SPRINT 1

HARDWARE SENSORS INTEGRATION WITH ESP32 MICROCONTROLLER ALONG WITH WIFI CONNECTIVITY

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Team ID	PNT2022TMID12810
Project Name	SmartFarmer – IoT Enabled Farming Application
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COMPONENTS USED:

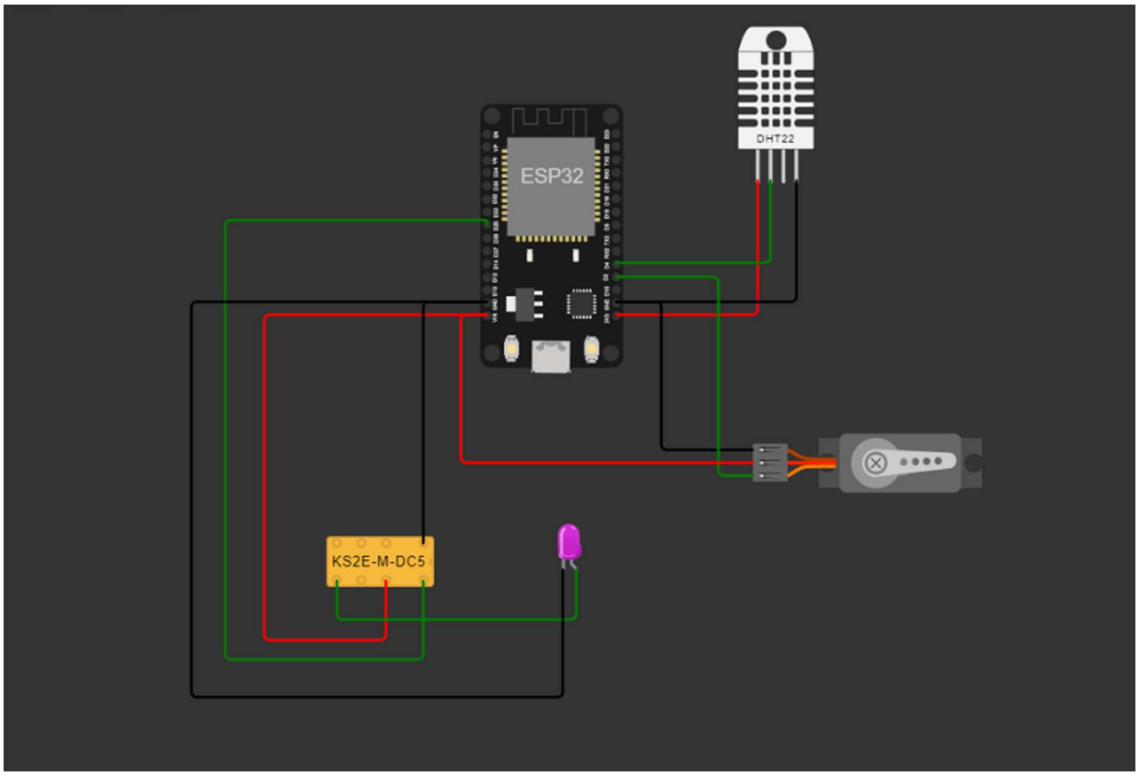
- ESP32 – Microcontroller
- DHT22 – Temperature and Humidity Sensor
- Servo Motor – For tap controlling water flow
- DPDT relay switch (to control the motor)
- Violet Led – (instead of motor as it is not available in WOKWI platform)

Note: Soil moisture sensor and other environmental sensors are not available in wokwi platform but available in tinkercad. The demerit in using tinkercad is that wifi connectivity module – esp8266 is disabled in that platform due to some security reasons

PLATFORM USED:

- WOKWI – Online Electronics Simulator

CIRCUIT DESIGN:



PROGRAM:

// Importing the necessary libraries

```
#include <Adafruit_Sensor.h>
#include <DHT.h>
#include <DHT_U.h>
#include <WiFi.h>
#include <ESP32Servo.h>
#define L LOW
#define H HIGH
#define DHTPIN 4
#define DHTTYPE DHT22
#define servoPin 2
#define voiletPin 25
```

