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 [ijircce@gmail.com](mailto:ijircce@gmail.com)

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# IoT Smart Dustbin Based Garbage Monitoring

Urmila Sudhakar Bachate

PG Student, Dept. of Electronics Engineering K. J. Somaiya College of Engineering, Mumbai-77 (Autonomous College Affiliated to University of Mumbai) Assistant Professor, Dept. of Electronics and Computer Science Shah & Anchor Kutchhi Engineering College, Mumbai, India

**ABSTRACT:** Waste management is one of the primary problem that the world faces irrespective of the case of developed or developing country. The key issue in the waste management is that the garbage bin at public places gets overflowed well in advance before the commencement of the next cleaning process. It in turn leads to various hazards such as bad odour & ugliness to that place which may be the root cause for spread of various diseases. To avoid all such hazardous scenario and maintain public cleanliness and health this work is mounted on a smart garbage system. 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 returning the process. 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. The whole process is upheld by an embedded module integrated with microcontroller and server Facilitation. An Android application is developed and linked to a web server to intimate the alerts from the microcontroller to the urban office and to perform the remote monitoring of the cleaning process, done by the workers, thereby reducing the manual process of monitoring and verification.

**KEYWORDS:** HC-SR04 ultrasonic sensor, Arduino Uno, Connecting wires, servo motor, ARDUINO Software.

## I. INTRODUCTION

Garbage consists of the unwanted materials left over from city, urban areas, Educational Institutions, Business organizations, home etc. This project will help to understand the developments of research on IoT to eradicate or minimize the garbage disposal problem. IoT is a recent communication Technology, in which the objects of everyday life will be equipped with arduino family microcontrollers, transceivers for digital communication and suitable protocol stacks, that will make them able to communicate with one another and with the users.

## II. RELATED WORK

World wise many scientists are doing researches on this project, where we often see the uses of RaspberryPi, which is a small computer board, used as a main tool of ultrasonic sensor.

Garbage is made up of undesired materials that have been left behind from cities, urban regions, educational institutions, businesses, and homes, among other places. In urban areas like Mumbai, organizations like BMC follow a routine schedule for garbage collection, where a truck goes to each allocated dustbin slot in a sequential manner, and collect the garbage, to dispose it off in the city's dump yard.

This system is very inefficient since, not all the garbage bin are filled to the brim each day, majority of the bins are half filled, and thus, these bins can be excluded from that day's collection routine. The areas where there are bins that are not fully filled can be avoided, thus reducing the turnaround time as well as pollution due to the monitor's daily transport across the city.

Some drawbacks of traditional garbage collection approaches-

- A. Time consuming
- B. High costs
- C. Greater traffic and congestion.



D. Unnecessary fuel consumption.

E. Increased noise and air pollution as a result of more trucks on the road.

As a result of a lack of real-time information, garbage collection was ineffective. There is a pressing need to improve the administration of this service in order to reduce infrastructure, operational, and maintenance expenses, as well as contamination from garbage collection.

This project will aid in understanding the progress of IoT research in order to eliminate or reduce the garbage disposal problem. IoT is a new communication technology in which ordinary things will be fitted with arduino family microcontrollers, digital communication transceivers, and appropriate protocol stacks, allowing them to connect with one another and with humans.

The proposed method assists in the detection of false reports, which can lead to management system corruption. As a result, the total number of waste collection truck trips has decreased, as has the overall cost of garbage

### **Software Implementation**

The software required for it is the Arduino IDE.

=ServoLibraryforArduino=

This library allows an Arduino board to control RC (hobby) servo motors. For more information about this library please visit us at <http://www.arduino.cc/en/Reference/Servo>

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### **III. PROPOSED ALGORITHM**

How collect a data in a new channel Step 1: Create a Channel

Step 2: Sign In to ThingSpeak using your MathWorks Account credentials, or create a new account. Step 3: Click Channels > MyChannels. On the Channels page, click New Channel.

