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Internet of Things-Based Garbage Disposal System

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ABSTRACT

We use trash cans on a regular basis to gather trash. On the other hand, most trash cans are tiny and covered with a lid. As a result of carelessness, some of the dust and debris fell outside the bin when dropping it. For fear of contamination or unpleasant odours, we may be hesitant to open the top of the trash can. Additionally, no one knows when the bin is full until they lift the lid, which results in a foul odour from organic waste decomposing in the bin and poses a health risk owing to the transmission of viruses and other infectious illnesses. An Internet of Things (IoT) smart trash can is one such option. The IR, Ultrasonic sensor (HC-SR04) and WIFI (Esp8266/IOT module) are components of this project. Part of the project that aids in opening the bin cover is the dc gear motor. The front of the bin has an infrared sensor. Anyone trying to open the bin cap will be detected. Put an ultrasonic sensor (HC-SR04) inside the bin to measure the amount of dust or garbage. When an infrared sensor detects an object approaching the bin, the lid will automatically open. Simultaneously, the LCD will show the estimated bin level as determined by the ultrasonic sensor. An Internet of Things (IoT) server will receive data from infrared and ultrasonic sensors. At the specified intervals, the (ESP8266/IOT) IOT module will send infrared and ultrasonic data to the IOT server. No portion of the bin has to be touched by the user in this case. You may check the level on the LCD to see when the bin is full, and the server will send a signal to empty it only when it is.

. INTRODUCTION

Trash management has become an enormous issue in modern urban areas. It is difficult to work with, pollutes the environment, and has negative effects on human health. Our garbage output has reached unprecedented heights due to the increasing urban population. This calls for innovative and astute solutions to maintain a sanitary and environmentally friendly

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environment. Because of this, the Garbage and Dustbin Management Project was established. Like a beacon of hope, it reveals a fresh approach to dealing with garbage in metropolitan areas.No one on this planet ever gets rid of their trash in anything other than a dustbin. When people need to get rid of trash, the first thing they see is the trash can. A smart trash can is just a regular trash can with some circuitry embedded in it.

components is done for more efficient use of it. Smart Dustbin is integrated with some hardware components such as Arduino, NODEMCU, Servo Motor, Ultrasonic sensor. These components help in opening the lid, on detection of human hand and waste by using IR sensor and also sending the notification in the form of LCD. The code required to perform the above-mentioned operation is dumped in Arduino and NODEMCU.

