SMART SOIL MOISTURE CONTROLLING SYSTEM

Group 09

Group Members

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Introduction to the Project

Sensors

- Soil moisture sensor

- Temperature and humidity sensor- DHT11
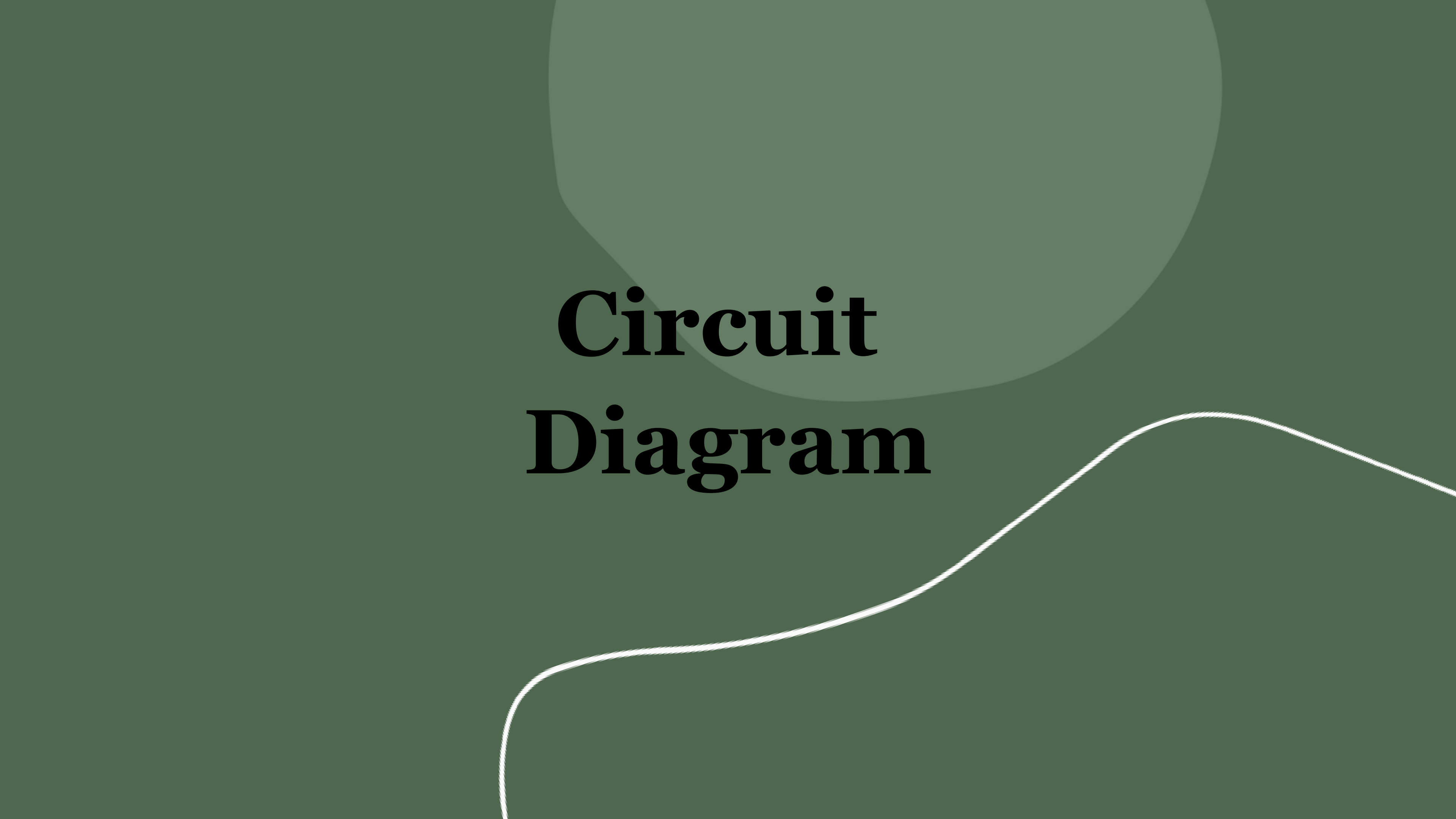
Actuator

- Water-pump

- Building an IoT-based Irrigation System using ESP8266 NodeMCU Module, sensors and actuator.

