of Electronics and Telecommunications, Sinhgad Institute of Technology, Lonavala, India[1].

Student, Department of Electronics and Telecommunications, Sinhgad Institute of Technology, Lonavala, India234.
Sinhgad Institute of Technology, Lonavala, Pune, India
dshende.sit@sinhgad.edu1, sainathmore192@gmail.com ,Sagarrautr@gmail.com
deshmukhkrushna2@gmail.com

Abstract : Today our lives are hurried and busy. We want to experience more and achieve more. This pursuit of fitting more into each day leaves little time for the most important factor which affects our quality of life- the food we eat. Many great innovations have come which help us to monitor our health, sleep, steps, pulse to live better. But the problem of eating fresh & healthy without any hassle is yet to be addressed. Unfortunately, mornings are hectic for most people, especially families with children.

In the current day situation it is very difficult to cope up with hunger pangs. Most people usually rush through the meal, gobble down whatever's handy in the kitchen, or grab a quick, on-the-go bite. That's where the Automated food Maker comes to the rescue. It's all about making a fresh food that one can grab and go. All it needs is to add the necessary ingredients and then selecting the preset menu of various dishes.

1.INTRODUCTION

Food automation the one among the fast growing technology, today's food making machines are most popular and most of need. The Automated food maker machine is a pioneering concept in food manufacturing since it is designed to cook more than one kind of dishes. In the modern day situation, food maker is the eye catcher of the people who are not able to cook for themselves manually. Automation in food manufacturing has been a primary solution in improving the consistency, safety and accessibility of food in major consumer marketsThis was mainly made by considering present busy life style of the people. Food maker reduces the man power and time to certain extent. The Automated food maker is designed to deliver a whole new set of functionalities that will create a benchmark in the automated food making sector

Objectives

- In this 21st century, women not only have to serve the home but also the corporation where she is working.
- Even just being only a home maker and managing the complete home is difficult for women. Of all the tasks in the home, cooking requires more time .
- It does not use any gas so any hazard can be avoided.
- Quality of food is not compromised.An advanced cooking system would probably reduce lthe burden
- This machine can be used either on a small scale or even on large scale purpose
- Reduction in wastage of food

Mechanical Parts and its working:

- Bowls: We will put raw food ingredients in this.
- Liquid Containers: For dispensing of water and oil in food preparation.
- Main shaft: It will move the bowl carrying raw food ingredients and dispense it into the cooking pot.
- Motor : It gives water and oil for food preparation into the cooking pot.
- Induction cooker: It is used to provide different heat temperatures to the cooking pot for food preparation.
- Stirrer: It rotates the food ingredients present in the cooking pot so that the food do not get burned.
- Spice dispenser: It will dispense required amount of spices and required spices into cooking pot.
- Cooking Pot: It collects the spices, raw food ingredients, oil and water and prepares the food inside.

Electrical Parts and its working: -

- Wi-Fi module It is used for communicating with the
- machine. AT328 Arduino uno It supervises all the process of the machine and every instruction is loaded in it.
- Power Supply: It gives power to every electrical equipment present in the machine.
- Servo motor: It is used to move vegetables bowls and also in spice dispenser.
- Induction : For providing heat to cooking pot.
- Relay: For operation various switches automatically

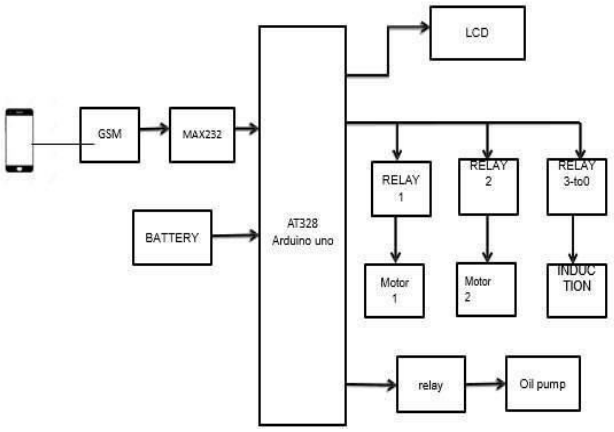


Fig-Block diagram

Methodology

For the Automated food maker to start it's working the user has to switch on the power supply and open the "SMARTY CHEF" app. The app display, then presents the user with various dishes that he/she likes to cook. Once the user selects the dish, the app again asks the user for number of serves or the amount of food to be cooked. The user needs to confirm the number of serves. This action switches on induction stove, relay circuit and microcontroller.

The microcontroller reads this input and chooses all parameters to cook the set dish microcontroller initializes all the data according to the user's input and starts executing programmed functions, hardware parts of the system are initialized and they start working according to the program.

The microcontroller program initializeinduction stove and sets the time and temperature accordingly. It then activates all containers containing ingredients to get the ingredients into the container by using the relay drive circuit.In the meanwhile, the stirrer assembly is also activated and it maintains the correct mixing of the ingredients. Finally the dish is cooked for the preset time and after the preset time is elapsed.

the microcontroller switches off the entire system so that the container containing the cooked dish can be taken out and the dish be served. strategic locations. Such information's should be in real time and transmitted wirelessly from the measured location.

SOFTWARE IMPLEMENTATION

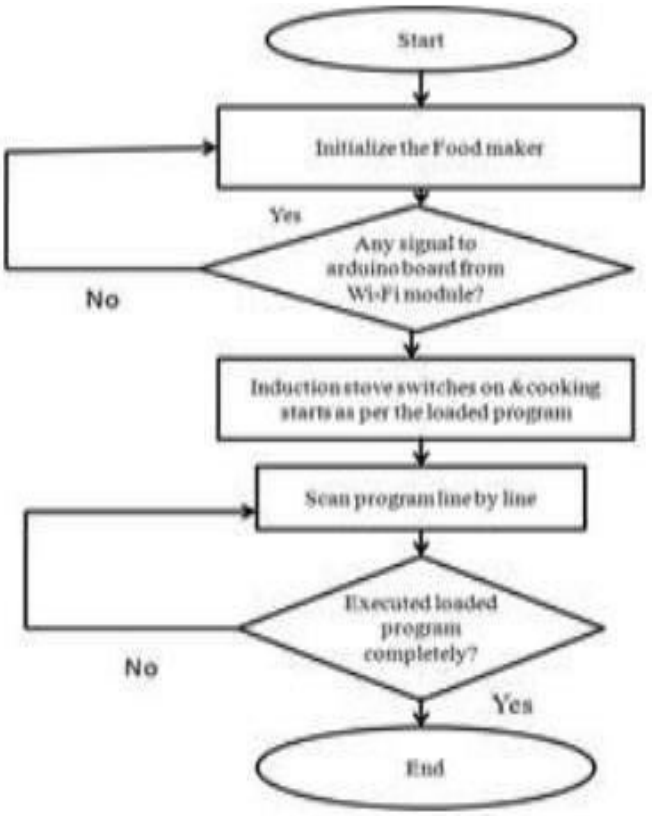
Arduino Software

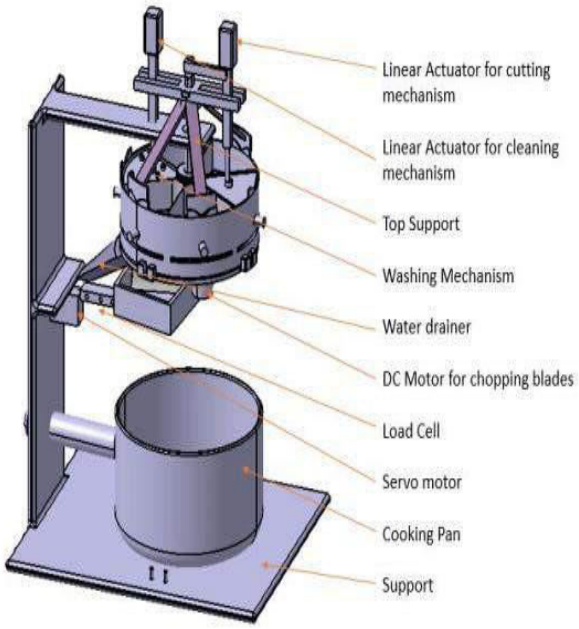
The program for the microcontroller is written in embedded C language using Arduino IDEThe Arduino integrateddevelopment environment(IDE) is across-platform application (for Windows, macOS,Linux) that is written in the programminglanguage Java.It is used to write and upload programs to Arduino compatible boards.

Android studio

In order to select the dish and to enter the number of serves, an android applic ation called as "SMARTY CHEF" is developed using android studio. To code the app java language is used. To develop android application for android devices, android studio is the official integrated development environment from Google. To create an app Arduino studio consists of all the API. On Windows, macOS and Linux based operating systems Android studio is available for download.

Flow chart





Result

- An Automated food maker for was fabricated successfully. The complete machine process control was done using microcontroller with embedded language as it is easier for individual to understand and operate.
- The necessary heater control and actuator control are done through power supply and relay board circuit. Few trails were conducted on the developed equipment to prepare Upma for 2 serves (that is for two people) during the trails we observed that proper amount of ingredients are been put into the vessel and is linked to selection of serves done by the operator.
- The trails show that apart from main ingredients, Water, Oil and other ingredients which are used are made to flow to meet the requirement. This is handled in the program part and it is functioning smoothly.

Conclusion

- This project mainly concentrates on concept
- development and trials to ensure electronic control parts operation.
- Hence the design is considered mainly for easy prototyping, keeping this the containers and other parts such as motors, vessel and induction stove are directly brought and integrated into the system to conclude the prototyping build provides all operation and functionality of the Automated food maker. However the design part can be reviewed to make more aesthetic and raged to fit into kitchen environment.

References

1. NizamUddin Ahamed; Zahari Bin Taha; Ismail B Mohd
2. Khairuddin;Tasriva Sikandar; Md. Asraf Ali; “Development Of Fuzzy Inference System For Automatic Tea Making” 2016 IEEE International Conference On Automatic Control And Intelligent Systems (I2CACIS) Pages: 196 – 201.
3. Kaviraj. N “Automatic Vegetable Curry Maker (AVC - Maker)” International Journal of Engineering Sciences & Research Technology (IJESRT) (Vol.6, No.2) 2017-03-02, Page: 53-55, ISSN:2277-9655 6(2): February, 2017.
4. Praise Sabu, Sreerag M P, Sukesh P P, “Design and Development of Automated Appam Maker” IJIRST – Volume 3 | Issue 11 | April 2017 ISSN (online): 2349-6010.
5. [Siraj M Tamboli, “Smart Dough Making Machine”Imperial Journal of Interdisciplinary Research(IJIR) Vol-3, Issue-4, 2017 ISSN: 2454-1362.
6. “Best bits: Applications of microprocessors: Chip makes drip coffee” IEEE Spectrum Year: 1981, Volume: 18, Issue: 9, Pages: 19 – 19.
7. Amit B Solanki, V R Solanki and D N Shah "Design & Development of Automatic Fast food Machine”

Importance of IoT in Agriculture

Authors :-

Lalit Patil (student)

SYBSc(Computer Science)

Ashoka Center for Business and Computer Studies ,

Nashik , India.

Lalitpatil2512186@gmail.com

Sayali Mhaisdhune (student)

SYBSc(Computer Science)

Ashoka Center for Business and Computer Studies.

sayalism22@gmail.com

Asst. Prof . Rahul Abhiman Sonawane

Dept of Computer Science,

Ashoka Center For Business And Computer Studies, Nashik

Guided by:-

Asst. Prof. Sonali Shirish Ingale

Dept of Computer Science,

Ashoka Center For Business And Computer Studies, Nashik

sonali.ingle7512@gmail.com

Abstract :

IoT(internet of things) is an enormous technology which can be used for efficient farming in our country. The farmers have been facing various problems like global warming, sudden environmental changes, uncertain climate, lack of workforce, lack of knowledge about new technologies introduced related to

Keywords :- IoT (internet of things) , farming , Agriculture , product distribution, efficient farming

1. INTODUCTION

The Internet of Things (IoT) describes the network of physical objects things that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet .Following are the important use cases of the IoT in the agriculture industry.

1. Real-time crop monitoring:

One more type of IoT product in agriculture and another element of precision farming is crop management devices. Just like weather stations, they should be placed in the field to collect data specific to crop farming; from temperature and precipitation to leaf water potential and overall crop health, these can all be used to readily collect data and information for improved farming practices.

2. Soil Testing :

Soil Analysis has become an essential factor for effective cultivation. There are many existing methodologies for soil testing. Earlier soil testing was done in laboratories and research centres which took a lot of time and effort to achieve results. With the help of IoT is has become possible to connect the sensors to the internet. We intend to use these sensors with IoT for performing soil testing anywhere and anytime. The existing methodologies test various parameters like moisture, respiration, bulk density, colour texture, pH, temperature.

3. Weather Forecast Application:

Climate plays a very critical role for farming and IoT solutions enable to know the real-time weather conditions. The whole IoT ecosystem is made up of sensors that can detect real-time weather conditions like humidity, rainfall, temperature and more very accurately. The sensors monitor the condition of the crops and the weather surrounding them.Now days most of the farmers are using application to know current condition of weather .

4. Greenhouse:

To make our greenhouses smart, IoT has enabled weather stations to automatically adjust the climate conditions according to a particular set of instructions. Adoption of IoT in Greenhouses has eliminated the human intervention, thus making entire process cost-effective and increasing accuracy at the same time. With the help of the sensors, the water consumption and greenhouse state can be monitored via SMS alerts. Automatic and smart irrigation is carried out with the help of IoT. These sensors help to provide information on the pressure, humidity, temperature and light levels.

5. Agriculture Drone:

The introduction of agricultural drones is the trending disruption. The Ground and Aerial drones are used for assessment of crop health, crop monitoring, planting, crop spraying, and field analysis. With proper strategy and planning based on real-time data, drone technology has given a high rise and makeover to the agriculture industry. Eventually smart drones have reduced the environmental impact. The results have been such that there has been a massive reduction and much lower chemical reaching the groundwater.

6. .Smart Irrigation System:

Smart irrigation systems tailor watering schedules and run times automatically to meet specific landscape needs. These controllers significantly improve outdoor water use efficiencies.Water is a critical input for agriculture crop yield in nearly all its aspects. Technological innovations like drip irrigation have helped in water management, though, there needs to be more done to ensure

the crops get the plants when they need them most.

2. IoT IN AGRICULTURE

The main challenges faced by agriculture and farming industry

- Global warming and environmental changes
- Lack of workforce, a huge supply-demand gap in manpower
- Lack of proper monitoring and need for large manual intervention
- Challenges to analyse large scale unstructured data

Benefits of Using IoT in Agriculture

As in other industries, application of Internet of Things in agriculture promises previously unavailable efficiency, reduction of resources and cost, automation and data-driven processes.

1. Expansion. :- By the time we have 9 billion people on the planet, 70% of them will live in urban areas. IoT-based greenhouses and hydroponic systems enable short food supply chain and should be able to feed these people with fresh fruits and veggies. Smart closedcycle agricultural systems allow growing food basically everywherein supermarkets, on skyscrapers' walls and rooftops, in shipping containers and, of course, in the comfort of everyone's home.

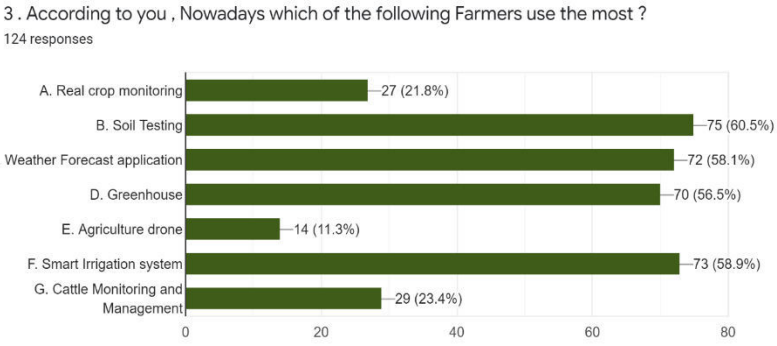
2. Reduced resources:- Plenty of ag IoT solutions are focused on optimizing the use of resourceswater, energy, land. Precision farming using IoT relies on the data collected from diverse sensors in the field which helps farmers accurately allocate just enough resources to within one plant.

3. Cleaner process:- The same is relevant to pesticides and fertilizers. Not only do IoT-based systems for precision farming help producers save water and energy and thus make farming greener, but also significantly scale down on the use of pesticides and fertilizer. This approach allows getting a cleaner and more organic final product compared to traditional agricultural methods.

4. Agility:- One of the benefits of using IoT in agriculture is the increased agility of the processes. Thanks to real-time monitoring and prediction systems, farmers can quickly respond to any significant change in weather, humidity, air quality as well as the health of each crop or soil in the field. In the conditions of extreme weather changes, new capabilities help agriculture professionals save the crops.

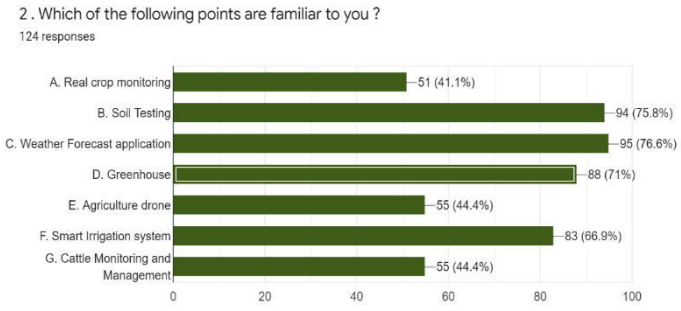
5. Improved product quality: Data-driven agriculture helps both grow more and better products. Using soil and crop sensors, aerial drone monitoring and farm mapping, farmers better understand detailed dependencies between the conditions and the quality of the crops. Using connected systems, they can recreate the best conditions and increase the nutritional value of the products.

6. Data, tons of data, collected by smart agriculture sensors**:** e.g., weather conditions, soil quality, crop's growth progress or cattle health. This data can be used to track the state of your business in general, as well as staff performance, equipment efficiency, etc.

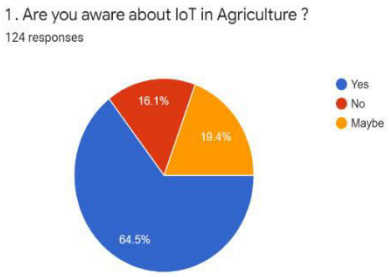


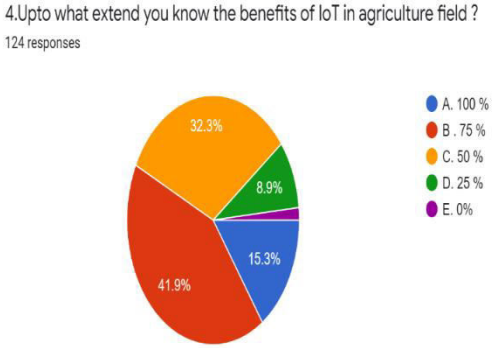
4. METHODOLOGY AND RESULT

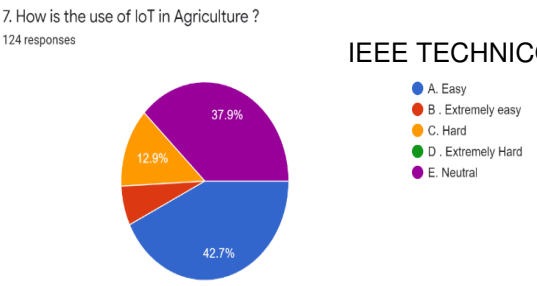
The authors conducted a survey to analyse at what extent IoT(Internet of Things) is used in agriculturefield . The survey involved sending a detailed questionnaire to famers as well as to



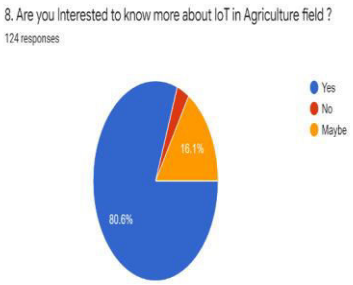
students who are belong to agriculture families. The survey couldn't conduct by visit to some farmers and agriculture college due to pandemic. Overall, 124responses were received and the survey analysis is presented below which illustrates the responses in detail . A survey on , The important of IoT in Agriculture







5.Conclusion



According to the survey we have concluded here , Awareness about IoT in agriculture is not as much as it needs to be. Many of them know about soil testing , greenhouse , smart irrigation system , weather forecast application but they aren't more aware about real crop monitoring , agriculture drone and cattle monitoring which are somewhere can be crucial for the agriculture sector as well as people don't have enough knowledge and resources to get information about this things. May be due to lack of importance of IoT in agriculture according to survey more than 50% people saying neutral as well as hard use of IoT can be done . IoT is latest technology which can reduce efforts , can save time and money of farmers for better farming . 80% people showing interest to know more about IoT which will be definitely useful for future of farmers and agriculture sector. Also, there is a lack of acceptance in farmers regarding IoT because of lack of knowledge and fear about loss. So, if they will have a sufficient knowledge then IoT can bring a revolution in agriculture sector.

5.Reference

- https://in.search.yahoo.com/search?fr=mcafee&type=E211IN826G0&p=iot+in+agriculuture
- https://www.zapmeta.ws/ws?q=iot%20in%20agriculture&asid=ws_ba_gc6_04&de=c&ac=5801&cid=316279481&aid=1361195641475788&kid=kwd-85074903279909:loc-90&locale=en_US&msclkid=25ef6e60780811e791ac0e59b5419d6b
- https://search.visymo.com/ws?q=agriculture%20iot%20companies&asid=vis_in_gc2_1&mt=b&nw=s&de=c&ap=&ac=14081&cid=12086885261&aid=116918246392&kid=kwd-356791713969&locale=en_IN&gclid=CjwKCAiA1eKBBhBZEiwAX3gqlxC7c6tQdb4kdhuc6oUbRQCbuwfNMGHb8Ts7_4QQf2oAf02Ss05ycBoCDU8QAvD_BwE
- https://search.visymo.com/?q=iot+in+agriculture+projects&sess=987bef3394d4480eb46b1258f7b7c965&dzn=&asid=vis_in_gc2_1&where=in&awc=vis&abt=&template=&pp=10&bkw=n&de=c&ac=14081&nwc=&rkb=b&rkln=3

Assessment of "Covid-19" Impact in Infrastructure on Construction Growth in Nashik City

Komal Bargat
Department of Civil Engineering
Maratha Vidya Pasarak Samaj's,
KBT College of Engineering
Nashik, India
bargatkomal21@gmail.com

Prof. Ajay Shelorkar
Department of Civil Engineering
Maratha Vidya Pasarak Samaj's,
KBT College of Engineering
Nashik, India
shelorkar.ajay@kbtcoe.org

Abstract*— COVID-19 is a global pandemic that changed the overall global perspective. The construction industry has been adversely affected due to the COVID-19 pandemic in every way. Numerous challenges arise in the post-COVID construction world. Right from the beginning stage of concrete production to the completion of the project, consequences will be of various forms like a deficit of workforce & material, need of proper planning and now it also includes safety during such pandemic. Covid-19 has a significant impact overall worlds and also on Nashik City. Nashik is one of the fastest developing cities in Maharashtra, which has been to its rapid Infrastructure growth. Nashik has been selected as one of the 100 Smart cities to be developed in India. This paper has been prepared to know the impact of Covid- 19 on Construction infrastructure in Nashik City. A questionnaire survey has been carried out from professional engineering, construction, and architecture practitioners operating in Nashik. The ongoing pandemic is indeed the primary cause to discontinue the traditional working pattern. The findings from this research revealed an impact on the construction industry due to the Covid-19 pandemic. The impacts have been determined, which occurred on the construction site. The impacts have been classified into different groups: material resource and human resources, financial sustainability, and safety during pandemic situations.

Keywords—Construction Industry, Covid-19, Nashik City

I. INTRODUCTION

The Government of India under Prime Minister Narendra Modi ordered a nationwide lockdown on 24th of March 2021 that was for 21 days. This lockdown limited the movement of the entire population of India to minimize the effect of viral Covid 19 disease. On 22nd of March 2021 public curfew was impose and a set of rules and regulations were stated on most affected regions in India. Again, there was an extension at the tail of the first lockdown with supplementary regulations by state governments and other advisory committees. On 14 April, Prime Minister Narendra Modi extended the lockdown from 14th April 2021 to 3 May. After 20 April there was some freedom of movement as spread had been controlled or was minimal. The lockdown was imposed by Government of India, restricting the movement of people and gatherings following to dismiss processing work. The construction sector works on the concept as hordes of workers toil together to meet the timelines. However, due to the Government's restrictions dominance of pandemic, all the construction activity, including most business activity across the country, has halted.

There are many consequences of the lockdown, which would further lead the troubles for the sector like reverse migration, disruption of supply chains, economic instability. Nashik is the land of opportunities for the construction industry. Nasik's rapid development and rising urbanization are reshaping the fabric of the city. In Golden triangle of Maharashtra i.e. Mumbai, Pune and Nashik. Nashik is meant to be the fastest growing city because of its favorable conditions, better connectivity and location which makes it an ideal investment destination for Construction Sector.

The impact of Coronavirus on Nashik city in the infrastructure of construction growth caused a huge loss in every term of development. The coronavirus 2019 (COVID-19) outbreaks in an epidemic, many countries have declared a complete national lockdown after a remarkable spike in COVID 19 cases. As the lockdown was imposed because of the pandemic it made all the construction office workers to terminate their onsite project work and made it mandatory to work from home [17]. The construction industry is one of the remarkable growth drivers of the economy in Nashik, and with no exception, it has also been completely shut down. Special precautions has to take for safety on labours [10].

II. OBJECTIVE

The emergence of COVID-19 in India has drastically changed the way Nashik work. Not only has it caused financial insecurity for companies, but it has also forced essential companies to make swift to their daily routines to remain operational. The objective of the paper is to know the effect of COVID-19 on Nashik's construction sector. In addition, remedial measures need to be taken for the safety of workers on the construction work. To know the problem that occurred on various construction sites in Nashik city. The study focuses on the effect of Covid19 on material supply, worker's availability, schedule, financial stability, and safety measures taken on construction sites to maintain site safety [12].

III. LITARTURE REVIEW

The impact of COVID-19 in infrastructure on the construction sector has caused a huge amount of loss. The literature review studies discuss the impact of the pandemic on various regions and investigate the effect of COVID 19 on the construction industry's survival. The case studies of the impact of COVID-19 in various areas referred to in the literature review are Kuwait[1], Maldives[2], Ethiopia[3], California[4], Oman[5], Jordan[6], GCC[7][15], Bahrain[8], and United Arab Emirates[9]. According to the literature review, a questionnaire survey was carried out in those regions to identify the impact. Major issues that the construction sector goes through are identified to understand possible outcomes and remedial measures on construction projects [13].

IV. METHODOLOGY

The situation with the rapid spread worldwide of Infection- the COVID-19 poses significant threats to the Nashik construction industry. The expert pointed out that the spread of the Coronavirus can hypothetically affect the ability to start and finish construction projects on time. "The industrialists said that lockdown has a disastrous impact on the economy of Nashik. "The builders have made commitments to customers, but the ongoing projects will be delayed because lockdown is imposed," said Wankhede.

Enterprises and Businesses are now seeking another ways to overcome from the impacts of Covid 19 on their ongoing projects and some measures to reduce to effect on their business. Force Majeure i.e. liability for non-performance was induced in general contractual provisions and legal principles to allow tailoring in resources [16]. Some financial institutions support construction enterprises in managing COVID-19 related risks, such as repayment delays. The effect of Covid 19 on the construction sector is excessive and it will take time to conquer to preCOVID-19 levels.

The impact of COVID-19 may vary from project to project, region to region, nation to nation, and continent to continent due to differences in project types, project locations, project owners, project duration and complex type of contract. To gather the most relevant onsite information a questionnaire survey was carried on the Impact of the Coronavirus on the construction site. Due to the COVID-19 situations, we cannot proceed onsite directly to collect the information. With the support of a questionnaire survey, the information is collected from construction sites of Nashik city to gain the Impact of the Coronavirus. So, by taking advantage of technology, the information is being taken. Questionnaires were created in Google Forms. These Questionnaires were mailed or by telephonic interviews information will be collected by contractors or builders. Depending upon their responses result is clarified.

The impact of Covid 19 on the construction sector of Nashik has made many more changes in daily routine. To know the impact and drastic changes that have been occurred due to the unsought pandemic Questionnaire survey is done. The questions were asked to the contractors and project managers about the situation to get the exact scenario of the construction industry in Nashik.

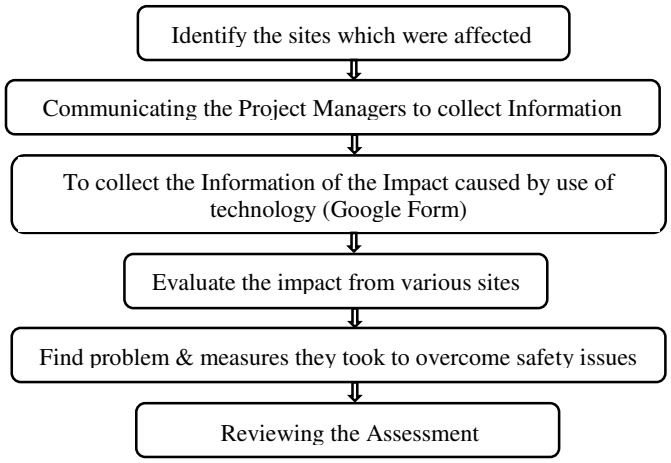


Fig. 1. Flow Chart of Work Process.

V. DATA COLLECTION

The COVID 19 pandemic has had far-reaching very severe consequences since it has spread all over. All the activities have been shut down unless it falls under the essential categories as necessary supplies and medical sectors and a few critical projects necessary to support the health system and safety of the people. It has limited the business, and companies have shifted to work Work-From-Home (WFH) concept remotely to accommodate and run the business and services. However, all the workers and staff need to work onsite to perform activities or monitor the work nearly in the construction industry. The construction sector is far different from all other industries, which y require the onsite involvement of all the project members. Hence, it is crucial to know how the construction industry addresses this unpredicted situation.

The Data collection process follows a particular procedure. Firstly, the research aims to adequately explain to the targeted population so that they can accurately fill the forms since it is an ethical requirement that needs to be adhered to in research. Participants were informed about the research and purpose of the study for their knowledge. The survey mainly had four sections Material Management, Human resources, financial conditions, and safety imposed. After the response given by the participant and all the data collected, results are shown in graphical representation.

List of Questions for Questionnaire survey.

Part A- Information

Participating Candidate Email

Part B

1. Does COVID-19 affect your construction site?
2. Was there any need for re-planning and rescheduling?
3. Was there any Interruption in contractual terms (legal issues)?
4. Does the pandemic affected your ongoing project during lockdown or your current projects?
5. Was your project delayed due to a pandemic?
6. What was the overall effect of delay on a project?

Part C- Material Management

1. Was the material supply chain of your site disturbed?
2. Was there availability of an adequate amount of materials when ordered?
3. Did COVID-19 affect lead times on certain materials?
4. Was there an increase in the cost of material?

Part D- Human Resources

1. Has COVID-19 affected the attendance of labours?
2. Does the labour available on site after lockdown?
3. Do you find any scarcity of Workers?
4. Were the labours confident for working on site after lockdown due to unsafe environment?
5. Were labours demanding high wages?

Part E- Safety during Pandemic

1. Safety Precautions taken onsite during a pandemic?
2. Safety Measures taken onsite during construction (Select safety measures taken)
   a. PPE Kit b. Face Masks
   c. Maintaining Social Distance
   d. Washing hand on regular

3. Were workers Comfortable using Safety Precautions?
4. Was a regular check-up (temperature, oxygen level, blood pressure) of workers done?
5. What new safety measures were taken at the beginning of COVID-19?
6. What were safety measures taken onsite to avoid the spread of Infection?
7. What measures are taken if a worker has symptoms of COVID 19?

Part F- Financial stability

1. Does the pandemic disturb your Project Budget?
2. Does the pandemic affect your Project Profit?
3. Project Cost overrun
4. Amount of impact of Covid 19 on overall project budget.

VI. Result and Analysis

The Questionnaire survey conducted in Nashik city on various factors results shows that there are significant impacts of Covid 19 on the construction industry. Many of the sites were affected; the planning and scheduling of the project were disrupted, causing delays. This gave rise to changes in contractual terms and legal agreements [11]. It also affected the material, human and financial resources.

A. *Impact of Pandemic on the Process of the Construction Project*

Covid 19 had a significant impact on the Construction sites in Nashik City, which included delays of a project to a large extent; rework on planning was required to complete the project. There were also changes made in Contractual terms between both parties. Many projects were delayed i.e. about 97% of construction projects were delayed due to pandemic. About 93% of the construction sites were affected in which about 43% of sites were strongly affected.

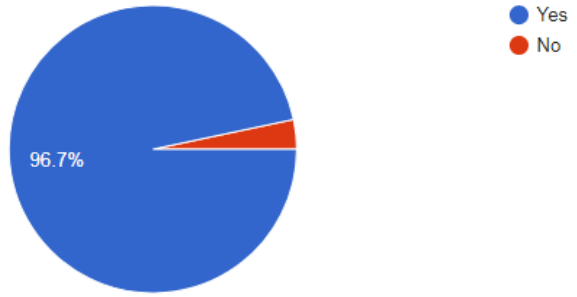


Fig. 2. Percentage of Firms indicating the delays caused due to pandemic on their projects.

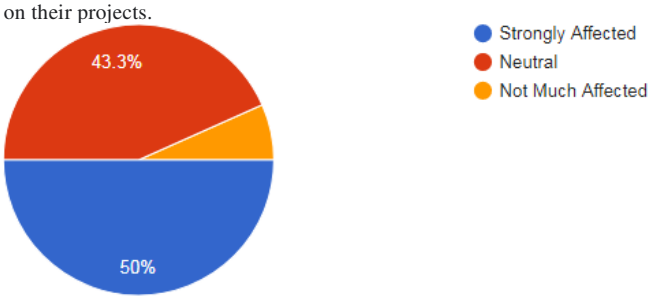


Fig. 3. Percentage of Firms indicating the amount of pandemic affected on the process of their project

A. *Impact of Pandemic on the Material Management of the Construction Projects*

Material Management is the critical factor for any project to run on its stipulated time. As the lockdown was imposed, the supply chain was disturbed, causing the delay of projects. About 100% of Participants accepted that the material supply chain was disturbed. 50% of contractors experienced that an adequate quantity of material was not available when ordered. Pandemic also affected the lead times of the material[17]. About 93% of construction firms experienced an increase in the cost of construction material.

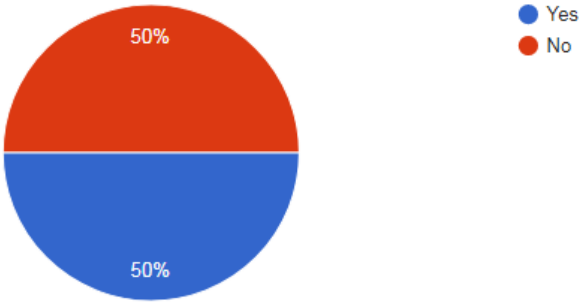


Fig. 4. Percentage of Firms indicating the availability of adequate material when ordered.

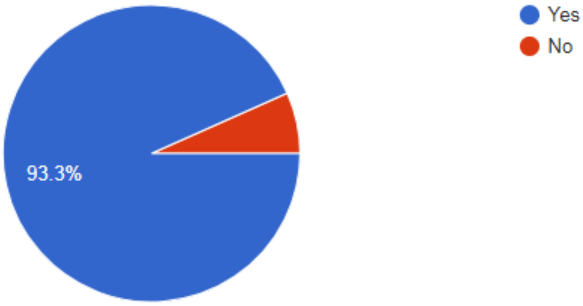


Fig. 5. Percentage of Firms experienced increase in cost of the material when ordered.

B. *Impact of Pandemic on the Human Resource on the Construction Sites.*

Covid 19 affected the availability of labours as the lockdown was imposed, and there were restrictions to the movement of people. Many of the labours migrated to their hometown. About 90% of the contractors in Nashik faced a scarcity of labours. 96% of firms were having the issues of labours onsite, in which 73% of firms were strongly affected. There was a scarcity of skilled labours. Also, due to the unsafe environment in a pandemic, 55% of labours from Nashik were not confident to work on site. So, labours were demanding high wages. 83.3% of site workers were demanding more wages to overcome such situations.

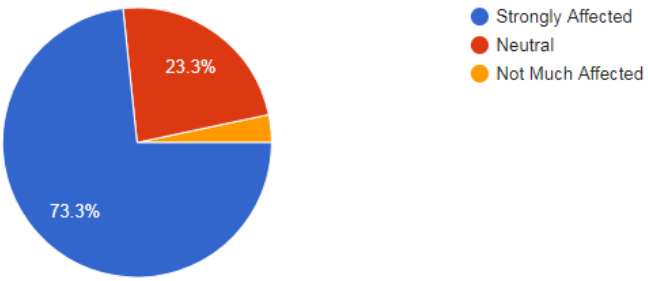


Fig. 6. Percentage indicating sites that were affected by the attendance of labour due to Covid 19.

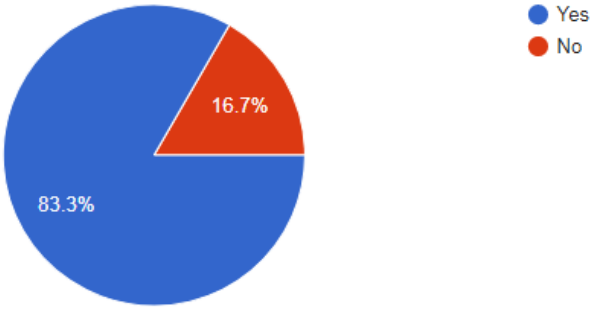


Fig. 7. Percentage of firms on which labours were demanding high wages.

C. *Safety precautions on Construction sites during Covid 19*

Every life is valuable thus, safety is the most priority on construction sites. Precautions have to be taken onsite, such as masks, PPE kit, sanitizer, maintaining social distance, washing regular hands-on intervals, etc. 97% of sites were taking safety precautions on construction sites. 97% of construction sites were doing regular check-up of workers, including checking of temperature, level of oxygen, and blood pressure of workers to know whether the worker is healthy and capable of working on site. Workers of 40% of the site were not comfortable using safety measures. Workers on construction sites have to do physical work, and so the use of safety measures like masks or PPE kits makes them uneasy to work on sites. Considering the ease of working, only 37% of workers on site were using PPE kits. Face Mask is the most critical and fundamental safety measure that has to be taken, and about 93.3% of sites workers were using face masks. Averages about 85% of the site maintain social distance and wash hands frequently.

Many of the firms were taking safety precautions on their level to control the spread of the disease. Measures taken were that only 50% of the works were allowed on site, Shifts were made, and the workers were alternately working according to shifts. The social distancing of workers from society, Workers, was given different places to stay to not mix with society. Awareness programs were arranged on a small scale to give correct guidelines about Covid 19 and working rules and regulations [14]. If any worker was found to have Covid 19, the worker was immediately isolated, Covid test was done, proper treatment was given to cure, hospitalizing or home Quarantine depending up to the health of leave was given to the worker.

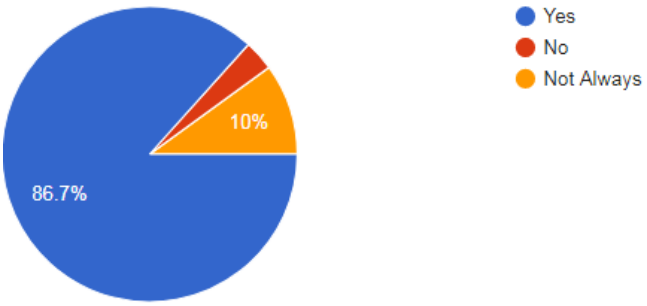


Fig. 8. Percentage of Firms indicating the safety measures taken on site.

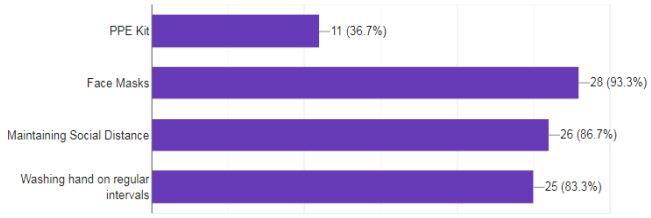


Fig. 9. Various Safety measures taken on site.

D. *Impact of Pandemic on the financial stability on the Construction Sites.*

Finance of any project is vital for any business activity. The pandemic affected the finance of the project, and 96% of construction firms have faced a reduction in their project profit, in which about 75% of construction firms had a significant amount of loss in their project profit. Delay of project, suspension of projects, installations of Covid 19 safety measures, increase in the cost of materials and high wages of labours thus reduced the project's profit. This created a cost overrun of the project. Cost overrun causes a decrease in stipulated profit. 93% of projects were on cost overrun, in which 33.3% of projects were having high cost overrun on ongoing projects. Financial instability created due to the Covid-19 pandemic affected a large number of construction firms. Thus, to overcome this space firms will take some period.

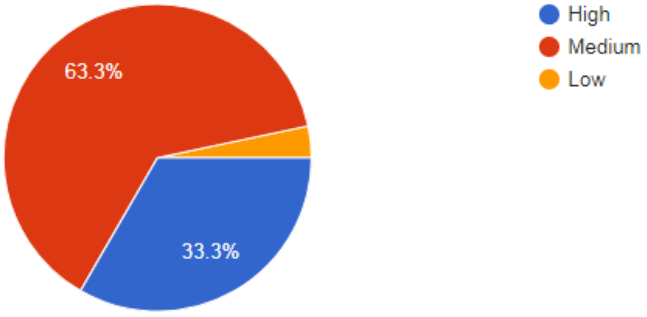


Fig. 10. Percentage of firms facing Project cost overrun.

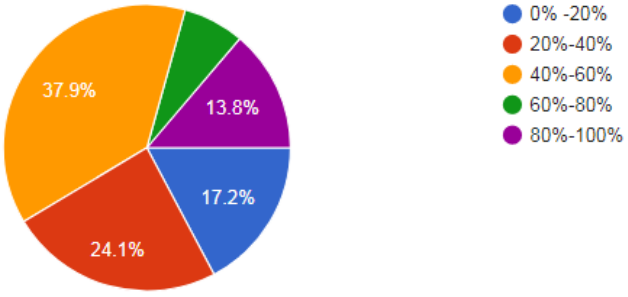


Fig. 11. Percentage of firms of the overall impact of Covid 19 on the project budget.

Covid 19 has been a disaster for all engineering sectors as all the calibrated plans and schedules have been interrupted. The primary affected area in the construction sector is material, labour, and finance. These can be considered as three wheels of the construction industry. Covid 19 pandemic has affected these three factors, which lead to the drop-down of construction projects. The overall effect of the pandemic on the construction sector is more, and it will take time to overcome such situations.

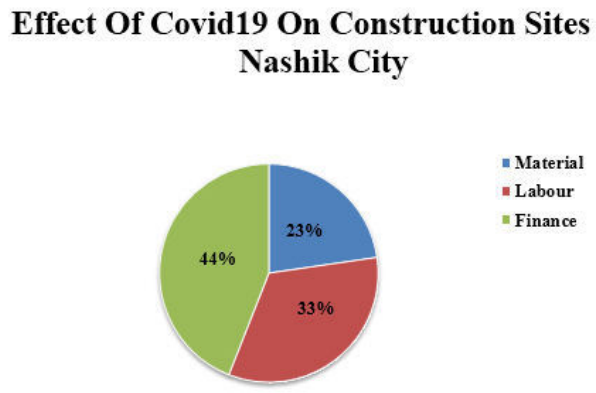


Fig. 12. Percentage of the effect of Covid 19 on construction sites of Nashik City.

CONCLUSION

The COVID 19 has impacted the construction industry in various ways, including loss of labour, lack of supplies, increased cost of construction material, and the change in demand. Due to pandemics, it is hard to complete most construction projects on scheduled time as per the set contracts. The running projects need to be settled by both parties because of the adverse impact of COVID 19.

The Government of India enforced strict lockdown and restricted movement of people due to which the companies engaged in the construction and engineering sector affected a lot. This create a shortage of raw material and workforce, disrupted the supply chain, further creating gap in completing projects. Some of the construction materials are imported so due to the lack of transportation it is hard in this times to obtain, creating a domino effect on the entire sector.

The impact caused on the construction industry:

- The suspension of constructing individual projects by the decision of developers or government agencies.
- Interruptions in the supply chain of materials and scarcity of labours.
- The displacement of workers due to the closure of borders between States.
- Reduced laborers productivity due to increased safety measures.
- Increased financial problems for contractors and suppliers of materials.

REFERENCES

[1] Thamer A N. Alenezi, "The impact of Covid-19 on construction project in Kuwait," International Journal of Engineering Research and General Science Volume 8, Issue 4, July-August, 2020 ISSN 2091-2730.

[2] Dr. Aishath Shehenaz Adam, "The impact if Covid-19 on the construction sector of the Maldives," Phase 1: Initial Assessment, August 2020.

[3] Abebe Demissew Gashahun, "Assessment on Impact of Covid-19 on Ethiopian construction industry," Volume 10 Issue No.7 ISSN 2321 3361 © 2020 IJESC

[4] Emily Bohannon, "The effect of Covid-19 on the commercial construction industry in California: A case study," (Unpublished)

[5] Tariq Al Amri, Manuel Marey-Perez, " Impact of Covid-19 on Oman's construction industry," *Vol. 9, 661-670, July 2020, ISSN: 2668-7798* DOI: 10.47577/tssj.v9i1.1021

[6] Dr. Khair, Al-Deen Bsisu, "The impact of Covid-19 pandemic on Jordanian Civil Engineers and construction industry, "International Journal of Engineering Research and Technology. ISSN 0974-3154 Vol.13, No.5 (2020), pp. 828-830

[7] Tariq Umar, "The impact of Covid-19 on the GCC construction industry," Inernational Journal of Service Science, Management, and Technology Vol. 13 Issue 2, March-April 2022, DOI: 10.4018/IJSSMET.20220301.oa1

[8] May Khalfan, Mona Ismail, "Engineering project and crisis management: A descriptive study on the impact of Covid-19 on engineering project in Bahrain" Second International Sustainability and Resilience Conference Technology and Innovation in Building Designs 2020IEEE, DOI: 10.1109/IEEECONF51154.2020.9319948

[9] Ahmad Ghandour, "The impact of Covid-19 on project delivery: A perspective from the construction sector in the United Arab Emirates," Humanities & Social Sciences Reviews eISSN: 2395-6518, Vol 8, No 5, 2020, pp 169-177, https://doi.org/10.18510/hssr.2020.8516

[10] Ankit Kumar Tripathi, "Impact of Covid-19 on concrete construction & innovative ways to make it sustainable & economical," International Journal of Science and Research (IJSR) ISSN: 2319-7064 Volume 9 Issue 8, August 2020, DOI: 10.21275/SR20808224841

[11] Dr. Yaser Gamil, Abdulsalam Alhagar, "The impact of pandemic crisis on the survival of construction industry: A case study of Covid-19," Mediterranean Journal of Social Sciences, Vol. II No 4. July 2020. DOI: https://doi.org/10.36941/mjss-2020-0047

[12] Mr. Moses Nyathi, Dr. Simon Taylor and Prof. Cecile Gerwel Proches, "The impact of Covid-19 on project managers in the construction industry," 02 July 2020 Volume: 8 Issue: 29, DOI: 10.13140/RG.2.2.30407.11686 , http://ndabaonline.ukzn.ac.za/UkzndabaStory/Vol8-Issue29/The%20Impact%20of%20COVID19%20on%20Project%20Managers%20in%20the%20Construction%20Industry/

[13] Ankan Biswas, Abhinandan Ghosh, Adrish Kar, Tuhin Mondal, Buntee Ghosh and Dr. Prasanta Kumar Bardhan, "The impact of Covid-19 in the construction sector and its remedial measures," doi:10.1088/1742-6596/1797/1/012054

[14] Shelly Stiles, David Golightly and Brendan Ryan, "Impact of Covid-19 on health and safety in the construction sector," Jan 2021, https://doi.org/10.1002/hfm.20882

[15] Altios, "Understanding the impact of Covid-19 in the UAE and GCC Region. Dubai," Sept 2020, *https://altios.com/wp-content/uploads/2020/06/COVID-19-IMPACT-IN-THE-UAE-AND-GCC-REGION.pdf*

[16] Bailey, J., Bouchardie, N. and Madalena, I., "COVID-19: The Current Impact on Construction and Engineering Projects," Sept 2020, https://www.whitecase.com/publications/alert/covid-19-current-impact-construction-engineering-projects on 11 Sept. 2020

[17] "COVID-19 Assessment of economic impact on construction sector in India," May 2020. https://assets.kpmg/content/dam/kpmg/in/pdf/2020/05/covid-19-assessment-economic-impact-construction-sector.pdf

IOT Warehouse Monitoring System

Ms. Iramsaba Mushir Shaikh.
Department of Electronics & Communication Engineering.
Maratha Vidya Prasarak Samaj's Karmaveer Babururao Ganpatrao Thakare College of Engineering.
Nashik, India.
iramshaikh5683@gmail.com

Mr. Deepak Vijay Sinha.
Department of Electronics & Communication Engineering.
Maratha Vidya Prasarak Samaj's Karmaveer Babururao Ganpatrao Thakare College of Engineering.
Nashik, India.
deepaksinha0042@gmail.com

Ms. Varsha Narendra Shinde.
Department of Electronics & Communication Engineering.
Maratha Vidya Prasarak Samaj's Karmaveer Babururao Ganpatrao Thakare College of Engineering.
Nashik, India.
shindevarsha@kbtcoe.org

***Abstract*—Aiming at monitoring the temperature and humidity inside the refrigerator and managing information of the refrigerator internal. In this system, there is a design of an intelligent monitoring system based on the Internet of thing, realized monitoring temperature and humidity inside the refrigerator unit and the intelligent cargo identification process by using advanced technologies like MQTT, Cloud Computing, sensor technology and the wireless communication technology. The proposed system used an ESP32 as main control unit, DHT22, E18 Infrared sensor. The system is very powerful to monitor refrigeration unit from anywhere and anytime using mobile application. This system will be capable to do control and monitoring through mobile and web application. We will achieve the good result to data monitoring such as Temperature, humidity and door status with MQTT. It is satisfied with the performance through the analysis of monitoring system and experiment results for the designed refrigerated unit monitoring system. Moreover, this proposed system has main advantages which are minimize the human effort for the manual monitoring and loss due to uncontrolled environment.**

Keywords— Refrigerator unit, Internet of Things, Intelligent Monitoring, MQTT.

