

# Ultrasonic Assisted Smart Garbage Monitoring System

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**Abstract – Day by day increasing pollution which lead to health hazards. The present garbage management system needs an updated and efficient technique in order to reduce this pollution. The main issues of the “STREET DUSTBIN” are overflow, starving of dustbins and non-separation of decomposable, non-decomposable and disposable wastes. To overcome this problem using of three components ARDUINO UNO, GSM Module and an Ultrasonic censor forms smart garbage monitoring system. These components are fixed on the top of the Dustbin which continuously detect the garbage overflow status and conveys the status to the garbage cleaner. As a result, pollution free, hygienic, disease eradicated society can be made.**

## 1. INTRODUCTION

In present days, time is an important parameter that cannot be managed by concerning each and every phenomenon with our tight schedule. So automatic system is given more preference than that of the manual based operating systems to make life easy and simple in every point of view. To make that possible Internet of things(IOT) has been developed [3]. The inappropriate waste management in streets generates the polluted environment in the neighboring areas. It leads to the growth of bacteria and viruses that causes diseases. In this situation for maintaining good environment we have to create a smart waste management system. Here we have to create a smart system for the purpose of alerting the authority. Internet of Things based garbage management system which was capable of checking the level of garbage by using different sensors. When the system detects the level was up to the mark it will intimate to the authorities through GSM module. We have to use ARDUINO UNO microcontroller as an interface between the sensors and the GSM modules. So, whenever the overloaded level was detected by the ultrasonic sensor it will intimate to the GSM module through the microcontroller ARDUINO UNO which was also used as a software for programming the workflow. whenever the GSM module got the signal it will send a message to the respective truck driver about the status of the garbage bin. Here we are going to plan the system over a group of dustbins located in a street. We are going to use a bus topology for receiving the information from the group of dustbins. The authority will receive the information in the form of bus topology in which the dustbins filled will indicate a black color and the dustbin's which are not filled will indicate white color. After collecting the waste, the

authorities will decompose the waste and produce fertilizers from the waste. Such that they will get the money from selling the fertilizers. Even the citizens who are maintaining the dustbin will be given money by which we are using the waste for producing fertilizers and getting money from them. So by following this method we can develop a 'SMART CITY' with pollution free environment.

## 2. LITERATURE SURVEY

### Smart Garbage Monitoring and Clearance System using Internet of Things

The increase in population, has led to tremendous degradation in the state of affairs of hygiene with respect to waste management system. The spillover of waste in civic areas generates the polluted condition in the neighboring areas. It may aggravate numerous severe diseases for the nearby people. This will humiliate the appraisal of the affected area. For eliminating or mitigating the garbage's and maintains the cleanness, it requires 'smartness-based waste management system. This paper is proposed IOT based smart waste clean management system which checks the waste level over the dustbins by using Sensor systems. Once it detected immediately this system altered to concern authorized through GSM/GPRS. For this system used Microcontroller as an interface between the sensor system and GSM/GPRS system. To monitor and integrate an android application is developed for the desired information which is related to the various level of waste in different locations. This is ensued the greenish in the environment and support for swach- bharat for cleanness.

### Internet of Things Based Garbage Monitoring System

In today's busy world time is a vital issue which can't be managed by noticing each and every phenomenon with our tight schedule. So now a day's Automatic systems are being preferred over manual system to make life simpler and easier in all aspects. To make it a grand success Internet of Things is the latest internet technology developed. The number of users of internet has grown so rapidly that it has become a necessary part of our daily life. Our matter of concern in this project is development of Internet of Things based Garbage Monitoring System. As the population of world is increasing day by day, the environment should be clean and hygienic for our better life

leads. In most of the cities the overflowed garbage bins are creating an obnoxious smell and making an unhygienic environment. And this is leading to the rapid growth of bacteria and viruses which are causing different types of diseases. To overcome these situations efficient garbage collection systems are getting developed based on IoT. Various designs have already been proposed and have advantages as well as disadvantages. This paper is a review of Garbage Monitoring System based on IOT.

