Part A: Project Statement

The purpose of project 3 is to create a real-time embedded system that can be used to help solve a problem. For this project, the chosen input peripheral is DHT11, and the chosen output peripheral is the LCD. The goal is to use these peripherals with the Nucleo embedded platform to determine the current humidity and temperature of the surroundings, and display that on the LCD. This can then be used for regular household day-to-day activities like checking that the house's heater or ac is working properly.

Part B: Initial Constraints and Specifications

- Temperature is displayed in degrees Celsius
- Humidity is displayed as a percentage from zero to one hundred
- The LCD displays "Temperature: " followed by the current temperature on the first line
- The LCD displays "Humidity: " followed by the current humidity on the second line
- Whenever the surrounding temperature or humidity changes, the LCD is updated with the new information.
- When the temperature is outside the ideal temperature range, a red LED is turned on.
- When the humidity is outside the ideal humidity range, a yellow LED is turned on.
- Must run "forever"

Part C: Asks

Purpose

The purpose is to create a real-time embedded system that can detect the surrounding temperature and humidity using the DHT11 and display it on an LCD with LEDs alerting when the temperature or humidity falls out of the ideal range.

Inputs

- DHT11

Outputs

- LCD
- LEDs

Constraints

- Temperature is displayed in degrees Celsius
- Humidity is displayed as a percentage from zero to one hundred
- Must run "forever"

- A red LED is turned on if the temperature is not ideal, and a yellow LED is turned on when the humidity is not ideal.

Part D: Preliminary BOM

Materials needed for this project include the following:

- DHT11 (Temperature and humidity sensor)

- Solderless Breadboard (to form connections)

- Jumper Wires (for convenience and may not be needed)

- LEDs (Red and blue)

- Resistors (1kOhm)

- A computer to program the Nucleo

- USB a to Micro USB B cable (connects the Nucleo to the computer)

- 16x2 LCDs with I2C for Arduinos and Raspberry PI, 1602 or 1802 model with the I2C element soldered on

- Electricity (to run the computer and the nucleo)