Step 4: Check the boxes next to Fields 1–3. Enter these channel setting values: Step 5: Name:

Click Save Channel at the bottom of the settings. You now see these tabs:

Private View: This tab displays information about your channel that only you can see. Public View: If you choose to make your channel publicly available, use this tab to display selected fields and channel visualizations.

Channel Settings: This tab shows all the channel options you set at creation. You can edit, clear, or delete the channel from this tab.

Sharing: This tab shows channel sharing options. You can set a channel as private, shared with everyone (public), or shared with specific users.

API Keys: This tab displays your channel API keys. Use the keys to read from and write to your channel.

Data Import/Export: This tab enables you to import and export channel data Next Steps Your channel is available for future use by clicking Channels > My Channels.

ThingSpeak is an open-source software written in Ruby which allows users to communicate with internet enabled devices. It facilitates data access, retrieval and logging of data by providing an API to both the devices and social



network websites. ThingSpeak was originally launched by io Bridge in 2010 as a service in support of IoT applications Thingspeak has integrated support from the numerical computing software MATLAB from MathWorks. Allowing Thingspeak users to analyze and visualize uploaded data using MATLAB without requiring the purchase of a MATLAB license from MathWorks Thingspeak is an IoT analytics platform service that allows you to aggregate, visualize and analyze live data streams in the cloud. Thingspeak provides instant visualizations of data posted by your devices to ThingSpeak. With the ability to execute MATLAB code in Thingspeak you can perform online analysis and processing of the data as it comes in. Thingspeak is often used for prototyping and proof of concept IoT systems that require analytics. IoT solutions are built for many vertical applications such as environmental monitoring and control, health Monitoring, vehicle fleet monitoring, industrial monitoring and control, and home automation.

At a high level, many IoT systems can be described using the diagram below:

Internet of Things (IoT) describes an emerging trend where a large number of embedded devices (things) are connected to the Internet. These connected devices communicate with people and other things and often provide sensor data to cloud storage and cloud computing resources where the data is processed and analyzed to gain important insights. Cheap cloud computing power and increased device connectivity is enabling this trend. IoT solutions are built for many vertical applications such as environmental monitoring and control, health monitoring, vehicle fleet monitoring, industrial monitoring and control, and home automation. At a high level, many IoT systems can be described using the diagram below:

#### IV. PSEUDO CODE

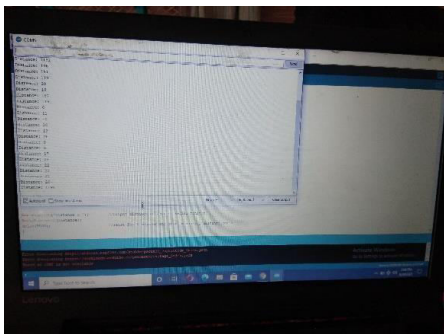


Fig.1: IOT Think Speak Result

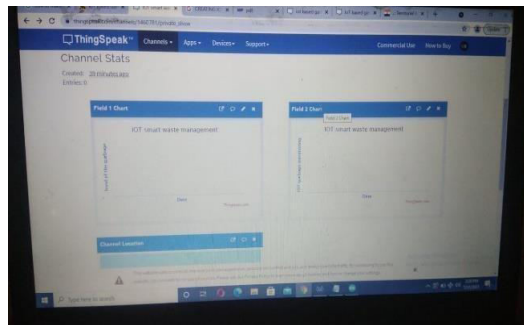


Fig2:IOT Think Speak Result

#### V. SIMULATION RESULTS

We observed the result with ultrasonic sensor. When obstacle is near to ultrasonic sensor arduino get signal from ultrasonic sensor so that the servo motor connected to the arduino as per the circuit given in Fig then servo motor rotated as 90 degree of clock wise direction. Then dustbin is open in proper manner and close after propagation delay. With the help of NODE MCU ESP8266 wifi module is connected for measuring distance of garbage level as well as obstacle distance

