Automation of dry-wet waste collection to support Swachh Bharat Abhiyan and its monitoring over IOT enabled WSN

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Abstract— with the ever increasing population, urbanization, migration issues, and change in lifestyle, municipal solid waste generation levels are increasing significantly. Waste management directly affects the lifestyle, healthcare, environment, recycling and disposal, and several other industries. Current waste management trends are not sophisticated enough to achieve a robust and efficient waste management mechanism. It is very important to have a smart way of managing waste, so that not only the waste status is notified in-time when to be collected, but also, all the stakeholders are made aware in timely fashion that what type of waste in what quantity is coming up at what particular time. This will not only help in attracting and identifying stakeholders, but also aids in creating more effective ways of recycling and minimizing waste also making the overall waste management more efficient and environment friendly. Keeping all this in mind, we propose a cloud-based smart waste management mechanism in which the waste bins are equipped with sensors, capable of notifying their waste level status and upload the status to the cloud. The stakeholders are able to access the desired data from the cloud. Moreover, for city administration and waste management, it will be possible to do route optimization and select path for waste collection according to the statuses of waste bins in a metropolis, helping in fuel and time efficiency.

Keywords—WSN, IOT.

I.   INTRODUCTION

In recent times, garbage disposal has become a huge cause for concern in the world. A voluminous amount of waste that is generated is disposed by means which have an adverse effect on the environment. The common method of disposal of the waste is by unplanned and uncontrolled open dumping at the landfill sites. This method is injurious to human health, plant and animal life. This harmful method of waste disposal can generate liquid leachate which contaminate surface and ground waters; can harbor disease vectors which spread harmful diseases; can degrade aesthetic value of the natural environment and it is an unavailing use of land resources. In India, rag pickers play an important role in the recycling of urban solid waste. Rag pickers and conservancy staff have higher morbidity due to infections of skin, respiratory, gastrointestinal tract and multisystem allergic disorders, in addition to a high prevalence of bites of rodents, dogs and other vermin. Dependency on the rag-pickers can be diminished if segregation takes place at the source of municipal waste generation. Swachh Bharat Abhiyan (English: Clean India Mission) is a campaign by the Government of India to keep the streets, roads and infrastructure of the country's 4,041 statutory cities and towns and its rural areas clean. Swachh Bharat Abhiyan (or Clean India Mission in English) is a campaign in India that aims to clean up the streets, roads and infrastructure of India's cities, smaller towns, and rural areas.

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II.   RELATED WORK

IEEE Xplore is a scholarly research database that indexes, abstracts, and provides full-text for articles and papers on computer science, electrical engineering and electronics. Following papers were used:
1. Automation of Smart waste management using IoT to support "Swachh Bharat Abhiyan" - a practical approach
2. Smart waste management using Internet-of-Things (IoT)
3. A survey of smart environment conservation and protection for waste management
4. Challenges and Opportunities of Waste Management in IoT-enabled Smart Cities: A Survey
5. Cloud-based smart waste management for smart cities
6. Technologies for segregation and management of solid waste: A review
7. Solid Waste Management Architecture Using Wireless Sensor Network Technology

III. METHODOLOGY

Wireless sensor network (WSN) refers to a group of spatially dispersed and dedicated sensors for monitoring and recording the physical conditions of the environment and organizing the collected data at a central location. WSNs measure environmental conditions like temperature, sound, pollution levels, humidity, wind, and so on. The WSN is built of "nodes" from a few to several hundreds or even thousands, where each node is connected to one (or sometimes several) sensors. Each such sensor network node has typically several parts: a radio transceiver with an internal antenna or connection to an external antenna, a microcontroller, an electronic circuit for interfacing with the sensors and an energy source, usually a battery or an embedded form of energy harvesting.

IV. RESULTS AND DISCUSSION

The project aims at collecting the garbage when the bin gets filled. The sensor nodes transmit the signal wirelessly and through the concept of iot the information gets displayed on the server. The vehicles can collect garbage in an organized manner using concept of iot and the app. All the garbage collected is separated as dry wet and metallic-nonmetallic on the conveyor belt using the sensors. The conveyor works on the rack & pinion mechanism and is driven by the stepper motor. The flap moves clockwise & anti-clockwise accordingly to separate the waste. Among the many challenges that a city faces, waste management is of utmost importance. This is because; it is directly related to health of people living in the area. We are further extending this work to address problems of segregating different kind of wastes (e.g., solid, liquid etc.), and identifying vehicles for collecting it. The app is created using MIT app inventor for timely collection of waste. It uses the concept of Think speak for better assessment. App inventor consists of the designer and block editor. The app inventor servers store your work and help you keep track of your projects. One of the neatest things about App Inventor is that you can see and test your app while you are building it, on a connected device.

V. CONCLUSION AND FUTURE SCOPE

In recent times, garbage disposal has become a huge cause for concern in the world. A voluminous amount of waste that is generated is disposed by means which have an adverse effect on the environment. It is very important to have a robust way of managing the waste, so that not only the whole process becomes efficient, but also, the disposal of waste is done in a productive way. Besides, food industry, healthcare, tourism, and other such departments can take benefit from the available resources related with waste management. With the proposed cloud-based waste management, a smarter way

The Internet of Things (IoT) is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and connectivity which enable these objects to connect and exchange data. Each thing is uniquely identifiable through its embedded computing system but is able to inter-operate within the existing Internet infrastructure. The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention.

of handling and disposal of waste is created, which also helps in various futuristic0research problems related with food, hygiene, environment, socio-cultural traits, lifestyle, etc. The project presents the collection of garbage when the bin gets filled. The sensor nodes transmit the signal wirelessly and through the concept of iot the information gets displayed on the server. The vehicles can collect garbage in an organized manner using concept of iot and the app. All the garbage collected is separated as dry- wet and metallic-non-metallic on the conveyor belt using the sensors. The conveyor works on the rack & pinion mechanism and is driven by the step-per motor. The flap moves in clockwise & anticlockwise accordingly to separate the waste. In the future, this work can be extended in the context of case or country specific waste generation trends. Big Data analysis can be done on the gathered data from different municipalities.
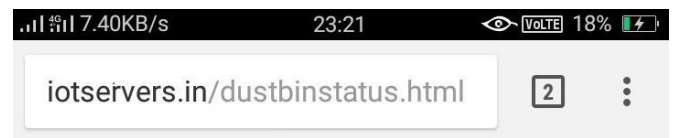

Dust Bin NO-1(SIT,LONAWALA) Level(cm) : 021

Figure 1.   Example of information displayed on server.
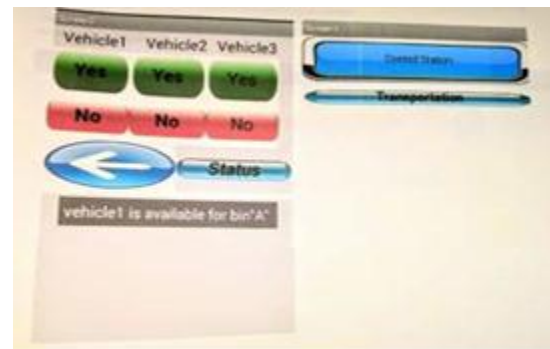
Figure 2.   Example of the user interface of app

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