AUTOMATED GARBAGE MONITORING SYSTEM USING GPS, GSM AND IOT

[1]**Ms. Komal V. Yawale** , [2]**Prof. G.D.Dalvi**
[1]**M.E student,** [2]**Prof. of electronics department**
[1]Department of Electronics and Telecommunication, Amaravati University.
[1]P.R. Pote (Patil) College of Engineering, Amravati, India

Abstract - In India, SWACCHA BHARAT ABHIYAN is a mission started by our P.M, Which aims to clean up the roads, streets and to develop the infrastructure digitally of India's city and rural areas. Focusing towards the clean India mission, we have provided an efficient solution for monitoring the waste level on the real time basis. Whole system is Internet of things based. The level ultrasonic sensors in the garbage dustbin detect the garbage level continuously and accordingly the system provides the information to the control office. This will avoid the overflowing of the garbage dustbins. Ultimately it will help us to keep our environment clean and also reduces the health issues. This project Internet of things Based Garbage Monitoring System is a very smart system which will help to keep our village and cities. We see that in our cities public bins are overloaded and it create unhygienic conditions for people and that place leaving a bad smell. To avoid all these things we are going to implement a project Internet of things based garbage monitoring System. These bins are interfaced with Arduino Uno base system having ultrasonic sensor along with central system showing the Current status of waste on display and web browser HTML page with Wi-Fi module. To increase the cleanliness in the country government started the various project.

Keywords - **IOT, Cloud, GPS, Ultra Sonic sensor, ESP8266, ATMEGA328, GSM, etc…**

I. INTRODUCTION

Due to increase in population of India it also leads to increase in the garbage also. India faces major environmental changes associated with inadequate waste garbage collection, transport and disposal[6]. we need many man powers, by this waste management monitoring system we reduce the man power with the help of embedded system is interfaced with Internet of things[6]. Implementation is done with the help of Internet of thinks concept. The Internet of things is a concept in which surrounding objects are connected through wired and wireless networks without user intervention. Objects communicate and exchange information. In this system multiple bins are located throughout the cities or the Campus, these bins are provided with a ultrasonic sensor which helps in tracking the level and weight of the garbage dustbins and a unique ID will be provided for every bin in the city so that it is easy to identify which garbage dustbin is full[5].

The model uses a Wi-Fi module (ESP8266) which sends data to a web server which is developed by the authors using Bootstrap. The data sent with a timestamp by the RTC module which also provides the user with the location of the dustbin by the use of a GSM module. The solutions created for management of waste garbage faces its own difficulties. The solution proposed by suggest the use of only a GSM module and an sensor which send the status of the dustbin directly to the registered number.

For effective usage of the monitoring system, IOT concept has been used for data communication, processing, storing and retrieving. The proposed work helps to eradicate the everyday difficulty of managing the garbage in the environment which is possible with the help of Internet of things [7]. These system consists of an Arduino Uno microcontroller, a garbage dustbin loaded with ultrasonic sensors and they are monitored continuously through a monitoring panel at the control office with the help of GSM & GPS module [7].We may dump the waste in the government allocated bins in area/locality or hand it over to the door to door collectors and after that the garbage should reach its end site which is very crucial and that's where our proposed model is going to fit in[8].

II. LITERATURE REVIEW

S.S.Navghane, M.S.Killedar [1] 2017 These dustbins are interface with microcontroller based system having IR wireless systems along with central system showing current status of garbage, on mobile web browser with HTML page by Wi-Fi module. . The main aim of this project is to reduce human resources and efforts along with the enhancement of a clean city vision.

Ashima Bajaj [2] 2017 this method is advance in which garbage monitoring system management is automated. This project Garbage Monitoring system using Internet of things is a very innovative system which will help to keep the cities clean.

Kasliwal Manasi H[3] proposed a system for organizing the collection of the garbage in the commercial and residential areas of the cities. In this system, the level of garbage in the bin was detected by the sensor which will send the data to the corporation room using the GSM module.