INTRODUCTION

With the continuous development of society, people pay more and more attention on the food safety in daily life, especially fruit, dairy and meat food's preservation problem. In the food cold-chain process of refrigerator units is an important segment to ensure food safety. In this segment, the temperature and humidity conditions within the refrigerator the state of door switch and the location of refrigerator must be real-time monitored. The Internet of things is a combination of the Internet and all kinds of information sensing devices such as radio frequency identification devices (RFID), infrared sensors, laser scanners, etc. Meanwhile, it based on the simple RFID technology and combined the existing network technology, database technology and middleware technology to form a huge network including lots of networking reader and countless mobile labels. This technology is widely used in intelligent transportation, environmental protection, public security, peace household, intelligent fire, industrial monitoring, and many other areas, which greatly improved the social intelligence and automation level. Appling the Internet of things technology in refrigerator can monitor the temperature and humidity etc. Real-time and monitor the whole process intelligently to improve efficiency. The system is based on the concept of thing networking, and used the advanced RFID technology, humidity sensor technology, door switch monitoring device, wireless communication technology and the Internet to form a remote monitoring intelligent system for the refrigerator .The remote intelligent monitoring system based on this networking technology can have a Realtime monitoring of the temperature and humidity, gate switch state, cargo information all that make the whole monitoring process reach informatization.

I. EASE OF USE

A. *Need of Project*

The main objective of the proposed system is to provide an IoT based food and grain warehouse monitoring system to reduce food losses and increase food safety.

B. *Objective*

- To reduce food losses and increase food safety using Internet of things.
- To design and develop an android, iOS and Web application for real-time monitoring Warehouse.
- To monitors the variation in the limit set for the sensors and send real-time updates to farmers.
- To develop a system that assure extra safety for food and Grain.

II. SYSTEM CONCEPT

In this system, the important factors such as temperature, humidity, door status is measured and detected. With the help of IoT the live data is visualized on the dashboard using MQTT broker and it can be monitored at any time by the farmers.

The IoT nodes are designed using ESP32 and various sensors. These nodes are located in the warehouse at various location. Farmers can observe the information using mobile phone as text message and e-mail and mobile application. In order to achieve well-organized warehouses in an easy way, let us present the idea of setting up a warehouse, which is based on IoT.

A. *Block Diagram and Explaination*

The temperature sensor is used to sense the rise in temperature. The humidity sensor is used to see the percentage of humidity present in the warehouse. On detection of harmful gas, the gas sensor helps in detecting CO inside the warehouse.On detection of tilt or any lateral movement of the rack, the shock sensor is used.

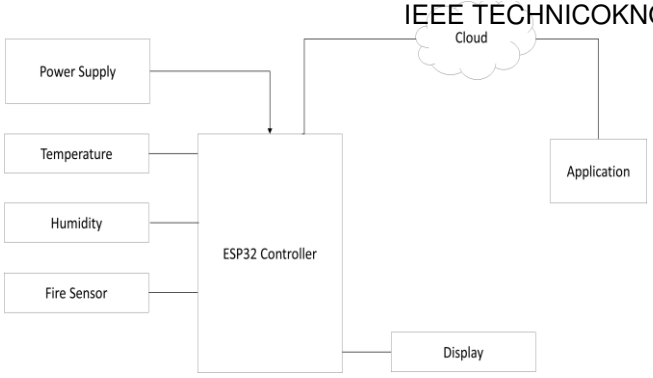


Fig.1: Block diagram.

If the presence of fire flame detected, to protect grains from fire, fire sensor is being used and a notification is sent to the user. The sensors data is being displayed in the dashboard to which a user can monitor the live data results from anywhere and anytime. Dashboard parameters update automatically with the newest sensor data. Moreover, simultaneously the e-mail is sent to the user.

B. Hardware Required

- Controller – ESP32.
- Sensor – DHT22, E18 proximity / limit switch/ door switch.
- Power Supply (5v DC / Lion Battery).
- Other – LCD/OLED display.

C. Software Required

- Programming language – C/Python.
- Tool – PyCharm, FileZilla, PuTTY(SSH client).
- Protocol – MQTT / HTTP.
- Cloud – Amazon AWS.
- Web – HTML, CSS, JavaScript, Bootstrap, PHP.

D. Schematic of circuit.

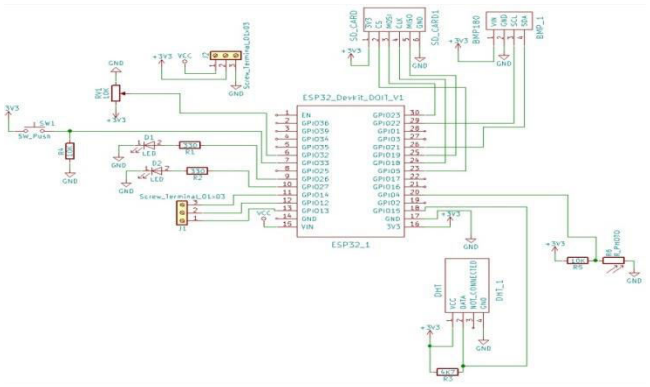


Fig.2: Schematic diagram.

E. Hardware circuit.

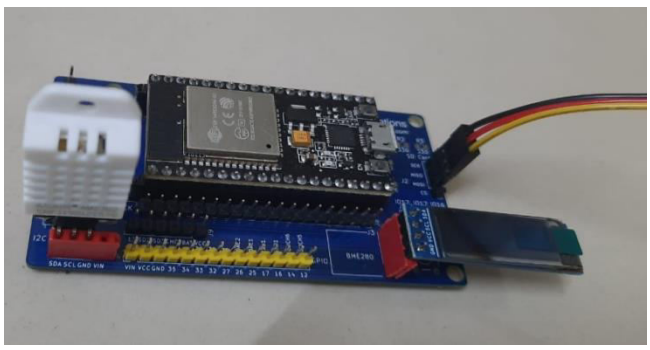


Fig.3: Hardware circuit

F. Advantages

- Better inform and monitor the impact of regulations to avoid loss of food and grain.
- Data will be accessible from anywhere and anytime.
- Empower farmers to make more informed decisions to increase the profit.

CONCLUSION

This work demonstrates the design and implementation of monitoring platform used in the food storage system. Besides establishing a food maintenance system, it proposes a low-cost solution based on IoT. This system promotes the upgrading of the warehouse management system avoiding food waste and unnecessary economic loss.

ACKNOWLEDGMENT

It gives us great pleasure in presenting the preliminary project report on IoT Instrumented food and warehouse monitoring system.We would like to take this opportunity to thank our internal guide Mrs. S. A. Dhumne for giving us all the help and guidance we needed. We are really grateful to them for their kind support. Their valuable suggestions were very helpful.

We are also grateful to Dr.V. M. Birari, Head of Electronics & Telecommunication Engineering Department, MVPS's KBTCOE, Nashik for his indispensable support, suggestions.With deep sense of gratitude we thank our Principal Dr. S. R. Devane and Management of MVPSs KBT College of Engineering, Nashik for providing all necessary facilities and their constant encouragement and support.

REFERENCES

[1] S. Kaushik and C. Singh, "Monitoring and Controlling in Food Storage System using Wireless Sensor Networks Based on Zigbee & Bluetooth Modules," Int. J. Multidiscip. Cryptol. Inf. Secur., vol. 2, no. 3, pp. 7–10, 2013.

[2] H. Nigam, A. K. Saini, S. Banerjee, and A. Kumar, "Indoor Environment Air quality Monitoring and its Notification to Building Occupants," TENCON 2019, Kochi, India, October 17-20, 2019.

[3] Srivastava and A. Gulati, "iTrack: IoT framework for Smart Food Monitoring System," Int. J. Comput. Appl., vol. 148, no. 12, pp. 1–4, 2016.

[4] S. S. Sruthi, D. R. Yasasweni, and J. N. Swathi, " Cold Storage Traceability System," Int. J. Res. Appl. Sci. Eng. Technol., vol. 5, no. V, pp. 1086–1096, 2017.

[5] T. N. A. Kumar, B. Lalswamy, Y. Raghavendra, S. G. Usharani, and S. Usharani, "Intelligent Food and Grain Storage Management System for the Warehouse and Cold Storage," Int. J. Res. Eng. Sci. Manag., vol. 1, no. 4, pp. 130–132, 2018.

[6] S. A. Khumkar, A. S. Bhujbale, S. B. Khandar, S. P. Deshmukh, and M. A. Pund, "IoT Based Monitoring And Control For Vegetables And Fruits Storage," IJARIIE, vol. 4, no. 2, pp. 4486–4490, 2018.

[7] P. Ghosh and Mahesh T R, "A privacy preserving mutual authentication protocol for RFID based automated toll collection system," 2016 International Conference on ICT in Business Industry & Government (ICTBIG), Indore, 2016, pp. 1-5.

[8] P. Sethi and S. R. Sarangi, "Internet of Things: Architectures, Protocols, and Applications," J. Electr. Comput. Eng., vol. 2017, 2017.

[9] A. Srilakshmi, J. Rakkini, K. R. Sekar, and R. Manikandan, "A comparative study on Internet of Things (IoT) and its applications in smart agriculture," Pharmacogn. J., vol. 10, no. 2, pp. 260–264, 2018.

A Survey on smart hand sanitizer dispenser with temperature measurement and mask vending with door controlling

Ganesh V. Madhikar
Faculty of Electronics and telecommunication department
Sinhgad College Of Engineering
Pune, India
gvmadhikar.scoe@sinhgad.edu

Vaishnavi U. Deshpande
Student of Electronics and Telecommunication
Sinhgad College Of Engineering
Pune, India
dvaishnavi8631@gmail.com

Nikita S. Bobade
Student of Electronics and Telecommunication
Sinhgad College Of Engineering
Pune, India
nikitab22999@gmail.com

Harshali S. Aherao
Student of Electronics and Telecommunication
Sinhgad College Of Engineering
Pune, India
harshaliaherao99@gmail.com

Abstract -- **In this covid-19 pandemic period all people in the world had understood the importance of personal and social hygiene. Hand sanitation is the most important phase in the spread of disease as suggested by doctors and the WHO. Using the best alcohol sanitizers and using masks while speaking in the public are two main important factors of precaution. Not touching anywhere and keeping our hands sanitized are some of the main steps in order to keep ourselves protected from the virus. Germs can even spread from small particles on the surface and from the air too. Therefore, we must use mask and hand sanitizer compulsorily. This research paper aims to design and implement a low-cost hand sanitizer spray with mask vending and contactless temperature sensing machine using arduino.**

Keywords— PIR sensor, microcontroller, mask vending, IR temperature sensor, motor.

I. INTRODUCTION

This automatic sanitization system will help people to be safer towards the covid-19 virus and many more viruses like this. This system is an ultra sanitary sanitizing machine that has built in a human body detector and an IR temperature measurement sensor. Everyone knows that the main symptom of this virus is fever. This system measures the temperature of the human body. The masks are compulsory everywhere and if not used by one; he or she must pay the fine, hence this machine also lends you the mask. Provided the temperature of the person is normal and the person is sanitized and wearing a mask, then only the door of the cabin or the room will open automatically and a person can enter the respective cabin. This system is contactless in order to take more precautions.

A. *Statement of Problem*

This research work seeks to showcase how only one machine can be used with multiple purposes like self-detecting human body and automatic sanitizer sprayer, Mask Vendor, Door controller, Temperature Sensor and RFID module based on Arduino Uno will be used to solve the many sanitizing system problems like:

i. The manual operating sanitizer dispenser
ii. Overuse of Sanitizer liquids by people
iii. Exclusive liquid dispensers.
iv. Damage of manual operating dispensers

B. *Objectives of Study*

The main objective of this project is to design a low cost Multi-objective ultra-sanitary sanitizer dispenser that is capable of detecting the human body and measuring the temperature of the person as well as which will spray the sanitizer as soon as the human body is detected and also for spreading awareness about using masks in public places which will provide you with a mask. The feature and advantage of this system includes:

1) The system that will detect the human body and spray the sanitizer as soon as the body is detected.
2) Providing the masks if a person does not have one.
3) Controlling the door to prevent having contact with the door surface to open or close it manually.
4) Keeping the record of the people entering or exiting the room or cabin.

II. LITERATURE SURVEY

Various researches have been carried out and many papers have been published in order to design the automated programmable liquid dispenser system. Only some of these are discussed here:

1) The paper *[ISSN: 2643-640X]* published by *Enerst Edozie, Wantimba Janat, Zaina Kalyankolo* on date *6, June – 2020* named *"Design and Implementation of a Smart Hand Sanitizer Dispenser with Door Controller using ATMEGA328P"* contains the components like Ultrasonic sensor for detecting the body , as soon as body is detetcted the LED blinks RED and LCD displays please sanituze here

and using dc motor the liquid is dispensed and after that LED blinks Green. After the sanitization, LCD displays open the door and the door is opened using the servo motor. This research paper based on a machine may be used everywhere. This can help to solve the problems faced by security guards at different stages such as bank doors, school gates, hospital gates etc. [1]

2) The paper *[ISSN No:-2456-2165]* published by *Abhinandan Sarkar* on date *5, May – 2020* named *"Design of Automatic Hand Sanitizer with Temperature Sensing"* shows the preventive measure that can be taken during the COVID-19 pandemic in the whole world. The design brings in an automatic hand sanitizer and temperature sensing system to keep the hands of people sanitized whenever they want to sanitize it, without contact with the sanitizing machine.[2]

3) The review paper published *by Ezekwe Chinwe Genevra, Okafor, K. C. and Mbonu,E.S* on date *October 2014* named "*An Effective Approach To Designing and Construction of Microcontroller Based On Self Dispense Detecting Liquid Dispenser*" in which au6thor says that this paper is based on an automated programmable liquid dispenser using microcontroller. The objectives of this research work in trying to solve the bottle necks of the existing system will facilitate the design and construction of the microcontroller based liquid dispenser system. The outcome at the end of the specified design period was a working prototype that was able to dispense a liquid if the user activates the button from the keypad. The results shows that the cup sensor carries out its sensing functionality satisfactorily. [3]

4) 4)The review paper *[ISSN No: 0932-4747]* published by *Ashish Gupta, Rajesh Kumar* on date *8, 2020* named "*Novel design of automatic sanitizer dispenser machine based on ultrasonic sensor*" was implemented using Arduino Uno, and Ultrasonic sensor and solenoid valves to control the inlet and outlet of the pump which is used for the dispension of the alcohol based sanitizer. It was concluded that, as the controller receives a signal from the sensor module, it triggers the pump to get water from the storage area and send it to the nozzle in spray form. Their program runs the pump for 3 seconds. Even we can change the time as per the user's need through the program. [4]

5) The review paper *[ISSN: 2278-0181]* published by *Akshay Sharma A. S.* on date *07, July-2020* named *"Review on Automatic Sanitizer Dispensing Machine"* is based on Arduino which is used as a microcontroller for calculating the distance between the sensor and the hand kept below it. If the distance is less than 7 cm, then the pump is turned on for 100ms using a relay and pumps alcohol-based hand sanitizer and also senses the distance for every 1000ms. Components like pump, relay, Arduino microcontroller were checked. The Hand Sanitizer used was a liquid type with some amount of alcohol liquids. He says that this can also be used for gel-type hand sanitizer too.[5]

The following table shows what actually our literature survey says:

TABLE I. THE LITERATURE SURVEY

SR NO.	PAPERS	AUTO-MATIC SANITIZING	MASK VENDING	IR-TEMP SENSOR	DOOR CONTROLLING
[1]	ISSN:2643-640X DESIGN AND IMPLEMENTATION OF A SMART HAND SANITIZER DISPENSER WITH DOOR CONTROLLER USING ATMEGA328	YES	NO	NO	YES
[2]	ISSN:2456-2165 DESIGN OF AUTOMATIC SANITIZER WITH TEMPERATURE SENSING(WITH CONTACT)	YES	NO	NO	NO
[3]	AN EFFECTIVE APPROACH TO DESIGNING AND CONSTRUCTION OF MICROCONTROLLER BASED SELF DISPENSE DETECTING LIQUID DISPENSER	YES	NO	NO	NO
[4]	ISSN NO: 0932-4747 NOVEL DESIGN OF AUTOMATIC SANITIZER DISPENSER MACHINE BASED ON ULTRASONIC SENSOR	YES	NO	NO	NO
[5]	ISSN:2278-0181 REVIEW ON AUTOMATIC SANITIZER DISPENSING MACHINE	YES	NO	NO	NO

Table no. 1) Literature survey

III. METHODOLOGY

In this project the whole process was divided into three parts. First one was assembling each component virtually, so to do that we took the help of the website circuit.io to get an idea of how the whole system can be combined together.
The second part was coding, so to write a code we use arduino IDE, and in this IDE we wrote a code in the C language. After a successful verification of the code, we obtained a .hex file of the code and used it further in part 3.
So now talking about part 3, it was proteus simulation, for that we used proteus 8 professional. Here the first task was to collect the libraries for all the components and assemble them together and after all the connection was done the .hex file we have obtained in the second part was dumped into the arduino/at mega 328 controller in proteus and tested whether the system was designed for a particular scenario and was working properly or not, so, basically, simulation helps to get an idea whether the methodology we use was behaving properly or showing some errors.

A) Micro-controller

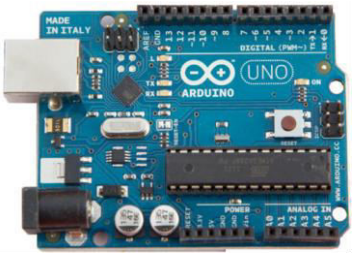


Fig. 1) Arduino Uno

Arduino Uno is a microcontroller board based on 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists of other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller. Arduino Microcontroller: Microchip ATmega328P

- Operating Voltage: 5 Volts
- Digital I/O Pins: 14
- Analog Input Pins: 6
- Flash Memory: 32 KB
- SRAM: 2 KB
- EEPROM: 1 KB
- Clock Speed: 16 MHz

B) Sensors

1) PIR Sensor

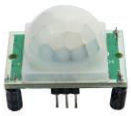


Fig. 2) PIR sensor

Passive Infrared Sensor is used to detect the human motion. This sensor is small sized, inexpensive and easy to use. In our project we are using it to detect human body to spray the sanitizer.

2) IR temperature sensor (GY-906)

Fig. 3) IR temperature sensor

The MLX90614 is a Contactless Infrared (IR) Digital Temperature Sensor that can be used to measure the temperature of a particular object ranging from -70° C to 382.2°C. We are using this temperature sensor to measure the body temperature of the person contactlessly.

3) RFID sensor (RC-522)

Fig. 4) RFID sensor

The RC522 is a 13.56MHz RFID module that is based on the MFRC522 controller from NXP semiconductors. The module can supports I2C, SPI and UART and normally is shipped with a RFID card and key fob. We are using this module to identify the staff member and other side member.

C) Electronics

1) DC motor

Fig. 5) DC motor

These motors can rotate in either direction and speed control is also possible, however do not expect a very fast speed and high torque from these small guys. We are using this motor to operate the spraying pump.

2) Servo motor (SG-90)

A servo motor is a type of motor that can rotate with great a precision. Normally this type of motor consists of a control circuit that provides feedback on the current position of the motor shaft, this feedback allows the servo motors to rotate with great precision. We are using this motor to control the door.

Fig. 6) Servo motor

3) Submersible spray pump (mini)

Micro DC 3-6V Micro Submersible Pump Mini water pump For Fountain Garden Mini water circulation System DIY project. This is a low cost, small size Submersible Pump Motor which can be operated from a 3 ~ 6V power supply. For spraying the sanitizer, we have used this spray pump.

Fig. 7) spray pump

4) LCD

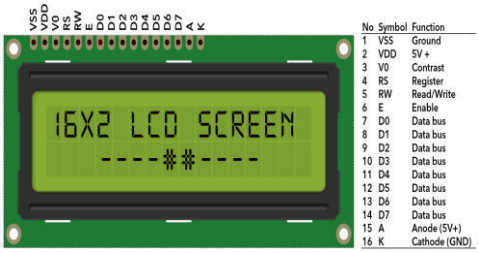


Fig. 8) LCD

LCD (Liquid Crystal Display) modules are very commonly used in most embedded projects, the reason being its cheap price, availability and programmer friendly. We have used this 16x2 LCD to display the messages.

IV. DESIGN AND IMPLEMENTATION

A) Block diagram

As we can see in the following block diagram, various sensors are used. The signal flow of the components is shown by the arrows. When the power supply is given, the microcontroller in the Arduino starts working. The PIR sensor used will sense the human being and send the signal to Arduino, and when sensed, the spray pump will receive the signal and sanitizer will be sprayed on the person's hand. Simultaneously, the IR temperature sensor will measure the temperature of that person and then reading will be displayed on the LCD and a proper message according to the temperature will be displayed on the LCD. When the RFID card is sensed by the sensor, the microcontroller finds the matching ID, and when it gets matched, the mask will be given to the person. After everything is done and the temperature of the person is normal, the door will get open using the servo motor.

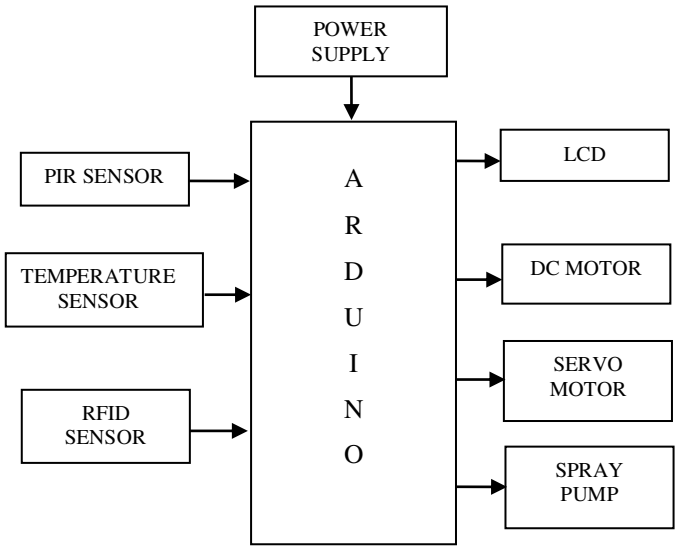


Fig. 9) The system Block diagram

B) Flow chart

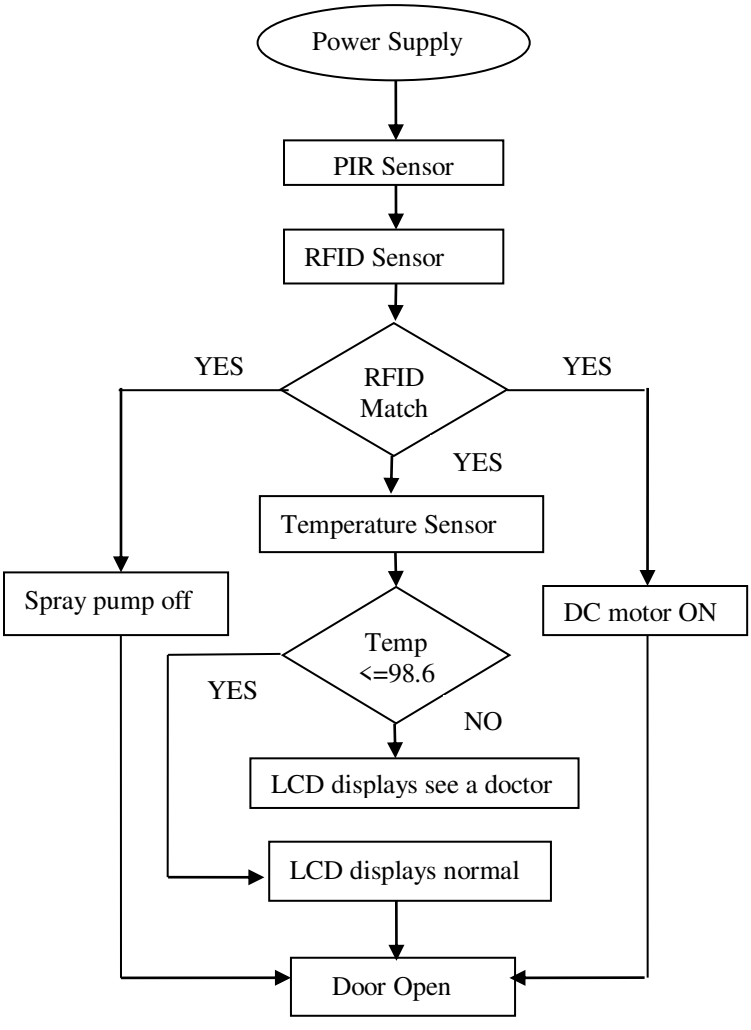


Fig. 10) The system Flow chart

As fig. 10 shows the flow chart, we can see the work flow of our project system. When the power supply is given, the components start working. If the PIR sensor senses the human body within the range of 30cm, it will send a signal to the microcontroller and the spray pump will start operating. If the body is not detected by the PIR sensor, the spray pump will not be turned on. Simultaneously, the IR temperature sensor will measure the human body temperature, and if the temperature measured is greater than 98.6℉ or 38℃, then the microcontroller tells the LCD to display the message as "see the doctor." Otherwise, the LCD will display the message as "normal." When the person coming doesn't have a mask with him, the RFID card provided should be shown to the RFID sensor, and if the ID matches, then the DC motor will be turned on and the mask will be provided.

As we are designing this system, we are considering the HOD's cabin and department staff entering the cabin. After everything is done, i.e., the person is sanitized and the temperature displayed is normal and is wearing the mask, then the door of the HOD's cabin will get opened by the means of the Servo motor. Hence, there will be no need for opening the door by using hands and contact spreading can be prevented.

C) Circuit diagram snapshot

Following is the Circuit diagram snapshot that has taken from the website named circuit.io to check how the connections should be made for our project. Also, to check the requirements of our project.

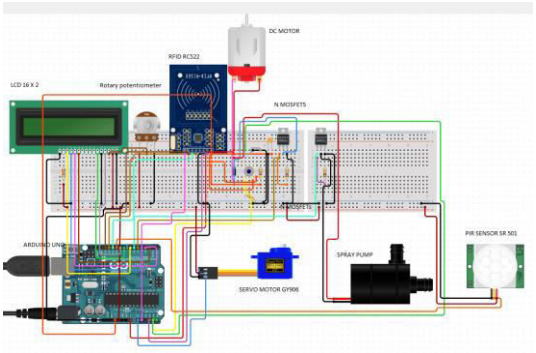


Fig. 11) circuit diagram snapshot

V. RESULT

The PIR sensor used will sense the human being and send the signal to Arduino, and when sensed, the spray pump will receive the signal and sanitizer will be sprayed on the person's hand. Simultaneously, the IR temperature sensor will measure the temperature of that person and then reading will be displayed on the LCD and a proper message according to the temperature will be displayed on the LCD. When the RFID card is sensed by the sensor, the microcontroller finds the matching ID, and when it gets matched, the mask will be given to the person. After everything is done and the temperature of the person is normal, the door will get open using the servo motor.

VI. CONCLUSION

The system will surely help in implementing the hand hygiene without any challenges as it is a must to have sanitizer if you are to access any entry point. It is much safer and recommended due to its touch-less property, which zeros down any chances for cross-contamination. This is a low-cost, user-friendly system that anyone can make use of. All the devices communicate well. It can be concluded here that our aim is to implement the system successfully and will be achieved without any deviations.

VII. ACKNOWLEDGEMENT

I am feeling very humble in expressing my gratitude. It will be unfair to bind the precious help and support which I got from many people in a few words. But words are only media of expressing one's feelings, and my feeling of gratitude is absolutely beyond these words. It would be my pride to take this opportunity to say thanks. Firstly, I would thank my beloved guide, Prof. G. V. Madhikar for his valuable guidance, patience and support. He was always there to force me a bit forward to get the work done properly in time. He has always given me freedom to do dissertation work and a chance to work under his supervision. I would like to express my sincere thanks to Dr. M. B. Mali, Professor and Head, Department of E&TC, for his constant encouragement in the fulfillment of the project work. I would also like to express my sincere thanks to Dr. S. D. Lokhande, Principal, for his co-operation. It is the love and blessings of my family and friends who drove me to complete this project work. Thank you all!

VIII. REFERENCES

[1] Enerst Edozie, Wantimba Janat and Zaina Kalyankolo (2020), "Design and Implementation of a Smart Hand Sanitizer Dispenser with Door Controller using ATMEGA328P". International Journal of Engineering and Information Systems (IJEAIS). Vol. 4, Issue 6, ISSN: 2643-640X.

[2] Abhinandan Sarkar, "Design Of Automatic Hand Sanitizer With Temperature Sensing", International Journal Of Innovative Science And Research Technology (IJISRT). Volume 5, Issue 5, ISSN No: 2456-2165.

[3] Ezekwe Chinwe Genevra, Okafor K.C. And Mbonu E.S. "An Effective Approach To Designing And Construction Of Microcontroller Based Self-Dispense Detecting Liquid Dispenser",Article In Proceedings Of The IEEE.

[4] Ashish Gupta1 , Rajesh Kumar2. "Novel Design Of Automatic Sanitizer Dispenser Machine Based On Ultrasonic Sensor", ISSN No: 0932-4747 Olume 6, Issue 8, 2020

[5] Akshay Sharma A S "Review On Automatic Sanitizer Dispensing Machine", International Journal Of Engineering Research & Technology (IJERT) ISSN: 2278-0181 IJERTV9IS070307 (This Work Is Licensed Under A Creative Commons Attribution 4.0 International License.) Vol. 9 Issue 07, July-2020

IoT Based Multiple Water Tank Level Control System

Rushikesh Kamble
Department ofInstrumentationEngineering
RamraoAdik Institute ofTechnology
Nerul, Navi Mumbai 400 706, India
rush.25899@gmail.com

Sourabh Bhujbal
Department ofInstrumentation Engineering
Ramrao Adik Institute of Technology
Nerul, Navi Mumbai 400 706, India
sourabhbhujbal1399@gmail.com

Pratul Govardhane
Department ofInstrumentation Engineering
Ramrao Adik Institute of Technology
Nerul, Navi Mumbai 400 706, India
pratul.govardhane@gmail.com

Shital Patil
Department ofInstrumentation Engineering
Ramrao Adik Institute of Technology
Nerul, Navi Mumbai 400 706, India
shital.patil@rait.ac.in

***Abstract*—Due to highly nonlinear and time varyingoperation, treatment of waste water is much complicated. To reduce the high production cost and to increase efficiency of the system, integrated automation system was developed. The design of a water level sensor is developed in such a way that it will measure level of water in a water tank or water storage. The system measures water availability in the tank by the level sensor and change the state of the water pump in accordingly to the water level. Ahigh pH level of the swimming pool water, can cause a serious reaction to skin and eyes of the users.**

Keywords—Water Quality,IoT, pH sensor, Water level

I. INTRODUCTION

Water is one of the foremost imperative common assets. Without it no life exits on the soil. Up to 60Water is an vital asset for all the livings on the soil. In that, a few individuals are not getting sufficient sum of water since of unequal dissemination. We can use this approach so that everybody gets the equal amount of water. It is additionally utilized to maintain a strategic distance from the wastage of water amid the distribution period.In the past method,the worker will go to that place and open the valve for a specific length, at that point once more the employee will go to the same put and near the valve, it is squander of time. The proposed framework is completely robotized. Here human work and time are spared. To guarantee the secure supply of drinking water the quality thought to be monitored in genuine time for that reason unused approach IOT(Internet of Things)based water quality observing has been proposed. In this venture, we'll execute the plan of IoT base water quality checking framework that screens the quality of water in real time. Few Sensor provides Water Quality parameter. The real-time checking of water assets data will benefit the water assets administration office and the public.The primary concept of real-time IoT based water assets information system is to supply comprehensive and precise data. The system is created through characterizing a few express water resource parameters then, water.Flooding water tanks in home, schools, colleges,Municipal overhead tanks, Clinics etc. can contribute to the massive amount of water wastage. In the event that we are able control this we will spare large amounts of water. Routine water tanks can not one or the other screen nor control the water level within the tank.As of now, the water level should be manually checked and refilled concurring to the necessities.

II. LITERATURE SURVEY

In 1948, the main progressed water checking framework was tried. That was for the most part it is toverify if the water was tainted, however sensor was not utilized. In 1956, the framework was somewhat more progressed for the use of various synthetics with turbidity sensors, yet it was not perpetual. since 1970, after the creation of first versatile pH sensor, individuals began estimate the pH level in water. In long time stamp, the oxygen sensors were presented in the checking framework. It is meant to check oxygen level [4][5][6].

Water detection information assortment moved from composed notes to advanced showcases through complex computerized hardware with the continuous information. Inspecting limit has advanced from several hand assessments consistently, one boundary at some random second, to consistent floods of data communicated throughmultiboundary instruments[7].

The paper [8] gives us a thought regarding the guideline and how the Ultrasonic sensor works, additionallyit gives anunderstanding about the Ultrasonic sensor with Arduinonetwork.

This paper [9] gave a thought about how to handle and manage the cloud server. Paper [10] will show how to associate Arduino. The execution of the Moisture sensor and working of sensor has been alluded from this paper [11].It shows how moisture sensor works with the Ethernet and its network with the cloud worker [12]. The dampness sensor working and gathering have gained from this paper [13].

In this overview, it is observed that require of IoT in shrewd water system. In the initial step, a fundamental engineering chosen and then connected.It compares diverse innovations, cost of hardware and strategies to construct a shrewd water frame- work. It uncoversIoT engineering with advances combined for water distribution system. It moreover takes into consideration of its preferences and disadvantages based on the writing survey. The choice of the best choice can be distinguished for keen water framework at the conclusion of this step.

The next step includes determination of the parameters required using IoT for water dispersion. At this step, the current issues during the choice of parameters and a few reasonable recommendations are provided. At last, an outline of the benefits which is necessary to execute IoT in shrewd water framework is examined. The survey structure is organized as takes after. Area 2 clarifies the basic architecture and advances connected at each layer in IoT for water administration and segment 3 indicates the parameters required to identify water quality, area 4 gives the applications. of IoT in water and segment 5 clarifies the benefits of IoT in keen water system based on the engineering.Internet of Things for Good Cities" by Andrea Zanella, Nicola Bui, Angelo Castellani, Lorenzo Vangelista, and Michele Zorzi. It offers an extensive review of the allowing technologies protocols and also structure for an urban IoT.

III. PROPOSED METHODOLOGY

In this project, the system performs the operation step by step inthe 1st stage dirty water is filter by filtration unit and in 2nd stagepHofwaterismeasurebyphsensorandinlaststageclea nwateris stored into distribution tank. The project consists of three watertank, level measurement sensor and pumps etc. to perform the watertreatment operation.the system ismonitorwith the help of IoT.the information of operation is sent to server with the help of WIFImodule anddisplayon 16*2 LCD display.

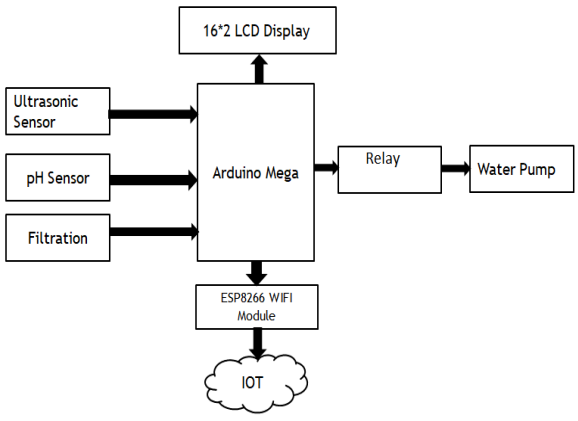


Fig.1 Workflow Diagram of Proposed Methodology

This project automatesthewater treatment plant and with the help of IoT which usesthe sensor Installed at various points in the system. These sensorscollectdataandsenditbacktothemonitoringsyste ms.

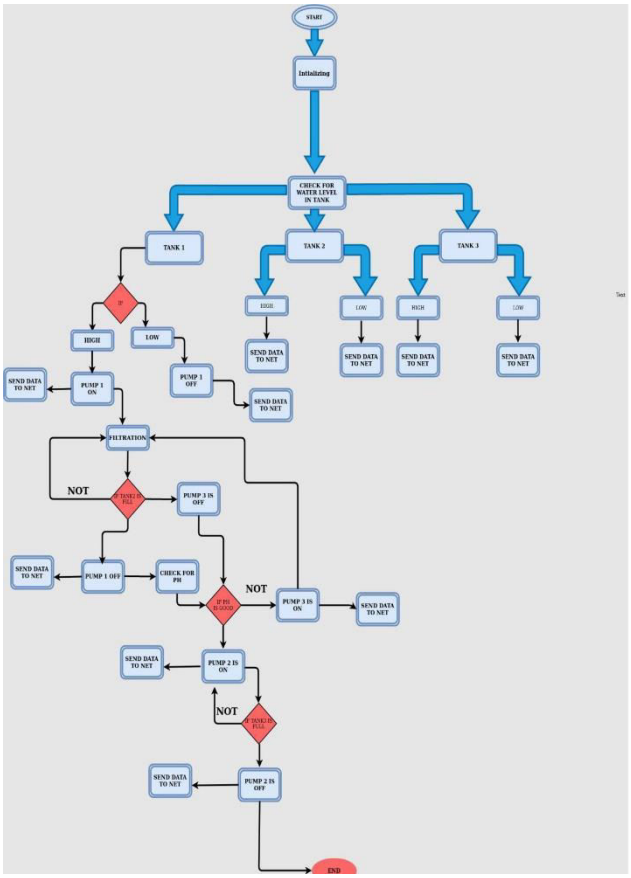


Fig.2 Flowchart of system

The purpose of this study is to create a low-cost, intuitive and automatic filtration device. There is six float sensors is place in tank at top and bottom places.There is three tanks and filtration unit and three pumps is use. The Wi-Fi module sends each step operation of data to server to monitor the operation. At starting stage, level of tanks is determined by float sensors sending this level status to server using Wi-Fi module. If tank1 is full the pump1 is on and put dirty water into filtration unit for cleaning. The pump1 is on till tank2 is full. If tank2 is full then pump1 is off. Again send data to server. There is pH is sensor is use to measure pH of any liquid which define liquid is base or acid. After tank2 is fill pH sensor is active and measure pH of water. If pH is between threshold values then water is passing to distribution tank. The good pH message is show on LCD. Send data to server. There is pump2 is activated when pH is good,when pump 2is active it shows on LCD,pump 2 is on till distribution tank is fill. After that Wi-Fi status of tank and pump status to server. But if pH is not in range of threshold there is another pump of tank 2.Which is use put water again into filtration unit wait till all water is pass by filtration unit. Again send data to server. If pH is good then pump3 is on water send to the distribution tank. Send the data to internet and process is repeat.

IV. RESULT

Calibration of pH:

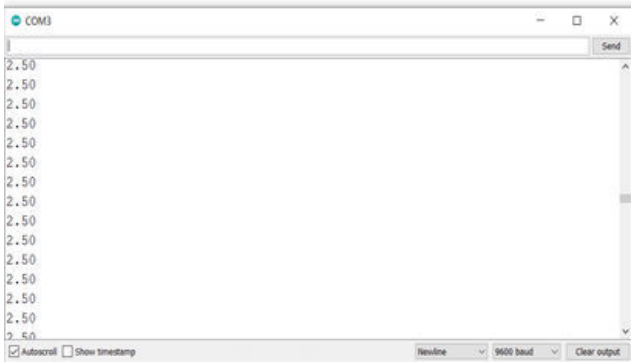


Fig.3pH Sensor Calibration

A suitable model has been identified to implement which is consistsof different sensors and other modules, their functionalitiesare shown in figure. Sensors are connected to Arduino UNO boardfor monitoring. Next, after sensing the data from various sensors and those were placed inarea of interest.Onceaproperconnectionisformed withseverdevice, then sensed data will automatically sent to ThingSpeak Server

Fig.4Implementation of Hardware

Fig.5Output graph of Tank 1 Level

Fig.6Output graph of Tank 2 Level

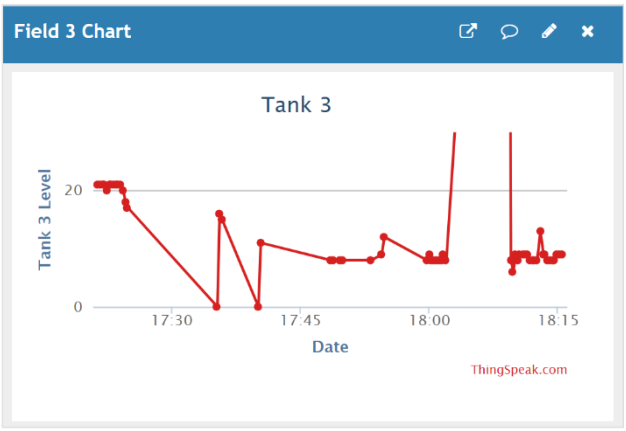


Fig.7Output graph of Tank 3 Level

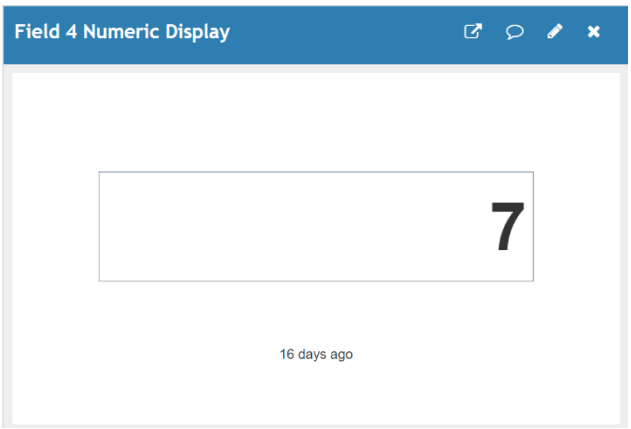


Fig.8Numeric Display for pH

V. CONCLUSION

This paper presents the water tank level controlling and monitoring using IoT system.It minimizes the number of wiring schemes and complicated networks.IoT can workmuch better as compared to the traditional automation systems. The important taskof water filling tank will be computerized. When the tank is Full, pump will stop automatically and Wi-Fi module will send necessary data of tank level to ThingSpeak server. This systemhelps to detect Water Pollution at higher speed;thus,ithelps Decision Making Department to understand irregular water quality information to base

station and to take preventive action to understand the status of the damage to establish the prevention. In near future, Précised water level sensor will be more in use than Ultrasonic Sensor. Précised Water Level sensor used higher accuracy above Water Level Detection reading and its more reliable too.

Water can be reuse for purpose of gardening, household activities like cleaning house, flushing toilet and also forfirefightingetc. This reuse of water decreases water scarcity. The deployment of sensors in the waste water treatment plan leads to automation of the plant.Major challenges like Treatment of waste water in big cities can be solved by using this scheme.

ACKNOWLEDGMENT

The authors are immensely grateful and thankful to Ramrao Adik Institute of Technology for giving us the opportunity and support required to carry out this work. A sincere thanks and appreciation to head of Instrumentation Engineering department, Dr. Sharad Jadhav andmentor Mrs. Shital Patil who has guided us through every problem that we had faced and helped us to overcome them.

REFERENCES

[1]Conference on control system, Computing Ping Zhang ,Mingzhe Yan,Hong Wang and Guabg Ping Yu,"Intergration Automation System of Wastewater Treatment Plant,"2006 6th World Congress on Intelligent Control and Automantion, Dalian, 2006,pp.6626-6630.

DOI:10.1109/WCICA.2006.171436.

[2] B.N.Gentuandh.A.Attia,"Automatic Water Level sensor and controller system," 2016 5th International Conference on Electronic Devices.System and Application (ICEDSA), 2016,pp. 1-4,DOI:10.1109/ICEDSA.2016.7818550.

[3] S.A. Hamin,A.M.A.Rahi,,S.Y.Fadhlullah,S.Abdullah, Z.Muhammad and N.A.M.Led,"IoT Based water Quality Monitoring System and Evaluation,"2020 10th IEEE International and Engineering (ICCSCE), 2020,pp.102-106,DOI:10.1109/ICCSCE50387.2020.9204931.

[4] "Water Quality Legislative History," [Online]. Available: www.des.nh.gov/organization/divisions/ water/ wmb/wqs/history.htm

[5] R. Yue and T. Ying, "A water quality monitoring system based on wireless sensorand solar power supply," in the proceedings of 2011 IEEE International Conference on Cyber Technology in Automation, Control, and Intelligent Systems, Kunming, China, 2011.

[6] R. Kumar, M. Mohan, S. Vengateshapandiyan, M. Kumar and R. Eswaran, "Solar based advanced water quality monitoring system, "International Journal of Science, Engineering and Technology Research (IJSETR), vol.3, no.3,2014.

[7] F.Akyildiz, W. Su, Y. Sankarasubramaniam and E. Cayirci, "Wireless sensor networks: a survey," Computer Networks, Volume 38, Issue 4, pp 393-422, 2002.[8] R. Akhil, M. Gokul, S. Sanal, V. S. Menon, and L. S. in mbient Communications andComputer Systems. Springer, 2018, pp. 103–115.

[9] T. Perumal, M. N. Sulaiman, and C. Y. Leong, "Internet of things (IoT)enabled water monitoring system," in 2015 IEEE 4th Global Conferenceon Consumer Electronics (GCCE). IEEE, 2015, pp. 86–87.

[10] K. M. Shahanas and P. B. Sivakumar, "Framework for a smart watermanagement system in the context of smart city initiatives in india,"Procedia Computer Science, vol. 92, pp. 142–147, 2016.

[11] P. D. Vani and K. R. Rao, "Measurement and monitoring of soil moistureusing cloud IoT and android system," Indian Journal of Science andTechnology, vol. 9, no. 31, pp. 1–8, 2016.

[12] A. Ezhilazhahi and P. Bhuvaneswari, "IoT enabled plant soil moisturemonitoring using wireless sensor networks," in 2017 Third InternationalConference on Sensing, Signal Processing and Security (ICSSS). IEEE,2017, pp. 345–349.

[13] N. Suma, S. R. Samson, S. Saranya, G. Shanmugapriya, and R. Subhashri, "IoT based smart agriculture monitoring system," International Journal onRecent and Innovation Trends in computing and communication, vol. 5,no. 2, pp. 177–181, 2017.

[14] R. Jisha, G. Vignesh and D. Deekshit, "IOT based Water Level Monitoring and Implementation on both Agriculture and Domestic Areas," 2019 2nd International Conference on Intelligent Computing, Instrumentation and Control Technologies (ICICICT), 2019, pp. 1119-1123, doi: 10.1109/ICICICT46008.2019.8993272.

