

SMART PUBLIC RESTROOM

Phase-2:innovation



Introduction:

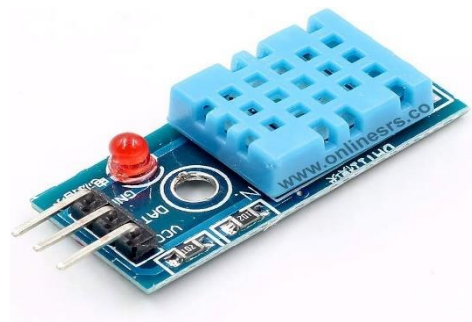
An IoT-based smart public restroom leverages the Internet of Things (IoT) technology to enhance the functionality, cleanliness, and management of public restrooms. Here are some key features and components of such a restroom:

Smart access control using RFID : (Radio-Frequency Identification) is a technology that uses RFID tags or cards to grant or restrict access to certain areas or resources. Here's how it typically works:

1. **RFID Tags/Cards:** Individuals are provided with RFID cards or tags, which contain a unique identifier.
2. **RFID Readers:** RFID readers are installed at access points, such as doors or gates, where access control is required.
3. **Authentication:** When an individual presents their RFID card or tag to the reader, the reader sends a signal to the RFID tag.

4. Verification: The RFID tag responds with its unique identifier, and the reader verifies this information against a database.

Automatic Door Control Sensors :Infrared (IR) Motion Sensors: These sensors emit infrared light and detect its reflection off nearby objects. When a person or object interrupts the infrared beam, the door opens or remains open. They are commonly used in sliding doors and swinging doors.



Ultrasonic Sensors: Ultrasonic sensors emit high-frequency sound waves and measure the time it takes for the waves to bounce back. When an object, like a person, enters the detection area, the door is triggered to open or remain open. Ultrasonic sensors are effective for both sliding and swinging doors.

Hygiene Monitoring Sensors :Hand Hygiene Sensors: These sensors are used to monitor handwashing compliance in healthcare settings. They can be worn as wearable devices or installed in or near handwashing stations, and they track healthcare workers' hand hygiene practices.

Surface and Air Quality Sensors: Sensors are used to monitor the cleanliness of surfaces and the quality of air in indoor environments. They can detect pathogens, allergens, pollutants, or other contaminants in the air or on surfaces.

Smart Entry and Exit:The restroom entrance is equipped with automatic sliding or swinging doors that open upon detecting an approaching user.Occupancy sensors near the entrance monitor the number of people inside and display real-time occupancy status on digital signage outside the restroom.

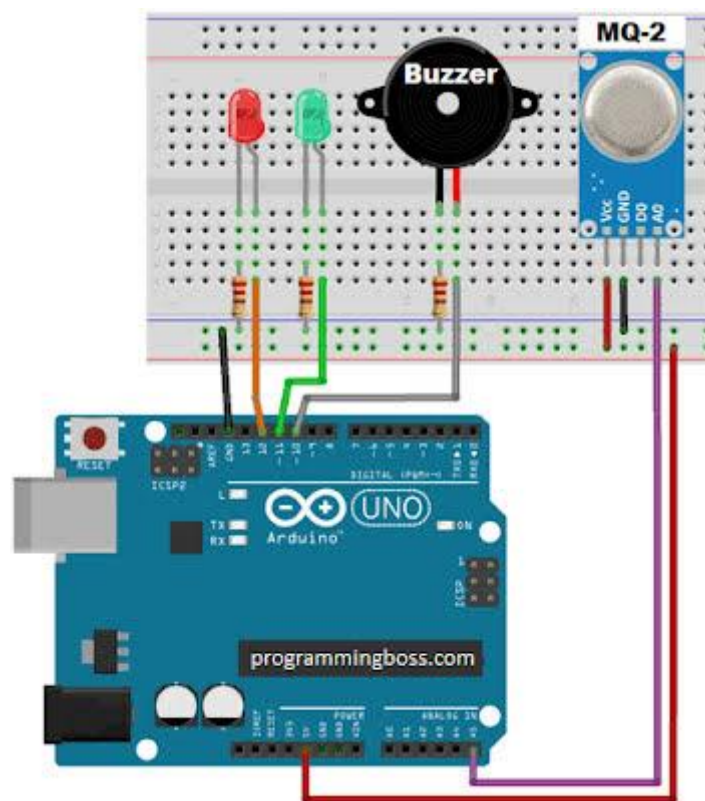
Touchless Fixtures: All fixtures, including faucets, soap dispensers, and hand dryers, are touchless, reducing the spread of germs. They are activated by motion sensors.Smart mirrors can display useful information like weather updates or local news while users wash their hands

Hygiene Supplies Management:IoT sensors in soap dispensers, paper towel holders, and toilet paper dispensers monitor supply levels. When these levels are low, alerts are sent to cleaning staff for timely restocking.A built-in hand sanitizer dispenser provides an extra level of hygiene.

Odor and Air Quality Control:IoT-based odor sensors detect unpleasant smells and trigger the ventilation system to maintain fresh air.Air quality sensors monitor humidity, temperature, and carbon dioxide levels to ensure user comfort.

Cleaning Schedules and Alerts: IoT occupancy and usage sensors help create dynamic cleaning schedules. When a certain threshold of usage is reached, a cleaning alert is sent to maintenance staff. Waste bins are equipped with fill-level sensors that alert staff when they need emptying.

CIRCUIT DIAGRAM:



APPLICATIONS:

The advantages of using IoT (Internet of Things) technology in public restrooms are numerous and can greatly enhance the user experience, improve maintenance, and contribute to better resource management.

Here are some key benefits:

Improved Hygiene: IoT-enabled touchless fixtures, such as automatic flush toilets, sensor-operated faucets, and soap dispensers, reduce the potential for germ transmission and enhance overall cleanliness.

Efficient Resource Management: Sensors for soap and paper towel dispensers can monitor supply levels, ensuring that these essentials are always available while reducing waste and restocking costs.

User Experience: Real-time occupancy monitoring helps users find available facilities quickly, reducing wait times and providing convenience.

Timely Maintenance: IoT sensors can trigger alerts for cleaning and maintenance staff when specific conditions, such as supply shortages or high usage, are detected. This leads to proactive maintenance rather than scheduled routines.

Energy Efficiency: IoT can optimize energy usage by controlling lighting and ventilation based on occupancy. This helps reduce energy costs and environmental impact.

Water Conservation: Water-efficient fixtures, along with sensors to detect leaks and irregular usage patterns, help conserve water resources.

Security and Safety: Surveillance cameras can deter vandalism and enhance security. **In case**