DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Project name : *Smart Public Restroom*

Team name : project_224780_Team_6

Team members :
         KEERTHANA.E (113321243020)
         MAHA PAVITHRA.R(113321243021)
         MAHA VARSHINI.V(113321243022)
         MALLU NAVYA (113321243023)

PROJECT

Building a smart public restroom using IoT involves various components and technologies. Below, I'll provide you with a high-level Python code example for a simplified smart public restroom system. Keep in mind that this is a basic example, and a real-world implementation would require more robust hardware, sensors, and a backend system for managing data.

Requirements:

The Components that are required are:

1. Raspberry Pi (or any other IoT device)
2. Sensors (e.g., occupancy sensor, door sensor, ultrasonic sensor)
3. IoT Platform (e.g., ThingSpeak for data visualization)
4. Actuators (e.g., LED lights, fans)
5. Relay module for controlling actuators
6. Internet connectivity

PYTHON CODE

```python
import RPi.GPIO as GPIO
import time
import requests

# Set up GPIO pins
OCCUPANCY_SENSOR_PIN = 18
DOOR_SENSOR_PIN = 23
ULTRASONIC_TRIGGER_PIN = 24
ULTRASONIC_ECHO_PIN = 25

GPIO.setmode(GPIO.BCM)
GPIO.setup(OCCUPANCY_SENSOR_PIN, GPIO.IN)
GPIO.setup(DOOR_SENSOR_PIN, GPIO.IN)
GPIO.setup(ULTRASONIC_TRIGGER_PIN, GPIO.OUT)
GPIO.setup(ULTRASONIC_ECHO_PIN, GPIO.IN)
```

```python
# Function to read ultrasonic sensor
def read_ultrasonic_sensor():
    GPIO.output(ULTRASONIC_TRIGGER_PIN, True)
    time.sleep(0.00001)
    GPIO.output(ULTRASONIC_TRIGGER_PIN, False)
    pulse_start_time = time.time()
    pulse_end_time = time.time()

    while GPIO.input(ULTRASONIC_ECHO_PIN) == 0:
        pulse_start_time = time.time()

    while GPIO.input(ULTRASONIC_ECHO_PIN) == 1:
        pulse_end_time = time.time()

    pulse_duration = pulse_end_time - pulse_start_time
    distance = (pulse_duration * 34300) / 2  # Speed of sound = 34300 cm/s
    return distance
```

```python
pulse_duration = pulse_end_time - pulse_start_time
    distance = (pulse_duration * 34300) / 2  # Speed of sound =
34300 cm/s
    return distance

# Function to send data to IoT platform
def send_data_to_iot(occupancy, door_status, distance):
    url = "https://api.thingspeak.com/update"
    params = {
        "api_key": "YOUR_API_KEY",
        "field1": occupancy,
        "field2": door_status,
        "field3": distance
    }
    response = requests.get(url, params=params)
    print("Data sent to IoT platform:", response.text)
try:
    while True:
        occupancy = GPIO.input(OCCUPANCY_SENSOR_PIN)
        door_status = GPIO.input(DOOR_SENSOR_PIN)
        distance = read_ultrasonic_sensor()
```

```python
    # Control actuators based on sensor data
        # For example, turn on lights and fans when occupancy is detected
        if occupancy == 1:
            # Activate actuators
            GPIO.output(LED_PIN, GPIO.HIGH)
            GPIO.output(FAN_PIN, GPIO.HIGH)
        else:
            # Deactivate actuators
            GPIO.output(LED_PIN, GPIO.LOW)
            GPIO.output(FAN_PIN, GPIO.LOW)

        # Send data to the IoT platform
        send_data_to_iot(occupancy, door_status, distance)

        time.sleep(5)  # Update data every 5 seconds

except KeyboardInterrupt:
    GPIO.cleanup()
```

CONCLUSION

Smart restroom technology is transforming the way we experience public and private restrooms. With features like occupancy sensors, oder 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.

As technology continues to evolve, the future of smart restrooms looks promising, with AI-powered systems, voice-activated controls, and blockchain-based solutions on the horizon. By embracing these advancements, facilities can create smart restrooms that meet the ever-changing needs and expectations of users.

THANK YOU