[15] S. Rafid, F. Redwan, A. H. Abrar, S. N. Uddin Ahmed and B. B. Pathik, "Water Quality Monitoring System: A Sustainable Design," 2019 6th International Conference on Signal Processing and Integrated Networks (SPIN), 2019, pp. 414-419, doi: **10.1109/SPIN.2019**.8

Smart Garbage Management System For Smart Cities Using Internet of Things (IoT)

Sumit Valsangkar
Student,Electronics and Telecommunication Department
Government College of Engineering, Karad
Karad, Maharashtra
sumitvalsangkar123@gmail.com

Kedar Khotkar
Student,Electronics and Telecommunication Department
Government College of Engineering, Karad
Karad, Maharashtra
kedar.khotkar786@gmail.com

Siddharth Patil
Student,Electronics and Telecommunication Department
Government College of Engineering, Karad
Karad, Maharashtra
siddharthpatil9977@gmail.com

Prof.S.P.Dawane
Project Guide,Electronics and Telecommunication Department
Government College of Engineering, Karad
Karad, Maharashtra
shitaldawane379@gmail.com

***Abstract*—The rise in population and hence increase in waste material has raised the issue of waste management and segregation in the garbage materials thrown at public places. The main reason behind the improper management of these waste materials is the lack of human efforts and the low level of detection system used. Hence, we are designing a system that gets the level of dustbin or garbage collectors in percentage and provides it to the municipal corporation and in an application, available to citizens nearby the locality of the garbage collector. Our system is more convenient and practically accessible to any user. The idea of smart cities is based on the internet of things and it makes human living more reliable and more sustained in every way. As a result, proper management of waste is an essential point and it must be implemented as a priority. Quick and proper management in handling scraps and degradable material can make the recycling process manageable and worthy.This is possible by using an ultrasonic sensor for level detection and NodeMcu for cloud interface. The filtration of air and biological organics present in waste materials can be segregated using a CCS811 sensor.The timeless collection of toxic and biodegradable materials makes the environment cleaner and healthier, also can reduce diseases by maintaining cleanness in the locality.**

Keywords - Smart waste management, Ultrasonic sensor, CCs811 air filter, IOT system, Municipal dustbins, garbage trucks, garbage collectors, NodeMCU, Cloud interface

I. INTRODUCTION

A major problem that is encountered while managing waste across cities is the inefficient pick-up schedule plan of the garbage trucks. It has been observed that garbage trucks go around the town or city with fixed routes that do not take into account the variability of garbage levels. This is a very inefficient and redundant process, no matter how thorough it might be[1].

According to a survey conducted by Ranjith KharvelAnnepu, 130,000 tons of waste is produced per day in urban areas of India which have the potential to produce 1,751 kcal/kg ofenergy[2]. All Modernization and progressive structure have a large share of irregularity in balancing environment structure and one of the main aspects of concern is the increase in pollution which damaging earth resources [2]. Hence the demand for food and materialistic substances has grown day

by day, due to which there is the ultimate increase in waste thrown in municipal garbage collectors. The less human efforts in managing process cannot deal with all toxic materials and unable to segregate waste products in the dump yard. So, we are doing these segregation and management processes at a place of waste throwing and in the collectors. In our system, we are implanting a CCS811 sensor for air filtration and checking the quality of air nearby the garbage collector. The proposed system comprises an Arduino-based microcontroller, a CCS811 sensor for volatile organic compound (VOC) measurement, which ensures the presence of gases like CO_2[3]. And we are also able to get percentile value of level comparing to a capacity of dustbin which can be sent to collection vehicles as well as corporations and societies nearby through web portal and application using cloud interface with NodeMCU. Just by tracking the location anyone can reach out and get to the municipal dustbins using a web and app interface. The enormous growth in renewable energy applications paid the way for enhancing a cost reduction over the decades and defines a change in productivity [4] That's the reason, we are using renewable technology based on solar panels for power supply in the system, which increases the life and efficiency of the system for years keeping it environment friendly.

II. SYSTEM ARCHITECTURE

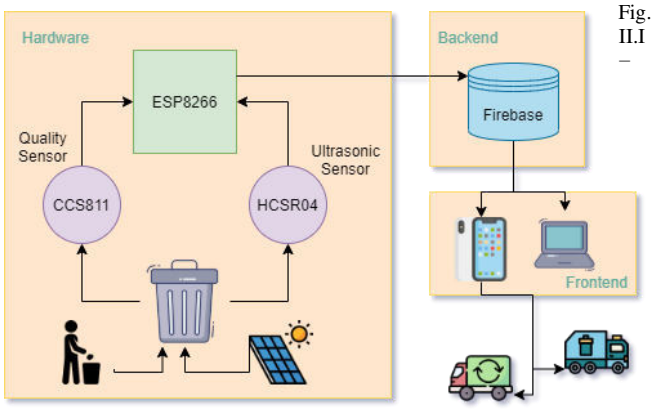


Fig. II.I –

System Architecture Diagram

Asyou can see in the above system Architecturethe main microcontroller gets inputs from the dustbin with the help of two sensors first one is the ultrasonic sensor and the second sensor is CCS811 which detect the values of co2 in parts per million and both the values are given to the esp8266 Nodemcu which will send these values over firebase using inbuilt Wi-Fi-module and internet. then from that firebase, the data is shown on the website for the proctors or if we deploy this system to the small society then the secretary of that society can monitor the garbage level by using this website. the second frontend element is the android app which we will give to the garbage collector person who can see the top garbage collection area on this app with a list of dustbins and their location as well.

III. Flowchart

As we all know that the flowchart is a diagrammatic representation of the algorithm of any system is the flowchart of the project in which you see that how one process initiates the other process and we have set some thresholds to sensors according to those thresholds they send the data to the end-user.

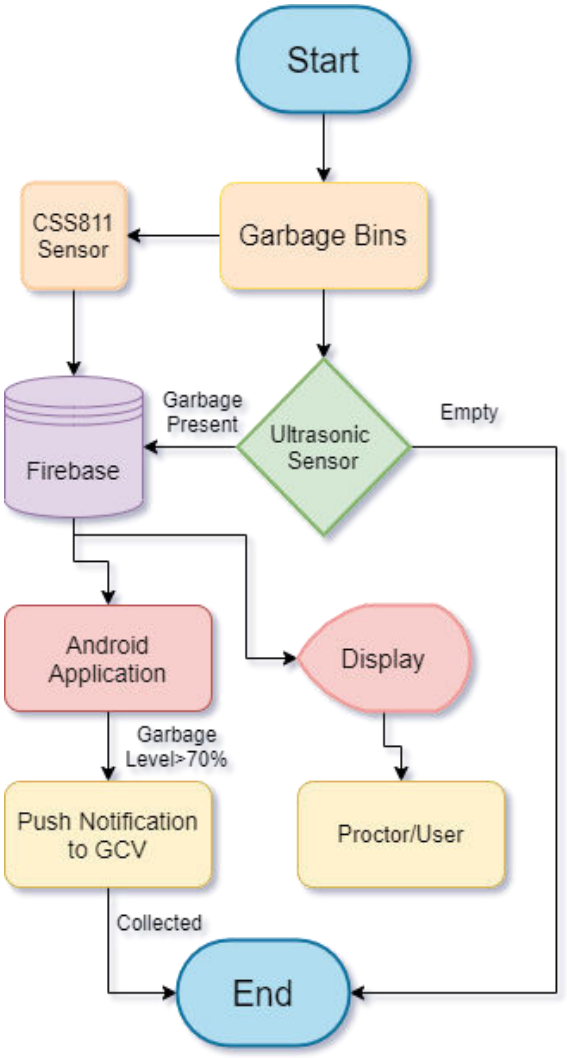


Fig. III.I – Flowchart Diagram

IV. Circuit Diagram

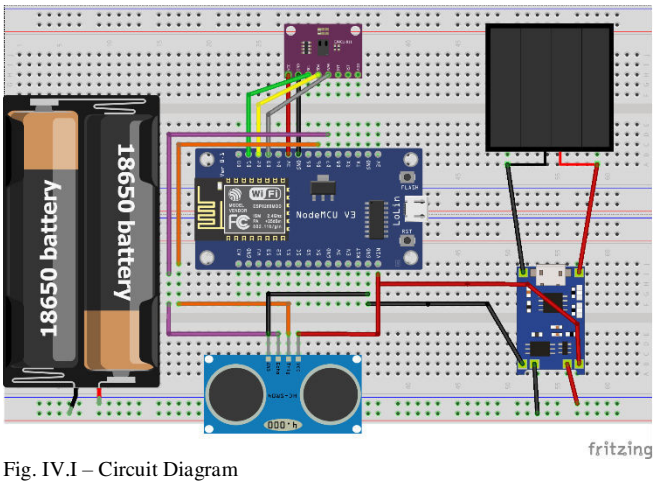


Fig. IV.I – Circuit Diagram

V. Hardware Used

A. *NodeMcu Esp8266 12E -*

NodeMCU is a microcontroller with inbuilt Wi-Fi and Bluetooth. By exploring functionality with the ESP8266 chip, NodeMCU firmware comes with ESP8266 chip having TensilicaXtensa® 32-bit LX106 RISC microprocessor which operates at 80 to 160 MHz adjustable clock frequency and supports RTOS. It has 128 KB RAM and 4MB of Flash memory for program and data storage. The ESP8266 Integrates an 802.11b/g/n HT40 Wi-Fi transceiver, so it can not only connect to a Wi-Fi network and interact with the Internet. As the operating voltage of ESP8266 varies from 3V to 3.6V, the board comes with an LDO voltage regulator to keep the voltage steady at 3.3V. if you have a regulated 5V voltage source, then you can use a VIN pin directly to supply the ESP8266 and its peripherals.

B. *Ultrasonic Sensor:*

The HC-SR04 Ultrasonic Module consists of 4 pins as Ground, VCC, Trig, and Echo. The VCC is connected to 5 volts power supply to work efficiently and the ground pin is connected to the ground of the microcontroller.It emits ultrasound at 0.04 MHz which travels through the air and when an obstacle comes in the path then waves are reflected from that obstacle. Considering the period and therefore the speed of the sound you'll calculate the space.

To trigger the ultrasonic sensor we give a trigger pulse of 10 µs. That will send an 8-cycle sonic burst which can travel at the speed sound and it'll be received within the Echo pin. The Echo pin will give the time in microseconds the acoustic wave traveled.

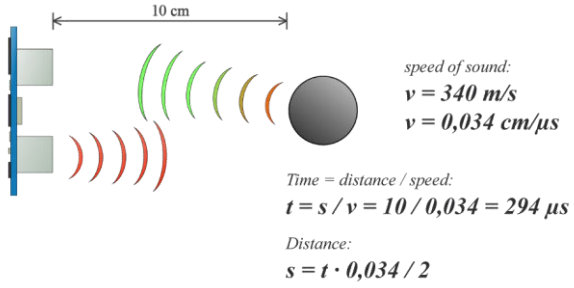


Fig. V.I – Hcsr04 Working Diagram

C. CCS811 Sensor:

CCS811 is a digital sensor with Low Power, which detectsperfect values for eCO2 (equivalent calculated carbon-dioxide) concentration varies from 400 to 8192 parts per million (ppm), and TVOC (Total Volatile Organic Compound) concentration varies from 0 to 1187 parts per billion (ppb). According to the fact sheet, it can detect 10,000 plus Volatile Organic Compounds and it supports wakeup and measure as per our requirement of the project. Volatile organic compounds (VOCs) are compounds that emit in form of gases from certain solids or liquid products used in daily life. These VOCs include chemicals like acetone, butanal, acetic acid, Carbon Disulfide, ethanol, and some alcoholic substances. paint, paint solvents, food preservatives, dry-cleaning agents used in the cloth industry, fuels, automotive products, pesticides, craft material like glues and adhesives, markers, carbonless xerox are some products that are filled with VOCs used in a day-by-day manner. Having VOCs containing products in a daily manner does adverse effects on health like nausea-like feeling, dizziness, emesis, headache, nose and throat discomfort, etc.Here, We are using CCS811, So that The percentage contained VOCs can be measured and can be reduced and easily segregated to minimize their adverse effects, for creating a fortune with a healthy and productive lifecycle.

D. Solar Panel:

Solar panels use direct sunlight as a source of energy and convert that directly to current electricity. Solar Panel is consisting of many tiny photovoltaic cells which form a full solar panel. We have different types of solar panels depend upon they are made from which substance and the power produced by them like 1w,6w,12w, etc. We can choose the solar panel according to our project requirement in this project we required 1w because the calculations are as follows –

1)Solar Panel Provides 1W * 5hr = 5 Watt-Hours

2)Energy available = 5*0.75 = 4.7 Watt-Hours

3)production in mAHr = 1W / 6V * 5hr = 833mAHr

Assumptions:

1)Using a 6volt 1w solar panel

2)Solar Panel is 100%* efficient

3)5 hours of Daylight

4)Using 2600 mAHr battery

* Losses not sunlight energy to electrical energy conversion

For Wi-Fi on for 10 secs then Sleep for 10-mins has 31mAHr Daily Solar Energy Replenishment Needed by NodeMcu 8266.The best part is that the TP4056 will prevent overcharging and using solar panels to charge a battery enables sustainable autonomous operation and it still depends on the weather no sun eventually means no battery capacity. The careful selection of battery and solar cell capacity can ensure continuous operation.Flat-Top in Fig. V. II. Battery Capacity vs Hours GraphDenotesa battery is full and the TP4056 Charging Module stopped charging.We can also reduce the power consumption of the NodeMcu by setting the CPU frequency to its minimum for WIFI On Situation this will Increases Battery life about by 70%.

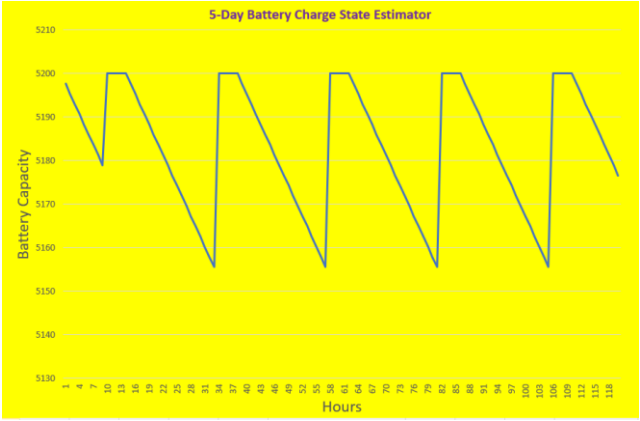


Fig. V.II – Battery Capacity vs Hours Graph

E. TP4056 Charging Module:

TP4056 is a linear charge controller for single-cell lithium-ion batteries, It is completely based on the constant-current/constant-voltage principle. The main characteristics of this module are fewer external components required and its 8-pin SOP packaging makes it more reliable for any outside application. TP4056 works with a USB b-type and wall adapter. The module provides 1 Amp current and the Charging voltage is fixed at 4.2V with 1.5% calibration, The current for output charge can be controlled by using a single resistor in series. The main feature of this module is, It terminates automatically when the charging current drops to 10% of the programmed value after the float voltage at the terminal.

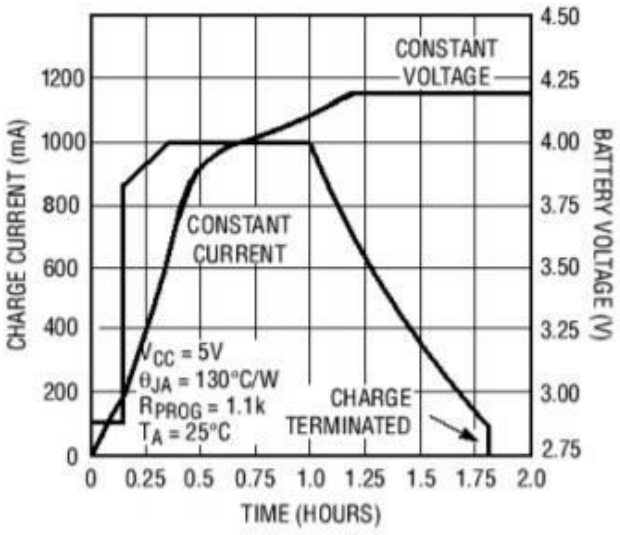


Fig. V.III – CC-CV graph for TP-4056 IC (Source – TP4056 datasheet)

F. Li-ion Battery:

A 18650 lithium-ion is a rechargeable battery used in portable applications. These cells have a voltage range of between 2.5v to 4.2v, and a standard nominal voltage is 3.7 Volts.The average battery charge time for 18650 is about 4 hours, which varies by amperage and charger potential, and type of battery used. The current range for batteries usually varies from 1800mAh to 3500mAh. Here, we are using a 2600mAh current output battery.

G. Battery Case:

A battery case is used for setting and connecting a battery cell in parallel connections with the system.

VI. 3D-Model

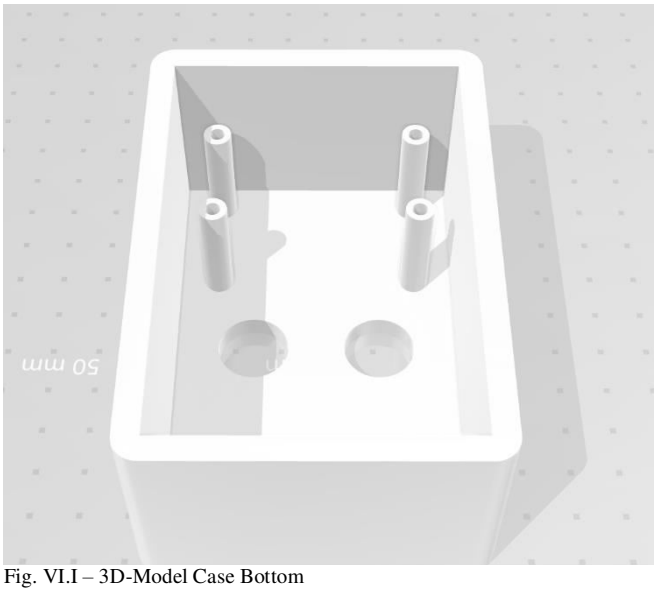


Fig. VI.I – 3D-Model Case Bottom

Fig. VI.II – 3D-Model Case Top

VII. Backend

Firebase is an open-source platform for the developer to store and retrieve data and also it is compatible with various development tools like React, Flutter, Android studio for that reason we have chosen firebase as a backend.

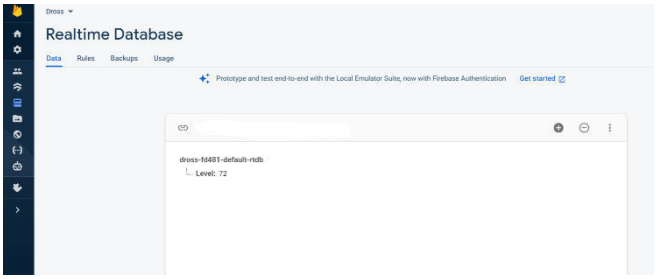


Fig. VII.I – Database Console Screenshot

VIII. Results

A. *React Website :*

As we saw in the system architecture diagram and the flowchart the output can be visible to users through a Well-structured Website constructed from React Framework some screenshots of the site are shown in

B. *Garbage Collection App :*

This application will give all information about dustbins and you can install new dustbins from this and with the hardware and any garbage collecting person can easily understand this app and will make the city clean in less time with effective way.

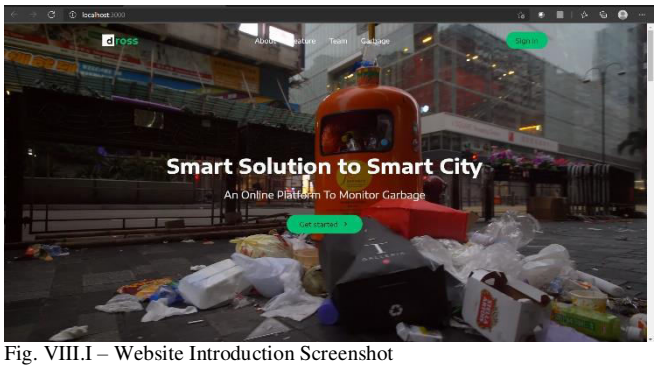


Fig. VIII.I – Website Introduction Screenshot

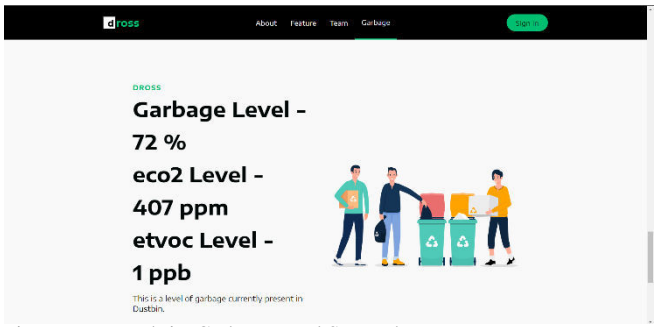


Fig. VIII.II – Website Garbage Level Screenshot

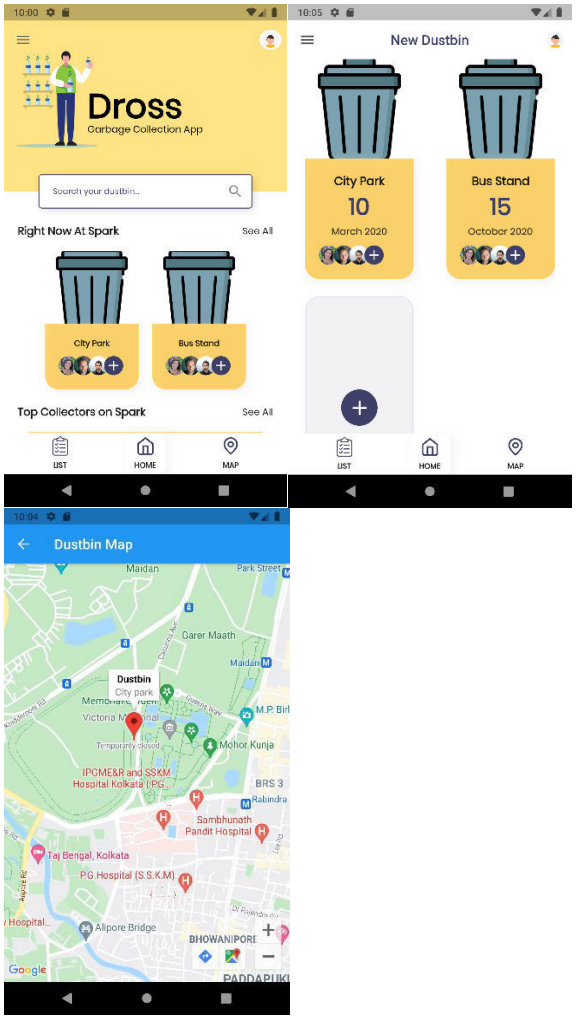


Fig. VIII.III – Mobile Application Screenshot

IX. ADVANTAGES

1)Due to this innovation, there is a discount within the number of waste collections needed by up to 80%, resulting in less manpower, emissions, fuel use.
2)The real-time data provided includes the last pick-up date, the status of all compactors expressed as a percent, the status of these pickups, the container's weight, and any service alerts.
3) By emptying only full trash bins, "trash bins, your organization can streamline its facilities and save.". Reducing your annual mileage could also assist you to renegotiate your insurance policies.
4) With fill level sensors, companies can limit their trucks' routes only to places with full bins, reducing pickups by up to 50%. It's just one of the varied IoT waste management benefits.
5) Current systems require dustcart drivers and collectors to follow routes coordinated according to the calendar, but an IoT-derived system can forecast a pickup schedule according to actual need, an approach that needs fewer employees to require care of the same quality standard of service.

X. APPLICATIONS

1)The next step for "digital bins" lies in automating the classification of waste content, a task at which most people make mistakes. An organization named Bin-e has come up with "Smart Waste Bins" which can identify and sort waste into categories like glass, paper, plastic, and metal.
2) Sanitation departments have started to achieve new value by accessing IoT applications in waste management. as an example, ISB Global is using IoT-powered applications to manage waste more effectively. Using sensors installed on each bin, cloud-based data collection and synthesis, and an interface / smart app, ISB has created a network of connected devices for effective waste management.
3) Optimizing garbage collection routes supported actual disposal unit fill levels as measured by fill-level sensors is one such application that's proving to be quite impactful.

XI. CONCLUSION

Human ways of life have placed pressure on the environment and have caused an imbalance within the ecosystems by the manufacturing, consuming, and wasting of natural resources. Hence, the proper management of waste is a must and it should properly be organized in such a manner that leads to effective and well-structured results. In this scenario, Monitoring the level of bins through the use of sensors, it is possible to understand a more precise system than the currently existing one. Our idea of a "Smart waste management system", mainly concentrates on Monitoring waste management,reducing the toxic gaseous emission from wastes, providing smart technology for waste systems, avoiding human intervention, reducing human time and energy, and which finishes up during a healthy and waste-ridden environment. The given idea is implemented for smart cities where the citizens would be busy enough with their busy schedules and have not much time for managing waste. The bins are often implemented during a city if desired where there would be a bin in the outside area which can have the capacity to accumulate the waste of solid type for one apartment.

XII. ACKNOWLEDGMENT

We sincerely thank Prof. Shital Pradeep Dawane madam without her help and guidance this project would not be in its present form. The keen interest taken by the guide in our project helped us to solve difficulties.

We are thankful to our respected head of the Department of Electronics and Telecommunication Engineering of Government college of Engineering, Karad Dr.A.M. Sapkal sir who provided us with the opportunity to work on this project and helped us a lot by providing valuable suggestions.

XIII. REFERENCES

[1] A. Medehal, A. Annaluru, S. Bandyopadhyay and T. S. Chandar, "Automated Smart Garbage Monitoring System with Optimal Route Generation for Collection," 2020 IEEE International Smart Cities Conference (ISC2), 2020, pp. 1-7, doi: 10.1109/ISC251055.2020.9239002.

[2] S. Thakker and R. Narayanamoorthi, "Smart and wireless waste management," 2015 International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS), 2015, pp. 1-4, doi: 10.1109/ICIIECS.2015.7193141.

[3] A. Géczy, L. Kuglics, L. Jakab and G. Harsányi, "Wearable Smart Prototype for Personal Air Quality Monitoring," 2020 IEEE 26th International Symposium for Design and Technology in Electronic Packaging (SIITME), 2020, pp. 84-88, doi: 10.1109/SIITME50350.2020.9292309.

[4] D. Saravanan and T. Lingeshwaran, "Monitoring Of Solar Panel Based On IOT," 2019 IEEE International Conference on System, Computation, Automation, and Networking (ICSCAN), 2019, pp. 1-5, doi: 10.1109/ICSCAN.2019.8878814.

Conversion of single phase to three phase AC using PWM technique

Amit YashwantDalvi
Department of Electrical Engineering
Atharva College of Engineering Mumbai,
India amitdalvi1999@gmail.com

Amir Jafar Ali Khan
Department of Electrical Engineering
Atharva collage of engineering Mumbai,
India smartyamirkhan786@gmail.com

Shivang Suresh Pendurkar*Department of Electrical Engineering Atharva College of Engineering* mumbai, india
shivangpendurkar@gmail.com

TriparnaPrabhakar Roy
Department of Electrical Engineering
Atharva College of Engineering Mumbai,
India roytriparna825@gmail.com

***Abstract*— In rural areas, the power distribution is typically a single phase type. The cost to change from single phase to a three phase power system is often high due to high cost associated with three phase extension. Also, the use of three-phase induction machines is preferred instead of single-phase induction machines of same voltage class and rating, due to its advantages such as low cost, lower volume, redundancy etc. In this paper, A topology forpower conversion from single-phase to three-phase power line is presented. The single phase to three phase converter must create a balanced three phasepower system, which means three phase power system along with three voltages of the same amplitudeand phase angles of 120 degree between voltage phases and three currents of the same amplitude andphase angles of 120 degree between current phases.**

As opposed to the conventional systems this particular topology utilizes a rectifier, DC to DC Boost Regulator, inverter and many other components. This scheme produces a well balanced operation.

***Keywords*- Rectifier, Boost converter, Three phase converters, Sinusoidal pulse width modulation and Total harmonics distortion.**

I. INTRODUCTION

In some remote areas, it is quite normal to only have a single-phase power supply even though three-phase distribution systems are very common. This is particularly the case in rural areas. Appliances such as Air conditioners and motors above a certain power level, require three-phase supplies. Applications, especially irrigation water pumping and small three-phase induction motors in rural or isolated areas, where the presence of a three-phase power supply greatly reduces equipment cost [1]. Customers in these areas may request three-phase power from the utility and find that the additional cost of three-phase distribution at this level is not reasonable for relatively small power need. Hence, a device that converts a single-phase supply to balanced three-phase voltages is oftenneeded.

Most of the electric power is consumed by motorloads, mainly induction motors [1]. These motors are used in fans, blowers, pumps, compressors as well as motor driven equipment. Above 0.5 kW three-phase induction motors are preferable as they are highly efficient, have smooth torque and good starting torque. A three-phase motor is also less expensive than a single-phase motor of the same voltage and rating [2].

The single-phase to three-phase converter must createa balanced three-phase power system, which means three voltages of the same amplitude and phase angle so f120 degree between voltage phases, and three current so the same amplitude and phase angles of 120 degree between current phases. Otherwise, three-phase motor will not self-start, may run backwards, will suffer from excess heating, and must be operated well below its rated load[4].The selection of a converter for a specific application involves not only an understanding the needs of the load but the economics and environmental limitations as well.

Present study proposes at opology for power conversion from single to three-phase power line. The circuitis

built in three parts rectifier, boost converter and inverter.
The scheme produces well-balanced three-phase network, simple in operation and cheap. The circuit topology and the initial analysis are presented. Simulation and experimental results support the proposed technique.

II. MATLAB SIMULATION

From this perspective, MATLAB/SIMULINK model simulations were carried out. Major four topologies are discussed in this paper.

A. RECTIFIER CIRCUIT

The construction of a bridge rectifier is shown in the figure below.The bridge rectifier circuits made off our diodes D1, D2, D3, D4, and a capacitor C1. The four diodes are connected in a closed-loop configuration to efficiently convert the alternating current (AC) into Direct Current (DC)[2].
The input signal of 220V AC is applied across the diodes terminals and the output DC signal is obtained acrossthecapacitorC1.Thefourdiodesarearrangedin such a way that only two diodes conduct electricity duringeachhalfcycle.D1andD2arepairsthatconduct electriccurrentduringthepositivehalfcycle.Likewise, diodes D3 and D4 conduct electric current during a negative halfcycle.

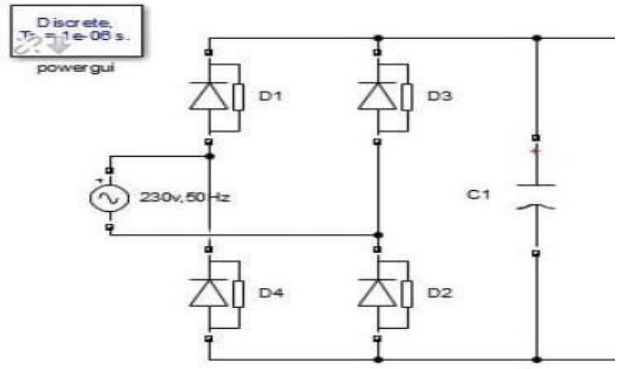


Fig 1. Rectifier MATLAB model

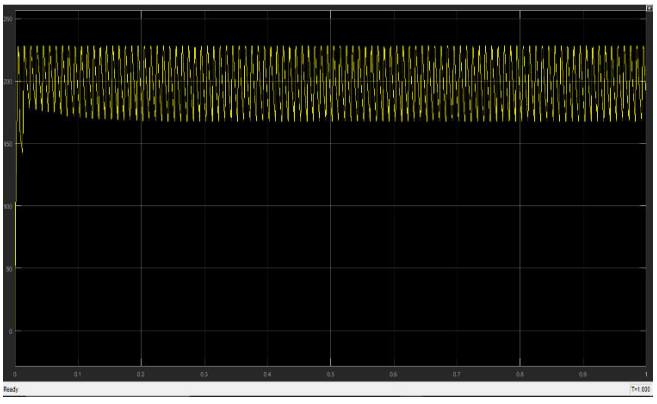


Fig 2. Simulation result of rectifier circuit

This is how both positive half cycle and negative half cycle completes one complete cycle of input. Thus, a bridge rectifier allows electric current during both positive and negative half cycles of the input AC signal. The output comes is pulsating 220V DC which is then smooth out by using a capacitor across the rectifier.
Capacitor is used to get constant DC signal ideally but in practical less fluctuating DC rather than pulsating DC [3].

B. BOOST CONVERTER

A boost converter is one of the simplest types of switch mode converter. As the name suggests, it takes an
input voltage then boost or increases it.All it consists of an inductor, a semiconductor switch MOSFET, a diode and a capacitor [2].

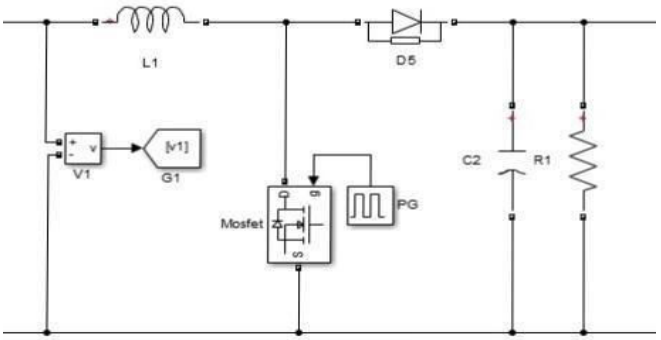


Fig 3. Boost converter MATLAB model

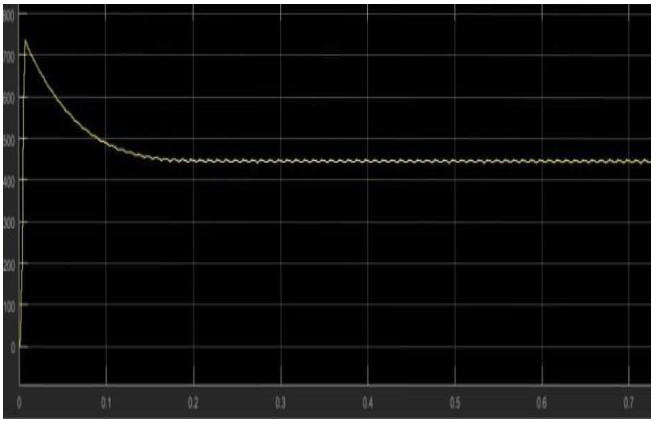


Fig 4. Simulation result of boost converter

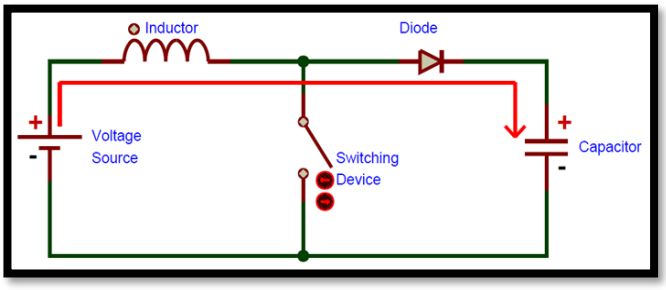


Fig 5. Boost converter with switch off

At first the input DC voltage is applied across the circuit, The output capacitor is charged to the input voltage minus one diode drop

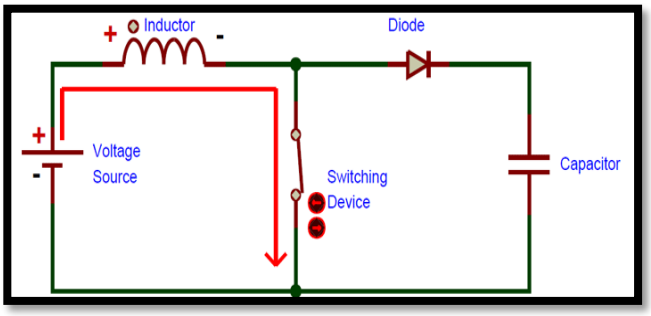


Fig 6. Boost converter with switchon

Now, when the switch is made on. The signal source goes high, turning on the MOSFET. All the current is diverted through to the MOSFET through the inductor. Note that the output capacitor stays charged since it can't discharge through the back-biased diode.

The power source isn't immediately short circuited, of course, since the inductor makes the current ramp up relatively slowly. Also, a magnetic field builds up around the inductor. Note the polarity of the voltage applied across the inductor.

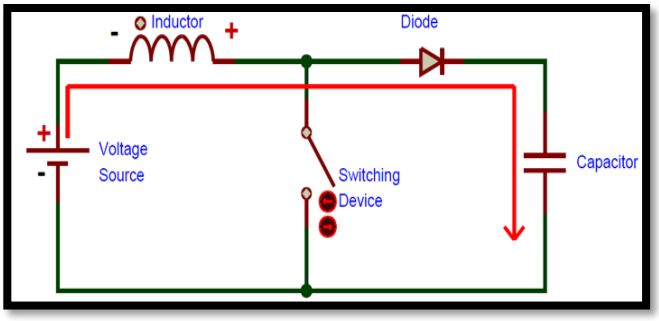


Fig 7. Boost converter with switch turn off

Now, The MOSFET is turned off and the current to the inductor is stopped abruptly.

Inductor generates a large voltage with the opposite polarity of the voltage originally supplied to it using the energy stored in the magnetic field. The inductor now acts like a voltage source in series with the supply voltage. This means that the anode of the diode is now at a higher voltage than the cathode remembers the capacitor was already charged to supply voltage in the beginning and is forwardbiased.

The output capacitor is now charged toa higher voltage than before, which means that the input 220V DC is successfully stepped up a to a 440VDC.

C.THREE PHASE INVERTER

Three phase bridge inverter are used for high power applications. Here MOSFET Bridge has been chosen. The main function of the three phase bridge inverter is to invert the DC voltage to AC voltage; hence this is achieved by applying the correct switching sequence. A three phase inverter is formed by three single phase inverters which are connected in parallel; the gate signals of single phase inverters should be delayed by 120° with respect to each other to obtain three phase balanced voltages. Here the MOSFETS"s are controlled by gate drive, each gate drive will control one MOSFET.Hence for six MOSFET"s six gate drives areneeded for the operation.

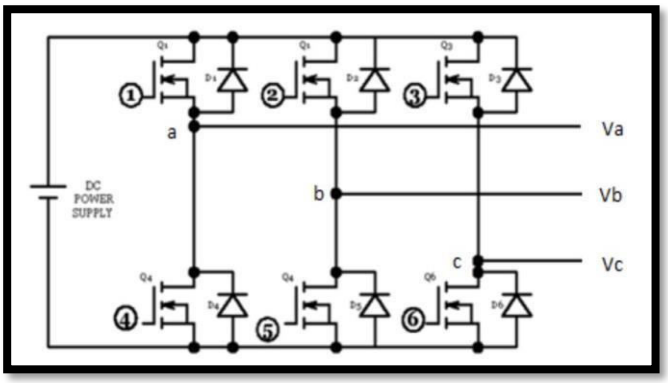


Fig 8. General three phase inverter circuit

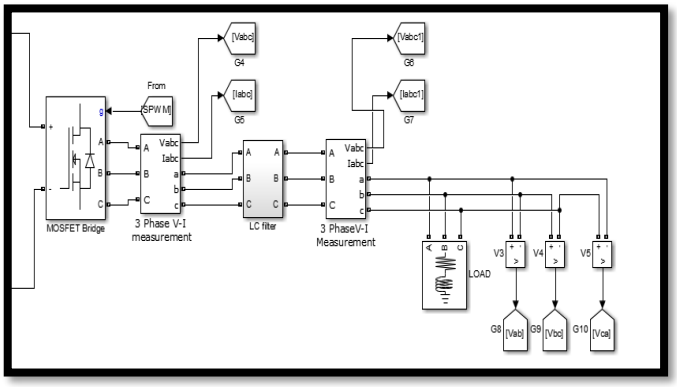
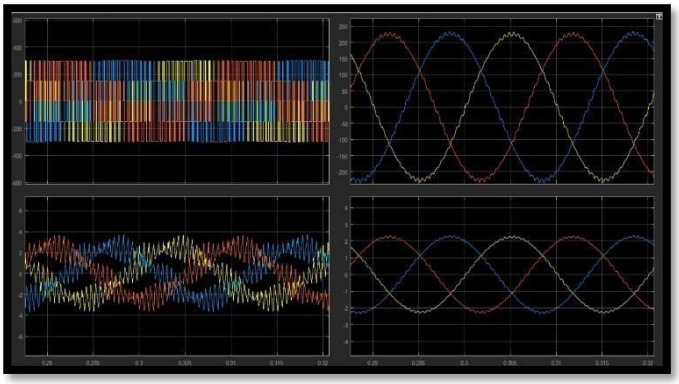


Fig 9. Three phase inverter MATLAB model



ff

A three-phase inverter working principle is, it includes three inverter switches with single phase where each switch can be connected to load terminal. For the basic control system, the three switches operation can be synchronized so that single switch works at every 60 degrees of basic output waveform to create a line-to-line output waveform including six steps[3].This waveform includes a zero voltage stage among the two sections like positive & negative of the square wave .Once PWM techniques based on the carrier are applied to these waveforms, then the basic shape of the waveform can be taken so that the third harmonic including its multiples will becancelled.

No.	S1	S2	S3	S4	S5	S6	Vab	Vbc	Vac
1	1	1	0	0	0	1	Vs	0	-Vs
2	1	1	1	0	0	0	0	Vs	-Vs
3	0	1	1	1	0	0	-Vs	Vs	0
4	0	0	1	1	1	0	-Vs	0	Vs
5	0	0	0	1	1	1	0	-Vs	Vs
6	1	0	0	0	1	1	Vs	-Vs	0
7	1	0	1	0	1	0	0	0	0
8	0	1	0	1	0	1	0	0	0

Table 1. Switching state for three phase inverter

D. SINUSOIDAL PULSE WIDTH MODULATION

In sinusoidal pulse width modulation procedure there are different quantities of output pulses per half cycle and the pulses have varying width. The width of every pulse is differing in extent to the amplitude of a sine wave assessed at the focal point of the same pulse. For producing the gate signals a sinusoidal reference wave is contrasted with a high frequency triangular signal.

In SPWM technique three sine waves and a high frequency triangular carrier wave are used to generate PWM signal. Generally, three sinusoidal waves are used for three phase inverter. The sinusoidal waves are called reference signal and they have 120° phase difference with each other. The frequency of these sinusoidal waves is chosen based on the required inverter output frequency (50 Hz) [8].

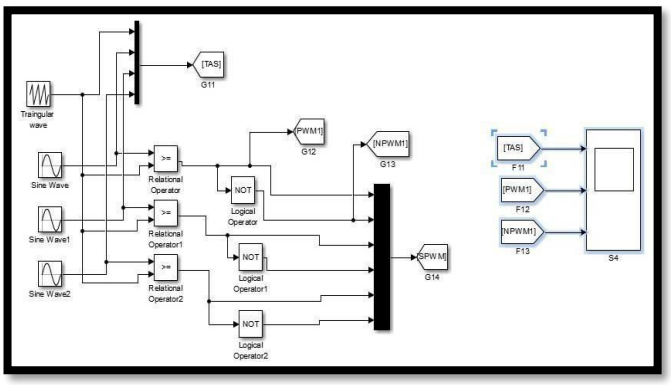


Fig 11. SPWM MATLAB model

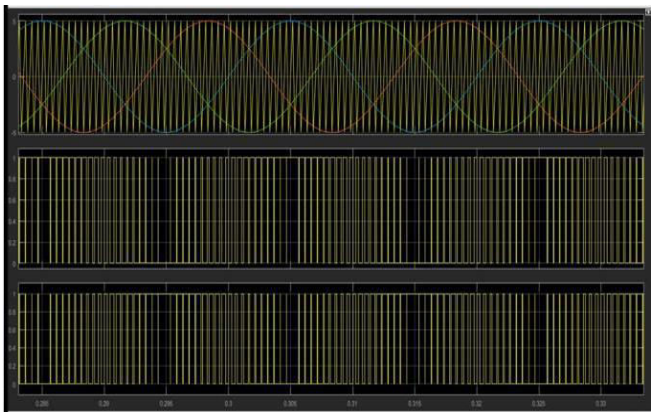


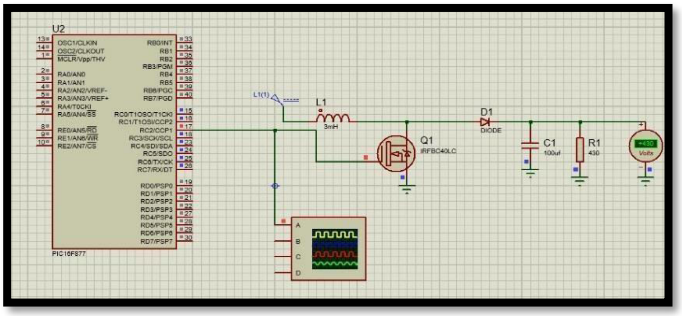
Fig 12. Simulation result of SPWM signal

The carrier triangular wave is usually a high frequency (6KHz) wave. The switching signal is generated by comparing the sinusoidal waves with the triangular wave [8]. The comparator gives out a pulse when sine voltage is greater than the triangular voltage and this pulse is used to trigger the respective inverter switches.

III. PRACTICAL CIRCUITS

A. MOSFET triggering circuit for boost converter

To trigger the MOSFET we have to generate the pulse of 6000 KHz frequency with 47 duty cycle. This is achieved by the use of pic microcontrollers (PIC16F877) this microcontrollers IC is used to generate the pulses required for triggering the MOSFET used. We have used pic microcontrollers as they are



accurate and easy to use as we just have to upload the programming for the frequency and duty cycle. The output of generated pulse is shown in figure 14.

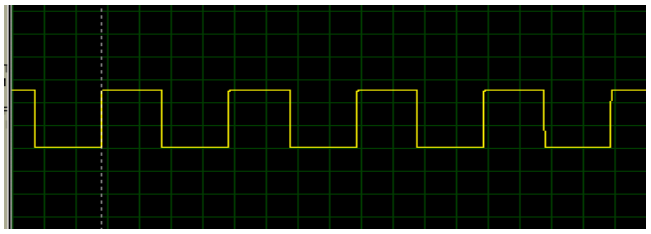


Fig14. Result of generated pulse

B. Sine wave generation circuit for SPWM signal

The most important component of the analog control circuit for inverter is sine wave oscillator. It is possible to generate the sine wave using Wien Bridge Oscillator. The output frequency of the oscillator is 50Hz. Wien Bridge sine wave Oscillator and its sine wave (50 Hz) output is shown in figure 16. A single phase shifter is used at the output of Wien Bridge Oscillator to create - 120° phase difference and another phase shifters to create-240°phasedifference[8].A phase shifter circuit (-120°) and (-240°) output waveform with respect to first sine wave is shown in figure15.

