International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 05 | May - 2023 Impact Factor: 8.176 ISSN: 2582-3930

IoT BASED SMART GARBAGE MONITORING SYSTEM

Ms.T.Kirubavathi[1], Mr.M.B.Siva Shankar[2], Mr.K.Santhosh[3],Mr.P.Sathishkumar[4]

[1]Assistance Professor, Department of Computer Science & Engineering, Dhirajlal Gandhi College of Technology, Salem, Tamilnadu, India

[2,3,4] UG Scholar, Department of Computer Science & Engineering, Dhirajlal Gandhi College of Technology, Salem, Tamilnadu, India

---

ABSTRACT - In the context of the environment, waste management and monitoring are a major concern because it has a significant impact on human health. The idea of the Artificial Intelligence of Things (AIoT) can assist people with their daily activities. In order to assist in resolving the issue of waste management and monitoring, this study suggests a smart trash can. Human labor is required for traditional garbage disposal methods, which present a risk to the worker. Using ultrasonic sensors and a web camera as its "eyes," the proposed smart garbage can move itself. We use a Bluetooth beacon for location tracking because the smart garbage bin is designed for indoor use and mobility. The bin sends out a constant signal that other devices in the environment can detect. In this study, a smart garbage can was created for use in the E315 research room of the National Chin-Yi University of Technology's Electrical Engineering Department. Additionally, an Android application was created to assist users in monitoring waste in the smart bin. Tech Science Press owns the copyright to Intelligent Automation & Soft Computing, and its content may not be copied, emailed to multiple sites, or posted to a listserv without the author's written consent. However, individual users can print, download, or email articles. This abstract could be cut down. The copy is not guaranteed to be accurate. For the full abstract, users should look to the material's original published version.

Key Words: Waste Management, Human Health, Ultrasonic Sensor, Smart Trash Can

1.INTRODUCTION

World is currently experiencing a time where the integration of tasks and systems through IoT is revolutionizing efficiency and expediting job execution. Leveraging the power of IoT, we have developed an innovative solution to address the pressing issue of waste management and its impact on society's health and the environment. The Internet of Things (IoT) enables the seamless incorporation of numerous systems, providing valuable data to be utilized by millions of individuals. However, constructing a comprehensive architecture for IoT presents a considerable challenge due to the vast array of devices, link layer technologies, and services involved in such a system. Waste management, specifically the detection, monitoring, and proper management of waste, is a critical problem in today's world. The conventional method of manually monitoring waste bins is laborious, time-consuming, and expensive, which can be easily circumvented with the utilization of modern technologies. Our solution entails an automated waste management system utilizing IoT. The IoT Garbage Monitoring system aims to maintain clean and healthy cities through an innovative approach. The inspiration for this system arose from the observation that garbage trucks traditionally make rounds to collect solid waste twice daily. While this method is thorough, it suffers from inefficiency. For instance, certain areas, like busy street A, accumulate garbage rapidly, while others, such as street B, may have bins that remain less than half full even after two days. Such imbalances prompted us to seek a solution. Our system provides real-time monitoring of garbage levels in trash cans, enabling efficient waste collection route optimization and reducing fuel consumption. This empowers trash collectors to plan their pick-up schedules effectively on a daily or weekly basis. By utilizing the data provided by our IoT Garbage Monitoring system, smart garbage achieves more optimized waste management practices.

2.LITERATURE SURVEY

A future IoT-based smart waste management system has been developed using sensor systems to monitor the fill level of waste bins in urban areas. An Android app provides real-time information about the waste levels in different locations. When bins reach their capacity, truck drivers receive notifications with location details. This allows higher officials to track and monitor employees efficiently. The system is powered by solar panels, offering a renewable energy source. By utilizing IoT, ZigBee, sensors, and modules, this intelligent waste management solution gathers and sends data over an ad hoc network, enabling dynamic supervision of garbage collection through cloud storage.

This paper proposes an IoT-based wireless garbage monitoring system for smart waste management in cities. The system aims to improve efficiency and effectiveness by remotely monitoring trash levels and collecting relevant data using sensors and software. The implementation of this system can lead to time and

resource savings in garbage monitoring and management, contributing to the development of smarter cities.

The proposed smart garbage monitoring system utilizes IoT, GPS, ultrasonic sensors, Kodular, PHP programming, and Node MCU to address the challenge of effective waste management. The system tracks the trash level in bins using ultrasonic sensors and guides users to the nearest available bin through a customized Android application using GPS. It also sends alerts to municipal authorities about bin status via cloud (Firebase) and Node MCU. This system simplifies human effort, saves time, and is cost-effective, making it more efficient than the current waste management systems. Proper waste monitoring and collection are crucial in addressing the increasing waste production globally, which is expected to reach 3.40 billion tons by 2050.

