LAB REPORT

IRE 212 : IoT Architecture and Technologies Sessional

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Session: 2021-2022
Date: 5/11/2024

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List of Experiments

a) Arduino Air Quality Monitoring System

Experiment No.: 01

Experiment Statement: Arduino Air Quality Monitoring System

Components and supplies:

- Arduino board
- MQ135 gas sensor for detecting various gases.
- DHT11 temperature and humidity sensor
- OLED display for visual output
- Breadboard and jumper wires

Circuit:

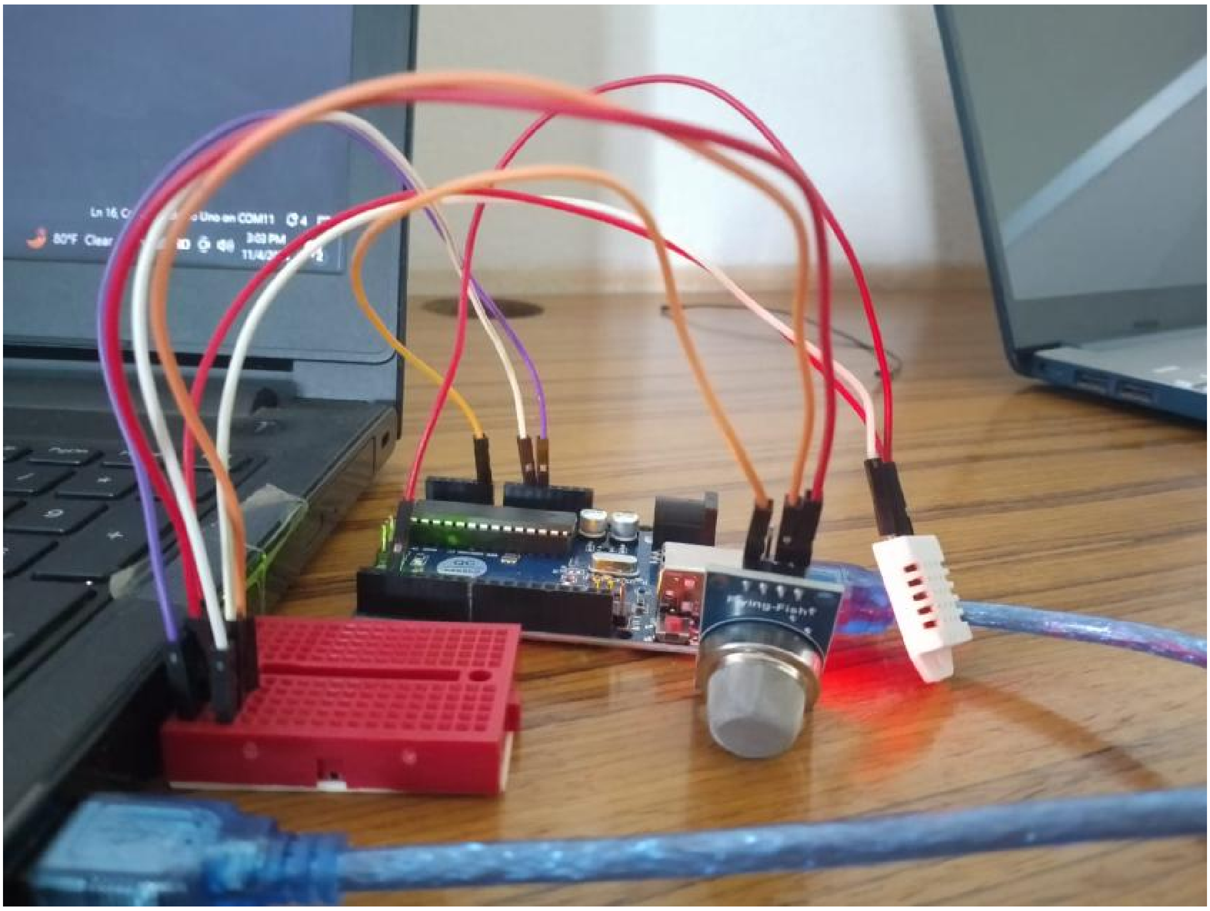


Figure 1: Circuit of Air Quality Monitoring System

Code:

```
#include <SPI.h>
#include <DHT.h>

#define sensor A0
#define DHTPIN 2      // Pin where the DHT sensor is connected
#define DHTTYPE DHT11 // Define the type of DHT sensor used (DHT11 or
DHT22)
```

```
int gasLevel = 0;
String quality = "";
DHT dht(DHTPIN, DHTTYPE); // Create an instance of the DHT class

void setup() {
    Serial.begin(9600);
    pinMode(sensor, INPUT);
    dht.begin(); // Initialize the DHT sensor
}

void sendSensor() {
    // Function to read temperature and humidity from the DHT sensor
    float h = dht.readHumidity();    // Read humidity
    float t = dht.readTemperature();  // Read temperature

    if (isnan(h) || isnan(t)) {
        Serial.println("Failed to read from DHT sensor!");
        return; // Return if reading fails
    }

    // Output to Serial Monitor
    Serial.print("Temperature: ");
    Serial.print(t);
    Serial.println(" °C");
    Serial.print("Humidity: ");
    Serial.print(h);
    Serial.println(" %");
}

void air_sensor() {
    gasLevel = analogRead(sensor);

    if (gasLevel < 151) {
        quality = "GOOD!";
    } else if (gasLevel >= 151 && gasLevel < 200) {
        quality = "Poor!";
    } else if (gasLevel >= 200 && gasLevel < 300) {
        quality = "Very bad!";
    } else if (gasLevel >= 300 && gasLevel < 500) {
        quality = "Toxic!";
    } else {
        quality = "Toxic";
    }

