Smart Agriculture (Soil Monitoring)

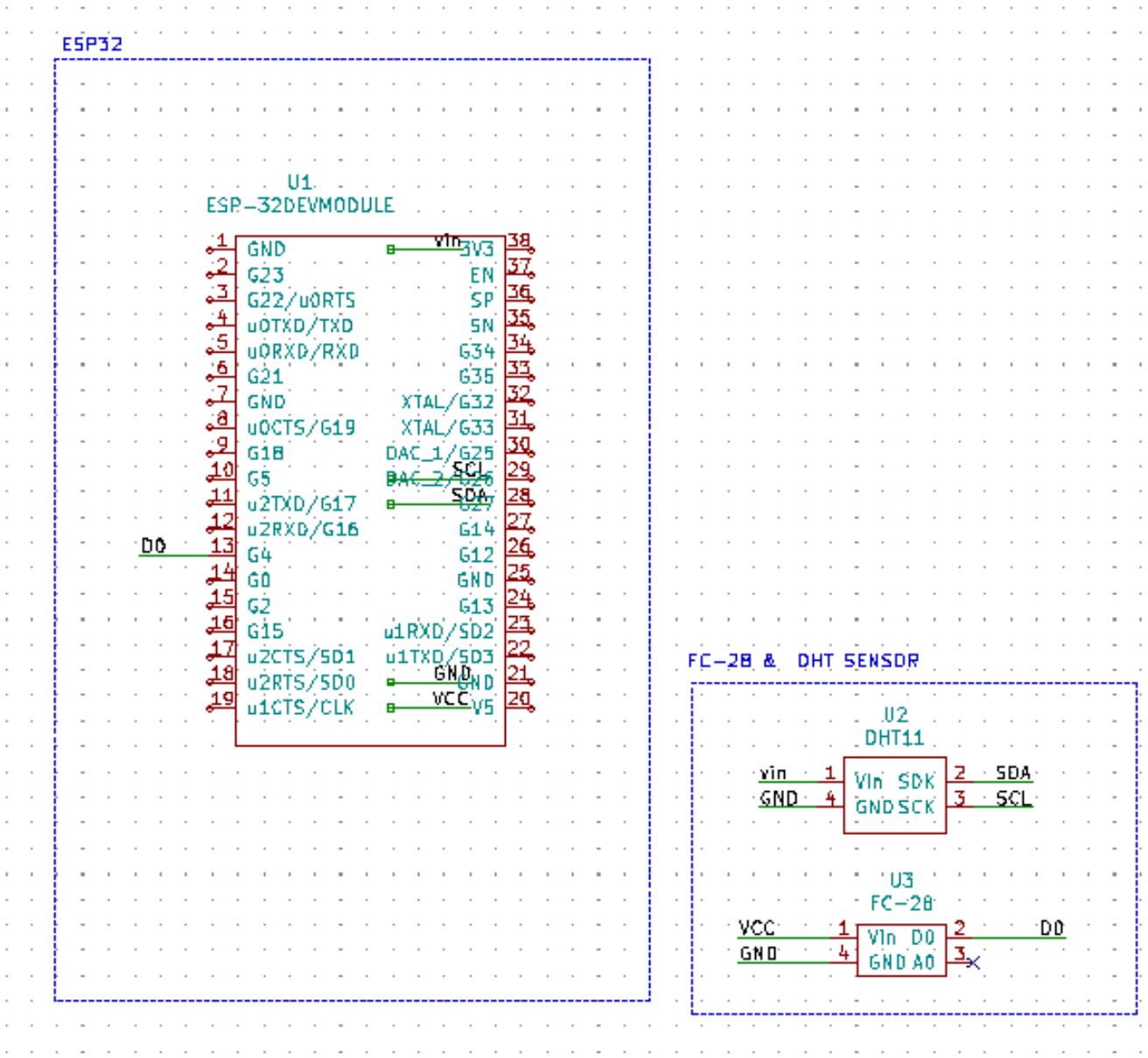
AIM: In this project we monitor soil and send its condition to soil moni application via firebase.

COMPONENT:

HARDWARE: ESP-32 development board, DTH11 sensor (temperature and humidity), FC-28 sensor (soil moisture).

SOFTWARE: Arduino IDE, Google Firebase, MIT app inventor.

SCHAMATIC:



CODE: This Arduino Ide code will take reading from DHT-11 and FC-28 senor to esp32 then with the help of wi-fi feature of esp32 it send the reading to the google firebase then from there firebase send to the application.

