Smart Restroom Hardware & Software

Designing a smart public restroom project involves a combination of hardware and software components.

Hardware Components:

Sensors:

Occupancy sensors (e.g., PIR motion sensors) to detect users.

Environmental sensors (e.g., temperature and humidity sensors).

Water usage sensors for sinks and toilets.

Actuators:

Automated flush systems for toilets.

Automated faucets for sinks.

Automated soap dispensers.

Automated hand dryers.

LED indicators for indicating restroom occupancy.

Microcontroller/Embedded System:

Raspberry Pi or Arduino for interfacing with sensors and actuators.

Communication:

Wi-Fi or Ethernet connectivity to send data to a central server.

Software Components:

Python Script (on the microcontroller):

Use libraries like RPi.GPIO (for Raspberry Pi) to control actuators.

Read data from sensors (e.g., occupancy, water usage).

Implement logic to automate flush systems, faucets, etc., based on sensor data.

python script

```
import RPi.GPIO as GPIO
import time

# GPIO pins for flush control
flush_pin = 17

# Initialize GPIO
GPIO.setmode(GPIO.BCM)
GPIO.setup(flush_pin, GPIO.OUT)

# Function to flush the toilet
def flush_toilet():
    GPIO.output(flush_pin, GPIO.HIGH)
    time.sleep(5)  # Flush for 5 seconds
    GPIO.output(flush_pin, GPIO.LOW)

try:
    while True:
        # Check occupancy sensor (replace with actual sensor input)
        occupancy = check_occupancy()  # Implement this function

        if occupancy:
            flush_toilet()
        time.sleep(1)  # Check occupancy every second
```

```
except KeyboardInterrupt:
    GPIO.cleanup()
```