

SMART DUSTBIN WITH GARBAGE MONITORING SYSTEM

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ABSTRACT—The increase in population also increases the level of garbage around urban areas. Here, we've created a smart trash can with sensor-based circuitry that runs automatically to address the problem. Normally we have a dustbin that needs to be opened by the person by pressing the foot against its lever to throw the garbage in the bin and also the person needs to track the dustbin when it gets full so that it can be emptied easily and reduced the overflow of the dustbin here we propose a smart dustbin which done the work by itself. Our project consists of a sensor to detect objects or a foot tap of a person so that it opens and closes the lid of the dustbin automatically. The trashcan also includes a level sensing ultrasonic sensor, which detects when the bin is about to fill up automatically as well as continuously measures the level of rubbish within. The bin is of huge use in houses, offices, and even in public places. Thus we get a fully automated smart bin that allows automated garbage cleaning.

Index Terms—level sensing Detection, Overflow Detection, ultrasonic sensor, servo motor, and ESP8266

I.INTRODUCTION

In this society, technology is improving nowadays. The population has increased. Till now, we are using the dustbin manually which means contacting the dustbin to open the lid or feet against the lever of the dustbin. And there is also an overflow of garbage. Regarding this there are many diseases spreading day by day and causing pollution, So, for this situation, if we develop a smart dustbin with a garbage monitoring system, it will be a great use for preventing disease and avoiding an unhygienic environment.

In the recent 10 years, urbanization is increasing the proportion of people living in towns and cities. At the same time, there is a dramatic increase in the production of waste. Mainly, our garbage collection system should be smarter. Additionally, people need an easy and comfortable to disposing point.

Also, the process of garbage collection has to be efficient in terms of time, cost, and fuel. In the present situation, the garbage that is collected in India is mostly manually i.e., the workers need to go to the location where the dustbin is located to collect the garbages which is dropped by the citizens.

In our developing stage, all are becoming smarter and automated at a fast rate. For eg. smart homes, rails, and airways with the use of information technology. However, In smart cities, we should need to improve the collection of garbage and disposal. This will reduce the wastage around the street and will never mess up with unwanted overflow

wastage. When everything is automated India will be the cleanest country better than in the past decades.

II. LITERATURE SURVEY

Smart dustbin management using IOT and Blynk application [1]: The main objective of the smart dustbin used is to create a hygienic society and will make the management of waste easier. In features, they have used maps to locate the dustbins which makes the authority to reach the location easier. To overcome this issue, this module is designed. This smart dustbin is built on an Arduino Uno board and is interfaced with GSM, GPRS, and sensors. The threshold levels are already set. This alert system is triggered by the sensors of the GSM modem. IOT-based smart dustbin monitoring with tracking system using Atmega 2560 microcontroller [2]: The main concept is to monitor and track garbage present in our ambiance. In addition, they have added IoT based cloud platform for real-time. When it reaches the end level of garbage it gets an alert and it is directly sent to the municipal corporation through the GSM module. If any kind of fire occurs in the garbage the bin will get an alert through the buzzer. Smart waste Collection monitoring System using IOT[3]: This process is a smart and fast approach to waste management dustbin with sensors and a microcontroller in a city which is monitored by a central control unit to speed up the process in the intelligent and smart way there by eliminating such current sluggish system. This project has been done in covid-19 pandemic situation. It is very useful to monitor and decompose medical waste properly. IoT-enabled dustbin [4]: The IoT enables dustbin these bins, to use RFID tags for tracking the wastes linked with a web-based online system, and according to the weight of garbage added, the host server calculates the data and updates it in the database. It measures the garbage bin level and updates the status of each dustbin in the municipal community. Design of a convolutional neural network-based smart waste disposal system [5]: Design a smart dustbin that is similar to an automated teller machine(ATM) along with an intelligent embedded system, which has been similar to an automated tell dustbin(ATD). By examining training features, an effective convolutional neural network (CNN) based image classifier is created that is capable of identifying and classifying an object as garbage. In addition, it counts the number and the price value of each object. Internet of Things (IoT) based smart waste bin to track dustbin and public complaint management system [6]: The Internet or net of effects plays an important role in everyone's life human life, work, health, and social zones, which will importantly affect the development of worldwide financial society. The Internet of Things allows

association among gadgets utilizing the web with the capacity to accumulate and trade data. The recent specification in advance led to an increase in carbon footprint.