**IOT Based Smart Garbage alert system using Arduino UNO**

This paper proposes a smart alert system for garbage clearance by giving an alert signal to the municipal web server for instant cleaning of dustbin with proper verification based on level of garbage filling. This process is aided by the ultrasonic sensor which is interfaced with Arduino UNO to check the level of garbage filled in the dustbin and sends the alert to the municipal web server once if garbage is filled. After cleaning the dustbin, the driver confirms the task of emptying the garbage with the aid of RFID Tag. RFID is a computing technology that is used for verification process and in addition, it also enhances the smart garbage alert system by providing automatic identification of garbage filled in the dustbin and sends the status of clean-up to the server affirming that the work is done.

**In Reality**

I Care Nothing for What Happens to Garbage Once It Leaves My Residence. –Citizens

“Sending trash to be re-used either directly or after some processing is called recycling”-Awareness

‘If recycling waste can be recycled with minimal efforts or a direct process they are classified into decomposable wastes’- Modern Definition

S.NO	YEAR	TITLE	DRAWBACKS
1	2017	Smart Garbage Monitoring and Clearance System using Internet of Things	Here in this paper android system and wi-fi module is used which involves a large process
2	2017	Internet of Things Based Garbage Monitoring System	This paper just deals about the required parts of the garbage monitoring system.
3	2016	IOT Based Smart Garbage alert system using Arduino UNO	Here we have to maintain the website and wi-fi module which involves a large process

**3. SYSTEM ARCHITECTURE**

The architecture of this system is quite unique it involves a series of Dustbin units connected in a network based on the arrangement of the houses here in this case all the Dustbins are connected similar to the bus topology maybe some places require a ring topology and some apartments may require a star topology. The Architecture diagram clearly depicts the system H1, H2, H3 are the houses which are involved in the system each house is allotted with a dustbin and user will be filling the dustbin with decomposable materials. Once the user starts using the dustbin a series of circuits connecting an ultrasonic sensor, Arduino and a GSM module works on detecting the status of the dustbin and finally conveying the status of the dustbin to the garbage truck or the manager concerned. The main aim of this project is to collect the decomposable materials from the user in an effective way so as to generate a huge income which pays the user and the actors involved in it. This system helps the rapidly developing cities like Chennai, Hyderabad and Bangalore in maintaining the environment and reducing the pollution. There is a great need in reality to implement this system in all the areas and create a great awareness among the citizens. Collection of decomposable materials involves its separation from other wastes which becomes very difficult at higher levels but it is very easy to separate them at individual level which is very easy and more effective. Implementation of this system is completely depicted in the architecture diagram.