- Sprinkle water on the soil depending upon the environmental conditions such as **Soil Moisture, Temperature, and Humidity**

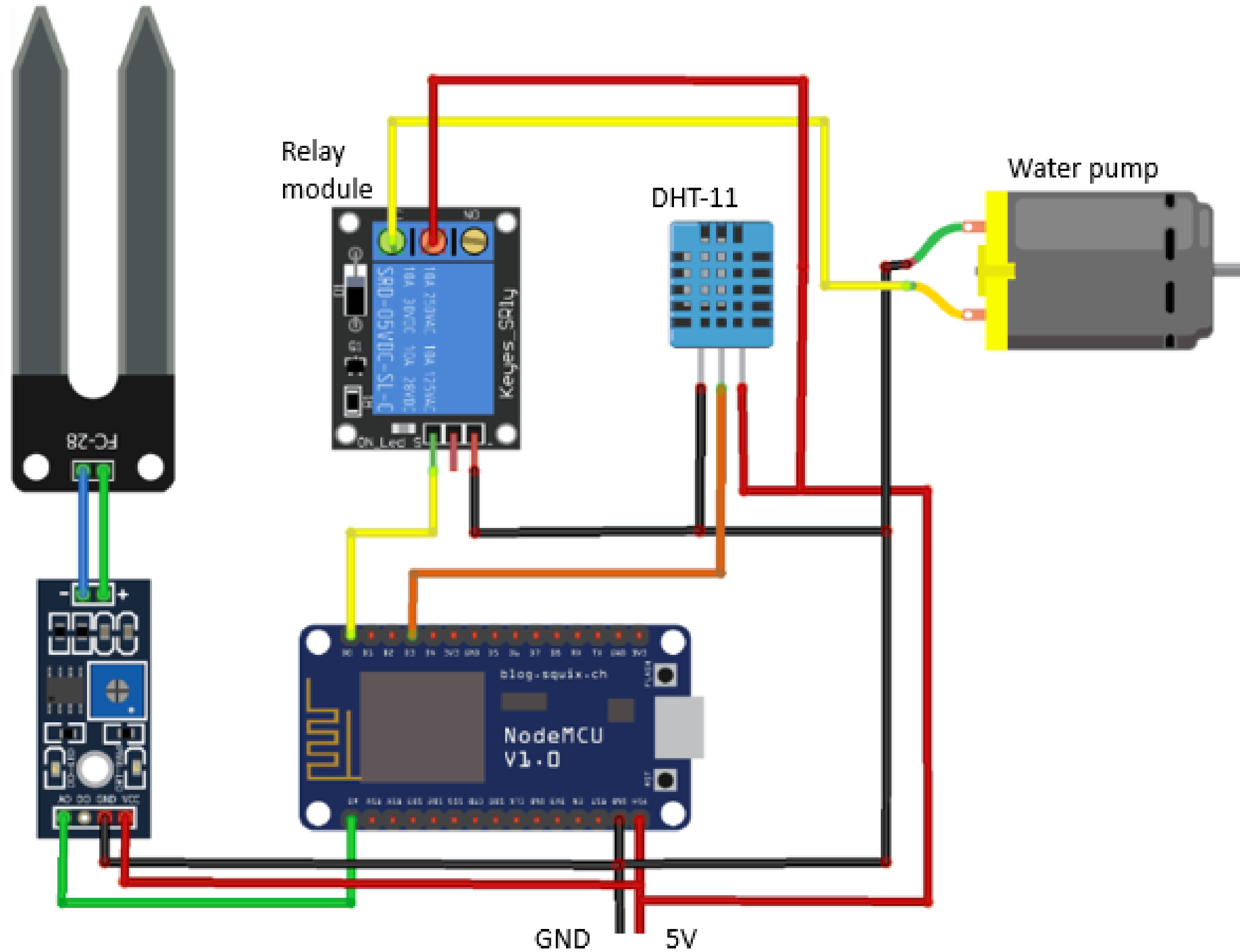- The system will maintain the soil moisture based on the temperature of the environment.

