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Smart Garbage Bin

Shubham Choudhary [1], Parth Deshpande [2] ,Varsha Gupta [3], Pratiksha Sontakke [4] , Ankush Hutke [5]

Bachelor of Engineering , Dept. of Information Technology , R.G.I.T. , Mumbai , Maharashtra , India[1]

Bachelor of Engineering , Dept. of Information Technology , R.G.I.T. , Mumbai , Maharashtra , India[2]

Bachelor of Engineering , Dept. of Information Technology , R.G.I.T. , Mumbai , Maharashtra , India[3]

Bachelor of Engineering , Dept. of Information Technology , R.G.I.T. , Mumbai , Maharashtra , India[4]

Assistant. Professor , Dept. of Information Technology , R.G.I.T. , Mumbai , Maharashtra , India[5]

Abstract— Many times, in our city we see that the garbage bins or dustbins placed at public places are overflowing. It creates unhygienic conditions for people as well as ugliness to that place leaving bad smell**.** Also due to this many diseases like Malaria Dengue Plague can spread. To avoid all such situations we are going to implement a project called IoT Based Smart Garbage bins. As people are getting smarter so are the things. The idea of Smart Dustbin is for the Smart buildings, Colleges, Hospitals and Bus stands. The Smart Dustbin is an improvement of normal dustbin by improving it to be smart using sensors. Smart dustbins is a new idea of implementation which makes a normal dustbin smart using ultrasonic sensors for garbage level detection and sending message to the user updating the status of the bin using GSM module.

Keywords*: : IoT; Smart Dustbin; GSM;*

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I. INTRODUCTION

Though the world is in a stage of upgradation, there is yet another problem that has to be dealt with. Garbage! Pictures of garbage bins being overfull and the garbage being spilled out from the bins can be seen all around. This leads to various diseases as large number of insects and mosquitoes breed on it. A big challenge in the urban cities is solid waste management. Hence, smart dustbin is a system which can eradicate this problem or at least reduce it to the minimum level. Our present Prime Minister of India, Sri Narendra Modiji has introduced the concept of implementing 100 smart cities in India."Swachh Bharat Abhiyan" was initiated to ensure a clean environment. Majority of viruses and bacterial infections develop in polluted environment. Safeguarding the environment using technology sources is needed at present. Majority of the public environment seems to be polluted with the waste material. So, modernization of the restaurants is needed by imparting the smart technology.[1]

Internet and its applications have become an integral part of today's human lifestyle. It has become an essential tool in every aspect. Due to the tremendous demand and necessity, researchers went beyond connecting just computers into the web. These researches led to the birth of a sensational gizmo, Internet of Things (IoT). The IoT concepts were proposed years back but still it's in the initial stage of commercial deployment. Home automation industry and transportation industries are seeing rapid growth with IoT.

All the equipment's we use in our day to day life can be controlled and monitored using the IoT. A majority of process is done with the help of sensors in IoT. Sensors are deployed everywhere and these sensors convert raw physical data into digital signals and transmits them to its control centre. By this way we can monitor environment changes remotely from any part of the world via internet.[2]

At present, we only have conventional garbage disposal by periodic overflowing checks by local authorities, leading to garbage bins. In this project, we aim at an automatic garbage level detecting system informing the concerned authorities timely by using the ultra-sonic sensors. These ultra-sonic sensors measure the depth of the garbage bin. The information is then received and processed by Arduino Uno. When the garbage level will exceed certain threshold value the warning message is generated and sent to user using GSM.

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II. RELATED WORK

This is not an original idea, for the implementation of smart garbage bin; the idea has been existed for many years, after the IoT field started finding its grip in our day to day lives. This is, however an original plan for designing a smart garbage bin with ultrasonic sensors,GSM,GPS and Arduino.

