VIT®

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

IOT EDGE NODES AND ITS APPLICATIONS CSE4034 (L55+L56)

Allen Ben Philipose – 18BIS0043

TASK – 3
SMART WATER TANK

Aim

Create a TinkerCad circuit simulation for a smart water tank level using an Arduino, multiple sensors, and actuators with an alerting section.

Usage Scenario

This developed circuit can be used for detecting water levels in a tank using an ultrasonic sensor, which will be placed on the rim of the tank. So, the distance detected will be the proximity of the water level till the tipping point.

When the water level rises, the ultrasonic sensor detects it moving closer and when it crosses a certain threshold distance, the microcontroller connected to the sensor shuts down the motor which was used to pump water and send alerts to the operator.

Alerting segment has 2 primary divisions –

i. Red LED
ii. ThingSpeak

Integration with ThingSpeak not only will help in data collection and analysis, but also in improving the alert systems in the future. The response time of this system is short as the processing is done on the edge node even though cloud storages are integrated.

Code

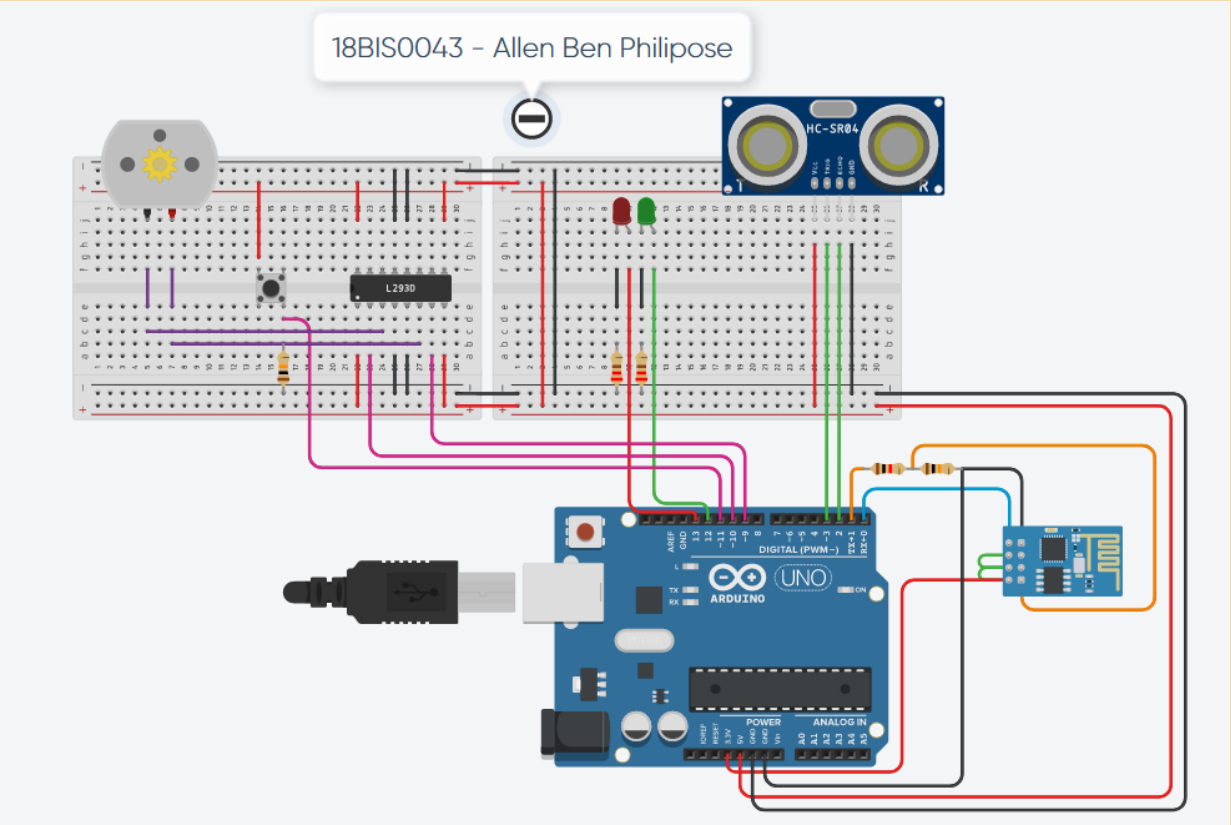
```
String ssid     = "Simulator Wifi";
String password = "";
String host     = "api.thingspeak.com";
const int httpPort   = 80;
String       uri                                    =
"/update?api_key=Q8ISYBE1VAIBAT25&field3=";
int Distance = 0;
int Motor;
long   readUltrasonicDistance(int   triggerPin,   int
echoPin)
{
  pinMode(triggerPin, OUTPUT);
  digitalWrite(triggerPin, LOW);
  delayMicroseconds(2);
  digitalWrite(triggerPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(triggerPin, LOW);
  pinMode(echoPin, INPUT);
  return pulseIn(echoPin, HIGH);
}
int setupESP8266(void) {
  Serial.begin(115200);
  Serial.println("AT");
```

```
  delay(10);
  if (!Serial.find("OK")) return 1;
  Serial.println("AT+CWJAP=\""  +  ssid  +  "\",\""  +
password + "\"");
  delay(10);
  if (!Serial.find("OK")) return 2;
  Serial.println("AT+CIPSTART=\"TCP\",\""  +  host  +
"\"," + httpPort);
  delay(50);
  if (!Serial.find("OK")) return 3;
  return 0;
}
void anydata(int t1, int t2) {
  int temp1 = map(t1,0,1000,0,1000);
  int temp2 = map(t2,0,1000,0,1000);
  String httpPacket = "GET " + uri + String(temp1) +
"&field4="    +    String(temp2)    +"&amp"    +    "
HTTP/1.1\r\nHost: " + host + "\r\n\r\n";
  int length = httpPacket.length();
  Serial.print("AT+CIPSEND=");
  Serial.println(length);
  delay(10);
  Serial.print(httpPacket);
  delay(10);
```

