AIR QUALITY MANAGEMENT

PHASE 3 : **DEVELOPMENT PART 1**

ABSTRACT:

- Internet of Things (IoT) may be a worldwide system of "smart devices" which will sense and connect with their surroundings and interact with users and other systems.

- Global air pollution is one of the major concerns of our era. The level of pollution has increased with times by lot of things like the increase in population, increased vehicle use, industrialization and urbanization which ends up in harmful effects on human wellbeing by directly affecting health of population exposed to it.

- Air quality goes down when enough amount of harmful gases present in the air like carbon dioxide, smoke, alcohol, benzene, NH3,and NO2.

- In order to analyses we are developing an IOT Based pollution Monitoring System which we'll monitorthe Air Quality over an internet server.

- The system uses MQ2 and MQ7 sensor for monitoring Air Quality. It measures their amount exactly and res = int(res_data)

PYTHON SCRIPT :

```
if res <= 50:
remark = "Good"
    impact = "Minimal impact"
elif res <= 100 and res > 51:
    remark = "Satisfactory"
    impact = "Minor breathing discomfort to sensitive
                people"
elif res <= 200 and res >= 101:
remark = "Moderate"
impact = "Breathing discomfort to the people with
            lungs, asthma and heart diseases"
elif res <= 400 and res >= 201:
remark = "Very Poor"
```

```
12. impact = "Breathing discomfort to most people on
                prolonged exposure"
13. elif res <= 500 and res >= 401:
14. remark = "Severe"
15. impact = "Affects healthy people and
                seriously impacts those with existing
                diseases”
16. print(remark)
17. print(impact)finds out harmful gases.
```

ARDUINO UNO R3 :

```
1.  #include <DHT.h>
2.  #include <WiFi.h>
3.  #include <ThingSpeak.h>
4.  #include "DHTesp.h"

5.  #define DHT_PIN 2  // Replace with the GPIO pin connected to the DHT22
    sensor
6.  #define LED_GREEN_PIN 21  // Replace with the GPIO pin connected to the
    green LED bulb
7.  #define LED_RED_PIN 22  // Replace with the GPIO pin connected to the red
    LED bulb

8.  char ssid[] = "Wokwi-GUEST";
9.  char pass[] = "";
10. WiFiClient client;

11. unsigned long myChannelNumber = 2308799;
12. const char *myWriteAPIKey = "Y5D386LU3W5X66Y2";
13. int statusCode;
14. DHTesp dhtSensor;

15. int ledGreen = LED_GREEN_PIN;
16. int ledRed = LED_RED_PIN;

17. struct Data {
18. float temperature;
19. float humidity;
20. };

21. Data data;  // Declare a variable to store the data

22. void setup() {
23. Serial.begin(115200);
24. WiFi.mode(WIFI_STA);
```

```
ThingSpeak.begin(client);
dhtSensor.setup(DHT_PIN, DHTesp::DHT22);

pinMode(ledGreen, OUTPUT);
pinMode(ledRed, OUTPUT);
}

void connectToCloud() {
if (WiFi.status() != WL_CONNECTED) {
Serial.print("Attempting to connect");
while (WiFi.status() != WL_CONNECTED) {
WiFi.begin(ssid, pass);
for (int i = 0; i < 5; i++) {
Serial.print(".");
delay(1000);
}
}
Serial.println("\nConnected.");
}
}

void computeData() {
TempAndHumidity sensorData = dhtSensor.getTempAndHumidity();
data.temperature = sensorData.temperature;
data.humidity = sensorData.humidity;
Serial.println("-----------");
Serial.println("Humi: " + String(data.humidity));
Serial.println("Temp: " + String(data.temperature));
Serial.println("-----------");
}

void writeData() {
ThingSpeak.setField(1, data.humidity);
ThingSpeak.setField(2, data.temperature);
statusCode = ThingSpeak.writeFields(myChannelNumber, myWriteAPIKey);
if (statusCode == 200)
Serial.println("Channel update successful.");
else
Serial.println("Problem Writing data. HTTP error code: " +
String(statusCode));
delay(15000);  // Data to be uploaded every 15 seconds
}

void loop() {
connectToCloud();
computeData();
writeData();

// Read temperature and humidity
```