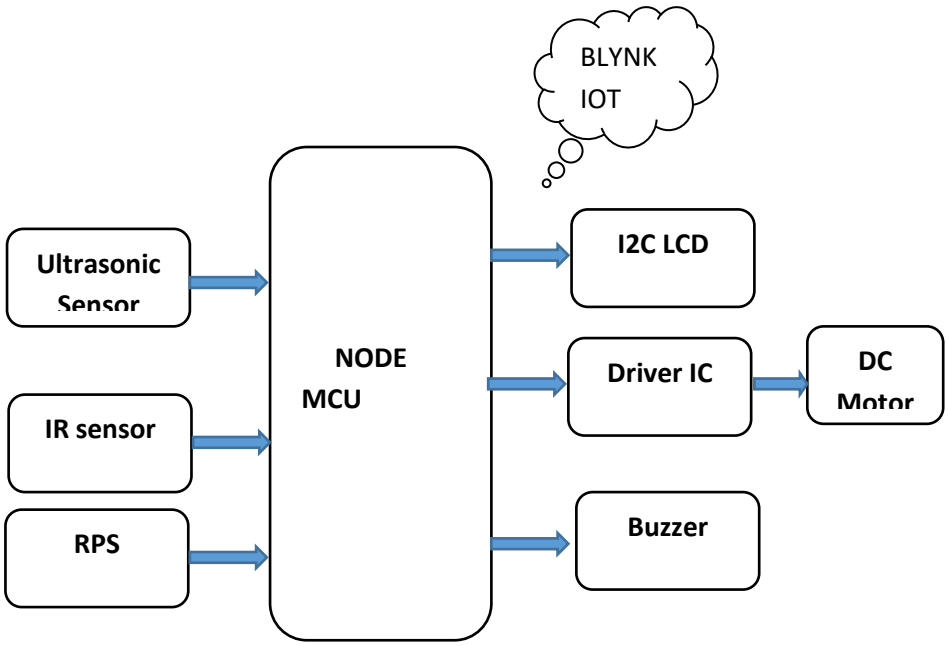

Figure.1 Block diagram

LITERATURE SURVEY

1.**"Design and Implementation of an IoT-based Smart Waste Management System"** by A. Gupta et al. (2020):

This study presents the design and implementation of an IoT-based smart waste management system, including smart dustbin. The authors discuss the integration of various IoT components such as sensors, communication modules, and automation mechanisms to optimize waste collection processes.

They highlight the significance of real-time monitoring, data acquisition, and remote management in improving waste management efficiency and promoting sustainability.

2**. "Smart Waste Management System using IoT**: A Review" by S. Kumar et al. (2019):

This review provides an overview of IoT-based smart waste management systems, with a focus on smart dustbins. The authors examine the key functionalities of smart dustbins, sensor integration, communication protocols, and implementation challenges.

They discuss case studies and potential applications of IoT in optimizing waste collection processes and enhancing environmental sustainability in urban areas.

3. **"Development of Smart Garbage Monitoring System using IoT"** by N. Patel et al. (2018):

In this paper, the authors describe the development of a smart garbage monitoring system using IoT technologies, which includes smart dustbins. They discuss the hardware and software aspects of the smart dustbins, sensor calibration, data acquisition, and wireless communication protocols.

The study evaluates the effectiveness of the system in real-world environments and its potential applications in smart city initiatives.

4. **"IoT-enabled Smart Waste Management System: A Comprehensive Review"** by M. Singh et al. (2021):

This comprehensive review provides insights into IoT-enabled smart waste management systems, focusing on smart dustbins. The authors discuss sensor technologies, data analytics, communication protocols, and implementation challenges.

They highlight the role of smart dustbins in optimizing waste collection processes, reducing operational costs, and promoting sustainability.

PROPOSED SYSTEM

The proposed system aims to address the limitations of the existing waste management system by introducing IoT-based smart dustbins. These smart dustbins are equipped with various sensors, communication modules, and automation mechanisms to enhance efficiency, optimize waste collection processes, and promote sustainability.

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This project includes WIFI (Esp8266/IOT module) and IR, Ultrasonic sensor (HC-SR04). Dc gear motor also part project which helps to open bin cap. IR sensor placed bottom of bin. It can detect to person who wants to open bin cap. Ultrasonic sensor (HC-SR04) placed inside bin to detect dust/waste level.

When some comes near to bin and activate IR sensor then bin cap will open. At the same time Bin level will be estimated by ultrasonic sensor. The information of IR and ultrasonic sensor will be transmitted to IOT server. Whenever bin cap open in that particular time data of IR and ultrasonic will transmitted to IOT server through (ESP8266/IOT) IOT module. Here user can't touch any part of bin. The information in the server will helps to collect bin whenever it filled completely.

