SMART GARBAGE SYSTEM

Shilpa Lambor, Chinmayee Sawakare, Arvind Shelke, Srushti Shevate, Siddhant Deshpande, Snehankit Khandare

Department of Artificial Intelligence and Data science ,

Vishwakarma Institute of Technology, Pune, Maharashtra 411037, INDIA

Abstract: The paper presents a smart dustbin that will aid in keeping our surroundings clean while also being environmentally friendly. As an Indian citizen, it becomes imperative to support the Clean India Movement. Swachh Bharat Mission has motivated us. Technology is becoming smarter by the day, if dustbins are not properly kept, they can contribute to an unpleasant atmosphere and pollute, both of which are harmful to human health. Hence a smart dustbin with an intelligent dustbin management system is proposed.

Index Terms - Arduino Uno, Ultrasonic Sensor, Garbage Management, Smart Dustbin, IOT

I. INTRODUCTION

Today, diverse urban areas are expanding all over the world, and as these urban areas develop, the population density of the area increases as well. As a result of the rise in population, the possibilities of an unsanitary environment increase as the volume of rubbish and waste products increases. The problem with today's society, particularly in India, is that most individuals lack a feeling of responsibility, and many people in our society lie around surrounded by rubbish. Pollution rises because of the filthy rubbish containers, which is detrimental for the environment. This gives the city an extremely unappealing appearance, which contributes to air pollution and the spread of infectious diseases. Bacteria and viruses can be spread via dustbin contamination, which might cause life-threatening conditions for humans. To overcome this kind of situation, this project is designed, which mainly aims at the hygienic condition and cleanliness of any society [1].

Everything is moving in the direction of smart technology for the good of humans. With the use of technology, it will bring about significant changes in terms of cleanliness. It is an IoT-based initiative that will deliver a variety of benefits and cleanliness in a new and innovative way. We're utilizing an Arduino IDE for code execution, and an ultrasonic sensor for detecting, which will open the lid and wait for a few moments. As it is a sensor-based dustbin, it is simple to reach and operate for people of all ages. It will provide real-time information on the dustbin's level. When the dustbin is full, it will quickly send a notice using the app. This system has a low cost. The resources are easily accessible.

Our goal is also to make it affordable so that many people may benefit from it. It should also be accessible to anybody and beneficial to them. Because the smart trash can is also exciting, it's entertaining for kids, therefore it'll help them learn preserve the cleanliness of our house.

II. RESEARCH METHODOLOGY

A Smart Waste Bin for Smart Waste Management proposed by [2], the system in this study is made up of sensors that measure the weight of waste and the level of rubbish in the bin. For short-range communication, Bluetooth is linked. The researchers [3] suggests the method for garbage management which is as follows. In this paper, an Arduino UNO is used to monitor the amount of waste in the dustbin and sends an alarm to the municipal web server when the bin is full. With the use of an RFID Tag, the driver acknowledges the work of discarding the rubbish after cleaning the dustbin. RFID is a computing technology that is used for verification, and in addition, it improves the smart garbage alert system by automatically identifying rubbish filled in the dustbin and sending the status of clean-up to the server, confirming that the work has been completed. The following is a strategy for waste management suggested by the researchers [4]. The system in this paper uses an Arduino Uno board, an LCD screen, and a GSM modem to send data. A 12V transformer provides electricity to the system. The LCD panel shows the status of the rubbish collection in the bins. GSM is designed to show the user the status whereas SMS is used to monitor it. The text in the SMS refers to all garbage cans. The rubbish level is displayed on the LCD screen. The device uses an Arduino board to continuously monitor waste on an LCD screen. The following is a strategy for waste management suggested by the researchers [5]. In this paper, the garbage bin was connected to a microcontroller-based system with an IR wireless system that communicated with a primary central system that displayed the waste bin's current condition. Using Wi-Fi, the status was seen on a mobile web browser with an html page. To save money, they employed a weight sensor in this system, and to broadcast and receive data, they used a Wi-Fi module on the sender's side. Finally, the weight sensor detects only the weight of rubbish in the bin, not the amount of waste. Twinkle Sinha, Mugesh