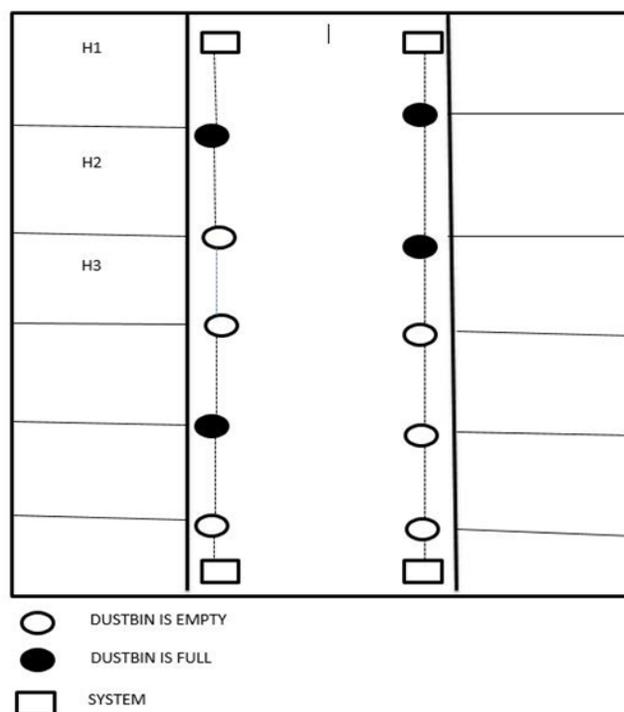


Figure 3: Architecture Diagram

4. ANALYSIS

Analysis of this project involves in the efficiency of this project and its working at various environment conditions. The most essential input for the system is continuous power supply this is done using a good battery which lasts up to six months and may vary according to the usage level of the system. The second most essential involves a good network at the place of installation of the system. This can be achieved using a good deal with the network provider and to be constantly maintained. A separate maintenance team is to be deployed in order to verify the working of the system. To reduce the complexity of the system there is a need to limit the number of users in a system may be 200 to 300 users can take part in a single unit. Selection of topology in connection of the individual units plays an important role in most of the cases we try to maintain a simple topology say Bus topology or a Ring topology. Usage of star topology has some great benefits but it results in the complexity of the system and requires more wiring which makes the system costlier. So, in most cases we go with the bus topology or a ring topology.

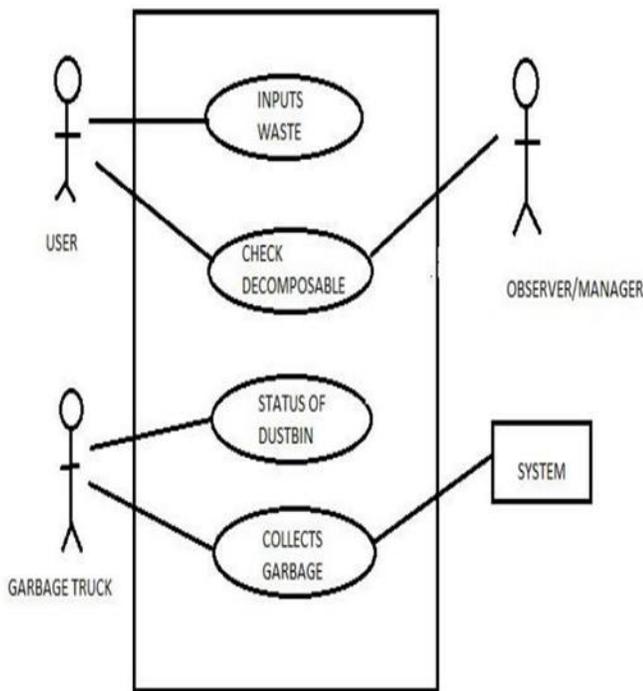


Figure 1 : Image depicting Use Case

The Use-Case diagram for this project is very essential as it shows the actors involved in the process and their relationships with different entities. The main actors in this system are User, Garbage Truck, Observer/Manager and the System which monitors the whole process. Some of the important Use cases in the system as of now involves Input waste, Check waste (Decomposable/Non-Decomposable), Status of the Dustbin

and finally Collects Garbage. This relationships between the actors and the use cases gives a great clarity in the working of the system.

S. No	Percentage Full	Status Message
1	0%	Dustbin Is Empty
2	<60%	Filling Slowly
3	60-90%	Filling Fastly
4	>90%	Almost Full

The dataflow diagram for the project is responsible for describing the sequence of work and the events to be occurred. It maintains the system and its working in a systematic way. The first step of the process involves in checking the type of waste, if it is non-decomposable material directly we can stop the process as the system deals with decomposable processes. The next step in the process is checking the status of the dustbin by the usage of the ultrasonic sensor and Arduino.

