

IoT-Based Water Level Monitoring



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Schematic Diagram

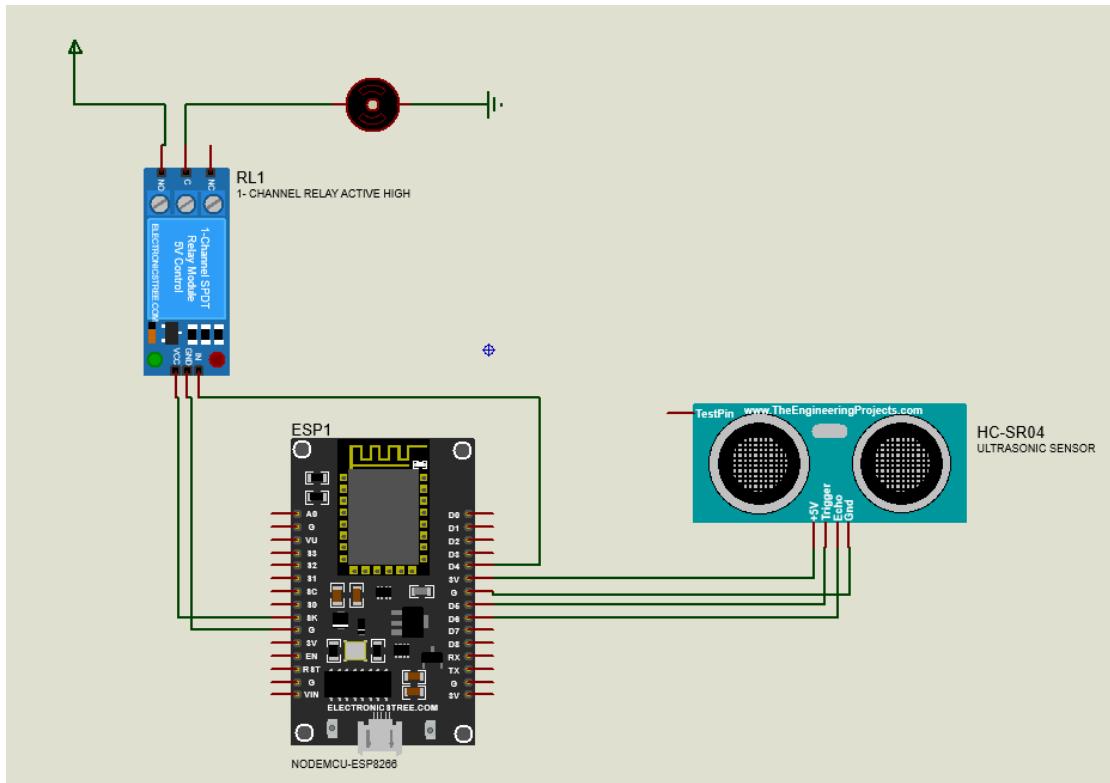


Figure 1: (Proteus)

