Project Documentation: Water Level Monitoring System

Group Members:
Sabawoon Jamal
Waheedullah Zarifzoi
Sharif Ullah Danish
Group: B, 6th Semester
Submitted to: Omar Bin Samin

Project Title: Water Level Monitoring System for Life-saving Applications

1. **Introduction:**
The Water Level Monitoring System is an embedded project designed to monitor water levels in various settings, such as bottles, streams, or dams. The system utilizes sensors to detect water levels and triggers alerts or LED indicators accordingly, ensuring prompt action and potential life-saving measures.

2. **Components Utilized:**
The following components were used to build the Water Level Monitoring System:

- Arduino Uno: The Arduino Uno microcontroller board serves as the main control unit for the system. It provides the necessary processing power and I/O capabilities.

- Breadboard: A breadboard is used for prototyping and connecting the various components. It offers a convenient platform for circuit construction.

- Jumper Wires: Male-to-male, female-to-female, and male-to-female jumper wires are used to establish electrical connections between components on the breadboard.

- Red and Green LEDs: The system incorporates red and green LEDs as visual indicators to represent different water level states.

- Water Level Sensors: Three water level sensors are utilized to measure the water level in the designated environment. These sensors provide analog output based on the detected water level.

- Resistor: A resistor is connected in series with each LED to limit the current and protect the LEDs from damage.

- Computer: A computer is required to upload the Arduino code to the Arduino Uno microcontroller.

3. **Circuit Connection:**
The components are connected as follows:

- Arduino Uno: Connect the Arduino Uno to the breadboard using jumper wires. Ensure proper connection of the ground (GND) and 5V pins.

- LEDs and Resistors: Connect the red and green LEDs to the breadboard, placing a resistor in series with each LED to control the current flow.

- Water Level Sensors: Connect the three water level sensors to the breadboard. The analog output pins of the sensors are connected to analog pins A0, A1, and A2 of the Arduino Uno.

4. **Arduino Code:**

```
// cpp
// Define the sensor pins
const int sensor1Pin = A0;  // Sensor 1 connected to analog pin A0
const int sensor2Pin = A1;  // Sensor 2 connected to analog pin A1
const int sensor3Pin = A2;  // Sensor 3 connected to analog pin A2

// Define the LED pins
const int greenLEDPin = 2;  // Green LED connected to digital pin 2
const int redLEDPin = 3;    // Red LED connected to digital pin 3

// Define the water level thresholds
const int lowLevelThreshold = 22;   // Threshold for low water level
const int highLevelThreshold = 500;  // Threshold for high water level
const int normalLevelThreshold = 200;  // Threshold for normal water level

void setup() {
  // Initialize serial communication
  Serial.begin(9600);

  // Set the LED pins as outputs
  pinMode(greenLEDPin, OUTPUT);
  pinMode(redLEDPin, OUTPUT);
}

void loop() {
  // Read the sensor values
  int sensor1Value = analogRead(sensor1Pin);
  int sensor2Value = analogRead(sensor2Pin);
  int sensor3Value = analogRead(sensor3Pin);

  // Check the water level and control the LEDs
  if (sensor3Value > highLevelThreshold) {
    // High water level detected
    digitalWrite(greenLEDPin, LOW);  // Turn off green LED
    digitalWrite(redLEDPin, HIGH);     // Turn on red LED
    Serial.println("HIGH level water");
  } else if (sensor2Value > normalLevelThreshold) {
    // NORMAL water level detected
    digitalWrite(greenLEDPin, LOW);    // Turn off green LED
    digitalWrite(redLEDPin, LOW);     // Turn off red LED
```

```
    Serial.println("NORMAL level water");
  } else {
    // LOW water level
    digitalWrite(greenLEDPin, HIGH);    // Turn ON green LED
    digitalWrite(redLEDPin, LOW);      // Turn off red LED
    Serial.println("LOW water level");
  }

  delay(2000);  // Delay for stability
}
```

5. **Operation**:
   - The water level sensors continuously monitor the water levels and provide analog readings to the Arduino Uno.
   - The Arduino Uno compares the sensor readings against the predefined low and high water level thresholds.
   - Based on the comparison, the appropriate LED (green or red) is illuminated to indicate the water level status.
   - The system also outputs corresponding messages to the Serial Monitor for debugging and monitoring purposes.

6. **Conclusion**:
   The Water Level Monitoring System demonstrates the potential of embedded systems in real-life applications. By utilizing Arduino Uno, breadboard, jumper wires, LEDs, water level sensors, and resistors, this project offers a cost-effective solution for water level monitoring in various scenarios. With the ability to trigger alerts and provide visual indicators, it contributes to saving lives and protecting valuable property. The project also serves as a foundation for further enhancements, such as incorporating additional sensors or transmitting data wirelessly to enable comprehensive water monitoring.