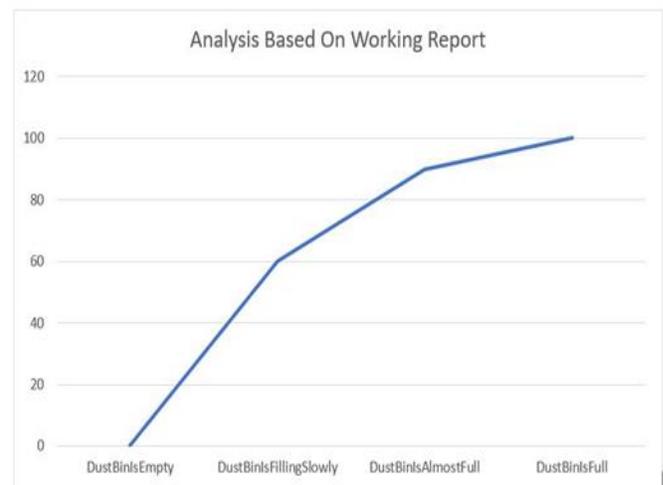


Figure 2: Analysis Report Base on Working Model

The next step of the process involves in the conveying the status of the dustbin to the concerned garbage truck using a GSM module connected to Arduino. Thus, the garbage truck receives the information from the dustbin and starts its process of collecting the waste and updating the status of the dustbin. This process is repeated in a loop as shown in the dataflow diagram each step in the dataflow diagram is responsible for the effective working of the system.

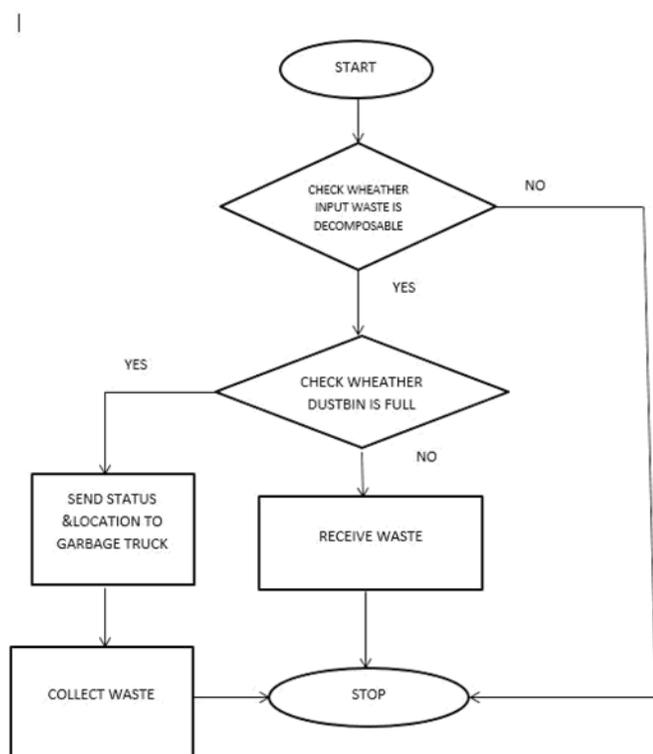


Figure 3 : Data Flow Diagram

### 5. CONCLUSION

Waste management is the most challenging aspect in the present world. If the waste is not managed or disposed properly it will cause a great damage to the environment. So, we have to introduce a new mechanism for the waste management. For the purpose of waste management in our project we have

developed a mechanism. This mechanism was used to garbage dispose in urban areas. various sensors have been used for the purpose of detecting the height of the waste in the dustbin. Whenever the dustbin was full a message was sent to the truck driver intimating to collect the garbage waste. This system will be helpful for eliminating the present-day scenario of leaving the dustbin without cleaning for several days. We are using GSM module for sending message to the worker who was allotted to that dustbin. It will create a good communication between the worker and the overloaded dustbins which will help for the maintenance of pollution free environment.

### 6. FUTURE ENHANCEMENT

Future enhancement of the project includes a formation of network connecting a group of dustbins in a topology in the lower level. Similarly, a group of garbage trucks are connected in a topology which shares the information about the process and their work to be made. This collection of data involves in a good communication among the different units of the system. Improvement in the efficiency of the process is major priority in the future enhancement. As we include a combination of ultrasonic sensors in a big size dustbin there arises a complexity problem this complexity can be resolved in using an advanced circuit and interfacing this sensors with an Arduino software. Usage of GSM module can be updated with a Bluetooth module or a WIFI module which has less maintenance compared to GSM module which makes the system less costly and more efficient.

### REFERENCES

- [1] Internet of Things Based Garbage Monitoring System. (2017)
- [2] Smart Garbage Monitoring and Clearance System using Internet of Things. (2017)
- [3] IOT Based Smart Garbage alert system (2016)
- [4] Automatic waste management system Using Arduino Uno Microcontroller (2016)