Components Used

- NodeMCU ESP8266
- Soil Moisture Sensor Module
- Water Pump Module
- Relay Module
- DHT11
- Connecting Wires

Circuit Diagram

Soil moisture sensor

Relay module

DHT-11

Water pump

NodeMCU V1.0

blog.squix.ch

GND   5V
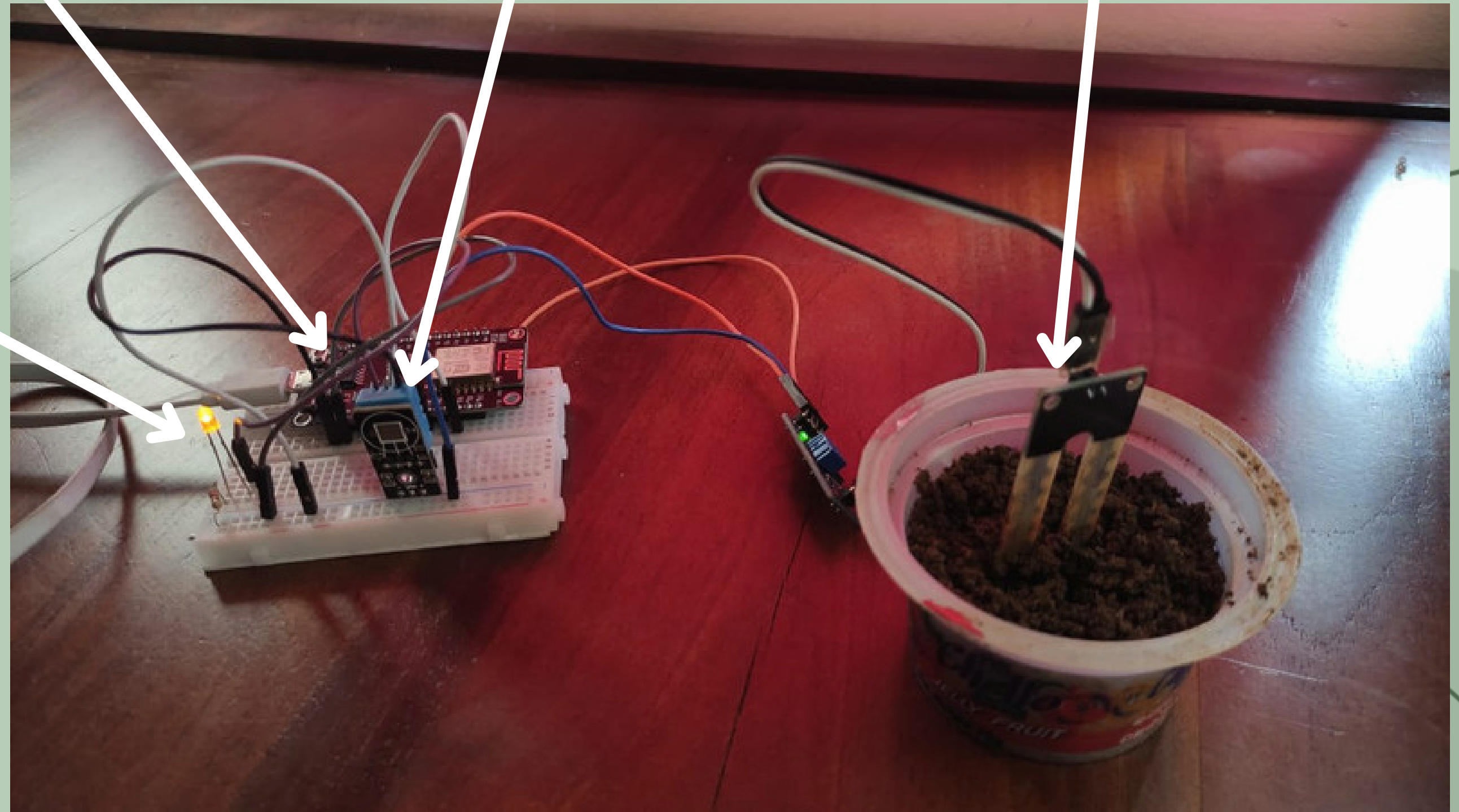
FC-28

Keyes_SQly

SRD-05VDC-SL-C

Hardware Implementation

NodeMCU ESP8266

DHT11 Sensor

Soil Moisture Sensor Module

Actuator -LED
(Indicate the status of the pump)

Sensors & Actuators Control Logic Explanation

Functions

- void readDHTSensor()
- void readMoistureSensor()
- void controlMotor()
- void connectToMQTTBroker()
- void publishHumidity()
- void publishTemperature()
- void publishMoisture()

```
void readMoistureSensor() {
  moisturePercentage = (100.00 - ((analogRead(moisturePin) / 1023.00) * 100.00));
```

Control Logic

```
void controlMotor() {
  if (t <= 15) {
    if (moisturePercentage < 10) {
      digitalWrite(motorPin, HIGH);  // Turn on motor
    } else {
      digitalWrite(motorPin, LOW);  // Turn off motor
    }
  }


  if (t <= 25 && t > 15) {
    if (moisturePercentage < 20) {
      digitalWrite(motorPin, HIGH);  // Turn on motor
    } else {
      digitalWrite(motorPin, LOW);  // Turn off motor
    }
  }


  if (t <= 35 && t > 25) {
    if (moisturePercentage < 30) {
      digitalWrite(motorPin, HIGH);  // Turn on motor
    } else {
      digitalWrite(motorPin, LOW);  // Turn off motor
    }
  }


  if (t > 35) {
    if (moisturePercentage < 40) {
      digitalWrite(motorPin, HIGH);  // Turn on motor
    } else {
      digitalWrite(motorPin, LOW);  // Turn off motor