A State of the Art review on Internet of Things by P. Suresh, Vijay. Daniel, R.H. Aswathy, Dr. V.Parthasarathy.It gave the idea of IoT subject and addition details about IoT. The proper smart environment and various applications.[3]

Internet of Things: Challenges and state-of-the-art solutions in Internet-scale Sensor Information Management and Mobile analytics by Arkady Zaslavsky, Dimitrios Georgakopoulos. This paper gave us the details about mobile analysis and sensor information management that will help in data segregation of various dustbins.[4]

Smart Garbage Management System by Vikrant Bhor, Pankaj Morajkar, Maheshwar Gurav, Dishant Pandya. It provided us

with additional details and designs needed for flow and management of garbage while collection.[5]

The authors in [6] have made a quantitative analysis between existing dustbins and their serving population. The study first analyses the spatial distribution of dustbins in some areas of Dhaka city using average nearest neighbor functions of GIS.Remarkably, the spatial circulation of the current dustbins has appeared to be dominatingly in clustered pattern. Next, an optimal number of additional dustbins were calculated. It is shown that the number of existing dustbins is insufficient in the study area.

The authors in [7] have equipped the smart bins with ultrasonic sensors which measure the level of dustbin being filled up. The container is divided into three levels of garbage being collected in it.Every time the garbage crosses a level the sensors receives the data of the filled level. This data is further sent to the garbage analyzer as instant message using GSM module. Placing three ultrasonic sensors at three different levels of the container may be a disadvantage as the cost of the dustbin increases due to the sensors and also the sensors can be damaged due to the rough action by the user

III. PROPOSED SYSTEM

By looking at the need of modern technology the smart garbage bin can be expensive but considering the amount of dustbin required in India, expensive garbage bin would not be a prior experiment that is why we have decided to use ultrasonic sensors to reduce its cost and also make it efficient and feasible in applications.

The working of proposed garbage monitoring system is as follows:
1.At first, the level or the height of the garbage in each bin is measured by using the ultrasonic sensor.
2.Developing a kit which will be installed in the required location for monitoring of the garbage level. The kit will basically include Arduino UNO R3, on which the ultrasonic sensor will be configured, GSM for data transfer and GPS for fetching the current location of the dustbin.
3. Collecting the respective level readings and the location and checking it against the threshold value.
4.If the garbage level in the bin is crossing the threshold level, then the warning message is generated and sent to the concerned authority using GSM.

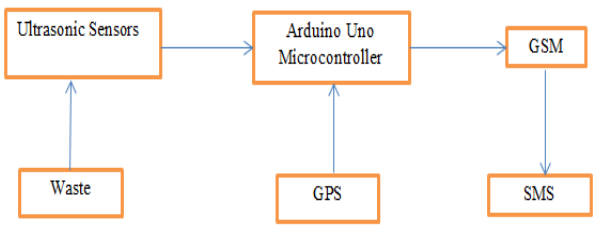
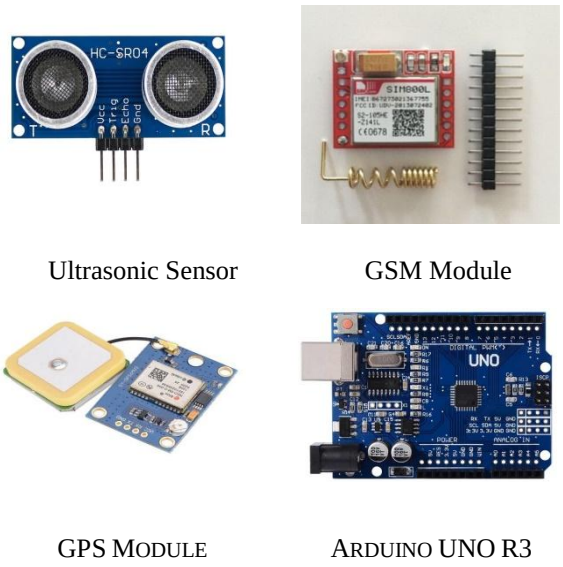


Fig 1. Block Diagram of the system

Fig 1.shows that the level of waste in the garbage bin is calculated by ultrasonic sensors which sends the data to Aduino Uno R3. The GPS fitted in the Garbage Bin tracks the current location of the bin and sends the location to the Arduino Uno R3. The data from ultrasonic sensor and GPS is sent as SMS to concerned authority via GSM Module if the Garbage Level in the bin is above threshold value.



