Review Paper on Implementation of Automatic Waste Management System Using IOT & Android for Smart Cities

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***Abstract*— Here, we have suggested an automatic refuse handling mechanism alert system, which uses an ultrasonic sensor functionality in order to track the depth measurement within the bin. The mechanism measures height from the bottom to the dust in the dustbin using a sensor. The Network Environment has implemented a system to manage all waste information. The Garbage Alert system is presented as a solution to these concerns. Internet-of-Things enabled smart cities (IoT). Various forms of rubbish and waste bins can be found across the city in the system. We have proposed one IoT Technology as a possible option for waste management alerts in the system. We need to take some smart measures in order to solve this concern. The Depth measurement mechanism will alert the local government or staff to the garbage problem in various sectors of the city. That dustbins will be connected to a central system and a microcontroller ATSAM3X8E Board additionally an ultrasonic sensor will be there. This shows the present state of the trash. The GUI module, which plays a big role in our project, is critical to its success.**

Index Terms: **smart dustbin, automatic bin, waste management system, IoT, monitoring sensors.**

1.INTRODUCTION

Cities all over the world are striving to become smarter, and we are witnessing a tremendous expansion of smart cities, but as a result of this rapid development, the quantity of waste and rubbish created is rising day by day. Garbage disposal has become a global concern. Because of the authorities' The trash containers are entirely full due to a lack of care and attention. As a result, it is up to us to think about what method we may employ to overcome this. Everything in India's future will be digital and reliant on the internet. The internet has become ingrained in our daily routines. The Internet of Things (IoT) and Cloud Computing are rapidly developing technologies. This is where machine and human communication takes place. The Internet of Things connects the things we use on a daily basis (IoT).

The Internet of Things (IoT) enables devices to sense and govern themselves from a distance. As a result of fast population growth, local administration chaos, a lack of public knowledge, and insufficient funding for programmes, garbage management has now become a global concern. In today's society, Due to a daily increase in trash output, we frequently witness garbage bins or dust bins located in public spots in cities overflowing. It creates a filthy environment for humans, as well as a foul odour in the surrounding region, contributing to the spread of dangerous illnesses and human illness; to prevent this, we propose building a "IoT-based Automatic Garbage Monitoring System."

2.LITERATURE SURVEY

The municipal corporation's community garbage cans are causing a slew of health, environmental, and social problems. This might be due to a variety of factors, including inadequate planning. The positioning of dustbins across the city, as well as the collection method, are both troublesome waste created by the municipal corporation, as well as citizens who are unaware of how to properly utilise dustbins. Various major concerns, such as filthy environments, air pollution, and unhealthy lifestyles,

are producing significant problems. The environment is harming people's health. One application displays the status of the garbage can, while another displays the status of the recycling bin. Garbage pickup vehicles can get to their destination faster if they use the shortest path approach. There is no active system that integrates RFID, GSM, and GIS technologies.

A concerted effort has been made to keep the situation under control. Such garbage exists in an atomized form. Taking all of these important considerations into mind, a smart solid waste management system was developed that would monitor the state of the dustbin and send out an alarm when it is full. The device also has a function that teaches people how to correctly use the trashcan and automatically detects and cleans rubbish outside the dustbin.

We also demonstrate how Machine Learning techniques such as Decision Forest Regression can be applied to the sensor data leveraged by the system to gain useful insights and improve garbage monitoring efficiency, as well as how a network of "intelligent garbage bins" based on a Stack Based Front End strategy to integrating Wireless Sensor Networks with Cloud technology can be implemented.