Sahil Mirchandani[8] proposed an Internet of things enabled bin, which uses RFID tags to identify the bins with a web-based online system approach and identifies the weight of the garbage that is added, all this data is calculated and added a host server to the parent database. Also, it has a mechanism that gives the level of the bins and updates the data of each bin on the parent server. It notifies the authority when the bin is full and provides the shortest route to the collection a truck to empty all the bins.

A Anitha[9] this system, the ultrasonic sensor detects the level of garbage and sends the value to control room through the GSM module. A GUI based on MATLAB was developed to check the information related to the garbage for different locations. Two units were present in the system; slave unit was placed in the bin whereas the master unit was there in the control room.

Sneha Patil[10] proposed a smart waste dustbin which uses a cloud based system which is connected to a raspberry pi which can identify when the garbage dustbin levels by the help of a sensor which measures the volume occupied and the left volume in the smart garbage dustbin. If the volume is full then there is a trigger generated that sends an alert message through raspberry pi and also sends an alert and location of the dustbin to the authority to collect the waste.

III. PROPOSED METHODOLOGY

In this project methodology model takes the fundamental process activities of Project Plan, specification, Analysis, hardware and software Design, development, validation and represents them as separate process phases.
Now, let us see the particulars of the various blocks of the hardware of an garbage monitoring system. As shown in Fig. the blocks are:
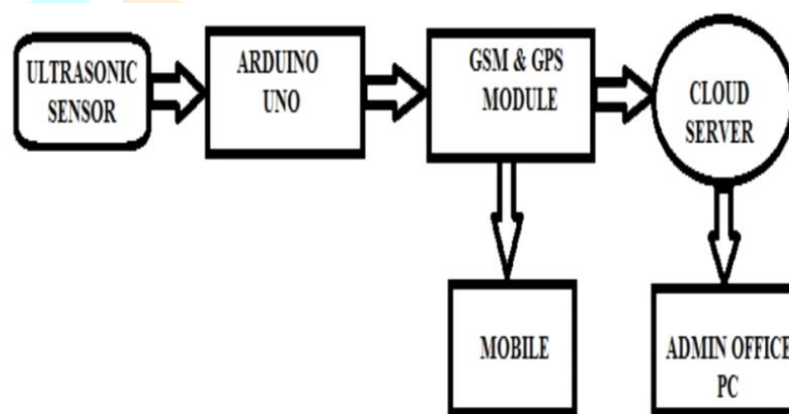

Fig. 1: Block Diagram of Smart Garbage Monitoring System using IOT

GPS – Global Positioning System
GSM – Global System for Mobile communication

The working objects of the slave unit are Arduino Uno, ultrasonic sensor, Potentiometer, GSM & GPS SIM908 module. The entire unit is kept at the top of the bin. The trigger pulse is sent from the ultrasonic sensor into the bin and as a result, the echo pulse will be received back by it. Thus the time lagging between the sent and received sound signal is used to determine the distance to the object. Through this it continuously checks the level of garbage in the bin. Once the garbage reach the specified threshold values, sensor gives indication to the Arduino uno.

Global System for Mobile Communications, originally Grouped Special Mobile commonly known as GSM, is a standard set developed by the (ETSI) to describe protocols for second generation digital cellular networks used by mobile phones. It became the fact of global standard for mobile communications with over 80% market share. The GSM modem is interfaced with the ARM microcontroller. If the garbage Box is full and if SMS alert has to be sent to the central office through the GSM[5]. The compatibility between Microcontroller and GSM Module will be taken care by MAX-232 chip and at the receiver side. Mobile is in the hand of user which receives SMS. The GSM Module is interfaced with the ARM microcontroller through MAX 232.