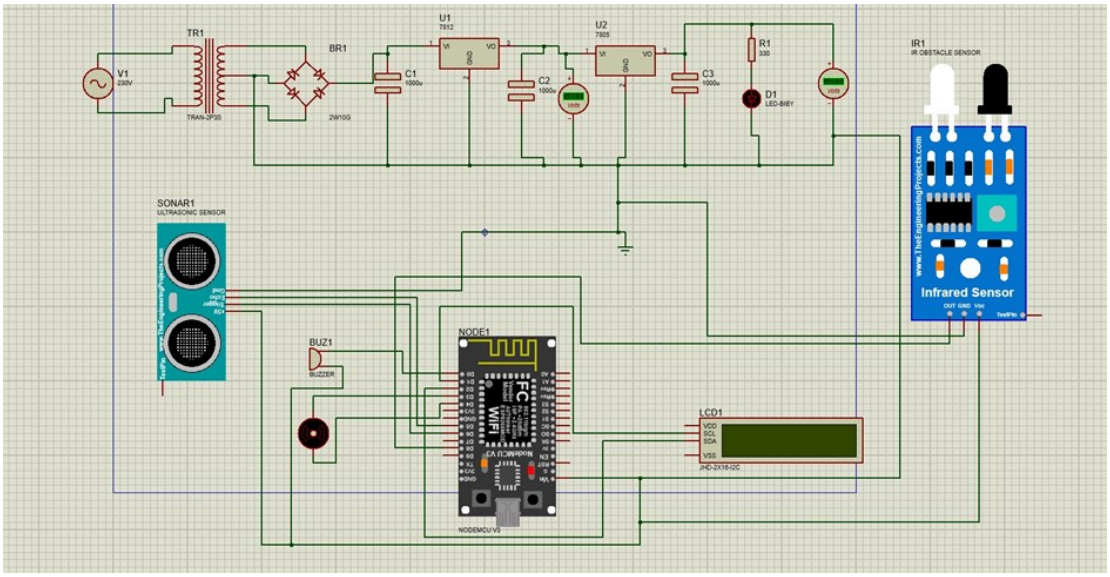

Figure.2 Schematic diagram

RESULTS

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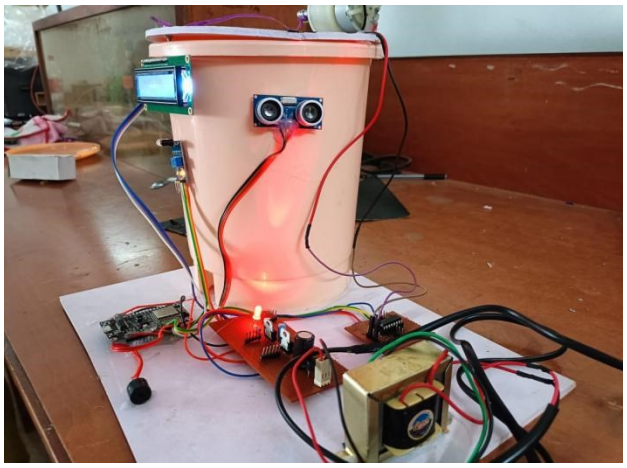