Kumar, Saisharan proposed Smart Dustbins can prevent the accumulation of the garbage along the roadside to a great extent thereby controlling the widespread of many diseases. It can prevent pollution and also prevent the consumption of the spread-out garbage by the street animals. This Smart Dustbin can contribute a lot towards a clean and hygienic environment in building a smart city [6]. Swati Sharma*1 & Sarabjit Singh proposed a smart dustbin management system using IoT as a hardware and ionic framework as our software ensures the cleaning of dustbins soon when the garbage level reaches its maximum. If the dustbin is not cleaned in a specific time, then the record is sent to the higher authority, in our case the admin who can take appropriate action against the concerned employee. This system also shows the use of PIR sensor, IR sensor and APR module. When some motion is detected by the PIR sensor it opens the gate of the Waste dustbin using the servo motor and when the PIR detects the motion APR module gives the information fed into it for a minimum of 30 sec. For our lucrative part that is shoe polish we have used IR sensor and to rotate the brush we have used the DC motor.[7]

The increased amounts of garbage have invoked the need for proper waste management. One of the solutions to this may be Smart dustbin. The level of waste can be detected by the sensor. Arduino UNO monitors the amount of waste, and the authorities are made aware about the situation of the dustbin. The amount of time taken to empty the dustbin is studied and accordingly steps are taken to fasten the process.

III Theoretical framework

This Paper proposes a novel garbage collection method to dispose of waste. With the aid of these sensors, authorities may obtain information on overflowing bins. With the information provided by the sensor, authorities can quickly discover the overflowing bin and crush it as soon as possible. The localites don't have to take charge about emptying the dustbin from time to time, if there are any complaints and grievances can be reported on the app. The bin level will be visible for the localites and the respective authorities through Thingspeak API.

The hardware requirements for the project are Node MCU, dustbin, ultrasonic sensor. Along with hardware, the software requirements are Arduino IDE.

A. Block Diagram
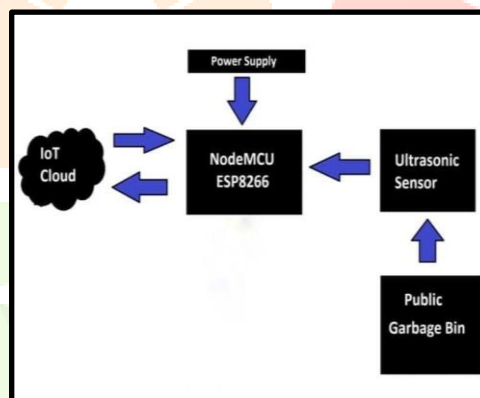
The Node MCU is connected with an ultrasonic sensor and IOT cloud along with a power supply.

B. Working

This project smart waste dustbin is a cutting-edge technology that will aid in the clean-up of cities. This device keeps an eye on the garbage cans and reports on the amount of waste that has been collected. The system detects the garbage level and compares it to the depth of the garbage containers using ultrasonic sensors positioned over the bins. The NodeMCU receives the functional program. The trash level is detected using an ultrasonic sensor, which sends signals to the NodeMCU. The received signal is processed by the Arduino and then sent to the ESP8266.
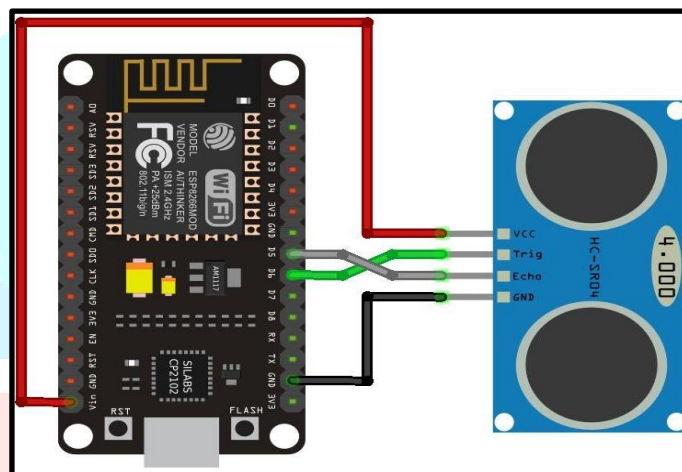
In our system, the ESP8266 is a Wi-Fi module (node MCU) that also serves as a transmitter. The ESP8266 plays a critical role in lowering the system's hardware requirements.
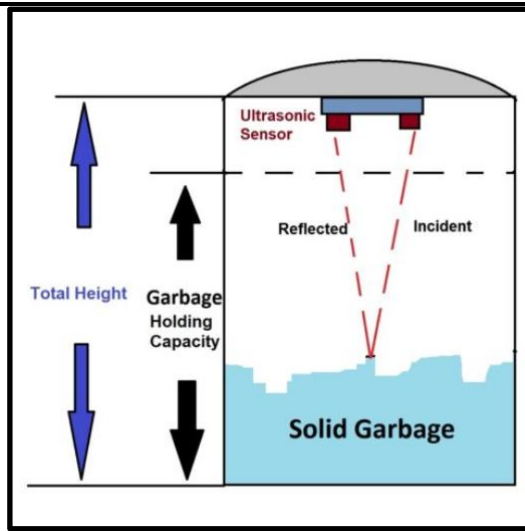
Working of a smart dustbin.
The Node MCU is connected with an ultrasonic sensor and IOT
cloud along with a power supply.

