

# GSM BASED GARBAGE AND WASTE COLLECTION BIN OVERFLOW INDICATOR

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## ABSTRACT

*In this paper, a smart garbage management system is proposed. This system monitors the garbage overflow in garbage bin. In this project, the level of garbage in the dustbin is detected with the help of sensor systems, and communicated to the authorized person through GSM system. Infrared sensor (IR sensor) is used to detect the level of garbage. Microcontroller is used to interface the sensor system with the GSM system. An RFID is used to monitor the desired information related to the garbage for different selected locations. It also monitors the attendance of the authority person. With the use of conveyor belt and PH sensor the degradable and non-degradable waste can be separated. Thus the collection and separation of garbage is monitored efficiently.*

**Keyword:** - GSM; RFID; IR sensor; PH sensor; Microcontroller

## 1. INTRODUCTION

With increase in population, the scenario of cleanliness with respect to garbage management is degrading tremendously. The overflow of garbage in public areas creates the unhygienic conditions in the nearby surrounding. In our city we see the garbage bins or dustbins placed at places overflowing. It creates unhygienic conditions and may provoke several diseases to the surrounding people. Generally, we see that they have a regular schedule of picking up these garbage bins or dustbins. This schedule varies 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, lots of garbage material is generated by people in a particular area. To avoid all such situations, we are going to implement this project.

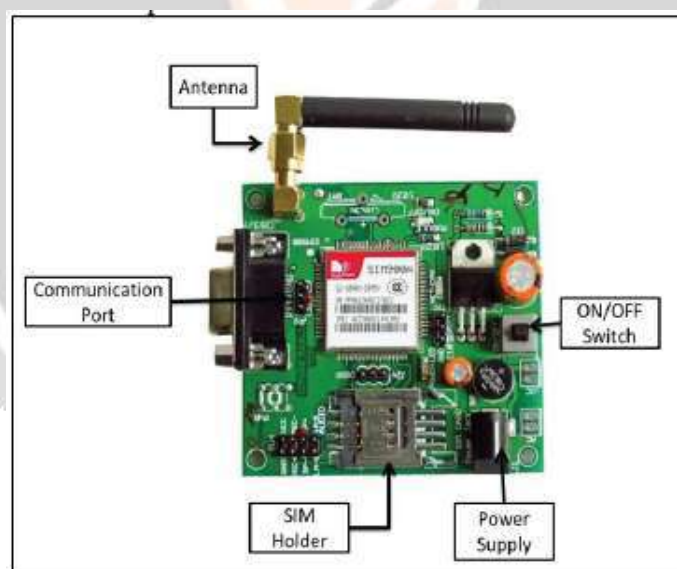
## 2. PROPOSED SYSTEM

For detecting the level of the garbage IR sensors are used in this system. Whenever the wastes are disposed in the bin the nature of the waste are identified whether it is degradable or not. And the waste is passed through the conveyor belt and are separated, collected in either degradable or non-degradable bin. The IR sensor as shown in the figure 1 will keep on monitoring the level of the garbage.



**Fig -1 IR sensor**

When the garbage reaches the threshold level the led will be on. Once the garbage is full it will automatically send to the authorized person indicating that garbage is overloaded via GSM. The authority person holds RF ID card and clears the garbage. Once the garbage is cleared it will send a message to the control station indicating that garbage had cleared. In case of any fire accidents in the garbage bin then the fire alert message is sent to the control station via GSM. Figure 2 represents the block of GSM modem.