The essay suggests a smart warning system for rubbish collection that sends a signal to the municipal web server, allowing for speedy dustbin cleaning and accurate rubbish filling level verification. An ultrasonic sensor linked to an Arduino UNO facilitates this procedure by checking the level of rubbish in the dustbin before sending an alarm to the municipal web server. The driver confirms the task of disposing the garbage after cleaning the trash can by using an RFID Tag. RFID is a computer technology that improves the smart waste alert system by automatically recognising garbage deposited in the trash, and validating that the task has been completed by transmitting the status of clean-up to the server. The entire operation is supported by an integrated module that uses RF technology. An RFID client badge is used to verify the user's identity. The Rfid contextualises the Identity card and assigns a unique ID to the user. The bin opens instantly once the id is identified, and allows a user to discard the wastage. [3]. A Microcontroller board and program are used to communicate the sensor bin to the desktop. In addition, the plot depends on the total of food waste produced. On an LCD panel, the user's id and the percentage of organic waste are presented.[3]

One of the most difficult issues in the Smart City is garbage collection. To optimise the trash collection logistic technique, we use our own genetic algorithm implementation. The proposed method allows for the calculation of more efficient garbage-truck routes. As a consequence, we give a series of simulations centred on the stated topic. All of our methodologies are integrated into an open source simulation framework that may be updated in the future.

The environment must become cleaner and more hygienic as the world's population expands. In most areas, overflowing garbage cans create an unclean environment. Various illnesses will then arise as a result of this. As a result, the level of living will decline. A smart waste collection system that is both efficient and effective must be designed to meet these concerns. Effective ways are becoming more easily available as the Internet of Things (IoT) expands in scope. To evaluate waste levels, the proposed garbage collection system uses data from trash cans in a metropolitan area. Sensor data is sent to a server through the Internet, where it is stored and processed.

In one of the proposed methods, waste segregation is done using bins of different colours. This method in which blue and green bins are placed together for segregating the waste has its own advantages and disadvantages due to maintenance issues.

The smart dustbin method makes use of electronic segments like Arduino, NodeMCU, ultrasonic sensors, Servo Motor etc. This is a more efficient and effective approach than other methods since it sends a message via WiFi technology and the garbage lid closes on its own and opens when a biological movement and garbage are detected. In this method, hygiene is also maintained because there is no need to touch the lid or the dustbin to dump the waste into it.

S.No.	Year	Authors	Title	Methodology

1.	2019	W. A. L. Gayanthika, G. K. C. D. Maduranga, A. I. S. Silva, S. D. H. S. Wikramarathne, R. M. I. S. Ranasinghe	Efficient Waste with an Intelligent Trash Can	Use of RFID tag to validate the ID of the user and open the lid of the dustbin. If indeed the trashcan is overflowing, send an sms to the administration.
2.	2016	Meghana K C and K R Nataraj	Automated Garbage building Green Infrastructure iot	Used IR sensor to sense the garbage level when it reaches the threshold. Location of the bin, date and current time are obtained.
3.	2015	Suyog Gupta and Dr. Pradeep Kumar	A Case Study of Kanpur City's IOT-Based Intelligent Bin for Smart Cities Real-Time Planning and Forecasting Strategy for Trash	Used RFID systems along with GSM networks to collect data and generate reports about solid waste collection.
4.	2020	Ms. Akhila Joseph, Ms. Anjali, Ms. Suhaila B.M and Mr. Mahesh B.L	Implementing Intelligent Bins in Transport Systems	The refuse collectors were fixed along an ultrasonic sensor that collected garbage level data and uploaded it to the main server.
5.	2015	Narayan Sharma, Nirman Singha and Tanmoy Dutta	Implementing Intelligent Bins in Transport Systems	Text messages indicating the levels were sent to the central office and the updated values of the dustbin level are taken to form the real time report.
6.	2013.	Lilliana Abarca Guerrero, Ger Maas, William Hogland	Municipalities in emerging economies have a number of sewerage difficulties.	Information was collected about the solid waste management system and segregation of waste
7.	2020	Telugu Maddileti , Harish Kurakula	Iot Based Smart Dustbin	Smart Dustbin was created using ultrasonic sensors, Arduino, NodeMCU that opens the lid, when a biological hand is found, and when garbage is detected and also sends the notification in the form of LED
8.	2015	K. Vidyasagar, M. Sumalatha, K. Swathi and M. Rambabu	Refuse Picking Robotics in an Environmentally Atmosphere using RFID Connection	A mobile robot was created using IR sensors, RFID technology to collect the waste materials from a particular table.
9.	2016.	Vishesh Kumar Kurre	Internet - of - things Intelligent Trash Collection Container Defendant and the plaintiff Warning	Use Raspberry Pi,ARM Microcontroller to absorb content from trash bin, process the data and finally share mail/message with Municipal Corporation.
10.	2021	Srinivasan P, Thiyaneswaran B, Jaya Priya P, Dharani B, and Kiruthiga V	Smarter Trash cans Leveraging Wifi.	Such as a sensor and a node that senses and transmits the waste level in the trash can, and sent it onto such a webpage if the trash can is 70% full.

