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DETAILED PROBLEM STATEMENT

Design an IoT device using an ultrasonic sensor and a microcontroller to monitor the water level in a tank. How would you program it to send alerts when the water level is too low or too high?

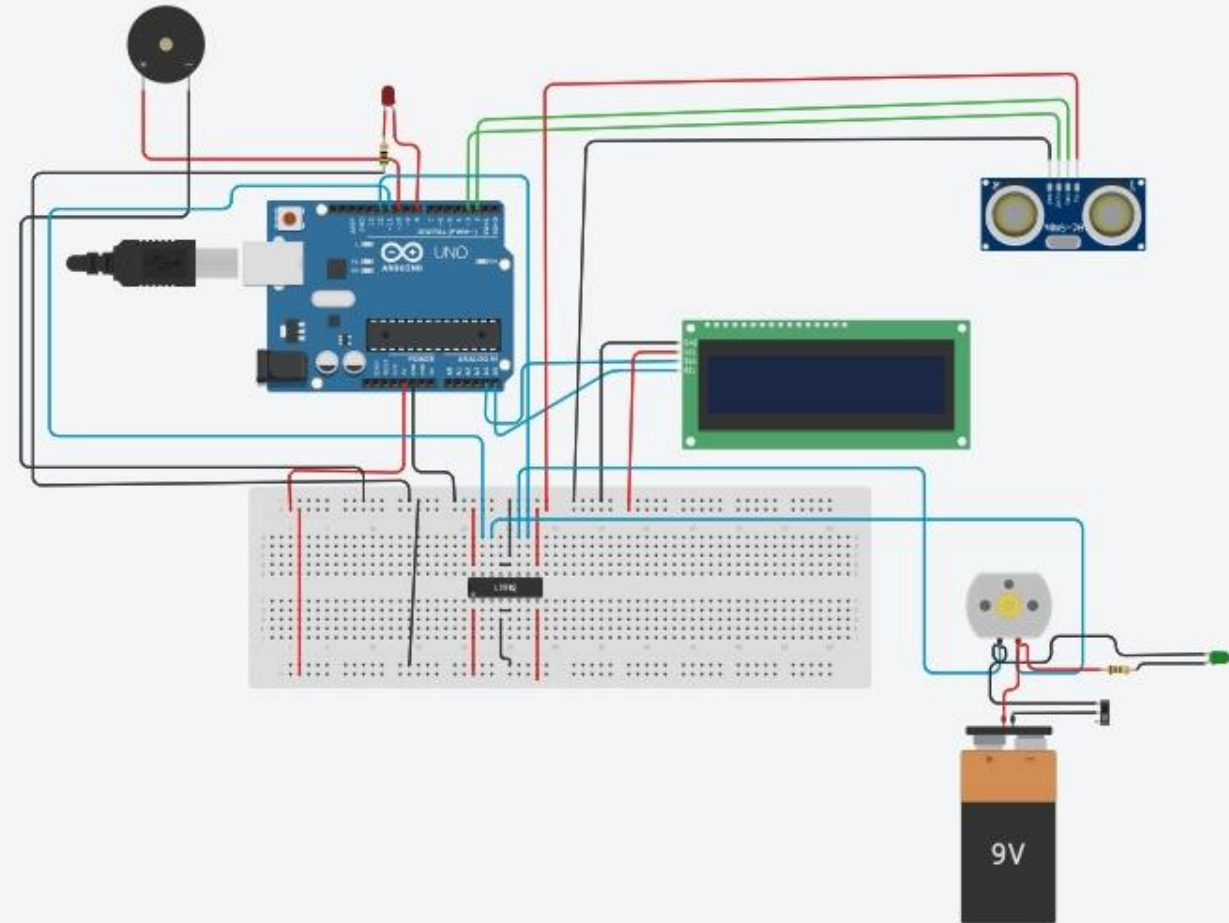
HARDWARE INTEGRATION :-

To design the IoT device following components are required –

- Ultrasonic sensor
- Arduino uno R3
- LCD display
- Water pump (Motor)
- L293d motor driver
- Battery
- Buzzer
- LED

Hardware Simulation link:

<https://www.tinkercad.com/things/4wLP2LeXM4r-symbiot-project>



Ultrasonic Sensor for Water Level Monitoring

1

Sensor Placement

The ultrasonic sensor is strategically mounted on the edge of the water tank, facing the surface of the water.

