Real Time Smart Waste Management for Developing City

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Abstract: *In modern era waste generated is very large so for handling for this waste we need to developed smart and a convenient solution for both municipal corporation authority and population. For proper sanitation this waste should be managed properly which can be achieved by developing an automation system to sort out wet and dry waste which help to separate degradable and non-degradable waste. In our project we have using different sensors like infrared, moisture, temperature and global system for mobile (GSM) through which the authority will get real time information via SMS when dustbin is completely filled.*

Keywords: Smart waste management, SMS, GSM, IR Sensor, RF transceiver, Moisture sensor

1. Introduction

Nowadays due to the continuous increase in population day by day a problem of waste management is arising so there is immense need to find an alternative smart solution for waste management which can be achieved by using sensor and GSM technology. The waste management system mainly consist of waste management which include different process like parting, processing, recycling and monitoring waste material and process of transporting waste from different localities to dumping yard where the waste is going to dumped. Waste management is very essential because it is very hazardous for human being as well as environment, so many new techniques have been developed out of which smart waste management techniques has been proving to promising, that's why many cities are adopting this techniques to manage the waste. Smart waste management can be simply referred to as co-relation between human, computer, and electronic things and all the mechanical working object can be controlled and monitored by using microcontroller, GSM and dc motor. These devices can communicate and interact with other over the signal data and they can be remotely monitored and controlled. In smart waste management system different sensors are been used which covert the physical data into the digital signals and transmit to the area where all these signals are monitored. All the physical data that is to be transmit over digital signal is based on real time scenario and by using this real time data we can develop a system architecture.

Now the current method of waste management is that government authorized person will monitor the status of the dustbin and normally in general they have a fixed schedule of collecting the waste or garbage from the dustbin. This schedule of collecting waste mainly depend on population of that area, it can be once in a day or twice in a day or in some cases once in two days. Here we can clearly see that quantity of waste generated is not been taken in consideration in our traditional old method of waste collection. But during some days in year like on festive season the waste generated is large in such cases the garbage dustbin gets immediately full which leads to overflow, which is not supposed to happen. Hence these kind of problem can be solved by implementing

our project in which the government authority will get the Short Service Message (SMS) immediately. Therefore we can say that smart monitoring is the best possible alternative for waste management because it reduces the amount of waste overflowing in bins such as domestic waste, small scale industry waste, agriculture waste etc. Man power required is also reduced and waste collection delay also minimized due to such benefit smart waste management has a great scope in future leading to new invention in waste management system.

If we considered the example of Ahmednagar city, generation of municipal solid waste is 125 MT/Day. The efficiency of collecting the garbage is poor in the city compared to other smart city and present mode of collecting disposal is open dumping without any treatment. In Ahemdnagar city, 872100 square feet land available for dumping, till today there is no treatment of waste for segregation, landfill and waste to energy process, therefore it gives great opportunities to Municipal Corporation to utilized this waste energy for electricity generation, which can be done by processing the municipal waste for electricity generation and remaining waste after some process can be used as fertilizer, fuel after drying. Solid municipal waste in landfill after 2 to 3 months it is further pass to the gas regulator in which gas flow is regulate and supply to gas turbine which rotate the electrical generator and hence electricity is produced.

Ahmendnagar city has also faces such big problem of waste which causes unhygienic condition, ugliness, overflow of waste, bad smelled. Which has overcome by such types of problems by implementing smart waste management technique which gives control and monitoring the garbage level.

2. Background Study

For collection of waste majorly human and vehicle is required. Here in our project we are using approach in which level of waste in the dustbin is automatically detected where for proper and systematic operation a unique ID number is provided to the dustbin, as soon as the dustbin will overflow, a SMS would be automatically send to the person who collects the waste by the means of vehicle. There are many

problems arising due to overflow of dustbins and a proper solution for this problem is development of smart waste management system. Now here we are interfacing a dustbin with microcontroller based system having IR wireless system so that all the status of the level of waste collected can be get notified when bins is full. In this manner whole city can be kept clean time to time by using such techniques in field of sanitation with help of electronic equipments.