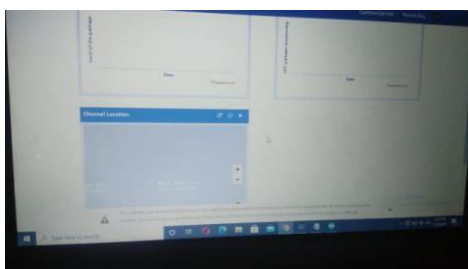


Fig3: large measurement Output of the distance measurement

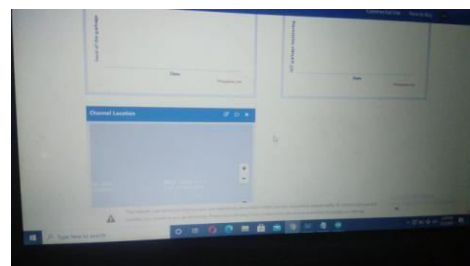


Figure 4: IOT think speak result



## **VI. CONCLUSION AND FUTURE WORK**

This project work is the implementation of Automatic smart garbage monitoring system using Ultrasonic sensor, Arduino Uno, servo motor. This system assures the cleaning of dustbins soon when the garbage level reaches its maximum. It will take power supply with the help of Piezoelectric Device. If the dustbin is not cleaned in specific time, then the record is sent to the Sweeper or higher authority who can take appropriate action against the concerned contractor. We built an efficient garbage monitoring system which can be used to monitor the level of garbage in the dump. This data can be further used to plan garbage collection trips more efficiently, ultimately reducing overflowing bins and helping have better public sanitation.

This system also helps to monitor the fake reports and hence can reduce the corruption in the overall management system. This reduces the total number of trips of garbage collection vehicle and hence reduces the overall expenditure associated with the garbage collection. It ultimately helps to keep cleanliness in the society. Therefore, the Automatic Smart garbage monitoring system makes the garbage collection more efficient.

The goal of this project is to create an automatic smart garbage monitoring system utilising an ultrasonic sensor, an Arduino Uno, and a buzzer. When the rubbish level reaches its limit, this system ensures that the dustbins are cleaned as quickly as possible. With the help of a Piezoelectric Device, it will obtain electricity, increasing its durability and lowering maintenance costs. If the trashcan is not cleaned within a certain amount of time, a report is submitted to the Sweeper or higher authority, who can take necessary action against the contractor in question. We created a reliable waste monitoring system that can be used to keep track of the amount of waste in the dump.

This information can also be utilized to better organize waste collection excursions, resulting in fewer overflowing bins and improved public sanitation.

Hands-free solutions are also vital in these times of covid; decreasing the number of times we need to touch a germ-infested area reduces the risk of the virus spreading. This method also aids in the monitoring of bogus reports, which can help to prevent corruption in the entire management system. As a result, the total number of waste collection truck trips is reduced, and the overall cost of rubbish collection is reduced. It ultimately contributes to society's cleanliness. As a result, the Automatic Smart Garbage Monitoring System improves the efficiency of garbage collection.

We can grow these sensor nodes and deploy them to all of the city's dustbins, as well as create a backend database and a frontend dashboard to visualise the garbage level in all of the city's bins. This will make it easier to make logistical judgments about cleaning the bins.

Furthermore, because it is an autonomous system, adding sustainable power sources could increase the system's value. Solar panels might help you save money on electricity by reducing your usage.

1. Changes can be done in the system to take it to another level and make it more useful for the employees and people who are using it.
2. In future, a team can be made which will be in charge for handling and maintaining this system and also take care of its maintenances.

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## BIOGRAPHY

**Urmila Sudhakar Bachate** is a Assistant professor in the Electronics and Computer Science Department, College of Shah and Anchor Kutchhi Engineering College, Mumbai University. received Master of Technology (M-Tech) degree in 2021 from K. J. Somaiya College of Engineering, Mumbai-77 (Autonomous College Affiliated to University of Mumbai). Her research interests are IOT, Computer Engineering.





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