2

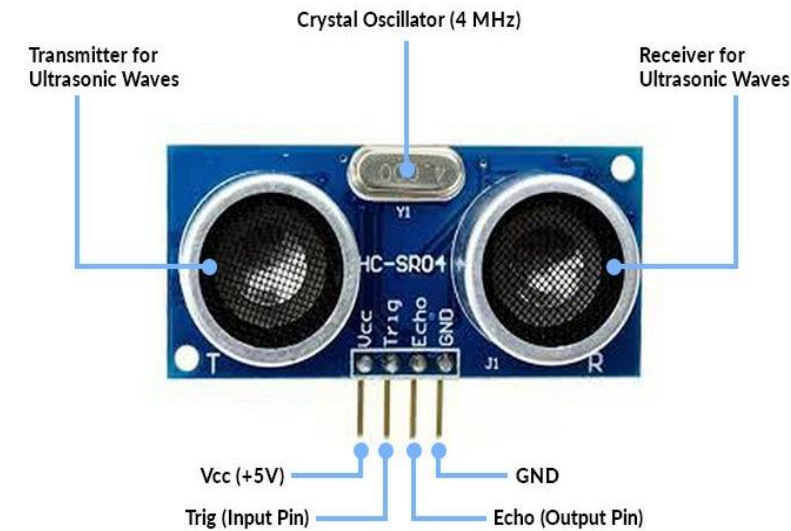
Measurement Principle

The sensor emits high-frequency sound waves that bounce off the water surface and are detected, allowing the device to calculate the water level.

3

Accurate Readings

The sensor provides precise, real-time measurements of the water level, ensuring reliable data for monitoring and management.



Microcontroller Integration and Programming

Microcontroller

The device incorporates a powerful microcontroller that processes the sensor data and manages the device's various functions.

Firmware Programming

Custom firmware is developed to integrate the sensor, control the display, and enable connectivity options for data transmission.

Smart Algorithms

Advanced algorithms analyze the water level data, detect anomalies, and provide intelligent insights to users.

Water level alert

Threshold Detection

The microcontroller continuously checks the water level against a pre-set low-level threshold.

