Phase 3: Report submission

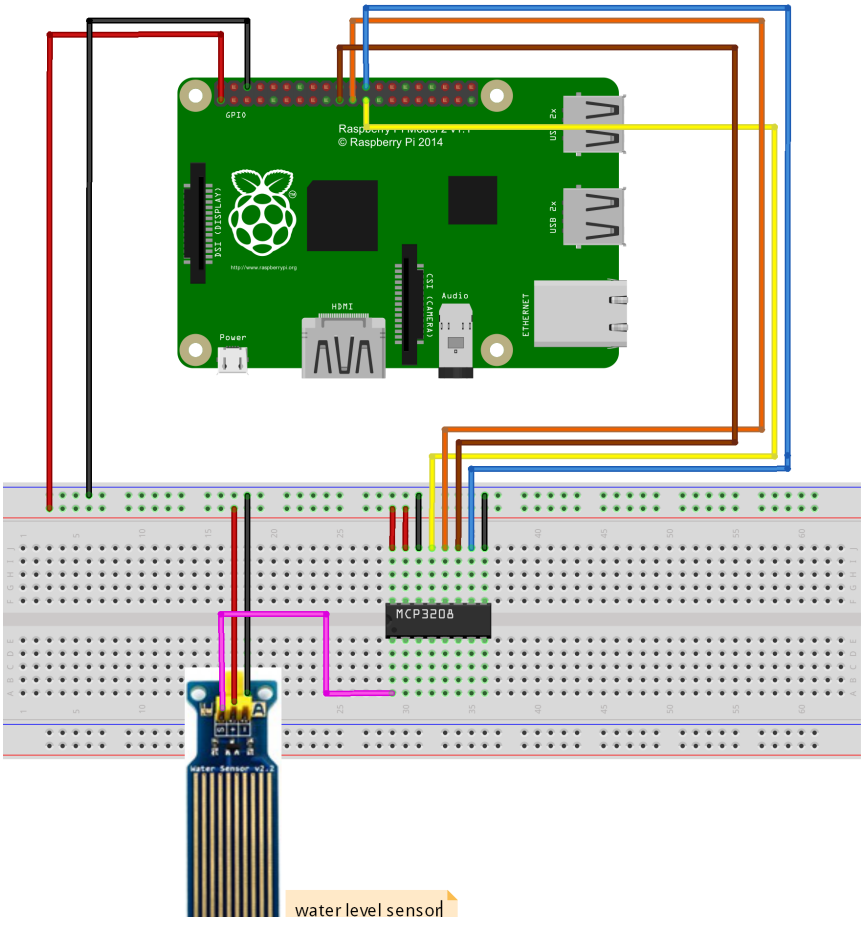
smart water management

introduction:

Water is a finite and vital resource, and its sustainable management is crucial in the face of increasing global demand and environmental concerns. To address these challenges, the development of innovative systems for monitoring and managing water consumption is of utmost importance. In this context, the Internet of Things (IoT) presents a powerful solution, offering real-time data collection and analysis capabilities.

This project aims to establish an IoT water consumption monitoring system, designed for public places such as parks and community centers. The system incorporates IoT sensors, specifically flow meters, to measure water consumption accurately. These sensors are equipped with the capability to transmit real-time data to a central data-sharing platform. The project leverages Python programming to facilitate seamless data transmission from the sensors to the platform.

circuit diagram:



circuit explantion:

- **Raspberry Pi Integration:**

At the heart of this system lies the Raspberry Pi, a versatile single-board computer that offers a wide array of capabilities. Raspberry Pi is used to facilitate the collection, processing, and transmission of data from water level sensors. These sensors are strategically positioned in specific areas where monitoring water consumption is essential. The Raspberry Pi serves as the central hub for data processing, making it an ideal choice for managing the intricacies of the system.

- **Water Level Sensors:**

Water level sensors are the critical components responsible for assessing water consumption. These sensors are designed to measure the level of water, offering valuable insights into how much water is being used at any given time. The system leverages this real-time data to create an accurate and up-to-date picture of water usage within the monitored area.

Dataset:

```
Timestamp,Location,WaterConsumption
2023-10-17 08:00:00,Public Park A,120.5
2023-10-17 08:15:00,Public Park A,125.3
2023-10-17 08:30:00,Public Park A,128.7
2023-10-17 08:45:00,Public Park A,133.2
2023-10-17 09:00:00,Public Park A,139.0
2023-10-17 09:00:00,Community Center,212.1
2023-10-17 09:15:00,Community Center,218.5
2023-10-17 09:30:00,Community Center,225.8
2023-10-17 09:45:00,Community Center,230.7
2023-10-17 10:00:00,Community Center,235.9
2023-10-17 10:00:00,Public Park B,97.2
2023-10-17 10:15:00,Public Park B,102.4
2023-10-17 10:30:00,Public Park B,106.8
2023-10-17 10:45:00,Public Park B,112.3
2023-10-17 11:00:00,Public Park B,117.6
```

Dataset explantion:

- **Timestamp**: The date and time of water consumption measurement.
- **Location**: The place where water consumption is monitored (e.g., public park, community center).
- **Water Consumption**: The amount of water consumed during the specified time period (in gallons, liters, or any suitable unit).

This dataset is just a simple illustration. In a real-world application, you'd have more complex data, possibly including additional sensor-specific information, sensor IDs, and more extensive time ranges. Data could be collected continuously and stored in a database for analysis and reporting.

Code:

```
import RPi.GPIO as GPIO
import time
import paho.mqtt.client as mqtt

# Configure MQTT broker details
broker_address = "mqtt.yourserver.com"
port = 1883
topic = "water_consumption"

# Initialize GPIO pins for the sensor
sensor_pin = 17
GPIO.setmode(GPIO.BCM)
GPIO.setup(sensor_pin, GPIO.IN)

# Initialize MQTT client
client = mqtt.Client("WaterSensor")

# Connect to MQTT broker
client.connect(broker_address, port)

try:
    while True:
        # Read sensor data
        if GPIO.input(sensor_pin) ==
GPIO.HIGH:
            # Water flow detected
            current_time =
```

```
time.strftime('%Y-%m-%d %H:%M:%S')
            data = f"Water Flow Detected at
{current_time}"
            client.publish(topic, data)
        time.sleep(1)  # Adjust the sleep
time based on your sensor and data rate
except KeyboardInterrupt:
    pass

# Cleanup GPIO and disconnect from MQTT
broker
GPIO.cleanup()
client.disconnect()
```

Conclusion:

In the journey to build an Internet of Things (IoT) water consumption monitoring system, we've explored the critical components and processes that make this innovative solution possible. By configuring IoT sensors, such as water level sensors, we can accurately measure and track water consumption in specific areas. This data-driven approach not only fosters better resource management but also encourages more sustainable and responsible water usage.

The integration of Raspberry Pi as the central processing unit ensures that data collected by the water level sensors is harnessed effectively. It serves as the linchpin, allowing for the processing and transmission of real-time water consumption data to a central platform for further analysis.