International Journal of Electrical and Electronics Engineers
Volume 14, Issue No. 01, Jan-June 2022
ISSN (O) 2321-2055
ISSN (P) 2321 -2045

# IoT BASED GARBAGE MONITORING SYSTEM

**Mr. Ch. Seshu Kumar[1], Mr. K. Prudhvi[2], Ms. E. Sai Bhavani[3], Mr. D. Eswar Venkateswarlu[4], Mr. E. Praveen[5]**

*1. Assistant Professor, Department of ECE, Tirumala Engineering College*

*2,3,4,5 U.G. Student , Department of ECE, Tirumala Engineering College*

**Abstract:** Nowadays certain actions are taken to improve the level of cleanliness in the country. People are getting more active in doing all the things possible to clean their surroundings. Various movements are also started by the government to increase cleanliness. We will try to build a system which will notify the corporations to empty the bin on time. In this system, we will put a sensor on top of the garbage bin which will detect the total level of garbage inside it according to the total size of the bin. When the garbage will reach the maximum level, a notification will be sent to the corporation's office, then the employees can take further actions to empty the bin. This system will help in cleaning the city in a better way. By using this system people do not have t0check all the systems manually but they will get a notification when the bin gets filled.

**Keywords:**Garbage collection, Ultrasonic sensor, Arduino, IOT

## 1. Introduction

We are living in an age where tasks and systems are fusing together with the power of IOT to have a more efficient system of working and to execute jobs quickly! With all the power at our fingertips this is what we have come up with. The Internet of Things (IoT) shall be able to incorporate transparently and seamlessly a large number of different systems, while providing data for millions of people to use and capitalize. Building a general architecture for the IoT is hence a very complex task, mainly because of the extremely large variety of devices, link layer technologies, and services that may be involved in such a system. One of the main concerns with our environment has been solid waste management which impacts the health and environment of our society. The detection, monitoring and management of wastes is one of the primary problems of the present era. The traditional way of manually monitoring the wastes in waste bins is a cumbersome process and utilizes more human effort, time and cost which can easily be avoided with our present technologies. This is our solution, a method in which waste management is automated. This is our IoT Garbage Monitoring system, an innovative way that will help to keep the cities clean and healthy.

## 2. Block Diagram Description

In this each dustbin is givenunique ID for easy identification. We continually monitor all the dustbin in our system through an Android App Thingspeak and also monitor all the events in the system. In this system many numbers of dustbins are connected through the internet. The ultrasonic sensor is connected to detect the level of dustbin. The dustbin is divided into three level. The Ultrasonic sensor detect the level of the dustbin and send it to the RF transmitter. The availability of waste could be monitored through android app. The ultrasonic sensor will be interfaced to Arduino Mega and will be the input section of the system. Arduino Mega will be programmed to perform the task to measure via sensor and give output. Arduino Mega will be connected to Internet and it will be logged onto the server through the Ethernet shield. This information is then given to the web using internet. The respective authorities get the output in virtualization. This will display the level of all dustbins and display the ID of dustbin which is full.

International Journal of Electrical and Electronics Engineers
Volume 14, Issue No. 01, Jan-June 2022
ISSN (O) 2321-2055
ISSN (P) 2321 -2045