GSM Module has a SIM card, it sends an SMS to user, when an error introduced. They are used for sending and receiving SMS and MMS alerts. The input to the sensor module would come from the waste bin which are placed at different localities in the public area . The sensor is placed in the garbage bin at a max level , if that level is crossed by the garbage in the bin, then sensor will sense that and will communicate to ARM 7 controller through Zig Bee technology. When the garbage box 1 becomes full, the ultrasonic sensor attached to its lid will detect the level and send a command through zigbee. The zigbee receiver will always receive the command and show the condition of garbage box on Liquid Crystal Display and on the computer .The Message would be that the garbage bin 1 in particular area is filled completely, please collect it". At the same time a same message will be sent to a driver's mobile that particular garbage bin is completely full through Short Message Service.

a)   *Ultrasonic Sensor*

Fig. 2: Ultrasonic Sensor

The Ultrasonic Sensor is used to measure the distance with high accuracy and stable readings. It can measure distance from 2cm to 400cm or from 1 inch to 13 feet. It emits an ultrasound wave at the frequency of 40 KHz in the air and if the object will come in its way then it will bounce back to the sensor. By using that time which it takes to strike the object and comes back, you can calculate the distance. Distance can be measured by equation...

Distance = Time x sound speed /2

Where, Time = the time between an ultrasonic wave is received and transmitted. It has four pins. Two are VCC and GND which will be connected to the 5V and the GND of the Arduino while the other two pins are Trig and Echo pins which will be connected to any digital pins of the Arduino. The trig pin will send the signal and the Echo pin will be used to receive the signal. To generate an ultrasound signal, you will have to make the Trig pin high for about 10us which will send an 8 cycle sonic burst at the speed of sound and after striking the object, it will be received by the Echo pin. Ultra sonic sensor as shown in figure.
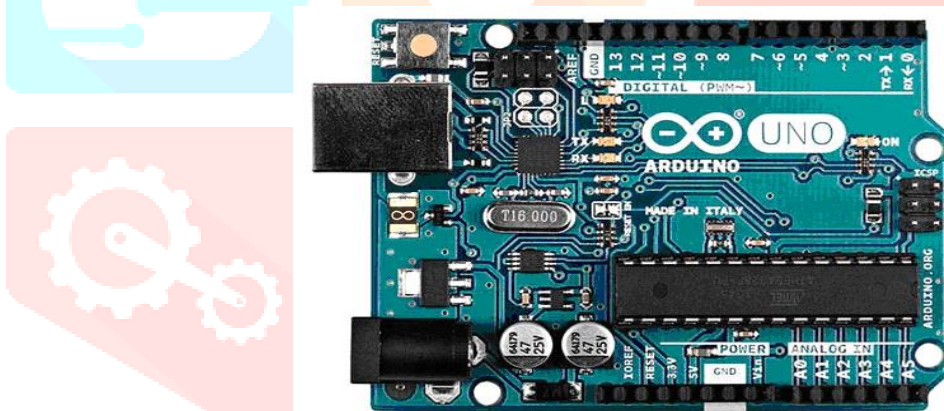
b)   *Arduino Uno*

Fig. 3: Arduino uno

Arduino is an open source, PC paraphernalia and programming organization, endeavour, and client group that plans and produce microcontroller packs for constructing programmed devices and intelligent object that can detect and control questions in the real world. The inception of the Arduino extend began at the Interaction Design Institute in Ivrea, Italy. The equipment reference plans are appropriated under a Creative Commons Attribution Share. Arduino Uno is shown in figure.

c)   *GSM / GPRS Modem*

This GSM modem is a highly flexible plug and play quad band GSM modem for direct and easy integration to RS232. Supports features like Voice, Data/Fax, SMS,GPRS and integrated TCP/IP stack.