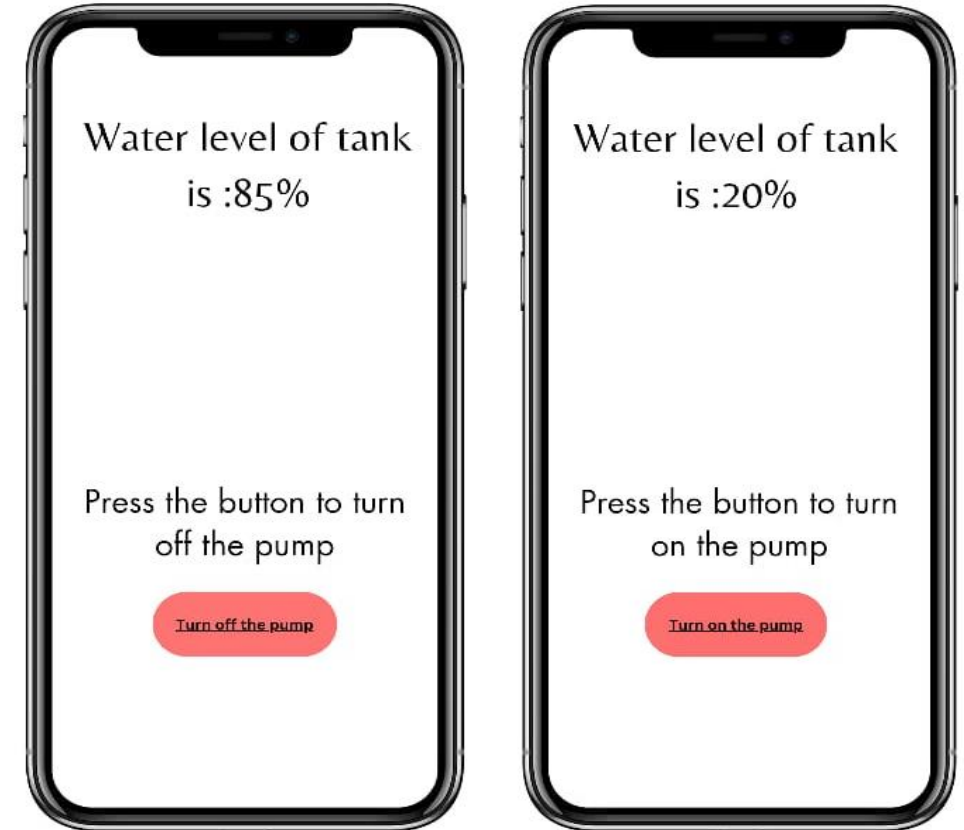
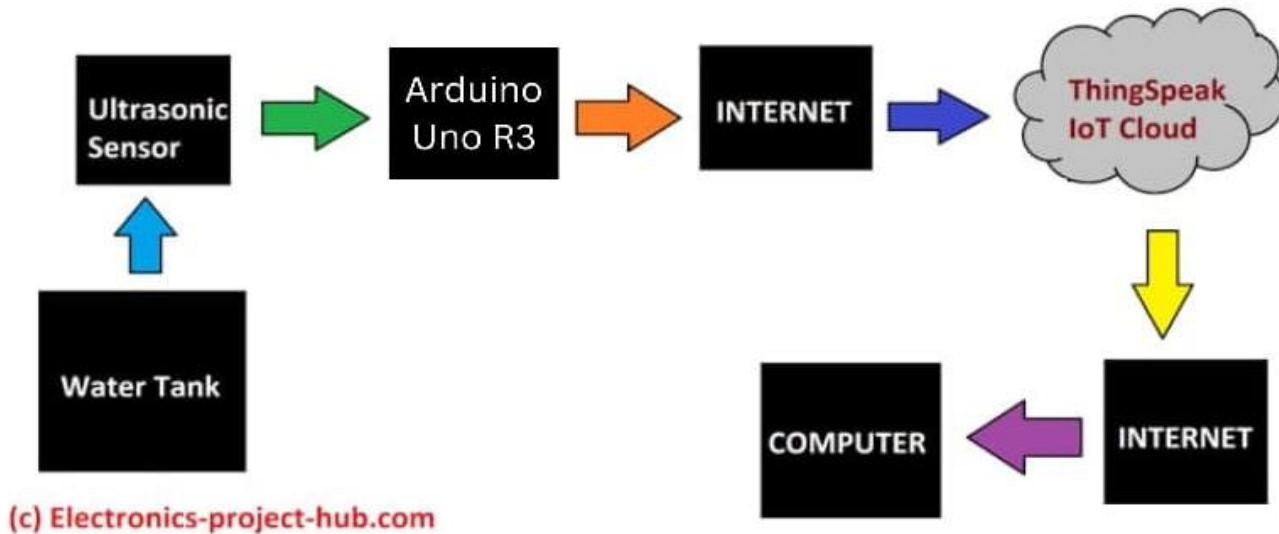
Buzzer Activation

When the water level drops below the threshold or surpasses the max. limit, the microcontroller triggers the buzzer to sound an alert.

LED Activation

The LED notifies the user that the tank needs to be refilled or the pump should be stopped, ensuring timely water management.

Remote communication using MQTT protocol



Conclusion and applications

Water Management

This IoT device helps to efficiently monitor and manage water levels, preventing waste and ensuring timely refilling.

Smart Home Integration

The device can be integrated into a smart home system, providing remote monitoring and control of the water level.

Water Conservation

By alerting users to low water levels, the device promotes sustainable water usage and conservation.

Reference

- <https://iotdesignpro.com/projects/iot-based-water-level-indicator-using-ultrasonic-sensor>
- <https://hackster.io/sridhar-babu/iot-based-tank-water-monitoring-system-6b7658>
- <https://www.tinkercad.com/dashboard>