ECGR4101/5101, Fall 2008: Lab 5
Serial I/O

Learning Objectives

You are to write a program that runs on both of your QSK62P boards that transmits and receives serial data.

Laboratory Assignments

In this lab you will be performing serial communications with polling. This lab will use the on-board UART to communicate between two boards. The LED's will be used for signaling and the LCD can be used to display debugging information. This lab must be demonstrated to the TA.

You will be expected to listen for several different commands. All valid commands will be transmitted in uppercase. The commands that are valid are R, Y, and G toggle the respective red, yellow, and green LEDs. All other characters should be considered invalid and ignored. You may find it helpful to use a logic analyzer to monitor the communications lines as you debug your program.

1. The QSK62P board has two available serial I/O ports. Document in your lab report the one port/bits used.
2. Write and develop your program to meet the requirements, below.
3. Complete your lab report.
4. Bring the boards to the lab TA and demonstrate the code (without the HEW application running). When the TA checks your board, she will also take your lab report. You **will** need to include a printout or soft copy all of the code – there should not be much.
5. Include the printout of the .map file.

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.   You do not need to use the LCD, but it may be helpful while you debug your code.
Req. 4.   The serial communications should operate at 1200 baud, even parity, 8 data bits, one stop bit.
Req. 5.   The two student boards will be connected via the UART transmit, receive, and ground pins. The transmit pin on one board will be connected to the receive pin on the other board. You should also have a ground line.
Req. 6.   The same code should be run on both boards, with the same functionality.
Req. 7.   Both boards will wait for a button press on its own board or a byte to be received from the other attached board.
Req. 8.   If "R" (NOT "r") is received from the other board, then the Red LED is inverted on the board.
Req. 9.   If "Y" (NOT "y") is received from the other board, then the Yellow LED is inverted on the board.
Req. 10.   If "G" (NOT "g") is received from the other board, then the Green LED is inverted on the board.

Req. 11.   If SW1 is pressed, then the Red LED is inverted on the board and the character "R" (NOT "r") is sent to the other board.

Req. 12.   If SW2 is pressed, then the Yellow LED is inverted on the board and the character "Y" (NOT "y") is sent to the other board.

Req. 13.   If SW3 is pressed, then the Green LED is inverted on the board and the character "G" (NOT "g") is sent to the other board.

Req. 14.   Once a command is processed the program returns to polling.

Req. 15.   The color of the LEDs on both boards must always match.

Req. 16.   The code should be as compact as possible. Lab scores will be based on the size of the compiled object file. Smaller compiled code will result in a better score.

Test Procedure

Procedure 1: Reset both boards. Press buttons in the following sequence: B1/SW1, B1/SW2, B1/SW3, B1/SW1, B1/SW2, B1/SW3. Verify LEDs.

Procedure 2: Reset both boards. Press buttons in the following sequence: B2/SW1, B2/SW2, B2/SW3, B2/SW1, B2/SW2, B2/SW3. Verify LEDs.

Procedure 3: Reset both boards. Press buttons in the following sequence: B1/SW1, B2/SW2, B1/SW3, B2/SW1, B1/SW2, B2/SW3. Verify LEDs.

Procedure 4: Reset both boards. Press buttons in the following sequence: B1/SWn, B2/SWn, B1/SWn, B2/SWn, B1/SWn, B2/SWn. Verify LEDs. (note: n=1, 2, or 3, TA's choice)

Lab Report

Include in the checkout part of your lab report the lines:

1. Test procedure 1 is executed and the LEDs match at all times   _____

2. Test procedure 2 is executed and the LEDs match at all times   _____

3. Test procedure 3 is executed and the LEDs match at all times   _____

4. Test procedure 4 is executed and the LEDs match at all times   _____

5. Comments written as specified in requirements   _____

6. Size of code (rank)   _____/_____

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 or modified to complete this lab...
       No need to include all the files for the lab. Just include the modified code.
Some important observations while completing/testing this lab were . . .
       Here include the memory report given at the end of the compile process (map file).
       *We are **especially** interested in seeing the map file.*
In this lab we learned . . . .