Laboratory #04 ENEE 148A Fall 2016

This lab will be done in pairs. You must divide up the code work and each of you indicate which routines you wrote or co-wrote. Complete the following tasks:

1. BEFORE you come to lab,
   1. Meet with your partner and decide how you will calibrate your sensor.
   2. Write up a plan on how to calibrate your sensor (to turn in at the beginning of lab).
   3. Bring any tools you will need to calibrate your sensor (like a yardstick/ruler).
   4. Each of you separately write a pseudo code for the calibration program, then together write the pseudo code you will use to write the calibration code.

During / After Lab:

1. Generate and run the program mcp3008.c, after building the necessary **temperature** sensor circuit.
2. Have your instructor verify successful operation.
3. Write a code that you can use to calibrate the SHARP IR distance sensor.
4. Calibrate the sensor at 90º incidence and compare it to the datasheet.
5. Calibrate the sensor at 30º and 45º incidence.
6. Change the program mcp3008.c to work with the distance sensor as follows:
   1. Record the distance measurement every second.
   2. Print out the elapsed time, the distance measurement and a simple moving average of the distance.
   3. Print out the message: “No object in sight” instead of the distance if the distance is > 50 cm.
   4. Print out the message: “Warning: Object too close” instead of the distance if the distance is < 10 cm.
7. Have your instructor verify successful operation.
8. Test out your code by carefully moving an object towards and away from your sensor at different angles. Test out your code with different objects. Try to obtain some idea of the limitations of the usefulness of this sensor.

For the write-up of this lab, due 14 October 2016, you need to submit (1) a paper copy of the codes that you wrote and (2) an electronic copy of the codes that you wrote. You also need to draw a diagram of the circuit that you built. Finally, you need to write up a lab procedure documenting your calibration process and presenting and analyzing the results of your experiments. Finally, you will have to turn in *all* of your pseudo codes.