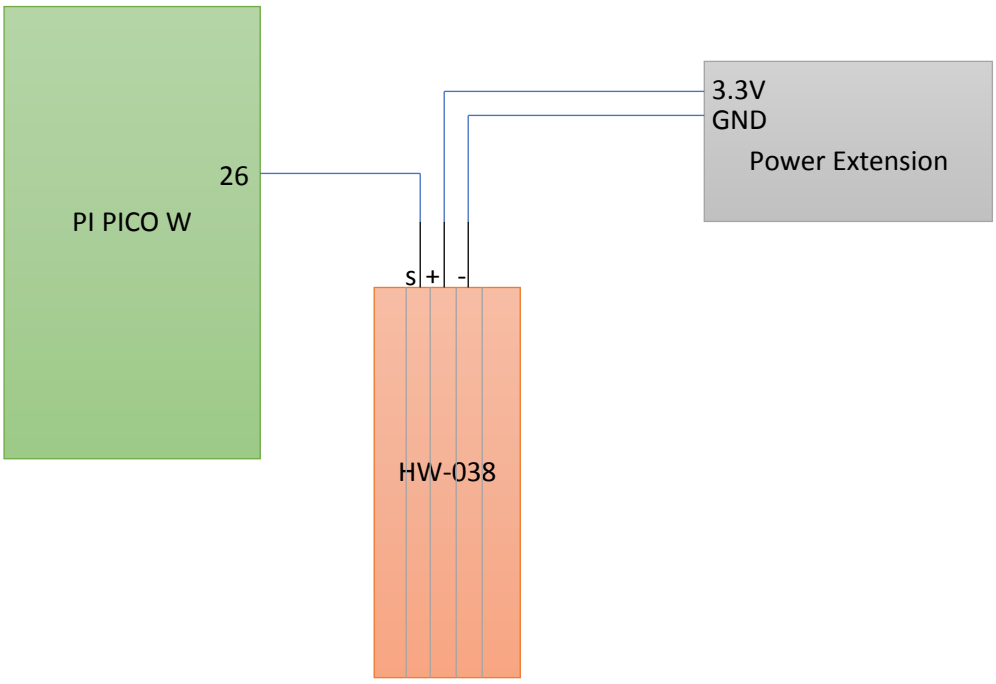
Ex. No. 8: Water Level Monitoring Using Sensors on Raspberry Pi Pico

1. AIM:
To design and implement a water level monitoring system using a sensor interfaced with a Raspberry Pi Pico board to measure and display water levels accurately.

2. REQUIREMENTS:

- **Hardware:**
  - Raspberry Pi Pico
  - Water level sensor -HW038
  - Jumper wires
  - Power supply
- **Software:**
  - MicroPython or Arduino IDE
  - Thonny IDE (for programming)

3. CIRCUIT DIAGRAM:



- The water level sensor is connected to the GPIO pins of the Raspberry Pi Pico.
- Power supply connections and ground connections are established.
- Data pins are configured to read the sensor output.

4. PROCEDURE:

1. Connect the water level sensor to the Raspberry Pi Pico following the circuit diagram.
2. Write the MicroPython code to read sensor values through GPIO pins.
3. Upload the code to the Raspberry Pi Pico using Thonny IDE.
4. Display the sensor readings on the serial monitor.
5. Configure threshold values to trigger alerts when water levels exceed or fall below certain limits.
6. Test the system with varying water levels and record the output.

5. CODE:

```
from machine import ADC, Pin
import time

# Initialize ADC pin (Water Level Sensor connected to GP26)
water_sensor = ADC(Pin(26))

while True:
    # Read ADC value (0 - 65535)
    raw_value = water_sensor.read_u16()

    # Convert ADC value to voltage (3.3V reference)
    voltage = (raw_value / 65535) * 3.3

    #percentage
    Percentage = ((raw_value/65535)*100)

    # Print values
    print(f"Raw ADC Value: {raw_value}, Voltage: {voltage:.2f}V,
Percentage: {Percentage:.2f}")

    # Wait for a while before next reading
    time.sleep(1)
```

6. OBSERVATION:

- The HW-038 sensor accurately detected water presence.
- Real-time changes in water level were reflected on the serial monitor.
- The sensor successfully triggered alerts based on water presence or absence.

7.RESULT:

The water level monitoring system using Raspberry Pi Pico and a water level sensor was successfully implemented. The sensor accurately measured water levels, and the data was displayed on the serial monitor. Threshold-based alerts functioned correctly. The project demonstrates the effectiveness of using a Raspberry Pi Pico for real-time water level monitoring. The system can be enhanced further by adding IoT-based remote monitoring and data logging.

9. APPLICATIONS:

- Home water tank monitoring
- Industrial water level control
- Smart irrigation systems
- Flood detection systems