**PROJECT TITLE- SMART PUBLIC RESTROOM- INTERNET OF THINGS**

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**PHASE 1:**

**PROBLEM DEFINITION:**

In this phase of the project, we will define the problem statement and outline a design thinking approach for the implementation of the Smart Public Restroom project. The goal is to enhance public restroom management by utilizing IoT (Internet of Things) sensors to monitor occupancy and maintenance needs. The project aims to provide real-time data on restroom availability and cleanliness to the public through a web-based platform or mobile app. This document will help us understand the project's objectives and how to proceed with its implementation.

**PROBLEM STATEMENT:**

Public restrooms in busy areas often suffer from issues such as overcrowding, poor cleanliness, and lack of real-time information about their availability. This project aims to address these problems by implementing IoT technology to monitor restroom occupancy and cleanliness. The primary challenges to be addressed include:

1. Restroom Availability: Ensuring that restroom users have access to real-time information about restroom availability, minimizing wait times, and improving user experience.

2. Cleanliness Monitoring: Monitoring the cleanliness of restrooms and ensuring timely maintenance to maintain hygiene standards.

3. Efficient Resource Management: Optimizing the allocation of cleaning staff and resources based on actual restroom usage and cleanliness needs.

**PROJECT OBJECTIVES:**

1. **Real-Time Restroom Availability**: Provide real-time information to the public regarding the availability of restrooms in a given location.

2. **Cleanliness Monitoring:** Implement IoT sensors to monitor cleanliness levels in restrooms and trigger maintenance requests when necessary.

3. **Improved User Experience**: Enhance the overall user experience by reducing wait times and ensuring clean and well-maintained restrooms.

4. **Efficient Resource Allocation:** Optimize the allocation of cleaning staff and resources based on data-driven insights.

**DESIGN THINKING:**

**IOT SENSOR DESIGN**

To achieve the project objectives, we need to carefully plan the deployment of IoT sensors within public restrooms. Key considerations for IoT sensor design include:

**Occupancy Sensors:** Install occupancy sensors at restroom entrances and exits to monitor the number of people entering and leaving the restroom. These sensors will provide real-time data on restroom occupancy.

**Cleanliness Sensors:** Use cleanliness sensors to monitor various factors such as the presence of trash, odors, and overall cleanliness. These sensors will trigger maintenance alerts when cleanliness falls below predefined thresholds.

**Power Supply**: Determine the power source for IoT sensors, which can be battery-powered or connected to a local power supply.

**REAL-TIME TRANSIT INFORMATION PLATFORM**

Designing a user-friendly web-based platform and a mobile app is essential to display real-time restroom availability and cleanliness data. Key elements of this platform include:

**User Interface (UI):** Create an intuitive and visually appealing UI for the web platform and mobile a

**Data Presentation:** Display restroom availability and cleanliness data in real-time, allowing users to easily find nearby clean and available restrooms.

**User Alerts:** Implement notifications and alerts to inform users when a restroom becomes available or when maintenance is required.

**User Feedback**: Provide a mechanism for users to provide feedback on restroom conditions, helping to improve cleanliness and maintenance.

**INTEGRATION APPROACH:**

The integration of IoT sensors with the restroom information platform is a critical component of this project. The integration approach involves:

**Data Transmission**: IoT sensors should transmit data to a central server or cloud platform. Consider using MQTT or HTTP protocols for data communication.

**Data Processing:** Process the incoming data to determine restroom occupancy and cleanliness status. Implement algorithms to trigger maintenance alerts.

**Real-Time Updates**: Ensure that the platform receives real-time updates from IoT sensors to provide accurate information to users.

**CONCLUSION:**

In this phase of the Smart Public Restroom project, we have defined the problem statement and outlined a design thinking approach. We have identified project objectives, planned the deployment of IoT sensors, designed the real-time transit information platform, and discussed the integration approach. The next phases of the project will involve the development and implementation of these components to create a smart public restroom system that enhances user experience and restroom management.