Project 7: smart public restrooms

# IoT Phase 2: INNOVATION

Title: **Smart Public Restrooms IoT Project**

Objective: **To create efficient, user-friendly, and sustainable public restrooms by integrating IoT technology with Arduino UNO for occupancy sensing, water conservation, hygiene, odor detection, security, and energy management.**

## Key Components:

# Occupancy Sensors **(Arduino UNO):**

- **Purpose: Detect restroom stall occupancy and availability.**

- **Benefits: Reduces wait times, improves user experience.**

- **Implementation: Arduino UNO-based sensors on restroom doors and stalls.**

# 2. Water Conservation Monitoring:

- **Purpose:** **Monitor water usage, control flow, and conserve resources.**

- **Benefits: Reduces water wastage, environmental impact.**

- **Implementation: Arduino-controlled water flow sensors and automated valves.**

# 3. Touchless Sanitizer Access (Arduino UNO):

- **Purpose:** Enable touchless hand sanitizer access.

- **Benefits:** Promotes hygiene, minimizes germ spread.

- **Implementation:** Arduino-based proximity sensors on sanitizer dispensers.

# 4. Odor Sensors (Ammonia Detection):

- **Purpose:** Detect and address unpleasant odors.

- **Benefits:** Enhances user comfort, maintains cleanliness.

- **Implementation:** Ammonia gas sensors for dominant odor detection.

# 5. Remote Monitoring and Security:

- **Purpose:** Ensure security and remotely monitor restroom conditions.

- **Benefits:** Enhances safety, facilitates proactive maintenance.

- **Implementation:** CCTV cameras, access control, remote monitoring systems.

# ****6. HVAC Energy Systems:****

- **Purpose:** Manage lighting and ventilation for energy efficiency.

- **Benefits:** Reduces energy consumption, extends equipment life.

- **Implementation:** Arduino UNO-based HVAC control based on occupancy.

# Advantages:

- **Efficient Restroom Management:** Arduino-based occupancy sensors indicate stall availability, reducing waiting times.

- **Resource Conservation:**Water flow monitoring and control, and energy-efficient HVAC systems reduce resource wastage.

- **Hygienic Environment:** Touchless sanitizer access, odor sensors, and cleanliness maintenance promote hygiene.

- **Security and Maintenance:**Remote monitoring and security measures enhance safety and facilitate proactive maintenance.

# Considerations:

- **Privacy and Data Security:**Protect sensor data and user privacy.

- **Maintenance:** Implement proactive maintenance schedules for sensors.

- **Accessibility:** Ensure that sensor-controlled features are accessible to all users.

# Conclusion:

**The Smart Public Restrooms IoT Project, leveraging Arduino UNO, aims to create modern, efficient, and sustainable public restrooms. By integrating occupancy sensors, water conservation measures, touchless sanitizer access, odor sensors, remote monitoring, and energy-efficient HVAC systems, this project addresses key challenges in public restroom management while enhancing user comfort, hygiene, and environmental responsibility.**