**SMART PUBLIC RESTROOM**

**Introduction**:

Smart restrooms in airports are technologically advanced restroom facilities that use various sensors, automation, and data analysis to improve hygiene, maintenance, and user experience. Real-time occupancy status monitoring. Supply level monitoring. Central management information network.

**Definition:**

Smart toilets have different sensors that perform multiple functions beyond just flushing. These sensors use infrared rays and ultrasound to detect if the person is inside the washroom and how long he has been sitting there. These sensors are equipped with Wi-Fi connectivity and provide real-time data.

**Abstract:**

The Smart Public Restroom System offers a holistic solution to the challenges associated with conventional restroom management. By harnessing the power of IoT, data analytics, and automation, this system aims to create a more sustainable, user-friendly, and hygienic public restroom experience, contributing to the overall well-being and satisfaction of communities.

Predictive maintenance algorithms play a crucial role in optimizing the performance of machinery and equipment by forecasting maintenance needs based on sensor data. Here's a comprehensive overview of how you can incorporate predictive maintenance algorithms into your system:

**1.Data Collection:**

Implement sensors to collect relevant data from your machinery or equipment. This can include data on temperature, pressure, vibration, fluid levels, and any other parameters relevant to the equipment's operation.

**2. Data Preprocessing:**

Clean and preprocess the collected data to remove outliers, handle missing values, and ensure consistency. This step is crucial for the accuracy of the predictive model.

**3. Feature Engineering:**

Identify and create relevant features from the raw sensor data. Feature engineering involves transforming the data to highlight patterns and relationships that the predictive maintenance algorithm can use.

**4. Historical Data Analysis:**

Analyze historical data to identify patterns and correlations between sensor readings and past maintenance events. This analysis helps in understanding the relationship between the data and potential failure modes.

**5. Selecting Predictive Models:**

Choose appropriate machine learning or statistical models for predictive maintenance. Common models include regression algorithms, decision trees, random forests, and neural networks. The choice depends on the complexity of the data and the specific requirements of your system.

**6. Training the Model:**

Train the selected predictive maintenance model using historical data. This involves feeding the model with input features (sensor data) and the corresponding output labels (maintenance events). The model learns to identify patterns that lead to maintenance requirements.

**7. Real-time Monitoring:**

Implement a real-time monitoring system that continuously collects and processes sensor data. The predictive maintenance model can then analyze this data in real-time to identify potential issues or predict when maintenance is likely to be needed.

**8. Thresholds and Alerts:**

Set thresholds for different parameters based on the model's predictions. When sensor readings surpass these thresholds, generate alerts to notifie maintenance teams. These alerts can be used to schedule proactive maintenance before a failure occurs.

**9. Integration with Maintenance Systems:**

Integrate the predictive maintenance system with your overall maintenance management system. This ensures that the insights generated by the algorithm are seamlessly incorporated into the maintenance workflow.

**10. Continuous Improvement:**

Regularly update and retrain the predictive maintenance model as more data becomes available. Continuous improvement is essential for adapting to changes in equipment behavior and ensuring the model's accuracy over time.

**11. Human Expertise:**

Combine the power of predictive algorithms with human expertise. Maintenance teams should use the insights provided by the system to make informed decisions and prioritize maintenance tasks.

By following these steps, you can create a robust predictive maintenance system that anticipates maintenance needs based on sensor data, helping to reduce downtime, extend equipment lifespan, and optimize maintenance resources.

**Application:**

Comfort, The smart toilet allows you to warm up the seat to feel more comfortable while using the toilet. It also allows you to feel more comfortable with how clean you are after using the spray feature. This is the best way to know you're actually clean.

**Advantages:**

Smart toilets often come equipped with features like

* automatic flushing,
* built-in bidets,
* adjustable water pressure, which promote better hygiene
* cleanliness

**Disadvantages:**

Faecal-borne bacteria like E. coli, Streptococcus, Staphylococcus, etc., lurk in abundance on the surface of public toilets. If you come in contact with the contaminated surfaces, you'll be exposed to these bacteria, and you could be struck down with diarrhoea.

**Purpose:**

As an "away-from-home" toilet room, a public toilet can provide far more than access to the toilet for urination and defecation. People also wash their hands, use the mirrors for grooming, get drinking water (e.g. refilling water bottles), attend to menstrual hygiene needs, and use the waste bins.

**Conclusion:**

Smart restroom technology is transforming the way we experience public and private restrooms. With features like occupancy sensors, odor detection, and supply level monitoring, smart restrooms enhance hygiene, efficiency, and user satisfaction. The implementation of smart restroom management systems and monitoring systems streamlines operations, optimizes resource allocation, and ensures a safe and pleasant restroom experience.