3. METHODOLOGY

Automatic Waste Management System is an Internet of Things (IoT) project. We're using an ultrasonic sensor to open the lid and wait for a few seconds, and we're utilising an Arduino for code execution. With the use of technology, it will bring about significant improvements in terms of cleanliness. With clever technology, everything is improving for the good of humans. As a result, using technology to keep the environment clean is beneficial. Because It's an arduino-based garbage can controller that's simple to have and accessible for adults of all backgrounds. Our goal is also to make it affordable so that a large

number of people may benefit from it. It should also be accessible to anybody and beneficial to them.

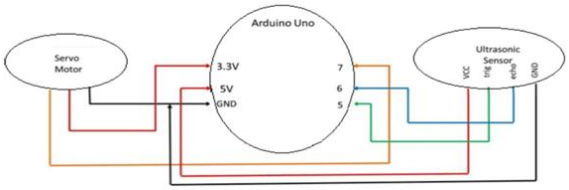

Fig. 3.1 Circuit Diagram for Implementation of Automatic Waste Management

System

We are going to use an arduino and in that arduino the embedded code will be triggered as soon as the people come in front of it. The distance is pre calculated by the developers. After waving/raising the hand in front of the dustbin, it responds and the dustbin lid will automatically open. So that the person can drop off the garbage into the bin and go back without touching anything. As the dustbin lid will close automatically after the person leaves the place from there. One more additional functionality is that if the Dustbin fills up in the next 1 week, then the embedded code of the arduino will again be triggered and one notification will be directly sent to the team who manages all this information.

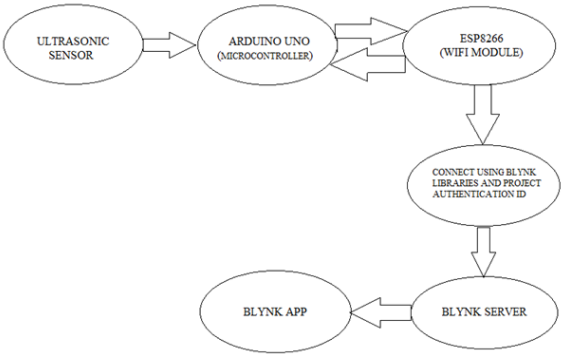

Fig. 3.3 Proposed Model- Architecture Diagram

The working of the automatic waste management system starts when we place the waste in front of the ultrasonic sensor which detects the waste and opens the lid of the dustbin. In this fashion, the wastewater is discharged into the trash can, and the process is repeated until the dustbin is empty. The NodeMCU has been connected to the WiFi Hotspot using the SSID and password.

By using NodeMCU Network connection is given to the system. The ultrasonic sensor computes the waste level of the dustbin and reports it to the Blynk App by indicating with the help of LEDs. Now this LED indicates that the waste in the dustbin is full and the dustbin is to be emptied. There will be use of different LEDs on the Blynk App for indicating the rise of the level of waste inside the dustbin which is calculated because of the decreasing distance between the waste and the ultrasonic sensor. The main advantage of using this system is that we can get real time notifications about the level of the dustbin on mobile with the help of WiFi. This will be very useful for maintaining the cleanliness of the surroundings because it will prevent the littering of waste in the surroundings after the dustbin becomes full.

