Smart Garbage Monitoring System Using IOT

Ansari Sohail[1], Vinayak Jadhav[2], Ajay Nair[3], Aniket Jadhav[4] , Rajan Deshmukh[5]

[1, 2, 3, 4, 5] Dept of Electronics and Telecommunication

[1, 2, 3, 4, 5] Rizvi College of Engineering

Abstract- *Waste management is an important issue. It is one of the primary problems India is facing. Garbage bins in public places keep overflowing before concerned personnel attend to it. This results in unpleasant odour in the neighbourhood and becomes breeding ground for mosquitoes and a number of disease-causing microorganisms. To overcome these problems, a Smart Garbage Monitoring System is essential. An effective solution is having a smart waste disposal alarm system. This paper proposes a smart alert system on municipal web server for efficient collection of garbage. It also checks whether the garbage is collected. Arduino uno is used as the microcontroller. The level of the garbage is checked with the help of ultrasonic sensor and is verified by RFID. The data is uploaded to municipal server through Wi-Fi module.*

Keywords- *Arduino Uno, Ultrasonic Sensor, RFID, Wi-Fi Module*

I. INTRODUCTION

Efficient waste management is the need of the hour. It is a huge concern. Piles of garbage keep overflowing and personnel reach after it becomes a problem. Systematic collection of garbage from Garbage bins is the main objective the paper. The level of garbage inside the bin is detected with the help of an ultrasonic sensor. It measures the distance of the garbage from the lid where sensor is mounted. The ultrasonic sensor continuously senses the distance till it reaches a threshold. Once it crosses the threshold, the alert mechanism is triggered and it transmits data to the municipal server. The authorities can then come to collect the garbage. Once the garbage is picked, it uses the RFID tag to verify that the garbage bin has been completely emptied. This is also uploaded on the web server. Thus, the garbage is being monitored and there is no piling up of waste. The Wi-Fi module uses internet to upload data from the ultrasonic sensor and RFID. The smart garbage monitoring system requires internet, hence, smart cities will be able to implement this technology.

II. WORKING

The working on this Smart Garbage Monitoring System is based on IOT. The garbage bin is monitored through internet. Here, is a block diagram of the proposed model.
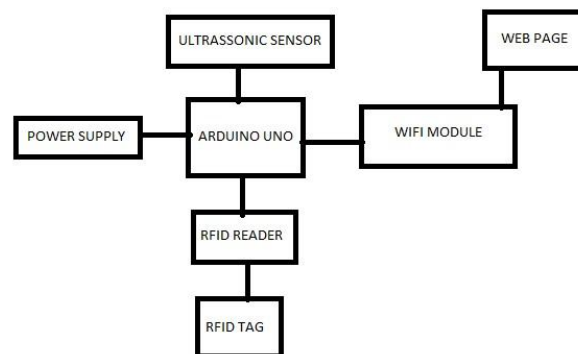

Figure 1. Block Diagram

The Arduino is powered by a 5V power supply. The ultrasonic sensor makes sure that garbage doesn't pile up. It scans continuously the distance between garbage and the lid on which it is mounted. There is a threshold distance. If the distance between the garbage and the lid is less than threshold, it will be displayed on the web page that the garbage bin is full. The concerned authorities, then, can come to empty the bin. The RFID reader will be mounted on the garbage bin. As soon as the garbage is emptied, the person must show an RFID tag to the RFID reader. The RFID tag has a unique code and if the code is matches, then the verification is done that the garbage has been collected. Now the ultrasonic sensor starts measuring the distance again. The data is uploaded through Wi-Fi module which requires internet.

Figure 2. Flowchart

Components list :

1. Arduino Uno
2. RFID
3. Wi-Fi Module
4. Ultrasonic Sensor
5. Connecting wires

The components when connected together form a circuit as shown.

Figure 3. Circuit Diagram

III. RESULTS

The above system was implemented on a household scale and the working was checked. It was found successful and hence can be used on a larger scale.

The lid of the dustbin was fitted with the ultrasonic sensor and an RFID scanner. This was connected to a computer system. When the garbage bin was empty, the sensor showed the bin status as 'Empty' with the distance between the uppermost layer of the garbage and the lid. This made the user aware of the amount of garbage inside the bin and also the approximate time the bin might take to fill up. This can be seen in the image shown.


```
Garbage Empty
37 cm
Garbage Empty
37 cm
Garbage Empty
38 cm
Garbage Empty
39 cm
Garbage Empty
56 cm
Garbage Empty
222 cm
Garbage Empty
58 cm
Garbage Empty
57 cm
Garbage Empty
57 cm
Garbage Empty
37 cm
```

Figure 4. Message sowing an Empty Bin

Next, when the garbage in the bin crosses the set threshold, the system gets notified with a 'Full' status as shown.


```
Garbage Full
Garbage Full
Garbage Full
Garbage Full
Garbage Full
Garbage Full
Garbage Full
Garbage Full
Garbage Full
Garbage Full
Garbage Full
Garbage Full
Garbage Full
Garbage Full
Garbage Full
Garbage Full
Garbage Full
Garbage Full
Garbage Full
Garbage Full
Garbage Full
```

Figure 5. Message Showing a Full Bin

Upon emptying the bin, the RFID tag is scanned and the status of the bin in again set to 'Empty'. The Ultrasonic sensor on the lid then again starts sensing the level of the garbage and the cycle continues.

Since this was successful on a small scale, it can now be used to operate on a larger scale, like Municipal Corporations, to tackle Waste Management efficiently.

VI. CONCLUSION

Waste Disposal has always been an issue of concern. More and more awareness has been created recently about keeping the surroundings clean. However, packed garbage bins are also to be taken care of. The above project looks after a solution to such packed dustbins. It uses Ultrasonic sensor which detects the level to which the bin is filled. Once the waste crosses a predetermined threshold, the system is triggered and the municipal corporation is informed about the packed bin, which can then send personnel to collect and reset the garbage bin. The bin also has a RFID scanner that is used to reset the bin to 'Empty'.

A GPS system can be programmed in order to get the exact location of the garbage bin on the cell phones of the concerned personnel. It can also be made available to the general public so as to make them aware of the garbage bin around them to dispose off their waste. This can lead to a better involvement of the commoners and also keep the city bright and beautiful.

REFERENCES

[1] Prof. Dr. Sandeep M. Chaware, Shriram Dighe, Akshay Joshi, Namrata Bajare, Rohini Korke. Smart Garbage Monitoring System using Internet of Things (IOT). International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering. Vol. 5, Issue 1, January 2017

[2] Ms. Poonam Agrawal, Prof. Devendra Gadekar. Applications of Internet of Things: A Survey. IJSART Vol. 3 Issue 1, January 2017

[3] Sheikh Md Shahid Md Rafique, Dr. Akash Langde. Design and Fabrication of River Cleaning Machine. IJSART - Volume 3 Issue 11 –NOVEMBER 2017.