Requirements Specification for EE465 Lab Project 3: Analog Temperature Sensor

Lab project goal: Measure the analog voltage output from a temperature sensor and the temperature sensor on the HCS908QG8 and display the ambient air temperatures from both devices.

Use the 16-position keypad to enter a value 1 through 9. Display that number on the top line of the LCD. Take n readings of the voltage output of the temperature sensor and the onboard temperature sensor on the microcontroller where n is the entered value. Upon finishing each conversion the program will calculate an average of the converted values. After averaging n results, display the ambient air temperature in degrees Kelvin and Centigrade on the top line of the LCD for the LM19 and on the second line of the LCD for the microcontroller.

Requirements for lab project completion:

1. Modify your HCS908QG8 breadboard to match the schematic titled "Lab3 - Analog Temperature Sensor." Each lab team member must build a hardware circuit and receive a sign off for his or her own circuit.

2. When the numbers 1-9 are entered via the keypad, the microcontroller will read the analog voltage output from the LM19 temperature sensor and the on-chip temperature sensor until n successive readings are obtained, where n is the number entered. The top row of the LCD should read "Enter n:" followed by the entry. After each new value for n is entered, the old number should be erased and the new entry displayed following "Enter n:"

3. Both lines of the LCD display should display the average of n readings of ambient air temperature in degrees Kelvin and Centigrade. For the LM19 use the top line, and for the on-chip sensor use the bottom line. The temp readings should be rounded to the nearest whole number and should appear after the fixed character strings "T,K:kk" and "T,C:cc" where kk is the air temperature in K and cc is the air temperature in C. Upon pressing the "*" key the program will return to the "Enter n:" prompt.

4. Add an LM19 temperature sensor as shown on the Project 3 schematic**.** Data sheets for the LM19 temperature sensor are available at our class web site.

5. Keep the heartbeat LED on PTA[3]. It should continuously toggle at 1 seconds on, 1 seconds off.

6. Your project grade will be based on your report, the signoff below, and the completion date. Your report must include:

a. Your *.asm file containing a header section with a clear description of the program purpose, the algorithms, key variables, and other information that would be useful to another programmer reading your listing at a later date. Your header should also include your name and your partners name, the date, and your EE465 lab session.
Your assembly program must follow the rules for comments and subroutines that are listed on the EE371 web site and are in the class hand-out regarding rules for comments.

b. A flow chart for this program.

c. A sign-off from the instructor or a TA indicating that your program performed as required and the required circuit modifications were completed. Please attach this requirments specification with signoff and partner names together with your listing, flowchart, and cover memo.

d. a cover memo. Your memo should include a summary that states:

1. amount of memory, RAM and FLASH, used by your program;
2. Interrupts used and interrupt vector assignments.

Lab Demo Due Thursday, March 18, 2014; Memo Report Due Tuesday March 20, 2014.

Completed Lab Signoff

Name(s)	Instructor/TA	Date

February 20, 2014