D.Circuit Diagram

Here the pin D6 is connected to Trigger , Then the echo Pin is connected to pin D5,
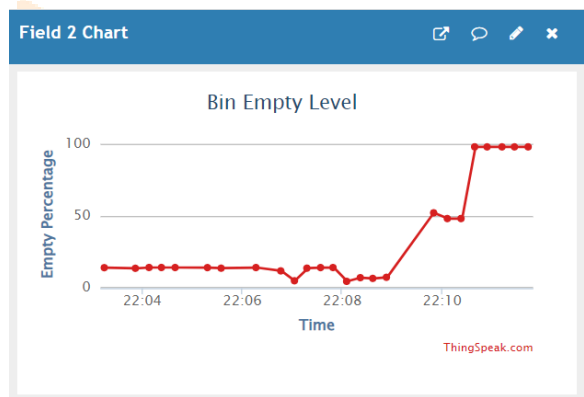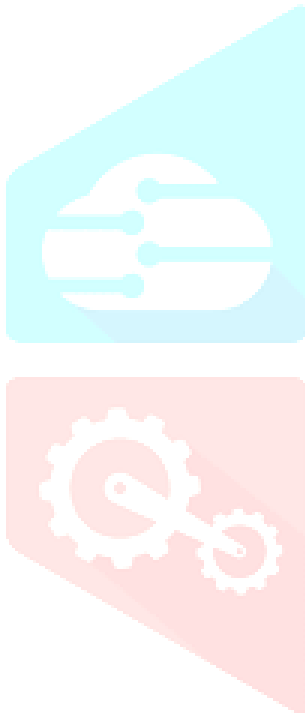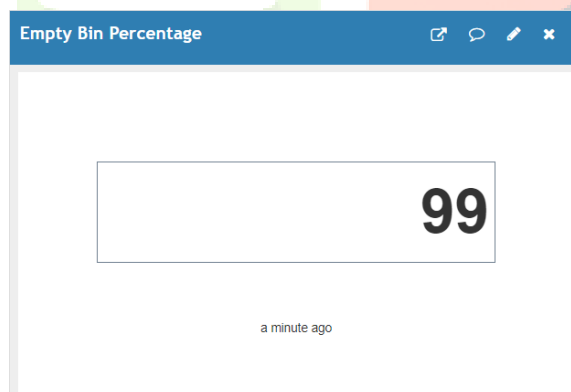Vcc is connected to Vin.

E.Images

Smart Dustbin

Ultrasonic sensor mounted on the dustbin

IV. RESULTS AND DISCUSSION

Fig1.ThingSpeak Bin Empty Chart

Fig2. Empty Bin Percentage On ThingSpeak

Fig3. ThingSpeak Dashboard

Fig 1 shows the chart available on the ThingSpeak website.The bin empty percentage data is shared to the website using the ThingSpeak API.The graph shows the Bin Empty percentage before and after collecting the garbage.Before collecting the garbage from the bin, the empty bin percentage is below 30% , meaning that only 30 % of the bin space is free. After collecting the garbage from the bin , the percentage again goes back up to 99% . Fig 2 shows the field on the ThingSpeak dashboard where the empty bin percentage is shown in numerical form.

V.Conclusion

When these smart trash cans are built, different aspects such as endurance, scalability, damage prevention, and maintenance difficulties are addressed. This Smart Dustbin can help establish a smart city by contributing to a clean and hygienic environment. However, because the technology is relatively new in India, adequate public awareness should be generated before it is utilized on a big scale. Otherwise, users' rough actions may cause sensitive electronics such as sensors to be destroyed. In the future, solar panels can be used as power supply. Waterproof circuit design can be implemented to protect it from wet waste.

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