PROJECT NAME: AIR QUALITY MONITORING

PHASE 3: DEVELOPMENT PART 1

SENSORS:

DHT22 Sensor

- The DHT22 sensor is a temperature and humidity sensor that provides a calibrated digital output , it comes with a dedicated NTC to measure temperature and an 8-bit microcontroller to output the values of temperature and humidity as serial data.
- It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and outputs the values of temperature and humidity as serial data.

- Here are some specifications of the DHT22 sensor:
  - Operating Voltage: 3.5V to 5.5V
  - Operating current: 0.3mA (measuring), 60uA
  - Output: Serial data
  - Temperature Range: -40°C to 80°C
  - Humidity Range: 0% to 100%
  - Resolution: Temperature and Humidity both are 16-bit

- In this project DHT22 Sensor is used to find air quality. By calculating the TEMPARATURE and HUMIDITY and measuring the differences air quality can be measured.

COMPONENTS USED IN THE PROJECT

- ❖DHT22
- ❖ESP32
- ❖Ultrasonic Distance Sensor

1.DHT22

- DHT22 is commonly used to measure temperature and humidity. It is based on a digital sensor output and can provide high accuracy measurements with a resolution of 0.1 degree Celsius temperature and 0.1% for humidity.
- The sensor can measure temperature from -40 degree Celsius to 80 degree Celsius and humidity from 0% to 100% with an accuracy of ±1°C and ±1%.

2.ESP32

- ESP32 not only has Built in WiFi but also has Bluetooth and Bluetooth Low Energy[1]
- The ESP32 can be used as the main microcontroller to gather data from various sensors (like the DHT22 for temperature and humidity) and send it to a server for further processing. This can be done through WiFi on the AQM system.

3.ULTRASONIC DISTANCE SENSOR

- It's main function is to measure the distance between the sensor and a target object by sending and receiving ultrasonic waves.

- Incorporating ultrasonic distance sensors to an ESP32 ,it enhances the system's ability to provide precise and location-optimized measurements, ensuring that the data collected accurately reflects the air quality near the source of interest.

CODE

```
import time

import machine

import dht

import ujson

from umqtt.simple import MQTTClient

try:

    dht_sensor = dht.DHT22(machine.Pin(4))

    mqtt_broker = "your_mqtt_broker_address"

    mqtt_topic = "your_topic"

    mqtt_username = "your_username"

    mqtt_password = "your_password"

    mqtt_client_id = "your_client_id"

    client =MQTTClient(mqtt_client_id,mqtt_broker,
user=mqtt_username, password=mqtt_password)
```

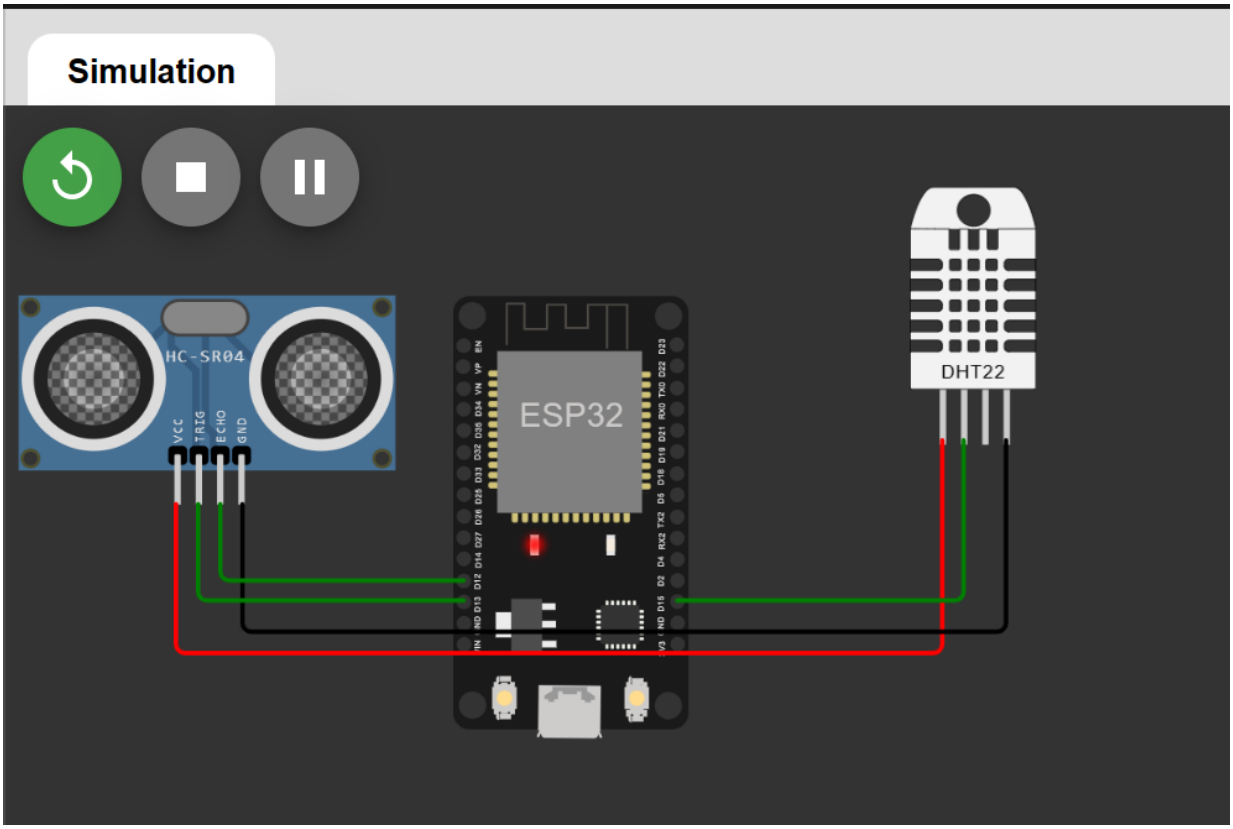
```
client.connect()
try:
    while True:
        try:
            dht_sensor.measure()
            temperature_c = dht_sensor.temperature()
            humidity = dht_sensor.humidity()
            data = {
                "temperature": temperature_c,
                "humidity": humidity
                    }
            client.publish(mqtt_topic, ujson.dumps(data))
            except Exception as e:
                print("Error:", e)
        time.sleep(60)
except KeyboardInterrupt:
        pass
client.disconnect()
```

except OSError as e:

print(“OSError”,e)

OUTPUT

Simulation



Output

```
clk_drv:0x00,q_drv:0x00,d_drv:0x00,cs0_drv:0x00,hd_drv:0x00,wp_drv:0x00
mode:DIO, clock div:2
load:0x3fff0030,len:4728
load:0x40078000,len:14876
ho 0 tail 12 room 4
load:0x40080400,len:3368
entry 0x400805cc
connected to wifi....
   data sent successfully
MicroPython v1.21.0 on 2023-10-05; Generic ESP32 module with ESP32
Type "help()" for more information.
>>>
```