

## GARBAGE MONITORING SYSTEM

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### ABSTRACT

Waste control is a primary problem that the sector faces, irrespective of whether or not a rustic is advanced or developing. The essential trouble with trash control is that garbage boxes in public locations overflow nicely earlier than the following cleansing operation begins. It then reasons distinct risks to that location, which includes unsightly odour and ugliness, which can be the basis motive of the unfold of many diseases. This attempt is primarily based totally on a clever waste machine to keep away from any doubtlessly risky eventualities and to make certain public cleanliness and health. This system is facilitated via way of means of an ultrasonic sensor this is related to an Arduino UNO and assessments the extent of waste withinside the dustbin earlier than sending an alert to the municipal internet server. With the usage of an RFID Tag, the motive force recognizes the paintings of discarding the garbage after cleansing the dustbin. RFID is a computing generation this is used for verification and, in addition, it improves the clever rubbish alert machine via way of means of routinely figuring out garbage stuffed withinside the dustbin and sending the popularity of clean-as much as the server, confirming that the paintings has been completed. An embedded module with RFID and IoT facilitation underpins the whole operation. An Android utility is advanced and connected to an internet server to ship warnings from the microcontroller to the town workplace and to carry out far flung tracking of the cleansing system done via way of means of the workers, putting off the guide tracking and verification procedure. The concept got here to us while we observed that the rubbish truck used to run across the metropolis two times an afternoon gathering strong waste. Although this method changed into comprehensive, it changed into inefficient. Let's say road A is a hectic road, and we note that the garbage bin fills up quickly, while road B's bin isn't always even 1/2 of complete after days. This instance is primarily based totally on real-existence events, which brought about the "Eureka" moment!

**Keywords:** Internet Of Things, Arduino, BOLT IOT Module, Ultrasonic And Moisture Sensors.

### I. INTRODUCTION

As the world's population grows, so does the amount of rubbish produced on a daily basis; as a result, waste management has become a serious concern in India. Hundreds of individuals pass by the same location every minute while travelling. Food coverings, polythene bags, and plastic bottles are carried by nearly 60-70 percent of people. The dustbins will be filled in a matter of minutes if they dispose of them all at once. With the growing popularity of IoT and the availability of low-cost actuators and sensors, the advantages of these technologies can be leveraged to address issues with present trash management methods in cities. Furthermore, today's garbage collection system is a time-consuming operation that necessitates a large amount of labour. IoT can be used in a variety of settings, including the home, health, environment, and industrial. It can also be used in the field of trash management, which would be beneficial in the development of smart cities. Environmental contamination has a significant impact on many individuals in many regions. This has extremely severe and destructive consequences for human health. The overflowing of municipal rubbish bins in a specific region of the city or an organisation has frightening and damaging implications for suburbia. To address such serious issues, a smart system must be developed that protects the environment while also reducing human labour by telling the municipality of bin filling so that bins may be cleaned on time. The suggested system is made up of three parts: The first section covers data sensing and acquisition. This can be accomplished by placing an ultrasonic sensor within the bin to measure and collect data such as rubbish weight and bin space. The second part is on data processing and transmission. The third section is about triggering and alerting.

### II. PROBLEM

One of the major environmental challenges has been solid waste management, which has a negative influence on our society's health and environment. One of the most pressing issues of our time is the observation, monitoring, and management of garbage. In a rapidly urbanizing area, there are a large number of flats and

apartments. The tenants of the flats encounter a variety of issues. Solid waste disposal is one of them. Let's say street A is a busy street, and we notice that the garbage cans fill up quickly, yet street B's bin isn't even half full after two days. Figure depicts a public garbage can that has overflowed.



### III. THE SOLUTION

There are numerous solutions for this technology that can solve our problem, such as providing real-time indicators of garbage level in the bin at any time, allowing us to optimise waste collection routes and, as a result, reduce fuel consumption. It also allows trash collectors to plan their daily/weekly schedules. Also, in today's environment, waste collection is a time-consuming procedure that necessitates a large amount of labour.

