

CS 530 Final Project

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Project Summary: Simplified Intelligent Waste Management System

Project Description:

Initiative, Background, and Motivation:

In many suburban and rural areas, waste management systems are largely manual and lack real-time monitoring, leading to inefficiencies and waste overflows. This project aims to address these challenges by creating an affordable, simple, yet effective waste management system. By providing real-time monitoring and notifications about waste levels in bins, the system will aid in timely waste collection and help maintain cleaner surroundings.

Objective:

The goal is to develop a Simplified Intelligent Waste Management System utilizing a Raspberry Pi and ultrasonic sensors. This system will be capable of detecting the level of waste in a bin and notifying the user of the fill level through a terminal-based application.

Problem Solving:

This project addresses the challenge of manual bin monitoring by automating the process. It offers real-time updates on waste levels, thereby enhancing the efficiency of waste collection.

Breakdown of Functions:

1. Monitoring:

- Continuously monitors waste levels using ultrasonic sensors.
- Calculates fill levels based on sensor readings.

2. Notification:

- Displays real-time fill levels in the terminal.
- Notifies the user when the bin is nearly full.

Competitor Products:

Unlike high-end, IoT-based solutions targeting industrial scales, this project focuses on simplicity, affordability, and suitability for smaller communities, schools, or individual households.

Project Management:

Breakdown of Tasks:

1. Design:

- Design the hardware setup, including the placement of the Raspberry Pi and ultrasonic sensor.
- Design the flow and structure of the Python script.

2. Implementation:

- Implement the hardware setup.
- Develop the Python script for hardware interaction and terminal notifications.

3. Testing:

- Test the hardware setup for accurate readings.
- Test the Python script for errors and logical issues.

Project Timeline/Milestones:

Week 1-2:

Finalize system design and flow.

Acquire necessary hardware components.

Week 3-4:

Complete hardware setup.

Implement the initial version of the Python script and conduct first-round testing.

Week 5-6:

Debug and refine the Python script.

Complete final round of testing and prepare for the final demonstration.

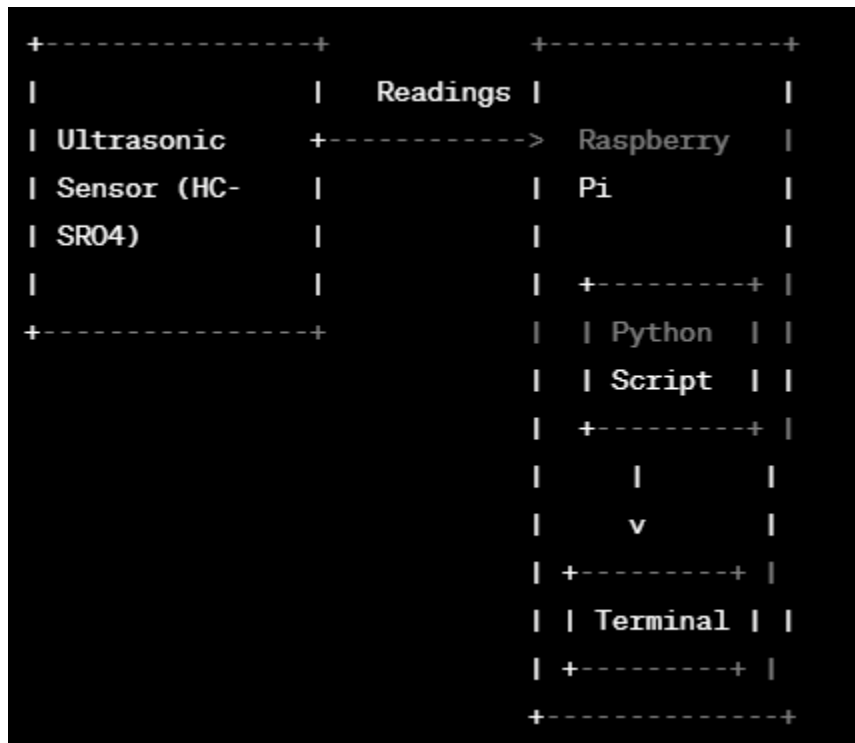
Conclusion:

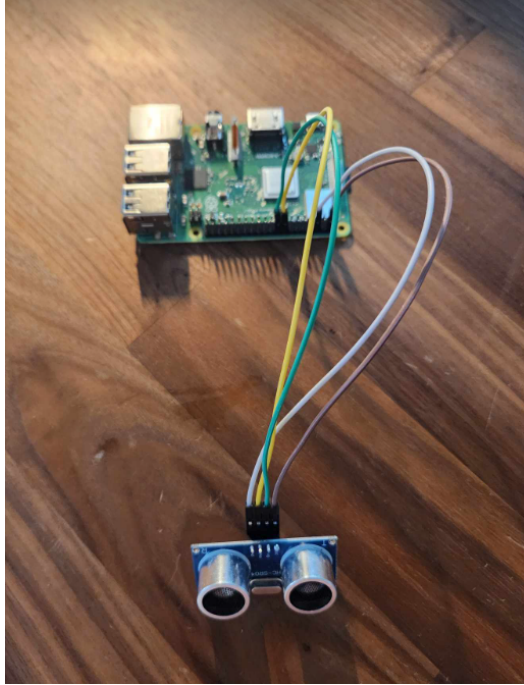
This project introduces intelligent waste management to areas previously dependent on manual monitoring and collection, contributing to a more efficient and sustainable waste management system.

Setup Description:

The setup involves an ultrasonic sensor (HC-SR04) attached to the bottom of the bin lid, facing downwards, connected to a Raspberry Pi. The Raspberry Pi runs a Python script that processes sensor readings and displays the fill level of the bin in a terminal interface.

System Diagram:





Link to a video demonstrating the prototype:

<https://youtube.com/shorts/DRbtLne5NVY>