TITTLE : SMART PUBLIC TOILET

INNOVATION:

Smart public toilets are a revolutionary advancement in urban infrastructure, integrating technology to transform the traditional public restroom experience. These innovative facilities incorporate a range of features, such as touchless fixtures, real-time monitoring, and sustainability initiatives, to provide users with a cleaner, more convenient, and environmentally friendly option. Beyond enhancing hygiene and accessibility, smart public toilets represent a significant step towards creating modern, user-centric, and efficient urban amenities that cater to the diverse needs of the public.

PROBLEM STATEMENT:

Traditional public toilets often lack cleanliness and accessibility, requiring a more innovative approach to address these issues in urban settings through smart public restroom solutions.

OBJECTIVES:

Occupancy Management: Monitor restroom occupancy and guide users to less crowded facilities.

Maintenance Alerts: Automatically detect and report equipment issues for quick maintenance.

User Feedback: Collect user feedback to improve the restroom experience.

Amenities Availability: Ensure essential supplies like soap and toilet paper are always available.

Security and Safety: Enhance safety with surveillance and alert systems.

Data Analytics: Analyze restroom data for better management and resource optimization.

METHODOLOGY:

Smart Fixtures Installation: Install sensor-controlled faucets, flush systems, and lighting to conserve resources. Integrate touchless features for improved hygiene.

Accessibility Features: Ensure the restroom is accessible to people with disabilities. Include features like automatic door openers, braille signs, and audio instructions.

Data Collection and Analysis: Collect data from IoT sensors for analysis. Use data analytics to optimize resource usage and improve the user experience.

User Education: Provide instructions to users on how to use the smart features. Educate users on water and energy conservation.

IMPLEMENTATION:

Sensors: Occupancy sensors, water usage sensors, cleanliness sensors, and other IoT devices to collect data.

Data Processing Unit: A computer or microcontroller for data analysis, processing, and communication with various components.

Control Systems: Software and hardware for monitoring and controlling restroom functions, including lighting, heating/cooling, and water management.

DATA COLLECTION AND PREPROCESSING:

1.Data Collection:

Occupancy Data: Install occupancy sensors to detect when the toilet is in use. These sensors can be infrared or ultrasonic.

2.Data Transmission:

Use IoT (Internet of Things) technology to transmit data from sensors to a central server.

Ensure data security and privacy to protect users' information.

3. Data Preprocessing:

Data Cleaning: Remove any outliers or erroneous readings from sensors.

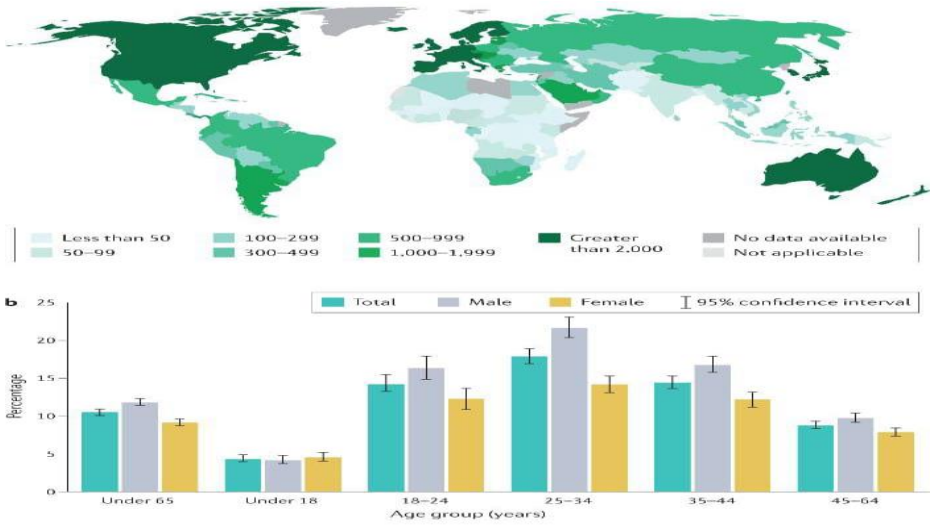
Data Transformation: Convert data formats or units if necessary.

Data Integration: Combine data from different sensors into a coherent dataset.

Data Normalization: Scale data to a common range.

Time Series Analysis: Aggregate data into time intervals to identify patterns and trends.

4.Data Analysis:



Analyze the data to derive insights into usage patterns and toilet maintenance needs. Use predictive maintenance algorithms to identify potential issues before they become critical. Optimize cleaning schedules and resource allocation based on usage data.

RESULTS AND FINDINGS:

#algorithm for smart public toilet

1. Initialize variables:
   - `last_cleaned_time` to the time of the last cleaning.
   - `cleaning_threshold` to a predefined value (e.g., every 2 hours).
2. While the toilet is operational:
   a. Continuously monitor the occupancy sensor.
   b. If the sensor indicates the toilet is unoccupied:
      I. Check the time elapsed since the last cleaning.
      ii. If the time elapsed is greater than or equal to the `cleaning_threshold`:
         1. Mark the toilet as “Dirty.”
         2. Update `last_cleaned_time` to the current time.
   c. If the sensor detects occupancy:
      i. Change the toilet status to “Occupied.”
3. Display the toilet’s status:
   - If the toilet is “Occupied,” show “Occupied” to users.
   - If the toilet is “Dirty,” schedule cleaning.
4. Repeat the process.

PROGRAM FOR SMAT PUBLIC TOILET:

```
Import time
Last_cleaned_time = time.time()
Cleaning_threshold = 7200
Toilet_status = “Operational”
```

```
While toilet_status == “Operational”:
    If occupancy_sensor.detect_occupancy():
      Toilet_status = “Occupied”
   Else:
       Time_elapsed = time.time() – last_cleaned_time
       If time_elapsed >= cleaning_threshold:
         Toilet_status = “Dirty”
         Last_cleaned_time = time.time()
 If toilet_status == “Occupied”:
      User_interface.display_message(“Occupied”)
   Elif toilet_status == “Dirty”:
      User_interface.display_message(“Dirty – Scheduling Cleaning”)
```

CONCLUSION :

smart public toilets are a welcome innovation in urban infrastructure. These modern facilities offer improved hygiene, convenience, and sustainability for the public. By integrating technology and automation, smart public toilets address longstanding challenges associated with traditional restrooms. Their commitment to inclusivity and user satisfaction enhances the overall urban environment, making them a valuable addition to cities worldwide.