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🔨 Project Title

Smart Waste Bin Monitoring System

📄 Project Abstract

The **Smart Waste Bin Monitoring System** is a simulation-based project designed to support sustainable city management by monitoring waste bin capacity and scheduling timely waste collection. In traditional waste management systems, garbage collection follows fixed schedules, leading to overflowing bins or unnecessary collection trips. This project addresses these issues by simulating smart waste bins that track fill levels in real time.

The system allows users to define bin capacity, simulate waste addition, monitor current fill levels, and automatically suggest waste collection when the bin reaches a critical threshold. By optimizing waste collection schedules, the system helps reduce fuel consumption, operational costs, and environmental impact.

This project is implemented using the **C programming language** and follows a **menu-driven approach**, making it suitable for beginners. It demonstrates fundamental programming concepts such as conditional statements, loops, functions, and basic system logic while modeling a real-world smart city application.

Features

- Set waste bin capacity

- Simulate waste filling

- Display current fill level and percentage

- Alert when bin is nearly full

- Schedule waste collection automatically

- Reset bin after collection

C Source Code

```c
#include <stdio.h>

#define ALERT_LEVEL 80   // Percentage threshold for collection alert

void displayStatus(int capacity, int current) {
    float percentage = ((float)current / capacity) * 100;
    printf("\n--- Bin Status ---\n");
    printf("Bin Capacity     : %d units\n", capacity);
    printf("Current Waste    : %d units\n", current);
    printf("Fill Level       : %.2f%%\n", percentage);

    if (percentage >= ALERT_LEVEL) {
        printf("⚠ ALERT: Bin is almost full! Schedule waste collection.\n");
    } else {
        printf("Bin status is normal.\n");
    }
}

int main() {
    int capacity, currentWaste = 0;
    int choice, addWaste;

    printf("=== Smart Waste Bin Monitoring System ===\n");

    printf("Enter bin capacity (in units): ");
```

```c
    scanf("%d", &capacity);

    if (capacity <= 0) {
        printf("Invalid capacity. Exiting program.\n");
        return 0;
    }

    do {
        printf("\nMenu:\n");
        printf("1. Add Waste\n");
        printf("2. View Bin Status\n");
        printf("3. Collect Waste (Empty Bin)\n");
        printf("4. Exit\n");
        printf("Enter your choice: ");
        scanf("%d", &choice);

        switch (choice) {
            case 1:
                printf("Enter amount of waste to add: ");
                scanf("%d", &addWaste);

                if (addWaste <= 0) {
                    printf("Invalid waste amount.\n");
                } else if (currentWaste + addWaste > capacity) {
                    printf("Cannot add waste. Bin will overflow!\n");
                } else {
                    currentWaste += addWaste;
                    printf("Waste added successfully.\n");
```

```c
            }
            break;


        case 2:
            displayStatus(capacity, currentWaste);
            break;


        case 3:
            printf("Waste collected successfully. Bin is now empty.\n");
            currentWaste = 0;
            break;


        case 4:
            printf("Exiting system. Stay clean, stay green 🌱 \n");
            break;


        default:
            printf("Invalid choice. Try again.\n");
    }


} while (choice != 4);


return 0;
}
```

Concepts Used

- Functions
- Loops (do-while)
- Conditional statements
- Menu-driven programming
- Simulation of real-world systems