ECGR 4101/5101/6090, Fall 2004: Lab 6

Interrupts I/O

Learning Objectives

This lab will introduce you to using interrupts to perform serial I/O available on the MSV30262-SKP board, and new C programming concepts.

General Information

The general steps for this lab are:

1. Generate a new project. Name your new project lab6.
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 steps 3 and 4 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 Smith 347 or your own PC to do this lab experiment. The machines in Smith 347 already have the software tools loaded.

1. Write the pseudo code for this lab

Laboratory Assignments

In this lab you will be utilizing onboard timers, serial I/O, and the a/d converters of the starter kit to generate a master slave system for temperature monitoring. Both boards should run the same software and pressing SW1 on either board will relinquish control to the board that had the SW1 pressed. The master board should request and display temperature data from the slave board every second. The slave board should respond with the most current temperature reading. The slave board should always be updating the on board display with the most current temperature data. You will need to determine how often is necessary, but this should be quicker than every second. All this functionality should change any time SW1 is pressed. You must use queues and Round-robin scheduling, and the UART should be set to communicate at 9600 baud, 8,N,1 with no flow control. The green LED should turn on or off every 0.5 seconds on both boards.

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. Did we mention you should write your comments as you progress, not at the end?
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 SKP16C26.
Req. 2 – The code is well commented and easy to follow.
Req. 3 – The two student boards will be connected via the UART0 transmit, receive, and ground pins. The transmit pin on one board will be connected to the receive pin on the other board.
Req. 4 – Queues will be used to transmit and receive characters.
Req. 5 – Round Robin scheduling must be used.
Req. 6 – Once a command is processed the program returns to checking for a character in the queue.
Req. 7 – The current temperature reading should be displayed on the slave board in degrees Celsius
Req. 8 – The red led on the slave board should toggle every time the temperature is measured
Req. 9 – Any time SW1 is pressed on a board, that board should become the master
Req. 10 – The master board should poll the slave board for a new measurement every second and display.
Req. 11 – The yellow LED on the master should toggle every time a new measurement is requested
Req. 12 – Both boards should run the same code
Req. 13 – Your lab report should include the final build output from the builder

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 . . . .