#### COMPONENTS:

##### 1) Arduino UNO Board:

Arduino is a low-cost, easy-to-use open source microcontroller which provides a platform for building various application based projects. It is a combination of both hardware and software. It is made of hardware circuit board which can be programmed by it's software (IDE) that runs on computer. When you create and upload a code in the software of an Arduino board the hardware runs and processes the project. Arduino UNO is the first ever Arduino board released hence the name UNO is given. The word UNO is derived from an italian word where UNO = 'one'. This Arduino UNO is released along with it's software Arduino IDE version 1.0.

Arduino board is prototype where you can build various circuits, upload the code and test out the results for the same. Arduino UNO basically have a total of 20 pins including 6 analog(input) and 14 digital pins (in & out). Along, with these pins it also contains USB Connector, Power Connector.

Arduino Board is programmed using a software called Arduino IDE where IDE stands for Integrated Development Environment. The code required for the project that is desired to built is dumped in this software and the code is in simple code languages similar to C++. The good thing about an arduino board is the software is free and also the board is low-cost for it's applications.



### 2) Ultrasonic Sensor

Sensor is an electronic device which identifies physical parameters in the surrounding environment. It converts the sensed parameters to equivalent electrical energy. Ultrasonic is derived from latin words where ultra = 'beyond' and sonic = ' sound '. So, the ultrasonic sensor is used to detect objects around it's orbit by using ultrasonic sound waves.

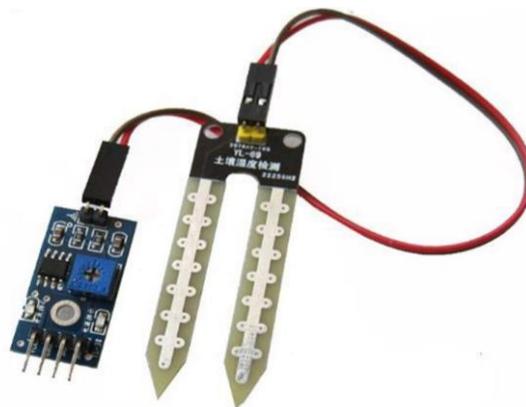
An ultrasonic sensor is a transducer which has both transmitter and receiver within it. Firstly, the transmitter present in the sensor emits ultrasonic sound waves into the surroundings. When, their is an obstacle present infront of the sensor then the emitted waves bounces back and the receiver receives these reflected waves and detects the presence of an object. This principle is followed to detect an object within a room. The time taken to receive the reflected waves by the transmitter plays crucial part in detecting the object.



### 3) Moisture Sensor

Capacitance is used by the Soil Moisture Sensor to determine the dielectric permittivity of the surrounding material. Dielectric permittivity in soil is a function of water content. The sensor generates a voltage that is proportional to the dielectric permittivity, and thus the soil's water content.

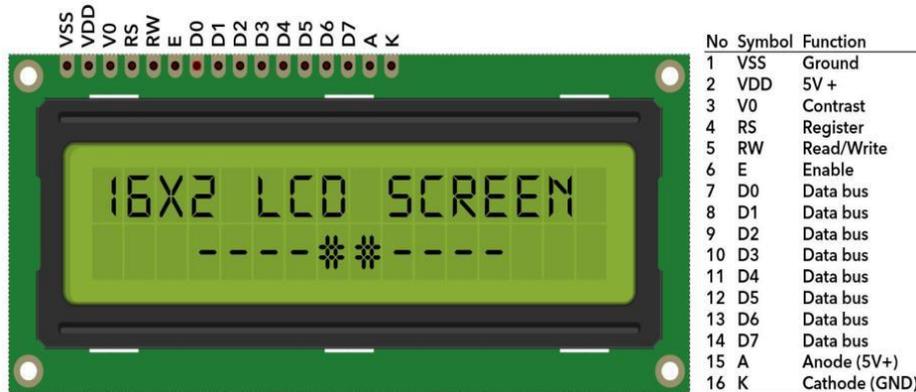
The water content of the sensor is averaged along its whole length. With respect to the flat surface of the sensor, there is a 2 cm zone of influence, however it has little or no sensitivity at the extreme borders. The electromagnetic field lines through a cross-section of the sensor are shown in the diagram above, indicating the 2 cm zone of influence.