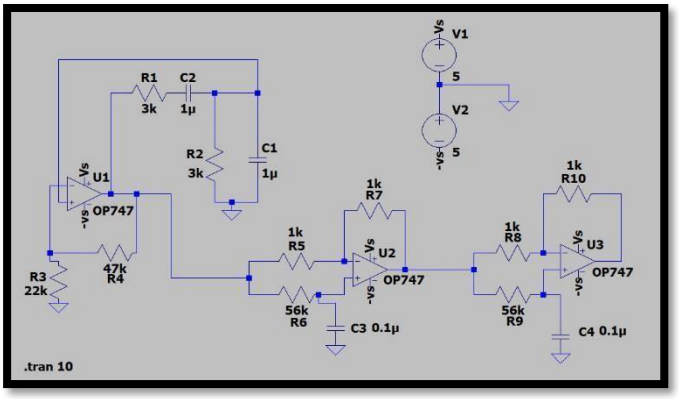


Fig 15. Wien bridge oscillator model

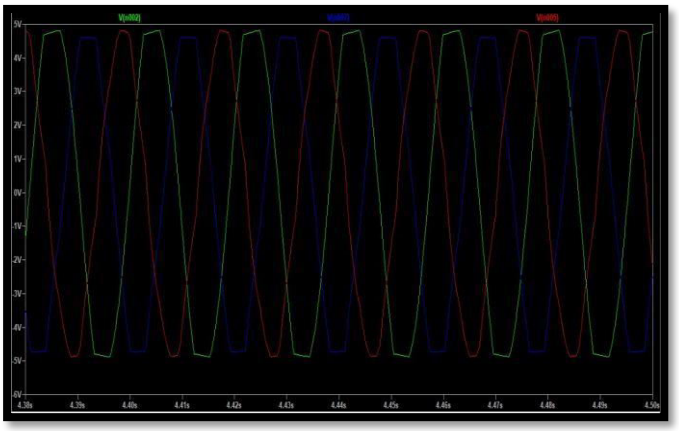
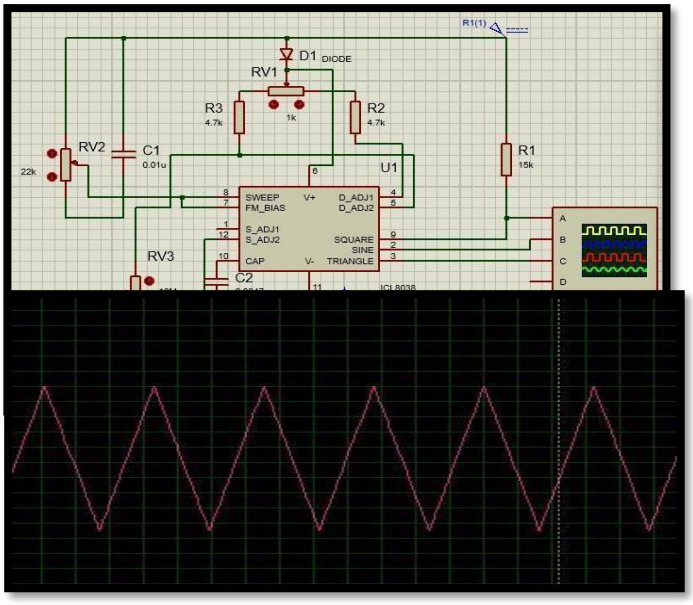


Fig 16. Three sinewave of 120° apart from each other

C. Triangular wave generation circuit for SPWM signal

To generate the high frequency triangular carrier signal the mini function Generator IC8038 is used. It can generate signals in a frequency range of 1.5KHz to 10KHz. In this design we require a triangular wave of 6KHz frequency. The amplitude of carrier triangular wave is controlled by the amplitude of Vin and the frequency is controlled by the 22K ohm potentiometer [7]. The circuit and output waveform is shown in figure 17 and 18 respectively.



D. Power supply circuit

In various parts of the circuit, 5V DC input is required for wien bridge oscillator and for pic microcontroller IC and 15V DC is required for triangular wave generator circuit.

The figure 19 shows the constant voltage generator circuit. The input 220V AC is step down to 12V AC then it is being rectify to 12V DC the voltage regulator IC is used to regulate the output voltage to constant 5V DC and we have used resistor combination for generating another constant 15V DC [7].

ff

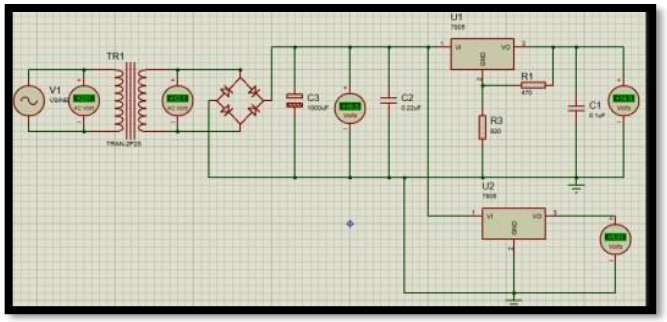


Fig 19. Power supply circuit

IV. CONCLUSION

A single phase to three phase drive system composed of single phase rectifiers, boost converter and three phase inverter was included. The proposed system permits to reduce the rectifier switch currents, theTHD of the grid current with same switching frequency and increases fault tolerance characteristics. Thus the losses of the system may belower.

A single phase to three phase conversion is systematically done in matlab simulation.

The waveform obtained from simulation is balanced and stable with required parameters.

Initially, the harmonics obtained in this system is high but later , the harmonics achieved is low. The result obtained from firing circuit of MOSFET is of desired parameters.

V. FUTURESCOPE

The advancement in this system will be done by including a closed loop controlling system so that the output could be obtained as per the load requirements. The Initial transient that occurs in the output wave form can be reduce with the help of transient suppression devices. The other PWM method can be used to get the better output voltage.

VI . REFERENCES

[1] P. Enjeti and A. Rahman, " A new single phase to three phase converter with active input current shapping for low cost AC motor drives" IEEE Trans . Ind.Appl., vol.29, no .2 pp. 806-813,jul/ Aug.1993.

[4] D.C Lee and Y.S Kim "Control of single-phase-to-three phase AC/DC/AC PWM converters for induction motor drives" IEEE Trans. Ind .Electron, vol,54, no.2,pp,pp.797-804, Apr.2007.

[3] E. Cipriano dos Santos, N. Rocha, and C. B. Jacobina, "Suitable single-phase to three-phase AC- DC-AC power conversion system," IEEE Trans. On Power Electron., vol. 30, no. 2, Feb. 2015, pp.860-870.

B.K. Lee, B. Fahimi, & M. Elhassan "Overview of reduced parts converter topologies for AC motor drives" IEEE PESC, 2001, pp 2019-2024.

[5] C. B. Jacobina , M.B. de R. Correa , A.M.N. Lima and E.R.C da Silva, " AC motor drive system with a reduced switch count converter " IEEE Trans .Ind. Appl., vol.39,no.5, pp. 1333-1342 , Sep /oct.2003.

[6] M D Singh and K B Khanchandani, Power Electronics, Tata McGraw –Hill Edition,1998.

[7] Muhammad H Rashid , Power Electronics Circuits, Devices and application ,Prentice Hall of India Private Limted, New Delhi,2004.

[8] Nazmul Islam Raju, Md. Shahinur Islam, Ahmed Ahsan Uddin,"Sinusoidalpwm signal generation technique for three phase voltage source inverter with analog circuit & simulation of pwm inverter for standalone load&micro-grid system" INTERNATIONAL JOURNAL of RENEWABLE ENERGY RESEARCH Nazmul Islam Raju et al., Vol.3, No.3.

[9] E. Iurie, B. Vladimir and I. Sergiu, "Single Phase to Three Phase Converter," 2019 International Conference on Electromechanical and Energy Systems (SIELMEN), 2019, pp. 1-6, doi: 10.1109/SIELMEN.2019.8905897.

Smart Charging for Electric Vehicle using Pantograph

Darshan Kolhe[1], Sanket Shinde[2], Rahul Tajane[3], Somnath Khemnar[4]

[1, 2, 3, 4]Department of Electronics and Telecommunication Engineering,

Amrutvahini College of Engineering, Sangamner, Maharashtra, India.

[1]darshankolhe0405@gmail.com

[2]sanketshinde0099@gmail.com

[3]rahultajane609@gmail.com

[4]somnathkhemnar1998@gmail.com

ABSTRACT:

The remarkable development of worldwide urban communities along with expanded population and an elevated concern in regards to environmental change and energy independence have expanded interest in electric vehicles (EVs) as one intends to address these difficulties. With numerous advantages, electric vehicle technology has experienced various difficulties like battery charging, expanding electric charges, and accessibility of charging stations, and battery life assessment. The smart charging system for EVs is proposed in this paper. Vehicle detection at the charging station is detected employing an ultrasonic sensor. The charging system after sensing the vehicle battery voltage is described in the later section. The proposed system provides a highly efficient, cheaper, and environment-friendly solution for charging EVs.

Keywords: Pantograph, Electric vehicle, charging.

1. INTRODUCTION

Electric Vehicles (EVs) have acquired the user's consideration because of their smart, economical, and eco-friendly services [1]. Because of the exceptional marvel of consistent development in city populaces, it is currently essential that metropolitan territories give sustainable solutions [2]. The transportation business alone is one of the significant supporters of this ecological instability, representing about a quarter of greenhouse gases emission around the world [3]. After a very long time wherein the customary internal combustion engine (ICE) has been the prevailing automotive solution, indications of a shift toward completely electric alternatives are getting obvious and there is motivation to accept that for the time being, there will be a time of development and an ascent of the EV industry [4]. Decreasing the emission of harmful substances (both CO2 and NOx) is one of the key reasons, yet different additional factors like economic benefits, more noteworthy energy autonomy, and a shift towards a less oil-concentrated vehicle area play a role in the overall development of EVs sector [5]. Customer interest, industry innovation advancements, as well as government initiatives and guidelines are the three primary forces that drive the reception of EV technology [6]. As these forces acquire strength, the EV portion of the overall industry will extend. By 2030, EVs are expected to represent up to 60% of new vehicle deals. If shoppers buy EVs at the normal rates throughout the following five to ten years, an absence of charging stations could turn into a hurdle to EV adoption [7]. A developing EV charging station foundation appears to be inescapable to accomplish the future difficulties of versatility. The vehicle and battery industries have gained significant technological growth with different solutions to overcome significant obstacles for mass-market sales, such as an upgraded charging framework organization [8].

In any case, the deployment of EVs is still at a beginning phase and there is a long way to go [9]. The establishment and business exploitation at the necessary scale of a public charging framework, or a public

charging station (CS) organization, is a critical component to work with mass EV adoption since it improves accessibility and availability, diminishes range anxiety, and empowers the utilization of EVs for significant distance travel [10]. It addresses an expense that is excessively high for governments and public organizations to bear alone. Therefore, making a public charging station plan of action is a difficult issue that requires further exploration. With consideration of all aspects, there is a need to develop smart charging stations worldwide to enhance the applicability of EVs.

2. RELATED WORK

Many researchers have worked upon the development of EV charging technology. Dharmakeerthi et al. developed a static load model for EV dc fast chargers and the impact of EV load on the power system voltage stability is analyzed [11]. Amini et al. proposed the ARIMA-based EV charging demand forecasting method using optimal values for the autoregressive and integration order parameters [12]. The impact of an EV charging station on the power grid was systematically analyzed by Deb et al. [13]. Sachan et al. assessed the impact of EV charging on the distribution grid and developed stochastic charging of EVs in smart power distribution grids [14]. Mozafar et al. implemented a Genetic Algorithm-Particle Swarm Optimization-based novel technique for optimal allocation of renewable energy sources and EV charging stations in smart grids [15]. A new fuzzy-logic control-based technique for smart charging of EVs was implemented by researchers and reduced the impact of EVs charging on the distribution network [16]. Zhao et al. developed an innovative charging method for EVs using distributed neurodynamic algorithm and achieved higher efficiency [17].

3. PROPOSED SYSTEM

The proposed system for the Smart Charging of an electric vehicle using pantograph is shown in figure 1. In the vehicle unit, the input alternating current (AC) voltage 230V is step down to the required variable alternating current (VAC) using a step-down transformer. This step-down AC voltage is then converted to direct current (DC) voltage using a rectifier circuit to provide the direct current (DC) voltage for the car. DC motor is used for the forward and reversed direction motion of the car. PIC18F4520 microcontroller programmed with C language is used to control all the activities. The ultrasonic sensor is used to detect the obstacle. The LCD display is used to display battery charging and voltage level. In the charging station unit, a power supply block is used to power the PIC microcontroller. A relay driver circuit is used to move the Pantograph. The presence of the vehicle on the charging location is detected using the ultrasonic sensor.

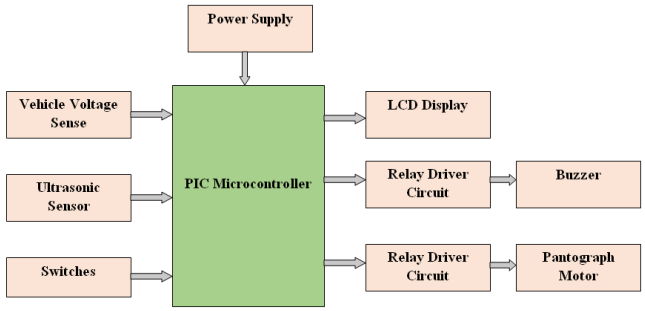


Fig.1. Charging Station

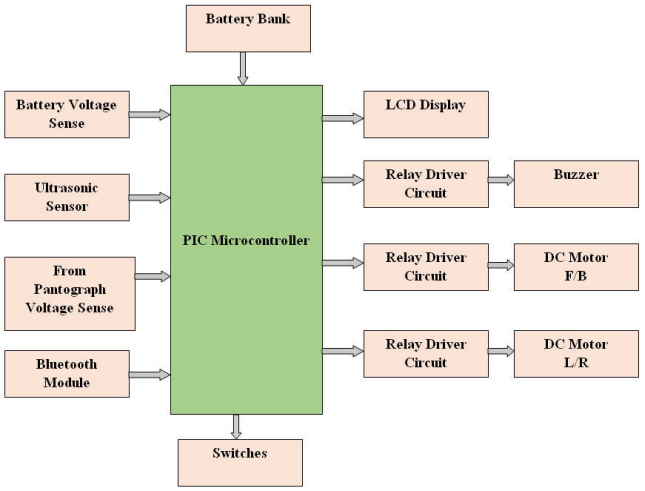


Fig.2. Vehicle Unit

A pantograph is a device that collects electric current from overhead for electric trains or trucks. This system could be a solution that allows the electronic buses to charge quickly at stops. Almost in all pantograph-based project pantograph is placed at the top, but in this proposed design pantograph is placed at the bottom/ ground level and a motor is being used to pop up and pop down the pantograph. IR sensors are provided for safety purposes. This type of charging has less power loss and high efficiency. The system works as per the flow shown in figure 3. The vehicle as depicted in figure 2 consists of a Bluetooth module for communication purposes and two motors for motion purposes. The vehicle battery is charged when the voltage drops below the threshold level.

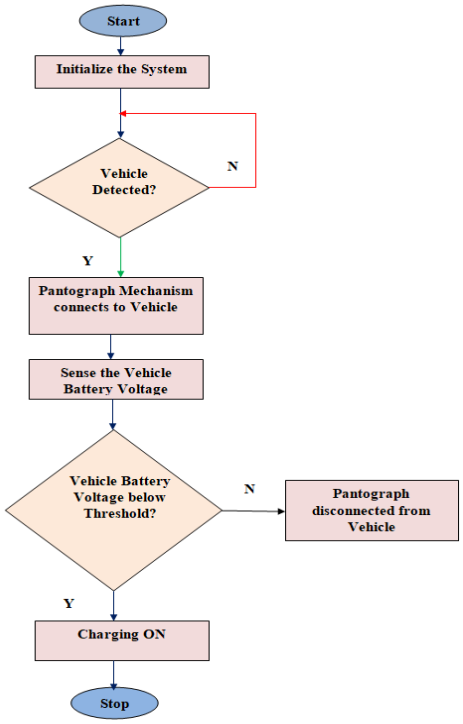


Fig.3. Flowchart of Charging Unit

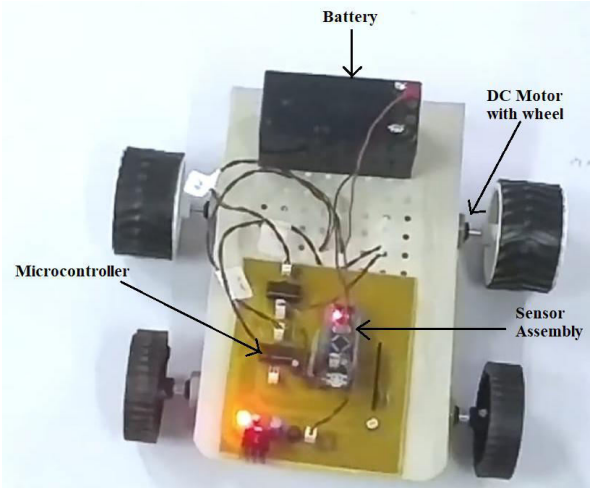


Fig.4. Prototype of Vehicle Unit

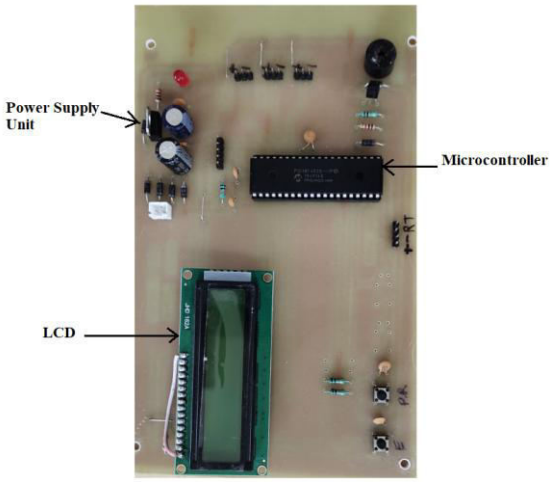


Fig.5. Prototype of Charging Unit

4. RESULTS AND DISCUSSION

The vehicle prototype was developed as shown in figure 4. The system was tested at different voltage levels of battery. The vehicle battery was charged successfully when the battery voltage was noted below threshold level. The voltage level was displayed on LCD available at charging unit as shown in figure 5.

5. CONCLUSION

With the advancement of EV technology, charging infrastructure, and grid integration facilities, EV popularity is expected to increase significantly in the next decade. In this context, the proposed system increases the charging efficiency using Pantograph technology. The system with improved facility also works better from environmental perspective because the system avoids the emission of harmful gases. The automation in the system also facilitates more accurate technology and with less manpower requirement. Thus the proposed system is the economical and environment-friendly solution for charging EVs.

REFERENCE

1. Qureshi, K.N., Alhudhaif, A., Jeon, G.: Electric-vehicle energy management and charging scheduling system in sustainable cities and society. Sustain. Cities Soc. 102990 (2021). https://doi.org/10.1016/j.scs.2021.102990

2. Pardo-Bosch, F., Pujadas, P., Morton, C., Cervera, C.: Sustainable deployment of an electric vehicle public charging infrastructure network from a city business model perspective. Sustain. Cities Soc. 71, 102957 (2021). https://doi.org/10.1016/j.scs.2021.102957

3. Napoli, G., Polimeni, A., Micari, S., Andaloro, L., Antonucci, V.: Optimal allocation of electric vehicle charging stations in a highway network: Part 1. Methodology and test application. J. Energy Storage. 27, 101102 (2020). https://doi.org/10.1016/j.est.2019.101102

4. Adnan, N., Md Nordin, S., Bin Bahruddin, M.A.: Sustainable interdependent networks from smart autonomous vehicle to intelligent transportation networks. In: Studies in Systems, Decision and Control. pp. 121–134. Springer International Publishing (2019)

5. Vaidya, B., Mouftah, H.T.: Smart electric vehicle charging management for smart cities. IET Smart Cities. 2, 4–13 (2020). https://doi.org/10.1049/iet-smc.2019.0076

6. Biresselioglu, M.E., Demirbag Kaplan, M., Yilmaz, B.K.: Electric mobility in Europe: A comprehensive review of motivators and barriers in decision making processes. Transp. Res. Part A Policy Pract. 109, 1–13 (2018). https://doi.org/10.1016/j.tra.2018.01.017

7. Engel, H., Hensley, R., Knupfer, S., Sahdev, S.: (No Title). (2018)

8. Anjos, M.F., Gendron, B., Joyce-Moniz, M.: Increasing electric vehicle adoption through the optimal deployment of fast-charging stations for local and long-distance travel. Eur. J. Oper. Res. 285, 263–278 (2020). https://doi.org/10.1016/j.ejor.2020.01.055

9. Zhang, L., Zhao, Z., Kan, Z.: Private-sector partner selection for public-private partnership projects of electric vehicle charging infrastructure. Energy Sci. Eng. 7, 1469–1484 (2019). https://doi.org/10.1002/ese3.367

10. Palomino, A., Parvania, M.: Advanced charging infrastructure for enabling electrified transportation. Electr. J. 32, 21–26 (2019). https://doi.org/10.1016/j.tej.2019.03.003

11. Dharmakeerthi, C.H., Mithulananthan, N., Saha, T.K.: Impact of electric vehicle fast charging on power system voltage stability. Int. J. Electr. Power Energy Syst. 57, 241–249 (2014). https://doi.org/10.1016/j.ijepes.2013.12.005

12. Amini, M.H., Kargarian, A., Karabasoglu, O.: ARIMA-based decoupled time series forecasting of electric vehicle charging demand for stochastic power system operation. Electr. Power Syst. Res. 140, 378–390 (2016). https://doi.org/10.1016/j.epsr.2016.06.003

13. Deb, S., Kalita, K., Mahanta, P.: Review of impact of electric vehicle charging station on the power grid. In: Proceedings of 2017 IEEE International Conference on Technological Advancements in Power and Energy: Exploring Energy Solutions for an Intelligent Power Grid, TAP Energy 2017. pp. 1–6. Institute of Electrical and Electronics Engineers Inc. (2018)

14. Sachan, S., Adnan, N.: Stochastic charging of electric vehicles in smart power distribution grids. Sustain. Cities Soc. 40, 91–100 (2018). https://doi.org/10.1016/j.scs.2018.03.031

15. Mozafar, M.R., Moradi, M.H., Amini, M.H.: A simultaneous approach for optimal allocation of renewable energy sources and electric vehicle charging stations in smart grids based on improved GA-PSO algorithm. Sustain. Cities Soc. 32, 627–637 (2017). https://doi.org/10.1016/j.scs.2017.05.007

16. Nour, M., Said, S.M., Ali, A., Farkas, C.: Smart Charging of Electric Vehicles According to Electricity Price. In: Proceedings of 2019 International Conference on Innovative Trends in Computer Engineering, ITCE 2019. pp. 432–437. Institute of Electrical and Electronics Engineers Inc. (2019)

17. Zhao, Y., He, X., Yao, Y., Huang, J.: Plug-in electric vehicle charging management via a distributed neurodynamic algorithm. Appl. Soft Comput. J. 80, 557–566 (2019). https://doi.org/10.1016/j.asoc.2019.01.053

An Embedded Controller for power quality improvement of an inverter with electrical grid

Miss. Supriya Sunil Kadam,
Research Scholar, Department of Electronics Engineering, Shivaji University, Kolhapur; 416004, Maharashtra,
India
supriya.ssk01@gmail.com

Dr.Yuvraj Krishnarao Kanse
Associate Professor (Electronics), Department of Electronics Engineering; Karmaveer Bhaurao Patil College of Engineering, Satara, Dist-SATARA; 415001, Maharashtra,
India.
yuvraj.kanase@kbpcoes.edu.in

Dr. Suhas S. Patil
Associate Professor (Electronics), Department of Electronics Engineering; Karmaveer Bhaurao Patil College of Engineering, Satara, Dist-SATARA; 415001, Maharashtra,
India
suhas.patil@kbpcoes.edu.in

***Abstract*—Nowadays, Power Quality is the biggest issue in the microgrid system. In order to mitigate peak loads and improve power quality and reliability, Inverter-interfaced distributed generators (DGs) can be flexibly deployed in power systems. The Microgrid interfaced inverter can operate both in the islanded and grid-connected mode using the proposed control system. The proposed control method used to improve the controlled performance of microgrids by coordinating the output powers of multiple Distributed Generators in microgrids for the two considerations of operation i.e., (integration of multiple Distributed Generators and autonomous island operation) and by optimizing the control parameters. Simulation of proposed system with grid connected inverter is expressed (MATLAB SIMULINK Model).**

***Keywords*—Microgrid,Three phase inverter, Power Quality, THD.**

I. INTRODUCTION

Power system supplies electric energy to customers. In the last few decades the extensive growth of industries results into tremendous demand of electrical energy. The demand for large amount of power increases the burden on the electrical energy generation station. Generation station is supposed to provide electrical energy to the distribution system and finally reached to consumers. All consumer products need electrical energy with higher power quality for larger life span. But, the difficulty lies in the maintenance of the electrical power quality [1]-[7].

There are many disadvantages of poor and low power quality. It may lead to higher power losses, abnormal and unusual behavior of electrical equipment, and interference with the nearby communication lines, poor voltage profile, harmonics, sag and swells in the voltage, poor and low distortion and displacement factor. Consumer equipments are more sensitive to variation of power quality and power quality is load sensitive [8]-[12].

The fundamental problem is the non-sinusoidal current of inverters and ripple in the rectifiers that contain the fundamental as well as higher order harmonic components. The displacement and distortion factors also become poor as these devices draw leading or lagging and non-sinusoidal current from the supply, thereby resulting in the injection of harmonics in the distribution systems [13]. The harmonic current then starts flowing across the line and source impedance and this causes distortion of voltages, excessive power loss and voltage drop. Malfunctioning of protection, control, and the metering equipment occurs as the power supply gets distorted [14].

Hence, Power system needs for the compensation of higher power quality. Many consumers are also there whose need of power quality is high than what provided by the electrical networks. So it's very much essential to obtain a higher quality of electrical power [15].

Relevant Literature is reviewed in second section. Proposed system of power quality improvement with Grid Connected three phases Inverter is described in Methodology section. Simulation and Results are discussed in next section.

II. LETRATURE SURVEY

Power distribution systems with inverter-interfaced renewable energy sources (RESs) and distributed control framework are solutions of AC optimal power flow (OPF) problems. Based on suitable linear approximation of the AC power-flow equations, the design of the distributed control algorithm is based. On the mismatches between the commanded set points and actual RES output powers, convergence of the RES-inverter output powers is established under suitable conditions [1]. For distributed energy resource converters in dc microgrids, this paper proposes a local power-based droop controller that is connected to upstream grids by grid-interface converters. Power flow regulation is at distributed energy resource converters output allowed by proposed controller [2].

To improve the power sharing performance of bidirectional distributed generators and the voltage regulation performance of a dc bus in a dc microgrid, a distributed control method is proposed. Voltage sensitivity analysis based on power flow analysis is presented in order to analyze the structural characteristics of a dc microgrid [3].

Due to rise of distributed energy resources (DERs), Microgrids are becoming popular. To maximizing the benefits, Controlling the power exchange across hybrid microgrids is an important aspect. Evaluation and Development of an average model of the hybrid microgrid is proposed in this paper [4].For voltage balancing of series connected battery cells using non-dissipative modular power electronics, a new distributed control scheme and charge flow analysis is presented. Interbridge charge transfer and

the balancing of pairs of battery cells, both within adjacent bridge modules and modules more removed [5].

In a microgrid, Distributed generators (DGs) are tightly coupled through power lines. If not properly handled, large transient line currents may trigger false. This paper presents a distributed control solution for inverter interfaced microgrids [6]. A feedback linearization based control algorithm with dynamic control bounds is designed at primary control level for voltage regulation and transient line current suppression [7].

For hybrid ac/dc microgrids operating in islanded mode, a novel dynamic power routing (DPR) scheme is proposed in this paper. The interlinking converters (ICs) between the ac and dc sides of hybrid ac/dc microgrids are utilized by this method. DPR-based optimal power flow (OPF) algorithm is implemented by a supervisory controller allow full load ability of the islanded network [8].

In the distribution system, renewable energy sources (RES) are widely used. Unintentional islanding, protection concerns, reverse power flow is the problems introduced in the RES System. For smooth transition to an islanded mode, distribution systems should be capable of detecting islanding condition. To detect the islanding phenomenon in a distribution system, an islanding detection method (IDM) is proposed in this paper. When fault occurs in the island, the proposed adaptive control strategy maintains stable operation of the island [9].

While maintaining the network state within operational margins, frequency control rebalances supply and demand. Proposed controllers can rebalance supply and demand after disturbances, restore the frequency to its nominal value and also preserve interarea power flows. Proposed controllers are distributed can allocate load updates optimally, and can maintain line flows within thermal limits [10]. To an optimal operation of a distribution feeder, adoption of information and communication technology based centralized volt–var control (VVC) is proposed. Distribution system state estimation (DSSE) acts as a backbone of centralized VVC. A volt–var optimization DSSE malicious attack mitigating strategy when the DER injection measurements are compromised are two solutions proposed in this paper. Local voltage regulation controller set-points and effectively employs historical data or forecast information are the two [11].

Voltage magnitudes lies within prespecified bounds is standard operational requirement in power systems. Through injections of reactive power, subject to power flow and operational voltage constraints, an optimization problem which maximizes the distance to voltage collapse. Based on a dual-ascent algorithm, this paper proposes a distributed feedback controller, to solve for the prescribed optimization problem in real-time [12]. In the operation of utility grids, demand for distributed generation based on renewable energy sources (RES) is rising. By smoothing the renewable resource's intermittency, improving the quality of the injected power and enabling additional services like voltage and frequency regulation, dedicated energy storage system could contribute to a better integration of RES into the microgrid [13].

Highly distributed off-grid solar photovoltaic dc microgrid architecture is designed in this paper which is suitable for rural electrification in developing countries. Generation and storage scalability, higher distribution efficiency, ability to provide power for larger communal loads without the requirement for large, dedicated generation by extracting the benefit of usage diversity and localized control by using the hysteresis-based voltage droop method, thus eliminating the need for a central controller are the characteristics of the performance comparisons. By using the Newton–Raphson method modified for dc power flow at varying distribution voltages, conductor sizes, and schemes of interconnection among the contributing nanogrids, a detailed analysis in terms of power flow, loss, and system efficiency was conducted [14].

A high integration level of distributed energy resources (DERs) and addresses the design of local control methods for real-time voltage regulation examines in distribution systems. In response to local changes in voltage levels, proportional control strategies wherein the active and reactive power output of DERs are adjusted. The stability of the proposed local controllers is analytically assessed and numerically corroborated [15].To maximize network utilization and to mitigate power variations under high penetration of distributed generation, loop power flow controller (LPC) enables closed-loop operations of active distribution network at medium-voltage level. To enhance the security and efficiency of LPC-looped active distribution network (LPC-ADN), the operation strategy of LPC plays a key role[16].

To mitigate voltage violations and thermal line and transformer overloading it can be expected that more battery systems will be installed in the distribution grid in near future. A two stage centralized model predictive control scheme for distributed battery storage that consists of a scheduling entity and a real-time control entity, presented in this paper. A robust multi-period optimal power flow (OPF) for the scheduling stage that minimizes battery degradation and maximizes photovoltaic utilization subject to grid constraints. Distributed DC optimal power flow (DC-OPF) algorithm was investigates and addresses to data integrity attacks in this paper [17].

In particular, we first show that a compromised distributed controller on a single bus could manipulate the power dispatch result by sharing false information to neighboring buses. Economic-driven and infeasibility-driven attacks are two malicious scenarios of launching the data integrity attack are considered [18].

Areas of generation, transmission, and distribution of electric energy, as well as end-energy user benefits, such as grid frequency regulation, renewable energy smoothing and leveling, energy dispatching and arbitrage, power quality and reliability improvements for connected customers, islanding operations, and smart microgrid applications are concerns in these projects concern. Useful guidelines in the use of new models to represent a BESS for power system analysis provided by this paper[19].

To transfer power from highly loaded to less loaded phases, without overloading the inverter or charger, three-phase photovoltaic (PV) inverters and electric vehicle (EV) chargers can be adapted. In this paper, a classic coordinated charging strategy for EVs is adapted. A positive effect on the system losses, the grid voltage, and voltage unbalance are shown by several load flow simulations with realistic data show. This control framework is composed of a droop-based controller at the primary level, and a combination of distributed power sharing and voltage conditioning schemes at the secondary level. Experimental results are presented to validate the efficacy of the proposed Method[25].

III. METHODOLOGY

Figure 1.shows the MATLAB simulation model block diagram for the proposed system. Electrical Grid system is ideal three phase AC supply. It contains three voltage sources Va_Grid, Vb_Grid and Vc_Grid. Parameters of each source can be set manually. Another side, three phase inverter provides the conversion of DC supply into AC voltages in three phase manner such as Va_inverter, Vb_inverter and Vc_inverter. Central part is PCC (Point of Common Coupling) which isolates these two systems. Same load system (1 KW) is used for both units. According to load requirement, the PCC provides the connection between three phase inverter & Grid. Control System Algorithm plays vital role here, which generates the pulses for triggering the power devices in three phase inverter. Depends on the algorithms, nature of pulses will be changed and it controls the three phase inverter. Powergui block set simulation type, simulation parameters and preferences.

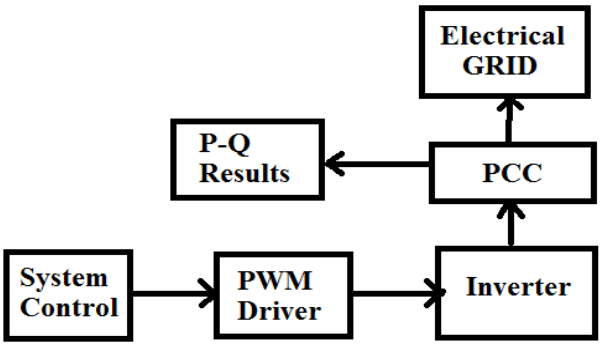


Fig.1. Block Diagram of MATLAB Simulation Model

First control algorithm operates on two signals, one is *Vabc_B2* or *Vabc_B3* to *PQ_B2* or *PQ_B3* and another is step reference signal. These two signals multiplexed and operated over transfer function called as active power controller. Generated signal given to the dq0 to abc transformer block with reference signal *sin_cos*. The dq0 to abc transformer generates abc signal given to hysteresis block with unit delayed *Iabc_IB*. Finally hysteresis block generates six pulses for three phase inverter. Remaining parameters and design is same for whole simulation.Figure.2.Shows the MATLAB simulation Model for algorithm1.

Second algorithm consisting constant V/Hz control and Discrete SV PWM pulses generator. Voltage control contains saturation timer, discrete rate limiter, discrete time integrator & Gain function. Two signal generated by m (modulation index) and theta (firing angle). Modulation Index should be in between 0 and 1.Figure.3. Present the MATLAB simulation model for Algorithm 3. Discrete SV PWM pulses generator generates SVPWM (Space Vector Pulse Width Modulation) wave for the switching devices. This generator can be generated two switching pattern of pulses for the devices. For proposed work, switching pattern 1of SVPWM pulses is selected.

IV. RESULTS AND DISCUSSION

Fig.2. shows the MATLAB Simulation Model. Control system generates the PWM pulses for the inverter system. Three phase Inverter system will connected to the Electrical grid system via three phase Breaker also called as Point Of Common Coupling (PCC). Power Quality can be measured by calculating THD (Total Harmonics Distortion), Error Voltage, Voltage across Inverter etc.

Fig.3. shows the Total Harmonics Distortions for Three phases of Inverter in MATLAB Simulation Model. Harmonics generated in each phase (0 to 0.05) can be minimized by improving the quality of power flow throughout the inverter. In case of synchronization, when inverter is connected to the Electrical grid, it is necessary to maintain the flow of power across the Point of Common Coupling (PCC). So, that for improvement in the power quality with suitable design of control algorithm which generates suitable PWM waveforms for Inverter.

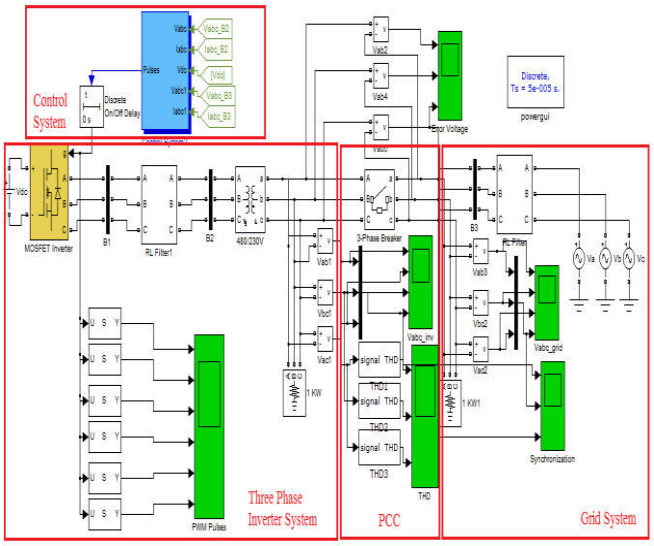


Fig.2. MATLAB Simulation Model

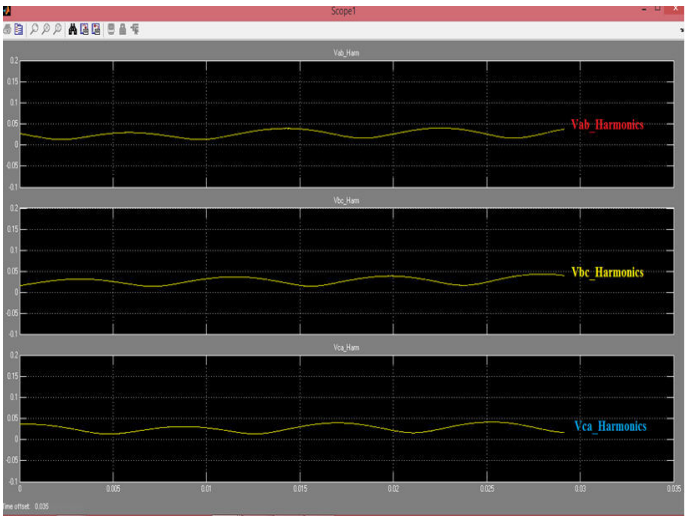


Fig.3. THD at Inverter phase Voltages in MATLAB Simulation Model

Control system of this algorithm anti-aliasing filter, controller & PWM Modulator. Input for anti-aliasing filter is Vabc_B2 or Vabc_ B3, Iabc_ B2 or Iac_B3 and Vdc. This input passes through the zero-order hold system and then goes towards the controller. Controller accepts additional inputs Vdc_ref & Iq_ref respectively. Controller contains PLL (Phase Locked Loop), abc to dq transformer, Voltage & current regulators and Vd_Vq to m, phi converter etc. Controller generates two signals m and phi signals which pass through unit delay block. PWM modulator accepts these two signals along with Vabc_sync signal and generates pulses for three phase inverter.

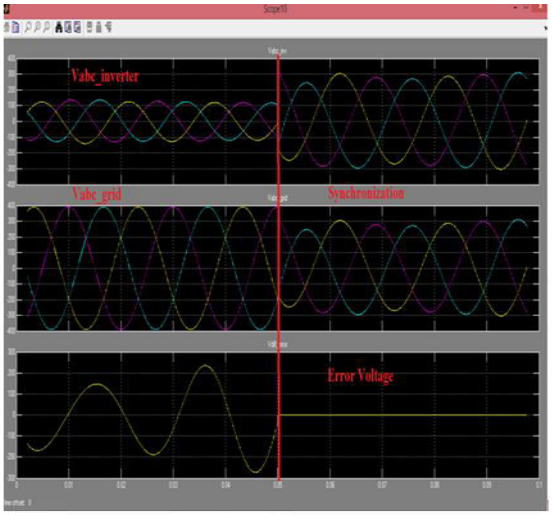


Fig.4. Error voltage with synchronization of grid and Inverter

It having amplitudes (V_a=230, V_b=230 and V_c=230), frequencies (F_a=F_b=F_c=50Hz) and phases ($V_{a\theta}$=0, $V_{b\theta}$ = -120°, $V_{c\theta}$= +120°). Grid voltage provided to the resistive Load having 1 KW active power. Load voltage for the grid system is shown in fig.4. having peak to peak amplitude +/- 330 Volt. Another side of model three phase inverter powered by DC supply i.e.400 Volt DC source. Synchronization pulses generated by the control algorithm are shown in fig. 4. Control system receives signals from grid such as Vabc, Iabc whereas Vdc is the reference voltage for control system. Control system Algorithm contains Anti-Aliasing filters, controller & PWM modulator. Anti-aliasing filter takes inputs Vabc, Iabc & Vdc. Filtered output passes through the zero-order hold & provided to the controller. Controller receives the reference inputs Vdc_ref & Iq_ref if required. Controller generates two outputs such as Modulation index (m) & Phase (phi (deg)).This signals given to PWM Modulator along with Vabc_ Sync (Grid output voltage). PWM Modulator provides 6 pulses for three phase inverter switches.

In controller, PLL receives Vabc signal from the grid & provide signal to Park transformation (abc to dq0 transformation). Park transformation gives signal IdIq. DC voltage regulator provides Id_ref which multiplexed with Iq_ref &gives to current regulator. Current regulator generates output VdVq based on IdIq & IdIq_ref. Vd_Vq to m,phi converter given below in detail. Compensating phase shift of anti-aliasing filters at 60 Hz added with phi signal & it generates phi (deg) signal.

In order to measure the phase voltage, frequency and phase, signal conditioning circuit should be interfaced with microcontroller system. Here step down transformer is used to convert the input phase voltage into small range of voltage. Rectifier circuit follows the down converted voltage and given the ADC channel in suitable range. That's why it is possible to measure the each phase voltage with respect to neutral for grid and three phase inverter output.

Frequency and phase of phase voltages can be measured with the help of ZCD (Zero Crossing Detector). Zero crossing detector circuit uses transistor diode for the calculation of zero crossing state. From the output pulse of ZCD circuit, successive pulses give the time duration for frequency calculation of phase. Phase calculation can be also calculated using ZCD output. The LPC2148 Microcontroller used to generate the PWM (Pulse Width Modulation) control signals for the three phase inverter. The LCD (Liquid Crystal Display) 16*2 displays will interface with same for displaying the status of synchronization parameters. Fig.5. shows the Hardware system for synchronization of inverter with electrical grid.

Fig.5. System Hardware for synchronization of grid and Inverter

V. CONCLUSION

Electrical grid can be operated in Islanded Mode or Grid Connected Mode. The grid connected mode of inverter increases the need of power quality improvement. The Parameter samples are taken into consideration for the analysis of the grid connected inverter performance. The performance of grid connected inverter regarding power quality is based on the control algorithm process by system controller. Switching actions of power devices of grid connected inverter will be decide by switching controller operated by system controller. The control parameters are assumed to be ideal for power quality improvement of grid connected inverter. Power quality measured in terms of Total Harmonics Distortions available in phase voltages of inverter. In MATLAB /SIMULINK model, THD available for the phase voltages are 0 to 0.05.

REFERENCES

[1] Yijian Zhang, Mingyi Hong, Emiliano Dall'Anese, Sairaj Dhople, and Zi Xu ," Distributed Controllers Seeking AC Optimal Power Flow Solutions Using ADMM" IEEE TRANSACTIONS ON SMART GRID ,PP.1-13.

[2] Guangyuan Liu, Tommaso Caldognetto, Paolo Mattavelli and Paolo Magnone," Power-Based Droop Control in DC Microgrids Enabling Seamless Disconnection from Upstream Grids" IEEE Transactions on Power Electronics ,PP.1-12.

[3] Gi-Young Lee, Byoung-Sun Ko, Jintae Cho, and Rae-Young Kim, "A Distributed Control Method Based on a Voltage Sensitivity Matrix in DC Microgrids with Low-Speed Communication" IEEE Transactions on Smart Grid,pp.1-9.

[4] Omair Khan, Samrat Acharya , Mohamed Al Hosani and Mohamed Shawky El Moursi , "Hill Climbing Power Flow Algorithm for Hybrid DC/AC Microgrids" IEEE TRANSACTIONS ON POWER ELECTRONICS, VOL. 33, NO. 7, JULY 2018, pp.5532-5537.

[5] A. Tavakoli, S.A. Khajehoddin, J. Salmon, "Control and Analysis of a Modular Bridge for Battery Cell Voltage Balancing" IEEE Transactions on Power Electronics, pp.1-12.

[6] Jiajun Duan , , Cheng Wang , Hao Xu , Wenxin Liu , Jian-Chun Peng and Hui Jiang," Distributed Control of Inverter-Interfaced Microgrids With Bounded Transient Line Currents" IEEE TRANSACTIONS ON INDUSTRIAL INFORMATICS, VOL. 14, NO. 5, MAY 2018,pp.2052-2061.

[7] Mahmoud A. Allam, Amr A. Hamad, Mehrdad Kazerani and Ehab F. El Saadany, "A Novel Dynamic Power Routing Scheme to Maximize Loadability of Islanded Hybrid AC/DC Microgrids under Unbalanced AC Loading" IEEE Transactions on Smart Grid ,pp.1-11.

[8] Aref Pouryekta, Vigna K. Ramachandaramurthy, Nadarajah Mithulananthan and Atputharajah Arulampalam, "Islanding Detection and Enhancement of Microgrid Performance" IEEE SYSTEMS JOURNAL,pp.1-11.

[9] Enrique Mallada , Changhong Zhao , and Steven Low , "Optimal Load-Side Control for Frequency Regulation in Smart Grids" IEEE TRANSACTIONS ON AUTOMATIC CONTROL, VOL. 62, NO. 12, DECEMBER 2017,pp.6294-6309.

[10] Ankur Majumdar, , Yashodhan P. Agalgaonkar, Bikash C. Pal and Ralph Gottschalg , "Centralized Volt–Var Optimization Strategy Considering Malicious Attack on Distributed Energy Resources Control" IEEE TRANSACTIONS ON SUSTAINABLE ENERGY, VOL. 9, NO. 1, JANUARY 2018,pp.148-156.

[11] Marco Todescato, John W. Simpson-Porco, Florian Dorfler, Ruggero Carli and Francesco Bullo," Online Distributed Voltage Stress Minimization by Optimal Feedback Reactive Power Control", IEEE Transactions on Control of Network Systems,pp.1-12.

[12] Quentin Tabart , Ionel Vechiu, Aitor Etxeberria, and Seddik Bacha, "Hybrid Energy Storage System Microgrids Integration for Power Quality Improvement Using Four-Leg Three-Level NPC Inverter and Second-Order Sliding Mode Control", IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, VOL. 65, NO. 1, JANUARY 2018,pp.424-435.

[13] Mashood Nasir , Hassan Abbas Khan , Arif Hussain, Laeeq Mateen, and Nauman Ahmad Zaffar, "Solar PV-Based Scalable DC Microgrid for Rural Electrification in Developing Regions", IEEE TRANSACTIONS ON SUSTAINABLE ENERGY, VOL. 9, NO. 1, JANUARY 2018,pp.390-399.

[14] Kyri Baker , Andrey Bernstein, Emiliano Dall'Anese and Changhong Zhao , "Network-Cognizant Voltage Droop Control for Distribution Grids" IEEE TRANSACTIONS ON POWER SYSTEMS, VOL. 33, NO. 2, MARCH 2018,pp.2098-2011.

[15] Xuetao Xing, Jin Lin, Can Wan and Yonghua Song, "Model Predictive Control of LPC-Looped Active Distribution Network With High Penetration of Distributed Generation" IEEE TRANSACTIONS ON SUSTAINABLE ENERGY, VOL. 8, NO. 3, JULY 2017,pp.1051-1063.

[16] Philipp Fortenbacher , Johanna L. Mathieu and Goran Andersson ¨ , "Modeling and Optimal Operation of Distributed Battery Storage in Low Voltage Grids", IEEE TRANSACTIONS ON POWER SYSTEMS, VOL. 32, NO. 6, NOVEMBER 2017,pp.4340-4350.

[17] Jie Duan, Wente Zeng and Mo-Yuen Chow, "Resilient Distributed DC Optimal Power Flow Against Data Integrity Attack", IEEE TRANSACTIONS ON SMART GRID, VOL. 9, NO. 4, JULY 2018,pp.3543-3552.

[18] Xiaokang Xu, Martin Bishop, Donna G. Oikarinen, and Chen Hao, "Application and Modeling of Battery Energy Storage in Power Systems", CSEE JOURNAL OF POWER AND ENERGY

SYSTEMS, VOL. 2, NO. 3, SEPTEMBER 2016,pp.82-90.

[19] Sam Weckx and Johan Driesen ," Load Balancing With EV Chargers and PV Inverters in Unbalanced Distribution Grids" IEEE TRANSACTIONS ON SUSTAINABLE ENERGY, VOL. 6, NO. 2, APRIL 2015,pp.635-643.

[20] Mohammad S. Golsorkhi, Mehdi Savaghebi, Dylan Dah-Chuan Lu, Josep M. Guerrero and Juan C. Vasquez, "A GPS-Based Control Framework for Accurate Current Sharing and Power Quality Improvement in Microgrids" IEEE TRANSACTIONS ON POWER ELECTRONICS, VOL. 32, NO. 7, JULY 2017,pp.5675-568.

[21] Sachu Sebastian; Erancy Sara Varghese; Erjancy Varghese, "Mitigation And Improvement Of Power Quality Using Shunt Series Switched Grid Tied Inverter (SSS-GTI)", IEEE conference International Conference on Electrical Energy Systems (ICEES), 11-13 Feb. 2021, pp.5.8.

[22] B. Srikanth Goud; R. Rekha; M. R. L. Jyostna; S. Sarala; B. Loveswara Rao; Ch. Rami Reddy, "Energy Management and Power Quality Improvement in HRES Grid-Connected System", IEEE International Conference on Electrical Engineering (FORTEI-ICEE), 23-24 Sept. 2020,pp.174-178.

[23] Julio Fredy Chura Acero; Henry Pizarro Viveros; Norman Jesús Beltrán Castañón; Reynaldo Condori Yucra, "Improvement of Power Quality for Operation of the Grid-Connected Photovoltaic Energy System Considering the Irradiance Uncertainty", IEEE XXVII International Conference on Electronics, Electrical Engineering and Computing (INTERCON), 3-5 Sept. 2020.