    }
  }
}
```

Sending Data to the MQTT Broker

Temperature

Humidity

Soil Moisture Percentage

mosquitto

C:\Windows\System32\cmd.exe - mosquitto_sub -t UoP_CO_326_E18_09_dht11_temp -h test.mosquitto.org

Microsoft Windows [Version 10.0.19045.3086]
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C:\Program Files\mosquitto>mosquitto_sub -t UoP_CO_326_E18_09_dht11_temp -h test.mosquitto.org
^C
C:\Program Files\mosquitto>mosquitto_sub -t UoP_CO_326_E18_09_dht11_temp -h test.mosquitto.org
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C:\Windows\System32\cmd.exe - mosquitto_sub -t UoP_CO_326_E18_09_dht11_hum -h test.mosquitto.org

Microsoft Windows [Version 10.0.19045.3086]
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C:\Program Files\mosquitto>mosquitto_sub -t UoP_CO_326_E18_09_dht11_hum -h test.mosquitto.org
^C
C:\Program Files\mosquitto>
C:\Program Files\mosquitto>
C:\Program Files\mosquitto>mosquitto_sub -t UoP_CO_326_E18_09_dht11_hum -h test.mosquitto.org
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C:\Windows\System32\cmd.exe - mosquitto_sub -t UoP_CO_326_E18_09_soil_moisture -h test.mosquitto.org

Microsoft Windows [Version 10.0.19045.3086]
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C:\Program Files\mosquitto>mosquitto_sub -t UoP_CO_326_E18_09_soil_moisture -h test.mosquitto.org
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C:\Program Files\mosquitto>mosquitto_sub -t UoP_CO_326_E18_09_soil_moisture -h test.mosquitto.org
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37.15