### 4) LCD Display

LCD (Liquid Crystal Display) is a form of flat panel display that uses liquid crystals as its primary source of illumination. LEDs are commonly found in cellphones, televisions, computer displays, and instrument panels, and they have a wide range of consumer and business uses. LCDs were a big step ahead from the technology they superseded, such as light-emitting diode (LED) and gas-plasma displays. Compared to cathode ray tube (CRT) technology, LCD technology enables for substantially thinner displays. LCDs consume significantly less

energy than LED and gas-display panels because they block rather than transmit light. The liquid crystals in an LCD employ a backlight to form a picture, whereas an LED emits light.



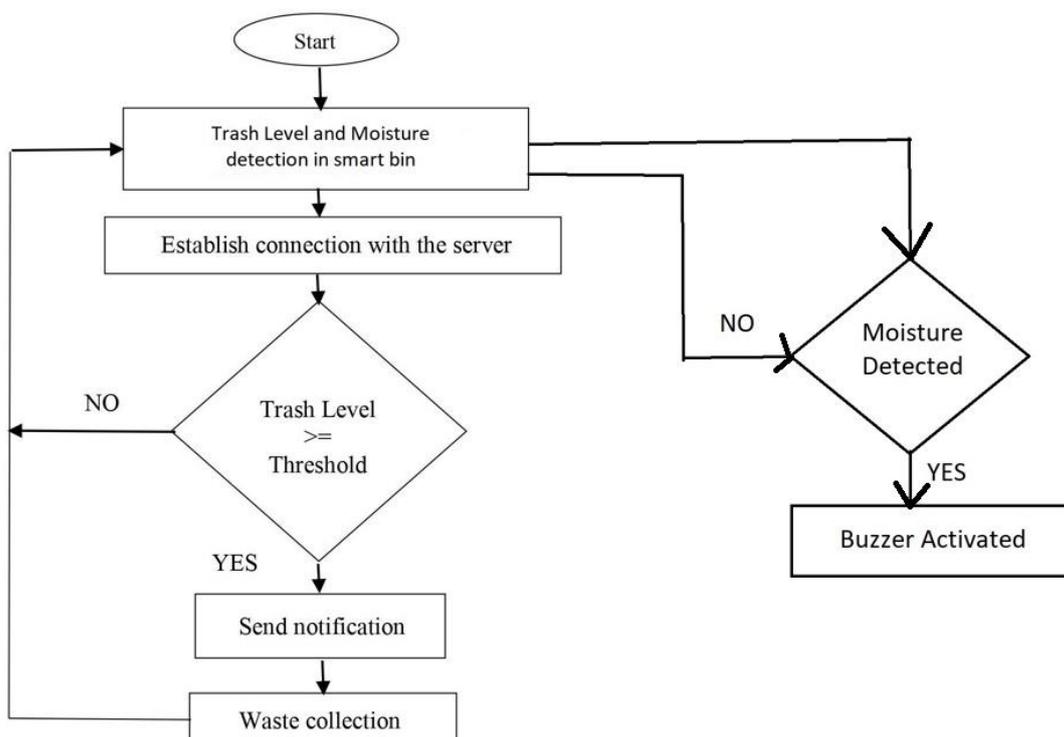
### 5) Tinker Card

Tinkercad is an open-source 3D modelling programme that anyone may use. It is completely free and accessible via the internet. This means that there are no downloads required, and it is available to anybody with an internet connection. Tinkercad consists of three primary components that can be used as a versatile learning tool for schools and anybody interested in 3D design, visual code blocks, or electronics. People just starting started with 3D printing should have a basic understanding of how it works because it has entered nearly every business on a professional level.

Even school-aged youngsters are taught how to use Tinkercad to learn about 3D printing. Tinkercad can be used to start a project by making small, basic prints to learn the skills. Visual code blocks in Tinkercad can be used to create custom shapes and designs using visual programming. In this portion of the system, users can edit the code blocks for each shape to get exactly what they need. It's one of the simpler options since when the user has adjusted the codes, all they have to do is click "Run" to see if they worked or go back in and make the necessary changes. The majority of the forms are pre-made, making them quick and easy to fill out.

