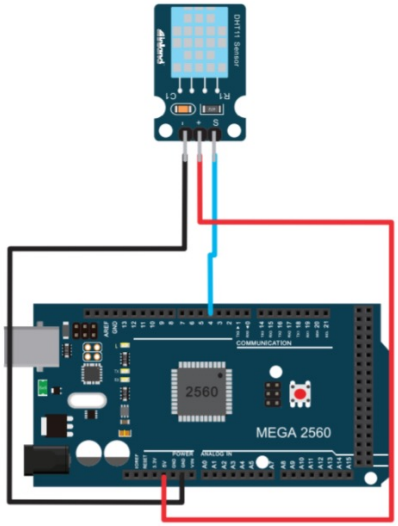
CpE 4010 Lab 4

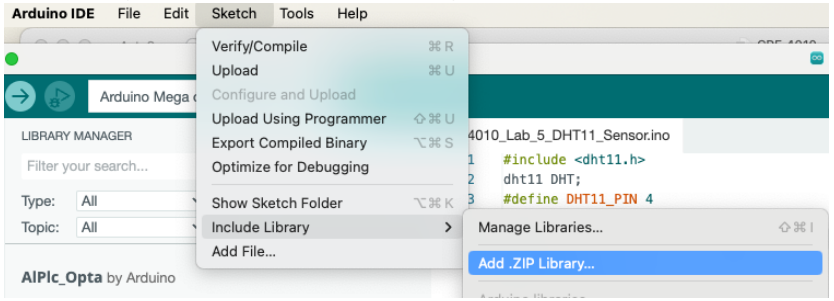
- Objective: To have the student experiment with a simple temperature sensor circuit wherein the device temperature represents our “sensed” input and the displayed data our “actuated” output. Thereafter, you will explore the response time of the sensor and compare it to the actual manufacturer specifications
- Procedures will be highlighted in red boxes; some procedures require you to collect data for your report. Enter all required data in the appropriate field within the accompanying Datasheet. Also, be sure to enter your name at the top of the Datasheet

• Once you have completed all of the following procedures and filled in your Datasheet, upload your complete Datasheet to the “Lab 4” folder under “Assignments”

1) Browse to the following website and construct the “DHT11 Temperature and Humidity Sensor” circuit:
https://wiki.keyestudio.com/052043_Super_Learning_Kit_for_Arduino#Project_30:_DHT11_Temperature_and_Humidity_Sensor



2) A) Download the Dht11.zip file from the Lab Manuals tab
B) Add the library for the DHT 11 temperature sensor to the Arduino IDE using the option under Sketch -> Include Library -> Add .ZIP Library



C) Copy and paste the sample code given in Step 1 into your IDE code window, then compile, upload, and run the program

3) Open Serial Monitor and view your displayed humidity and temperature data; it should be updated every second. **Take a screenshot of your Serial Monitor window displaying several temperature messages and insert the screen shot into the associated section of your Lab Datasheet.**

4) Modify the code to get only temperature data displayed every second. Also include mathematical conversions to display the temperature in Celsius, Fahrenheit and Kelvin with proper units displayed.

5) Add a counter to your code to count and display the time in seconds which is displayed along with Temperature Data. **Take a screenshot of the code and serial monitor and insert them in the associated field of your Lab Datasheet.**

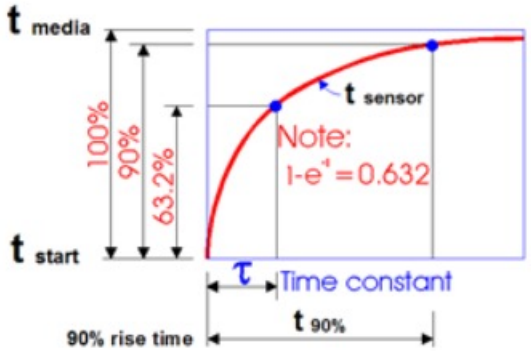
6) Open the DHT11 datasheet from here:

   https://www.mouser.com/datasheet/2/758/DHT11-Technical-Data-Sheet-Translated-Version-1143054.pdf

7) Find the resolution, accuracy and response time of the sensor from the specifications table. **Write these in the associated field of the Lab Datasheet.**

8) Allow your DHT 11 temperature sensor to settle to room temperature by leaving it untouched and away from heat sources for about 10 minutes. **Record the stable room temperature and insert it in the associated field of the Lab Datasheet.**

9) Record your starting time in seconds and pinch your temperature sensor with your fingers from both sides. While holding, record the time for every temperature increase point. Continue this until you observe a stable temperature measurement of your body.
It may be more convenient to modify your code to display an output in the serial monitor only when the measured temperature changes.



10) Use your recorded data points to plot time (x-axis) vs measured temperature (y-axis). Determine the 63% (approximately) of T_{body} with respect to T_{start} and find how long it took in time for that change in temperature to happen (response time, time-constant).
Insert the plot figure and measured response time in the associated field of the Lab Datasheet. Compare the result with the data provided in the sensor datasheet.

11) Write a conclusion in the “Conclusions” section of the Datasheet explaining your observations and lessons learned.