[24] Chaithanya S.; Anjali Anand K., "A Comparative Study on Adaptive Control Algorithms for Grid-tie Inverter", International Conference on Power Electronics and Renewable Energy Applications (PEREA), 27-28 Nov. 2020.

[25] Shailesh Kapoor; Nidhi Mishra; Mohd Tariq, "Power Quality Improvement in PV fed GridConnected Three-Level NPC Converter", IECON 2020 The 46th Annual Conference of the IEEE Industrial Electronics Society, 18-21 Oct. 2020, pp.3308-3312.

OPTIMISING THE USE OF ENERGY IN A HYBRID ROOFTOP WIND PRODUCTION SYSTEM

Miss. Prajakta R. Sarvade
PG Student
Electrical Engineering Department ,
Government College Of Engineering,
Karad.
prajaktasarvade208@gmail.com

Prof. U S Patil
Assistant Professor
Electrical Engineering Department
Government College Of Engineering,
Karad.
umapatil15@gmail.com

***Abstract*—The main purpose of this paper is to assume the model of wind and solar photovoltaic (PV) system for the charging of battery which is simulated by using MATLAB R2018a using Simulink. In this paper, DC-DC converter is used named as Zeta converter fed by wind system and solar photovoltaic (PV) system designed and simulated. The proposed model consists of solar photovoltaic system and wind system together known as hybrid model for the generation of electricity which are most reliable and efficient renewable energy sources as compared to other renewable energy sources. In this project wind turbine/ system is assumed as AC voltage source. Zeta converter is fourth order power electronic converter can be able to operate either in step up or step down mode. In this paper actually no MPPT technique is used only the concept of how we get maximum power from solar panels and wind turbine with the help of zeta converter is considered. Here we are going to set a input and thereby we get output as it is so with that maximum power i.e. output we can charge the battery for the desired application.**

Keywords— Solar Photovoltaic (PV Array), Zeta converter, AC voltage source, 1- phase diode bridge rectifier.

I. INTRODUCTION

Now a days hybrid energy systems uses solar and wind renewable energy sources even though other renewable energy sources are available in the earth crust. Solar energy and wind energy is easily available for all of us in free of cost is most advantageous. The concept of photovoltaic is easily understood and currently many PV based power systems are designed worldwide for the generation of electricity. The PV based power

system is environment friendly and no one is getting harmful by this type of power system as compared to other systems. The output of solar system is mainly depends on solar irradiance and temperature.

Wind energy is easily available in nature and is free of cost. Renewable energy sources such as solar energy and wind energy have been seen clean, inexhaustible, unlimited, and environmental friendly. The electricity generated from wind system is AC so there is need of conversion which is done by using 1 phase diode bridge rectifier. In this paper, our main objective is to charge the battery using generated electricity of the hybrid system. We are going to analyse this with the help of MATLAB/SIMULINK. Energy generation due to individual energy source problem is eliminated by hybrid system.

II. DESIGN OF PROPOSED SYSTEM

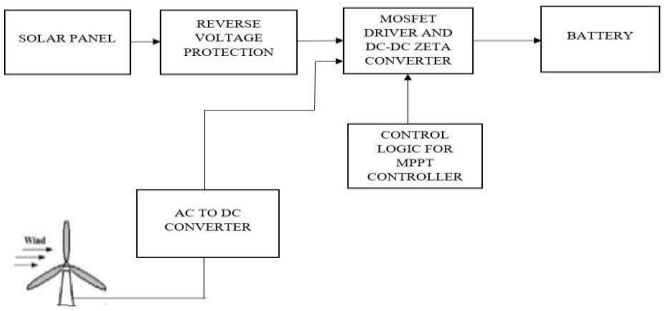


Fig.1 Proposed work Block Diagram

2.1. Design of Solar PV cell

In this system solar PV array is used to generate DC voltage which is boosted at rated value by DC-DC zeta converter. PV array is combination of solar cells connected in series and parallel. Linear variations in dc current are because of sun irradiance variations. The solar panel is modelled using MATLAB/ SIMULINK.

$$P_{mp} = (N_{p*} I_{mp}) * (N_{s*} V_{mp}) = 1.49 \text{ kw} \text{ ----- (1)}$$

Table No.1

Specifications of solar panel

Solar panel output power	213.15 watt
Solar panel open circuit voltage	36.3 volt
Solar panel short circuit current	7.84 amp
Solar panel voltage at MPP (V_{mp})	29 volt
Solar panel current at MPP (I_{mp})	7.35 amp
Solar array peak power	1.49 kw

2.2. Design of Power Converter

In this paper proposed converter is zeta converter which has advantages like adaptability, low settling time. Power converter is the heart of entire system which play an important role.

Zeta Converter:

Fig 2. Shows the zeta converter consists of two inductors, two capacitors, diode and switch. Zeta converter is capable of converting input voltage into non inverting output voltage. Zeta converter operates in two mode of operation such as continuous conduction mode and discontinuous conduction mode.

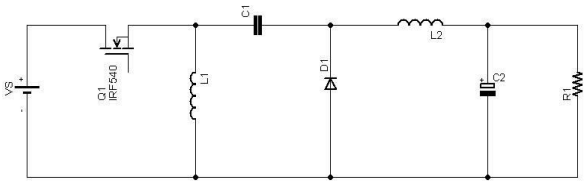


Fig 2. Zeta Converter

Fig 2. Shows the zeta converter consists of two inductors, two capacitors, diode and switch. Zeta converter is capable of converting input voltage into non inverting output voltage. Zeta converter operates in two mode of operation such as continuous conduction mode and discontinuous conduction mode.

Mode 1. when the diode (D) is off and Switch(S) is on , continuous conduction mode is achieved. The current through the inductor L1 and L2 are drawn from the source Voltage Vs. The Inductor current iL1 and iL2 increase linearly. This mode of operation is also known as charging mode.

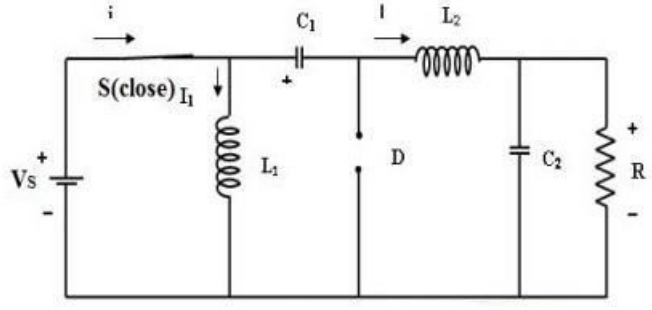


Fig 3. ON state Zeta converter Circuit

Mode 2**.** when the diode (D) is in ON state and switch (S) is off, discontinuous conduction mode is achieved. In this mode of operation the energy stored in the inductors discharges and transferred to the load (resistive load) and current in the inductors decreases linearly that's why this mode is known as discharging mode.

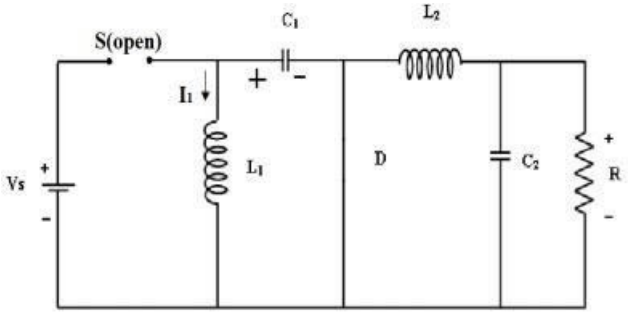


Fig 4. OFF state Zeta converter Circuit

The model of zeta converter is designed in MATLAB/SIMULINK as shown in fig.5.MOSFET switching is controlled by using PWM generator and duty cycle.We can take any input voltage range by that PWM generator and duty cycle is adjusted to give output as that of input range.This is concept behind we get desired maximum output.

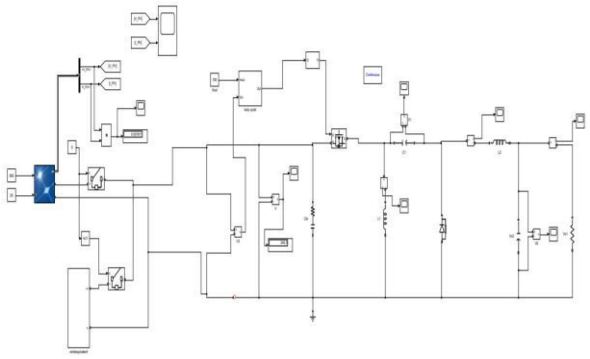


Fig. 5. Simulation of proposed system

Design equations of zeta converter:

Duty cycle when zeta converter operating in continuous conduction mode ,

$$D = V_o + D / V_{in} + V_o \quad ----(2)$$

Inductor and capacitor equations,

$$L1 = L2 = Vin + D / \Delta Il + Fs \quad ---(3)$$

$$C1 = D * V_{out} / \Delta Vc1 * R * F_s \quad ----(4)$$

$$C2 = (1- D) * V_{out} / 8 * \Delta V_{out} * L2 * F_s \quad ---(5)$$

2.3. Wind Subsystem:

In this paper instead of using wind turbine , we are using AC voltage source which is converted into dc with the help of 1-phase diode bridge rectifier for prototype model.

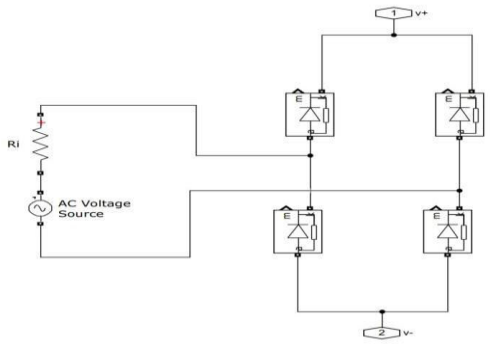


Fig.6. Wind Subsystem

When we have to charge the battery using wind turbine, logic 0 is given to breaker 1 next to PV array and NOT gate so that wind subsystem get logic 1 and thus operation starts and we can see the output in DC form. When we have to charge the battery using solar panel logic 1 is given to breaker 1 so operation starts and we see DC output which is used to charge the battery. Lithium ion battery is used in this project. In fig.9. and fig.10., some starting fluctuations are seen because no any system is stable at starting.

III.SIMULATION RESULTS

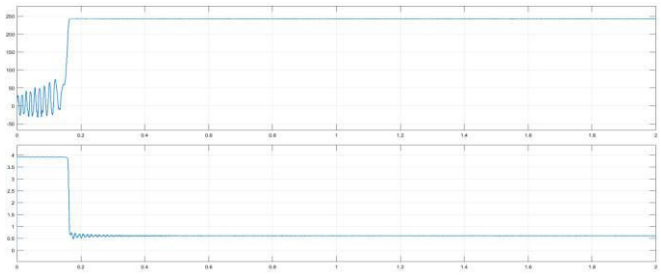


Fig.7. solar panel output voltage And current

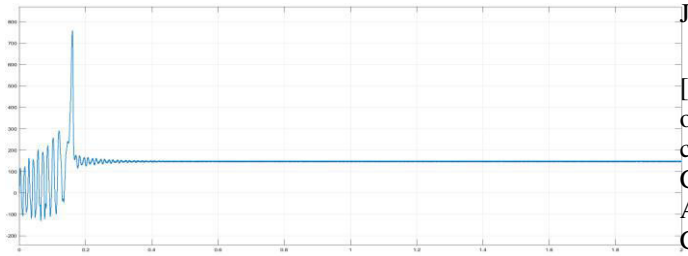


Fig.8. Solar panel power

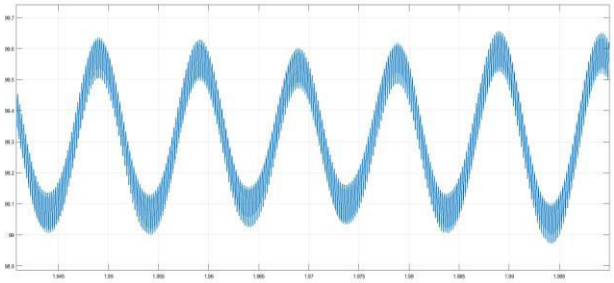


Fig.9. Output Voltage

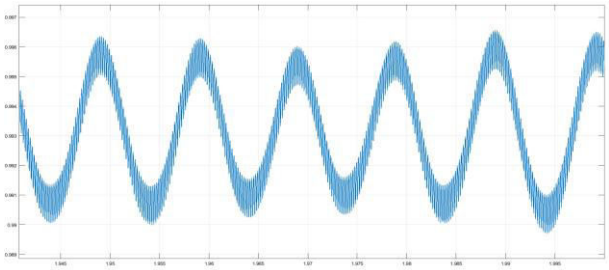


Fig. 10. Output Current

IV.CONCLUSION

The hybrid system model of solar system and wind system has been proposed. Under different solar irradiance Zeta converter maintains output voltage as constant and operated in boost mode operation. Zeta converter is controlled with the help of duty cycle. Maximum power is obtained with the help of zeta converter instead of using MPPT techniques.

V. REFERENCES

[1] Ashish S. Ingole, Prof. Bhushan S. Rakhonde, " Hybrid Power Generation System Using Wind Energy and Solar Energy", International Journal of Scientific and Research Publications, Volume 5, Issue 3, March 2015 1 ISSN 2250-3153G.

[2] N. Sowmya Smitha Raj, Smt. B. Urmila, " PV fed Zeta converter " International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com Vol. 3, Issue 4, Jul-Aug 2013, pp.2692-2696.

[3] L. G. Vasant and V. R. Pawar, "Optimization of solar-wind energy system power for battery charging using MPPT," 2017 International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS), Chennai, 2017, pp. 1308-1310, doi: 10.1109/ICECDS.2017.8389656.

[4] Abderrahim SASSI, Noureddaher ZAIDI, Othman NASRI, Jalel BEN HADJ SLAMA, " Energy Management of PV/Wind/Battery Hybrid

Energy System Based on Batteries Utilization Optimization" Conference Paper © 2017 IEEE.

[5] M. Pathare, V. Shetty, D. Datta, R. Valunjkar, A. Sawant and S. Pai, "Designing and implementation of maximum power point tracking (MPPT) solar charge controller," 2017 International Conference on Nascent Technologies in Engineering (ICNTE), Navi Mumbai, 2017, pp. 1-5, doi: 10.1109/ICNTE.2017.794792.

[6] Sujata S. Naik,Shirish B. Karapurkar, " Implementation of Zeta Converter in SPV Application" International Journal of Scientific & Engineering Research Volume 10, Issue 5, May-2019 ISSN 2229-5518.

[7] Kumuthawathe Ananda-Rao, " Design of MPPT charge controller using zeta converter for battery integrated with solar Photovoltaic (PV) system" et al 2020 J. Phys.: Conf. Ser. 1432 012058.

[8] R. Eke*, O. Kara and K. Ulgen, "OPTIMIZATION OF A WIND/PV HYBRID POWER GENERATION SYSTEM" International Journal of Green Energy, 2: 57–63, 2005 ISSN: 0197-1522 print / 1543-5083 online DOI: 10.1081/GE-200051304J.

An Automatic Solar Panel Cleaning System

Dr. R.V. Babar, Assistant Professor, Sinhgad Institute Of Technology,Lonavala, rbabar.sit@sinhgad.edu
Mr. Nilesh Tejaram Bagde, Student, Sinhgad Institute Of Technology,Lonavala, nileshbagde02@outlook.com
Ms. Sanjana Narendra Khapare, Student, Sinhgad Institute Of Technology,Lonavala, khaparesanjana12@gmail.com
Mr. Umesh Ashok Patil, Student, Sinhgad Institute Of Technology,Lonavala, umesh42068@gmail.com

Abstract - Renewable sources of energy are solar, wind and geothermal which are inexhaustible. Solar energy is abundant in nature and is proving its existence for many applications like street lighting, house hold appliances, water heating, agricultural and industrial purpose. One of the ways to harness solar energy is done by using solar panels. Limitation of solar energy is its efficiency for any application due to the factors like dust, humidity, temperature etc. Electrical parameters of solar panel are sensitive to accumulated dust density and will affect the transmittance of the solar panel thereby reduce its efficiency. In order to overcome this problem, it is necessary to clean the solar panels regularly. One of the method is to increase the efficiency of solar panel is by removing the dust accumulated on solar panel. Cleaning of solar panels is difficult task. The normal way to clean the solar panels is washing them manually but it is not reliable and economical. In this regard a work is taken up to design and implement the automatic dust cleaning mechanism for solar panel. The designed automatic cleaning mechanism consists of Voltage Sensor, LDR arrangement in order to sense the dust accumulated on solar panel. The efficiency of solar panel is determined by taking the readings of voltage and current of particular panel with and without dust for various days, weeks and months. By the recorded values efficiency comparison of solar panel with dust and without dust is made. The designed automatic cleaning system produces an effective, non-abrasive cleaning and avoids irregularities in the generation of power due to the deposition of dust on the solar panel. From the study it is proved that average efficiency of solar panel increases about 1.6% to 2.2% by regular cleaning. Thus developed model maximizes the efficiency.

Keywords: Solar panel, cleaning, sensor network, Node MCU, automatic cleaning.

I.INTRODUCTION

The renewable energy industry has been growing remarkably in the last years and the Fukushima event has given a further incentive. In this context, solar radiation represents one of the most accessible and clean energy resources. For this reason the number and size of the photovoltaic (PV) systems is growing and consequently the amount of the investments and the related opportunities and risks are increasing. Therefore, the optimization of electrical performances of PV plants and the assessment of their quality and reliability are important for both the investors and the manufacturers. The sun emits energy at an extremely large rate hence there is abundant availability of solar energy in the nature. If all solar energy could be converted into usable forms, it would be more enough to supply the world's energy demand. However, this is not possible because of conditions in the atmosphere such as effect of clouds, dust and temperature. Solar energy can be converted to more usable energy forms through solar panel. There is unprecedented interest in renewable energy, particularly solar energy, which provides electricity without giving rise to any carbon dioxide emission. Of the many alternatives, photovoltaic method of extracting power from solar energy have been considered has promising toward meeting the continuously increasing demand for energy. The efficiency of solar panel is limited due natural conditions so it is very much essential to take care of parameters like dust, humidity and temperature. In this regard the work has been taken up to study the efficiency of solar panel with and without dust collected on it. The developed project includes design and implementation of microcontroller based dust cleaning system. The main aim of the project is to provide automatic dust cleaning mechanism for solar panel. The arrangement keeps the modules clean and thereby improving its efficiency. Traditionally cleaning system was done manually. The manual cleaning has disadvantages like risk of

staff accidents and damage of the panels, movement difficulties, poor maintenance etc. The automatic dust cleaning system of solar panels has taken to overcome the difficulties arise in the traditional cleaning and also produces an effective, nonabrasive cleaning and avoids the irregularities in the productivity due to the deposition of dust. The studies carried out to evaluate the efficiency of solar panel for dust collected on it for one day, one week and a month. The efficiency of solar panel also calculated after cleaning the surface for one day, one week and a month. And finally comparing both the efficiencies it is proved that solar panel efficiency increases considerably. Thus the developed model enhances the solar panel performance.

II.OBJECTIVE

1. To record the measured voltage and current for efficiency calculation of SPV panel with and without dust.
2. To compare the calculated efficiency of SPV panel with and without dust.
3. To design and implement the microcontroller based dust cleaning system.
4. To maximize the efficiency.

III.PROPOSED SYSTEM

Project proposed system divided into two parts:

1. Mechanical part
2. Electronic part

The chassis, brushing system, vacuum cleaning, and dirt disposal mechanisms make up the mechanical body.

A. Chassis

Acrylic board, two encoder motors with Teflon tyres with O-rings for preventing friction, two ball casters with frictionless steel balls, aluminum angular braces, and aluminum holders for two lead acid batteries with 12V and 1.2Ah ratings make up the body's foundation. These motors are driven independently and positioned diagonally, with two ball casters on the opposite diagonal of the acrylic board, allowing the motors to freely travel along their axes and carry more weight than a chain mechanism. A DC geared motor, sprockets for moving the chain from the geared motor to the spinning brush, and two aluminum rods for supporting the vacuum cleaner mechanism and dirt compartment are all included in the cleaning assembly. This DC geared motor is mounted on one side of an acrylic board, with an aluminum holder and sprockets attached to the shaft of the motor. Both components are mounted on the lower side of the acrylic sheet to keep the robot's centre of gravity low and stable.

B. Brushing

One rolling brush, a steel sheet for the cover, two aluminum holders, two ball bearings, and one mild steel strip make up the brushing mechanism. One rolling brush, set on bearing-filled aluminum holders. This mechanism is connected to the robot's base through a mild steel strip. In the case of a carpeted solar panel, a brush is used to broom the dirt particles into the vacuum chamber for effective cleaning.

C. Vacuum

Cleaning and Disposal of Dirt The vacuum cleaning and dirt disposal system is made up of a vacuum motor, propeller, steel motor holders, filter mounted on two steel rods, aluminum alloy sheet, steel sheet, servo motor, aluminum brackets, and aluminum strips. Filters are positioned on the inside of the aluminum alloy and are mounted to a vacuum motor by steel holders. A robot was created by moulding steel sheet in the form of a robot. Aluminum alloy is shaped into a form similar to steel sheet, but on a larger scale. When both sheets are joined together, a small tunnel appears on the front side and a wide compartment appears on the back side. A narrow tunnel is needed for better dirt suction, and a wide compartment serves as the dirt compartment. To dispose of dirt, at the very end of both sheets, there is an aluminum strip operated by a servo motor mounted on the upside of aluminum alloy right behind the vacuum cleaner. The inner side of the Vacuum Cleaner battery holder is spot welded to accommodate an 18.1V, 5AhLiPo battery.

Circuits were implemented on PCB after component values were optimized.

This project uses five main circuits, including three batteries, and all of them are engineered, evaluated, and implemented in compliance with IEEE Standard 1621. The following is an explanation of both of these circuits:

A. Motor Controllers

Motor controls, also known as H-Bridges, are used to drive motors in both clockwise and counterclockwise directions with a current rating of 15 amps. There are two pieces to this controller. The first part is to use an Node MCU controller to trigger relays and drive motors, while the second part is to regulate the speed of the motors. Switching is done with relays, while speed control

is done with transistors. The relays in this circuit have a 12V dc coil rating and a 15A current rating, while the lead acid battery has a 12V and 1.2Ah rating. Since encoder motors have a stall current of 7A, 15A relays were used for safety. In a flyback diode configuration, two diodes are used. The term "free-wheeling diode" refers to a situation in which a diode is placed in reverse between battery terminals. When a relay is de-energized, a large voltage is emitted in the backward state, which can affect other components. To prevent this, a diode in a flyback configuration is used in conjunction with the relay. For speed control, pulse width modulation (PWM) is used. PWM is applied to the transistor BJT 2N2222, along with a duty cycle, to force the motor to start at predetermined intervals, resulting in speed regulation. This circuit is operated by a separate battery that is connected to an ON/ OFF switch and a fuse to provide safety, as well as a red LED that glows if the circuit is disconnected according to IEEE Std. 1621 section 4.

B. Vacuum Cleaning Controller

One transistor, one relay, one diode, and two batteries are used in the vacuum cleaner control circuit. One 12V 1.2Ah lead acid battery is used to control the vacuum cleaner's power (ON/OFF) by energizing the coil of a relay with a diode in the fly back position, and one 18V 5Ah LIPO battery is used to supply power to the vacuum cleaner with different ground terminals to avoid short circuit currents and properly isolate the batteries from the circuit, including a separate Yellow LED for Disconnect. The Node MCU controller sends a signal to the BJT 2N2222 transistor, which energizes the relay and relay switches. Following the switch, the relay allows the 18V battery to supply power to it and switches on the vacuum cleaner with an ON/ OFF switch. Since currents can exceed 7A, this circuit is properly insulated to ensure safety. Two transistors make up the circuit. The Node MCU controller sends a signal to one transistor, which drives the other transistor. The transistor that receives the signal is the BJT 2N2222, and the other is the TIP-122. Since a single TIP- 122 has a high current rating and cannot be powered directly by Node MCU, two transistors are used. The BJT 2N2222 transistor is not used solely because the brush motor's stall current is extremely high, and the BJT cannot have the required current. As a result, combining these two results in a good brush motor driving circuit.

C. Power Supply to Sensors

Many of the sensors are 5V, but the batteries are 12V and 18V. This circuit was designed and implemented to provide 5V to five IR sensors, two encoder sensors, one magnetometer, and one Bluetooth module. The IC 7805 regulator is used to convert 12V to 5V with current in the milli ampere scale. Capacitors are often used for voltage control, and if an impulse occurs that causes power to be disconnected from sensors, these capacitors can serve as a source to keep the sensors connected. Because of section 3.1.14 of IEEE Standard 1621, when the power supply to the sensors is disconnected, the White LED glows and is labelled as disconnected.

D. Precautionary Circuit

Bridge rectifiers, relays, transistors, diodes, fuses, Positive voltage adjustable regulator, LEDs, terminal lines, and slim headers make up this main circuit. There are three sections to this circuit. The first is for motor battery safety and voltage regulation, the second is for circuit battery voltage safety, and the third is for controlling motor battery via circuit battery and powering the Node MCU controller. One relay with a flyback diode, one transistor, one fuse, terminal blocks, one regulator, and a variable resistor are used in the first section. To begin, the battery terminals are connected to a terminal block that is shorted with the inputs of a bridge rectifier, the KBPC 5040, which has a voltage rating of 1000V and a current rating of 50A. If the battery terminals are attached in the positive or negative direction, a bridge rectifier is used to hold the supply voltage positive and protect the circuits. The Node MCU controller sends a signal to the transistor BJT 2N2222, which energizes the relay, allowing the motor voltage to flow to the fuse from the rectifier and then to the regulator input. The LM338k is a positive adjustable voltage regulator with a 15A rating that can control voltage between 12V and 6V. This regulator is used to ensure that the output does not fluctuate and that the motor runs smoothly. After changing the voltage to 12V, the output will be shorted with a terminal block, and that block will now be used for both encoder and brush motor battery output. Fuse holders are used for added protection so that if there is some shot circuiting, it would not damage other components and the fuse can be quickly adjusted. Since the encoder motor's stall current is 7A and the brush motor's stall current is 5A, the fuse used is rated at 10A. Just

after the regulator, an LED and a resistor are mounted to check if voltage is hitting the output terminal. The circuit battery protection is made up of one relay with a diode in fly back mode, one transistor, one bridge rectifier, fuse, terminal block, and LED in the second portion. To begin, the battery terminals are connected to a terminal block that is shorted with the inputs of a bridge rectifier, the KBPC 810, which has an 800V and 10A voltage rating. The bridge rectifier is used because the output will remain positive regardless of whether the battery terminals are connected in the positive or negative direction, and the circuits will remain stable. First, voltage from the bridge rectifier is sent to the fuse, and then a signal from the Node MCU is sent to the BJT 2N2222, which energizes the relay, causing it to turn on and allow voltage to pass through it. Finally, the relay is shorted with a terminal block that serves as the circuit battery output terminal block, and other circuits are operated from this output terminal block. Fuse holders are used for added protection so that if there is some shot circuiting, it would not damage other components. Just after the relay, an LED and a resistor are mounted to check if voltage is reaching the output terminal. In the final section, the motor battery circuit is regulated via a circuit that consists of one transistor and one relay with a diode in flyback mode. The regulator is also used to supply power to the Node MCU through the header. The Node MCU sends a signal to the transistor, which activates the relay linked to the motor battery circuit. When the relay is activated, it closes the circuit of the motor and thus regulates the motor battery through the circuit battery circuit. Long wires are often used for checking between the output terminal blocks of the motor battery and the circuit battery.

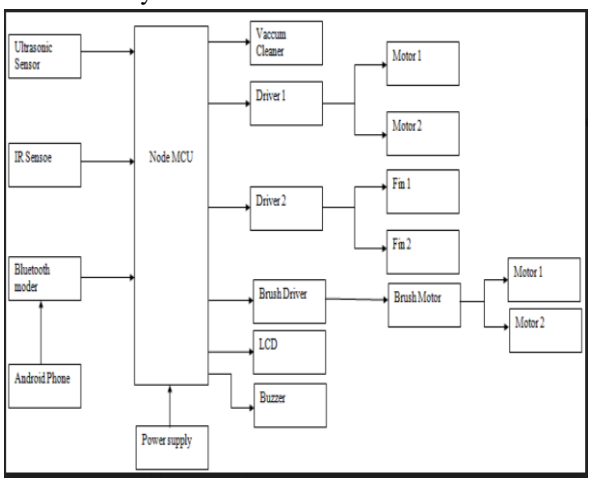


Fig 1. Block diagram

IV EXPECTED CONCLUSION

The project describes the performance of solar photovoltaic panel subjected to environmental dust collect. The effect of dust on the power reduction and efficiency reduction of PV module was quantified. From the analysis it is observed that average efficiency increases about 1.6%-2.2% by regular cleaning. Hence implemented automatic cleaning system maximizes the efficiency.

REFERENCE

[1] Prof. J. B. Jawale, Prof. V. K. Karra, Dr. B. P. Patil, Puneet Singh, Shailender Singh,SaloniAtre "Solar Panel Cleaning Bot For Enhancement of Efficiency- An Innovative." Approach.IEEE 2016.

[2] S. B. Halbhavi, S. G. Kulkarni, Dr. D. B. Kulkarni "Microcontroller Based Automatic Cleaning ofSolar Panel" IJLTET 2015.

[3] BandamAbhilash, Ashish K Panchal "Self-Cleaning and Tracking Solar Photovoltaic Panel for Improving Efficiency"

[4] E. M. Al-Qubaisi, M. A. Al-Ameri, A. A. Al-Obaidi, M. F. Rabia, L. El-Chaar, L. A. Lamont "Microcontroller Based Dust Cleaning System for a Standalone Photovoltaic System"

[5] E. M. Al-Qubaisi, M. A. Al-Ameri, A. A. Al-Obaidi, M. F. Rabia, L. El-Chaar, L. A. Lamont "Microcontroller Based Dust Cleaning System for a Standalone Photovoltaic System" IEEE 2012.

Programmable Switching Control For Domestic and Industrial Loads.

Tejas Nagotakar[1], Hrishikesh Takale[2], Chinmay Ranawade[3]

Project Guide - Prof. UjwalaTade

Department of Electrical Engineering

Lokmanya tilak college of engineering, Navi Mumbai, India

Abstract:In this project, we have illustrated how to switch domestic and industrial loads using a user programmable switching control device for sequential operation used for repetitive nature of work. In this project we have demonstrated this working using a microcontroller of 8051 family. In industries, there are many tasks carried out which requires some repeated operation in various orders and time intervals. In order to achieve this, microcontrollers are programmed in such a way that the loads can be operated in three modes: Set mode, Auto mode and Manual mode.All the modes and status of loads are displayed on an LCD. Thus, tasks performed in industries can now be achieved using a microcontroller making the device cost effective. Further the project can be enhanced by interfacing it with a GSM modem where by sending an SMS to the control system we can select the mode and timing remotely.

Keywords: Embedded Systems, PCB, Proteus Software, Keil Software, Microcontroller.

I. INTRODUCTION

This project is designed to control Programmable Switching Control using an Android application. The concept of controlling Programmable Switching Control wirelessly using an android application is interesting. A Bluetooth device is interfaced to the control unit for sensing signals transmitted by the Android application. This data is conveyed to the

control unit which switches on loads ON/OFF as desired. An 8051 series microcontroller 89S51 is used in this project as a controlling device. Remote operation is achieved by any smart-phone or Tablet with Android OS, upon an App operation. The transmitting end uses an Android application for the commands that are transmitted to digital bits. At the receiver end, these commands are used for controlling the on and off. At the receiving end, the appliances are driven by Relay that is interfaced to the microcontroller. This project has integration of Android mobile technology and embedded systems. Android mobile users have to install an application on their mobile handset to control the devices.

II. NEED FOR AUTOMATION

In the end, industrial automation yields increased safety, reliability, and profitability. The benefits of automation typically fall into a few categories, including savings, safety, convenience, and control below are some key benefits of automation.

1. Increase labor productivity
2. Reduce labor costs
3. Reduce the impact of labor shortages
4. Reduce or eliminate routine office and manual tasks.
5. Improve work safety.
6. Improve the product quality.
7. Reduce manufacturing time.

8. Achieve processes that cannot be done manually.

III. OBJECTIVES:

By automation the productivity is increased as there are much less humans for production. High accuracy (because ofapplication i.e., c language). When operated by hand there are greaterprobabilities of mistakes so automation allows in much less human error.It is dependable as it's miles automated.

IV. OPERATING MODES:

1. **Set mode:** In this mode the user can operate devices for desired time period by setting time of operation through user application.
2. **Auto mode :**In this mode devices will operate on default time setting/ time delay which is fed into the program.
3. **Manual mode:** In this mode devices will operate manually by the user. It functions while respective commands are pressed depending on the user's need and flexibility.

V. BLOCK DIAGRAM OF SYSTEM:

1. Microcontroller
2. Relays
3. Bluetooth module
4. Transformer
5. Rectifier
6. Display

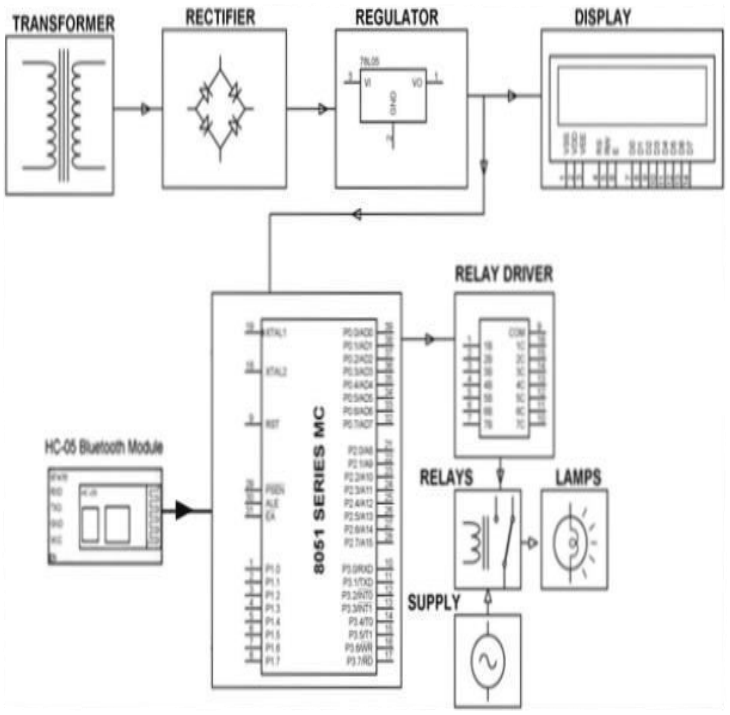


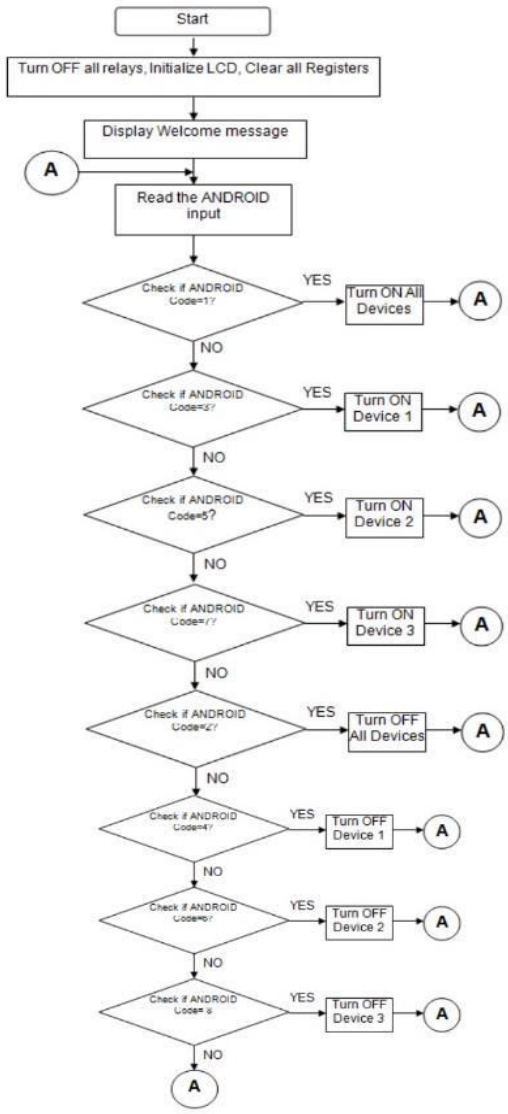
Fig. Block Diagram

The AC mains is given to the transformer primary to get the required voltage at the secondary. Then it is applied to the bridge rectifier, which converts the sinusoidal input into full wave rectified output. The output of the rectifier contains some ripple voltage. To remove this voltage filter circuit is used. A ripple voltage is nothing but a small value of AC over DC signal. Then a pure DC is given to the regulator. The function of the regulator is to give the constant or stable output DC in spite of changes in the load current. This DC signal is given to the input of the microcontroller. Microcontroller, Bluetooth module, relays and LCD are interfaced with each other and commands are shared in between them.

VI. MICROCONTROLLER PROGRAMMING:

In this project we used the Keil C compilerto developa microcontroller program in C language. The followingfigure briefly shows the flowchart of our project. When the system is on, the microcontroller activates its serial port and displays the buttonsthatmust be pressed for different modes on the LCD screen and wait for the command from the mobile phone before taking any action. Whenthe '1' key is pressed, the AUTO mode is switched. in which all loads remain in operationone after the other for a specified time.

SR No.	KEY	DEVICE	FUNCTION	MODES
1	1	1,2,3,4	Turn ON & OFF	Auto
2	2	Light 1	Turn ON	Manual
3	3	Light 1	Turn OFF	Manual
4	4	Light 2	Turn ON	Manual
5	5	Light 2	Turn OFF	Manual
6	6	Motor 1	Turn ON	Manual
7	7	Motor 1	Turn OFF	Manual
8	8	Motor 2	Turn ON	Manual
9	9	Motor 2	Turn OFF	Manual



FLOWCHART OF SYSTEM

VII. SOFTWARE & APPLICATION:

1. Keil:

The Keil 8051 Development Tools are designed to solve the complex problems facing embedded software developers. When starting a new project, simply select the microcontroller you use from the Device Database and the µVision IDE sets all compiler, assembler, linker memory options for you.

2. Proteus:

It is a software suite containing schematic, simulation as well as PCB design . The Proteus is an electronic circuit design software which includes a schematic capture, simulation and PCB (Printed Circuit Board) Layout modules. Proteus is ahead in simulating the circuits containing the microcontrollers where we can simulate the circuit by uploading the hex code to the Microcontroller whereas Multisim can't do this.

3. ISP Programmer:

Atmel-ICE is a powerful development tool for debugging and programming AVR microcontrollers with on-chip debug capability. Atmel-ICE supports: Programming and on-chip debugging of all AVR 32-bit MCUs . It gives you a seamless and easy-to-use environment to write, build, and debug your applications written in C/C++ or assembly code. It also connects to the debuggers, programmers, and development kits.

4. Bluetooth controller:

We used the Android application Bluetooth Controller, which is freely available onthe GooglePlaystore. It is an interface between the user and the system. In industrial applications itacts as a control panel for the user. It contains various keys for issuing commands to the system. The up and down arrows are used toincrease and decrease the time. count each.

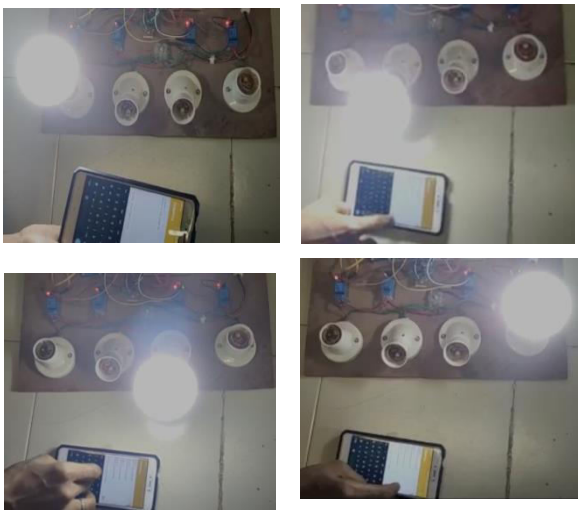
VIII. OBSERVATION:

While controlling through bluetooth switch app, each key is assigned for a particular task. you will be able to pair your device to the system by entering the password then, wait for a few seconds. After successful pairing of device, give the commands through the cell phone for desired operation.

Respective commands are given in following table.

IX. Result

After successfully connecting your android device to the module, you can see all controls and details in controller application. You can see output on system for the key you have selected.



X. FUTURE SCOPE

- Voice interactive services can be added to offer better interaction with user.
- Computer can be interfaced for more simple& precise application.
- We can modify and develop modes of operations to improve functionality.
- By upgrading communication medium such as GSM, IRF, etc. we can increase operational range of the system.
- We can make this system compatible to 3 phase AC system.

XI. CONCLUSION

With the knowledge of new techniques in 'Electronics' we are able to make ourself more comfortable. One such application of electronics is used in "Programmable Switching Control for

Domestic and Industrial Loads" The approach we followed and which is explained in this project report is novel and has achieved the target of " Programmable Switching Control for Domestic and Industrial Loads" satisfying user needs and requirements. Programmable Switching Control for Domestic and Industrial Loads is an automatic versatile system. It can be implemented in industry, home, agricultural field, remote and hazardous applications. It provides flexibility & system reliability with low cost as well as less maintenance. It provides remote access to the system to deliver service at any time of the day. With this system, we can control as well as monitor the devices at a remote location. Hence, we can conclude that the required goals and objectives of our project have been achieved.

XII. REFERENCES:

1. Programmable Logic Controller by J.W.Webb and R.A.Reis.
2. Karnopp, Dean C., Donald L. Margolis, Ronald C. Rosenberg, System Dynamics: Modeling and Simulation of Mechatronic Systems, 4th Edition, Wiley, 2006.
3. 8051 Microcontroler By Ajay Deshmukh.
4. Microcontroller and Embedded System By Mazidi.
5. Telecommunication Switching System and Networks ByThiagarajanViswanathan.
6. Microcontroller and Embedded System - By Mazidi.
7. Telecommunication Switching Systems and Networks - By ThiagarajanViswanathan.

Development of Autonomous Quadruped Robot (Using Image Recognition for Direction Finding)

Tathagat
Student, Electronics, and telecommunication,
SIT Lonavala, SPPU,
IEEE Bombay Section
Pune, India
tathagatk2000@ieee.org

Yogesh Kumar
Student, Electronics, and telecommunication,
SIT Lonavala, SPPU,
Pune, India
princethakur578@gmail.com

Vikram Chavan
Asst. Prof. Electronics and telecommunication,
SIT Lonavala,SPPU,
Pune, India
vchavan.sit@sinhgad.edu

Deepak Thakur
Student, Electronics, and telecommunication,
SIT Lonavala, SPPU,
Pune, India
deepakkrthakur1998@outlook.com

Abstract –The research in autonomous robotics and unmanned vehicles is on the rise with the development of electric automobiles. But the main problem encountered with the wheel-based vehicles and robots is the inability to reach in extreme terrains. To overcome that difficulty, our research is based on the development of leg based quadruped robot which will eliminate the setbacks caused bywheel-based vehicles.

I. INTRODUCTION

The development of concept-mobile vehicles is on the dawn of development in the current world. With its increasing varieties and demand, the development of Drones, Rovers and Multiped bots are on the frontline requirement.This is mainly because the reach of humans in remote locations is still a difficulty in extreme climates and terrains. And this is when robots come into picture.The Autonomous Quadruped Robot (AQUABOT) developed by us, is to overcome the same problem.

II. INPUT DATA AND USE

The input data to be used in the development of the robot is based on the real-life image captures across several projects and image databases. The input image will be processed though a basic neural network which will help classify the real time camera sample inputs of the camera sensor to be used in the robot. This will ensure that the robot recognizes the required parts of the images such as facial features in humans, direction arrows, roads, paths, etc.

The robot, once it has received a fresh image input from the camera sensor, will match it with the previous database (used to train the TensorFlow model) and move in the desired direction, accordingly.

The current database on which the software was being tested was built by *Haarcascades,* which helped it in the basic code of facial recognition using Open CV libraries.

III. SOFTWARE

The software(s) used in the development of the robot include,

A. Blender.
For the creation of a simulated 3D environment, and for the development of all 3D parts and elements to be printed and assembled, creation and rendering is done in Blender 3D.

B. Microsoft 3D Builder.
Used for viewing and inspecting the created 3D designs and modelsregarding the blender files (.stl format).

C. Python (3.9).
Python programming language is used for executing the codes for automating the robot and for other functions such as taking camera input samples and checking with database.

D. TensorFlow.

TensorFlow will be used to create the Machine learning model used for image classification. (Based on Python)

E. Sublime text 3.

Used for code writing and editing. Also, for running and testing python commands. (with regard to current project, first hand used for testing code for taking camera sample inputs.)

IV. HARDWARE

The hardware parts to be used in the building of the robot are of several types, the microcontroller, the robot chassis, the sensors to be used, the connecting wires and cables, and the motors.

The motors to be used are specifically servo motors, either metal geared (MG90 series) for heavier body materials, or plastic geared (SG90 series) for light body requirements. Servo motors are specially used here due to their ability to have accurate and measured movements.

A number of microcontrollers can be used in the proper functioning of the robot such as Arduino UNO (ATMEGA328P), Raspberry Pi, Arduino Pro Mega, etc. The purpose of the microcontroller is to help in processing the power requirements, taking sensor inputs, giving actuator outputs, and processing all the functions in a synchronised manner in order to make the robot function.

The connecting wires used are common jumper cables used in Arduino and RPi project kits.

The types of sensors are basically two. One is the main Camera sensor (camera sensors used can vary from USB webcams and Low power camera modules to RPi camera modules.), and either Wi-Fi module or Bluetooth module for remote controlling and wireless data transmission.

V. CHASSIS

The chassis is the highlight of the robot model. The frame and legs are designed in such a way that it enables free movement of the robot in all directions. With the setting of proper alignment and servo locks, the ground clearance of the robot body can also be varied.

Each leg (ped) of the Quadruped has three joints (elbow joints), which enables it 110^{o} movement in the horizontal plane. Also, the other two connecting limbs offer extended support to elongate the arms and hold them up in the air above the horizontal plane.

The body, the limbs and the joints are all designed using blender and given appropriate dimensions to have a functional aspect.

The body weight is also considerably lower (along with the microcontroller and wire housing) than the legs combined, to ensure that the legs do not malfunction due to excessive weight of the body. (Not accurately calculated, approximated based on the average total weight of the materials and components used.)

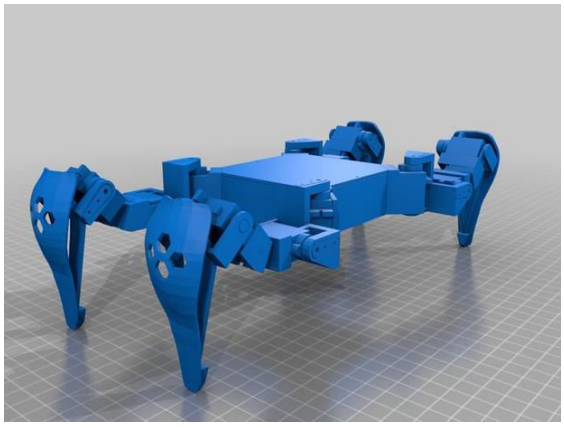


Fig. 1. 3D structure of the proposed chassis model

VI. MATERIAL STUDY

The materials used in the creation of the chassis and the joints can vary as per the user requirement. In the immediate prototype built here, the material used is PVC (Polyvinyl Chloride). With the further development of the specifies robot in the same scope

of application, there are various other materials that can be used instead of PVC.

The said material is used based on two primary factors, first that it can bear the stress imposed on it due to the body weight. Second, that the material is readily available for easy use and that the market rates are at par with the estimated costs for the same.

Carbon fibre, Stainless steel sheets, etc. can be used when the development of the robot when the applications are more rough and heavy duty. To be used in military, space and extreme terrains on ground, the specified materials can be used. Other alloys and dense materials can also be used, but only under specific conditions and based on the type of application customised.

I. WALKING AND STABILITY

There are multiple methods to support the walking mechanism of any quadruped robot. Most of the walking mechanisms depend on the build of the quadruped in hand. The two most wide and common walking gaits used in quad. Robotics are Creep and Trot. The Robot in our development uses the Creep gait.

Creep gait functions when the robot has three legs on the ground, and one is used for moving in the desired direction. This ensures that the COG of the robot is maintained, and it doesn't topple over on one side.