// Since motor is not available in wokwi platform,

// violet led is used instead of motor. However the connections

// remains same for motor if used.

```
DHT_Unified dht(DHTPIN, DHTTYPE);
uint32_t delayMS;

// Temperature and humidity variables
int temperature = 0;
int humidity = 0;

// SSID and Password for WiFi connection
char SSID[] = "Wokwi-GUEST";
char PASSWORD[] = "";

Servo servo;
// angle position of servo motor
int deg = 0;

// Setup function - run only once
void setup() {
  Serial.begin(115200);
  WiFi.mode(WIFI_STA);
  WiFi.begin(SSID, PASSWORD);
  pinMode(voiletPin, OUTPUT);
  digitalWrite(voiletPin, LOW);

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

```
  Serial.print("Connected to ");
  Serial.print(SSID);
  Serial.print("(IP Address: ");
  Serial.print(WiFi.localIP());
  Serial.println(")");

  Serial.print("MAC Address: ");
  Serial.println(WiFi.macAddress());

  // DHT22 sensor and Servo motor configuration
  dht.begin();
  servo.attach(servoPin, 500, 2400);
  sensor_t sensor;
  dht.temperature().getSensor(&sensor);
  Serial.println("------------------------------------");
  Serial.print("Temperature Sensor - Resolution : ");
  Serial.print(sensor.resolution);
  Serial.println("°C");
  Serial.println("------------------------------------");
  dht.humidity().getSensor(&sensor);
  Serial.print("Humidity Sensor - Resolution : ");
  Serial.print(sensor.resolution);
  Serial.println("%");
  Serial.println("------------------------------------");
  delayMS = sensor.min_delay / 1000;

}

// Loop function - run continuously
```

```
void loop() {
  // Getting temperature and humidity values at the moment
  sensors_event_t event;
  dht.temperature().getEvent(&event);
  Serial.println("====================================");
  Serial.println("------------------------------------");
  if (isnan(event.temperature))
  {
    temperature = 0;
    Serial.println("Got error while reading temperature!");
  }
  else
  {
    temperature = event.temperature;
    Serial.print("Current Temperature: ");
    Serial.print(event.temperature);
    Serial.println("°C");
  }

  dht.humidity().getEvent(&event);
  if (isnan(event.relative_humidity))
  {
    humidity = 0;
     Serial.println("Got error while reading humidity!");
  }
  else
  {
    humidity = event.relative_humidity;
    Serial.print("Current Relative Humidity: ");
    Serial.print(event.relative_humidity);
```

```
  Serial.println("%");
}

Serial.println("-----------------------------------");