IV. FLOW CHART

The municipality dashboard shows real time tracking of the garbage collecting trucks employed for collecting, it shows the truck capacity of the garbage trucks on duty, it has an option where it can send alerts to the consumers of the particular pin code saying that the truck is in their area for collection. It also has an attention board where any request/queries raised by the consumer are made available there.
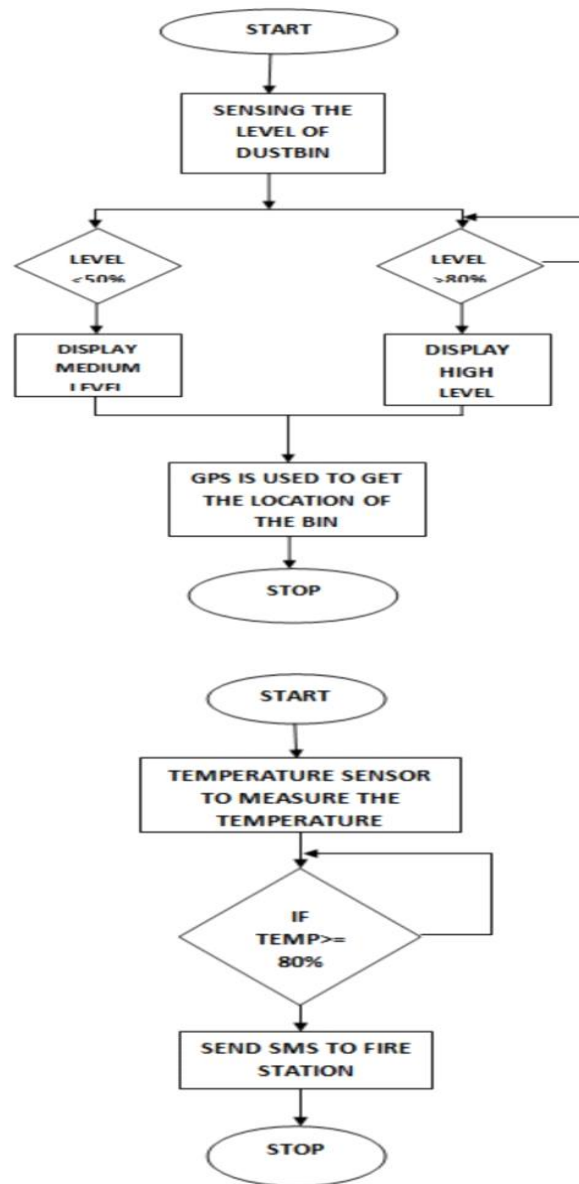
Fig. 4: Flow Chart

V. ADVANTAGES AND APPLICATION

ADVANTAGES:
1. Monitors the garbage bins and informs about the level of garbage collected in the garbage bins.
2. To keep our Environment clean & Green.
3. The cost & effort are less in this system.
4. To collect dustbins at public places in city.
5. Many times garbage dust bin is over flown and many animals like dogs or goat enters inside or near the dust bin. This creates a bad scene. Also some birds are also trying to take out garbage from dustbin. This project can avoid such situations

APPLICATION:
1. This project can be used in the "SMART CITY".
2. This project is helpful for the nation's "CLEAN INDIA MISION".
3. This project is also helpful in the Government project of "SWACH BHARAT ABHIYAN".
4. This project can also be used in college/university cumpus.
5. This project when implemented reduces the human interference and also increases the efficiency of waste collection.

VI. RESULT ANALYSIS AND DISCUSSION

RESULT:

