ECGR 4101/5101, Fall 2005: Lab 4
Using the onboard digital I/O and ADC of the SKP

Learning Objectives

This lab will introduce you to using digital I/O and Analog to Digital Converter on our Renesas board, and new C programming concepts.

General Information

The general steps for this lab are:

1. Generate a new project. Name your new project Lab4.

2. Modify the main.c file and include the appropriate files. Include commenting along the way.

3. Program the lab. Don't forget the necessary include files to get the correct functionality.

4. Compile the code into an .x30 file, and load onto the board.

5. Test the program and repeat sets 4 and 5 until the program works as required.

6. Write your lab report.

7. Demonstrate for a TA and turn in your report.

Prelab Activity

You may use the PCs in SciTech 203 or your own PC to do this lab experiment. The machines in SciTech 203 already have the software tools loaded.

Inspect the files created for your project.

1) Which file includes macros to make using the LED's and switch's more user friendly?

2) What are these macros?

3) What file includes the LCD setup functions?

4) What function allows you to display a string to the LCD?

Laboratory Assignments

In this lab you will be generating a main.c file from scratch. The program will use the three switches to display different messages to the LCD. The three LED's will be used for debugging to make sure that the switches are being read correctly.

1. At power-up the LCD should display a "ECGR4101 rocks!", and all LED's should be off. This will need to be split between the two lines of the LCD.

2. The program should wait for the user to press SW_2. Once SW_2 is pressed the display should clear and the green LED should light up.

3. The LCD will remain blank and green LED should remain ON until the user presses SW_3. Once this is pressed read the temperature sensor. On the first line of the LCD, show the raw value of the Analog port in the format xxxx.

4. On the second line, print the temperature by converting the raw number to a temperature in Fahrenheit and displaying it with the format xxx.x.

Steps

1. Follow the steps given in lab 2 for generating a new project.
2. Create the main.c file and include the appropriate files.
3. Build your program slowly, testing along the way. Perform compiles and solve each requirement one at a time.
4. Continue to build and test the program until all of the requirements have been met.
5. If you run into problems, use the break point functionality of KD30 to step through the code until you find the problem.
6. Once all the requirements have been met, ensure that everything works.
7. Finish lab write-up and demonstrate for a TA.

Requirements

Req. 1 – The code generated is written in C for the SKP16C62P.
Req. 2 – The code is well commented and easy to follow
Req. 3 – The introduction display is correct
Req. 4 – The program displays the introduction until SW_2 is pressed
Req. 5 – Once SW_2 is pressed the green LED turns on, and the LCD is blanked. The program should then wait for SW_3 to be pressed.
Req. 5 – Once SW_3 is pressed the green LED remains on, and the LCD shows the raw temperature data and the true temperature.
Req. 6 – The program waits for SW_3 to be pressed again
Req. 7 – Once SW_3 is pressed again display the new temperature data.
Req. 7 – Only valid buttons are active.
Req. 8 – The raw temperature value is in the form of xxxx on the first line of the LCD.
Req. 9 – The current temperature reading should be displayed on second line of the LCD in degrees Fahrenheit, in the format xxx.x.

Lab Report

Turn in a hard copy of the code you wrote and a printout of the map file. Also include in your lab report observations and procedure like the following:

The general learning objectives of this lab were . . .

The general steps needed to complete this lab were . . .

Some detailed steps to complete this lab were . . . .
1. Step one
2. Step two
3. . . . .

Code generated for this lab...

Some important observations while completing/testing this lab were . . .

In this lab we learned . . . .