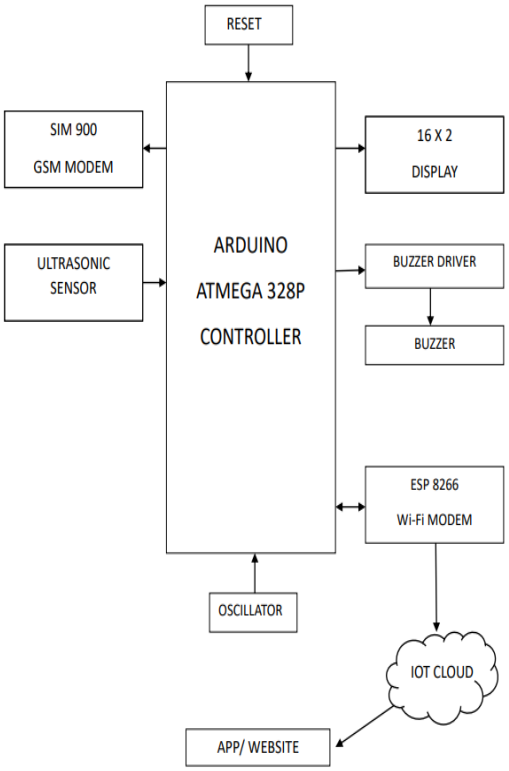


**Fig 2.1:** Block Diagram

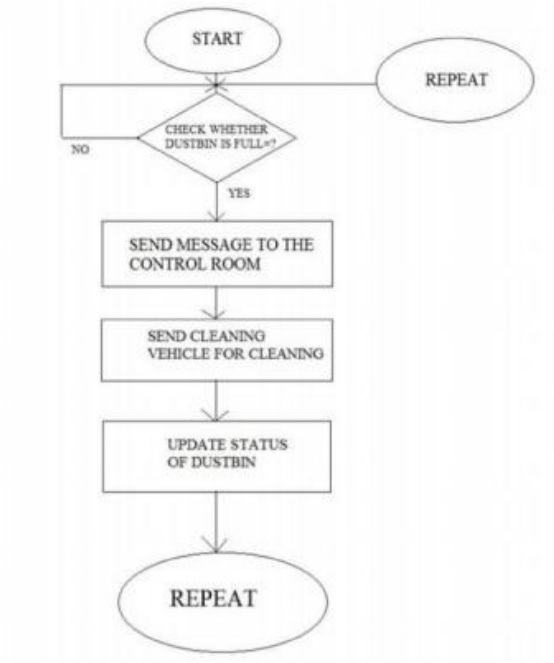


**Fig2.2:** Flowchart of project

## 3. Existing System

Nowadays, there are tons of flats and apartments which have been built in the rapid urbanization area. This is due to high housing demands which have been drastically risen as a result of migration from villages to cities to find work. In order to accommodate the growing population in the urban area, the government has also constructed more apartment complexes. There are several issues faced by the residents of the flats. One of them is disposal of solid waste. Unlike private houses, the residents of all the apartments use a common dustbin, which tends to fill up very quickly. This overflowing of garbage is a sanitary issue which might cause diseases like cholera and dengue. Moreover, it is a waste of fuel to travel around a complex or an area to find that some of the garbage are filled and some are not. Also, on rare days, problems might arise that there is so much garbage that the truck doesn't have enough capacity. The idea struck us when we observed that the garbage truck use to go around the town to collect solid waste twice a day. Although this system was thorough it was very inefficient. For example, let's say street A is a busy street and we see that the garbage fills up really fast whereas maybe street B even after two days the bin isn't even half full. This example is something that actually happens thus it led us to the "Eureka" moment!

## 4. Proposed System

Our proposed model provides real time monitoring to the garbage bins placed in various locations. These garbage boxes have been assigned with a unique id which determines the garbage bin identity. The garbage bins are built with a sensor module which continuously monitors the garbage level inside the garbage bin.

At any moment if the gap between the garbage and sensor become less than 10cm, the system sends the notification. The monitoring panel receives the message and so the cleaning team collects the garbage from that bin.

## 5. Working

**Ultrasonic Sensor:** The sensor is used to detect the level of the dust in the dustbin. It uses a sound transmitter and receiver. An ultrasonic sensor creates a ultrasonic pulse called ping and listen for the reflection of pulse. The sound pulse is created

International Journal of Electrical and Electronics Engineers
Volume 14, Issue No. 01, Jan-June 2022
ISSN (O) 2321-2055
ISSN (P) 2321 -2045

electronically using a sonar projector consisting of signal generator, power amplifier and electroacoustic transducer array. A beam former is usually employed to concentrate the acoustic power into the beam.

**Fig 5.1:** Ultrasonic Sensor

**Arduino UNO:** The mega 2560 is a microcontroller board based on the ATmega2560. It consists of 54 digital input and output pins in which 15 can be used as PWM output,16 analog input,4UARTs which is a hardware serial port,16 MHz crystal oscillator, a USB connection. It also has reset button power jack and ICSP header. It has the sensor to detect the temperature and humidity and axis digital accelerometer. The board contains battery shield and connector cables. In this coding is embedded in the kit. The coding contains information used to determine the temperature then HTML code is used for display the output.


**Fig 5.2:** Arduino UNO

**WIFI Module:**Serial Wi-Fi wireless transceiver module: ESP8266 is a chip which is wireless network micro-controller module. It will be a system-on-a-chip (SoC) with capabilities for 2.4 GHz Wi-Fi, general-purpose input/output etc.

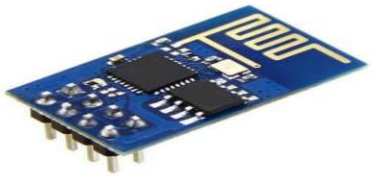

**Fig 5.3:** ESP8266

**GSM Module:** It is used to send message to the authorized personnel if the Garbage Bin crosses the defined threshold level. It is used to send message to the authorized personnel if the Garbage Bin crosses the defined threshold level.