// Controlling tap and motor based on certain conditions
if ( ((temperature < 27)||(temperature == 0)) && ((humidity > 30)||(humidity == 0)) )
{
  digitalWrite(voiletPin, LOW);
  Serial.println("Now tap is closed and irrigation stopped!");
  Serial.println("Also MOTOR IS OFF (Shown by non-glowing voilet led)");
  for (; deg >= 0; deg -= 1)
  {
    servo.write(deg);
    delay(15);
  }
}
else
{
  digitalWrite(voiletPin, HIGH);
  Serial.println("Now tap is open and irrigation occurs!");
  Serial.println("Also MOTOR IS ON (Shown by glowing voilet led)");
  for (; deg <= 90; deg += 1)
  {
    servo.write(deg);
    delay(15);
  }
}
Serial.println("-----------------------------------");
delay(delayMS + 1000);
```

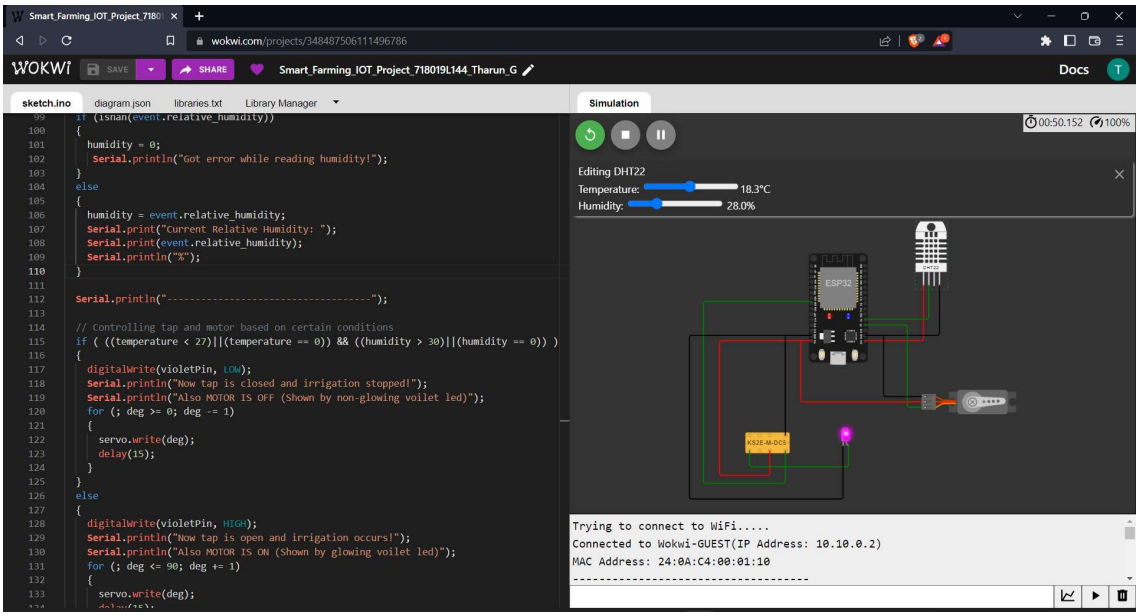
```
}
```

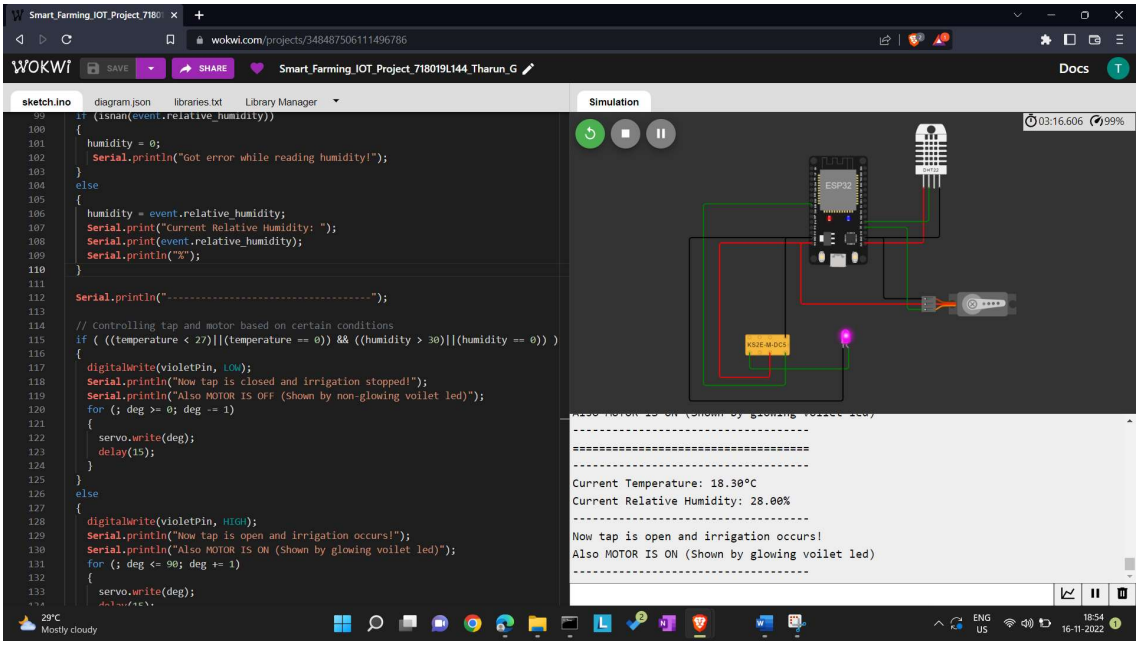
SERIAL MONITOR:

