19Z604 - Embedded Systems

Assignment Presentation

Smart Aquarium Motor

Project Report

Team Members:

Roll No	Name
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Introduction:

Aquarium is a water-filled fish tank used for keeping aquatic life and is commonly used for decorating. The smart motored Aquarium Kit will help people maintain the water level in the tank without any effort. This project designs a system that maintains the perfect water level in the aquarium tank and constantly gives status about the water level automatically to help in maintaining the fish tank.

With the help of an Arduino microcontroller, ultrasonic sensor, and water pump the water level in the fish tank can be monitored and maintained above a certain threshold. This project uses a similar concept to the present system but the difference is that the present project uses a water level sensor instead of an ultrasonic sensor and also has two different ultrasonic sensors in the system, one to monitor the water level in the fish tank and the other to monitor the water level in source tank. The method in short is to refill the tank once the tank level becomes too low from the source water tank and that will happen once the ultrasonic sensor senses the level of the water to activate the water pump. Also, this system checks the water level in the source tank. This application can also be used in water fountains.

Problem Statement:

To design an embedded system to monitor the water level and refill water in the fish tank and if the water level goes below the threshold value it automatically refills the fish tank. This system constantly gives status about the water level of the fish tank and source water tank to the user.

Components Required :

- Arduino UNO Board - 1
- Ultrasonic sensor - 2
- Relay module - 1
- Water pump - 1
- Bluetooth module - 1
- Android mobile phone

