

Smart Garbage Bin

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Abstract - The absence of efficient waste management as caused serious environmental problems and cost issues. We here propose a probable solution to this problem, an automatic garbage level detecting system informing the concerned authorities timely and also the periodic data for a month of each bin is stored in a micro SD card which can be used for analysis of garbage management more efficiently and effectively. Here we are going to place ultrasonic distance measurement sensor in the dustbin which measures the amount of garbage collected and sense continuous information to the centralized control system situated in the municipal office and a capacitive sensor to segregate wet and dry waste. This model consists of an Arduino controller, a garbage bin loaded with sensors and they are monitored continuously through a web. This system also has a scope for citizen participation, wherein any grievances from citizens related to waste management is heard.

Keywords: Ultrasonic sensors, Capacitive sensor, Arduino.

I. INTRODUCTION

As the second most populous country in the world India facing major problem in waste management. As if now there are traditional waste management systems like periodic and routine cleaning by the various civic bodies like the municipal corporation. But even though these routine maintenances are carried out, we often come across overflowing garbage bins from which the garbage spills on to the streets. This happens because as if now there is no system in place that can monitor the garbage bins and indicate the same to the corporation.

We have observed that the municipal officer or the government authorized person will monitor the status of dustbin. Generally, we see that they have a regular schedule of picking of this garbage bins and they have to segregate manually which is a very difficult task for human beings. This schedule as per the population of that place. It can be once in a day or twice in a day or in some cases once in two days.

However, we see that in case there is some festival or some function, lot of garbage material is generated by people in that particular area. In such cases the garbage

bin gets immediately filled and then it overflows which creates many problems. This paper introduces a system, that is garbage detection in smart ways and also segregation of dry and wet waste and this can also be a major part of developing a smart city.

II. OVERVIEW

The basic project idea is to design a smart waste level detection system which would automatically notify the officials about the current status of various garbage bins in the city, also segregates the dry and wet waste into separate chambers that have real-time monitoring capabilities, which would be remotely controlled.

III. MOTIVATION

In some cities, current waste collection logistics is carried out by emptying containers according to predefined schedules and routes which are repeated at a set frequency. Such a System has major disadvantages:

- A. Time consuming.
- B. High costs.
- C. Greater traffic and congestion.
- D. Unnecessary fuel consumption
- E. Increased noise and air pollution as a result of more trucks on the road [6].

All the above disadvantages are a result of lack of real time information resulting in unsuccessful collection of waste as shown in the figure 1. in some cities Municipal itself finds this as a big problem and a big hurdle in between Smart City initiative. There is an urgent need to optimize the management of this service to reduce infrastructure, operating and maintenance costs, as well as reduce contamination directly associated with waste collection.



Fig 1. Conditions in the city.

IV. PROPOSED WORK

City which is big enough to have problems regarding waste management. The main objective is urban waste management scenario and enables a two-way communication between the infrastructures deployed in the city and the operators / administrators. A centralized system for real-time monitoring and a segregation unit to separate wet and dry waste is our goal to achieve [1]. In this way both the municipal and citizens benefit from an optimized system which results in major cost savings, easy recycling and less urban pollution [2].

V. WORKING

Here there are two units that is segregation unit and control unit show in the fig2 and fig3, we are going to place ultrasonic distance measurement sensor in the dust bin which measures the amount of garbage collected and sends continuous information to the centralized control system situated in the municipal office. The human sensor is placed at the top of the bin which senses the human beings within the specified distance and displays the welcome message on the LCD display along with the audio message from an audio system. The capacitive sensor is placed inside the dustbin to check whether waste is dry or wet. The communication link between the garbage bins and municipal office is made by 2.4GHz wireless transceiver which provides high data security and a network of 1024 similar devices can be framed.

