SMART WATER FOUNTAINS

Project Objectives:

- **1. **Water Quality Monitoring:** Incorporate sensors to measure parameters such as pH, turbidity, and temperature in the water.
- 2**. **Water Consumption Tracking:** Implement flow meters to track water usage in real-time.
- 3. **Remote Control:** Enable users to control the water fountains via a mobile app or web interface.
- 4. **Data Analytics:** Collect and analyze data to optimize water usage and detect anomalies.
- 5. **Sustainability:** Promote water conservation through responsible usage.

IoT Device Setup:

- 1. **Sensors:** Install water quality sensors (e.g., pH and turbidity sensors) and flow meters at the water fountains.
- 2. **Microcontrollers:** Use IoT-compatible microcontrollers like Arduino or Raspberry Pi to collect data from sensors.
- 3. **Connectivity:** Connect the microcontrollers to the internet using Wi-Fi or cellular modules for data transmission.
- 4. **Power Supply:** Ensure a stable power supply, possibly using solar panels or mains power with battery backup.
- 5. **Security:** Implement security measures to safeguard the devices and data from unauthorized access.

Platform Development:

- 1. **Data Storage:** Set up a database to store sensor data securely.
- 2. **IoT Cloud Platform:** Utilize a cloud-based IoT platform (e.g., AWS IoT, Google Cloud IoT, or Azure IoT) to manage device connectivity, data ingestion, and control.
- 3. **User Interface:** Develop a web or mobile app for users to monitor water quality, consumption, and control the fountains.
- 4**. **Data Analytics:** Implement algorithms for data analysis and visualization to derive insights.
- 5. **Security and Authentication:** Ensure robust security and user authentication mechanisms to protect data and control access.
- 6. **Notifications:** Implement notifications/alerts for users to receive updates about water quality or consumption issues.
- 7. **Scalability:** Design the platform to handle an increasing number of devices and users.

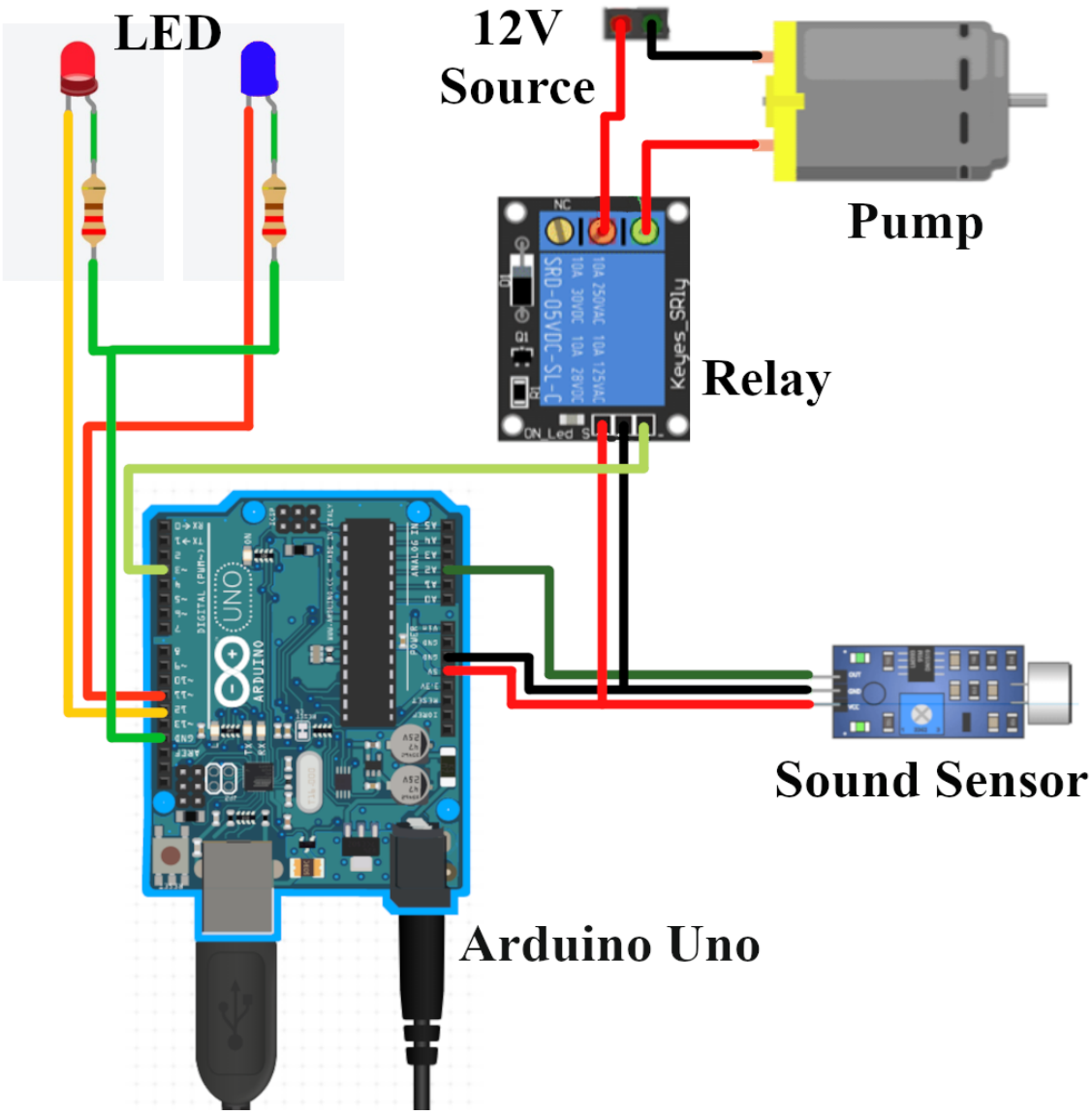
- 8. ****Integration:**** If necessary, integrate the platform with other systems or smart home platforms for a seamless user experience.