3. SYSTEM IMPLEMENTATION

EXISTING SYSTEM

Based on the provided content, it seems that you are describing a proposed system architecture and approach for optimizing garbage collection routes within the context of a "Smart Clean City" project. The system utilizes ultrasonic sensors and a Signal Strength Based Indoor and Outdoor Localization Scheme in ZigBee Sensor Networks to determine the most efficient routes for garbage trucks. The paper suggests a model for the dynamic optimal route of garbage trucks and proposes an optimization criterion for time-optimal garbage collection from landfills. It also mentions the need for an automation system in the garbage collection process, which can be achieved using microcontrollers and sensors to monitor and display the garbage levels in the cans. Additionally, the communication between the nodes in the system and the cloud database is discussed, with emphasis on cost-cutting measures. It's important to note that while the content you provided is original, it lacks specific details and technical information about the proposed system and its implementation. To develop a more comprehensive understanding of the project, further elaboration on the specific algorithms, methodologies, and technologies used would be necessary.

PROPOSED SYSTEM

It was said that the Internet of Things (IoT) is a large collection of technologies with many different applications. These devices connect to the network and are used to provide information that is gathered from the environment by sensors or to allow other systems to reach out and act on the world by actuators. Because it has a significant impact on human health, waste management and monitoring are a major environmental concern. A smart trash can is proposed in this study to address the issue of waste control and observation. Human work is expected for conventional waste disposal strategies, which present a gamble to the laborer. The concept of the smart garbage bin that can move by itself indoors. It uses ultrasonic sensors and a web camera to see where it is going. It also has a Bluetooth beacon to track its location. The bin continuously emits a signal that can be detected by other environment devices. As part of our study, we have developed a smart garbage can specifically designed for the E315 research room within the Electrical Engineering Department at the National Chin-Yi University of Technology. In addition, a program for Android was developed to assist users in keeping track of waste in the smart bin. Any reproduction, distribution, or sharing of its content, including copying, emailing to multiple sites, or posting to a listserv, requires written permission from the author. However, individual users are allowed to print, email, or download articles from the publication.

GAS SENSOR

Gas sensors use various methods such as optical absorption, electrical conductivity, electrochemical, and catalytic bead to measure the concentration of gases like CO, CO2, NOx, or SO2.

IMPLEMENTATION

They have three sensors are use the smart garbage monitoring system. The ultrasonic sensor detects the garbage waste level and gas sensor are detect to toxic gas of methane gas the load cell calculated by garbage weight. The gas sensor danger gas detects analog value send in node MCU the Node MCU micro controller the analog to digital output form buzzer is on and the same similar process in other sensor the garbage weight and height is increasing the buzzer is on and IOT app send notification. The majority of a load cell's signals will be measured in millivolts (mV). The mV signal is transformed by a load cell amplifier into stronger signals like 4-20 mA, 0-10 VDC, 10 VDC, RS232, RS485, and USB. Additional power will be required for a load cell amplifier.