Smart garbage and waste collection bin using IOT[7]: This system is to maintain garbage dustbins because of overloaded garbage. To avoid all situations they have implemented a project which is known as IoT Base smart garbage and waste collection bin using IoT. The Internet of Things (IoT) may seamlessly integrate a wide range of various and heterogeneous end systems. They are providing access to a select subset of data for the development of digital services. Smart garbage management system [8]: This project is designed from existing dustbins and the populations. This consists of major three modules which are the sensor module, the communication module, and the analysis and monitoring module; Sensor module is used to sense the garbage level and is connected to the Arduino board, and the Communication module is used to communicate the Bluetooth between the sensors and Arduino Uno board, Analysis, and Monitoring module are used to collect information and send it to admin analysis. Smart dustbin using LoRa and Tensorflow network [9]: With effective detectors inserted in the system to perform real-time observation and enable more effective waste management, the outdated waste management system is updated. The LoRa communication protocol is used to transmit data. The purpose of this project is to develop a deep learning model based on TensorFlow and the LoRa communication protocol for a smart waste management system. While LoRa gives device information, TensorFlow does real-time object recognition and classification. While LoRa gives device information, TensorFlow does real-time object recognition and classification. For garbage sorting, the bin is divided into a number of sections, including divisions for metal, plastic, paper, and general waste, all of which are run by servo motors. Using a trained object identification model and the TensorFlow framework, object. Waste Management of Residential Society using Machine Learning and IoT Approach [10]: The monitoring of several trash cans situated in distinct residential societies is the focus of this research. Dustbins come with sensors that keep an eye on their capacity, metal content, and hazardous gas content. In order to regulate society's waste, the accuracy of alarm signals sent to third parties is tested using machine learning classification techniques such as SVM, NB, RF, DT, and KNN. Also, the findings imply that the RF algorithm generated the most precise projections of the alert message. The RF algorithm's accuracy is 85.29%. This study's overall effect is to improve green technology by lowering pollution in smart cities.

III. EXSISTING SYSTEM

Overflow of garbage leads to the spread of diseases among all human beings and living things. Overflow of garbage leads to inconvenience for all living beings to travel, which leads to unhygienic human life. Addressing these types of issues requires individual responsibility and a collective effort from governments and society.

To stop the overflow of garbage there should be some kind of awareness that should be indicated to government

corporations and common people and there should be some sort of rules that people should not put their garbage waste after a certain level. This technology sends an alert if the garbage level leads to a certain level and it prevents from overflow of garbage.

IV. PROPOSED SYSTEM

The proposed system stands out from the existing system by employing a unique combination of sensors for monitoring garbage dustbins. We have used an Ultrasonic sensor, servo motor, NodeMCU, and Liquid Crystal Display (LCD). The use of such things leads to maintaining the overflow of garbage. It doesn't spread diseases in the environment.