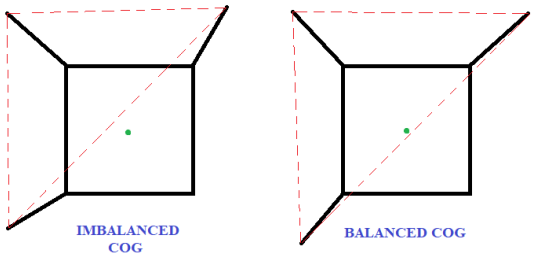


Fig. 1. Walking mechanism to maintain Centre of gravity.

In the shown image, if the green dot (COG) doesn't lie inside the Red dotted triangle, the robot is in the risk of falling due to imbalance.

To prevent this, Creep gait maintains the stationary legs' position such that it maintains its Centre of gravity at a point where the balance is apt for the next leg to be hoisted and moved.

This step is repeated for all the legs in succession to make the walking mechanism fulfil its condition.

II. 3D PRINTING

There are various methods in which we can implement the process of 3D printing to achieve desirable results. The method which is most convenient in the current application is by *slicing* technique.

Some softwares that can help us achieve the sliced models is *CURA or SLIC3R*. There are other softwares which have the same results, but the stated two softwares are accurate.

The proposed 3D printers are those which give the most accurate prints in the most cost-effective technique.

III. SCOPE OF IMPROVEMENT

The current prototype is capable of basic object identification and movement. Upon further implementation of large-scale sizes, advanced grade materials and more precise software, it can be developed to carry out more intricate tasks. Moreover, with the addition of more sensors and communication peripherals like GPS modules, etc. it can be programmed to carry out more intricate outputs uder the given conditions.

IV. CONCLUSION

In this paper, an advancement to the commonly used mode of mobilization in tough terrains id proposed which can ease the movement of cargo and people in inaccessible regions. To achieve the desired application, the method of Quadruped is developed to replace wheel-based vehicles, and the

development of the same is continuous and ongoing. The proposed robot can overcome the setbacks caused by common wheel-based rovers for better mobility and access.

V. REFERENCES

1. Improved object tracking algorithm based on tracking-leaning-detection framework Wu Runze ; Wei Yuxing ; Zhang Jianlin 2017 7th IEEE International Conference on Electronics Information and Emergency Communication (ICEIEC)Year: 2017 | Conference Paper | Publisher: IEEE

2. Development ofthe Gait Planning for Stability Movement on Quadruped Robot GiffarAjiPrasetyo ; Andre Faqih Ilham Suparman ; Zikri Nasution ; EkoHenfriBinugroho ; AdytiaDarmawan 2019 International Electronics Symposium (IES)Year:2019 | Conference Paper | Publisher: IEEE

3. https://oscarliang.com/arduino-quadruped-robot-stalker

4. https://www.hackster.io/yasaspeiris/raspberry-pi-powered-quadruped-bbb68b

Robotic ARM

Prof.P.R.dike[1]
Professor, Department of Electronic and Telecommunication
Sinhgad Institute of Technology, Lonavla, India[1].
Pdike.sit@sinhgad.edu line 1: 4th Given Name Surname

KunalPohane[2]
Student, Department of Electronic and Telecommunication,
Sinhgad Institute of Technology, Lonavla, India[1].
mrpohane2122@gmail.com[2]

Shivani Totawar[3]
Student, Department of Electronic and Telecommunication,
Sinhgad Institute of Technology, Lonavla, India[1].
totawarshivani@gmail.com[3]

Sushant Kumar[4]
Student, Department of Electronic and Telecommunication,
Sinhgad Institute of Technology, Lonavla, India[1].
sushantkumar@gmail.com[4]

Abstract—this is a paper on a robotic arm and their development. It gives a technical introduction to some of the recent research work in this field. This is a working field of research in which there are a number of outstanding open problems and an area of exploration. Nowadays, a different variety of robotic arms are commercially available. Some of them are excellent in accuracy and repeatability. In this paper, we understand the evolution of robotic arm in last 20 years and described different parameters of an arm. Type of robotic arm only depends on these parameters. Our survey may be used for knowledge and guidelines for future research work. The paper concludes with research gaps and proposed work. Robotic arm uses in the different fields like a household, workplace, and working station. Keywords- Robotic arm, axis, degree of freedom, working envelope and space, kinematics, payload, speed and acceleration, accuracy and repeatability.

Keywords- Robotic arm, axis, degree of freedom, working envelope and space, kinematics, payload, speed and acceleration, accuracy and repeatability

I INTRODUCTION

In today's scenario, the precise and repetitive work is effectively done with the help of robots. And the robot with high output, high accuracy and with zero errors is in demand. A computer-controlled mechanical arm is called as a robotic arm, which acts like a Human arm. The main aim of this project is to make a robot that has a capability of picking a pre-specified objects and placing in a different place based on the colors. A Robotic Arm can identify the objects based on colors like Red, Green, Blue, using camera module and image processing technique. Robotic arms are manufactured by using different parameters like number of axis, degree of freedom, working envelope and working space that arm cover, kinematics, payload, speed and acceleration, accuracy and repeatability, motion control and drive of an arm etc. This survey papers to summarize the development in a robotic arm.

Axis are used for movement indication, one use for a line, two for a plane and three for a point at anywhere in space. Roll pitch and yaw control are the main factors of a robotic arm axis, use for full control. Before 1987 robots robotic arms are working. In [2] 2-axis and 3-axis. But now there in [3] 4-axis, in [4] 5-axis, in [5] 6-axis and in [6] multi-axis robotic arms are available. Figure 2 shows a six axis- robotic arm. Freely moving are good for a three dimensions, rotating axis arm must be positive interactive for good stability. Mass of arm should be less for less force of inertia at different joints, lighter arm performs more dynamically than bulky arms at same stability level. Industrial robotic arms are using bulky tool and weight of arm also very high, use for big construction. Robots may become flexible and less in weight by using multiple axis arms

We have discussed robotic arm using different parameters. Now we discuss research gaps using parameters - numbers of axes, degree of freedom, working envelope and working space, kinematics, payload, speed and acceleration, accuracy and repeatability, motion control and drive. There is an ongoing development in the field of number of axes but this field has experienced very little progress. Degree of freedom is a very important part of a robotic arm. In this field, every year, a new technology evolves for improving it, but there is a gap, because there were 6 DOF arms available in 1996 and now most of the arms work on 6 or 7 DOF. Working space and working envelope are getting better with time, it started with a half circle and now the arm can easily cover half of the sphere, but it's possible to cover more than 70 percent. Sphere. Kinematics is also have some gap, some paper was not clearly specifying about it. Payload is very important for industrial arms it should be between 1kg. To 1000kg. Vary according to use. Speed and acceleration may be improved by using effective use of motor and rigid links. Accuracy and repeatability was not much improving before 5 years then they improve continuously. Motion control may become much better in few years. These are main research gap

Raspberry Pi 3 (Model B+):

Raspberry Pi (model B+) has consisted of an ARM 1176JZF-S processor, 512MB SDRAM shared with GPU, one video and audio output, 4 USB port, one HDMI output. A Video Core IV GPU, 1 100 M bit/s Ethernet port, which runs at 700MHz clock speed. It was developed by a foundation of Raspberry Pi in the UK for the use of computer science education. The third version model B+ of the Raspberry Pi is used in this project. It has 26 pins including 8General purpose Input/output (GPIO), one SPI bus, one I2C bus, one UART bus and 3.3V, GND and 5V. The Raspberry Pi needs an external Secure Digital (SD) card to store its operating system and also all the user data.

II. IMPLEMENTATION

Raspbian OS is used in raspberry pi for processing the hardware. Python language is used for identification and detection of the object and its color. Simple CV libraries are used to enhance and process the image through Image processing. In image processing, the input is a low-quality image, and the output is an image with improved quality. Common image processing include image enhancement, restoration, encoding, and compression .Cv libraries are used to identify the color of an object and control the robotic arm for pick and place operations.

The implementation process of this model is done in three steps.

1. In order to identify the object color (RGB) Image processing techniques are used.

2. The Assembling and Controlling of Robotic Arm.

3. Combined vision system with a Robotic arm to control for pick and place actions of the arm.

III HARDWARE

1) Laptop
2) Raspberry pi 3 Model B+
3) Robotic Arm
4) Servo Motor
5) Universal USB cable
6) Ethernet cable
7) Motor Driver
8) Raspberry Pi Camera Module
9) Connecting wires
10) Wi-Fi Router (Internet)
11) Raspberry Pi Camera Module
12) SD card

Raspberry Pi Camera Module

In this project, we are using the Raspberry Pi Camera Module for monitoring the real-time object image on the Raspberry Pi.It supports 1080p30, 720p60 and 640x480p60/90 video. Camera is supported in the latest version of Raspier, Raspberry Pi's preferred operating system. For raspberry pi zero/zero W/Zero WH kindly use a different camera cable.The camera board is integrated with a fixed lens that has a resolution of 5 megapixels.

Current Module

This module allows to maintain the current of a servo motor and work effectively. This robotic arm consists 7 servomotors, and module helps to maintain high speed. A continuous power supply for all servo motors helps to reduce the jerks or choppy movements in them. Current Module 5V, 3A.

Motor Driver

A motor driver is an integrated circuit chip which is usually used to control motors in autonomous robots. Motor driver act as an interface between Arduino and the motors. The most commonly used motor driver IC's are from the L293 series such as L293D, L293NE, etc. These ICs are designed to control 2 DC motors simultaneously. L293D consist of two H-bridge. H-bridge is the simplest circuit for controlling a low current rated motor. We will be referring the motor driver IC as L293D only. L293D has 16 pins.

Servo Motor (SG90)

It is tiny and light weight Servo motor with high output power. It rotates approximately at 182 degrees (90 degrees in each direction). It is a digital version. The advantage of using this servo motor is high speed at high torque value.

Material Study

The arm can be made up of plastics-based 3D printing, wood, scrap materials, acrylic sheet, Aluminum and more. The arm using in our project has a low-cost arm that has a good quality acrylic.

IV. SOFTWARE

1) Image processing
2) Open CV library
3) Numpy Library
4) Python

Image Processing

Image processing techniques are used for detection and identification of the object color (RGB). The values are stored in pixel. The color space is the mapping of the channels of the color model to absolute reference values. The aim is applying a Color Key to an image, picking out a specific color or range of colors in the image and removing them, or replace them with a separate background image.

Open CV Library

Open CV is a cross-platform library using which we can develop real-time computer vision applications. It mainly focuses on image processing, video capture and analysis including features like face detection and object detection

Integrate the vision system with a Robotic arm to control for pick and place the desired object.

Numpy Library

By reading the image as a Numpy array ND array, various image processing can be performed using numbly functions.

By the operation of ND array, you can get and set (change) pixel values, trim images, concatenate images, etc. Those who are familiar with Numpy can do various image processing without using libraries such as OpenCV.

Even when using OpenCV, OpenCV for Python treats image data as ND array, so it is useful to know how to use Numpy (ND array). In addition to OpenCV, there are many libraries

such as sickie-image that treat images as ND array.

Python

Python programming language is used for executing the codes used in the project taking camera input samples . Python language is used for identification and detection of the object and its color.

Fig1. Robotic Arm with Raspberry Pi connection.

V. RESULTS

The establishment of a model that makes robotic arm to pick and place object accordingly had been done. To control the robotic Arm using Raspberry pi many experiments has been conducted. The image processing had been done for the identification and detection of the color of an object, and respective commands are sent to robotic arm to place the detected object. The arm can be controlled automatically as well as manually, which is the certain for the Industrial purpose. The arm can work accordingly in situations where a man may or may not be able to access. Finally all these conducted experiments have gained the accuracy to accomplish the task. Therefore, the arm will pick and place the targeted object one by one, and detection of the object will be done and it will be placed in its respective positions.

VI. FUTURE SCOPE:

It can be used in industrial application to provide speedy, Low cost pick and place systems, with advent of raspberry pi which in future will have models with much improved RAM thus providing a low cost solution, fruit harvesting can be done depending on color of ripe and unripe fruits by making it mobile Robotic Arm

Further application can even help to detect disease or abnormalities in fruits, and can be used in other researches concerning textures and shapes.

We can define many colors using just one code instead of getting different codes as done while using a color sensor, hus making it a robust solution.

Further applications can provide an android application or website through which the full system could be controlled via internet from anywhere in the world.

The system could be Started/Stopped via the Android application, simultaneously providing the live video feed of the ongoing on site process and also provide the data of number of objects sorted and the count of objects sorted out into the various categories

The speed of processing can be further increased on by using much light weight operating systems such as Arch.

VII. CONCLUSION

This proposed solution gives better result when compared to earlier existing system such as efficient image capture, etc. Identification of the colored object by the robotic arm can be controlled for the industrial purpose. The arm can segregate among three colors and place it accordingly. The hardware implementation was carried out using raspberry pi.

VIII. REFERENCE

1] “A robotic arm with labels,” http://i-heart-robots.blogspot.in/, accessed: 2015-08-20.

[2] A. Shirkhodaie, S. Taban, and A. Soni, “Ai assisted multi-arm robotics,” in Robotics and Automation. Proceedings. 1987 IEEE International Conference on, vol. 4, Mar 1987, pp. 1672–1676.

[3] Y. Huang, L. Dong, X. Wang, F. GAO, Y. Liu, M. Minami, and T. Sakkara, “Development of a new type of machining robot-a new type of driving mechanism,” in Intelligent Processing Systems, 1997. ICIPS’97. 1997 IEEE International Conference on, vol. 2. IEEE, 1997, pp. 1256–
1259.

[4] Z. Kuijing, C. Pei, and M. Haixia, “Basic pose control algorithm of 5- dof hybrid robotic arm suitable for table tennis robot,” in Control Conference (CCC), 2010 29th Chinese. IEEE, 2010, pp. 3728–3733.

[5] A. Bejo, W. Pora, and H. Kunieda, “Development of a 6-axis robotic arm controller implemented on a low-cost microcontroller,” in Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology, 2009. ECTI-CON 2009. 6th International Conference on, vol. 1. IEEE, 2009, pp. 328–331.

[6] M. Nakashima, K. Yano, Y. Maruyama, and H. Yakabe, “The hot line work robot system phase ii and its human-robot interface mos,” in Intelligent Robots and Systems 95.’Human Robot Interaction and Cooperative Robots’, Proceedings. 1995 IEEE/RSJ International Conference on, vol. 2. IEEE, 1995, pp. 116–123.

[7] “a six axis robotic arm ,” http://robotics.stackexchange.com/questions/284/which-type-of-actuator-will-be-suitable-for-a-very-strong-robot arm.

[8] V. Potkonjak, S. Taffetas, D. Kostas, and G. Djordjevic, “Human-like behaviour of robot arms: general considerations and the handwriting task part i: mathematical description of

human-like motion: distributed positioning and virtual fatigue," Robotics and Computer-Integrated Manufacturing, vol. 17, no. 4, pp. 305–315, 2001.

[9] "a seven joint robotic arm ," http://opensourceecology.org/wiki/File:Degreesofreedom.gif.

[10] H. Ueno and Y. Saito, "Model-based vision and intelligent task scheduling for autonomous human-type robot arm," Robotics and autonomous systems, vol. 18, no. 1, pp. 195–206, 1996

Design and Development of a Two Wheeled Self Balancing Robot.

Pranay Doble[1], Shradha Parkhi[2], Anagha Bodhe[3], Dr. D. S. Mantri[4]

Student, Department of Electronic and Telecommunication,
Sinhgad Institute of Technology, Lonavla, India[123].
Professor, Department of Electronic and Telecommunication
Sinhgad Institute of Technology, Lonavla, India[4].

pranay.nmdle17@sinhgad.edu[1],shradha.jghnd17@sinhgad.edu[2],anagha.nhlmd17@sinhgad.edu[3],dsmantri.sit@sinhgad.edu[4]

Abstract: ***Two Wheeled Self Balancing Robot is a most popular research topic in the area of robotics and control engineering. This project deals with the theoreticalprinciplesandconceptofinvertedpendulum which is naturally unstable. The major focus on this paper is the hardware development of a two wheeled self-balancing robot. The main application of the projectistocarryobjectsfromoneplacetoanother.The modeling of theself-balancing robot is done in terms of the inverted pendulum. As the two wheeled self-balancing robot is unstable and nonlinear different types of controllers like PID are used.***

Keywords:Selfbalancingrobot,Invertedpendulum,PID controller.

I. INTRODUCTION:

Robotics has always been played an integral part in the human life. The dream of creating a machine that replicates human thought and physical characteristics extends throughout the existence of mankind.

Developments in technology over the past fifty years haveestablishedthefoundationsofmakingthesedreams come true. Robotics is now achievable through the miniaturization of the microprocessors which performs the processing and computations.

To make a self-balancing robot, it is essential tosolve the inverted pendulum problem or an inverted pendulum on cart. While the calculation and expressionsareverycomplex,thegoalisquitesimple: the position so that the inclination angle remains stable with in a pre- determined value, when therobot starts to fall in one direction, the wheels should move in the inclined direction with a speed proportional to angle and acceleration of falling to correct the inclination angle. So, we get an idea that when the deviation from and when the deviation is large, we should move more quickly. Self-balancing robot is an inverted pendulum example problem therefore it is difficult to balance[1].

The paper proposes the idea is to keep the robot upright by driving the wheels towards the leaning angle tilted.

The main objectives of this paper are

A. To get the robot to settle at the upright position in the shortest settling time and smallest overshoot.

B. To demonstrate the methods and techniques involved in balancing an unstable robotic platform on two wheels.

C. To move a predetermined distance along the horizontal whilst keeping its uprightposition.

The Complete paper is organized in different sections as,
Section II: Explanation about block diagram,
Section III: Working of self-balancing robot
Section IV: Flow Chart
Section V: Explore the functionality
Section VI: Hardware requirements
Section VII & VIII: Result is discussed and concluded.

II. BLOCKDIAGRAM:

The design of the system is quite challenging to bring the hardware and software to work together. The main components in the circuit of the two-wheel balancing robot are

The MPU (6050), theAtmega328controller, the stepper motor, motor driver, ultrasonic sensor, bluetooth and 12V battery.

Fig 1 shows the overall block diagram of the electronic system for the balancing robot. The MPU6050 is used to measure the acceleration and the angular rate of the robot and the output is processed into digital form. The raw inputs from the IMU are further processed to obtain thetilt angle of the robot. This tilt angle is then fed into the PID controller algorithm to generate the appropriate speed to the stepper motor in order to balance the robot. The ultrasonicsensorisusedtomeasuretheobjectdistanceand help the robot to prevent accident[2].

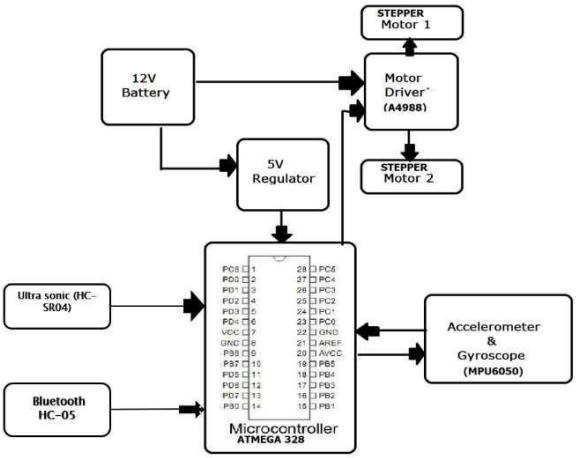


Fig 1. Block diagram of Self-balancing Robot

III. WORKING:

The basic component which is required for working of the self-balancing robot is a control system, PID algorithm, sensor and actuator. The inverted pendulum can't control itself in an upright position as shown in Fig 2.

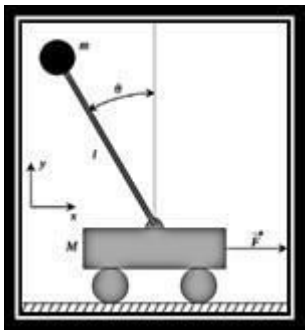


Fig 2: A inverted pendulum model

If we look at the Fig 2. when force is applied in a forwarding direction the pendulum moves in a backward direction so, therefore inverted pendulumis considered highly unstable. With the help of a microcontroller, the control system establishes aclose feedback loop between the sensor and actuator. The data generated by the motor process and fed to the sensorthenitiscomparedwiththesetpointanddetect forerrorwiththehelpofthePIDalgorithm.Afterthat, the output is fed to the microcontroller and then the actuator resets its position according to new data[3].

IV. FLOW CHART:

The Fig 3. represents the step by step working of the model.

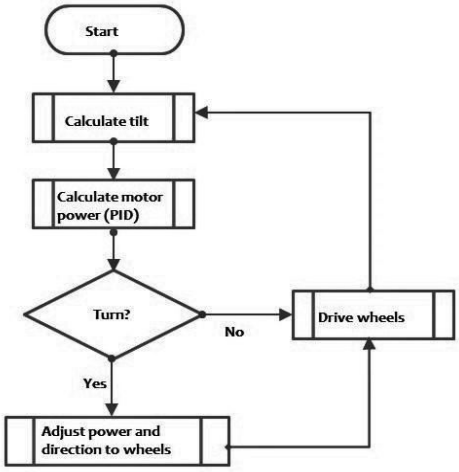


Fig 3. Flow Chart

Step1:Therobotisstartedwhenthepowersupplyof5vis applied to the microcontroller.
Step2:byusingtheMPUsensorthetiltvalueiscalculated. Step 3: The title value is fed to the PID algorithm and is compared with thesetpoint.
Step 4: After comparing the value with the setpoint it is feedback to the driving wheels and it adjusts its power and direction of the wheel.
Step 5: This process is followed in a continuous closed loop.

V. FUNCTIONALOPERATION:

The detailed operation of self-balancing robot is divided in different parts as

A. CONTROLSYSTEM:

The purpose of a control system is to keep a system, withinaspecifiedrangeofelementsandsetvariables.With the help of close loop feedback with the help of sensorand actuator. This could refer to numerous applicationssuch as production, assembly and industrial plants through to computer, electrical and electronic systems. For this it refers to the control system charged with maintaining stabilityoftherobotchassisasshowninFig4.Controlling the stability of the balancing robot requires sensors to detectthedirectionandrateofmotionaswellasadecision-based application that will provide the response signals to the actuator[4].

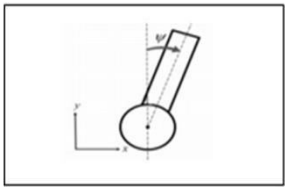


Fig 4: Simplified sketch showing the tilt angle, ψ and the position x

B. PID CONTROLSYSTEM:

The algorithm which was used to balance the self-balancing robot on its own was PID controller. The Proportional-Derivative-Integral (PID) is an instrument used in control applications such as to regulate temperature, flow, pressure, speed and other process variables. It is also a closed loop control system and also called as negative feedback system. PID is the most stable controller. The working principle behind a PID controller is that the proportional, integral and derivative terms must be individually adjusted or "tuned"[5].

A PID controller continuously calculates an error value e(t) which is subtraction of desired outputvalue from the reference set-point value. The error is then given to the PID controller, where the error gets managed in three ways and summation of those isuse to create the correcting signal. Again, the error value isgiventothefeedbackloopandtheprocesscontinues till it get stable. Fig 5. represents the concepts ofPID

$$V(t) = Kp*e(t)+ Ki \int e(t)\,dt+Kd\, de/dt \quad --(1)$$

where,

V(t) is the voltage,
e(t) is the errorsignal,
Kp is the proportional gain,
Ki is the integralgain,
Kd is the derivative gain

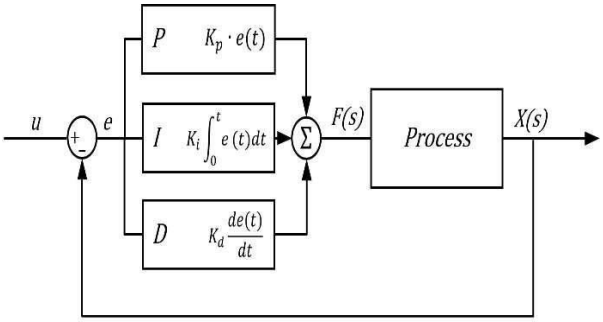


Fig 5: Concept of PID

C. EFFECT OF CONTROL PARAMETERS ON THE CLOSE LOOP SYSTEM:

Due to proportional controller, we will have reduced the rise time but no effect on steady state error.Anintegralcontrolloopreducesthesteady-state errorforstepinput,butnegativeeffectonrisetime.A derivative increases the stability of the system as well as reduces the overshoot. Table 1. shows effects of PID

Table 1: PID parameter effect comparison.

Closed loop response	Rise time	Over shoot	Settling time	Steady state error
Kp	Decrease	Increase	Small Change	Decrease
Ki	Decrease	Increase	Increase	eliminate
Kd	Small Change	Decrease	Decrease	No change

VI. HARDWAREREQUIREMENTS:

A. MPU6050

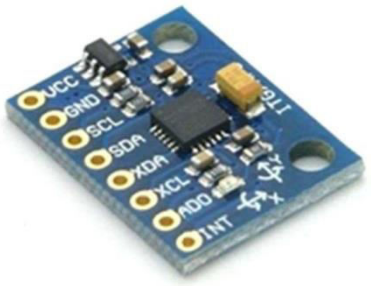


Fig 6: MPU 6050

- MPU6050 sensor module is 6-axis Motion Tracking Device as shown in Fig 6.
- It has 3-axis Gyroscope, 3-axis Accelerometer and Digital MotionProcessor.
- It has I2C bus interface to communicate with the microcontrollers328P.

Specifications:

a. Supply voltage: 2.3-3.4 V
b. Accelerometer
   1. Measures ranges: ±2g ±4g ±8g ±16g
   2. Calibration tolerance:±3%
c. Gyroscope
   1. Measuring ranges: ±250/500
   2. Calibration tolerance:±3%

B. STEPPERMOTOR

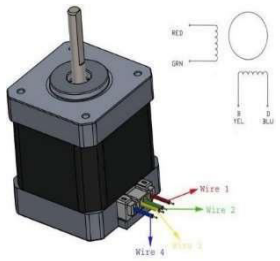


Fig 7: Stepper Motor

- Above Fig 7. shows stepper motor whose operating voltage is 12v, it is 3 phase brushless DC motor and divides full rotation 200 stepper revolution with step angle is equal to1.8.
- It has high torque and low vibration at lowspeed.

represent stepper motor.
Specifications:

a. Weight: 350g
b. Size: 42.3mm square x 48mm
c. Voltage rating: 4V

C. STEPPER MOTORDRIVER

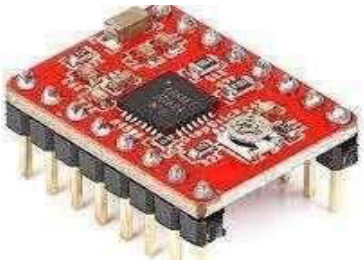


Fig 8: A4988 Stepper MotorDriver

- Fig8showsthemoduleofsteppermotordriverit has output drive capacity of up to 35 V and±2A.
- Has built-in translator for easyoperation.
- This reduces the number of control pins to just 2, one for controlling the steps and other for controlling spinningdirection.
  Specification:
  a. Maximum operating voltage:35V
  b. Minimum operating voltage:8V
  c. Current per phase:2A
  d. Micro step resolution: Full step,1/2 step,1/4 step,1/8 step and 1/16step

D. ATMEGA 328P

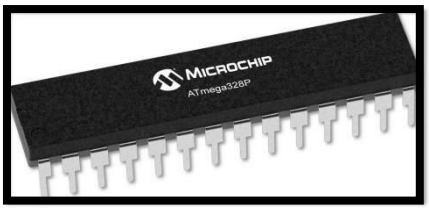


Fig 9: A4988 Stepper Motor Driver

- Atmega328PasinFig9isan8-bitAVRRISC-based microcontroller.
- It has 32kb flash memory with read-while-write capabilities, 1024B EEPROM, 2KB SRAM, 23 general-purpose input-output lines, 32 general purpose working registers, and three flexible timer/counter.
- SPI- serial port,6-channel 10-bit analog to digital converterandthedeviceisoperatinginarangeof1.8-5.5 V

E. LITHIUM POLYMERBATTERY

Specification:
Voltage: 11.1V
Constant Discharge: 30C (10.5A)
Max discharge: 40C (10 sec)
Dimensions: 74 x 34 x 22 (LxWxH)(mm)
Weight: 107 gm
Charge Rate: 1-3C Recommended, 5C Max

Fig 10: LiPo battery

VII. RESULT:

By doing the simulation using Arduino IDE we are able to get the values of yaw, pitch, and roll as shown in the Fig 11. The graphical representation of yaw (pink) and pitch (sky blue) and roll (yellow) are shown in Fig 11. For the initial time, the value is oscillated after that it becomes stable and it is followed in a close loop pattern after deriving this value for self-balancing robot works well.

After simulation, the final working model is implemented as in Fig 13, which consist of all the component mention in the section VI

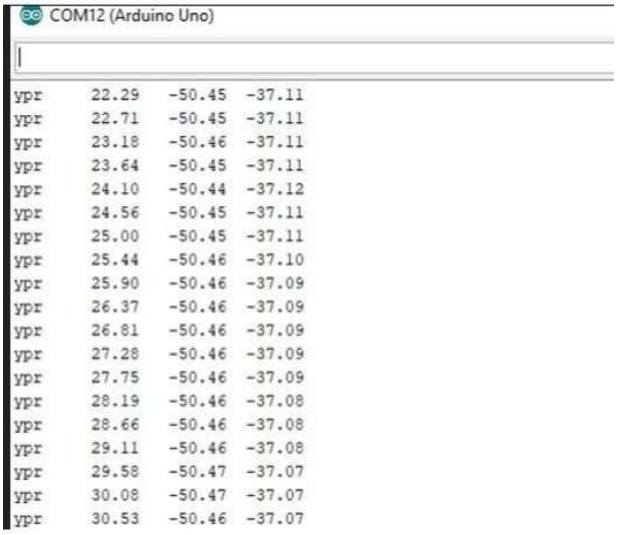


Fig 11: Readings of yaw, pitch and roll

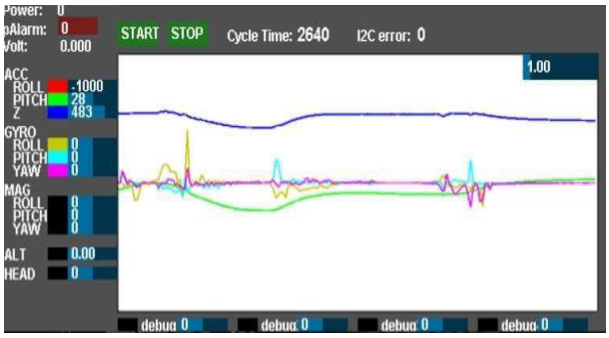


Fig 12: Representation of poles

Fig 13: Self balancing robot

VIII. CONCLUSION:

This paper has presented implementation of a two-wheel self-balancing robot equipped with two supporting wheels. The structure as well as hardware components has been introduced. The self-balancing robotisabletoholditsuprightpositionintheshortest settling time and can move a predetermined distance along a horizontal line. And can carry objects from one place toanother.

REFERENCE

[1] Yun Su, T. Wang, K. Zhang, C. Yao, Z. Wang ,"Adaptive Nonlinear Control Algorithm for a Self-Balancing Robot", in IEEE access vol. 8, pp. 3751 - 3760,2019.

[2] Xiao WU, Yulei GONG and HuijiaoMA ,"Research on Control Strategy of Two- wheeled Self-balancing Robot", in 2015 International Conference on Computer Science and MechanicalAutomation.

[3] Hau-Shiue Juang and Kai-Yew Lum , "Design and ControlofaTwo-WheelSelf-BalancingRobotusingthe Arduino Microcontroller Board", in 2013 10th IEEE International Conference on Control and Automation (ICCA)

[4] RuanXiaogang,CaiJianxian,LiXinyuan,ZhaoJianwei. Research and "Design of Two- wheeled Self-balancing Robot". Beijing: Science Press,2012.

[5] KealebogaMokonopi, "BALANCING A TWO WHEELED ROBOT", A dissertation report Courses ENG 4111 and ENG4112 Research Project (Issue: November,2006).

VISION BASED AUTONOMOUS CAR

R.Sivaraj[1], P.Siva[2], S.Joy Sebastin[3], V.Tamilselvan[4]
Department of Mechatronics Engineering.
Kamaraj College of Engineering and Technology.
Virudhunagar, Tamil Nadu
18umtr026@kamarajengg.edu.in,18umtr033@kamarajengg.edu.in, 18umtr025@kamarajengg.edu.in, 18umtr010@kamarajengg.edu.in

***Abstract*--This paper presents a unique characteristics of autonomous car. In future autonomous car plays a vital role in transportation. Autonomous car available in 2030's on market. The emerging technologies such as artificial intelligence, machine learning, artificial neural network, convolution neural network, open computer vision has been used. Autonomous car becomes an autonomous part in our society. In our project came rain front of the car take a real time picture – image converted into grey scale image – then to HSC (hue, sat, val) image – masking the color of the image pixel summation – map the magnitude of pixel with turn rate – command to motors of car – movement of car. In traffic signal detection convolution neural network is used with keras library. Next preprocessing data with augmentation – grey scale conversion – alignment – training process – input signal to firmware – automatic movement after the completion of training**

Keywords--- camera, image processing, motor control, vehicle movement

I. INTRODUCITON

Car is one of the important vechile, which has a vital role in transportation and comfort. Due to the advancement of technologies many changes has been done in the path of advancement in car, some advancements have been done in wheels, motor, engine, fuel, brake, transmission system, comfort, design, look, sockoberver, gear system etc. But now a day scientists, engineers and other car manufactures concentrating in the manufacturing of autonomous car. Our society has a doubt why we want to move on autonomous car? Simple answer is to prevent accidents, with following the traffic rules and obstacles detection. Another important thing is drivers can't drive continuously they need break and rest during driving, sometimes drivers may drunk and feel sleepy and lack of concentration. so that accidents are happening. So the scientists move on to the autonomous car. . An autonomous car is a vechile capable of sensing its environment and operating without human involvement. A human passenger is not required to take control of the vechile at any time, nor is a human passenger required to be present in vechile at any circumstances. The car will automatically run when the target is fixed. This car is operated by modern technologies such as internet of things, artificial intelligence, machine learning, neural networks, open computer vision and with high level programming language like python. With this modern technologies autonomous car become true.

II. AUTONOMOUS CAR

This project is a robotic vehicle which can able to detect lanes in the road by using camera. The aim of the project is to auto-pilot the automobile to achieve the better experience in fearless travelling with automobile. Also, We provide the convolutional neural network model for traffic sign recognition. In this project,camerain front of the car take a real time picture of lanes by means of 20-30fps.Then these pictures converts the pictures into gray scale so that we can use it in the image processing with the help of openCV. Here, We are using rasperry pi as our main module that provide us the hardware support of python. High level programming language like python contains advance image processing modules and machine learning tools than can manipulate the images and data as per our wish. We use the CV2 module to program our processor to achieve image processing. Then we have used a powerful machine learning module like keras to provide traffic sign recognition. After processing image processor commands the vechile to move.

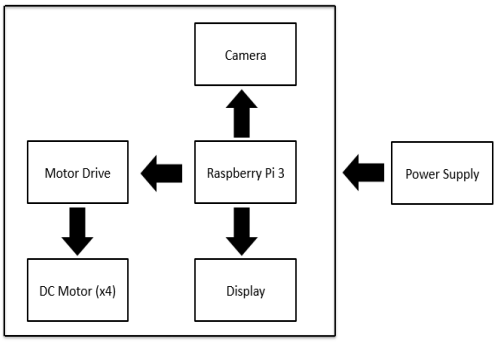
III. LANE DETECTION

Firstly, we have converted taken picture (one picture at a time) into the grey scale images and then into HAV(Hue,Sat,Val) images. we have adjusted HSV parameters to achieve our detection of lane(in our case, white colour) in the road. Then, mask all the other colors with black with the help of cv2.Then,We have use technique of pixel summatiomto detect the magnitude and direction of the Pixels. Assume the linear curve that contains the values of the Turn rate. Then, we have map the magnitude of pixels with turn rate. With the help of map list function inpython.then, the turn rate has given to the motor module to achieve precise turn of vehicle.

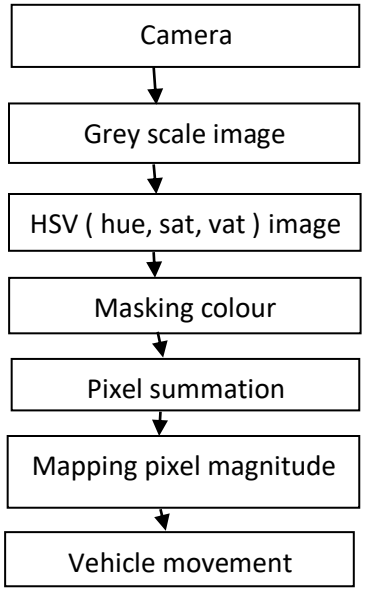
IV. TRAFFIC SIGN DETECTION

In traffic sign detection, we firstly created the convolution neural network model with the help of keras library. It's a supervised learning model which has two convolutional layers with contains two max pooling layer for resize the image and output with ReLU activation function and also have fully connected layers with soft max activation function so we have to flatten the output of the convolution neural network. So that we can able to use it in fully connected layers. After the creation of the model, we have trained it by using certain amount of preprocessed traffic signs image data. Preprocessing the data contains augmentation, grey scale convertion align it with labels then training process. Then we have make a copy of the image that is taken by the camera and resized it. Then, it is given to the same preprocessing that we did before except that the labels. After preprocessing it ready pass through the model for classification. With classification result it generated the interrupt signal to firmware So that thecar can results the certain action by the program. According to program processor commands and car runs This cycle continues.

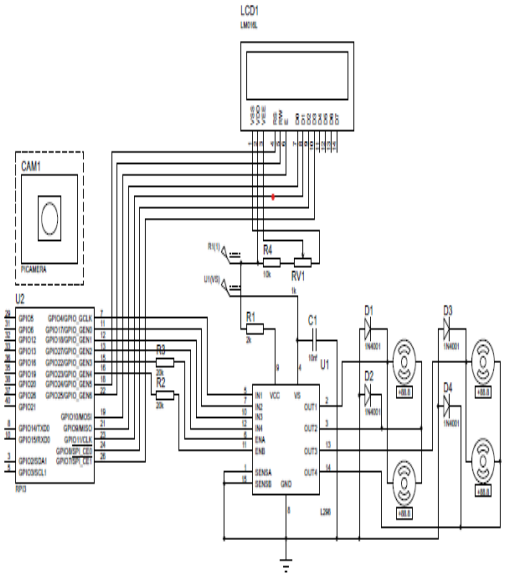
V. BLOCK DIAGRAM



VI FLOW CHART



VII.CIRCUIT DIAGRAM



VIII RESULT

The main outcome of the project is to reduce the human effort on self driving cars. Implementing automation in the cars based on neural networks for making the machine to learn and collect new data from the surroundings & implementing them in real time work. This project can reduce the accidents happening suddenly by following the traffic rules correctly by seeing and learning them.

XI CONCLUSION

In Automation of vehicles, Artificial Intelligence plays a vital role. It works on Data which is given by user and uses it on the right time when it needed. This Big Data can be access by Machine Learning algorithm. Raspberry Pi is become a popular micro-processor which can do fast process on big data and runs python code. Its processing speed is fast, so it can runs bigger processes efficiently. Electric Vehicles are now equipped with autonomous systems. Due to the lack of Vehicle-to-Infrastructure (V2I) communication, Traffic Signal Detection is considered as an important module in vehicles and can be done efficiently with the help of Deep Learning Neural Networks

X REFERENCE

- Zhenchao Ouyang, Jianwei Niu, Yu Liu, Mohsen Guizani: ***Deep CNN-Based Real-Time Traffic Light Detector for Self-Driving Vehicles.***
- Md Tarequl Islam: ***Traffic sign detection and recognition based on convolutional neural networks.***
- Phil Kim. ***Deep learning with Machine learning, Neural networks and artificial intelligence****, ISBN: 9781484228449.*
- Md. Abdul Alim Sheikh, Alok Kole, Tanmoy Maity: ***Traffic sign detection and classification using color feature and neural network.***
- M.Vidhyia, S.Elayaraja, M.Anitha, M.Divya & S.Divya Barathi, Department of Civil Engineering, PSG Institute of Technology & Applied Research: ***Traffic Light Control System Using Raspberry-PI***
- Eben Upton, Gareth Halfacree. ***Raspberry Pi User Guide (4th Edition),*** ISBN: 9781119264361, 2016
- Jake VanderPlas. ***Python Data Science Handbook: Essential Tools For Working With Data,*** ISBN-13: 9781491912058, 2016
- Umberto Michelucci. ***Applied Deep Learning: A Case Based Approach By Deep Neural Networks,*** ISBN-10: 1484237897, 2018.
- Kareem Alkaseer. ***Machine Learning and Big Data,*** Published on 2020

Analysis of the factors causing disputes in Nashik Construction Company

[1] Mangisha Yadav, [2] Dr. A.P. Shelorkar

[1] *M.E Student, M.V.P.S's KBT College of Engineering, Nashik, Maharashtra,India*

[2] *Assistant Professor, M.V.P.S's KBT College of Engineering Nashik, Maharashtra ,India*

***Abstract*: As the construction industry is covering a rapid growth across the world, disputes have been arising due to various factors in the sector and to prevent these uncertainties it is mandatory to take some actions to settle these problems for the smooth running, functioning of the construction sector. This study focuses to analyze the various factors that causes disputes in the Nasik Construction Industry. As the industry is dynamically changing due to this the construction projects are probably going to have various potentials for disputes which depends upon the size of projects, time of completion of the project, delay, financial failures etc. In this paper a literature survey is conducted that gives the responsible factors that leads to disputes in construction. Accordingly, the conflict arising in the contractor, consultant, client is studied and the reasons, causes of the disputes are found. Thus the further analysis will be carried out with the help of a statistical method to determine the various causes of disputes according to their importance.**

Keywords: Construction disputes, causes, factors, contractor, client, consultant.

1 INTRODUCTION

The construction sector is a compound sector in which client , contractor, consultant with various views, talents and levels of knowledge of the construction process work together. In this sector the client, contractor ,consultant from various parts have their own goal to get maximum profit . Construction disputes may happen often during every construction project and could take place at any time during the design and construction phase of the project. It is essential to know the causes of dispute in the field, to avoid delays since majority of the money is locked in the construction sector to avoid these reasons one should know the reasons of dispute happening on the field and between the client ,contractor, consultant as well the authority running the cases as" arbitration" and "conciliation act "1996(India) for the disputes. There is a special provision provided in the contract for the Alternative disputes resolution and Dispute Resolution Boards techniques. However there is a uncertainty between the dispute and conflict between the people of the sector . conflict and dispute are two distinct notations. Conflict exists wherever there is irreconcilability of interest. Conflict can be coped , possibly to the extent of avoiding / preventing a dispute resulting from the conflict. On the other side disputes are one of the major factors which delay the successfully completion/progress of the construction project. Disputes are associated with distinct judiciary laws and require resolution such as the arbitration process Dispute may be defined as the disagreement between two people / or employees of same field, organization or other to reach one single objective with different opinions and ideas of thinking for a work or a project Conflict it is a condition which occurs when the parties consider two or more competing options to satisfy a particular situation when there are chances of occurrence of threat to their needs.

2 LITERATURE SURVEY

Udechukwu ojiako, et al, (2018),. In this paper it examines, the rule of law and, justice implementation of using the Online Dispute Resolution platforms as technology-mediated, interfaces for small level dispute resolutions in the construction projects. Data is obtained by the questionnaire survey, among the construction people ,professionals, administered using direct ,non-random sampling of professional contacts with the authors.

Keyao Li, et al, (2017), showed Effective dispute management contributes to the cleaner production of the construction works . His study has this main objective of arobust bias conceptualization in the construction dispute negotiation is developed. Data on practice of biased behaviors in the construction dispute negotiation have been collected from three sources: i) by the self-reflection of the disputants; ii) by self realization of the disputants in a the dispute negotiation simulation; iii) by observations of dispute solving by the third party

A.A. Elziny, et al, (2015), his study attempts to shed a great deal of light on the problem of construction dispute in the Egyptian projects. This paper presents a review of the available literature on analysis of disputes. The objective of this paper is to provide an excellent and expert system that can evaluate the overall dispute settlement procedures . A questionnaire has been used to study dispute origins and resolution methods.

N.B. Chaphalkar ,et al, (2015). His study focuses on determining the I factors for construction disputes related to claims raised due to variation from 72 arbitration awards through Case Study approach and furthermore statistically proving their importance in arbitral decision making by seeking professional cognizance through a questionnaire survey..

Emre Cakmak, et al, (2014), This paper aims to analyze the main causes of disputes which occur in the construction company. In order to fulfill this aim, a literature review was done to identify the common construction disputes occuring in the industry. using the analytical (ANP) approach to determine their importance The paper aims to analyze the important causes of disputes which occur in the construction industry.

Sources of conflicts and disputes

To search the various factors that are responsible for disputes and conflicts in the Nashik construction company, a questionnaire survey was conducted. The questionnaire was sent to professionals of the Nashik construction companies. A response rate of 56% was achieved also a literature survey was conducted where the various researchers analyzed and found the various factors that were common in most of the papers **.**Also further , the selected factors are classified in the following categories

Table .1 Lists Of Factors Causes Conflicts And Disputes In Construction Projects

Contract related	1.1 Risk allocation
	1.2 Ambiguities in the contract documents
	1.3 Different interpretations of the contract provision
	1.4 Other contractual problems
Owner related	2.1 Change of scope
	2.2 Late handling over of possessions
	2.3 Unrealistic expectation
	2.4 Design variation initiated by owner
	2.5 Payment delay
Contractor related	3.1 Quality of work
	3.2 Time extension
	3.3 Lack of communication
	3.4 Technical inadequacy of the contractor
	3.5 Delay in work progress
	3.6 Financial failure of contractor
Design related	4.1 Quality of design
	4.2 Incomplete specifications and design errors

3 DATA COLLECTION

Using an electronic survey tool, data is collected which is then summarized, evaluated and discussed. In the view of the objective the data from the survey is collected against the literature review.

Demographics. With the help of questionnaires, demographics the various factors causing disputes were obtained The following pie chart shows graphical representation of the following data,

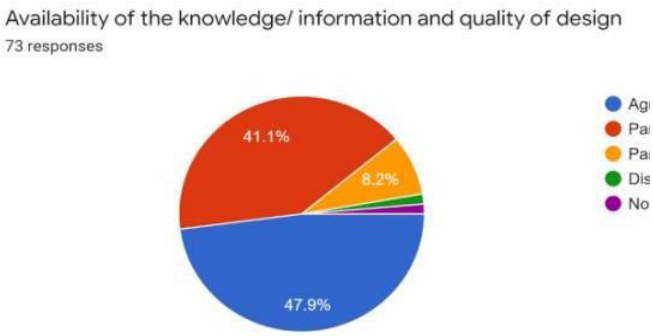


Fig.1 Respondents view on availability of information and quality of design

The above figure demonstrates the response received in chart format when asked whether the improper quality design and availability of information are the causes of disputes or not , so its been seen that 47.9% of the population agree with this while 41.1% partially with this and the remaining 8.2% partially disagree with this.

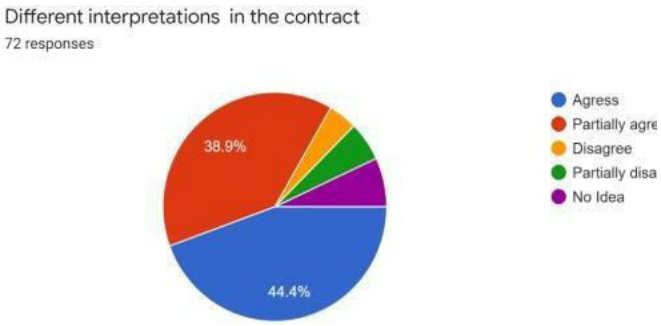


Fig 2. Respondents view on different interpretations in the contract

The above figure demonstrates the response received in chart format when asked whether the different interpretations in the contract causes disputes or not, so its been seen that 44.4% of the population agree with this while 38.9% partially agree with this.