    // Output to Serial Monitor
    Serial.print("Gas Level: ");
    Serial.print(gasLevel);
    Serial.print(" - Quality: ");
    Serial.println(quality);
}

void loop() {
    // Read and display sensor data
    air_sensor();
    sendSensor();

    // Add a delay to avoid flooding the Serial Monitor
    delay(2000); // Adjust delay as needed
}
```

Explanation of Code:
This Arduino code uses an analog gas sensor and a DHT11 temperature and humidity sensor to monitor air quality, temperature, and humidity levels. Here's a breakdown of the main parts of the code and the output it produces:

Library and Sensor Setup:

- #include <SPI.h> and #include <DHT.h>: Imports the necessary libraries for handling SPI communication and the DHT sensor.
- #define DHTPIN 2 and #define DHTTYPE DHT11: Specifies that the DHT sensor is connected to pin 2 and uses the DHT11 type.
- DHT dht(DHTPIN, DHTTYPE): Creates an instance of the DHT class to interface with the sensor.

sendSensor() Function:

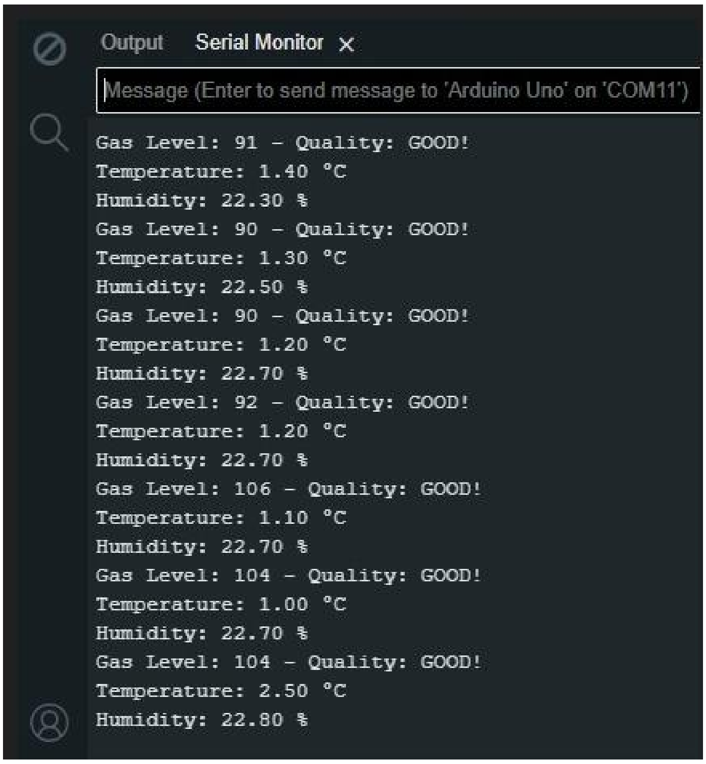
- Reads humidity and temperature values from the DHT sensor.
- If readings fail (isnan(h) or isnan(t)), it prints an error message.
- If successful, it prints temperature and humidity values to the Serial Monitor.

air_sensor() Function:
Reads the analog value of the gas sensor and assigns a corresponding air quality label:

- <151: "GOOD!"
- 151 - 199: "Poor!"
- 200 - 299: "Very bad!"
- 300 - 499: "Toxic!"
- >=500: "Toxic"

Outputs the gas level and quality to the Serial Monitor.

Output:



```
Gas Level: 91 - Quality: GOOD!
Temperature: 1.40 °C
Humidity: 22.30 %
Gas Level: 90 - Quality: GOOD!
Temperature: 1.30 °C
Humidity: 22.50 %
Gas Level: 90 - Quality: GOOD!
Temperature: 1.20 °C
Humidity: 22.70 %
Gas Level: 92 - Quality: GOOD!
Temperature: 1.20 °C
Humidity: 22.70 %
Gas Level: 106 - Quality: GOOD!
Temperature: 1.10 °C
Humidity: 22.70 %
Gas Level: 104 - Quality: GOOD!
Temperature: 1.00 °C
Humidity: 22.70 %
Gas Level: 104 - Quality: GOOD!
Temperature: 2.50 °C
Humidity: 22.80 %
```

Figure 2: Output