

The Smart Waste Management System

Abstract

The Smart Waste Management System revolutionizes conventional waste collection methods by integrating Internet of Things (IoT) technology to create an efficient and intelligent waste management infrastructure in urban environments. This system is designed to address challenges associated with timely waste collection, route optimization, and resource efficiency within municipal areas.

Introduction

The Smart Waste Management System revolutionizes traditional waste collection methods by incorporating Internet of Things (IoT) technology to create an intelligent and efficient waste management infrastructure. This system is designed to address the challenges associated with timely waste collection, route optimization, and resource efficiency in urban environments.

Group members

65107690 Waraporn Prawat
65119810 Siwakorn Leeham
65132185 Kewalin Savatadul

Methodology

1. Hardware Setup :

Mount the ESP32 microcontroller onto the Protoboard and connect it to the infrared distance sensor to establish proper communication.

2. ThingSpeak Configuration :

Create a ThingSpeak account and set up a Channel to store data received from the ESP32. Configure the ESP32 with the API Key for data transmission to ThingSpeak.

3. ESP32 Programming :

Write a program using Arduino IDE to enable the ESP32 to collect data from the infrared distance sensors and send it to the designated ThingSpeak Channel.

4. Web Dashboard Development :

Utilize HTML, CSS, JavaScript, and Bootstrap to construct a user-friendly web Dashboard capable of fetching and displaying data from the ThingSpeak Channel.

5. Testing :

Conduct thorough testing to ensure the system functions correctly, including sensor functionality, data transmission, and Dashboard display.