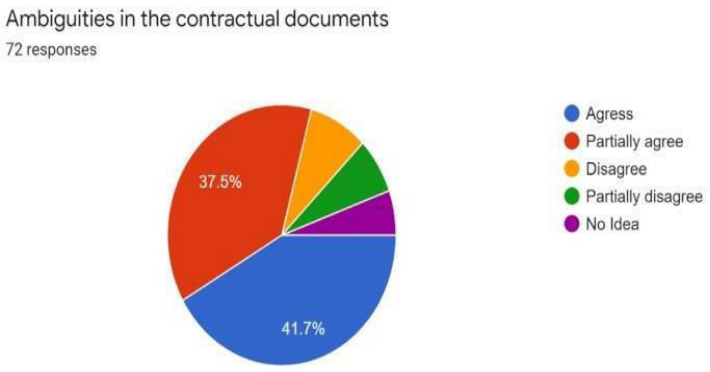


Fig 3.Respondents view on contractual documents

The above figure demonstrates the response received in chart format when asked whether the ambiguities in the contractual documents causes disputes or not , so its been seen that 41.7% of the population agree with this while 37.5% partially agree with this .

4 RESULT AND DISCUSSION

From the literature survey the various factors causing disputes were identified and were categorized into main 4 groups i.e owner related, contractor related, contract related and design related .Also from the questionnaire survey the main factors were identified ,about 17 factors were found from both the surveys .

5 CONCLUSION

In this study, the main causes of disputes causes in the construction industry were identified. First of all the main causes of construction disputes were determined with a comprehensive literature review .Then, the disputes derived from the literature were classified into main groups .According to the classification , main disputes categories were found as owner related, contractor related disputes, design related disputes and contract related disputes. The future work will be carried out to find the most critical factors that cause disputes in the construction industry with the help of analytical tool One way ANOVA technique.

6 REFERENCES

[1] Udechukwu Ojiaka , Chipulu, Maxwell ,Marshall, Alasdair and Williams, terry "An examination of the 'rule of law' and 'justice' implications in online disputes resolution in construction projects" , International journal of project management **(2018)**. p-p 301-316.

[2] A.A Elziny ,M.A Mohamadien ,H.M .Ibrahim ,M.K.Abdel Fattah. "An expert system to manage disputes resolution in construction project in Egypt",Ain shams engineering journal **(2015)**.p-p 57-71

[3]N.B Chaphalkar ,K.C. Iyer, Smita K. Patil , "Prediction of outcome of construction disputes claims using multilayer perceptron neural network model" ,International journal of project management, **(2015)**

[4]A.A Elziny , M.A.Mohamadien ,H.M.Ibrahim ,M.K. Abdel Fattah , "An expert system to manage disputes resolutions in construction projects in Egypt", Ain shams engineering journal **(2015)** .p-p 57-71

[5] Emre Cakmak, Pinar Irlayici chakmak , "An analysis of causes of disputes in the construction industry using analytical network process", Procidia – social and behavioral sciences ,**(2014)** .p-p183-187.

[6] Sandbhor, " Application of neural networks in resolution of disputes for escalation clause using neuro- solutions". KSCE Int. J. Civ. Eng. 19, **(2014)** p-p 10–16.

[7] Cakmak, "An analysis of causes of disputes in the construction industry using analytical hierarchy process (AHP). AEI" Science direct ,**(2013)**. p-p 183-187.

[8]Carneiro, "Using case-based reasoning to support alternative dispute resolution." Adv. Intell. Soft Comput. 79, **(2010)** p-p 123–130.

[8]A.H.A.T.M.N.S.N.Jaffar , "Factors of conflicts in construction industry : A literature review,"in the 2nd International Building Control conference , **(2011)**

[9] T.M .Sitigus Mitkus, " Causes of conflicts in a constructional industry: a communicational approach ," in contemporary issues in Business, Management and Education **(2013)**

[10] Y.D.L.a.J.K.K .Nirmal Kumar Acharya, "Critical construction conflicting Factors Identification using Analytical hireachy process ."KSCE Journal of civil Engineering,Vol 10 no 3, p-p 165-175,
(2006)

[11] Arditi, "Predicting the outcome of construction litigation using neural networks" Infrastruct. Eng. 13 **(1998)** p-p 75–
81.

[12]Kumaraswamy,"Conflicts, claims and disputes in construction." ,Construction management and economics **(1997)** .p-p 95-111.

SEISMIC ANALYSIS OF BUILDING USING STADD-PRO

1)Anuja Ahire,
Dept of CivilEngineering Student,
Savitribai Phule Pune University,
Nashik, India,
anujaahire25@gmail.com

3) Vidya Shinde,
Dept of CivilEngineering Student,
Savitribai Phule Pune University,
Nashik, India,
vidyashinde2018@gmail.com

2)Pragati Palve,
Dept of CivilEngineering Student,
Savitribai Phule Pune University,
Nashik, India,
palvepragati16@gmail.com

4)Vaishali Wagh,
Dept of CivilEngineering Student,
Savitribai Phule Pune University
Nashik, India,
waghvaishali097@gmail.com

ABSTRACT

Earthquakes constitute one of the dangerous hazards of life and property on the earth.The earthquake resistance construction is considered to be very important to mitigate their effects.This paper presents the brief essentials of earthquake-resistant construction and few techniques to improve building and building material resistance to earthquake forces.rom previous earthquakes, it has been shown that a large amount of tall buildings have turned out to be overall engineering marvels.Currently, it has turned out to be essential to decide seismic reactions over such structures.Earthquakes, their frequency and effects, as well as their influence and structural reaction, have been researched and well known for many years in earthquake history.the primary goal for seismic resistant design of ordinary structures is to prevent collapse and loss of life as structural steel is a very ductile material with make earthquake resistant building as the steel is recyclable and reused it is a green material. The embodied enrgy for the efficiently designed steel structure is less than the rcc structure.for sustainable green building steel is best material nowdays.IS 1893:2016 response spectrum analysis is done for the frames in staad pro software.this paper discuss same of the underlying issues and highlights serval approaches to achieve structural system that are more sustainable

KEYWORDS: Earthquake , Earthquake Resistance Building, G+6 Stories Building, Staad-Pro, Dead Load, structural steel, sustainable designs

I. INTRODUCTION

The viewpoint of seismic design can be summarized as:

The design viewpointimplemented in the code is to confirm that structures have at least a least strength to

i) Resist minor earthquake (< DBE), which may occurfrequently, without damage;

ii) Resist moderate earthquake (DBE), without significant structural damage through some non-structural damage.

iii)Resist major earthquake (MCE) without collapse.

“The maximum earthquake that can reasonably be predicted to occur at the site once during the structure's lifetime is known as the Design Basis Earthquake (DBE).The earthquake corresponding to the ultimate safety requirements is often called as Maximum Considered Earthquake (MCE). Generally, the DBE is half of MCE”

Earthquake are one of the nature’s greatest hazards on our planet disaster are unexpected events caused by the sudden movement of the tectonic planets in the earth crust as a result of release of elastic energy in matter of few second. It is caused due to a sudden release of energy in the earth’s crust which result in seismic wave. when the seismic waves reach the foundation Level of the structure,it experiences horizontal and vertical motion at ground surface level.

Earthquake Are related to compression or tensional Stresses, volcanic eruption,rock fall,landslides and explosions can also cause earthquake.

Design it means that it is analysis of forces building due to loads acting on it.

A structure is enough to resist the earthquake then such building is called earthquake resisting structure such design is called earthquake resistance design.

The concept of earthquake resisting design is that the building should be designed to resist the forces which arise due to design basic earthquake with only minor damages and the forces which arise due to maximum considered earthquake with some accepted structural damage but no collapse.In this project we can use different methods.Seismic analysis and design of G+6 storied R.C building with asymmetrical plan.

The Building Model and Calculation Using the Software STAAD PRO. Building which analysed using manually calculationtechnique.

The response spectra as per IS 1893(part 1):2002 for hard soil analysis is performed various load and load combination for design of beam and column by using as per IS 456:2000.

final design is obtained from software and it is compared by using IS 1893:2002 and IS 1893:2016

METHODS

As a building is shaken by ground vibrations during an earthquake, it vibrates. Any three mutually perpendicular directions can be used to overcome the arbitrary motion of the ground caused by an earthquake: the two horizontal directions (x and y) and the vertical direction (z).The framework vibrates or shakes in all three directions as a result of this motion, with horizontal shaking being the most common. In general, structures built only for vertical shaking can be unable to safely withstand the effects of horizontal shaking. The inertia forces produced by the horizontal components of ground motion, on the other hand, need more attention in seismic design.As a result, it's also important to make sure the foundation can withstand horizontal earthquake shaking. The measurement of seismic design forces and the means of ensuring adequate ductility are two major concerns for a design engineer.Death loads, live loads, and wind loads can all be accurately calculated in most structural engineering calculations. The case with earthquake powers, on the other hand, is somewhat different. Earthquake Loads (ELs) are inertia forces that are attributed to the structure's density, stiffness, and energy absorption (e.g., damping and ductility) properties.The building codes propose design seismic loading in the form of static lateral loading, which is determined by the weight, gross proportions, and type of construction, as well as the seismicity of the region of which it must be constructed. These static geometry loads are used to assess the structural strength needed to withstand earthquake-induced dynamic loads.

EQUIVALENT LATERAL FORCE METHOD

The lateral force is still assumed to be equal to the real (dynamic) loading in most seismic analyses of structures. This approach only necessitates a fundamental amount of time. It is not enough to know the intervals and shapes of higher natural modes of vibration.The base shear, or overall horizontal force on the structure, is measured using the mass, fundamental time of vibration, and corresponding form of the structure. According to code, the base shear is spread along the height of the system in terms of lateral forces.

RESPONSE SPECTRUM ANALYSIS

The modal method, or mode superposition method, is another name for response spectrum analysis. The approach can be used on structures where modes other than the fundamental one have a major impact on the structure's reaction.This approach is founded on the fact that for some types of damping – which are reasonable models for several buildings – Each natural mode of vibration can be individually calculated, and the modal responses can be combined to quantify the overall response. Each mode has its own deformation pattern (mode shape), frequency (modal frequency), and damping (modal damping).It can be used to model forces and deformations in multi-story buildings caused by moderately significant but basically linear ground shaking. Both methods use the same lateral force and reaction continuum analysis technique, are based on the same basic principles, and are applicable to buildings that display complex response behaviour that is rational in accordance with the consequences of the analysis assumptions. The size of the base shear and the distribution of the lateral forces are the major differences.The force equations in the response spectrum method are based on compound intervals and mode shapes of multiple modes of vibration, while the equivalent lateral force method is based on an approximation of fundamental time and formulae for force distribution that are suitable for buildings with normal mass and stiffness distribution over height.

IS 1893 - 2016 PROVISIONS – EQUIVALENT LATERAL FORCE METHOD AND RESPONSE SPECTRUM METHOD

STATIC ANALYSIS (EQUIVALENT LATERAL FORCE METHOD)

The static method, also known as the equivalent static method or the seismic coefficient method, is a method for calculating construction lateral forces. This approach does not include dynamic analysis, but it does account for the building dynamics appropriately.

Design Spectrum: The design horizontal seismic coefficient Ah for a structure shall be determined by the following expression: Ah=[(Z/2)*(Sa/g)]/(R/I)Z = Seismic Zone Factor given in Table 3, IS 1893 (Part 1) :2016 I = Importance Factor given in IS1893(part1 to 5) for the corresponding structures; when not specified, the minimum values of Ishall be, a) 1.5 for critical and lifeline structures; b) 1.2 for business continuity structures;and c) 1.0 for the rest IS 1893 (Part 1): 2016. R = Response reduction factor given in IS 1893 (Part 1 to 5)for the corresponding structure;and. Sa / g = design acceleration coefficient for different soil types,normalized with peak ground acceleration, corresponding to natural period T of structure (considering soil-structure interaction, if required). It shall be as defined in sections 1 to 5 of Is1893 for the respective structures; if not specified, it shall be assumed to be that which corresponds to 5% damping.Design Seismic Base Shear.The following expression determines the overall design lateral force or design base shear (VB) in every principal direction. VB = Ah W, where Ah is the design horizontal acceleration coefficient value as per 6.4.2, IS 1893 (Part 1): 2016 and Ta is the fundamental natural time as per 7.6.2 in the assumed shaking direction; and W = Seismic weight of the building as per 7.4 Fundamental Natural Period The approximate fundamental translational natural period of oscillation (Ta), in seconds, shall be estimated by the following expression: [Clause 7.6.2, IS-1893 (2016)] Ta = 0.075h^0.75(for RC MRF building), Ta=0.080h^0.75(for RC- steel composite MFF building), 0.085h^0.75(for steel MRF building) where h = height(in mm) of building this excludes the basement storey, Where the basement storeys' walls are attached to the GL deck it is between the columns of the house, the basement storeys are used, but not when they are not.The approximate fundamental translational natural period of oscillation (Ta), in seconds, of all other buildings, may be estimated by the following expression: [Clause 7.6.2, IS-1893 (2016)] d h Ta .0 09h= where, h = Height of building,as defined in 7.6.2(a) in m. d = At the plinth floor, the building's base dimension isin m along the expected path of earthquake shaking Design Force Distribution: The design base shear is measured for the entire building and then spread over the building's height.Individual lateral load-resisting elements are assigned to the lateral forces received at each floor level. IS 1893 (Part

1):2016, Clause 7.6.1, vertical spread of base shear over various floor levels.

Dynamic Analysis: Dynamic analysis may be performed either by response spectrum method or by time history method. In the response spectrum method, the peak response of a structure during an earthquake is obtained directly from the earthquake response (or design) spectrum. This procedure gives an approximate peak response which is quite accurate for structural design purposes. Dynamic analysis is classified into two types, namely, Response spectrum method and Time history method Dynamic analysis shall be performed to obtain the design seismic force, and its distribution to different levels along the height of the building and to the various lateral load resisting elements, for the following buildings: a) Regular buildings — Those greater than 40 m in height in Zones IV and V, and those greater than 90 m in height in Zones II and III. b) Irregular buildings — All framed buildings higher than 12 m in Zones IV and V, and those greater than 40 m in height in Zones II and III. Dynamic analysis may be performed either by time history method or by the response spectrum method. However in either method, the design base shear VB shall be compared with a base shear Vb calculated using fundamental period Ta , where Ta fundamental natural period of vibration. Where VB is less than Vb , all the response quantities (for example member forces, displacements, storey forces, storey shears and base reactions) shall be multiplied by Vb / VB.

- CASE STUDIES

Two building are studied, each situated in Zone II and Zone III. The geometrical dimensions, member properties and member node connectivity are modeled in the analysis program Case Study 1 The building is shown in Figure 1. The building consists of Stilt Floor + 11 floors (Total 12 Floors). The structure stands 42.25 metres tall, with a massive base area standing on hard soil stratum. According to the soil survey, the soil bearing potential at a depth of 2.0 m from NGL is 400 KN/sq.m. Zone II is where the foundation is located. According to the protocols, the arrangement is modelled as a space frame with DL, LL, and wind loads.The earthquake loading is used to calculate seismic weight as member weights. Alternatively, joint weights may be used to apply these loads (Lumped mass for each floor ascertained by assigning pin supports at floor nodes). The earthquake loads are used as member weights in this research.

- **OBJECTIVE OF STUDY**

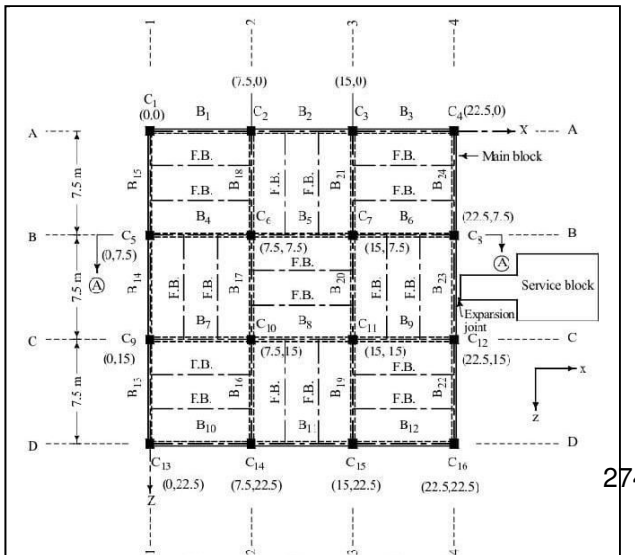
The main objective behind this study is to understand the basic concept of earthquake. Techniques of earthquake resistant construction will be identified by the researchers under this study.
Two methods used
1. G+6 building analysis Using STAAD - PRO and manually calculation method
2.Compare IS:1893:2002 &IS: 1893: 2016.

II. LITERATURE REVIEW

Poncet, L. And Tremblay (2004) proposed the impact and effect of mass irregularity considering case of an eight-storey concentrically braced steel frame structure with different setback configurations. Methods used in present paper are equivalent static load method and the response spectrum analysis method. Devesh P. Soni (2006) considered several vertical irregular buildings for analysis. Various criteria's and codes have been discussed and reviewed in this paper. Vertical irregular structure performance and response is reviewed and presented. The studies suggested that for combined-stiffness-and-strength irregularity large seismic demands are found. Patil and Kumbhar (2013) considered ten story building and tested against nonlinear dynamic response under seismic effect. SAP 2000 is used as a software application tool in this paper. Five number of seismic time histories are used to compare results of considered cases. Aijaj and Rahman (2013) tried to analyse the proportional distribution of lateral forces involved in earthquake for individual storey due to changes in stiffness of vertically irregular motion's structure. S. Varadharajan et al. (2013) reviewed existing works regarding plan irregularities and justified the preference of multistorey building models over single storey building models. HimanshuBansal (2014) analysed vertical irregular building with Response spectrum analysis and Time history Analysis. Irregularities considered are mass irregularity, stiffness irregularity and vertical geometry irregularity. The storey shear force was found maximum for the first storey and it decreases to minimum in the top storey in all cases.Harshitha. R (2014) studied dynamic behaviour of high-rise building using IS1893-2002 code recommended response spectrum method and time history method STAAD Pro software is used to analyze the building models and it is found that the base shear obtained from Time history analysis is higher than Response Spectrum analysis. This is because of variation in amplitude and frequency content of the group.

III. METHODOLOGY

The following methods are available for analysis of earthquake resistant structure.
1.Equivalent Lateral Force (Static Force) Procedure
2.Dynamic Analysis
i. Response Spectrum Method
ii.Time History Analysis
If structure not properly designed and constructed with required quality, they may cause large destruction of structure due to earthquake
1. Extensive literature survey by Referring Books, specialized papers did to understand essential idea of subject
2. Selection of an appropriate plan of g+6, Story Building
3. Computation of loads and selection of preliminary cross section of structural members.
4. Structural analysis of building for various loading conditions as per is code provisions
5. In the present work it is proposed to complete seismic investigation of multi-story RCC structure with the help of STAAD-PRO software.



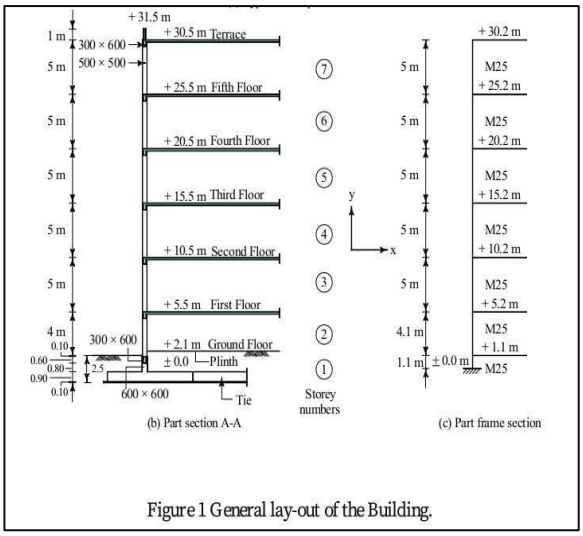


Figure 1 General lay-out of the Building.

IV. ANALYSIS AND DESIGN BUILDING

Table1. Building Data for Analysis

Sr. No.	Description of Structure	Values
1.	Material	Concrete(M25) and Reinforcement(FE415)
2.	No. Of Storeys	G+6
3.	Size of Beam	600*300mm
4.	Size Of Column	300*600mm
5.	Floor Height	3m
6.	Dead load	14KN/m
7.	Live Load	4KN/m

V. RESULT

Table2. Distribution of Total Horizontal Load to Different Floor Levels by using seismic coefficient methodIS : 1893 (part 1):2002

Storey	Wi (KN)	hi (m)	Wihi^2	Wihi^2 /{Wihi^2	Q=VB* Wihi^2 / {Wihi^2
					x
7	5597	30.2	5105	0.362	480
6	6381	25.2	4052	0.288	380
5	6381	20.2	2604	0.185	244
4	6381	15.2	1474	0.104	138
3	6381	10.2	664	0.047	62
2	6138	5.2	166	0.011	16
1	2027	1.1	3	0.000	0

Sa/g = 1.36/0.97 =1.042

VI. CONCLUSION

Technology is available to makes buildings more resistant to earthquakes. G+6 residential building has been analyzed and Designed using STADD-PRO software and designed (beams,columns,footingsand seismic load analysis by using STAAD-PRO.all the loads (dead,liveand earthquake)are calculated using is 456:2000and is 1893:2002.STAAD-PRO having ability to determine the reinforcement required for any concrete section based on its loading. STAAD-PRO gives accurate results of static as well as dynamic analysis of structure.

VII. REFERNCES

- Patil A.S, kumbharp.d "time history analysis osmulitistoredrrcbuiling for different seismic intensities",international journal of structural and civil engineering research, vol-2, issue-03,aug2013.3214
- AgusBambang Siswanto, bambangwuritno,maria eliabeth2017.stucture design of parking building by static analysis method.
- Bis(2001)is 4326-ed32, earthquake resistant design and construction of building-code of practice
- Agarwal,.P and M S hrikhnde 2006,earthquake resistance design of structures ,prentice-hall new Delhi.
- Amankumar,Mohitumar international journal of innovation research in science, engineering and technology.(an Iso 3297:2007)
- IS:1893(part1-5):2002 criteria for earthquake resistant design of structure, BIS, New Delhi
- Kelly, Skinner and Heine; Mechanisms of energy absorption in special devices for use in earthquake resistant structures; Bulletin of N.Z. Society for Earthquake Engineering, Vol. 5 No. 3, September 1997
- Catastrophe and Culture: The Anthropology of Disaster. Susanna M. Hoffman and Anthony OliverSmith, Eds.. Santa Fe NM: School of American Research Press, 2002
- Mazza and Vulcano; Base-isolation techniques for the seismic protection of RC framed structures subjected to near-fault ground motions; Paper No. 2935; 13th World Conference on Earthquake Engineering at Vancouver, B.C., Canada; August 1-6, 2004
- Morris, Neil; Earthquakes; Crabtree Publishing Company; 1998.
- Mahesh N.Patil, Yogesh N.Sonwane"Seismic Analysis of multistoried Building",Intrnational Journal of engineering and Invative Technology(IJEIT),Volume4,Issue9,march2015
- Mohammed Rizwan Sultan, D.Gouse Peera"Dynamic Analysis of multi-storey building for different shapes",International Journal of Inovative Research in advanced Engineering (IJIRAE),Issue 8, volume 2 (august2015)

- A.S.patil and P.Dkumbar"Time History Analysis of Multistoried RCC Building for Different Seismic Intensities",Int. J.Struct & civil engg. Vol.2, No.3 August 2013
- T. Mahdi, V. Soltangharaic"Static and Dynamic Analyses of Asymmetric Reinforced Concrte Frame "2012
- Mr. S.Mahesh, Mr.Dr. B . Panduranga Rao "Comparison of analysis and design of regular and irregular configuration of multi storey building in various seismic zones and various types of soils using ETABS and STAAD "Journal of mechanical and civil engineering (IOSR-JMCE),Volume11, Issue 6 (nov-dec,2014
- Balaji.U and Selvarsan M.E "Design and Analysis of multi storied building under static and dynamic loading condition using staad software."volume 4,issue4.(july-aug.2016)

..

.

Measuring and Monitoring of Chemical Reactor using PLC

Dr.S.B.Gholap[1]
Associate Professor[1], Department of Electronics and Telecommunication[1234] Sinhgad Institute of Technology, Lonavla, India[1] Pune,India
sharadgh@gmail.com[1]

Umkant Chilhate[2]
Student, Department of Electronics and Telecommunication[1234] Sinhgad Institute of Technology, Lonavla, India[1] Pune,India
uchilhate003@gmail.com[2]

Saniya.S. Saikh[3]
Student, Department of Electronics and Telecommunication[1234] Sinhgad Institute of Technology, Lonavla, India[1] Pune,India
salinasheikh12@gmail.com[3],

Sujata.K.Palakar[4]
Student, Department of Electronic and Telecommunication[1234] Sinhgad Institute of Technology, Lonavla, India[1] Pune,India
sujatakpalakar9637@gmail.com[4]

***Abstract*——Reactor is one of the most important equipment in pharmaceutical industry which requires continuous measurement and monitoring of process parameters like reactor mass temperature, reactor inner volume level and internal mass pressure of reactor. There are possibilities of errors in the measurements various stages involved with human workers. So advanced measurement and monitoring system is required to avoid failures, and are achieved by Programmable Logic Controller (PLC) and Supervisory Control And Data Acquisition system (SCADA). The present work chemical reactor consist of three different types of sensors, one is Resistive Temperature Detector (RTD) for measuring the reactor mass temperature, capacitive type level sensor for measuring the inner substances level and third one is diaphragm type pressure sensor used for measurement of internal pressure of reactor. SCADA is used for continuous visual monitoring of reactor temperature, pressure and Level sensors outputs given to a PLC. Which process all the process parameters of reactor. The SCADA system is conceptualized and developed to generate reports and trends of the data recorders in the SCADA system. The proposed system is capable of performing real-time measurement of industrial physical parameters data that can be efficiently transferred from PLC to a SCADA system which is stored and monitored through MODBUS communication protocol. It can be conclude from the theoretical data and experimental results data that proposed real-time measurement and monitoring achieved for Industrial pharmaceutical chemical reactor system.**

Keywords: ***Industrial Pharmaceutical Chemical reactor, PLC, SCADA, Level sensor, Pressure sensor, Temperature sensor, MODBUS Comm. Protocol.***

I. INTRODUCTION

The industrial pharmaceutical chemical reactors are extremely important because the output products are different types of drugs, chemicals, tablets, and pesticides have a great usage in our day to day life. Many researchers have studied that the usage of SCADA/PLC system are used in the boiler operation, distillation plants and water distribution plants. Now a day's industrial automation technology is well established in infrastructure systems for chemical processing reaction experiment, leads to heavy use of Programmable Logic Controllers (PLC) which typically are intelligent automation stations forming the core of industrial systems [1] Hybrid wind-PV-battery renewable energy system is connected to PLC and the system is Real-time monitoring and control by SCADA and PLC. The total system consist of two induction generators (IG1&IG2), solar system (PV), a AC-to- DC convertor, a battery unit, and DC-to-AC inverter with large number of inputs and outputs signals connected to the CSI series of OMRAN PLC connected with the SCADA system for monitoring system [2] water storage and distribution process are in pharmaceutical industries facing crucial to sustain community health, clean and safe environment purpose applying the SCADA solutions has a positive impact on the operations, maintains , process development and saving from water storage and distribution plants. A SCADA software application is implemented on the plants with interface to the hardware to connect a comprehensive real-time application environment for the modern water storage and distribution plants [3] industrial power plants must have steam boilers, so the boilers require continuous measuring, monitoring and inspections at frequent intervals there it is number of physical parameters like steam level temperature, boiler drum level and pressure of the steam line. The steam level temperature produces electrical power generation and steam water reuse different section in relevant temperatures. In order to automate a boiler plant and minimize the human intervals, there is need to develop PLC/SCADA system, SCADA is a centralized system used to supervise a complete plant. In boiler automation system which consists of PLC/SCADA, resistive temperature detector PT 100 (RTD PT 100) is used to measure the temperature, RT pressure switch is used to measure the pressure inside the boiler and float switch are used to detect the feed water level inside the boiler.

II. HARDWARE OF THE PRESENTEDSYSTEM

Fig.1 shows the Block diagram of L.T and TT of the process.

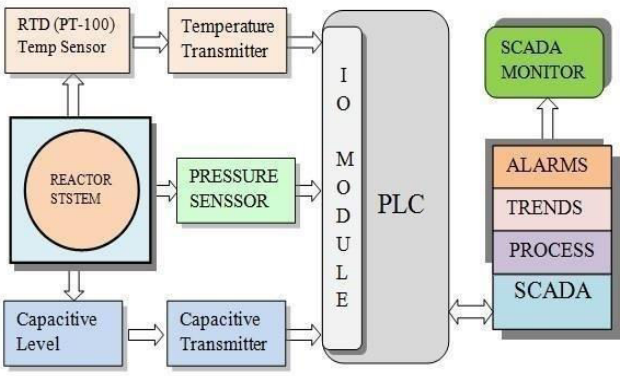


Fig. 1 Block Diagram of Proposed System

The hardware consist of the following are

1. *Programmable Logic Controller*
2. *SCADA system with*
3. *Industrial chemical Reactor*
4. *Temperature sensor*
5. *Pressure sensor*
6. *Level Sensor*
7. *MODBUS Comm. Cable*

A detailed explanation for each individual unit as present below:-

1. Programmable Logic Controller (PLC): The PLC used in the present work is Telemecanique Modicon Micro TSX PLC 3750 controller which has 16 digital inputs, 12 digital outputs 4 analog inputs and 2 analog outputs.

Fig.2 Programmable Logic Controller

The controller has various unique features such as(internal central processing unit (CPU) for processing typical electrical signals from the field sensors, The PLC has different type 412KB memories like Read Only Memory (ROM) for storing the firmware software and Random Access Memory(RAM) for user programmed memory. The PLC has multiple types of various interfacing protocols like MODBUS Serial communication protocol for communication with human machine interface (HMI), SCADA interface and various industrialdevices.ThePLCisprogrammedusingladderlogicPL7 Pro V4.4 developing software.

1. SCADA System with PC: The Supervisory Control And Data Acquisition (SCADA) is a purely software system, the present work SCADA software installed in personal computer with minimum configuration. The present personal computer has windows 7 operating system, 4GB RAM, 500GB hard disk and 2GB graphic card and etc. the SCADA system have unique features such as graphic design and development in multiple pages for the process visualization, developed the variable identification for individual memory location with different data types like integer, real, Word, and etc. in the SCADA developing own different type of libraries like genius, mages, and pages and etc. the system providing individual communication configuration with multiple devices. The SCADA system supported various communication protocols like MODBUS, PROFIBUS, Serial Comm., CANOPEN, MODNET and ETHERNET .The SCADA system communicate at a time multiple Programmable Logic Controllers (PLC) with various industrial protocols. The SCADA system basically alarms, trends, history and process popup, most automation industry used combination of PLC and SCADA both systems worked together information shared. In this system SCADA real-time measured and monitored of reactor process sensors continuously and stored the data in specific DATABASE of personal computer then present developed SCADA is VIJEO CITEC 2015 version 7.50software.

2. Industrial Chemical Reactor*:* For the preparation of bulk drug materials purpose and designed a prototype industrial chemical reactor , this reactor is made with stainless steel (SS-304) withstand temperature is above 300 deg and internal mass maximum pressure of reactor up to 9 bar and isolated jacket pressure is 4 bar . The reactor system consisted of mass inlet and mass outlet as well as jacket inlet and jacket outlet as shown in fig.2. In the chemical reaction formation process having different type's temperature set point, so we need to meet the temperature set points then in the reactor jacket multiple types of temperature utilities derived. So prototype industrial chemical reactor without disturbing mass reaction continuously to measure and monitor the internal mass temperature of the reactor and also measure the derived utility temperature in the reactor jacket so for this purpose in the basic reactor design provided two provision of sensors placement. Any reactor system must have constant internal mass volume, this is decided that how much quantity of chemical drug having in the mass of the reactor then in the process of reaction. we must continuously measure and monitor the internal mass volume of the reactor, so for this purpose in design given to provision of level monitoring sensor, and also in reaction time process having internal mass reaching lower deg temperature to higher deg temperature the in the reactor developed a some constant pressure so for safety purpose continuously monitor the internal pressure of the prototype industrial chemical reactor.

Fig.3 Chemical Reactor System

2. Resistive Temperature Detector (Pt-100): Resistive Temperature Detector (Pt-100) is used as a temperature sensor in the prototype industrial chemical reactor system the sensor range is -50 deg to 200 deg. In the RTD device having two types of measuring technique i.e. two wires and three wire sensors main difference is the accuracy increased in three wire sensors. The RTD sensor basic function is in the center of the reactor in reaction process internal mass temperature is continuously converted into change in resistance, the resistance is converted in to conventional 4-20 mA current signal with help of temperature transmitter.

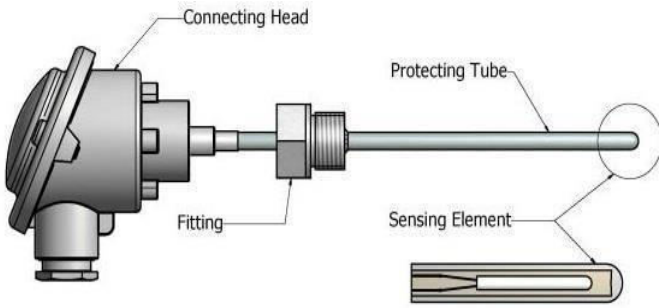


Fig. 4 Resistive Temperature Detector

The 4-20mA current connected with configured PLC analog-to-digital input channel in I/O module of the PLC, the PLC process the current information to digital form then store the information in configured memory locations then processing the data in PLC processer.

3. Capacitance Level Transmitter: Level measurement devices are many types in process industries like capacitance, ultrasonic, radar and hydro static level transmitters.

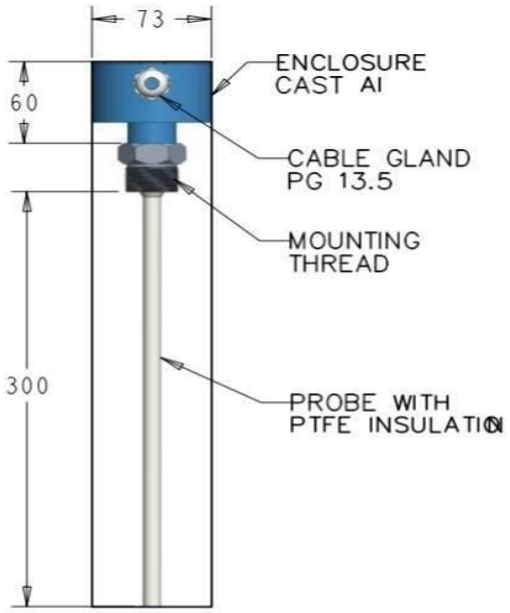


Fig.5 Capacitance Level Transmitter

In the prototype industrial chemical reactor system, the internal mass level measured with Capacitance Level Transmitter, the device is manufactured with stainless steel coated with Polytetrafluoroethylene (PTFE) used as probe material. The CapacitanceLevelTransmitteroperatingvoltageis12to30vdc power supply and it is with stands -20 deg to 120 deg of operating temperature of reactor, the process of measuring level substances in reactor internal level (0 to 215mm) changing with simultaneously changed the capacitance of the device, The changed capacitance verses changing with output current (4-20mA) of the transmitter. The conventional current connected to the configured analog-to-digital input channel of I/O module of the PLC. The PLC processing the digital information and then stored in to the dedicated memory location of PLC memory.

4. Diaphragm Pressure Transmitter:

The diaphragm pressure sensor used to measure the prototype industrial chemical reactor internal mass pressure, the sensor made with stainless steel (SS316) and the sensor pressure range is 0-10 bar with High Accuracy of (+/-0.50% FSO) then operating power supply is 24V dc.

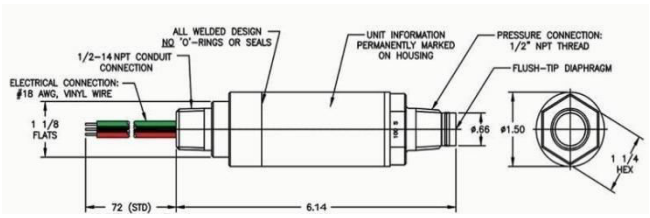


Fig.6 Pressure sensor Details

The main work function of this sensor is when the reaction in process in mass of the rector with differential pressure is developed so this pressure is continuously measured by the sensor, which provide the output in conventional electrical current 4-20mA.

Fig. 7 Diaphragm Pressure Transmitter

The output of pressure sensor connected with the configured analog to digital channel of the PLC I/O module. The PLC module converted from electrical information to digital information and this data processed furthered by processer

5. MODBUS Serial Comm. Protocol Cable: The reactor system moving in process the sensor devices converting physical parameters in to electrical signal and are connected with the PLC then these signal convening into digital information data.The digital data processed by PLC processer in every scan cycle, the updated data need to visualized in SCADA system. In a modern technology device to device data communication is enabled in different types of protocols like Local area network (LAN), PROFIBUS, PROFINET, MODBUS, MODNET and etc.

Fig. 8 Unitelway Comm. Cable

In the present system working on the MODBUS serial communication protocol from Personal computer SCADA system to PLC via TSX Micro's Telemecanique programming (Unitelway)cablesTSXCUSB485,TheTERportisphysically the same port. The TER port is usually used for SCADA units via a protocol that supports multi dropping communications from plc to SCADAsystem.

III. SOFTWARE IMPLIMENTATION

The present Reactor process system consists of three physical parameters of mass temperature, level and internal pressure of rector system. For the measurement and monitoring of process system developed the PLC/SCADA system. The developing system used Telemecanique Modicon Micro TSX PLC 3750 controller for fetching the data from sensors of physical parameters of the system. The PLC programmed with PL7 Pro developing software. The configuration and development measurement techniques used as following parameters shown in below Table.1

Process Parameter	Sensor output to PLC					Total Range of Sensor
Sensor Output(mA)	4mA	8mA	12mA	16mA	20mA	4-20mA
Temperature (˚C)	"-50 ˚C	12.5 ˚C	75 ˚C	137.5 ˚C	200 ˚C	"-50 to 200 ˚C
Pressure (Bar)	0 Bar	2.5 Bar	5 Bar	7.5 Bar	10 Bar	0- 10 Bar
Level (ml)	0 ml	1250 ml	2500 ml	3750 ml	5000 ml	0-5000ml
Signed data from PLC	0	2500	5000	7500	10000	0-10000

Sensor output of PLC

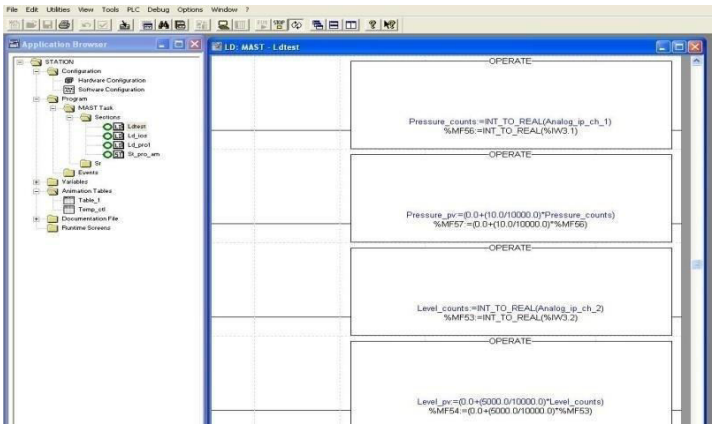


Fig. 9 PL7 Pro Software

The process parameters shown in graphical representation purpose used SCADA system of vijeo citect V7.5 designing software. This software contains different SCADA features that are process parameters numerically updated instant of time, process alert alarm system, parameters trending system, graphical visualized of measured parameters and etc. The reactor level and reactor volume measured and displayed in SCADA system in simulation way applied to the parameters also as shown in below Fig. 10

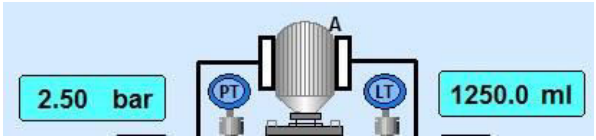


Fig.10 SCADA Design Display

IV. RESULTS

The system is successfully designed and developed for the reactor process parameters temperature, level and pressure is measured and monitored continuously. The complete reactor process sensors and actuators controlled by the programmable logic controller system, The PLC system converted analog data to required digital format. The digital information of PLC memory mapped with SCADA system memory location with MODBUS Serial communication protocol. The real-time numerical values of the Temperature, Level, and Pressure sensor information is graphical visualized in the SCADA system By selecting the Reactor button on the welcome screen then reactor screen will displayed shown in Fig. 11

REFERENCES

[1] H. Kleines, J. Sarkadi, F. Suxdorf and K. Zwoll, "Measurement of real-time aspects of Simatic/spl reg/ PLC operation in the context of physics experiments," in *IEEE TransactionsonNuclearScience*,vol.51,no.3,pp.489-494, June 2004. doi: 10.1109/TNS.2004.828504

[2] Li Wang and K. Liu, "Implementation of a Web-Based Real-Time Monitoring and Control System for a Hybrid Wind-PV-Battery Renewable Energy System,"*2007 International Conference on Intelligent Systems Applications to Power Systems*, Toki Messe, Niigata, 2007, pp.1-6.

[3] Viswanathan, Rajeswari & Suresh, L. & Rajeshwari, Y.. (2013). Water storage and distribution system for pharmaceuticals using PLC and SCADA. Proceedings of IEEE International Conference on Circuit, Power and Computing Technologies, ICCPCT 2013. 79-86. 10.1109/ICCPCT.2013.6528951.

[4] S.Kalaivani, M.Jagadeeswari " PLC & SCADA Based Effective Boiler Automation System for Thermal Power Plant" International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 4 Issue 4, April2015

[5] K. Gowri Shankar " Control of Boiler Operation usingPLC – SCADA" Proceedings of the International Multi-Conference of Engineers and Computer Scientists 2008 Vol II IMECS 2008, 19- 21 March, 2008,Hong Kong.

[6] Sánchez Pacheco, Francisco & Sotorrio, Pedro & Heredia-Larrubia, Juan & Perez-Hidalgo, Francisco & Sidrach-de-Cardona, M.. (2014). PLC-Based PV Plants Smart Monitoring System: Field Measurements and Uncertainty Estimation. Instrumentation and Measurement, IEEE Transactions on. 632215-2222.10.1109/TIM.2014.2308972.

[7] Promsawat, Thipichpon & Kummool, Sart & Pongswatd, Sawai & Julsereewong, Amphawan. (2016). Real-time monitoring and reporting alarm system for pH measurement inwetscrubbers.353-358.10.1109/ICCAS.2016.7832343.

[8] Mumtaz, Fatima. (2015). Real-Time, PLC based, Energy MonitoringSystem.1-5.10.1109/INDICON.2015.7443747.

[9] Zaev, Emil & Babunski, Darko & Tuneski, Atanasko. (2016). SCADA system for real-time measuring and evaluation of river water quality. 83-86. 10.1109/MECO.2016.7525708.

[10] An Intelligent Model based level control of boiler Drum. KG Begum, D Mercy, HK Vedi, M Ramathilagam. International Journal of Emerging Technology and...

[11] Irfan, Muhammad & Saad, Nordin & Ibrahim, Rosdiazli & Asirvadam, Vijanth. (2013). Development of an intelligent condition monitoring system for AC induction motors using PLC. BEIAC 2013 - 2013 IEEE Business Engineering and Industrial ApplicationsColloquium. 789-794. 10.1109/BEIAC.2013.6560243.

[12] Ramasami, Ashok & Pandimeena, S & Rajameena, R & Jeyanthi, R & Ramya, S. (2016). Modern Industrial Power Plant Boiler Automation Using GSMTechnology.

[13] Fuzzy Logic Approach for Boiler Temperature & Water Level Control A Shome, SD Ashok - International Journal of Scientific & Engineering …,2012

[14] Moursi, Israa & El-Din, Loay. (2014). SCADA system for oilrefinery control. Measurement. 47.5–13. 10.1016/j.measurement.2013.08.032.

[15] Lakhoua, Mohamed Najeh. (2010). SCADA applications in thermal power plants. International Journal of Physical Sciences. 5.1175-1182.

[16] Xibin, Wang & Guohong, Li & Xuejie, Wei. (2011). PLC-based SCADA system for oil storage and application. 10.1109/ICEICE.2011.5777205.

[17] Wiliem, Leonard & Hargreaves, Douglas & Stapelberg, Rudolph & Yarlagadda, Prasad. (2007). Development of Real-Time Data Filtering for SCADA System. Journal of Achievements in Materials and Manufacturing Engineering. 21.

[18] U. Younas, S. Durrani and Y. Mehmood, "Designing Human Machine Interface for Vehicle's EFI Engine Using Siemen's PLC and SCADA System,"*2015 13th International Conference on Frontiers of Information Technology (FIT)*, Islamabad, 2015, pp. 205-210. doi: 10.1109/FIT.2015.44

[19] Yang, X.H., 2014. Design and Research for a Boiler Steam Drum Control System Based on PLC. AdvancedMaterialsResearch1030–1032,1442–1444.https://doi.org/10.4028/www.scientific.net/amr.1030-1032.1442

[20] Das, Rishabh, Sayantan Dutta, Anusree Sarkar and Kaushik Samanta. "Automation of Tank Level Using PlcandEstablishmentofHmibyScada."(2013).

[21] R. P. Jerrard, "Temperature Drop to Resistance Temperature Detector in Stator Windings of Turbine Generators [includes discussion]," in *Transactions of theAmericanInstituteofElectricalEngineers. Part III: Power Apparatus and Systems*, vol. 73, no.1, pp. 665-670, Jan. 1954.doi:10.1109/AIEEPAS.1954.4498872

[22] M. Laciak, P. Fazekaš and J. Kačur, "Monitoring and control of temperatures in electric furnace in PROMOTIC system,"*2011 12th International Carpathian Control Conference (ICCC)*, Velke Karlovice, 2011,239-242. doi:10.1109/CarpathianCC.2011.5945855

[23] S. Pradhan and S. Sen, "An improved lead compensation technique for three-wire resistance temperature detectors," in *IEEE Transactions on Instrumentation and Measurement*, vol. 48, no. 5, pp. 903-905, Oct. 1999.doi:10.1109/19.799644

[24] T. K. Maiti, "A Novel Lead-Wire-Resistance Compensation Technique Using Two-Wire Resistance Temperature Detector," in *IEEE Sensors Journal*, vol. 6, no. 6, pp. 1454-1458, Dec. 2006. doi: 10.1109/JSEN.2006.883903

[25] Promsawat, Thipichpon & Kummool, Sart & Pongswatd, Sawai & Julsereewong, Amphawan. (2016). Real-time monitoring and reporting alarm system for pH measurement inwetscrubbers.353-358.10.1109/ICCAS.2016.7832343.

FACTORS AFFECTING SUPPLIERS SELECTION IN CONSTRUCTION INDUSTRY OF NASIK CITY

MaheshwariSahebraoPatil
Department of Civil Engineering,
Student of Masters in Engineering
MVPS's KBT College of Engineering,Nashik,SavitribaiPhule Pune University, India.

Dr. Ajay P. Shelorkar
Department Of Civil Engineering,
Assistant Professor
MVPS's KBT College of Engineering, Nashik, SavitribaiPhule Pune University, India.
Patilmahi1996@gmail.comshelorkar.ajay@kbtcoe.org

ABSTRACT

Construction is the largest industry. The construction industry suffers various problems and complex factors such as cost overruns, time overruns, quantity, quality and safety. In the Construction industry, the material cost is more important for overall project cost. The construction sector is the largest sector, including contractors, consultants, architects, designers, owners, and others. This paper aims to identify factors affecting supplier selectionat a building construction project. A literature was review and considered by experts to classify the factors. 20 factors, categorized into 5 groups, were analyzed and ranked considering Analytic Hierarchy Process.

The questionnaires were distributed to the Project Manager, Project Engineer, Architecture, consultants, clients, and Others (Scheduler and Estimator). It was concluded that the final cost projects were higher than the actual estimated cost. It's recommended to develop human resources and continuous training programs,vision and a planning for the overcome barriers to performance of the construction projects. The below-calculated factors are expected to complete construction projects successfully.

***Keywords*:Construction industry, Supplier selection factor, Analytic Hierarchy process, Contractor, Cost, Quality.**

I. INTRODUCTION

In today's world, growth increases rapidly, Competitive business environments, successfully producing and selling high-quality, low-cost products.Time delays without considering the satisfactory set of suppliers and distributors is complicated. It is crucial for enterprises to source products, sell a product, and select which supplier and distributor to select building an effective chain is important to residential projects. Choosing the most suitable supplier and distributor is an important strategic management decision that can affect the supply of all organizations and distributor is integral to physical availability.theintegration of the processes, system, and organization controls the movement of goods from the material supplier to the customer without waste.

