3.5C - Integrated Environmental Monitoring

Summary

- For this particular assignment, I built and developed an Arduino-based environment monitoring system which is capable of measuring soil moisture, humidity and air temperature simultaneously. This I did by connecting a DHT22 sensor to measure the temperature and humidity and a Soil Moisture Sensor to track the moisture level in the soil. The environmental conditions were represented by two LED lights, red and green with which it was possible to determine whether they attained certain set values. The red LED only glows until the soil moisture and air temperature both cross certain levels, while the green LED is always on. After assembling the parts on the bread board using the jumper wires, I developed a software that made it possible to receive sensor data, process it and control the LEDs using the readings after integrating the parts with an Arduino Uno.

- While the soil moisture sensor provided an analog reading for dryness of the soil the DHT22 required a library to measure temperature and humidity. Using conditional logic as a means to set temperature and moisture standards resulted in the activation of the red LED when given threshold values reached. Since, I get to apply my circuit building capacity, integration of sensors, and coding skills with Arduino on the project. Also, it enhanced my understanding of environmental monitoring systems and how basic transmitting meters are utilized to gather data in live time.

Reflection

- In this project the learning objectives were accomplished due to the incorporation of several sensors into an Arduino circuit, displaying data in real time, and ensuring that LEDs worked according to specific thresholds.

- The first and most significant point learnt was that if the system is complex and required data from different sources then more than one sensor must be incorporated into the system and its outputs dealt with at the same time.

- By the exercise, I enhanced my understanding of managing analog and digital signals and working with individual sensors—two critical skills in complicated electronic projects.

- From this activity, people will receive information and skills that they can benefit from in other tasks such as Applications and Programing of Automated Systems for handling multiple data, Smart Agriculture and Environmental Analysis.

Arduino code

```
#include "DHT.h"

#define DHTPIN 2 //The DHT22 digital pin

#define DHTTYPE DHT22 //DHT 22 (AM2302)

#define MOISTURE_PIN A0 //The soli moisture sensor's analogue pin

#define GREEN_LED 9 //LED Green Pin

#define RED_LED 10 //LED Red Pin


DHT dht(DHTPIN, DHTTYPE);


void setup() {
  Serial.begin(9600);
  dht.begin();
  pinMode(GREEN_LED, OUTPUT);
  pinMode(RED_LED, OUTPUT);


}


void loop() {
  float humidity = dht.readHumidity();
  float temperature = dht.readTemperature();
  int moistureLevel = analogRead(MOISTURE_PIN);


  if (isnan(humidity) || isnan(temperature)) {
    Serial.println("Failed to read from DHT sensor!");
    return;
  }
```

```
Serial.print("Humidity: ");

Serial.print(humidity);

Serial.print("%, Temp: ");

Serial.print(temperature);

Serial.print(" °C, Moisture: ");

Serial.print(moistureLevel);

Serial.print();


digitalwrite(GREEN_LED, HIGH); //Keep the green led going.


//Specify thresholds to activate the red LED.

if (temperature >30 && humidity <40 && moisturelevel <300) {

  digitalWrite(RED_LED, HIGH); //RED LED Turn on

} else {

  digitalWrite(RED_LED, LOW); // RED LED Turn off

}


delay(2000); //Manage your time between reading


}
```
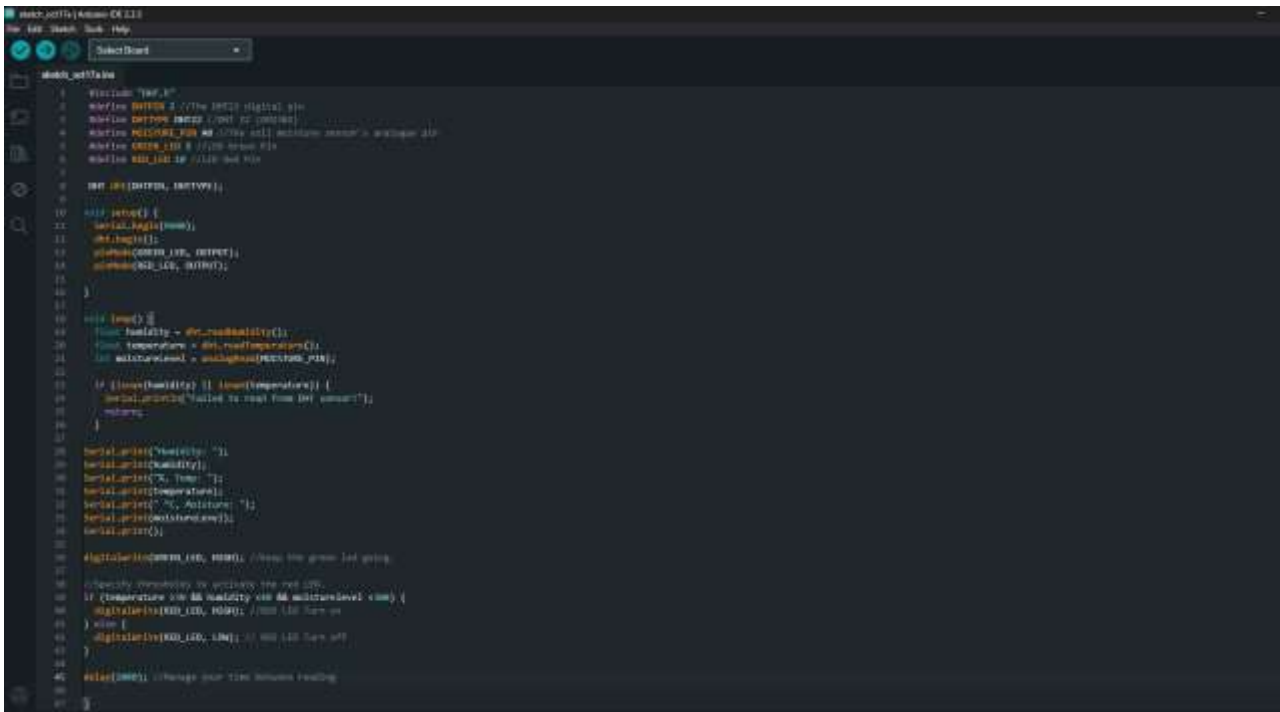
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