Ultrasonic Sensor GSM Module

GPS MODULE ARDUINO UNO R3

Fig 2. Basic Components of the System.

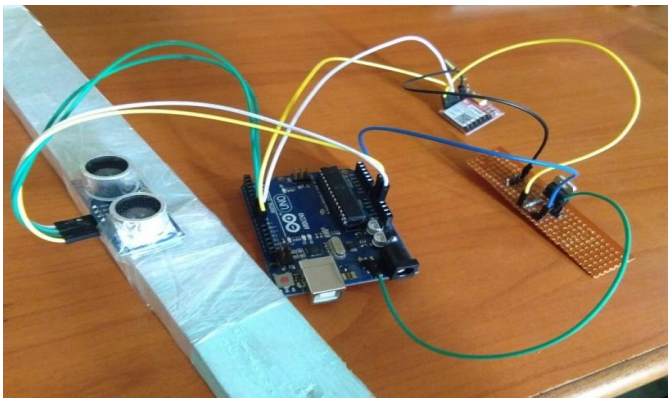


Fig 3. Circuit Diagram

IV. SIMULATION RESULTS

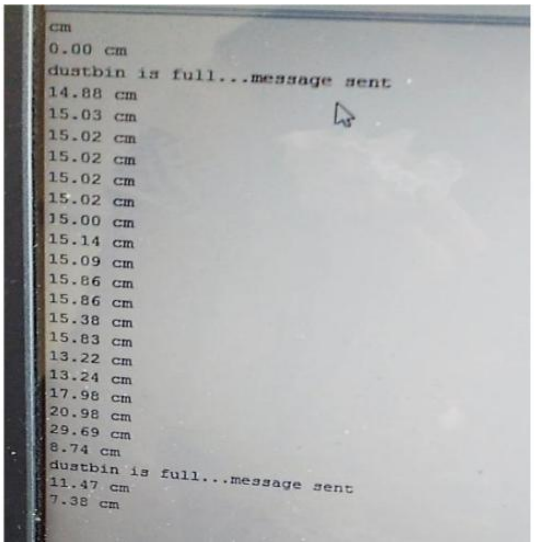


Fig 4 . Level detection by Ultrasonic sensor

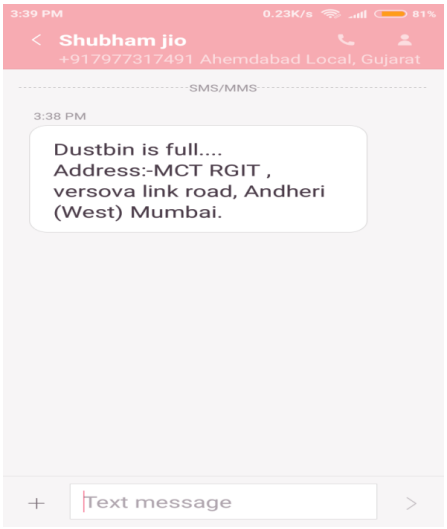


FIG 5. MESSAGE SENT TO THE AUTHORITY

V. CONCLUSION

With the help of new proposed system we can avoid overflowing of Garbage. The Project work is implementation of Smart Garbage Management System using Ultrasonic Sensors, Arduino, GSM, GPS, IoT. This system assures the cleaning of dustbins soon when the Garbage level reaches its Threshold value. This reduces the total number of trips of garbage collecting vehicle to collect the Garbage and reduces the overall expenditure associated with Garbage Collection. This method helps in keeping the environment clean. Thus Garbage collection is made more efficient.

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