II. OBJECTIVE

This study aims to identify the highly affected factor for the selection of supplier. To select asuitable material supplier by using a soft computing technique like AHP. And to meet consumers demand for guaranteed delivery of high quality & low cost with minimal lead time. This study also aims at successfully reducing the complexity of selecting of supplier for the small construction company.

III. NEED FOR STUDY

We need to focus on the contemporaneous activities & minimal resource allocation for the same. It refers to the material, resources, quality, funds they move from one place to another. Thus, they face many problems like Poor Quality, much cost, so that supplier selection is the most important.

IV. RESEARCH METHODOLOGY

A. Literature Review

A literature review has been done from previously published research papers on this topic from various international journals as well as relevant books and researched topics to understand the previous work done on such kind of project.

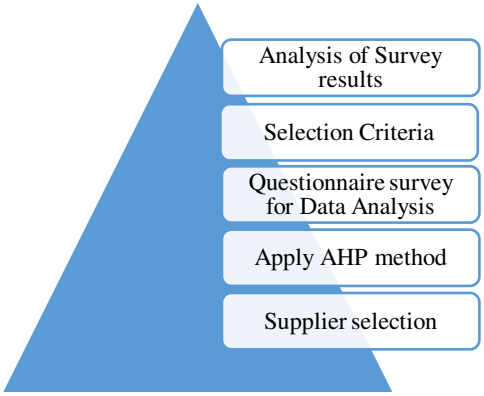
B. Data Collection

Data collection has been carried out by questionnaire survey from various construction sites that have faced problems during material suppliers.

C. Data Analysis

Data analysis has been done from collected data survey by analyzing the data so that proper importance index to
Factor can be achieved.

Table: 2 – Analysis of survey



V. DATA COLLECTION

A. General

This chapter describes the background of the quantitative data collection and represents the main factors considered for collecting data required for the study, whereas the methodology chapter describes the steps taken in designing the questionnaire survey.

B. Questionnaire Design

The questionnaire is made by seeing the comparative literature in the area of Factor affecting supplier selection in the Construction industry.

C. Data Measurement

For measuring the process, a scale is used.The scale of 1 to 5 depending upon its effect, 5 being the most important and 1 the least.

Table: 1 – Rating Scale

Scale	Weight
Strongly Agree	5
Agree	4
Undecided	3
Disagree	2
Strongly Agree	1

VI. The procedure of Analytic Hierarchy Process (AHP)

- **Define Alternatives**

A= ((X1*X2*X3*X4*X5*……Xn)*(1/n))

- **Define the Problem and Criteria**

A2 (Weights) =
(Individual A1 / Sum A1) = 1

- **Establish Priority amongst Criteria Using Pairwise Comparison**

A3 = (Individual A1* Individual weight)

- **Check Consistency**

A4 = A3/A2

- **Get the Relative Weights**

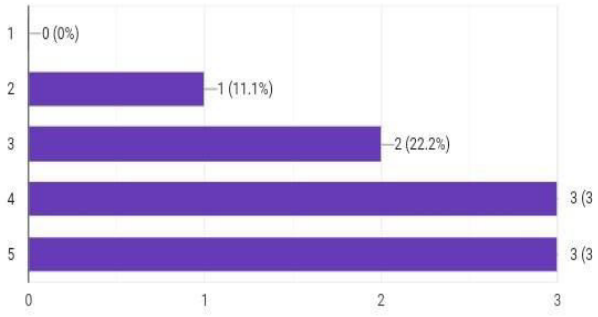
A4 = A3/A2
I.e. Average value

A. Analysis of factor

Calculation of AHP Method Values of Factors Is As Follows

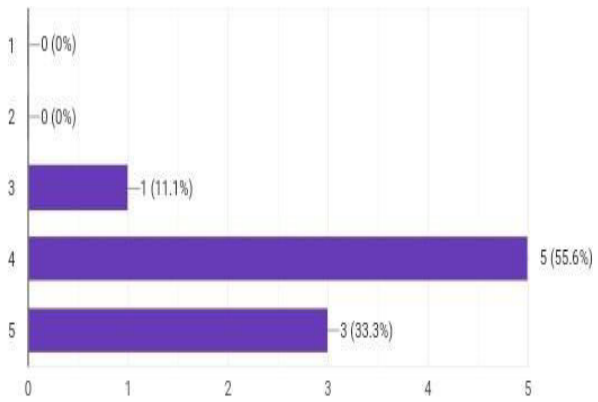
1) selection procedure for Suppliers

Fig:-3.1.1 AHP for selection procedure



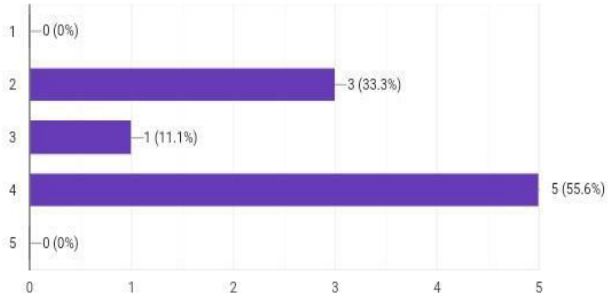
2) selection criteria for Suppliers

Fig:- 3.1.2AHP for Selection criteria



3) Impact of technical expertise of the supplier on your project.

Fig:- 3.1.3 AHP for technical expertise

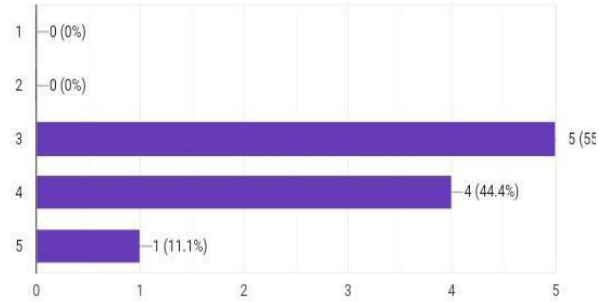


4) Inspection procedure for Suppliers

Fig:- 3.1.4 AHP forInspection procedure

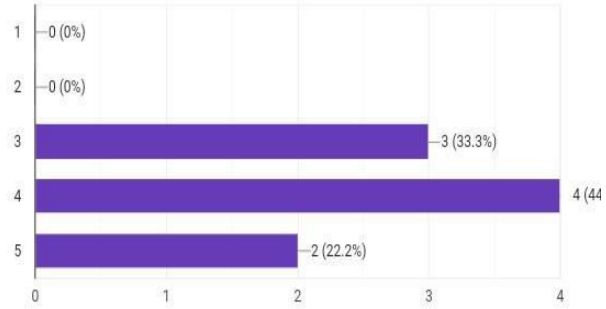
5) Resourcefulness of supplier

Fig:-3.1.5AHP for Resourcefullness



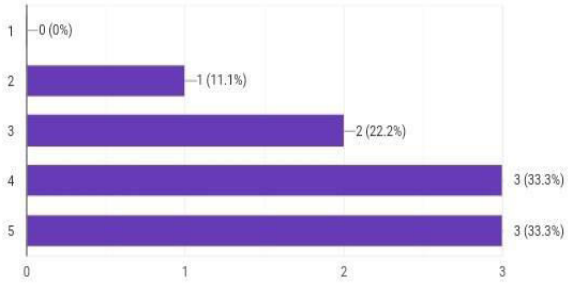
6) Expectations from suppliers

Fig:-3.1.6 AHP for Expectations from suppliers



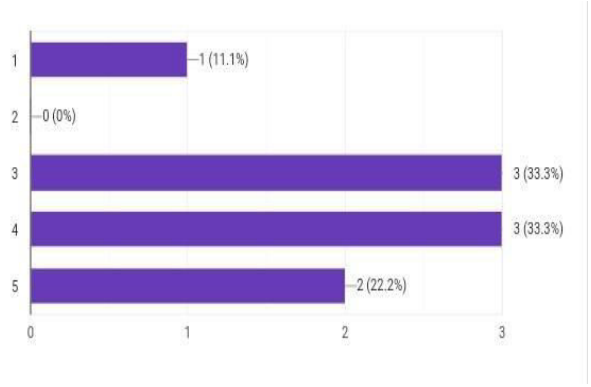
7) Attitude towards supplier selection

Fig:-3.1.7 AHP for Attitude of clients towards supplier



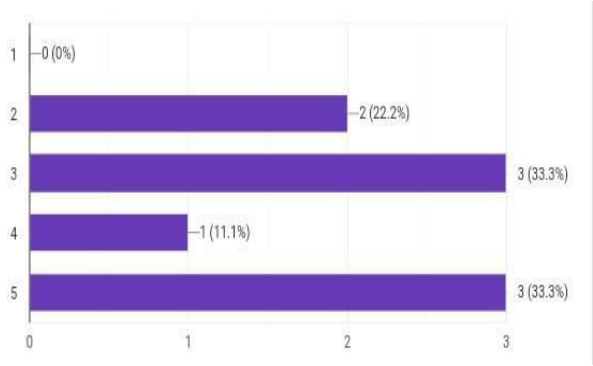
8) Material availability due to frequent design changes.

Fig:-3.1.8 AHP for Materials availability due to frequent design change



9) The reasons for adopting Suppliers for projects.

Fig:-3.1.6 AHP for adopting the supply chain



VII. CONCLUSION

The respondents were all industry practitioners, including the residential project contractors, clients, subcontractors, engineers, assistant managers, forpractical analysis of the suppliers in construction projects. By distributing questionnaires, the analysis of these questionnaires helped calculate the Analytical Hierarchy Process of each clause. In this research, find some factor by using the arithmetic mean method. This factor is used for finding the best supplier in the construction industry. Delay is unique in every of the most significant issues construction projects face today, so the project represents the result of the questionnaires survey conducted to identify and evaluate the Analytic hierarchy process of the significant factors contributing to delay in the construction project.

VIII. RESULTS

A survey intended to gather feedback from people interested in construction projects (clients, contractors, subcontractors, and suppliers). These factors generated through the survey are pretty helpful in managers involved in residential projects.

These factors include Tendering & Direct selection, Technical knowledge & quality for the supplier, the supplier delivered services, past performance of the project,Cost saving in labors, materials and methods.

REFERENCES

[1] L.Muhwezi, J.Acai, et.ai. an assessment of the factors causing delay on building construction project 2014, (1-8)

[2] Barbara Gaudenzi, Antonia Borghesi, Managing Risks in the Supply Chain Using AHP Method,2015,(4-10)

[3] Mamatarajgor, chauhanparesh, et al. Effective techniques for finding delay in construction project. 2016, (1-5)

[4] KamleshNanaji (2015), "Supplier Selection Process in the construction material purchasing system", International Journal of Engineering Science and Research Technology,Vol.4, pp.670 - 680.

[5] Tak.K.Mak, FASSIL Nebebe, et.al, factor analysis and methods of supplier selection, 2016 (1-9)

[6] Barbara Gaudenzi, Antonia Borghesi, Managing Risks in the Supply Chain Using AHP Method,2015,(4-10)

[7] JineshJain,G.S.Dangayach et al. Supply Chain Management:Litrature Review And Some Issues 2010 (5-12)

[8] Aziz Muysinaliyev, sherzodAktamav, Supply Chain Management Concepts: Litrature review,2014,(1-7)

[9] Wajahat Hussain, Jabir Hussain, The effects of supply chain managementpractices,2014,(1-11)

[10]Adam N. Elmachtoub, supply chain Mamagement with online customer selection,2015,(5-10)

[11] Ernesto Mastrocinaque, Adrian E. Coronado Mondragon, Selection in the supply chain context by means of fuzzy-AHP,2016,(1-

[12] Faisal al Madi Hashemite, The impact of supply chain Management practices on supply chain performance in the industrial sector, 2017, (10-15)

[13] M.K.Samiah, G.Asai, et.al, Relative Importance Analysis of factors influencing unauthorized silting of residential building, 2015 (1-10).

[14] Ashis Kumar Pani. A study to compare relative importance of criteria for supplier evaluation 2011 (1-8).

Innovation and Modernization in Job Safety Analysis of Labours and Public on Road Construction Site

1st Kajal Bargat
Department of Civil Engineering
Maratha Vidya Prasarak Samaj's,
KBT College of Engineering
Nashik, India
bargatkajal21@gmail.com

2nd Mr. Pritesh Aher
Department of Civil Engineering
Maratha Vidya Prasarak Samaj's,
KBT College of Engineering
Nashik, India
pd.aher4875@gmail.com

3rd Dr. M. P. Kadam
Department of Civil Engineering
Maratha Vidya Prasarak Samaj's,
KBT College of Engineering
Nashik, India
kadammadhavp@gmail.com

***Abstract* - This paper focuses on identifying the existing safety practices that aid to prevent injuries at road construction sites. The construction site is dynamic and is a large sector. The complex nature of construction also has its hazards throughout the process until safety is ensured. This source directly or indirectly makes an adverse effect on the construction progress. Also, the safety to be taken while construction of the road is given, to ensure that the workers working on site are safe from the hazard by providing and securing them from the accidents. It involves new concept in construction as a measure to enhance the safety of the labours working on site. To scrutinize the benefits of safety in construction place, and involving the measurements to prevent the causes of the accident.**

Keywords - Accident prevention, Spike Arrangement, Net Provision, Laser Light Sensor.

I. INTRODUCTION

Construction safety is a concern to the proper working environment. Road construction site becomes a continual problem if the safety is not ensured [17]. Safety regulation is giving efforts towards the safe working environment on road construction site. Sufficient road safety measures play an important role in the smooth running of the project. Efforts are taken to increase the importance of safety at the worksite, to decrease the labour accident rate of labour as well as employee working in the construction industry. To ensure a corrective measure for preventing the accidents on-site numbers of techniques are developed. Preventing labour accidents on the road right from small scale to large scale construction work is necessary along with it accidents takes on the road construction site where the general public who are unaware of any site ongoing in frontline may face such accidents [3]. So along with the prevention of accidents of labour on-site, the accidents taking place at the surrounding of the ongoing construction should be taken into consideration [5]. Thus safety problems are to be considered from the initial stage till the completion of the project. In this paper, the accidents taking place on-site is noted and the preventive measure to ensure its safety is undertaken. The labour accidents and the accidents taking place on working road construction site are taken as the main concern. The primary data was collected using a questionnaire survey, and observations were used to analyze the collected data about the causes of workplace injuries and possible measures [16]. The survey includes the questionnaire part including a project with different specification. The road project was carried on the Wakan-Pali-Khopoli route. The length of the road is about 160 km, depending upon the length the equipment is arranged. The road exists in different phases with different kilometers running. The survey reveals that most of the injuries taking place on the site and the preventive measures as an output.

II. OBJECTIVE

The objective of this project is to ensure the safety measures of labours and the public on road construction site. To develop a new concept of spike arrangement, provision of the transparent net, installation of laser light to ensure the safety on construction working site.

III. METHODOLOGY

A Job Safety Analysis is the step in safety management before an activity is performed. Identify the work that is high-risk construction work, measuring hazards relating to the high-risk construction work and risks to health and safety associated with those hazards [5]. The control measures are been implemented, monitored and reviewed. Action controlling the risk by taking sufficient measures to reduce or eliminate it is adopted. In this project, the new concept of ensuring safety is developed and the hazard and the preventive measures are analysed. Different new method like spike arrangement on road construction site, using light laser on road construction site, provision of installation of transparent nets where the construction is going on, and the measures to be taken for labours to prevent an accident on site.

A. Spike arrangement

While the execution of the road, different layers are laid along with the alignment of the road and this work is carried out in patches as per the availability of material; types of machinery. Working in patches is also a reason to regulate the continuous flow of traffic smoothly. Due to this road is open on one side to allow the traffic to pass easily, while another side is taken to execute. In that case, even if we install barricade, Delineators, safety cones and safety board's/sign to make awareness for traffic to take diversions at necessary points, still accident may occur in the rainy season which makes all safety board's sign flow away with winds also in Foggy regions where visibility is at low at the time vehicle is passing by the diversions. To overcome this accidental lead we can install a spike on the road surface which is newly laid and kept for curing and can't be open to traffic unless and until it's curing duration is completed. If a vehicle enters in the same path in the absence of Safety boards and sign, the spike will puncher the vehicle passes by and vehicles will be bought to rest and can prevent an accident. This method also applies to the vehicle whose brakes are failed.

B. *Installation of Laser light*

So as we see traffic can also be alerted earlier before entering an accidental path if vision due to foggy areas and heavy rainstorm are not clear by installing laser lights to indicate diversion ahead. This can be installed on the street lights or electrical polls before 100-200 M before perpendicular to the road alignment that is when a vehicle will pass from that range of installed laser light even if it foggy area or heavy rains laser light will reflect on a car as well as on driver and he will be aware of diversion ahead.

C. *Provision of Transparent Net*

In the places where the construction is carried out, various activities are taking place at the site. Digging of road, preparation of layers on road, laying of layers, etc. In such a case, while working as heavy instruments are used for digging purpose the chances that the particles of rocks, some pieces of rocks may fly in the air due to pressure and may fall on someone causing the accident. Similarly, there is the number of people in the surrounding who is working at the same time might accidentally come across the working time leads to an accident. Some people are eager to see what and how the work is carried out, comes near the place, and may lead to an accident. To overcome such issue and to avoid hazard the provision of the transparent net is provided from 2-3 m from the construction site. This will prevent any kind of rock pieces from entering or fall on labour and as it transparent net everyone can observe the work by maintaining distance from it. This is one of the method to prevent accidents.

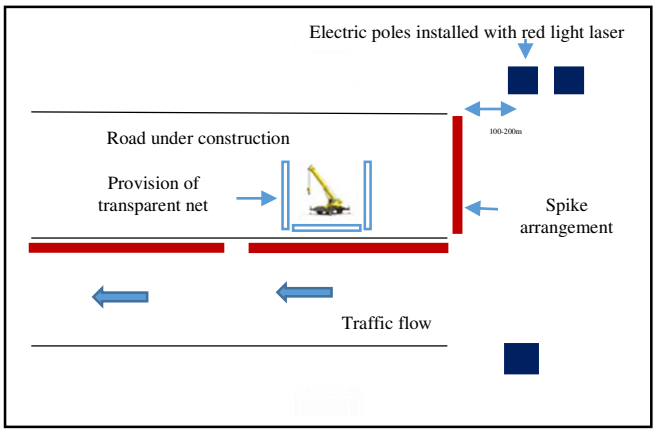


Figure 1. Representation of Spike Arrangement, Net Provision, and Red Light Laser.

IV. DATA COLLECTION

Information required for this study is collected through the online and offline method of questionnaire survey [16]. The questionnaire was sent to the respondent in the form of google online form. This method helped us to analyze the information needed to carry out the project. The questionnaire survey included questions on the hazards, accidents, safety taking place on road. This gave the way of idea exactly what type of accidents takes place on-site and what measures should be implemented and what kind of new technologies can be developed for betterment in further safety on road construction site. Two different methods of data collection are described separately below.

A. *Method 1- Questionaries Survey conducted through online method by google form*

The data gathered is through an online process which enables us to get the necessary ideas about safety measures and any innovations required to enhance more safety to labours working on-site and the public passing through the location of road site construction. Below are few screenshots of the respondent with different percentage of opinion.

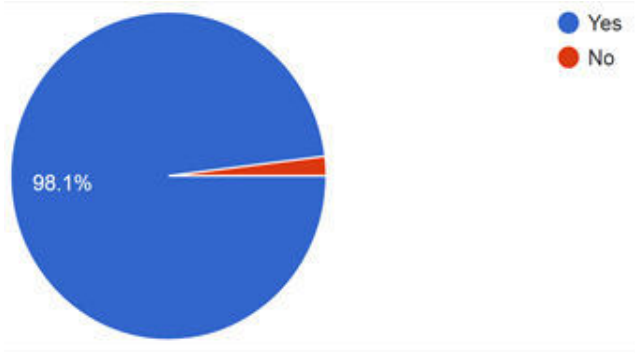


Figure 2. Percentile on increasing training to driver will reduce accident rate.

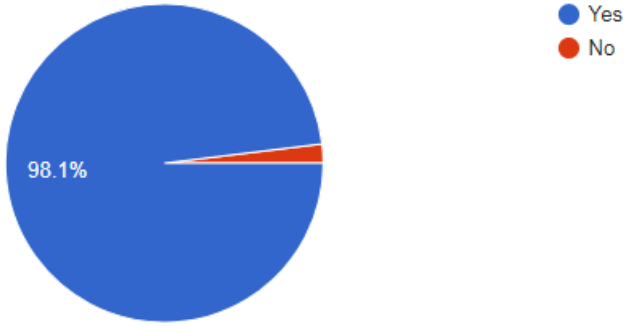


Figure 3. Percentile on using Personal Protective Equipment reduces accidents on site.

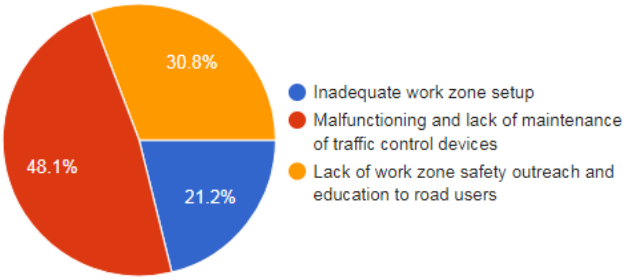


Figure 4. Percentile on highway work safety problems

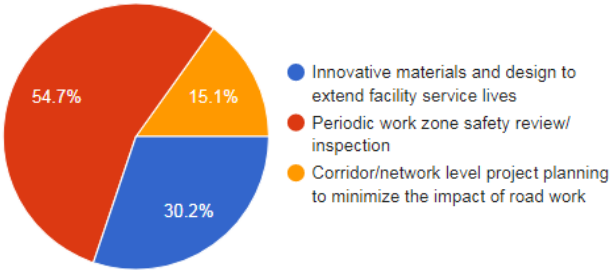


Figure 5. Percentile on effective measures for improving work zone safety

B. *Method 2- Questionaries Survey conducted through site survey method*

In this data analysis, different type of accidents taking place on-site construction of the road is mentioned. The survey enabled us to know the work carried on the actual site of road construction. Different tables show the representation of the survey conducted on-site [7]. The project took place in the number of a kilometer, the road was divided into different phase, below is the survey showing data according to per phase of construction work. Required members for construction site work depend upon the type of work, the members described are based on per kilometer are shown below.

TABLE 1
Staff members involved in construction work

Members in Company	Project
Project Manager	1
Supervisor	1
Safety Representative	1
Construction Workers	45

Although many of the JSAs address recurring and common activities. The study shows a well-functioning tool to deal with changes in the conditions for such activities It is firstly identified in the early project phase before execution of the work as part of the planning process, which is typically included as part of the project's overall plan [16]. The number of operating equipment are mentioned according to the different phase of construction considering the total length of the road.

TABLE 2
Project Specific Activities Involved

Project-specific activities	No. of Equipment
Multiple cranes operating in each zone	1-2
Digging near electrical cables	2
Digging proximate to road with heavy traffic	-
Digging on steep slope	1
Damper	5
Grader	5-6

Causes of accidents taking place on road site construction throughout the length of road and numbers of injuries took place on road construction of Wakan-Pali-Khopoli route is mentioned below (The number of accidents taking place depends on different site conditions)

TABLE 3
Causes of Accident leading to no. of harm to Labour

Causes of accidents on road construction site	No. of labour Injured
Base layer not laid properly	-
String of electric wire coming across the time of material laying.	2
Driving problem in unbalanced surface road with heavy machineries.	1
Getting stucked in Tar/Bitumen	1
Improper way of spraying bitumen on road	1
Inadequate Knowledge on-site working.	3
Contact with electricity	-
Improper way of digging hard rock base.	-
Total numbers of causes of accident	8

V. RESULT AND DISCUSSION

A. *Result Analysis*

In order to standardize performance measurement on the road site and from the above data collection through online and offline process is done [1] [16]. The question was distributed to labours and the staff which helped us in knowing the safety they are taking on-site and the hazards taking place usually on site [4]. The obtained data is the number of labours and people passing through the surrounding where the construction is going on get harm by any of the reason. This reduces the ability of the person to do the work and also the work process of the construction slow down. Below are few causes and its prevention to be taken is listed.

TABLE 4
Causes and Preventive Measures

Sr. No.	Causes of Accident		Prevention on the causes
A.	Accidents by Vehicles		
1.	Roller	a. People/Childers running behind the roller while working. b. Judgement of the driver goes wrong.	a. People/Childers running behind the roller while working. b. Judgement of the driver goes wrong.
2.	Grader/JCB	a. Over-loading of vehicle. b. Improper way of filling the material.	a. Calculation of material to be filled/collected at a time. b. Get trained from the person who have experience.
3.	Dumper	a. Over-lifting of material.	a. Get properly trained.
B.	Human Error		
1.	Bitumen Spraying/Laying	a. Getting stucked in Bitumen/Tar b. Improper way of spraying causing danger to body.	a. Get proper treatment of spraying the bitumen. b. Ban the entry of other people by proving nets. c. Use Personal Protective Equipment.
C.	Miscellaneous Error		
1.	Contact with electricity	a. String of electric wire coming across the time of material laying.	a. Use Personal Protective Equipment.
2.	Base layer	a. Based layered not laid properly may lead to unbalancing of vehicle b. Improper way of digging hard rock base.	a. Proper survey must be conducted b. Measurement and proper laying must be done
3.	Lack of knowledge	a. Inadequate Knowledge on-site working leading	a. Periodical training must be arranged
4.	Lack of safety Equipment measures	a. Outdated Epuipments are under use	a. Know what safety equipment is required for task able to provide and enforce use of equipment.

B. Classification of Preventive measures

Hazards and accidents taking place on-site causing numerous issue in schedule work. To reduce this issue following are some preventive measures to be undertaken to enhance safety and proper flow of work [5].

1. Mandatory instructions should be given on every site that labours should be given at least one week of training before joining the actual site.
2. Safety training and regulation regarding safety to be given.
3. Hazards and accidents usually taking place on-site must be explained, accordingly prevention can be ensured.
4. Compulsory use of Personal Protective Equipment.
5. Keep medical facilities before work, so if any incident takes place without any delay the measure can be taken which will reduce the amount of risk on site.
6. Training of proper understanding of the signs and symbols while work is under process.
7. Examine and inspect the working platform before use.
8. Check whether the equipment is proper before using it on site.
9. At the initial stage the work should be carried out under the observation of experienced staff.
10. Be attentive while working, avoid misbehavior at the time of working.
11. Start each day with a safety meeting team.
12. Always follow the correct procedures as instructed.

CONCLUSION

In this paper, the on-site survey was carried out, and the result found was the accidents taking place on-site causing harm to the labours working on-site and also the public moving around the site. Accidents such as the improper way of spreading the bitumen, getting stuck in tar, inadequate knowledge of laying proper base layer, due to high speed and unawareness of the surrounding work the vehicle entering in the work zone all such issues caused the accident on the site. The questionnaire survey conducted helped to know the issues that occurred on-site and the risk on labours and the general public. From the questionnaire survey, it can be concluded that the majority of the accidents take place leading to a high amount of injuries. The number of preventive measures is adopted by training the workers by explaining to them the hazards taking place on-site, explaining the meaning of symbols and the way of using it at necessary while working, trained for using standard signs and symbols like work under construction, warning symbols such as eye protection required, head hat mandatory, and various roll-up signs, properly examining the equipment before using, proper demonstration regarding each activity should be explained, and also various considerable actions which help in reducing the accidents. Considering the harmful issues and reducing the number of accidents, the measures for avoiding hazards the concept of spike arrangement, provision of the transparent net, and installation of laser lights can be taken. The workers, labours, employees working on site will be safe as the adoption of these techniques will increase betterment in safety practice.

REFERENCES

[1] Zheng, W., Shuai, J., Shan, K., 2017, "The energy source based job safety analysis and application in the project" Saf. Sci. 93, 9–15

[2] Ahmed, S.M. Kwan, J.C. Ming, F.Y.W. Ho, D.C.P., 2000, "Site safety management in Hong Kong. Journal of Management in Engineering" November 2000,34–42.

[3] Shekhar Choudhary, Pulkit Saluke, "Job Safety Analysis Applied In Construction Industry," IJSTE - International Journal of Science Technology & Engineering | Volume 4 | Issue 09 | March 2018.

[4] Amotz Perlman, Rafael Sacks, Ronen Barak, "Hazard recognition and risk perception in construction" Safety Science 64 (2014) 22–31, 12 December 2013.

[5] Miss. Smita .A. Bhole, "Safety Problems and Injuries on Construction Site: A Review" International Journal of Engineering and Techniques - Volume 2 Issue 4, July – Aug 2016.

[6] S. H. A. Kalkhoran, G. Liravi, and F. Rezagholi, "Risk management in construction projects" International Journal of Engineering Trends and Technology (IJETT), vol.10, no. 3, 2014.

[7] S. Akintoye and M. J. MacLeod, "Risk analysis and management in construction" International Journal of Project Management, vol. 15, no.1, pp. 31-38, 1997.

[8] Vitor Sousa , Nuno M. Almeida, Luís A. Dias , "Risk based management of occupational safety and health in the construction industry Part 1: Background knowledge" Safety Science 66 (2014) 75 ,86, 3 March 2014.

[9] Etherton, J.R. NIOSH Technical Report – Safe Maintenance Guidelines for Robotic Workstations. U.S Department of Health and Human Services– National Institute for Occupational Safety and Health: DHHS (NIOSH) Publication No. 88-108; 1988.

[10] Varun Gopinath and Kerstin Johansen, "Risk Assessment Process for Collaborative Assembly – A Job Safety Analysis Approach / Procedia CIRP 44 (2016) 199 – 203.

[11] V. Praveen Kumar and C. K. Vishnuvarthan, "A study on construction jobsite safety management," International Journal of Innovative Research in Science, Engineering and Technology, vol. 3, no. 1, pp. 44–52, 2014.

[12]S.R.Meena, P.M.Nemade,S.N.Pawar, & A.S.Baghele,"Implementation of safety management through review of construction activities in M.S. building projects," International Journal of Engineering Research and Technology, vol. 2, no. 5, pp.1656–1662, 2013.

[13] Neal, A. and Griffin M. A. "Safety Climate and Safety at Work In the Psychology of Workplace Safety" 'I. J. B. M. R.' 2004. , PP 15–34.

[14] Holt, A. J. (2005) "Principles of Construction Safety" 2nd edition, Cornwall: MPG Books Ltd. Blackwell Publishing.

[15] T.S.Abdelhamid and J.G.Everett, "Identifying root causes of construction accidents" Journal of Construction Engineering and Management, vol. 126 (1) , pp. 52-60.

[16] Eirik Albrechtsen, Ingvild Solberg, Eva Svensli, "The application and benefits of job safety analysis" Safety Science 113 (2019) 425–437.

[17] V. H. P. Vitharana, G. H. M. J. Subashi De Silva and Sudhira De Silva, "Health Hazards, Risk and Safety Practices in Construction Sites – A Review Study" Vol. XLVIII, No. 03, pp. [35-44], 2015.

[18] Rita Yi Ma Li, " Smart construction safety in road repairing works" 8th International Conference on Advances in Information Technology, IAIT2016, 19-22 December 2016.

Cricket bowling machine

Supriya Sunil Kadam
Assistant Professor
Electronics and Tele-communications, Government college of engineering Karad, Satara, 415124, Maharashtra
India
supriya.ssk01@gmail.com

Megha Prasannan,
Student
Electronics and Tele-communications, Government college of engineering Karad, Satara, 415124, Maharashtra
India
megzprasannan99@gmail.com

Nikita Shivrai,
Student
Electronics and Tele-communications, Government College of engineering Karad, Satara, 415124, Maharashtra
India
nsshivrai91@gmail.com

Akanksha Kapare
Student
Electronics and Tele-communications, Government College of engineering Karad, Satara, 415124, Maharashtra
India
akankshakapare02@gmail.com

***Abstract*— This paper represents a design of cricket bowling machine which can provide support to the batsmen to develop their batting skill. The machine will be capable of generating different patterns of bowling. The paper firstly reviews about the design of the model, different aspects of bowling and hardware structure to successfully create cricket bowling machine. The model consists of two dc motors with wheels in which one rotates in anticlockwise direction and the other in clockwise. A valve is welded and placed in between two wheels. As, the motor attains the speed the balls are inserted into the valve. Next, the electronic circuit design is expressed (PROTEUS) with dimensions and calculations regarding trajectory of the ball.**

***Keywords*- Trajectory, rotating wheels, frictional gripping , rpm, length of pitch, ball throwing.**

I. INTRODUCTION

Today cricket is one of the most popular game in world. So, it is felt technology can be used to develop a cricket bowling machine with variable speed, swing and spin for the benefit of practicing of batsman. The cricket bowling machine is to provide accurate and consistent batting practice for players of all standards like professional, amateur cricketers and club level cricketers for fine tuning of batting as well as reduce flaws in their batting without necessity of bowler and also for fielders or wicketkeepers for catching practise. Also it will be of much use at school, training centres and junior level where the standards of bowling are weak.

The main principle of the machine consists of two heavy wheels, between of 80 mm in diameter. These are fixed on a aluminium frame such that the rotating wheels are in the same plane inclined at particular angle. The whole assembly is fixed on another frame so that the plane of the wheels can be adjusted to be at the height that a typical bowler would release the ball. The motors are typically powered by DC source, and are rotated in opposite directions. A controller is used which allows variation of the speed of each wheel, allowing the machine to be slowed down for less experienced batsmen or to set higher range for getting professional experience and swing bowling can also be achieved.

The design of cricket bowling machine also aims to develop a cost effective and compact cricket bowling machine which provide provision for using various pattern of bowling style such as straight, outswing, inswing, off-break, leg break. LCD is used which will display the speed, type of bowling, angle to be set, etc. The outcome of the machine is positive as it is releasing the ball as expected. The speed is also varying by controllers of both the motors. Also the upper frame can be adjusted to three different angles to change the releasing situation of the ball at different heights.

II. LITERATURE SURVEY

The main principle of working in a Cricket bowling machine consists of two rotating wheels, each driven by its own motor, between which the balls are fed. The device is mounted on a tripod or similar stand, at such a height as to simulate the delivery of a bowler of average height. The machine runs on rechargeable batteries, each charge providing between two to six hours of running time. [1] There are a number of different types of bowling machine available in market but they are costly and occupies larger space. All the types are quite different in the ways they achieve the required delivery, though most allow the use of control, so that a coach or another person can be closer to a batsman when the stroke is played. [2]. Firstly, we studied the different techniques of ball throwing and finalised the throwing mechanism with minimum disadvantages.

This machine will not only give variable speeds for bowling different deliveries but the length of deliveries can also be adjusted by tilting the head of the machine as required. The speed of the ball can be varies over a specific range on the buttons on the machine. A number of devices introduced by various researchers explained for throwing balls. Among them some are: (i) pneumatically operated ones, (ii) spring actuated devices and (iii) one or two wheel rotating device. However, each category of ball throwing machines mentioned

their advantages, disadvantages and obviously there are few excluded limitations.

The pros and cons of every methods were studied. Also different bowling styles were observed [3]. Pneumatically operated ball throwing device uses a compressor actuated by a motor to produce highly compressed air into throwing pipe. This type of ball throwing device occupies a lot of space, it is not very much economical and portable. The spring actuated type device employs a striking and throwing mechanism consisting of either elastic or a spring to throw ball in projectile. In this type of arrangement difficulty is encountered in designing a controllable actuating mechanism for delivering ball. Moreover, these devices provide only limited direction control of the ball as it is released and incapable of simulating the flight characteristics of a normally delivered ball and is affected by the air drag and other practical factors affecting it[4].

The third type is one in which one or more wheels mounted over a motor which deliver the ball when it comes in contact with the rotating wheel. In this type gaps between the two counter rotating wheels is fixed and are mounted on a base for axial rotation in common axis. The base is supported on a tripod. The tripod provides projection of the ball from different heights. There must be appropriate friction between the ball to be delivered and the rotating wheels.[5] A number of types of wheels can be used for this purpose but mostly less weighted wheels are preferred. Most common types of wheels are plastic wheels or wooden wheels with rubber belt. Other type of wheel is a pneumatic wheel or omni wheels; among these the requirement to maintain proper inflation pressure in order to ensure consistent ball friction with wheel and correct wheel balancing so as to prevent ball wobble and to avoid the air drag and consequent erratic ball throwing. Secondly, positive and precise adjustment of the rotational plane of the wheels at all position is not possible hence precise control of the ball is the necessary part which is considered throughout the designing of this model[6].

For varying the speed of motor or to get the inclination required for different trajectories, the electronic circuit is designed using microcontroller, LCD, motors, motor driver etc.[7]. The 3-D model of the machine is shown in this paper for reference of the proposed design. Also, the proper dimensions and components are discussed.[8].

III. PROPOSED METHOD

The key working mechanism of a cricket bowling machine consists of two spinning wheels, each driven by its own motor, through which the balls are fed. The system is placed on a tripod or similar stand at a height that mimics the delivery of an average-height bowler. The proposed model is depicted in Figure 1. The unit is powered by rechargeable batteries, with each charge lasting between two and four hours.

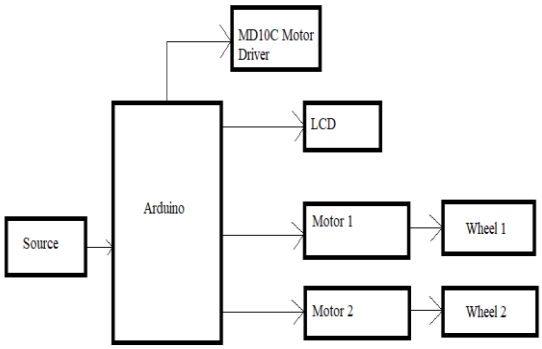


Fig 1 Schematic of proposed model

EXPERIMENT AND RESULTS

The Cricket Bowling Machine project work resulted in the development of the cheapest ball throwing device ever, capable of automatically throwing the balls at various appropriate adjustable speeds for cricket practice. The machine's result is positive, as it releases the ball as predicted. The speed of both motors is also controlled by their controllers. The upper frame can also be tilted at three different angles At various heights, adjust the ball's release condition. The Ball Throwing Mechanism of this tennis ball system works admirably in general. It is capable of throwing the tennis ball according to the previously mentioned technical specifications. Three key considerations are taken into consideration in order to ensure that the thrower system runs smoothly. The ball's throwing distance and rotational speed are among the variables. Estimation According to previous research and review, the ball speed range of tennis ball machines on the market is between 20 and 120 km/h. As a result, the average speed of the ball expelled from the launcher is assumed for this project. The location of the ball launcher is 0.33 meters above the ground. To get the total height traveled by the ball, the height travelled by the ball must be added to this amount. This tennis ball machine's thrower mechanism has three different elevation angles that can be modified

We performed simulation as shown in Fig 2 on proteus and created 3D model as shown in Fig 3.

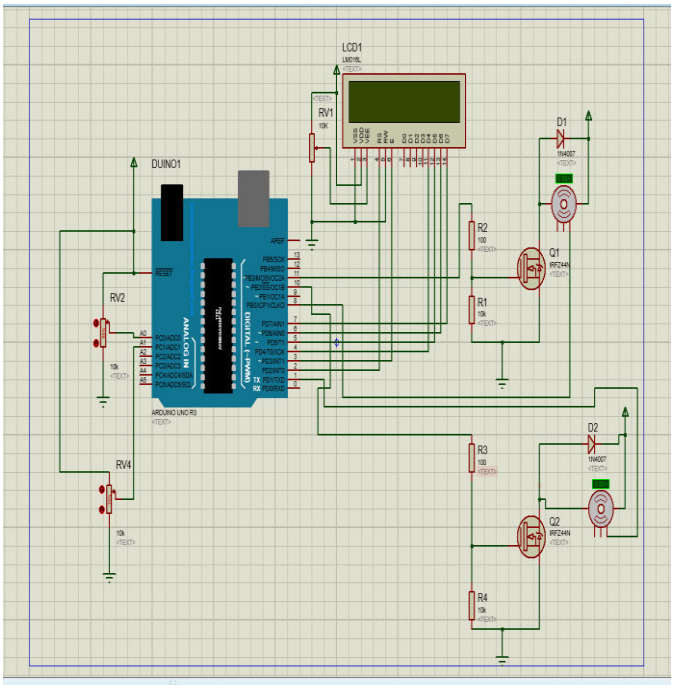


Fig 2 Simulation Circuit

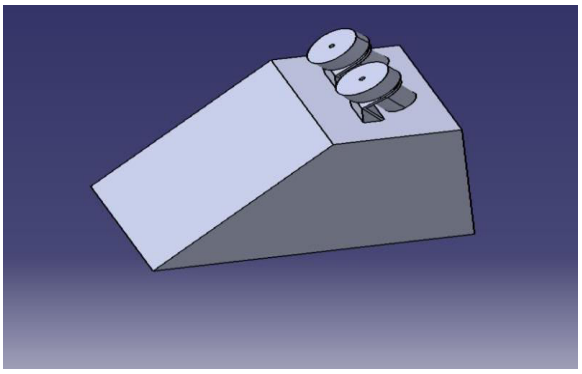


Fig 3 3D Model

IV. CONCLUSIONS

Thus, we have designed a cricket bowling machine for batsmen to improve their batting skill without the need of a bowler. This project is to design an improved cricket bowling machine, which is adjustable to throw different sizes cricket balls at various speeds in predetermined line and length. The existing cricket bowling machines are very expensive and therefore cricket bowling machine was designed keeping in mind to develop a cost effective (economic) and compact cricket bowling machine. This project is to provide provision for using various pattern of bowling style such as straight, outswing, inswing, off break, leg break.

V. ACKNOWLEDGMENT

It gives us a great pleasure in bringing out the project report entitled “CRICKET BOWLING MACHINE”. This project is something that could not have been implemented without the co-operation of many people who have involved in this project. We take this opportunity to express our thanks for all the people who had helped us in the completion of this project. We sincerely thank to Prof. S.S.Kadam with his help and guidance this project would not be in its present form. The keen interest taken by the guide in our project helped us to solve difficulties. We are thankful to our respected H.O.D. Dr Prof. A.M.Sapkal who provided us the opportunity to work on this project and helped us a lot by providing valuable suggestions

VI. REFERENCES

[1] D. J. McNamara, T. J. Gabbett and G. Naughton, "Assessment of Workload and its Effects on Performance and Injury in Elite Cricket Fast Bowlers", *Sport. Med.*, vol. 47, no. 3, pp. 503-515, Mar. 2017.

[2] K.middeltone, D.Foster and J.Alderson, “Pelvic and trunk mechanics and injury in cricket: A spin bowling case study”, InternationalJournal of Sports Science & Coaching,vol.11,no.2pp.250-254,2016.

[3] H.Su,Z.Fang,D.Xu and M.Tan,”Trajectory Prediction of Spinning ball based on Fuzzy Filtering and Local Modeling for Robotics Ping-Pong Player “,IEEE Transactions on Instrumentation and Measurement,Vol.62, no.11,pp.2890-2900,2013.

[4] Akshay R. Varhade, HrushikeshV Tiwari and Pratik D. Patangrao, “Cricket Bowling Machine”, International Journal of Engineering Research & Technology (IJERT), ISSN: 2278- 0181 vol. 2 Issue 12, pp. 1920- 1924, December 2013.

[5] Abhijit Mahapatra, Avik Chatterjee and ShibenduShekhar Roy’ “Modeling and simulation of a ball throwing machine”, 14th National Conference on Machines and Mechanisms (NaCoMM09), NIT, Durgapur, India, pp. 416-422, December 17-18, 2009

[6] H. Bhattacharjee, *The slippery dew factor and its effect on the field. WisdenIndia*, 2017, [online] Available: http://www.wisdenindia.com/cricket-article/the-slippery-dew-factor-and-its-effect-on-the-field/239382.

[7] A Training Utility for Estimating the Bowling Speed of a Cricketer Using Accelerometer Data https://ieeexplore.ieee.org/document/8601232

[8] G.Robinson and I.Robinson,”The motion of an arbitrarily rotating spherical projectile and its application to ball ganes “, Physica Scripta, vol.88,no.1,pp.1-17,2013

[9] K.wojcicki,K.Pucilowski and Z.Kulesza, “Mathematical Analysis for a New Tennis Ball Launcher”, Acta Mechanica etAutomatica, vol.5, no.4,pp.110-119,2011.

[10] F.Kovacs and G.Hosszu,”Highly Accurate Tennis Ball Throwing machine with Intelligent Control”,International Journal of Mechanical Industrial Mechatronic and manufacturing

Engineering,vol.9no.9,pp.1629-1633,2015.

[11] F.Alam,H.Chowdhury,H.Moria,R.La and A.Subic,"A Comparative Study of Golf Ball Aerodynamics", 17th Australasian Fluid Mechanics Conference,2010.

[12] F.Alam,D.Hillier, J.Xia,H.Chowdhury,H.Moria,R.La Brooy, et at.,"Aerodynamics of Used Cricket balls", 17th Australasian Fluid Mechanics Conference,2010.

[13] R.Cross, Physics of baseball & softball, New York:Springer, pp. 37-57, 2011.

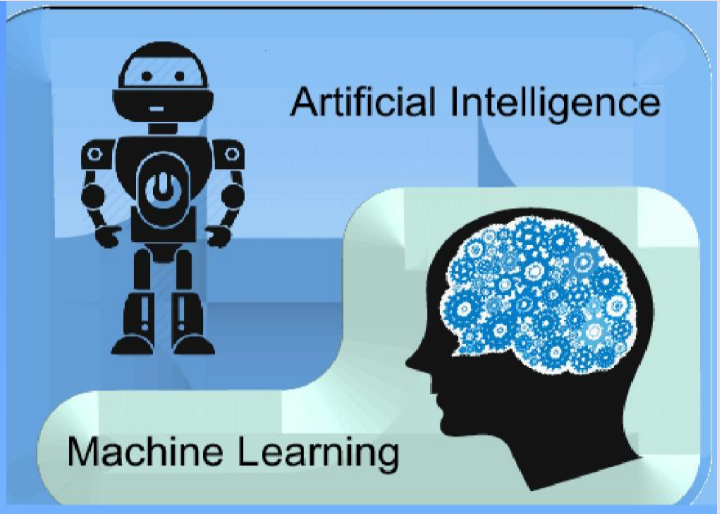
[14] A.mahapatra, AChatterjee and S.Roy,"Modelling and Simulation Of Cricket Bowling Machine",International Journal on recent Trends in Engineering & Technology,Vol.3,no.6,pp.15-19,2010.

[15] A.Varhade,H.Tjwari and P.Patangrao, "Cricket bowling Machine", International Jpournal of Engineering Reasearch & Technology,vol.2,no.12pp.1920-1920,2013.

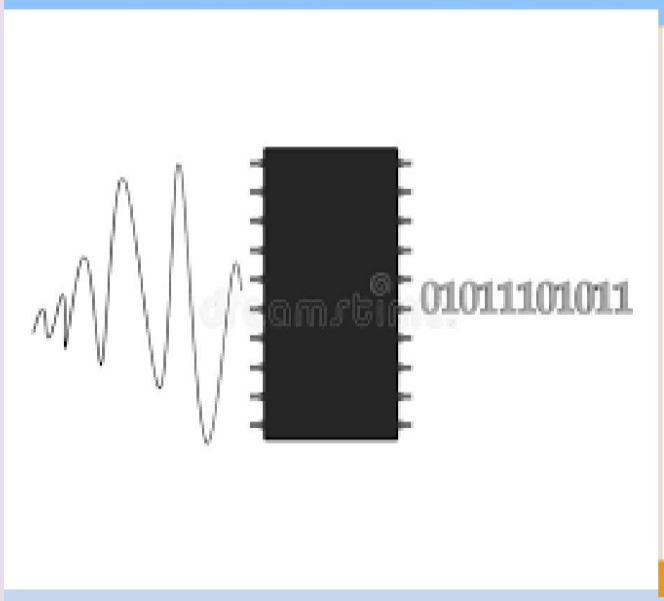
[16] C. G. Brechbuhl, Millet and L. Schmitt, "Accuracy and Reliability of a New Tennis Ball Machine", *Journal of Sports Science and Medicine*, vol. 15, no. 2, pp. 263-267, 2016.

[17] K.ball and C.Hrysomallis,"Synthetic grass Crickey pitches and ball bounce Characteristics",Journal Of science and medicine in sports, vol.15,no.3,pp.272-276,2012.

IOT


Artificial Intelligence
Machine Learning

COMMUNICATION
Productivity
Strategy
Teamwork
People
Facts
Idea
Plan


01011101011

Power transmission
Smart homes
Solar power
Electric vehicles
Power generation
Wind power
Grid monitoring
Smart Power Grid

Green ICT
in Daily Life
SAVE
ENVIRONMENT
MONEY
ENERGY