VELAMMAL
INSTITUTE OF TECHNOLOGY

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Project name : Smart Public Restroom

Team name : project_224780_Team_1

Team members :

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Objectives:

There are over 100 Million Urban Poor living in Indian cities, who rely on public toilets. However, a large number of these toilets are today in a bad state, unusable. Smart Public Toilet is an IoT and AI-enabled governance platform that enables Urban Local Bodies and schools to improve toilet cleaning and standardization of toilet hygiene.

Creating a smart public restroom using IoT (Internet of Things) involves a combination of hardware, software, and connectivity. While web development technologies may not be the only requirement, they can play a crucial role in creating a user interface for monitoring and controlling the smart restroom system.

Description:

The Goal of the system is to monitor and evaluates Toilet Condition In Real-Time, enabling city governments to improve the toilet cleaning & upkeep through:

- Monitoring capabilities
- Actionable intelligence
- Engagement & behavior change
- Standardization of toilet hygiene

To achieve this goal, We have to monitor

1. Number of Male/ Female using toilets
2. Water Usage and Level monitoring
3. The smell in the toilet.
4. Light/ Darkness in the Toilet
5. User Feedback from the Toilet.

Platform required:

1. **Hardware for IoT:** You'll need various IoT devices and sensors to collect data from the restroom. This might include occupancy sensors, water quality sensors, temperature sensors, and more. These devices will gather data about the restroom's condition and usage.

2. **IoT Communication Protocols:** To connect the IoT devices to the web, you'll need communication protocols such as MQTT, CoAP, or HTTP(S) for data transmission.

3. **Microcontrollers and IoT Development Boards:** You might use platforms like Arduino, Raspberry Pi, or specialized IoT development boards to control and manage the IoT devices.

4. **Internet Connectivity:** You need a stable internet connection for the IoT devices to send and receive data. This could be through Wi-Fi, Ethernet, or cellular connectivity.

5. **IoT Cloud Platform:** You'll need a cloud platform like AWS IoT, Google Cloud IoT, or Microsoft Azure IoT to manage the data collected from the IoT devices. These platforms provide tools for data storage, processing, and management.

Web development technologies:

- Front-End: You can use HTML, CSS, and JavaScript for creating a web based dashboard or user interface. Frameworks like React, Angular, or Vue.js can simplify the development process.
- Back-End: You might need a server to handle data processing, user authentication, and other backend functionalities. You can use Node.js, Python, Ruby, or any other server-side technology.
- Databases: Use databases (e.g., MySQL, PostgreSQL, MongoDB) to store and retrieve data.
- APIs: Create APIs to connect the front-end and back-end. RESTful or Graph QL APIs are common choices.

SMART PRODUCTS TO EQUIP RESTROOMS:

1. **AVAILABILITY INDICATORS:** By means of red and green light, indicators notify washroom users on cubicles availability, which, in turn, reduces congestion. Since it is not always clear whether there is a free cubicle, there might occur situations when stalls remain unoccupied while there is a long line and nobody wants to leave the queue to check if all the stalls are indeed occupied. Therefore, these indicators prevent such cases and release of the necessity to knock or to try doors.

2. **SOAP DISPENSER:** A smart internet-connected dispenser that ensures there is always enough soap for restroom users. It also helps avoid soap wastage by emitting the exact amount of soap a person needs to wash hands.

3. **SMART TAP:** A touch-free tap ensures washroom users are protected from Legionella bacteria. The tap monitors water and pipes temperature and condition to alert the supervisor in case there is a risk of Legionella development.

4. **SMART CLEANING SYSTEM:** The system injects a portion of biocidal substance with every flush to kill bacteria and odors. Besides, the system can provide workers with information about use frequency and even the amount of toilet paper left.

Conclusion:

Overall, smart washroom solution is one of those IoT solutions that enhance user experience, allow effectively manage workload, promote workers well-being, and take care of users' health. Therefore, very soon, it will be hard to imagine a restroom not stuffed with sensors, indicators, and displays. We at Quinta group have expertise in IoT solutions development and are eager to make your home and life smarter. We are willing to contribute to world automation and be among those who generate and successfully implement IoT products using artificial intelligence, machine learning techniques, and LoRaWAN technology.

Our proposed project will create awareness among the people about the proper sanitation. It makes use of Internet of things, which is a rapidly growing technology. Our proposed system will make everyone to strictly follow the cleanliness and proper sanitation in the toilets. It prevents the many new contagious diseases that spread due to improper sanitation of the toilets. Thus by using technologies in the smarter way, we can maintain the cleanliness which is next to the godliness. Keep Clean, Be Safe.

Thank you