

Arduino Based Garbage Monitoring System using IoT

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Abstract - Waste management is all the activities and actions required to manage waste from its inception to its final disposal. This includes collection, transportation, treatment and disposal of waste together with monitoring and regulation. Waste collection methods vary widely among different countries and regions. Domestic waste collection services are often provided by local government authorities. Curbside collection is the most common method of disposal in most countries, in which waste is collected at regular intervals by specialized trucks. Waste collected is then transported to an appropriate disposal area. Nowadays, cities with developing economies experience exhausted waste collection services, inadequately managed and uncontrolled dumpsites and the problems are worsening. Waste collection method in such countries is an on-going challenge and many struggle due to weak institutions and rapid urbanization. In the present world, we see the dustbins are placed on the roadside and dustbin is overflowing this overflow of dustbin is due to the increase in the population and the wastage from hotels, industries etc. This Project is implemented to place in the smart cities. In this proposed system, multiple dustbins from the different areas throughout the cities are connected using IOT technology. In this the dustbin is provided with low cost embedded devices and it will sense the level of dustbin, then it is sent to the municipality officer. Then he will send the information to the truck driver to collect the waste. Ultrasonic sensor will sense the level of dust in dustbin.

Key Words: Garbage Collection, UV Sensor, Arduino, IOT, Swachh Bharat

1. INTRODUCTION

According to the UN, between now and 2025, the world population will increase by 20% to reach 8 billion inhabitants (from 6.5 today). With this increase in population, the responsibilities towards waste management also increases. Our waste administration frameworks and our economic situations, even taking care of business, are unequipped for taking care of the developing measures of waste universally. So unless a new paradigm of global cooperation and governance is adopted, a tidal wave of uncontrolled dumpsites will be the principal waste management method, especially in Asia.

On the west coast of America, San Francisco leads the way with a landfill disposal diversion rate of 72% and the city has set itself a target of zero waste to landfill by 2020. According to the Pune Municipal Corporation (PMC), Pune alone

generates around 1600 metric tons of solid waste daily in the form of organic, inorganic, bio-medical, and industrial Hazardous and e-waste etc. During the monsoon and festive season, the daily waste generation goes up by 15 to 20 percent.

In response to this there are only 412 compactor buckets and 1200 garbage containers in the area of 700 km². Moreover, the number of garbage pickers is just around 2300 which is insufficient to cover over 10 lakh households in the city. To encounter this alarming problem, many organizations have come with their solutions like the Swachh (Solid Waste Collection and Handling or, officially, the Swachh Seva Sahakari Sanstha Maryadit, Pune) and the Adar Poonawala

Environment is essential for everyone and present everywhere, that supply all natural needs in an abundant manner but also we have some responsibilities towards our environment. In several urban areas although the dustbins are provided so that it can be used by the people but its proper maintenance is also needed lacking of which unhygienic increases destroying our environment day by day also resulting severe adverse effects for mankind. This project presents some revolutionary remedies in this context. People are more interested to use such technologies which can reduce their time and effort in efficient manner. Automation is the most demandable feature now a day. For this purpose smart dustbins are the much suitable approach. It will be helpful to develop green and smart city. For this we have to develop a fully automatic dustbin which will first be able to detect the current status and connected to local area network and servers by sending the data to computer system about its current status.

Though the world is in a stage of up gradation, there is yet another problem that has to be dealt with Garbage. Pictures of garbage bins being overfull and the garbage being spilled out from the bins can be seen all around. This leads to various diseases as large number of insects and mosquitoes breed on it. A big challenge in the urban cities is solid waste management. Hence, smart dustbin is a system which can eradicate this problem or at least reduce it to the minimum level.

Our present Prime Minister of India. Mr. Narendra Modi ji has introduced the concept of implementing 100 smart cities in India. "Swachh Bharat Abhiyan" was initiated to ensure a clean environment.

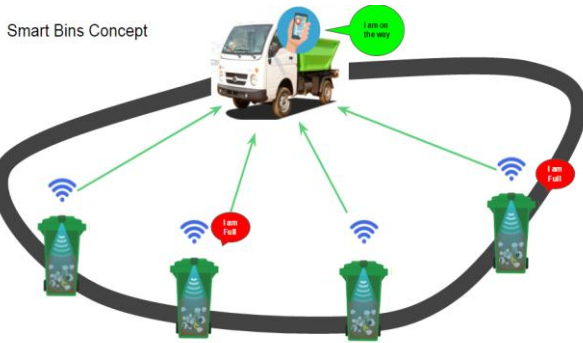


FIG 1: Smart Dustbin Concept.

2. BLOCK DIAGRAM DESCRIPTION

In this each dustbin is given a unique ID for easy identification. We continually monitor all the dustbin in our system through an Android App Blynk and also monitor all the events in the system. In this system many number of dustbins are connected through the internet. The ultrasonic sensor is connected to detect the level of dustbin. The dustbin is divided into three level. The Ultrasonic sensor detect the level of the dustbin and send it to the RF transmitter. The availability of waste could be monitored through android app. The ultrasonic sensor will be interfaced to Arduino Mega and will be the input section of the system. Arduino Mega will be programmed to perform the task to measure via sensor and give output. Arduino Mega will be connected to Internet and it will be logged onto the server through the Ethernet shield. This information is then given to the web using internet. The municipality officer get the output in virtualization. This will display the level of all dustbin and display the ID of dustbin which is full. It will also indicate the presence of Toxic gases in the dustbin.