Code Implementation:

Using python

```
import RPi.GPIO as GPIO

import time

# Set up GPIO pins

water_sensor_pin = 17

water_pump_pin = 18

GPIO.setmode(GPIO.BCM)

GPIO.setup(water_sensor_pin, GPIO.IN)

GPIO.setup(water_pump_pin, GPIO.OUT)

# Main loop

try:

   while True:

      if GPIO.input(water_sensor_pin) == GPIO.HIGH:

         print("Water level is low. Turning on the water pump.")

         GPIO.output(water_pump_pin, GPIO.HIGH)

      else:

         print("Water level is sufficient. Turning off the water pump.")

         GPIO.output(water_pump_pin, GPIO.LOW)

      time.sleep(1)  # Check water level every second

except KeyboardInterrupt:

   GPIO.cleanup()
```

Circuit Diagram

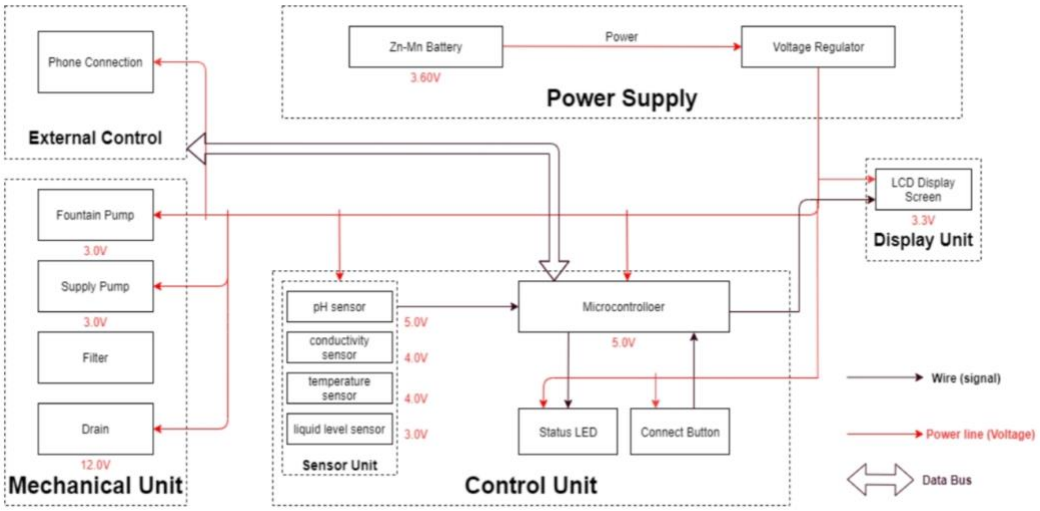


Smart water fountains typically work by using sensors and technology to monitor water levels, water quality, and other parameters.

- 1. **Sensors:** Smart water fountains are equipped with various sensors to detect the water level in the fountain basin, as well as other factors like temperature, pH, and sometimes even motion (to detect if someone is near).
- 2**. Data Collection:** The sensors continuously collect data and transmit it to a central control unit, which is often a microcontroller or a more advanced computer system.

- 3. **Control Unit:** The control unit processes the data from the sensors and makes decisions based on the programmed parameters. For example, it can determine when the water level is too low or if the water quality needs adjustment.
- 4. **Pump and Valve Control:** If the control unit decides that the water level needs to be replenished or that water quality should be adjusted, it can activate pumps to add more water or open/close valves to control the flow.
- 5. **Alerts and Notifications**: In case of any issues or abnormal conditions, the system can send alerts or notifications to users or maintenance personnel. This could include low water levels, filter replacements, or water quality concerns.
- 6**. Energy Efficiency:** Some smart fountains are designed to be energy-efficient, with the ability to adjust water flow or other parameters based on real-time data, weather conditions, or user preferences.

Block Diagram:



Conclusion:

The smart water fountains project represents a significant advancement in the field of public health and sustainability. By incorporating technology and data-driven solutions into the design of water fountains, we have created a system that promotes hydration, reduces single-use plastic waste, and provides valuable insights for efficient maintenance. This project not only enhances the quality of life for communities but also contributes to a more environmentally responsible and connected world.