

Smart Garbage Management System using IOT

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Abstract: *Swachh Bharat Abhiyan started by honorable prime minister of India in 2014 to develop citizen friendly and sustainable smart cities across the country. As India alone produces approx. 11 lakh metric tons of solid waste per day which is much higher than produced by many of the other countries. There are times when these trash cans get over-flown contaminating surroundings. Current procedures to empty and clean these trash cans are sometimes inefficient and insufficient, due to lack of man power and transportation costs. A smart and innovative methodology is proposed in this paper to efficiently handle this scenario.*

Keywords: IOT, Garbage Monitoring, Smart City, Waste Management, Energy Efficient, Wireless Network.

I. Introduction

Recent advances of technology and its availability the common man, especially due to low cost of consumer electronics (Mobile phones and Smart sensors), has helped improving the standard of living. Introduction of concepts like Internet of Things (IOT) connected with much evolved mobile phones has made building of smart cities and smart homes a lot easier. Waste management is a major concern for all the developing countries and India, being one of the largest developing countries with huge population, the amount of waste generated per day is beyond handling limits of the authorities at many places with current procedures followed. As there are countless sources of waste the major sources among them are industrial, commercial, domestic, institutional and medical. As there are countless sources of waste the major sources among them are industrial, commercial, domestic, institutional and medical. The waste generated from household activities such as cleaning, cooking, repairing and a huge use of plastic bags. Due to their improper disposal humans suffer from skin, eyes and respiratory problems. It also affects our water bodies and animals. Hence there is a grave need of handling these wastes efficiently. Use of technology in a smart way can help in effective waste management and disposal.

Adopting internet of things to connect different sensors for more remote sensing and efficient monitoring of various domestic applications has evolved in recent years. Use of the same for proper garbage management is being proposed here. This is envisaged in lines to reduce the man power and transportation costs proving the disposal team (Garbage Van) with a smart way to locate and guide vans to the filled garbage cans in the locality. Authorities also find an easy way to

monitor the status of the various garbage cans in the locality over a period of time to manage the vans and allocate the man power effectively.

A provision for automatic opening and closing of the garbage bins is made to assist the public and reduces the stink in the surroundings.

II. Material and Methodology

The proposed methodology involves design of innovative garbage bins attached with a sensor to read the level of the garbage inside the bin. Typically, an ultrasonic sensor is used to indicate level of solid materials for various applications. Garbage, being a solid matter, ultrasonic sensor is used in this application, selectively chosen in the range of height of the garbage bin. These sensors generate analog signals corresponding to the height of the garbage in the bin. These analog signals are received and are processed by a local controller. This controller receives signals from multiple garbage bins, dry and wet garbage bins etc. The processed output indicates the level of the garbage bins, number of days old the garbage in the bin is and location of the bins. This controller is connected with an inbuilt WiFi-module and acts as a hotspot. This local controller sends the processed output to the mobile devices connected to the hotspot. An application runs on the mobile devices which receives this processed output and this information is displayed on the mobile screen. This controller is also connected to a GPS to send its local information to nearest-garbage vans and also to the authorities at remote location as well.

The information received by the application on the mobile device placed in garbage van will help the disposal team to prioritise the disposal of various garbage bins located in the locality. This shall improve the efficiency of the disposal saving time and manpower. The same information, in a consolidated way can be seen by the authorities at remote locations helping them to manage and guide the disposal teams to the bins needing urgent attention effectively.

In addition to these monitoring, a new feature is added to the bins to automatically open and close the bins as the person goes near the bins. This allows for reducing stink and also avoids stray dogs from littering the garbage bins. A servomotor controlled by a microcontroller is attached to the lids of the bins to achieve this.

Ultrasonic sensor is chosen to cater for the depth of the bins. Controller is chosen with in an inbuilt WiFi module for ease

of integration. Controller is attached to a network for sending information of the bins and its location to the remote receivers and the mobile devices in the vicinity. Servomotor and a microcontroller to open and close the lids of the bin are attached to the local controller. The list of materials required is given in Table 1.

Table 1: List of Items

S. NO.	Device	Model
1.	Ultrasonic Sensor	HC-SR04
2.	Controller	D1 Wemos
3.	Application	Blynk
4.	Mobile device	Android mobile phone supporting blynk app
5.	Microcontroller	Arduino
6.	Servomotor	SG90

The block diagram of the entire setup is shown in Figure 1.

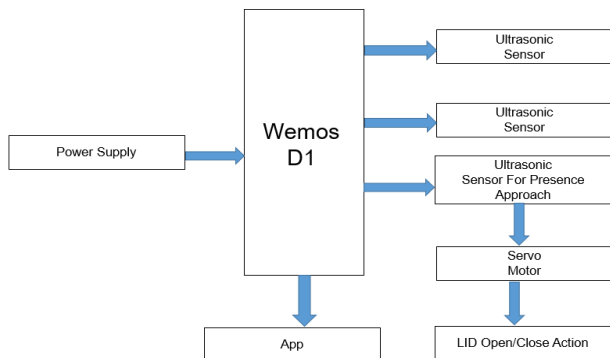


Figure 1: Block Diagram

The working setup is shown in Figure 2.



Figure 2: Working setup

III. Results and Tables

Demonstration of the working of the system is reported. The snapshot of the application showing the status of the bins is shown in Figure 3. The status indicates the level

of garbage and also the location of the garbage bins. The same status accessed at remote location is shown in Figure 3.

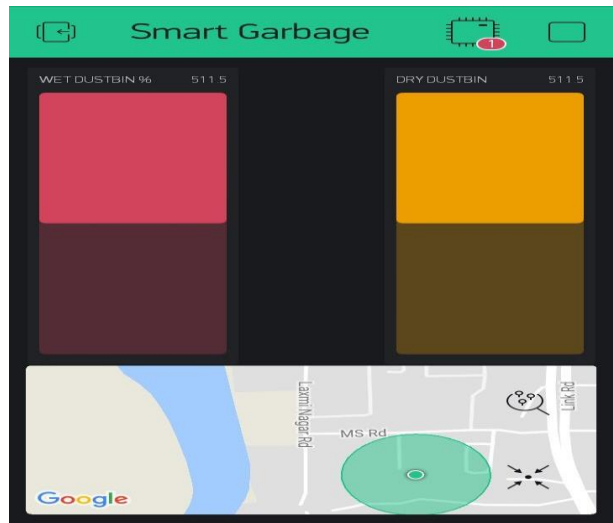


Figure 3: Snapshot of the application

IV. Conclusion

A smart garbage management system is proposed to effectively handle the garbage for earlier disposal and lower the manpower and transportation costs. The same has been implemented on the cost effective electronics platform and has been demonstrated. This system shall help both the disposal team and the authorities to manage the garbage disposal of the entire city in smart and efficient way.

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