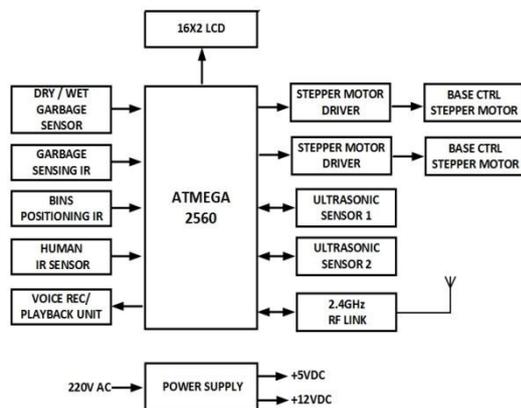
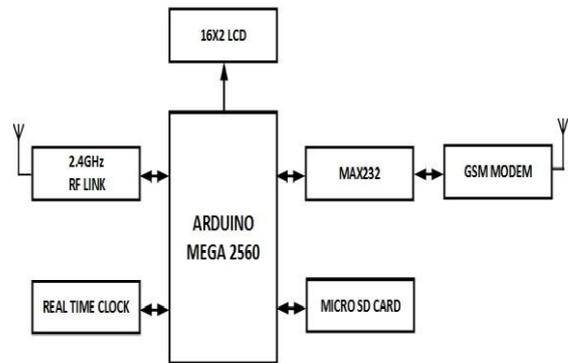


Fig 2. Block diagram of segregation unit.

The centralized control system situated in the municipal office has a GSM modem to send SMS, RTC (real time clock) to maintain the date and time and a micro SD card which record periodic data from each bin into a .txt file with date and time respectively for a period of 60 days.

When the garbage reaches to the threshold value, the centralized control system sends SMS to the respective

municipal or concerned authorities for collection of waste. Here we use a low maintenance communication development like GSM. Even after receiving the SMS, the garbage bin is not cleaned, the next SMS is sent to higher authorities. This adds to the social relevance, as it can also act as an automatic double check on the efficient functioning of the local authorities by the higher authorities.



CENTRALIZED CONTROL UNIT

Fig 3. Block diagram of control unit.

VI. APPLICATIONS

1. Waste Level detection inside the garbage bins. Transmission of the information wirelessly to concerned officials [7].
2. System can be accessed anytime and from anywhere.
3. Real-time data transmission and access.
4. Avoids the overflows of garbage bins.
5. This system can be used anywhere and can be implemented in city, state or a country.
6. Easy for further recycling process has the dry and wet waste are separated.
7. Using this system, waste collection would become efficient and also reduction in transportation costs can be witnessed.

VII. COMPONENTS AND COMPATIBILITY

For small scale simulation purposes, we need the following hardware components —

1. Arduino Mega 2560 board.

"Arduino is open-source electronics prototyping platform based on flexible, easy-to-use hardware and software [3]- [4].

2. Ultrasonic Sensors.

One of the advantages of ultrasonic sensing is its outstanding capability to probe inside objectives non-destructively as ultrasound can propagate through any kinds of media including solids, liquids and gases except vacuum. In typical ultrasonic sensing, the

ultrasonic waves are travelling in a medium and often focused on evaluating objects [5].

3. SIM800A

It is a quad band GSM /GPRS modem that works on frequencies 850MHz,900MHz,1800MHz and 1900MHz.

4. Other necessary wires and PBCs. Platforms:

5. Operating System:

Windows XP and above, Linux [Kernel version- 3.01 and above], Mac OS X.

6. Programming Language: sketch IDE.

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VIII. CONCLUSION

This implementation of Smart Garbage Bin system, assures the cleaning of dustbins soon when the garbage level reaches its maximum. If the dustbin is not cleaned in specific time, then the record is sent to the higher authority who can take appropriate action against the concerned official. This system also makes the recycling process easy as it separates the dry and wet waste, also helps to monitor the fake reports and hence can reduce the corruption in the overall management system. This reduces the total number of trips of garbage collection vehicle and hence reduces the overall expenditure associated with the garbage collection. It is ultimately helps to keep cleanliness in the society.

The system aims at cleanliness of the areas where trash bins are located and the very basic management that it contains with it. We use ultrasonic sensors (details mentioned above) and its other hardware microcontrollers and processors such as Arduino for analyzing the garbage levels and sending information about it to administrators and then garbage trucks are being deployed by them. Another very important aspect of our project is the web portal that is designed in such a way that operators and citizens both will find it user friendly to monitor the garbage information of various places [as discussed above). Hence all in all, a smart garbage bin system is the one that will be a great service to the world and make it a better place to live in, to some extent.

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