6. Enhancement and Optimization :

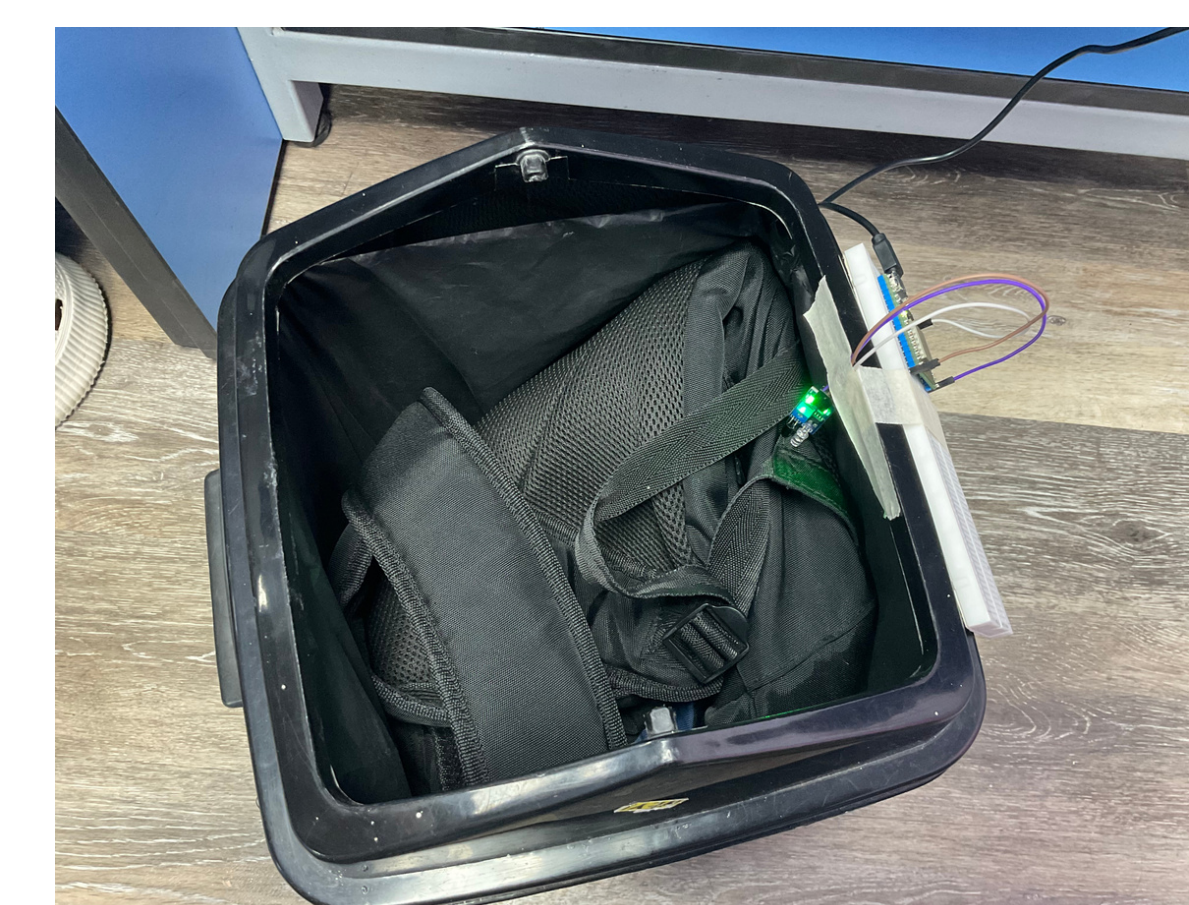
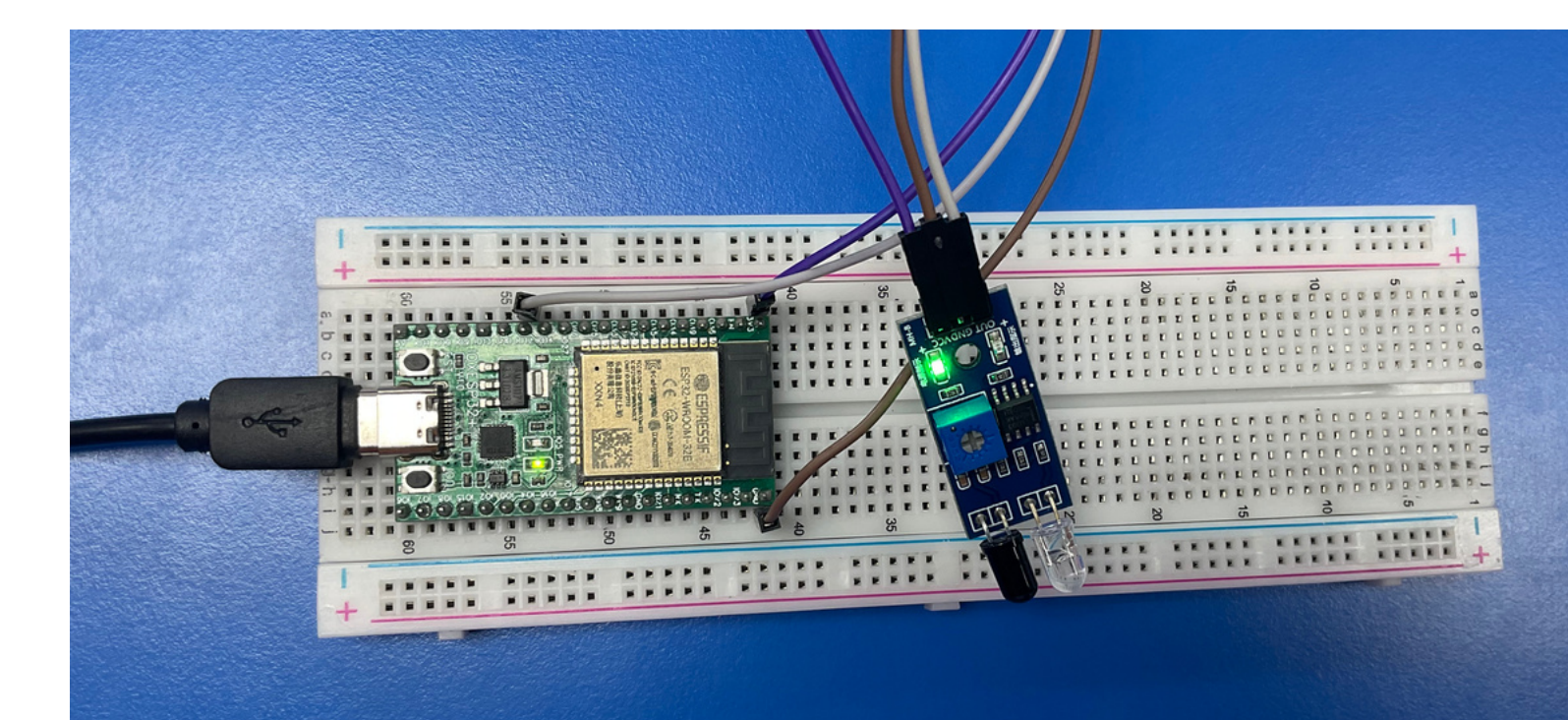
Make necessary improvements based on testing results and project requirements to enhance system performance and reliability.

7. Monitoring and Maintenance :

Continuously monitor the system to ensure proper operation and address any issues that arise, ensuring long-term efficiency.

Results

Throughout the project, our team encountered various challenges and obstacles related to sensor operation and programming complexity. Despite these challenges, we successfully implemented the ESP32 and Infrared distance sensors to collect data and transmit it to ThingSpeak for further analysis on web Dashboard, constructed using HTML, CSS, JavaScript, and Bootstrap provided a visually appealing interface for users to monitor waste levels in real-time.



Conclusion

In conclusion, our project showcased the effectiveness of real-time waste monitoring with the Smart Waste Management System, confirming our hypotheses on waste overflow reduction and operational efficiency improvement. Our comprehensive approach to data collection, management, analysis, and visualization underscored the significance of proactive waste management strategies. However, while the backend implementation was successful, deploying the web interface remains pending. Future investigations should prioritize long-term system reliability and scalability for comprehensive validation of its effectiveness in tackling waste management challenges.

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