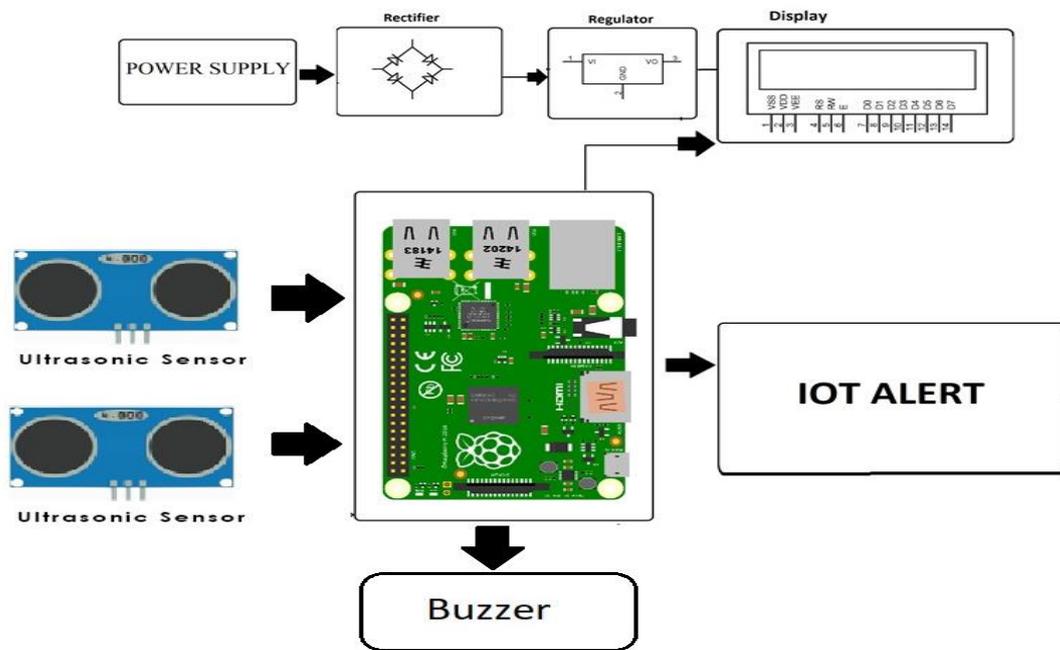
## IV. IMPLEMENTATION

### FLOWCHART:



**ARCHITECTURE OF CIRCUIT:**

This programme is being used in rural and urban areas with large and small areas to identify the state of dustbins without having to manually inspect them. For small locations, this type of configuration requires only one WeMOS D1 mini and two ultrasonic sensors connected to it. A breadboard, connecting cables, a tiny USB cable, and a laptop are also used.



**MODULE DESCRIPTION:**

a) Dustbin level detection

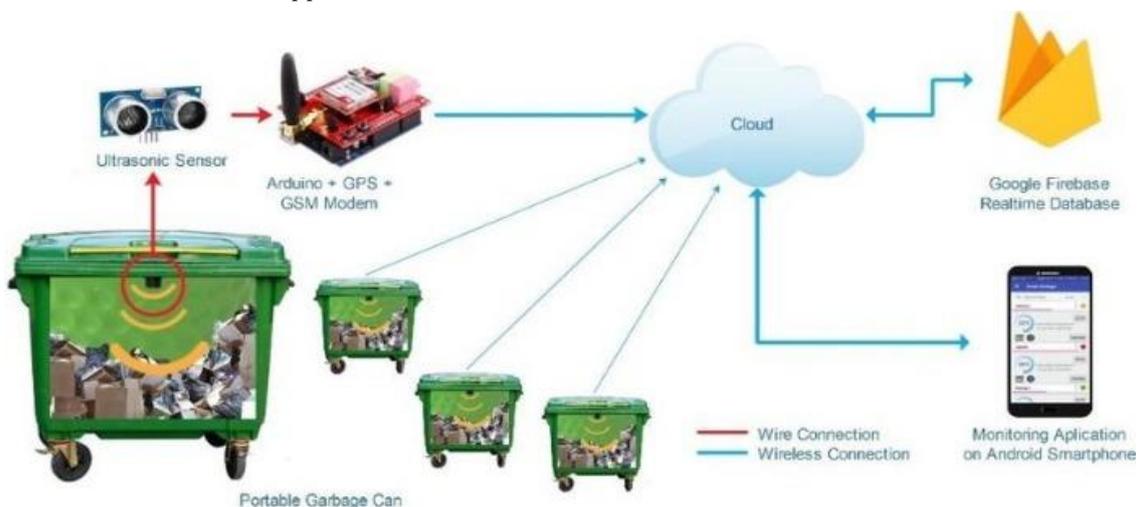
We demonstrate a smart waste bin that detects when the garbage bin is full using a cloud IoT-based technology. Using an ultrasonic sensor, we can determine the volume occupied and left in the smart rubbish bin. Ultrasonic distance measuring sensors provide information on the absolute position of a target or moving item. For shiny surfaces, translucent items, or environments with high levels of dust and humidity, ultrasonic procedures are often the only alternative to mechanical probing.