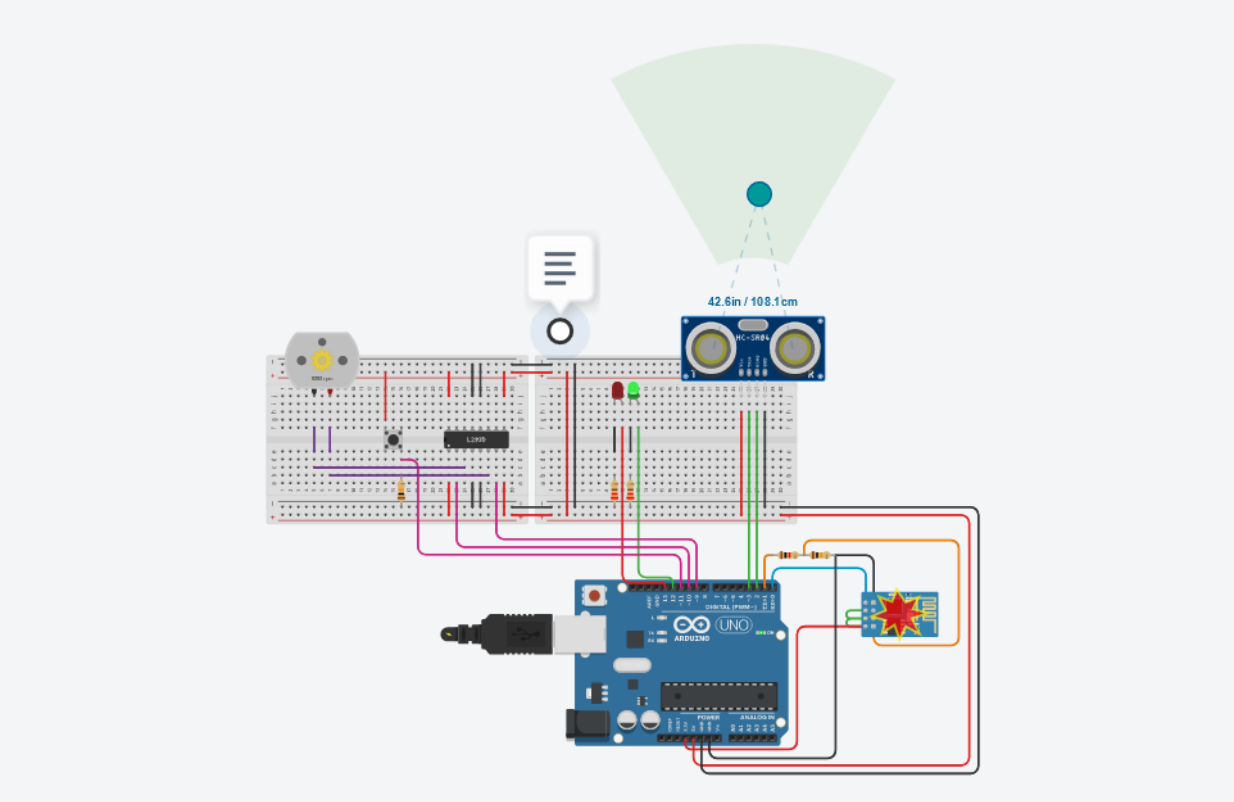
```
  if (!Serial.find("SEND OK\r\n")) return;
}

void blink(){
  for(int i=0;i<5;i++){
    digitalWrite(8, HIGH);
    delay(200);
    digitalWrite(8, LOW);
    delay(200);
  }
}

void setup() {
  pinMode(13, OUTPUT);
  pinMode(12, OUTPUT);
  pinMode(11, INPUT);
  pinMode(10, INPUT);
  pinMode(9, INPUT);
  pinMode(8, OUTPUT);
  pinMode(6, INPUT);
  setupESP8266();
}
```

```
void loop() {
  Distance = 0.01723 * readUltrasonicDistance(3, 2);
  if (Distance >= 80) {
      digitalWrite(13, LOW);
      digitalWrite(12, HIGH);
      digitalWrite(9, HIGH);
      digitalWrite(10, LOW);
      blink();
      Motor = 1;
  }
  else {
      digitalWrite(13, HIGH);
      digitalWrite(12, LOW);
      digitalWrite(9, LOW);
      digitalWrite(10, LOW);
      blink();
      Motor = 0;
  }
  anydata(Distance, Motor);
}
```