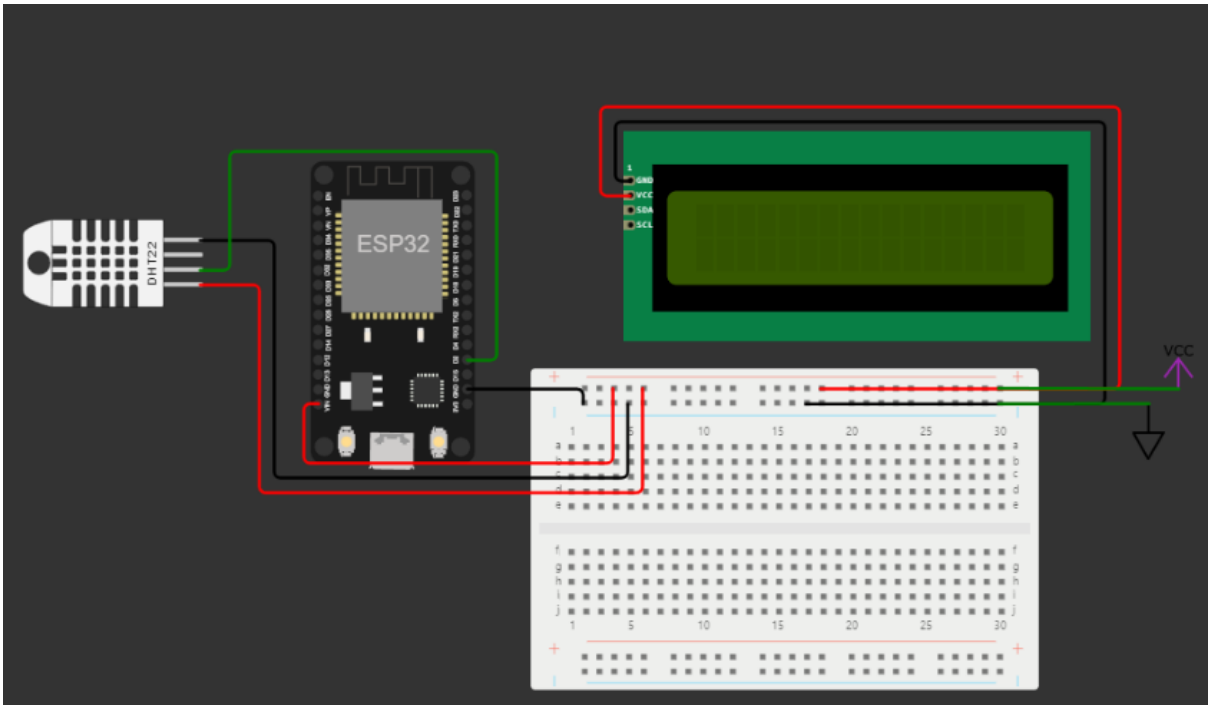
```
67.  float temperature = dhtSensor.getTemperature();
68.  float humidity = dhtSensor.getHumidity();

69.  // Print the results
70.  Serial.print("Temperature: ");
71.  Serial.print(temperature);
72.  Serial.println("°C");
73.  Serial.print("Humidity: ");
74.  Serial.print(humidity);
75.  Serial.println("%");

76.  // Add a condition for air quality
77.  if (temperature > 25.0 && humidity > 70.0) {
78.  Serial.println("Air quality might be poor (high temperature and humidity).");
79.  digitalWrite(ledRed, HIGH);
80.  digitalWrite(ledGreen, LOW);
81.  } else if (temperature < 20.0 && humidity < 30.0) {
82.  Serial.println("Air quality might be poor (low temperature and humidity).");
83.  digitalWrite(ledRed, HIGH);
84.  digitalWrite(ledGreen, LOW);
85.  } else {
86.  Serial.println("Air quality appears to be normal.");
87.  digitalWrite(ledRed, LOW);
88.  digitalWrite(ledGreen, HIGH);
89.  }

90.  delay(10000);  // Wait for some time before the next measurement (10
     seconds)
91.  }
```

IOT DEVICE CODE :

```
1.  {
2.  "version": 1,
3.  "author": "B. Mohan",
4.  "editor": "wokwi",
5.  "parts": [
6.  { "type": "wokwi-breadboard-half", "id": "bb1", "top": 93, "left": 185.2, "attrs": {} },
7.  { "type": "wokwi-esp32-devkit-v1", "id": "esp", "top": -43.3, "left": 43, "attrs": {} },
8.  {
9.  "type": "wokwi-dht22",
10. "id": "dht1",
11. "top": -33.6,
12. "left": -113.7,
13. "rotate": 270,
14. "attrs": {}
15. },
16. {
```

```
17. "type": "wokwi-lcd1602",
18. "id": "lcd1",
19. "top": -60.8,
20. "left": 245.6,
21. "attrs": { "pins": "i2c" }
22. },
23. { "type": "wokwi-vcc", "id": "vcc1", "top": 77.56, "left": 595.2, "attrs": {} },
24. { "type": "wokwi-gnd", "id": "gnd1", "top": 115.2, "left": 575.4, "attrs": {} }
25. ],
26. "connections": [
27. [ "esp:TX0", "$serialMonitor:RX", "", [] ],
28. [ "esp:RX0", "$serialMonitor:TX", "", [] ],
29. [ "dht1:VCC", "bb1:tp.5", "red", [ "h38.4", "v134.4", "h259.2" ] ],
30. [ "dht1:GND", "bb1:tn.4", "black", [ "h48", "v153.6", "h230.4" ] ],
31. [ "dht1:SDA", "esp:D2", "green", [ "h19.2", "v-76.9", "h172.8", "v134.4" ] ],
32. [ "esp:VIN", "bb1:tp.3", "red", [ "h-9.6", "v38.4", "h153.6" ] ],
33. [ "esp:GND.1", "bb1:tn.1", "black", [ "h0" ] ],
34. [ "lcd1:GND", "bb1:tn.14", "black", [ "h-9.6", "v-38.4", "h316.8", "v182.4" ] ],
35. [ "lcd1:VCC", "bb1:tp.15", "red", [ "h-19.2", "v-57.5", "h336", "v182.4", "h-192" ] ],
36. [ "bb1:tp.25", "vcc1:VCC", "green", [ "v0" ] ],
37. [ "bb1:tn.25", "gnd1:GND", "green", [ "v0" ] ]
38. ],
39. "dependencies": {}
40. }
```

IOT DEVICE :



THANK YOU

THESE CODE AND THEORY ARE INCLUDED IN PHASE 3: AIR QUALITY MONITORING

BY:

KAVIYA K

422621104019

UNIVERSITY COLLEGE OF ENGINEERING,PANRUTI.