Schematic Diagram :
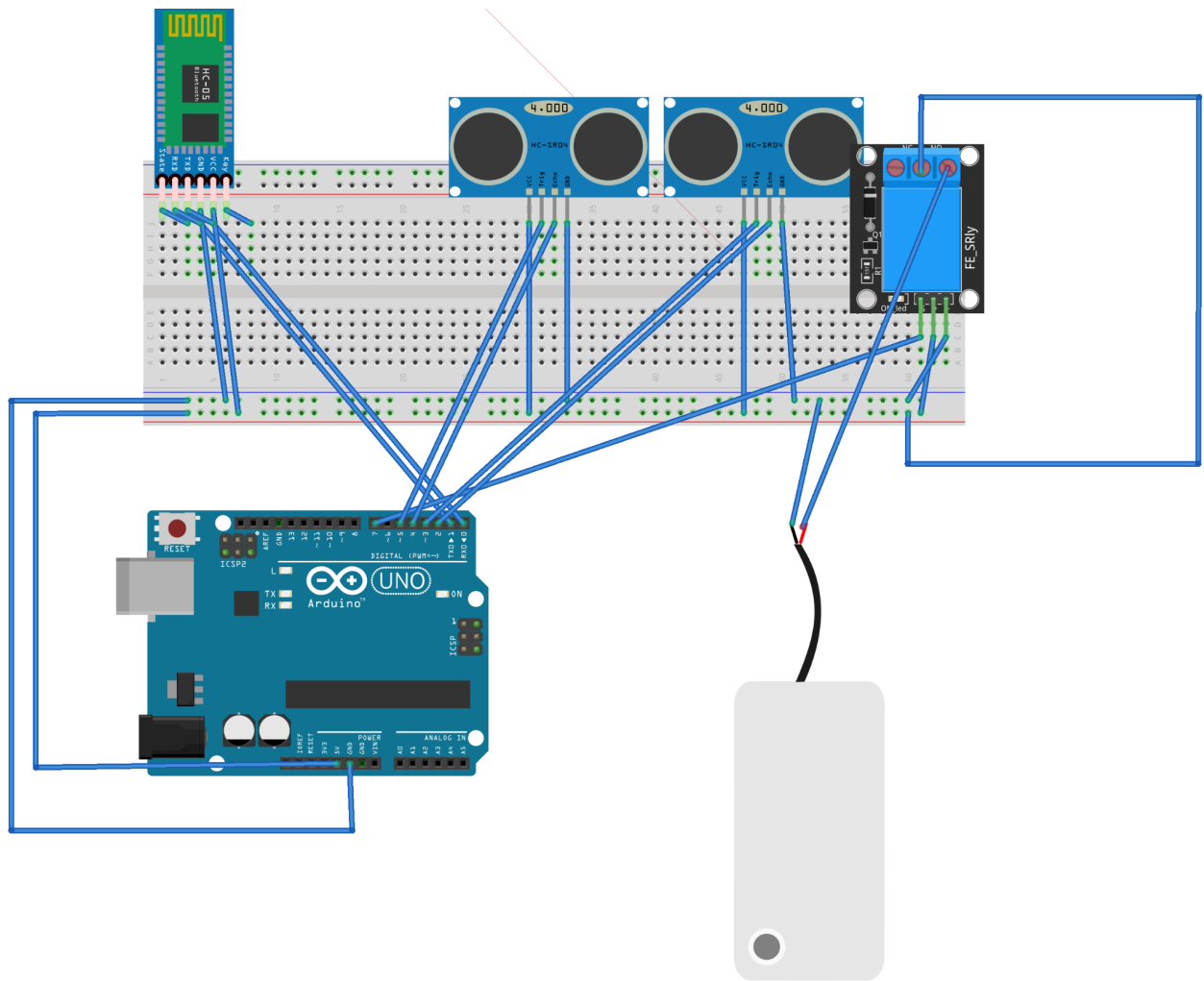
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Code :

```
int trigPin = 5;    // TRIG pin
int echoPin = 4;    // ECHO pin
int led = 10;
int led2 = 11;
int trigPin2 = 3;
int echoPin2 = 2;

float duration_us, distance_cm;
int distanceTreshold = 0;
double percent=100.0;
int count = 0;
int Limit = 27;
```

```arduino
long duration, percentage, range;

void setup() {
  // begin serial port
  Serial.begin (9600);
  // configure the trigger pin to output mode
  pinMode(trigPin, OUTPUT);
  // configure the echo pin to input mode
  pinMode(echoPin, INPUT);
  pinMode(trigPin2, OUTPUT);
  pinMode(echoPin2, INPUT);
  pinMode(led, OUTPUT);
  pinMode(led2, OUTPUT);
}

void loop() {
  // generate 10-microsecond pulse to TRIG pin
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);

  // measure duration of pulse from ECHO pin
  duration_us = pulseIn(echoPin, HIGH);

  // calculate the distance
  distance_cm = 0.01723 * duration_us;
  distanceTreshold = 336;
  percent = (distance_cm/336.0)*100.0;
  if ( distance_cm > distanceTreshold-300)
    {
      if (count ==1){
        delay(1000);
      }

      if (count ==1){
        delay(1000);
      }
      digitalWrite(led, HIGH);
      Serial.println("Motor ON ");
    }
   if ( distance_cm < distanceTreshold-325){
      if (count ==1){
        delay(1000);
      }
      digitalWrite(led, LOW);
      Serial.println("Motor OFF");

      if (count ==1){
```

```arduino
      delay(1000);
     }


    }
    if (count ==1){
      delay(1000);
    }
  delay(500);
  digitalWrite(trigPin2, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin2, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin2, LOW);
  duration = pulseIn(echoPin2, HIGH);
  range  = 0.01723 * duration ;

if ((range >= 0)){
   if (range > 100){
      Serial.print("Tank is Empty ");
    }
   if ((range >= 30) && (range <= 70)){
      Serial.print("M ");
    }
   if (range <= 30){
      Serial.print("Tank IS Full ");
    }
   Serial.println();
   delay(500);
  }}
```

Android App Output:

Challenges Faced :

Tinkercad simulation of our idea performed as expected with few problems, however we encountered more issues when we implemented utilizing hardware components.

- It was difficult to find resources in Android Studios for receiving Bluetooth data. So, we used a different tool for creating an android application (MIT Android Inventor). It takes time to adjust to the new environment.
- The Ultrasonic sensor did not function as expected and showed incorrect readings.
- Synchronizing the bluetooth and android application was difficult. Random values of delay needed to be used for synchronization.

Contribution of Team Members :

Roll No	Name	Contribution
19Z316	Goutham S	Android application
19Z326	Krishna Teja B	Arduino Coding
19Z362	Vinoth Subbiah PL	Android application
20Z462	Mukesh	Hardware
20Z465	Srinivasan	Arduino Coding

Reference :

- https://www.tinkercad.com/things/1esaFHmlPJ1-water-level-detector
- https://www.tinkercad.com/things/dgYi8uXcxDy-copy-of-oxygen-sensor-circuit/editel?tenant=circuits
- https://www.tinkercad.com/things/87PeAGw899a-copy-of-final-exam-automatic-pump-and-water-level-controller/editel?tenant=circuits
- https://create.arduino.cc/projecthub/karem_benchikha/smart-aquarium-d4d2dd

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