Figure.3 Project setup

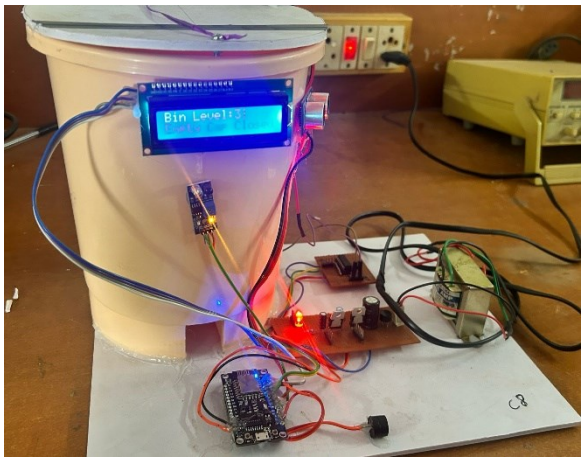

Figure.4 Bin level

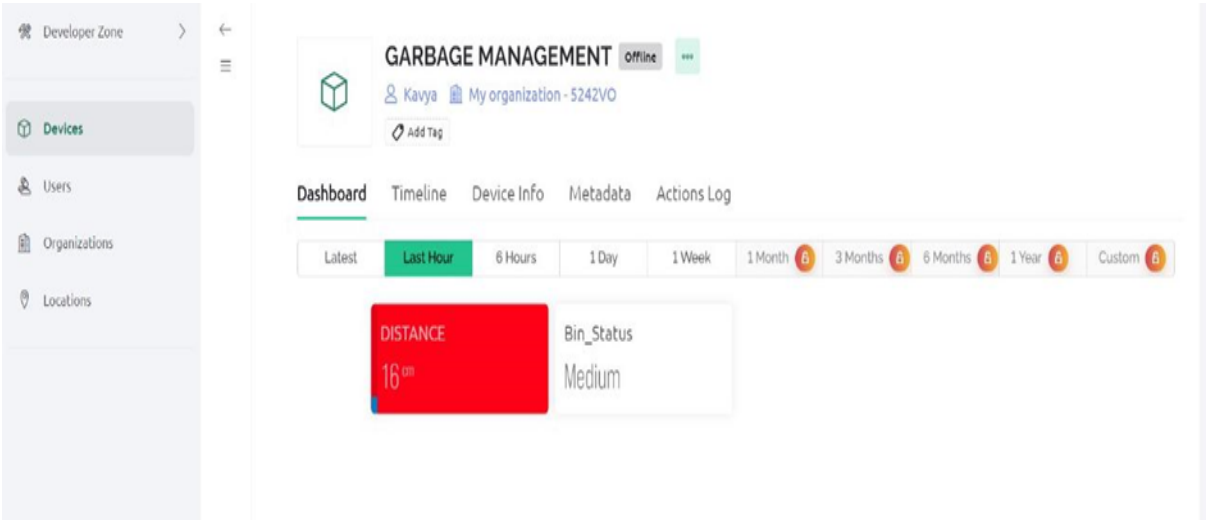

Figure.5 Distance & level of the Bin on Blynk

CONCLUSION

The Garbage Dustbin Management System using IoT has proven to be an efficient and innovative solution for waste management. By integrating IoT technology, this system has significantly improved the monitoring, tracking, and management of garbage dustbins in various locations.

The implementation of sensors and connectivity devices has enabled real-time data collection, allowing authorities and waste management companies to optimize their collection routes and schedules. This has led to reduced operational costs, improved waste disposal, and enhanced cleanliness in public areas.

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Moreover, the use of smart dustbins with IoT technology has encouraged responsible waste disposal among the general public. The system's ability to send alerts and notifications when a bin is about to be full or when it requires maintenance promotes a sense of accountability and awareness among citizens.

FUTURE SCOPE

The future scope of a garbage dustbin management system using IoT (Internet of Things) appears to be quite promising. This innovative technology can significantly improve waste management and contribute to a cleaner and more sustainable environment. Here are some aspects to consider regarding the future potential of this system:

Smart Dustbins: IoT-enabled smart dustbins can be equipped with sensors that monitor the fill-level and send alerts when they need to be emptied. This can help in optimizing waste collection routes and reducing the number of unnecessary trips, thereby lowering operational costs.

Waste Segregation: IoT can facilitate better waste segregation at source by providing users with real-time information on what can be recycled and what cannot. This will encourage people to separate their waste, making the recycling process more efficient.

Data Analytics: The collected data from these smart dustbins can be analyzed to identify patterns in waste generation, which can help in devising effective waste management strategies and policies.

Public Awareness: IoT-based dustbin management systems can be used as an educational tool to raise public awareness about the importance of waste segregation and recycling.

Integration with Other Technologies: The system can be integrated with other IoT devices such as smart bins for organic waste, which can be used for composting, or smart recycling bins that can identify different types of recyclable materials.

Automated Cleaning: In the future, IoT-enabled dustbins could be integrated with robotic arms or other cleaning devices to automatically clean themselves, reducing the need for manual labour.

Carbon Footprint Reduction: By optimizing waste collection routes, reducing unnecessary trips, and promoting recycling, this system can contribute to a reduction in carbon emissions, making it an essential part of a sustainable future.

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