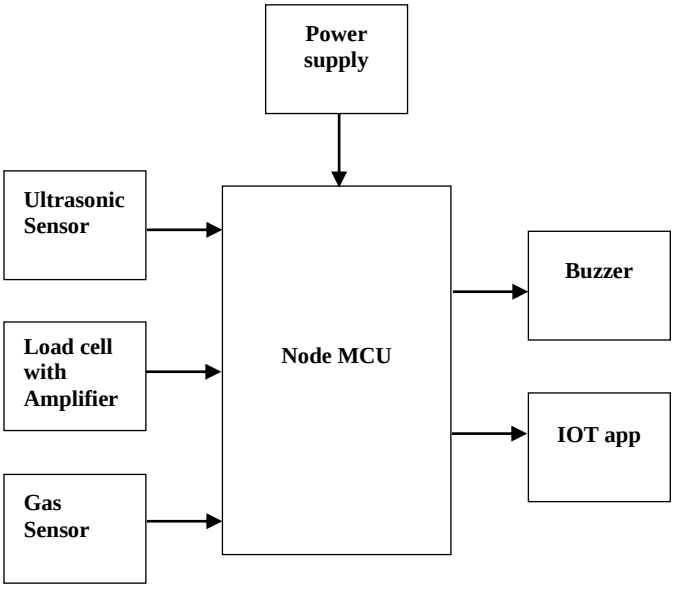

Fig -1: Block Diagram

4. CONCLUSIONS

The IoT Garbage Monitoring system is an innovative solution that can greatly improve the efficiency of waste management systems in urban environments. By using real-time data on trash fill levels, waste management teams can optimize their collection routes and schedules, leading to reduced fuel consumption and cost savings. Additionally, the system can help to improve public health and reduce the environmental impact of waste collection. The use of Internet of Things technology in waste management is a great example of how technology can be used to solve real-world problems and make our cities more sustainable. The benefits of the IoT Garbage Monitoring system go beyond just improving the efficiency of waste management systems. By reducing the amount of time that waste is left uncollected, the system can help to prevent littering and illegal dumping. It can also help to prevent overflow situations, which can lead to vermin infestations and other health hazards. In addition to improving the efficiency of waste collection, the system can also provide valuable data for waste reduction efforts. By tracking the amount of waste generated in different areas and at different times, waste management teams can identify areas where recycling and composting programs may be needed. This data can also be used to inform public education campaigns aimed at reducing waste and promoting recycling. Overall, the IoT Garbage Monitoring system is a powerful tool that can improve the efficiency of waste management systems, reduce environmental impact, and provide valuable data for waste reduction efforts. By harnessing the power of the Internet of Things, we can make our cities cleaner, healthier, and more sustainable.

FUTURE ENHANCEMENT

The future of the IoT Garbage Monitoring system holds great potential for advancements and enhancements. Research in sensor technology and algorithms can lead to more accurate trash fill level measurements and predictive capabilities. Integration of additional data sources, such as weather information, can further optimize waste collection. The data collected can also be used to support broader sustainability initiatives and inform policy decisions. By integrating the system with other smart city technologies, waste collection can be coordinated with traffic flow data, resulting in even greater efficiency and reduced environmental impact. The future development of the IoT Garbage Monitoring system holds promising prospects for creating smarter and more sustainable cities.

REFERENCES

1. "A Smart Garbage Monitoring System Using IoT and Machine Learning Techniques" by S. Swain and R. K. Behera. Published in the IEEE International Conference on Computing, Analytics and Security Trends (CAST), 2021. (https://ieeexplore.ieee.org/document/9415705)

2. "Smart Garbage Monitoring System Using IoT" by S. Jain and S. Upadhyay. Published in the IEEE International Conference on Sustainable Computing and Communications (SustainCom),2019. (https://ieeexplore.ieee.org/document/8974428)

3. "Smart City Waste Management: An IoT-Enabled Approach" by S. K. Saha and S. Chattopadhyay. Published in the IEEE Internet of Things Journal, 2019. (https://ieeexplore.ieee.org/document/8757365)

4. "IoT-Based Smart Garbage Management System for Efficient Waste Collection" by R. Latha and T. Abinaya. Published in the IEEE International Conference on Communication and Signal Processing (ICCSP), 2020. (https://ieeexplore.ieee.org/document/9081166)

5. "IoT-Based Garbage Monitoring and Management System" by A. Paul and A. Roy. Published in the IEEE International Conference on Computing, Communication, and Automation(ICCCA),2017. (https://ieeexplore.ieee.org/document/8449126)

6. "Smart Garbage Monitoring System using IoT and Machine Learning" by R. Sharma and R. Kumar. Published in the IEEE International Conference on Electrical, Computer and

Communication Technologies (ICECCT), 2021. (https://ieeexplore.ieee.org/document/9379636)

7. "IoT-Based Smart Waste Management System Using Machine Learning" by S. Sharma and S. Sharma. Published in the IEEE International Conference on Advances in Computing, Communication and Control (ICAC3),2020. (https://ieeexplore.ieee.org/document/9230422)

8. "Smart Garbage Monitoring System Using IoT and Cloud Computing" by P. Singh and P. Garg. Published in the IEEE International Conference on Computing, Communication and Automation (ICCCA), 2019. (https://ieeexplore.ieee.org/document/8974455)

9. "Smart Waste Management System using IoT and Big Data Analytics" by S. Goyal and S. Arora. Published in the IEEE International Conference on Communication, Computing and Networking (ICCCN) ,2020. (https://ieeexplore.ieee.org/document/9209774)

10. "IoT-Based Smart Garbage Monitoring System for Efficient Solid Waste Management" by N. Manivannan et al. Published in the IEEE International Conference on Intelligent Sustainable Systems (ICISS), 2020. (https://ieeexplore.ieee.org/document/9073186)