SIT111: Task 3.5C - Integrated Environmental Monitoring

Learning Objective

To understand how to integrate multiple sensors in an Arduino circuit.

Summary - TL; DR

1. Read through the materials on the unit site.
2. Build and test the Arduino circuit, run experiments.
3. Submit:
    - Summary and reflection
    - Outcome from activities:
        - Photos, codes, videos of the constructed circuit or experiments
        - Describe any additional insights or knowledge learned during the active learning activities

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Your Task

Build an Arduino-based system to simultaneously monitor air temperature and humidity with the DHT22 sensor and soil moisture with the Soil Moisture Sensor. The system will keep a green LED on at all times and turn on a red LED when specific thresholds for both temperature/humidity and soil moisture are reached.

Materials Required

- Arduino Uno (or similar Arduino board)
- DHT22 Temperature and Humidity Sensor
- Soil Moisture Sensor
- 1 Green LED
- 1 Red LED
- 2 Resistors (220-ohm for LEDs)
- 1 Resistor (10k-ohm as an optional pull-up resistor) for the temperature sensor
- Breadboard
- Jumper wires
- USB cable for connecting the Arduino to a computer
- Arduino IDE installed on the computer
- DHT sensor library installed in the Arduino IDE

Circuit Diagram:

The attached image shows the connection setup for this project. The DHT22 and Soil Humidity sensors are connected to respective pins of the Arduino, and an LEDs is connected to other digital pins with a resistor in series.

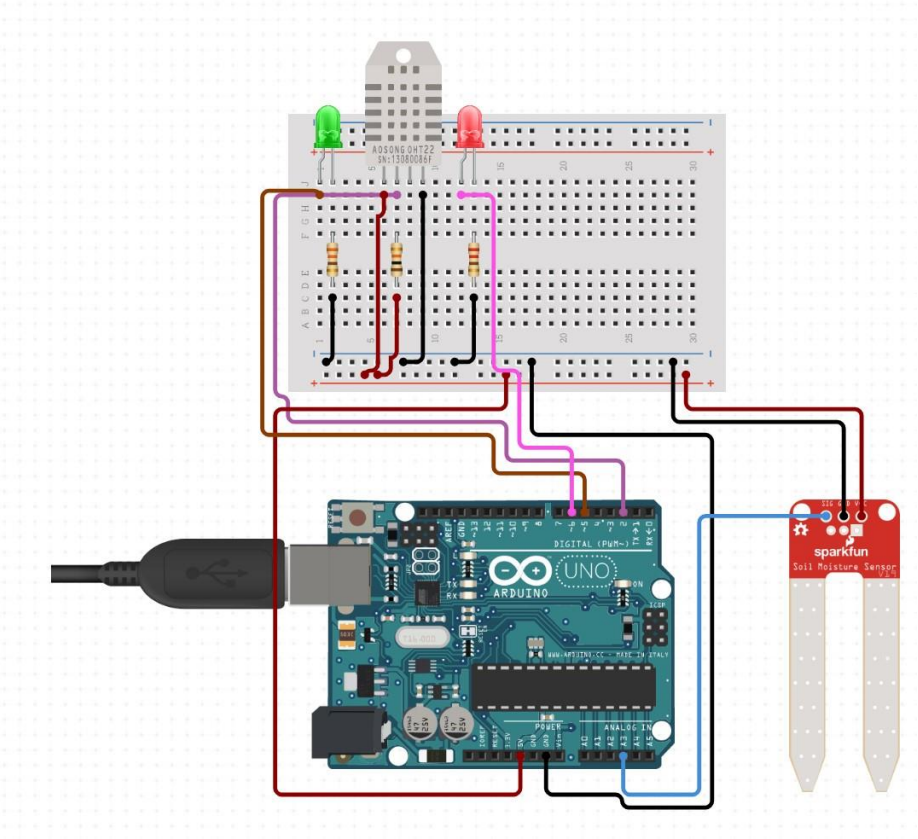

Figure 1: Sample Circuit

Programming:

- Include the DHT sensor library.
- Initialize both sensors and define LED pins.
- Continuously read data from both sensors in the loop().
- Keep the green LED turned on.
- Turn on the red LED when both the temperature/humidity and soil moisture exceed predefined thresholds.

```
#include "DHT.h"

#define DHTPIN 2                    // Digital pin for DHT22
```

```
#define DHTTYPE DHT22 // DHT 22 (AM2302)
#define MOISTURE_PIN A0 // Analog pin for Soil Moisture Sensor #define
GREEN_LED 9     // Green LED pin
#define RED_LED 10              // Red LED pin

DHT dht(DHTPIN, DHTTYPE);

void setup() {
  // Initialize serial communication, sensors, and LED pins
  // [Students to complete this section]
}

void loop() {
  // Read temperature and humidity from the DHT22 sensor
  // Read moisture level from the Soil Moisture Sensor // [Students to
  complete this section]

  // Implement logic to control the green and red LEDs // [Students to
  complete this section]

  delay(2000); // Delay between readings
}
```

Uploading and Testing:

- Connect the Arduino to your computer with the USB cable.
- Upload the sketch to the Arduino using the Arduino IDE.
- Monitor the behavior of the LEDs based on sensor readings.

Prepare Your Submission

Once you feel confident that you have achieved the learning goals, you can prepare a submission to demonstrate this. This will contain three sections: summary of what you learnt, reflection on your learning, and evidence of study and practice.

Section 1: Summary

Summarise what you have done and what you have learnt from the experiment. This should be a personal summary, written so that it will be useful to you should you need to quickly revise these concepts and tools in the future. Capture the most important aspects from the materials in the unit site and anything else you find related to this topic.

Section 2: Reflection

Reflect on your learning by responding to the following prompts: - How do you know you have achieved the learning goals? - What is the most important thing you learned from this and why? - How does the content or skills learned here relate to things you already know? - Where or when do you think it will be useful?

Note:: The content for the first two sections should not exceed 500 words or 1 printed page.

Section 3: Evidence of study and practice

This section will contain evidence of your outputs from the learning activities for this task:

- Screenshot of the Arduino IDE successsfully uploading the code
- Your code
- Collected readings from the sensor(s)
- A short video of the working hardware (YouTube or Panopto)

Upload Your Submission

Once you have all the evidence in place, login to CICRA VLE and mark the task as **Ready for Feedback**. The submission process will ask you to upload evidence of completion of the task. For quizzes, please include a screenshot showing your quiz score. For Active Learning Session problems, you must submit evidence that you yourself had completed the activities. While working in groups/pairs is welcome, you must have evidence of your own contributions.

The system will also ask you to reflect on what unit learning outcomes have been achieved by this task.

Engage with Feedback

To get the task marked as **Complete**, you need to engage with the feedback you receive. Your tutor will review your submission and may ask you to clarify aspects of your learning, redo parts of the task, or include aspects you have missed. You may be asked to discuss the task in class or online. Use these discussions as an opportunity to help develop and validate your understanding.

If you are asked to resubmit, *make sure your subsequent submission includes a comment that describes how you have addressed the feedback you received*. This needs to demonstrate how you have addressed all the aspects indicated by your tutor in their feedback on your learning.