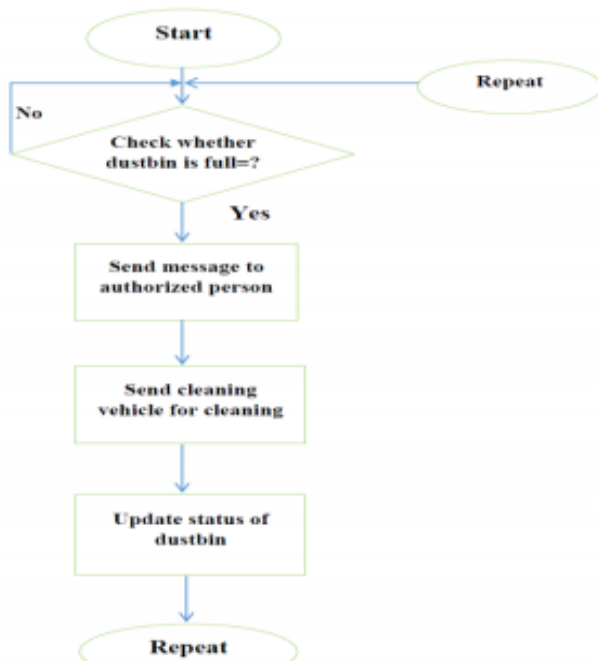


FIG 2: Flow Chart of Smart Dustbin

3. EXISTING SYSTEM

In the existing system there is no indication whether the dustbin is over flow. It is more time consuming task and it is less effective. It leads to the wastage of time since the truck will go and clean whether the dustbin is full or empty. This system need high cost. This system will create a unhygienic environment and make the city unclean. In this system the level of the dustbin will not be known and create the bad smell spreads and cause illness to human beings. It also make more traffic and noise.

4. PROPOSED SYSTEM

In present day the dustbin is overflow, the proposed system will help to avoid the overflow of dustbin. It will give the real time information about the level of the dustbin. It will send the message immediately when the dustbin is full. Deployment of dustbin based on actual needs. Cost of this system is minimum the resources are available easily. Improves environment quality by reducing the smell and make the cities clean. It has effective usage of dustbins. It will also reduce the wastage of time and energy for truck drivers. It will also indicate the availability of toxic substance in the bin.

5. WORKING

Ultrasonic Sensor: The sensor is used to detect the level of the dust in the dustbin. It uses a sound transmitter and receiver. An ultrasonic sensor create a ultrasonic pulse called ping and listen for the reflection of pulse. The sound pulse is created electronically using a sonar projector consisting of signal generator, power amplifier and electro-acoustic transducer array. A beam former is usually employed to concentrate the acoustic power into the beam.



FIG 3: Ultrasonic Sensor

Arduino UNO: The mega 2560 is an microcontroller board based on the ATmega2560. It consist of 54 digital input and output pins in which 15 can be used as PWM output,16 analog input,4UARTs which is a hardware serial port,16 MHz crystal oscillator, a USB connection. It also has reset button power jack and ICSP header. It has the sensor to detect the temperature and humidity and axis digital accelerometer. The board contains battery shield and connector cables. In

this coding is embedded in the kit. The coding contains information used to determine the temperature then HTML code is used for display the output.



FIG 4: Arduino UNO

Serial Wi-Fi wireless transceiver module: ESP8266 is a chip which is wireless network micro-controller module. It will be a system-on-a-chip (SoC) with capabilities for 2.4 GHz Wi-Fi, general-purpose input/output etc.

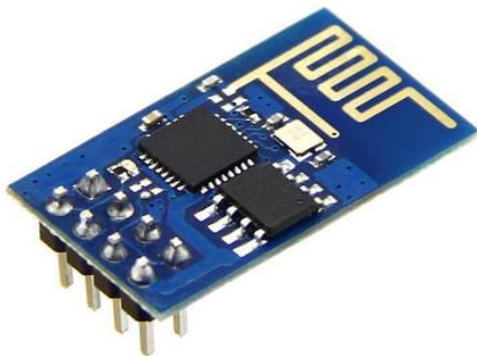


FIG 5: ESP8266

LCD Display: In this the result is displayed in the virtual form. The information about the level of the dustbin and the area where it is located is send to the municipality office with the unique ID that is given to the dustbin. The waste level inside the dustbin is detected by this system. This will transmit the information to the concerned person wirelessly. Everyone can access the data at any time from any where in the world. Continuous and immediate data transmission. This system will avoid the overflow of dustbin .It will also avoid the emission of toxic gases from the dustbin.



FIG 6: LCD Display

6. CONCLUSION

This paper shows how the smart waste management using IoT can be implemented. This proposed system assures the collection of garbage soon when the garbage level reaches its maximum level. The system will thus provide accurate reports, increasing the efficiency of the system. The real-time monitoring of the garbage level with the help of sensors and wireless communication will reduce the total number of trips required of GCV and thus, will reduce the total expenditure associated with the garbage collection. Thus, the dustbins will be cleared as and when filled, giving way to cleaner city, better infrastructure and increased hygiene. This waste Management System using IOT has implemented the management of waste in real time using smart dustbin to check the fill level of dustbin to check if it is full or not. The novel cloud-based system for waste collection in smart cities. Providing the services for the different kind of stake holders involved in this area. On-board surveillance cameras and reporting system. Development of application for city administration, municipality staff. In this information is send and action is taken immediately based on the aspect. It is accessed from anywhere in the world continuously. It is able to be understand easily by all kind of people. It does not have any complicated work. This IOT based management of waste is very useful for smart cities in many aspects.

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BIOGRAPHIES



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