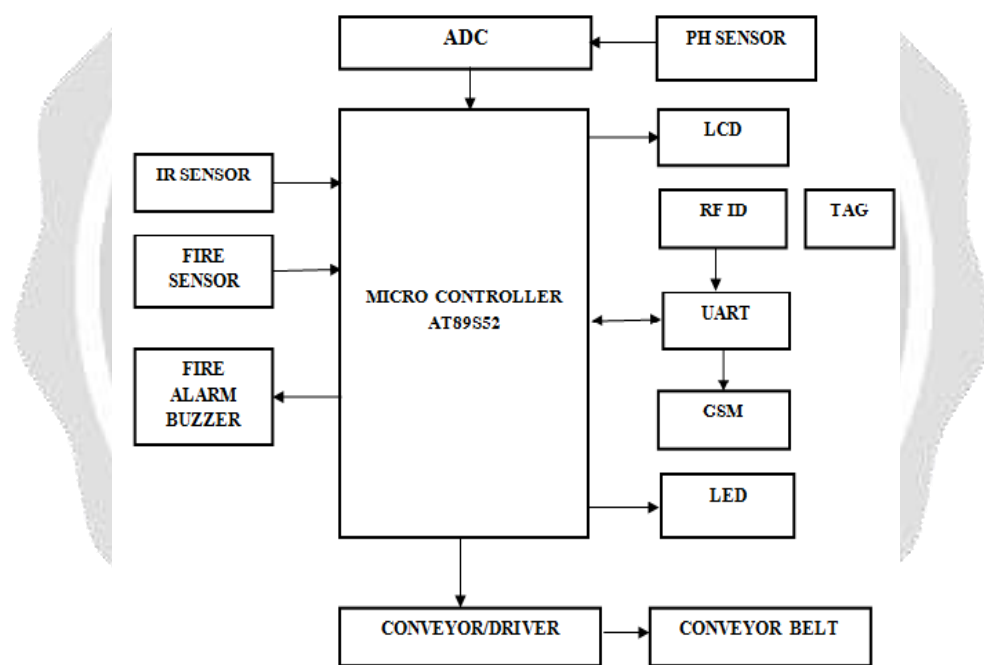
**Fig- 2 GSM modem**

### 3. BLOCK DIAGRAM

Figure 3 represent the block diagram of the proposed system. The pH sensor detects the acidic content of the material and used to detect the type of the material whether it is degradable or non-degradable material. The waste is separated through a conveyor mechanism. After detecting the nature of the material then it is made to pass through the conveyor belt. The conveyor model has a pneumatic which helps in pushing the material into the degradable or non degradable bin. When the PH value range is below the threshold the waste is pushed into a non- degradable bin.

When the PH value is greater than the threshold the waste is pushed into the degradable bin. This mechanism is thus done through the conveyor belt.

The IR sensor detects the level of the garbage to check the overflow condition of the garbage. IR sensor emits the light, which is invisible to naked eye but the electronic components can detect it. The IR Sensor-Single is a general purpose proximity sensor. It is used for collision detection. The module consists of a IR emitter and IR receiver pair. The high precision IR receiver always detects the IR signal. An LED is present on the IR sensor board. It is used to indicate the presence or absence of an object. The garbage level reaches the threshold value the LED will be on. IR sensors are highly sensitive to surrounding lights. Hence, these sensors are covered properly in order to reduce the light effect on the sensor. The LCD display is used to display the overflow of garbage in the bin. If the level of IR sensor reaches the threshold level the garbage overloaded message will be sent to the authorized person via GSM.

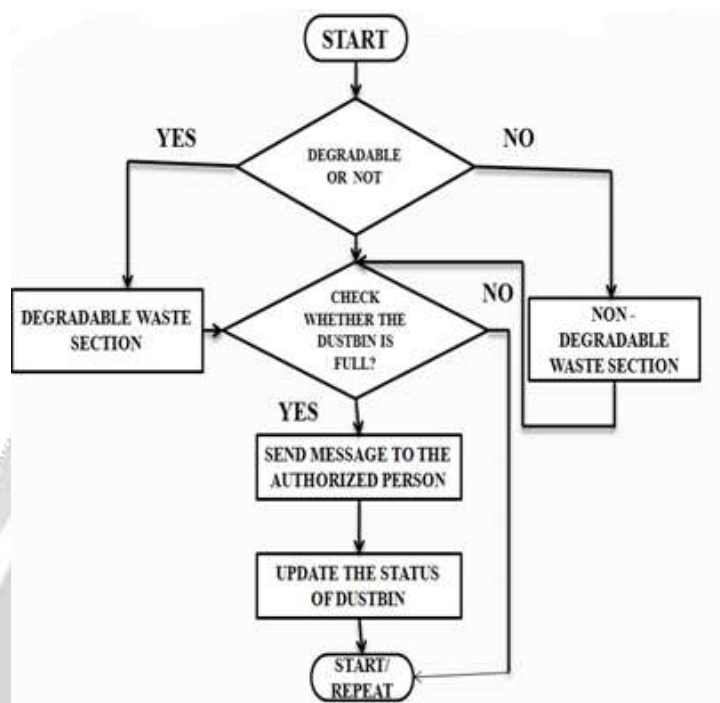


**Fig -3:** Block Diagram

If in case of fire inside the collection bin then buzzer will be automatically on. It will intimate the person about the fire occurrence in the garbage. GSM modem mainly consists of antenna for wireless communication, SIM holder, and communication port, ON or OFF switches and power supply. A GSM modem is connected to the computer via serial or USB cable. The advantage of connecting is it provides mobile network to the computer to transfer and exchange information with modems. Meanwhile it provides mobile internet connectivity and also used for forwarding the SMS and MMS messages.

An UART, universal asynchronous receiver / transmitter is responsible for performing the main task in serial communications with computers. The device changes incoming parallel information to serial data which can be sent on a communication line. Radio-frequency identification (RF ID) is the wireless non-contact use of radio-frequency electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to

objects. The RFID card is used by the worker to clear the garbage and to make the record of clearance of garbage. The flow of the process is shown in the figure 4.



