

## **ECE 3/5/6090, Fall 2003: Lab 3**

Using the onboard digital I/O of the MSV30262-SKP

### **Learning Objectives**

This lab will introduce you to using digital I/O available on the MDECE30262 board, and new C programming concepts.

### **General Information**

The general steps for this lab are:

1. Generate a new project using the supplied files. Name your new project Lab3.
2. Download the MSV30262-SKP Lab 3 Program files to your file space.
3. Create a main.c file to hold your main routine for this lab.
4. Program the lab. Don't forget the necessary include files to get the correct functionality.
5. Compile the code into an .x30 file, and load onto the board.
6. Test the program and repeat sets 5 and 6 until the program works as required.
7. Write your lab report.
8. Demonstrate for a TA and turn in your report.

### **Prelab Activity**

You may use the PCs in Smith 347 or your own PC to do this lab experiment. The machines in Smith 347 already have the software tools loaded.

Inspect the files supplied for lab 3.

- 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 "Welcome ECGR3090", 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 red LED should light up.

3. The program should then wait for the user to press SW\_2 again. Once SW\_2 is pressed the LCD should display both lab partner's unity ID, and the red LED should turn off and the yellow one turn on. There should be one person's ID on line 1 and the other on line 2. (HINT: Debounce the switch using software so that this step will work.)
4. This will remain the same until the user presses SW\_3. Once this is pressed all the LED's should be lit, and the partner's unity ID's should be swapped. The ID that was on line one should now be on line 2.
5. SW\_4 is the reset and should turn off all LED's and restart the program. This button press should work at all times.
6. SW\_2 and SW\_3 should only perform their intended function in the order of the requirements. If you are waiting for SW\_2 then SW\_3 should do nothing.

## 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 MSV30262-SKP
- 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 Red LED turns on, and the LCD is cleared
- Req. 6 – The program waits for SW\_2 to be pressed again
- Req. 7 – Once SW\_2 is pressed again the Yellow LED turns on and the Unity ID of both Partner's is correctly displayed
- Req. 8 – The program waits for SW\_3 to be pressed
- Req. 9 – Once SW\_3 is pressed all the LED's turn on and the Unity IDs swap lines
- Req. 10 – SW\_4 is always valid and resets the program
- Req. 11 – Only valid buttons are active

## 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 . . . .*