CODE_EXPLANATION:

```
#include <WiFi.h>
#include <IOXhop_FirebaseESP32.h>
#include <DHT.h>
```

These are the required library added to program **WiFi.h** for Wi-Fi feature of esp32 and **IOXhop_FirebaseESP32.h** for connecting esp32 to firebase and DHT.h for **DHT-11** sensor.

```
#define FIREBASE_HOST "testxxxxxxxxxxxxxx.com"
#define FIREBASE_AUTH "11xxxxxxxxxxxxxxxxxxxxxxxxxo"
#define WIFI_SSID "xxxxxxx"
#define WIFI_PASSWORD "xxxxxxxx"
# define sensorPin 36
#define DHTPIN 27
#define DHTTYPE DHT22
```

These parameters are unique for each firebase and WIFI. Here we define firebase host and authentication id of project from firebase. WIFI _SSID is your Wi-Fi name and WIFI_PASSWORD is your Wi-Fi password. Pin 36 of esp32 is use for analog reading of FC-28 sensor and pin 27 for DTH sensor output.

```
DHT dht(DHTPIN, DHTTYPE);
```

Here we passed DHTPIN and its type (here type is 11) to DHT.h header file using DHT dht () function.

```
Serial.begin(115200);
delay(1000);
WiFi.begin(WIFI_SSID, WIFI_PASSWORD);
```

Here we define baud rate i.e 115200 and after 1sec delay pass Wi-Fi name and password to **WiFi.h** header file with the help of **WiFi.beign ()** function.

```
Serial.print("Connecting to ");
 Serial.print(WIFI_SSID);
 while (WiFi.status() != WL_CONNECTED) {
  Serial.print(".");
  delay(500);
  }
```

This segment will check the Wi-Fi status of esp32 and print dot (.) till it not connected to given Wi-Fi .

```
  Serial.println();
  Serial.print("Connected to ");
  Serial.println(WIFI_SSID);
  Serial.print("IP Address is : ");
  Serial.println(WiFi.localIP());
  Firebase.begin(FIREBASE_HOST, FIREBASE_AUTH);
  dht.begin();
```

When esp32 will be connected to provided Wi-Fi the it will print its local ip address by **WiFi.localIP()** and it begin the firebase and DHT library with the help of **Firebase.begin()** and **dht.begin()** function.

```
dht.readHumidity()
dht.readTemperature()
analogRead(sensorPin)
```

These three functions is to read humidity, temperature and moisture value (from analog pin of moisture sensor). All these three values will be read in float variable .

```
String fireHumid = String(h) + String("%");
String fireTemp = String(t) + String("°C");
String fireMoisture= String(mois);
```

Here all above float value will be converted in string and store in other three variable by **String()** function.

```
Firebase.setString("Humidity",fireHumid);
Firebase.setString("Temperature", fireTemp);
Firebase.setString("Moisture",fireMoisture);
```

Here set all three value to fire base in three different tag of firebase (Humidity, Temperature and Moisture) with help of **Firebase.setString()** function .

CODE:

```
#include <WiFi.h>                                   // esp8266 library
#include <IOXhop_FirebaseESP32.h>                   // firebase library
#include <DHT.h>                // dht11 temperature and humidity sensor library
```

```
#define FIREBASE_HOST "testxxxxxxxxxxxxxx.com"    // the project name address from firebase id

#define FIREBASE_AUTH "11xxxxxxxxxxxxxxxxxxxxxxxxxxo"          // the secret key generated from firebase


#define WIFI_SSID "xxxxxxx"                                    // input your home or public wifi name

#define WIFI_PASSWORD "xxxxxxxx"                               //password of wifi ssid

# define sensorPin 36

#define DHTPIN 27 //dth11 out pin

#define DHTTYPE DHT22    //type of dht sensor

DHT dht(DHTPIN, DHTTYPE);

 void setup() {

  Serial.begin(115200);

  delay(1000);

  WiFi.begin(WIFI_SSID, WIFI_PASSWORD);                        //try to connect with wifi

  Serial.print("Connecting to ");

  Serial.print(WIFI_SSID);

  while (WiFi.status() != WL_CONNECTED) {

    Serial.print(".");

    delay(500);

  }

  Serial.println();

  Serial.print("Connected to ");

  Serial.println(WIFI_SSID);

  Serial.print("IP Address is : ");
```

```
  Serial.println(WiFi.localIP());                                  //print local IP address
  Firebase.begin(FIREBASE_HOST, FIREBASE_AUTH);                    //
connect to firebase
  dht.begin();                                                     //Start reading dht sensor
}
void loop()
{
  float h = dht.readHumidity();//humidity measurement
 Serial.print("Humidity: ");  Serial.print(h);
  String fireHumid = String(h) + String("%");      //convert integer humidity to
string humidity
   float t = dht.readTemperature();//temperature measurement
  Serial.print("%  Temperature: ");  Serial.print(t);  Serial.println("Â°C ");
  String fireTemp = String(t) + String("Â°C");
//convert integer temperature to string temperature
  delay(2000);
  int mois = analogRead(sensorPin);
  String fireMoisture= String(mois);
Serial.print("Moisture Sensor Value:");

Serial.println(analogRead(sensorPin)); // read the value from the sensor
delay(1000);
Firebase.pushString("/DHT11/Humidity",fireHumid);
//setup path and send readings
  Firebase.pushString("/DHT11/Temperature", fireTemp);
//setup path and send readings
  Firebase.pushString("/Moisture",fireMoisture);
}
```

SOFTWARE: Install the given application :

Screen:

THANK'S