```
Trying to connect to WiFi.....
Connected to Wokwi-GUEST(IP Address: 10.10.0.2)
MAC Address: 24:0A:C4:00:01:10
-----------------------------------
Temperature Sensor - Resolution : 0.10°C
-----------------------------------
Humidity Sensor - Resolution : 0.10%
-----------------------------------
===================================
-----------------------------------
Current Temperature: 18.30°C
Current Relative Humidity: 28.00%
-----------------------------------
Now tap is open and irrigation occurs!
i.e. MOTOR IS ON (Shown by glowing voilet led)
-----------------------------------
===================================
-----------------------------------
```

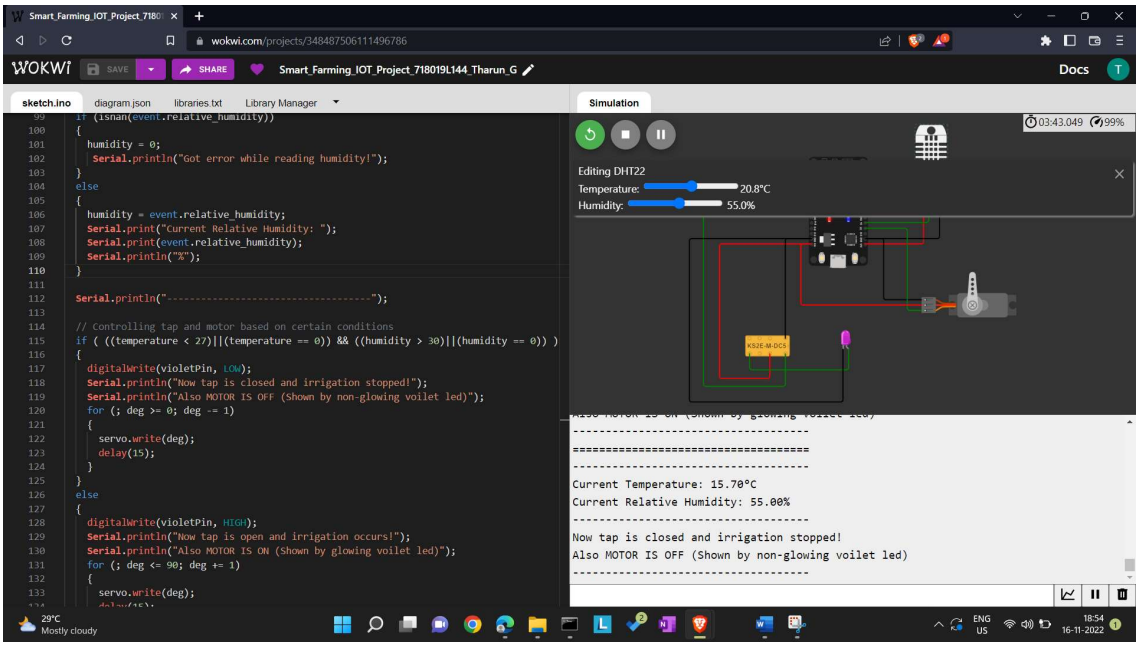
OUTPUTS:

- From the below screenshot, we can understand that the ESP32 gets connected to WiFi and since humidity is less than threshold (30%), the tap is open and the motor is turned on i.e. violet led glows.





- In below screenshot, since the both temperature and humidity are in acceptable ranges, the tap is closed and the motor is turned off i.e. violet led does not glow.


Smart_Farming_IOT_Project_718019L144_Tharun_G
wokwi.com/projects/348487506111496786
WOKWI
SAVE
SHARE
Docs
sketch.ino
diagram.json
libraries.txt
Library Manager
Simulation
03:43.049
99%
Editing DHT22
Temperature: 20.8°C
Humidity: 55.0%
if (isnan(event.relative_humidity))
{
humidity = 0;
Serial.println("Got error while reading humidity!");
}
else
{
humidity = event.relative_humidity;
Serial.print("Current Relative Humidity: ");
Serial.print(event.relative_humidity);
Serial.println("%");
}
Serial.println("------------------------------------");
// Controlling tap and motor based on certain conditions
if (((temperature < 27)||(temperature == 0)) && ((humidity > 30)||(humidity == 0)))
{
digitalWrite(violetPin, LOW);
Serial.println("Now tap is closed and irrigation stopped!");
Serial.println("Also MOTOR IS OFF (Shown by non-glowing voilet led)");
for (; deg >= 0; deg -= 1)
{
servo.write(deg);
delay(15);
}
}
else
{
digitalWrite(violetPin, HIGH);
Serial.println("Now tap is open and irrigation occurs!");
Serial.println("Also MOTOR IS ON (Shown by glowing voilet led)");
for (; deg <= 90; deg += 1)
{
servo.write(deg);

====================================

Current Temperature: 15.70°C
Current Relative Humidity: 55.00%

Now tap is closed and irrigation stopped!
Also MOTOR IS OFF (Shown by non-glowing voilet led)

29°C
Mostly cloudy
ENG
US
18:54
16-11-2022