Smart Public Restroom

Project Definition:

The project aims to enhance public restroom management by installing loT sensors to monitor occupancy and maintenance needs. The goal is to provide real-time data on restroom availability and cleanliness to the public through a platform or mobile app. This project includes defining objectives, designing the loT sensor system, developing the restroom information platform, and integrating them using loT technology and Python

1. IoT Sensor Deployment:

Occupancy Sensors: Install occupancy sensors within the restroom facility to detect when restroom stalls or areas are in use. These sensors can be passive infrared (PIR) or ultrasonic sensors.

Cleanliness Sensors: Deploy cleanliness sensors equipped with environmental monitoring capabilities to detect factors such as air quality, humidity, and temperature. These sensors can also include cameras for visual cleanliness assessment.

2. Real-time Data Collection:

IoT Devices: Use IoT devices (e.g., Raspberry Pi or Arduino) as data collection points for occupancy and cleanliness sensors. These devices will collect data from sensors and transmit it to a central processing unit.

3. Central Processing Unit:

Data Processing: Develop a Python-based central processing unit that receives and processes data from IoT devices. This unit will be responsible for real-time data analysis and anomaly detection.

Data Storage: Store historical data in a database (e.g., PostgreSQL or MongoDB) for trend analysis and reporting.

4. Restroom Information Platform:

Web-Based Platform: Design a user-friendly web-based platform using technologies like HTML, CSS, JavaScript, and a web framework (e.g., Django or Flask) to provide real-time restroom availability and cleanliness data.

User Interface: Create an intuitive interface that displays real-time occupancy status (e.g., available, occupied), cleanliness ratings, and additional information such as restroom location and amenities.

5. IoT Integration:

Communication Protocol: Implement a secure communication protocol (e.g., MQTT or HTTPS) for IoT sensors to transmit data to the central processing unit and the web-based platform.

Data Presentation: Integrate IoT sensor data seamlessly into the web-based platform, enabling users to access real-time information on restroom availability and cleanliness.

Technology Stack:

IoT Sensors: PIR or ultrasonic sensors for occupancy, environmental sensors (e.g., air quality, humidity, temperature), and cameras for cleanliness assessment.

IoT Devices: Raspberry Pi or Arduino for data collection and transmission.

Central Processing Unit: Python for data processing and analysis.

Database: PostgreSQL or MongoDB for data storage.

Web-Based Platform: HTML, CSS, JavaScript, and a web framework (e.g., Django or Flask).

Communication Protocol: MQTT or HTTPS for secure data transmission.