SMART PUBLIC RESTROOM

INTRODUCTION:

Smart washrooms are among recent IoT solutions that are very soon to be implemented here and there. Such new generation restrooms are expected to significantly improve customer experience and employee well-being while also lower costs allocated to maintain equipment.

ABSTRACT

In the contemporary world, the technologies are sharply developed, but still the hygiene in our country is under hazards. The abstract of project is to provide clean and hygienic toilets or washrooms. All the public toilets should be clean and hygienic means disease free. In our country, government has introduced the scheme called "Swachh Bharat" (Clean India) so keeping the toilets clean is the one of the objective of Clean India Scheme. Our proposed solution can contribute to raise the clean India project. In future, it can play the major role in Clean India scheme. The existing system focus on detecting the dirt in the toilets. In our proposed system, we have focus on keeping clean toilets, observing the sweeper's working activities. It can avoid many diseases and may create the awareness among people about the Toilet management. Therefore, our solution is used to have safe and hygienic toilets. The proposed system is based on IOT and using different sensors like smell sensor, IR sensor, ultra sonic sensor, RFID reader. By using these sensors, we can create the smart toilets.

BENEFITS OF SMART RESTROOM:

Smart washrooms products do a lot. In particular, they maintain lavatory in the best condition by:

- Optimizing refills: no more worries that towels or soap will run out at the worst moment.
- Sending notifications when maintenance is needed: no need for employees to check the state of things every 30-60 minutes as they get alerted as soon as supervision is required.
- Tracking presence: less time in queues since users always know when there is an unoccupied cubicle, which guarantees that all cubicles are used more or less equally.
- Detecting and reporting smoking activities at no smoking area.
- Notifying when bins are full.
- Providing predictive analytics based on real time information tracking.

PROCEDURE:

Step 1: Define Objectives and Scope

Clarify the goals of the smart public restroom project. Determine the key features, such as occupancy monitoring, water conservation, automated cleaning, etc. Define the scope, including the location, target audience, and budget constraints.

Step 2: Research and Benchmarking

Conduct thorough research on existing smart restroom solutions and IoT technologies. Identify best practices, available hardware, and software solutions. Benchmark against successful smart restroom implementations to gather insights.

Step 3: Needs Assessment and User Research

Understand the needs of the users and the context of the restroom. Gather feedback from potential users and stakeholders to ensure the design meets their requirements and preferences.

Step 4: Design Concept Refinement

Based on research findings, refine the initial design concept. Consider factors like accessibility, privacy, and user-friendliness. Ensure the design integrates seamlessly with IoT components.

Step 5: IoT Component Selection

Select the IoT devices and sensors that will be integrated into the restroom. This may include occupancy sensors, water flow sensors, automated dispensers, air quality monitors, and other relevant IoT components.

Step 6: Hardware and Software Integration

Choose the hardware (microcontrollers, sensors, actuators, etc.) and software platforms (IoT platforms, cloud services, mobile apps) required to facilitate communication between devices and enable data processing.

Step 7: Data Security and Privacy Measures

Implement robust security protocols to protect user data and prevent unauthorized access to IoT devices. This includes encryption, authentication, and regular security updates.

Step 8: Sensor Placement and Installation

Determine optimal locations for sensors and devices within the restroom to ensure accurate data collection and efficient operation. Install the hardware according to the design plan.

Step 9: Network Configuration and Connectivity

Set up a reliable network infrastructure, including Wi-Fi or other connectivity options, to facilitate communication between IoT devices and the central system.

Step 10: Data Collection and Processing

Configure the IoT system to collect data from sensors. Process and analyze the data to derive actionable insights, such as restroom occupancy, resource usage patterns, and maintenance needs.

Step 11: User Interface (UI) Development

Design and develop the user interface for accessing and controlling the smart restroom features. This may include a mobile app, touchscreens, or web-based interfaces for users and administrators.

Step 12: Testing and Quality Assurance

Thoroughly test all IoT components, sensors, and the overall system to ensure they function as intended. Verify data accuracy, response times, and user interactions.

Step 13: Integration with Building Management Systems

Integrate the smart restroom system with the broader building management infrastructure, if applicable, to coordinate functions like HVAC, lighting, and security.

Step 14: Pilot Testing (Optional)

Conduct a pilot test in a controlled environment to evaluate the system's performance and gather user feedback before full-scale deployment.

Step 15: Deployment and Monitoring

Install the smart restroom system in the designated location. Monitor the system's performance in real-time and address any issues that arise.

Step 16: Maintenance and Updates

Establish a regular maintenance schedule to ensure all IoT components are functioning optimally. Implement software updates and security patches as needed.

Step 17: User Training and Support

Provide training for restroom users and maintenance staff on how to interact with and troubleshoot the smart restroom system.

Step 18: Data Analysis and Optimization

Continuously analyze data collected by the IoT system to identify areas for improvement. Optimize settings and functionalities based on usage patterns and feedback.

OUTCOMES SMART RESTROOM SOLUTION BRINGS

There are indeed numerous positive outcomes entailed by the smart restroom solution application. All of them significantly improve work process and decision-making.

- Number of complaints reduces.
- Restroom users can easily feedback on any problems they spot.
- Equipment is well-maintained due to real time data usage.
- A supervisor is always aware of daily, weekly, and monthly statistics concerning equipment exploitation, thus, is able to make the best decisions regarding rooms layout.

CONCLUSION

For quality control, we devised and constructed an Internet of Things-based Washroom feedback system. As previously said, this system consists of sensors that can be simply placed. All sensor readings and input from users of public restrooms were collected regularly using a web application. To collect and store all of the information, readings, and database for user input, a Firebase is used as a service. To quickly analyze data obtained on cleanliness, the water level in tanks, water leakage, bad odour detection, and washroom accessory maintenance. For this project, we will create a web application. Our proposed technique will also aid in raising public awareness about good sanitation. As a result, by incorporating smart technology into current public restrooms, we can maintain hygiene and cleanliness, limiting the spread of new diseases caused by poor hygiene. Using hardware-based prototype modules with all automated sensors and new technology internet of things, we will deploy smarter technologies and raise public awareness about good hygiene as a result of this project. It makes use of the Internet of Things, a new technology that is rapidly gaining

traction. Thus, by employing technology more intelligently, we may maintain cleanliness, which is second only to godliness. Keep it clean and stay safe.