Research Exhibition in Mathematics and Computer Sciences (REMACS 6.0)/
ISBN: 978-629-97440-5-4

SMART GARBAGE BIN MONITORING SYSTEM

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ABSTRACT - The increasing student population in our country has given rise to a corresponding increase in waste generation within educational institutions, including UiTM Perlis. This surge in waste poses a significant challenge, as inadequate waste management can lead to detrimental consequences, such as the emission of air pollutants that pose health risks. Additionally, the accumulation of overflowing garbage serves as a breeding ground for flies, which can transmit various diseases, including food poisoning, dysentery, and cholera. To address these waste management challenges in UiTM Perlis, this research proposes the implementation of a Smart Garbage Bin Monitoring System. The primary objective is to develop a sophisticated prototype system that incorporates humidity, ultrasonic, and GPS sensors to effectively monitor and locate garbage bins. With the aid of a mobile application called Blynk, users will have access to comprehensive data on garbage levels and bin locations. The functionality test, prototype system test, usability test, and network performance test conducted for this project have yielded positive results, indicating the system's efficacy. However, there is still potential for further enhancement and refinement. Future researchers are recommended to consider incorporating additional sensors and implementing mechanisms to gather user feedback, thereby optimizing the system's performance and addressing any potential shortcomings.

Keywords: Internet of Things, Arduino, Ultrasonic Sensor, Humidity Sensor, Blynk

1. INTRODUCTION

Over the past few years, the population of students in this country is increasing rapidly. Due to that, the amount of waste in the campus is also increasing. A Research that was conducted in University Putra Malaysia for three weeks regarding the analysis of municipal solid waste found that the average of waste in the cafe area only is 325.75 kg (Abd Hamid et al., 2018). Thus, waste management is very crucial and can lead to many consequences if it is not handled smartly. In Universiti Teknologi MARA (UiTM) Perlis, there is no cutting-edge, organized and systematic system to monitor and collect the garbage. Monitoring the garbage bin is crucial in order to maximize management, resources and cost (Thapar, 2022). It is also important because it can reduce workforce to deal with the collection of garbage. Therefore, the existing system is not systematic and will lead to many drawbacks. In this project, a smart garbage bin monitoring system will aid them minimize these problems and all the drawbacks from occurring.

2. METHODOLOGY

The Smart Garbage Bin Monitoring System comprises six stages: initiation, planning, development, evaluation, analysis, and documentation. Experimental data were gathered to test the readings of the ultrasonic sensor and humidity sensor. Following that, multiple variables were employed in various scenarios to assess the capabilities of the ESP8266 Wireless module, including different distances and types of connections. These performance and functionality tests were conducted multiple times to ensure the prototype's functionality.

3. RESULTS AND DISCUSSION

The testing process has revealed that the smart garbage bin monitoring system functions effectively, with all components operating as intended. The research results focused on evaluating the functionality test, system prototype test, usability test and network performance test. The IoT components were utilized to their fullest capacity, as demonstrated by the functionality and network testing procedures. Ultimately, following extensive testing, the prototype has proven to enhance farmers' job performance and operates successfully.

4. NOVELTY OF RESEARCH / PRODUCT

This project presents a novel research/product that combines the Blynk app with a smart garbage bin monitoring system. By integrating various sensors and network communication capabilities, the system provides real-time updates on the garbage bin's fill level. This allows for timely notifications to be sent to users, ensuring efficient waste management and preventing overflow issues. This project presents a novel research/product that combines the Blynk app with a smart garbage bin monitoring system. By integrating various sensors and network communication capabilities, the system provides real-time updates on the garbage bin's fill level. This allows for timely notifications to be sent to users, ensuring efficient waste management and preventing overflow issues.

5. CONCLUSION

As the conclusion, the project has successfully completed and the objectives of the project are also achieved. This technology improves air quality and also reduces health risks. It will also let the waste management municipalities to constantly monitor the garbage bin status. Future researchers should enhance monitoring by adding sensors for detailed garbage bin data and implement user feedback mechanisms.

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