

Automatic Sanitization System for Transportation And Auditorium

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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 COVID-19 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-19 quickly 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. So 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 learning 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 disinfecting 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 SYSTEM

The hardware consist of the following are

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

4. Water motor

Software components are as follows

1. Python IDE
2. BOLT cloud

A detailed explanation for each individual unit as present below

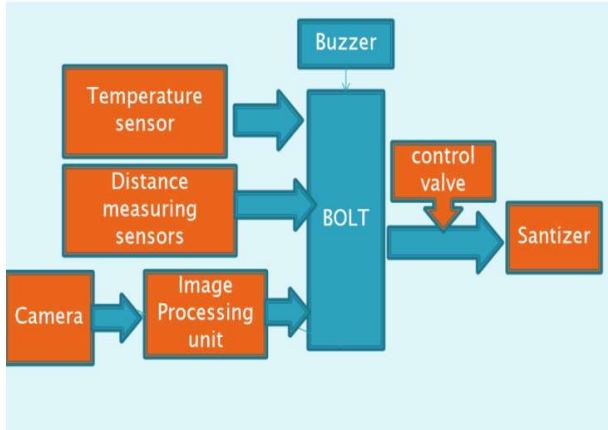


Fig.1 shows the Block diagram of the proposed system

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.

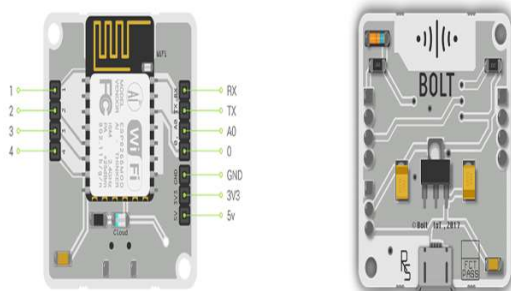


Fig.2 BOLT IOT module

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

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.

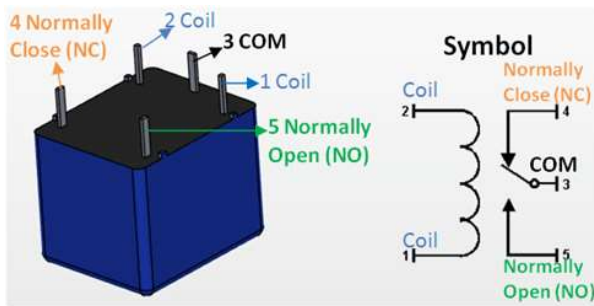


Fig.4 Relay

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

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 .

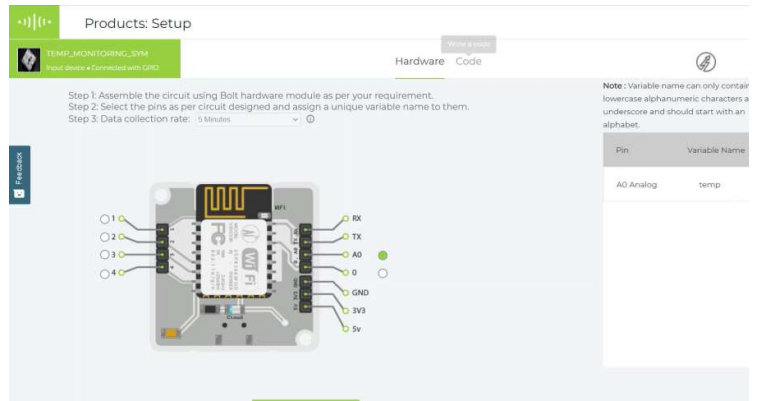


Fig. 6 configuration of Bolt module with cloud

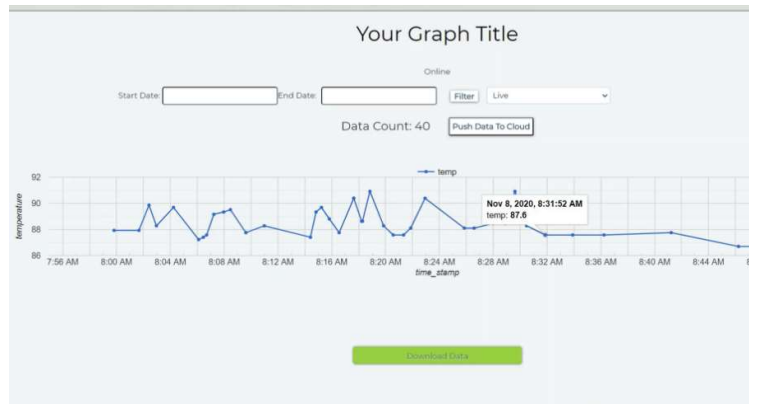


Fig.7 Data recorded and represented in graphical form of collected data

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.

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