    The system was checked repeatedly by increasing and decreasing the level of garbage in the bin. Notification was sent each time the level got changed. The user checked the notification was checked by the user on the mobile, so it can be said that the system has worked in the way we planned. Proper security was also given to the hardware components so that the output which comes is accurate because further actions have to be taken based on the output. The result of the notification is provided in figure
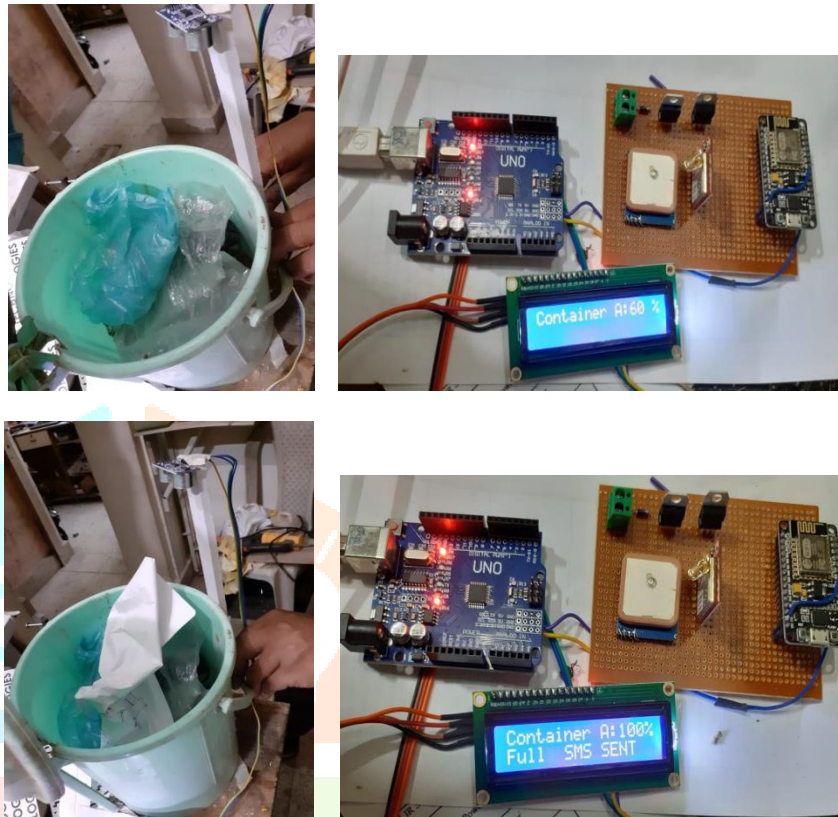
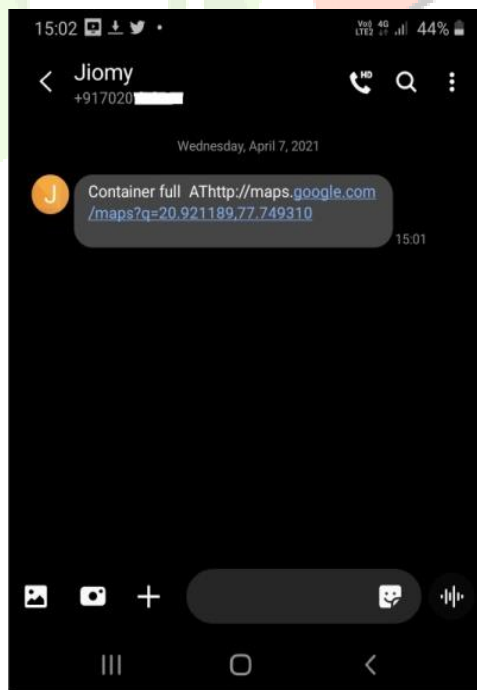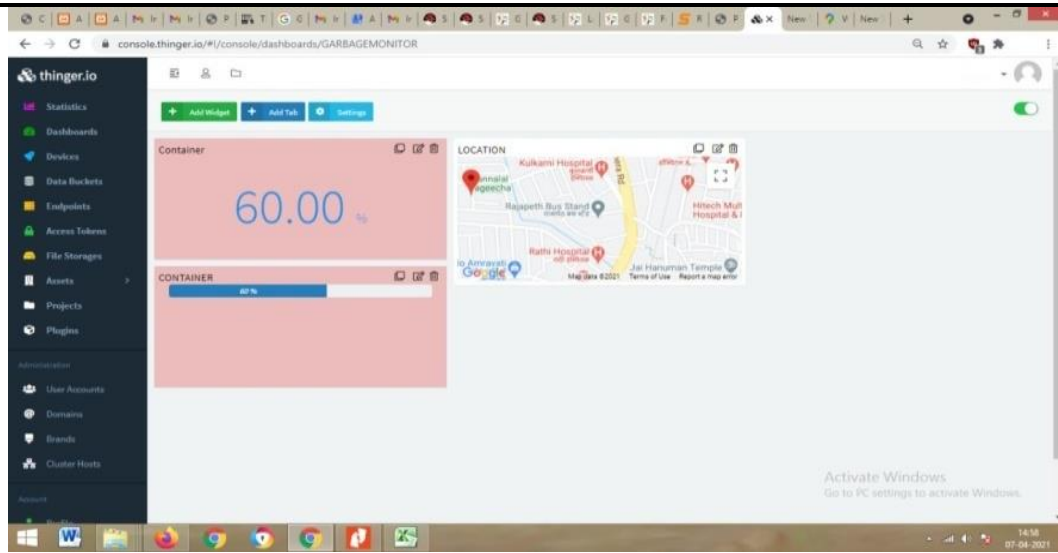**Fig. 5: Hardware Implementation & Percentage of Accuracy Detected**