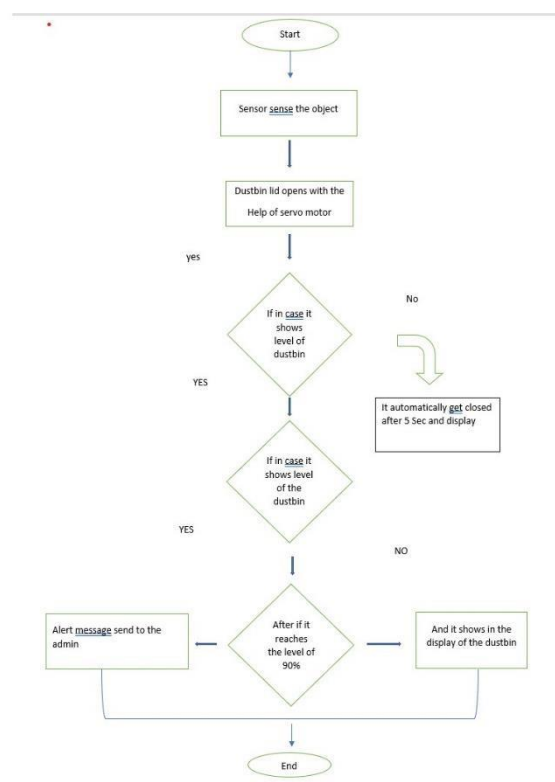


Fig. 1. Proposed Flowchart of Garbage Monitoring

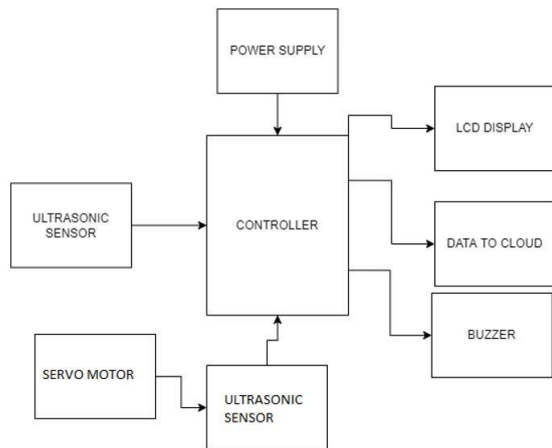


Fig 2: proposed block diagram of Smart Dustbin

A. LEVEL SENSING DETECTION:

The ultrasonic sensor is used to measure the distance by using ultrasonic waves. Here the ultrasonic sensor calculates the distance from the object(garbage) inside the bin and shows the result in LCD.

B. OBJECT DETECTION:

The ultrasonic sensor detects the object using ultrasonic waves and receives reflected wave from the target which means a range of 5m which automatically opens the lid of the dustbin.

C. STATUS DETECTION:

The result which is measured by the ultrasonic sensor will show in the LCD. If the dustbin is empty, it shows 0% is displayed. If the dustbin is crossed half, it shows 50% is a display. If the dustbin comes near the sensor, it shows 90% is displayed.

V. IMPLEMENTATION

The proposed system utilizes various components, including a NodeMCU, a buzzer, a servomotor, an LCD display, and an ultrasonic sensor. Below are the specifications of these components that are employed in the system's implementation.

A. NODEMCU:

The controller we used in this project is NodeMCU. NodeMCU is a microcontroller with a wifi module. It uses an ESP8266 microcontroller chip. It calculates the object's distance and sends it to the MCU ESP8266. By calculating the object's distance, MCU ESP8266 instructs the servo motor to rotate and open/close the lid.



Fig 3: NodeMCU

B. BUZZER:

A buzzer, often called a sounder, an audio alarm, or an audio indication, is a simple audio device that produces sound in response to an incoming electrical input. Here, We used the buzzer that beeps to indicate that the level of garbage crosses above 90%.



Fig 4: Buzzer

C. SERVOMOTOR:

The dustbin lid can be opened with the aid of a servo motor. This servomotor, which is a rotary actuator or linear actuator that enables precise control of angular or linear position, velocity, and acceleration, is used to open the lid after the waste is detected by an ultrasonic sensor in accordance with the Arduino's programming. A servomotor is a closed-loop servomechanism that regulates its motion and ultimate position using position feedback.



Fig 5: Servomotor

D. LCD DISPLAY:

LCD is also known as a Liquid Crystal Display. Depending on how far away the trash is from the ultrasonic sensor, the LCD display will reveal the status of the waste. The distance has been set in the Arduino coding. These figures show the reading of the garbage from the ultrasonic sensor and the displaying at the LCD display



Fig 6: LCD display

E. ULTRASONIC SENSOR:

An ultrasonic sensor is used to measure the distance of the target (garbage). It is used to detect the object or foot tap of a human so that it opens the lid of the dustbin. And it is used to measure the level of the dustbin so that we can know the status through lcd.



Fig 7: Ultrasonic sensor

VI.RESULT:



Fig 8: Final result part

The Node MCU microcontroller is used as a cloud wifi module. This is accomplished using an ultrasonic sensor and male and servomotor. LCD is used to display the level of the garbage. A buzzer sound is used to notify and alert the admin through the buzzer and it sends a notification message to the admin through the cloud. Everyone can view the cloud page at any time.

VI.CONCLUSION:

It thus emphasizes on the feasibility of the prototype to be put into mass production pertaining to its simplicity in design and low production cost. The Smart Dustbin aims to improve the garbage collection system and its disposal at an appropriate time across the country. The features of VCAD include garbage level sensing, and dynamic mobility will marginally reduce the human efforts required to collect the garbage in comparison to the conventional methods. There are still some shortcomings such as the problem of foul doors, and manual control which restricts the mobility of the dustbin which can be addressed in future versions of the dustbin.

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