b) Garbage collection

This approach uses a moisture sensor to distinguish between dry and wet waste. The cap will open if the sensor detects dry waste.

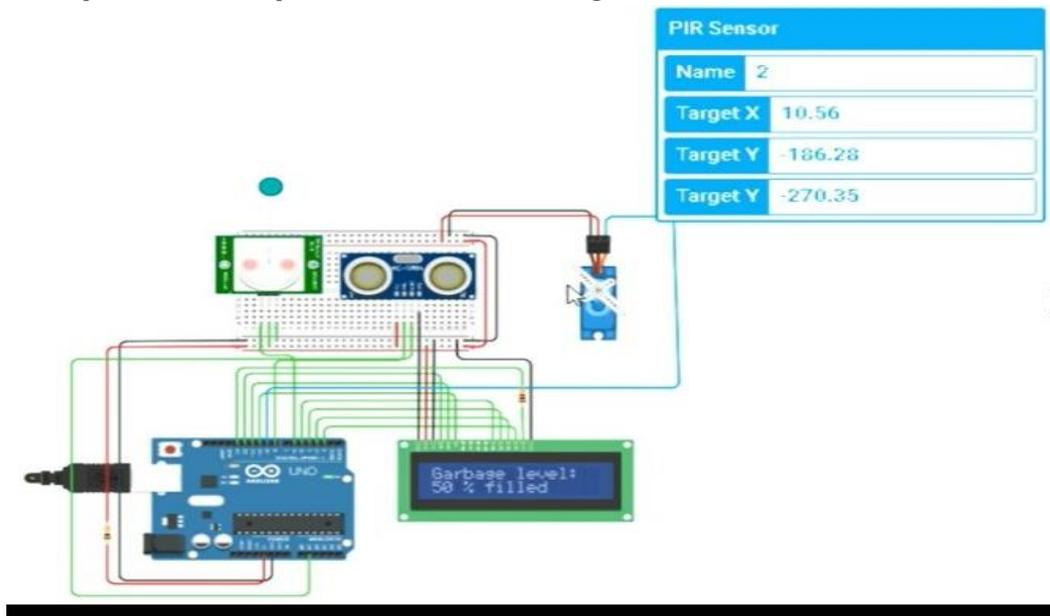
c) Web application

We'll send a notice to the web application whenever the dustbin is full.