Fig. 6: Alert Message Sent to the Mobile of Authority

Fig. 7: Map view Provides shows the location & the Current State (Percentage) of the Bin

FUTURE SCOPE:

Now this system can be used in certain areas but as soon as it proves its credibility it can be used in all the big areas. In future, a team can be made which will be in charge for handling and maintaining this system and also to take care of its maintenances. Inclusion of the control room will effectively help monitor the garbage level from the Central Office. Integrating the system with an application based website to have an exact location on the map.

VII. CONCLUSION

This system also helps to monitoring the fake reports and hence can reduce the corruption in the overall management system. This reduces the total number of trips of waste collection vehicle and the overall expenditure associated with the garbage collection. It ultimate helps to keep cleanliness in the cities. Therefore, the smart garbage management system makes the garbage collection more efficient the use of solar panels in such systems may reduce the energy consumption. Such systems are valuable to plundering of components in the system in different ways which needs to be worked on.

VIII. ACKNOWLEDGMENT

REFERENCES

[1] S.S.Navghane, M.S.Killedar, Dr.V.M.Rohokale. "IOT Based Smart Garbage and Waste Collection Bin", International Journal of Advanced Research in Electrical and Communication Engineering(IJARECE), Volume 5, Issue 5,May 2017.
[2] Ashima Bajaj, Sumanth Reddy. "Garbage Monitoring System Using IOT", International Journal of Pure and Applied Mathematics, Volume.114 No.12 2017, 155-161
[3] Kasliwal Manasi H and Suryawanshi Smithkumar B 2017 A Novel approach to Garbage Management Using Internet of Things for smart cities International Journal of Current Trends in Engineering & Research 2 348-53.
[4] Norfadzlia Mohd Yusof, Mohd Faizal Zulkifli, Nor Yusma Amira Mohd Yusof, Azziana Afififie Azman. "Smart Waste Bin with Real-Time Monitoring System". International Journal of Engineering & Technology, 7 [2.29] [2018] 725-729.
[5] MS. AMRUTHA P.V. MS. CHAITHAR B.N. "IOT BASED WASTE MANAGEMENT USING SMART DUSTBIN" PROJECT REFERENCE NO.: 40S_BE_2142_2018 : SHRIDEVI INSTITUTE OF ENGINEERING AND TECHNOLOGY
[6] Shobana G1, Sureshkumar R2 1PG Scholar, Dept. of EEE, Kumaraguru College of Technology, Coimbatore 2Assistant Professor, Dept. of EEE, "AUTOMATED GARBAGE COLLECTION USING GPS AND GSM" Volume 118 No. 20 2018, 751-755.
[7] Mr.D.Poornakumar , "Smart Garbage Monitoring System Using IOT" INTERNATIONAL JOURNAL FOR TRENDS IN ENGINEERING &TECHNOLOGY VOLUME 27 ISSUE 1 – MARCH 2018 - ISSN: 2349 – 9303.
[8] Sahil Mirchandani, Sagar Wadhwa, Preeti Wadhwa, Richard Joseph, "IoT Enabled Dustbins", 2017 International Conference on Big Data, IoT and Data Science (BID) Vishwakarma Institute of Technology, Pune, Dec 20-22, 2017, Pg 73-76
[9] A Anitha. "Garbage monitoring system using IoT", IOP Conference Series: Materials Science and Engineering, 2017.
[10] Sneha Patil, 2Snehal Mohite, 3Aishwarya Patil, 4Dr. S.D.Joshi "International Journal of Advanced Research in Computer Science and Software Engineering".