**Fig 5.4:** GSM Module

**Liquid Crystal Display:**In this the result is displayed in the virtual form. The information about the level of the dustbin and the area where it is located is send to the municipality office with the unique ID that is given to the dustbin. The waste level inside the dustbin is detected by this system. This will transmit the information to the concerned person wirelessly. Everyone can access the data at anytime from anywhere in the world. Continuous and immediate data transmission. This system will avoid the overflow of dustbin. It will also avoid the emission of toxic gases from the dustbin.

**Fig 5.5:** LCD Display

International Journal of Electrical and Electronics Engineers
Volume 14, Issue No. 01, Jan-June 2022
ISSN (O) 2321-2055
ISSN (P) 2321 -2045

## 6. Web Applications Used

**Thingspeak:** THINGS SPEAK App is a Platform with IOS and Android apps to control Arduino, Raspberry Pi and the likes over the Internet. It's a digital dashboard where you can build a graphic interface for your project by simply dragging and dropping widgets. It can be found from following links

1. Android THINGS SPEAK App
2. https://thingspeak.com/
3. IOS THINGS SPEAK App.

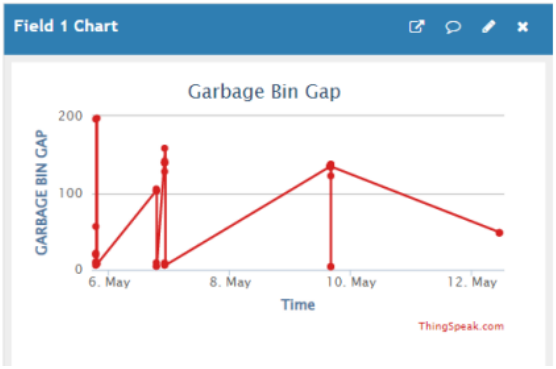


**Fig 6.1:** Thingspeak Data Field

## 7. Results

**Fig 7.1:** Reading Data


**Fig 7.2:** Sending SMS


**Fig 7.3:** SMS Notification


**Fig 7.4:** App View

International Journal of Electrical and Electronics Engineers
Volume 14, Issue No. 01, Jan-June 2022
ISSN (O) 2321-2055
ISSN (P) 2321 -2045

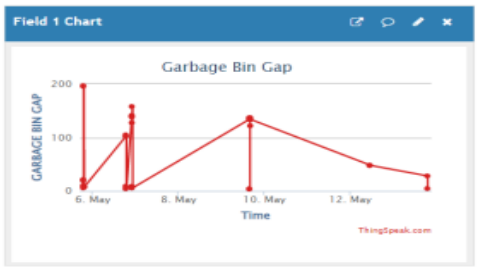


**Fig 7.5:** Website View

## 8. Conclusion

The main objective is to maintain the level of cleanliness in the city and form an environment which is better for living. By using this system, we can constantly check the level of the garbage in the dustbins which are placed in various parts of the city. If a particular dustbin has reached the maximum level, then the employees can be informed, and they can immediately take certain actions to empty it as soon as possible. The employees can check the status of these bins anytime on their mobile phones. This can prove to be a very useful system if used properly.

## 9. References

1. Navghane S S, Killedar M S and Rohokale D V 2016 IoT Based Smart Garbage and waste collection, International Journal of Advanced Research in Electronics and Communication.
2. Monika K A, Rao N, Prapulla S B and Shobha G 2016 Smart Dustbin-An Efficient Garbage Monitoring System International Journal of Engineering Science and Computing 6 7113-16.
3. Medvedev A, Fedchenkov P, Zaslavsky A, Anagnostopoulos T and Khoruzhnikov S,2015 Waste management as an IoT-enabled service in smart cities In Conference on Smart Spaces Springer International Publishing 104-15.
4. Monika K A, Rao N, Prapulla S B and Shobha G 2016 Smart Dustbin-An Efficient Garbage Monitoring System International Journal of Engineering Science and Computing 6 7113-16.
5. Prof. R.M. Sahu, Akshay Godase, Pramod Shinde, Reshma Shinde, “Garbage and Street Light Monitoring System Using Internet of Things” INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN ELECTRICAL, ELECTRONICS, INSTRUMENTATION AND CONTROL ENGINEERING, ISSN (Online) 2321 – 2004, Vol. 4, Issue 4, April 2016.