### V. WORKING

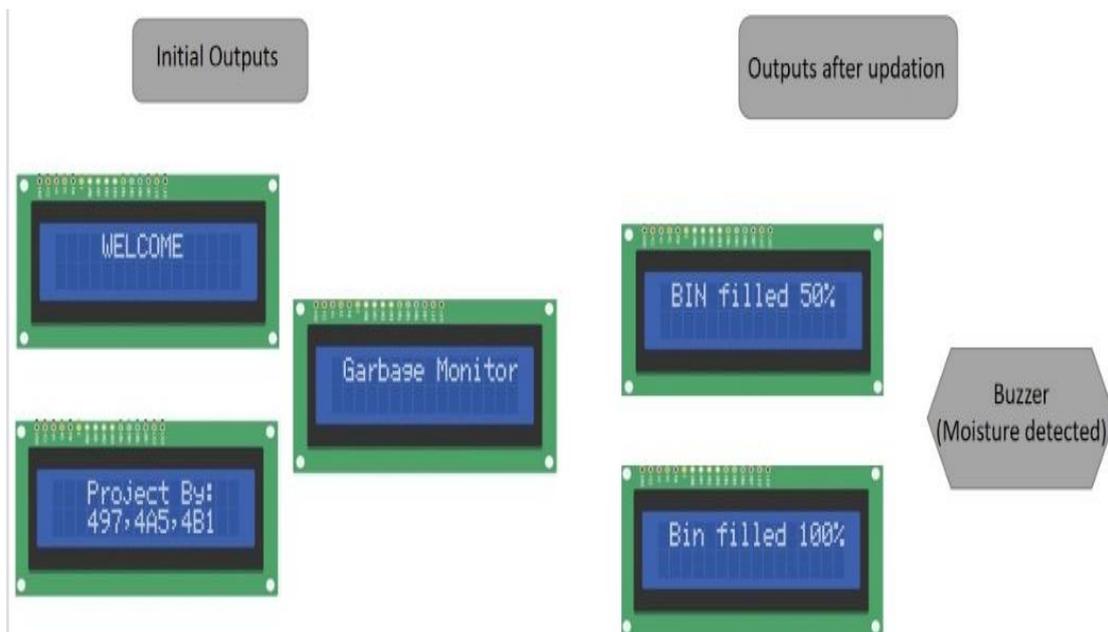
- After wiring and connecting all of the devices and connecting them to the Smart Dustbin, check all of the necessary configuration to see if anything is missing.
- The next step is to submit/upload code in Arduino and power up the circuit when the connection has been established. When the system is turned on, Arduino keeps an eye out for anything that comes within a certain range of the sensor.
- When an Ultrasonic sensor detects an item, such as a hand or another, Arduino evaluates its distance and if it is less than a predefined value, the servo motor is activated at first.
- The lid will open for a certain period of time before closing on its own.



### VI. RESULTS AND DISCUSSION

#### OUTPUT:

Outputs are displayed on lcd screen. Initial outputs are obtained based in the user input statements in the code. Now after the execution, the outputs are obtained based on the brim level of the bin which helps to send the message to the server to collect the garbage if the bin is 100% filled. This prevents overflow of garbage.



**ADVANTAGES:**

Following are the advantages of using Smart dustbin:

- Up to an 80% decrease in the number of garbage pickups required, resulting in reduced personnel, pollution, fuel use, and traffic congestion.
- A decrease in the number of trash cans required.
- Keep the environment clean (i.e. Over flow of waste and unpleasant smell is prevented).
- It will bring the advancement of technology in terms of cleanliness

**DISADVANTAGES:**

Following are the disadvantages of smart garbage monitoring system:

- The method necessitates a higher number of rubbish containers for separate waste collection in proportion to the city's population. As a result, the initial cost is high.
- The memory size of the sensor nodes utilised in the dust bins will be restricted.
- Because it is an autonomous system, no human intervention is required, resulting in job loss.

## VII. CONCLUSION

We're going to make some modifications here that will lead to a cleaner environment. Smart dustbins are superior to ordinary garbage cans due to their mix of sophisticated waste monitoring and trash compaction technology. It includes smart devices such as sensors and Arduinos, among other things. When an object approaches the dustbin, the lid will automatically open, and it will close after a specified amount of time. It will benefit societal health and cleanliness, and it will benefit business since we are attempting to make it inexpensive to as many people as possible. So that everyone may benefit from it, from the poor to the wealthy. This, I believe, will bring about some changes in terms of cleanliness and technology. As a result, our next task will be to install another sensor that will detect whether or not our dustbin is full. There will also be a display so that the user can see if the trash is full or not.

The internet is rapidly spreading around the world, and it has the potential to digitise many elements of daily life. The project's goal is to teach people about the internet and how to use it so that they can help make their village smarter by giving features like smart rubbish collection, digital water supply, and intensity-controlled street lighting, among other things. Using both classic and modern procedures, the rubbish collected may be transformed into compost. The smart waste warning system proposed design is highly adaptable and can be readily implemented in more populated areas such as airports, train stations, bus stops, retail malls, workplaces. The government can set up recycling centres and determine the profit that will be made.

## VIII. REFERENCES

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