Location-based Smart Waste Management System

Project Guide:

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Abstract

In modern urban environments, the efficient management of waste poses significant challenges. Traditional waste collection methods often prove inadequate, leading to inefficiencies, resource wastage, and environmental concerns. To address these issues, this project introduces a comprehensive solution leveraging the power of IoT (Internet of Things) and web-based technologies to create a smarter, more sustainable waste management system for cities.The proposed system focuses on the integration of smart bins equipped with ultrasonic sensors and embedded devices such as ESP32 microcontrollers. These sensors monitor the fill levels of garbage bins in real-time and transmit the data to a central MQTT (Message Queuing Telemetry Transport) server. This server acts as a communication hub, facilitating seamless interaction between the physical sensors and the software application.

On the software front, a user-friendly web application is developed using the Python Django framework. This application serves multiple stakeholders, including administrators, waste collection drivers, and citizens. Administrators have access to a comprehensive dashboard where they can manage garbage bins, allocate routes for drivers, view reports, and address public complaints. Waste collection drivers receive optimized routes, update their work status, and report bin fill levels. Citizens, on the other hand, can register complaints, and track their status.

Hardware Specification

- Processor: i5 or i7

- RAM: 8GB (Minimum)

- Hard Disk: 500GB or above

- Mouse

- Keyboard

Software Specification

- Tool: Python IDE, Anaconda, Visual Studio Code

- Python: version3

- Operating System: Windows 10

- Front End: HTML, CSS, Javascript

- Back End: Python Django

- Database: SQLite

System Modules

Administrator Module

- Login
- Add garbage bins
- Manage garbage bins
- Retrieve and view garbage level from MQTT server.
- Add drivers
- Manage drivers
- Allocate routes for drivers
- View garbage reports
- View public complaints
- Logout

Public Module

- Registration with basic details
- Login with credentials
- Complaint registration
- View complaint and its status
- Logout

Driver Module

- Login with credentials
- View work updates
- View route
- Update garbage load
- Logout

Main Project

Administrator

- Create, Update and Delete Garbage bins.

- Create and Manage garbage truck driver details.

- View Garbage collection reports in the dashboard which is generated based on the garbage level data send from the **IOT based Smart Garbage bins**.

- Address and manage public grievances submitted through the platform by the public garbage bin users.

General Public

- Register into the Web app to submit complaints regarding garbage collection.

- Has Dashboard to track the status of the filed complaints.

Drivers

- Has access to drivers dashboard to keep track on the Daily Work updates and view the routes assigned by the Administrator.

Hardware Part

- Interfacing of sensor
    - Interfacing of ultrasonic sensor with esp32.
- Interfacing of MQTT
    - Interfacing of ESP32 with MQTT server.

Embedded Devices

- Ultrasonic sensor for measuring the fill level of the bins.
- ESP32 for sending the sensor value to the MQTT server.
- Power supply for powering the system.