Visualize Data on SCADA

Design on Node-Red
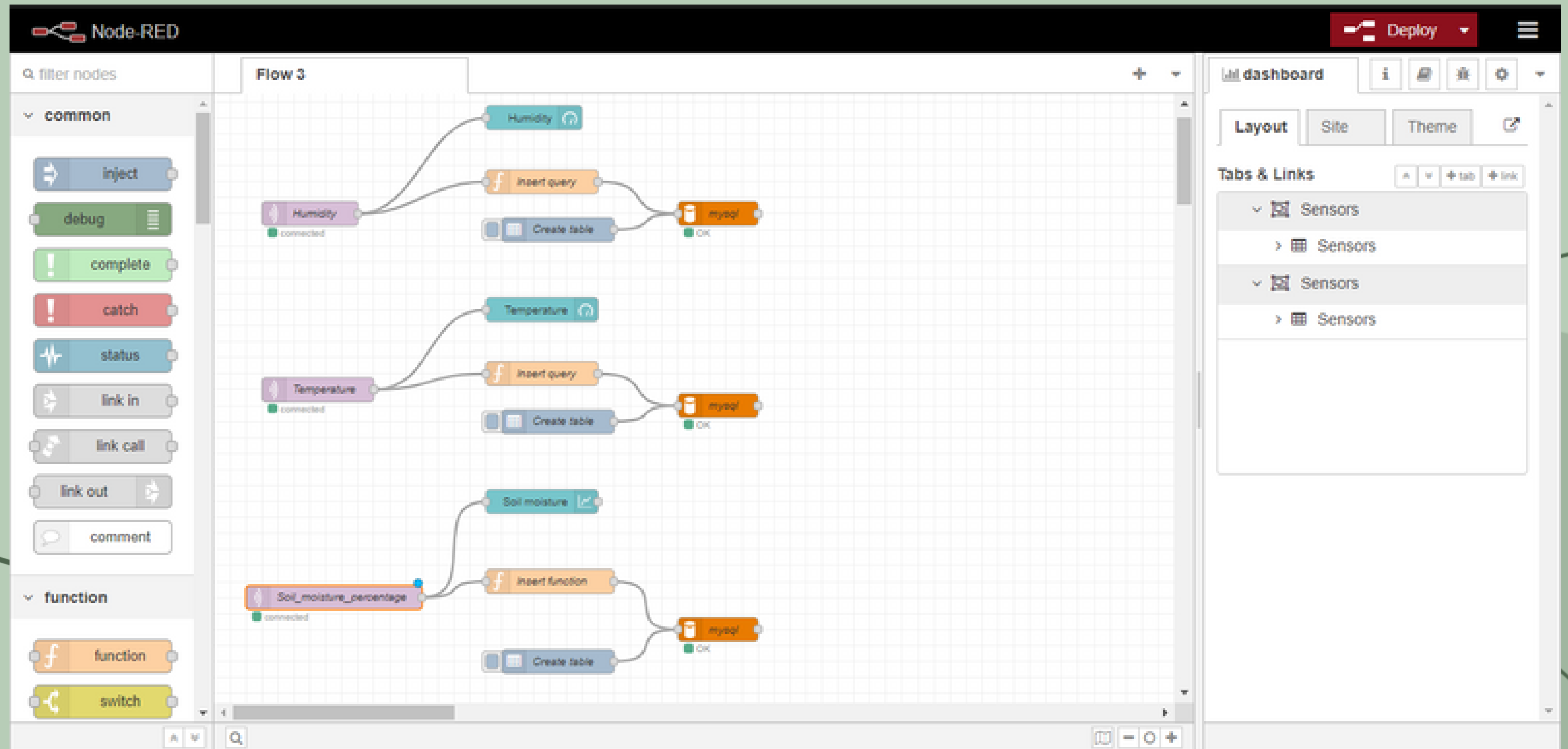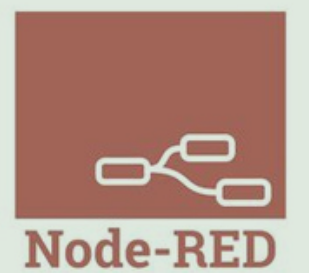
Dashboard
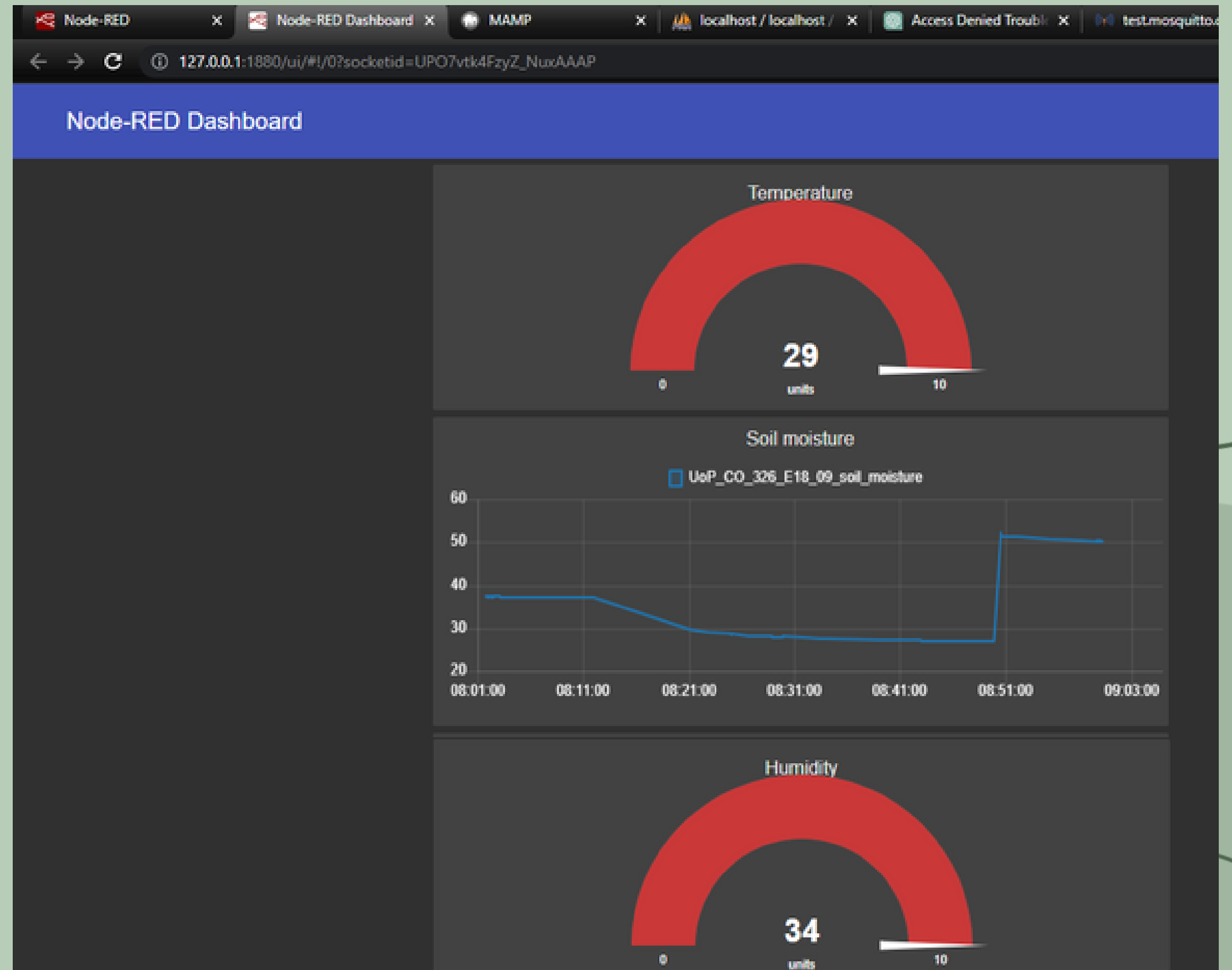
Storing Data in the Database

Tables created in Database

Data Records
Inserted into Tables

Demonstration

GITHUB REPO

🔗 https://github.com/cepdnaclk/e18-CO326-Smart-Soil-Moisture-Controlling-System

QNA

THANK YOU!