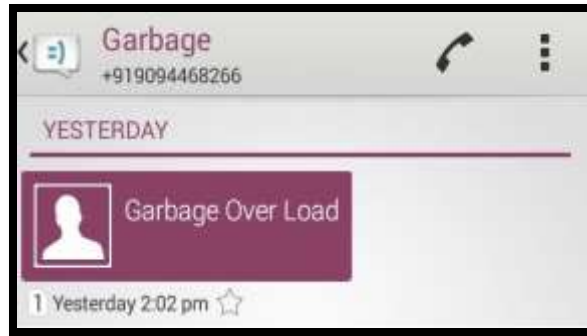
**Fig- 4** Flowchart of the process

All these information (garbage overload, garbage cleared, fire alert) are sent as message to the control station via GSM. The degradable and non-degradable waste can also be separated with the help of PH sensor. This separation is done based on the acidic content of the material. The conveyor belt is included which is used to separate the degradable and non-degradable waste. It is separated with a pneumatic which help to separate the waste.

The authority person holds RF ID card. Once the garbage is cleared it will send a message to the control station indicating that garbage had cleared. This holds the clear information about the garbage clearance. The clearance of garbage can is monitored efficiently without any overflow in the garbage and the garbage can is cleared at proper interval of time.

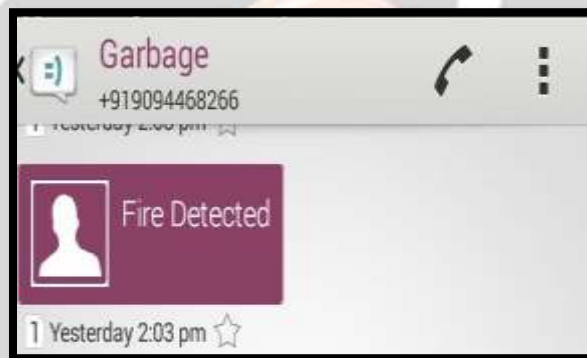
#### 4. RESULTS AND DISCUSSION

The disposal of garbage is done efficiently in this system. The IR sensor measures the level of the garbage. Once the threshold level is reached it will immediately send message to the authorized person. Once the waste is thrown it is immediately send message that the dustbin is started to collect the waste. The message started message is sent to the person through GSM. In this each garbage can will be allocated with the mobile number such that the message will be sent to the authorized person via GSM. Once the threshold level is reached it will immediately send message to the authorized person that the garbage level is overloaded. This is indicated below in the figure 5.



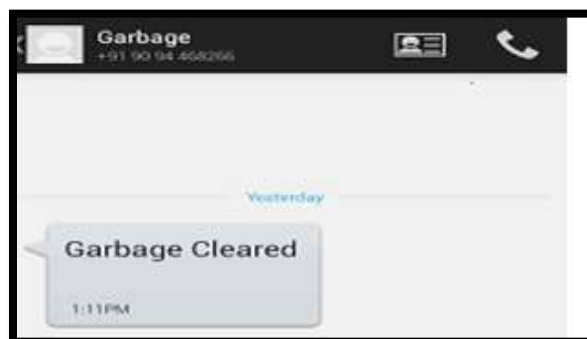
**Fig- 5** Garbage overload message

In some cases there may be occurrence of fire within the garbage. If it is not cleared at the proper time it cause air pollution and affect the nearby people. This is avoided by using a fire sensor. Once the fire level reaches above the threshold value it will immediately send message to the authorized person in the form of message as shown in the figure 6.



**Fig-6** Fire detected message

This message will alert the person that there is occurrence of fire and the authorized person will immediately clear the occurrence of fire. This RFID tag will hold the record that the person has cleared the garbage. Each person will hold their unique RFID tag such that their clearance of garbage can is maintained in the control station. Once the garbage is overloaded the authorized person will be indicated with the message. Once the message is received the person will immediately clean the garbage. It also indicates the control station that the garbage has been cleared properly. This indication is given in the form of message as indicated below figure 7.



**Fig- 7** Garbage cleared message

In this PH sensor is also used to identify the nature of the waste. This will measure the acidic content of the material. When the material is placed its acidic value is measured. If it is greater than the threshold value it is considered as a degradable material, else it is considered as a non-degradable material. It is displayed on the LCD display. A conveyor belt is used in this project to separate the degradable and non degradable waste. Once the PH value is measured the garbage will pass over a conveyor belt. When the PH value reaches the threshold it will be pushed over the degradable bin or else it will push it in non-degradable bin. It will send a PH alert message to the authorized person.

## 5. CONCLUSION

In this paper, we propose a new solution to enhance waste collection efficiently using the RFID technology and sensor systems. In this, proposed system the garbage can be cleared and the overflow of garbage can be managed efficiently.. This system can also avoid fire accidents in the garbage cans with the help of fire sensor. This will intimate or send SMS to the authorized person through GSM. It can also indicate degradable and non-degradable waste with the help of PH sensor. This method helps in keeping the waste bin clean when the bin is completely filled and separate them using conveyor model mechanism. The garbage managing system and the facility of collecting the garbage presently doesn't fit to the current requirement. Hence better facility of collecting garbage and transportation should be provided. Since, this system provides the information when the bin gets completely filled with garbage, it reduces the number of times the arrival of vehicle which collects the garbage. This method finally helps in keeping the environment clean. Thus, the garbage collection is made more efficient.

## 6. REFERENCES

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