In our project following components are used:-
- AT mega 16 MICROCONTROLLER
- GSM MODULE
- MOISTURE SENSOR
- IR SENSOR
- TEMPERATURE SENSOR
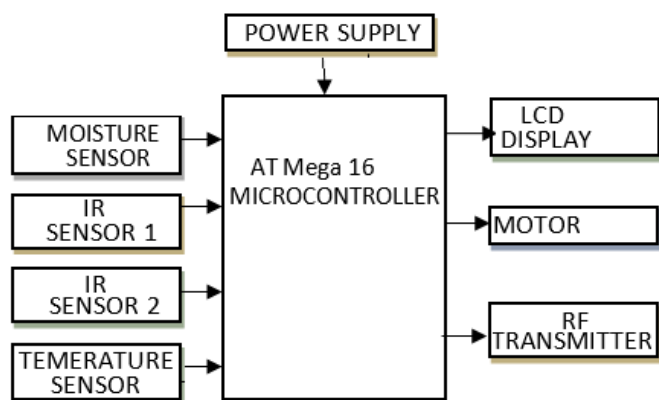- DC MOTOR
- LCD
- RF TRANSRECEIVER

3. System Development

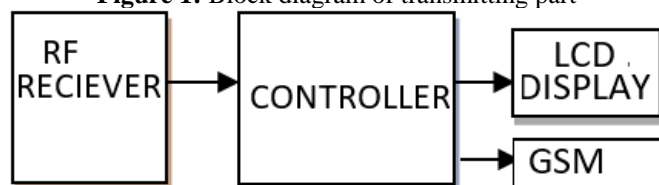**Figure 1:** Block diagram of transmitting part

Figure 2: Block diagram of receiver part

In this management system, smart bins play the vital role to start the processing in a standardized way. This project is the co-relation of human, computer and field device which is smart bins in our project. In a single unit we are using two separate waste collection bins, at top part of the dustbin moisture sensors are been placed which work on principle of dielectric medium and separate out the solid and liquid waste with help dc motor placed attached to separator, hence lots of time is saved while dumping the waste. To detect the level of waste an infrared sensor is been used which is interfaced to AT mega 16 microcontroller unit which is then further connected to LCD which indicates the level of waste filled in bin. Also the real time data is also been transmit by using GSM and IR sensor to the receiver side from where the whole system will monitored through controller, GSM, IR sensor power supply unit is used to provide supply to the whole system. For convinces of working person bin which is

made up of fiber material having separate arrangement of water tank for each unit and pipe is directly connected tank and the bin via motor. So at the time of collection the operator just have to turn on the switch for turning on the motor and the bin will become clean. In this manner whole system works.
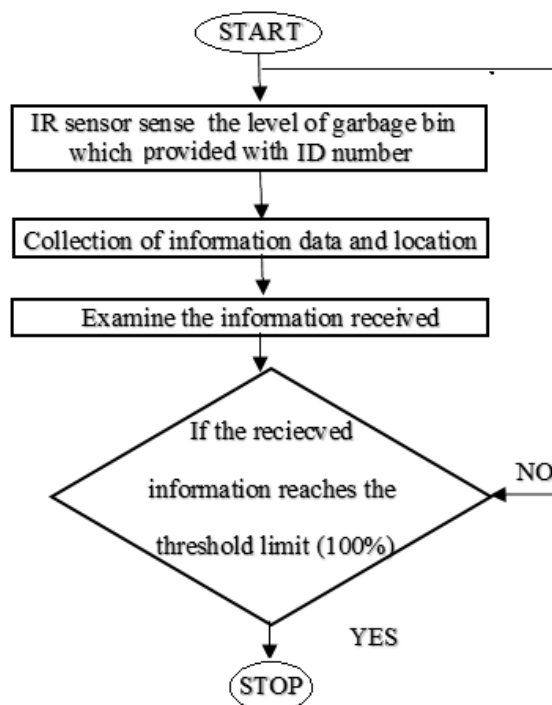
4. Working Flow of System

Figure 3: Flow Chart of Operation of Waste Management System

Mainly three department are control whole management. Those are safeguard unit, transport and mechanical engineering. When the waste are being filled up in the smart bins which will be connected in the microcontroller, sensor and GSM, the data will be sent be send to regional office and then on the basis of waste amount, priority table is formed in which we will get the most filled up waste in the upper and least filled up waste as in the least time consuming task in the last so, we have the task list in descending order.so bins which is almost filled up will be treated first. Also if available, the system will assign more than one person if needed to clear out an area with comparatively more waste filling up in the bins.as per ID provided by operator waste collection process start by person who are responsible for waste collection. After the collection of waste bins status update as empty or 0% level of waste and process is repeat again and again. If when moving toward waste collection bin any bin as per priority order is pass away then we also give priority for that bin which indirectly reduced the working time

5. Conclusion

The objective of this research paper is to solve the problem related of traditional way of handling waste management system by using IR sensor, AT mega 16 microcontroller and RF transceiver and GSM technology. Also to solve the problem of unhygienic condition, overflowing of waste and

bad smell of the waste that has been overflow due to lack of awareness. This reduce the total number trips of waste collection of municipal corporation vehicle, hence ultimately help to keep cleanliness of society. Therefore the smart waste management makes the waste collection more efficient and convenient.

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