Circuit Diagram

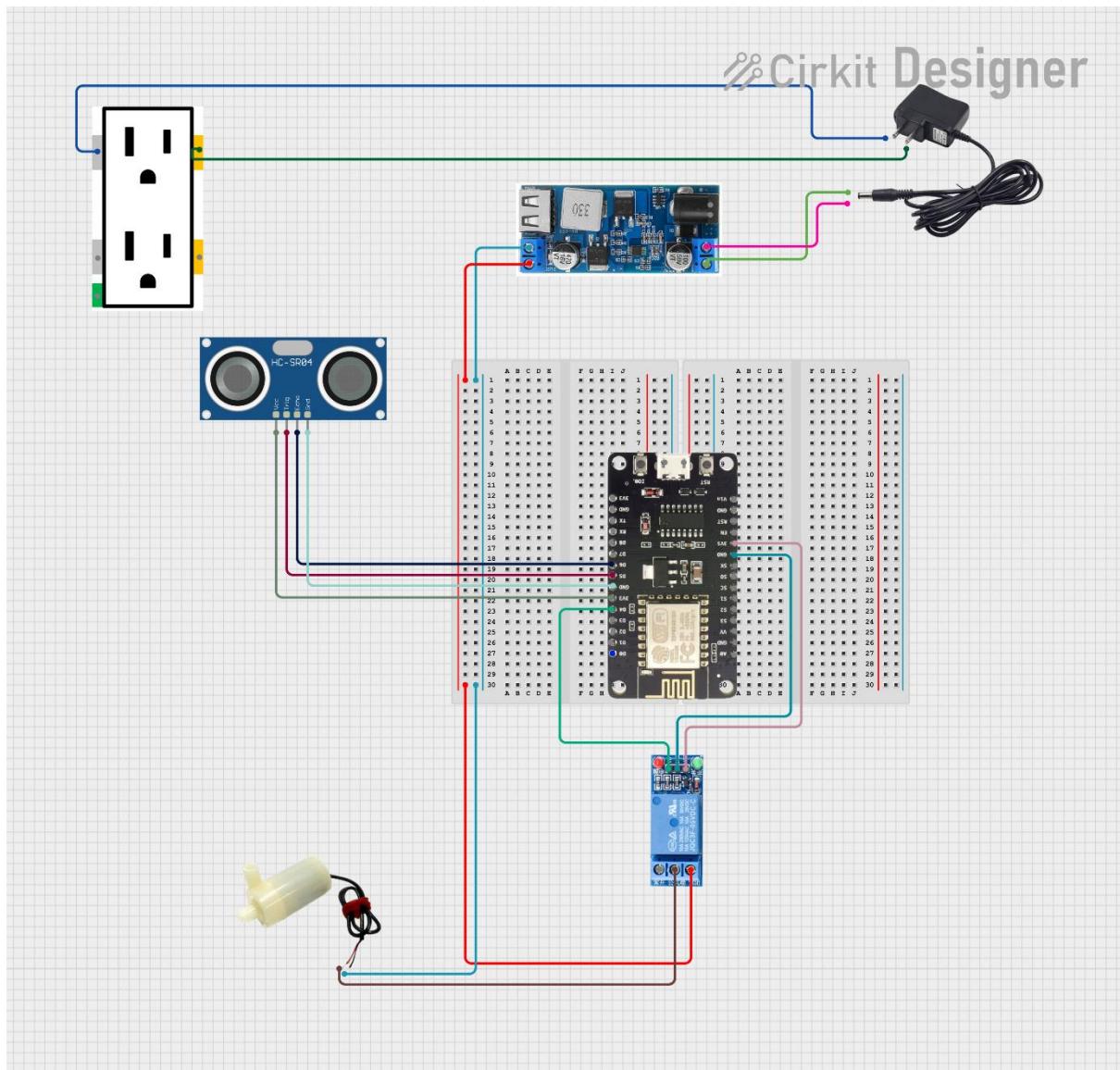


Figure 2: (Fritzing)

Source Code

```
#include "arduino_secrets.h"
#include "thingProperties.h"

#define TRIG_PIN D5
#define ECHO_PIN D6
#define RELAY_PIN D4 // Relay controlling the pump

const int tankHeight = 18;          // Physical tank height in cm
const int effectiveMaxLevel = 16;    // Actual max water level (to show 100%)
const int lowLevelThreshold = tankHeight / 2; // Turn pump ON if level < 9 cm
const int pumpOffLevel = 15;         // Turn pump OFF when level == 15 cm

long duration;
int distance;
bool pumpState = false; // false = OFF, true = ON

void setup() {
    pinMode(TRIG_PIN, OUTPUT);
    pinMode(ECHO_PIN, INPUT);
    pinMode(RELAY_PIN, OUTPUT);

    digitalWrite(RELAY_PIN, HIGH); // Pump initially OFF (active LOW relay)

    Serial.begin(9600);
    delay(1500);

    initProperties(); // Initialize Arduino IoT Cloud variables

    ArduinoCloud.begin(ArduinoIoTPreferredConnection);
    setDebugMessageLevel(2);
    ArduinoCloud.printDebugInfo();
}

void loop() {
    ArduinoCloud.update();

    // Trigger ultrasonic pulse
    digitalWrite(TRIG_PIN, LOW);
    delayMicroseconds(2);
    digitalWrite(TRIG_PIN, HIGH);
    delayMicroseconds(10);
    digitalWrite(TRIG_PIN, LOW);

    // Read echo and calculate distance from sensor to water
    duration = pulseIn(ECHO_PIN, HIGH);
    distance = duration * 0.034 / 2;
```

```

// Calculate actual water level (tankHeight - distance)
int level = tankHeight - distance;

// Clamp values
if (level < 0) level = 0;
if (level > tankHeight) level = tankHeight;

// Normalize to 0–100% using effectiveMaxLevel
water_level = (level * 100) / effectiveMaxLevel;
if (water_level > 100) water_level = 100; // Cap at 100%

// Debug output
Serial.print("Distance from sensor: ");
Serial.print(distance);
Serial.print(" cm -> Water in tank: ");
Serial.print(level);
Serial.print(" cm (");
Serial.print(water_level);
Serial.println("%)");
}

// Pump control with hysteresis
if (level < lowLevelThreshold && !pumpState) {
    digitalWrite(RELAY_PIN, LOW); // Turn pump ON (active LOW)
    pumpState = true;
    Serial.println("⚠ Water dropped below 9 cm. Pump ON.");
}
else if (level >= pumpOffLevel && pumpState) {
    digitalWrite(RELAY_PIN, HIGH); // Turn pump OFF
    pumpState = false;
    Serial.println("✓ Water reached 15 cm. Pump OFF.");
}

delay(2000); // 2-second interval
}

```