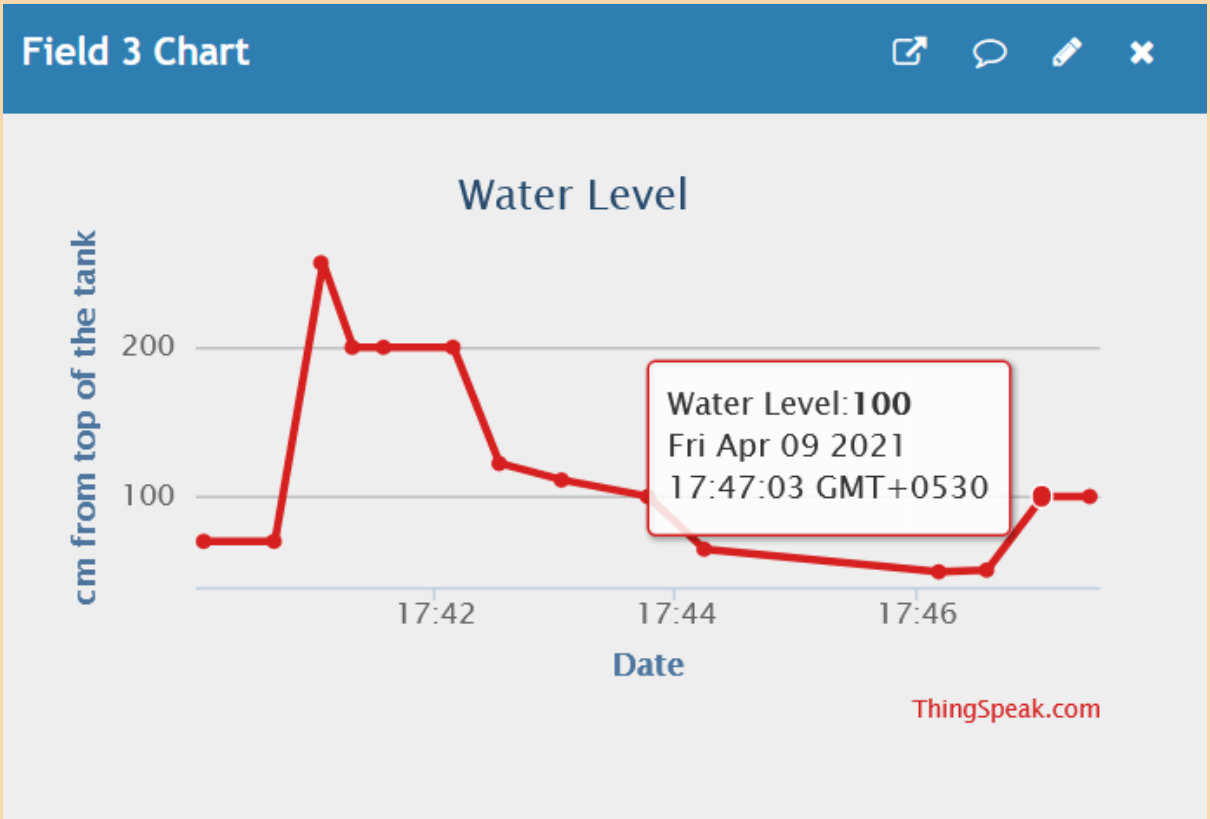
Circuit Diagram

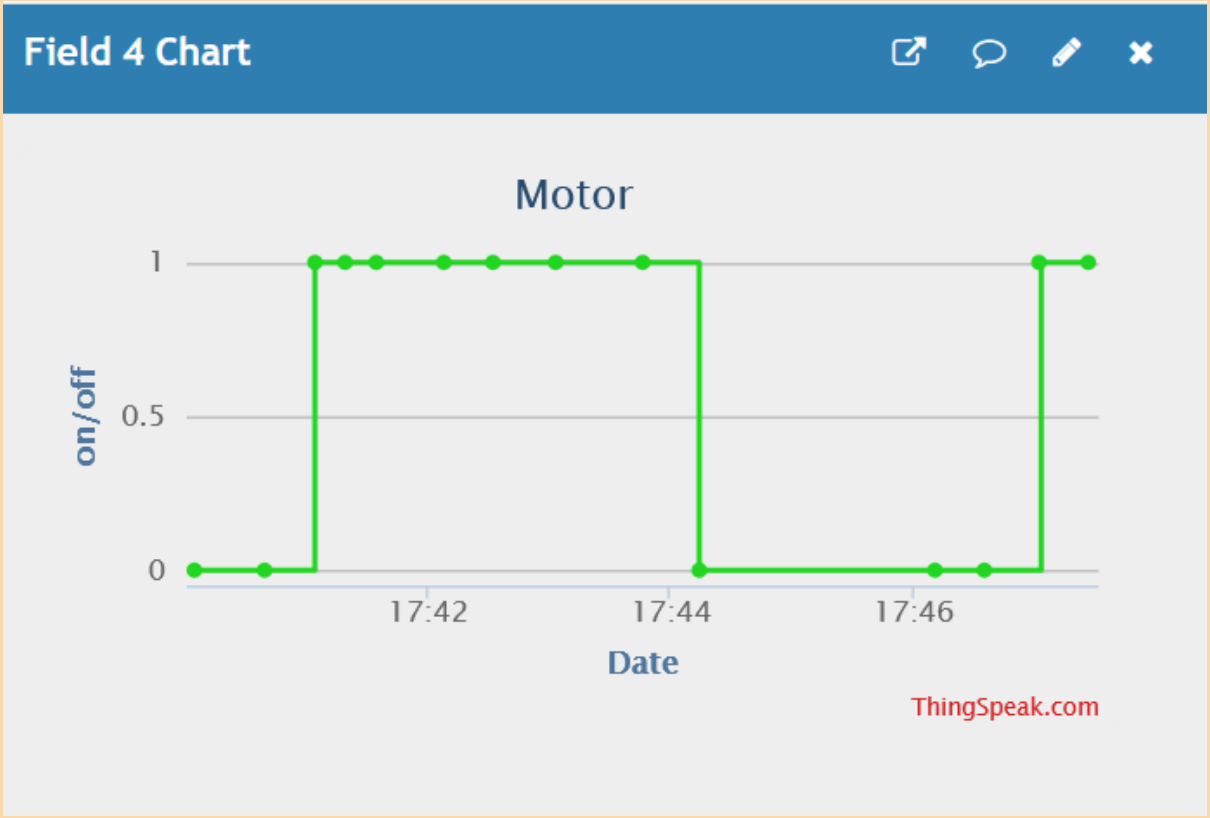


Active circuit:



ThingSpeak output





When **Water >= 80 cm** from top of tank**, motor = on**

Components

1. **ESP8266** – Connection between the local system to cloud services for data analysis, visualization, and other forms of alerting methods.
2. **LEDs** – Red glows when the water is in the proximity and the motor stops rotating. Until then, the water is being pumped and the green LED glows.
3. **Ultrasonic Sensor** – For detecting proximity from the top of the water tank.
4. **Motor** – Standard issue motor used to represent the water motor that will pump water into the tank. Once the parameter exceeds the necessary threshold, the motor is immediately notified about the water level and motor is shut off.
5. **Push button** – Manual Override for the motor.

Conclusion

Therefore, we have created a TinkerCad circuit simulation for a Smart water tank system using an Arduino, ultrasonic sensor, and actuators with an alerting segment. The design stands out because the circuit has multiple systems plugged in for accurate input and a strong array of alerting methods.