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

**TEAM MEMBERS: MENTOR:**

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**PHASE 2:**

**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.

**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.

**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.

**INNOVATIONS: Predictive Maintenance Algorithms**

**PROJECT IMPLEMENTATION PLAN:**

**1. Sensor Deployment:**

- Identify high-traffic public restroom locations for sensor deployment, considering factors like foot traffic and usage patterns.

- Install occupancy sensors at restroom entrances and exits to monitor the number of people entering and leaving the restroom.

- Deploy cleanliness sensors at strategic locations within restrooms to monitor trash levels, odors, and overall cleanliness.

**2. Data Collection and Transmission:**

- Ensure sensors collect data at regular intervals and transmit it securely to a centralized server or cloud platform.

- Implement encryption and security measures to protect sensor data from unauthorized access.

**3. Real-Time Information Display:**

- Develop a user-friendly mobile app or website that displays real-time restroom occupancy information for each location.

- Users can access this information to decide when and where to use the restroom, reducing wait times.

**4. Cleanliness Monitoring:**

- Set predefined cleanliness thresholds for cleanliness sensors.

- When sensor data indicates a cleanliness issue, trigger maintenance alerts and notifications to cleaning staff or management.

- Implement a dashboard for cleaning staff to view and respond to maintenance requests in real-time.

**5. Predictive Maintenance:**

- Develop predictive maintenance algorithms that analyze historical sensor data to anticipate maintenance needs.

- These algorithms can help in scheduling maintenance activities proactively, reducing downtime and improving restroom hygiene.

**6. Maintenance Workflow:**

- Implement a workflow for handling maintenance requests generated by cleanliness sensors.

- Track the status of maintenance tasks, from request creation to completion, to ensure timely resolution.

**7.Maintenance Records and Reporting:**

- Maintain a comprehensive record of all maintenance activities, including timestamps and actions taken.

- Generate reports and analytics based on sensor data to identify trends and areas for improvement.

**8.Scalability and Expansion:**

- Plan for scalability to accommodate additional restroom locations in the future.

- Regularly update the system to incorporate new technology advancements and improve overall efficiency.

By following this implementation plan and considering the key design considerations for IoT sensor deployment, you can address the challenges of overcrowding, poor cleanliness, and lack of real-time information in public restrooms, ultimately improving the restroom experience for users and optimizing resource allocation for maintenance.