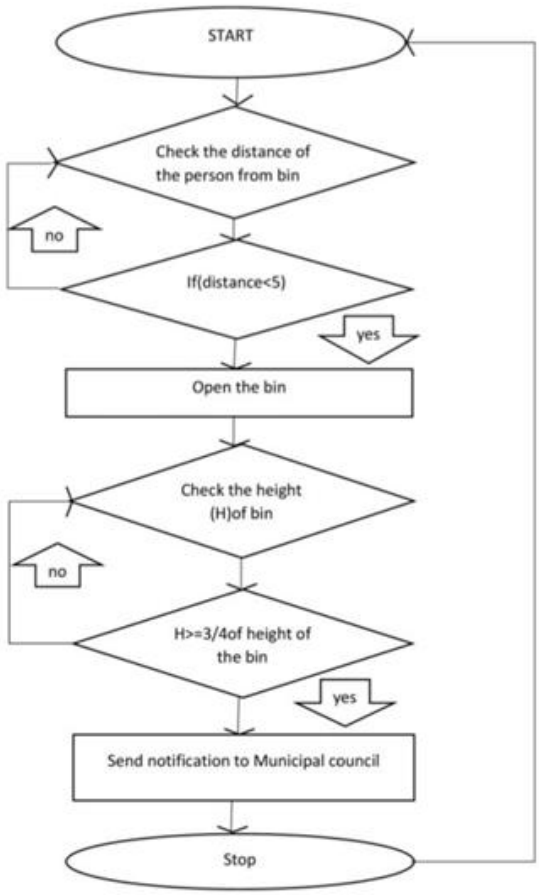

Fig. 3.4 Working of the Automatic Waste Management System

4. RESULTS

Here is where Smart Dustbin, a simple yet useful Arduino project, was born. With this project, the trashcan lid will open and close automatically, and the Wifi Module will be incorporated as well. As a

result, the buzzer will be engaged at that moment, and a message will be sent to the data management team.

In the programme known as Blynk IOT, we can even see real-time data.

The current model has an ultrasonic sensor that opens the trash route when a person approaches. The distance is pre-calculated by the Developers. To meet the smart dustbin's maximal yet precise criteria, an ultrasonic sensor and a load-cell are used. Additionally, the Wi-Fi and Bluetooth modules allow users to engage with and attract other users. As the safety of the city has been a major issue in recent years, radioactive sensing allows for the identification of any type of radioactive or toxic chemical. With the widespread usage of smartphones, web technology has shown to be user-friendly for people of all ages.

5. CONCLUSION

Because ineffective waste management is due to a lack of methodology to categorise waste and collect it on an effective time schedule, the system designed will influence people to categorise their waste on their own, and the municipal council will be able to collect it on a proper schedule with the notifications they receive from the smart dustbins when they are about to fill and overflow, because ineffective waste management is due to a lack of methodology to categorise waste and collect it on an effective time schedule, because ineffective waste management is The waste collection is no longer a concern for the municipal government. The local government can sell most garbage categories since the collected garbage volumes at municipal waste collection centres may be appraised by those recycling businesses. Furthermore, the government may implement this system to address a variety of issues, including trash classification, collection, disposal, and recycling.

6. FUTURE INSIGHTS

The technology used here is both user-friendly and environmentally beneficial, as it runs entirely on solar energy. It will be simpler to attract users, allowing the cleaning objective to be successfully completed. These trash cans can stop a lot of terrorist strikes. The only thing that distinguishes this paradigm is that it places equal emphasis on user and goal achievement. We can also interface different ID proof links other than Aadhar Card in the future, minimise reaction time, develop water-resistant circuit and body design, and build a Human Machine Interface employing a controller and sophisticated Nuclear detector.

The global smart trash bin market was valued at USD 266.51 million in 2020, will increase to USD 301.55 million in 2021, and will rise at a CAGR of 13.48 percent to USD 569.33 million by 2026. The research includes market sizing and Forecasts for the US dollar, euro, British pound, Japanese yen, and Australian dollar.

7. ACKNOWLEDGEMENT

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