ECGR 4101/5101, Fall 2006: Lab 6

Complex Serial Communications, Interrupts, and Timers

Learning Objectives

This lab will introduce you to using UARTs and interrupts 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 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 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.

Laboratory Assignments

In this lab you will be communicating between a PC running HyperTerm and your board using UARTs. You will use queues to count characters and report your findings. Also you will use a timer to report a temperature.

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 –Serial communications must be handled with interrupts and queues.
Req. 4 – Communicate at 1200 baud, odd parity, one stop bit

Req. 5 – Connect two data lines and one ground line between the board and the PC, using the MAX232 chip to run at the correct voltage.
Req. 6 – The PC should use a HyperTerm-like application to send and receive data.
Reg. 7 – The board shall accept strings of characters and count the number of characters that start with the letter in the first position of the string (the string is ended with CR).
Req. 8 – The Board will respond with the line "The character x occurred yy times.", where x is the first character and yy is the count (minimum 0 characters, maximum 79 characters in a string).
Req. 9 – Every 15 seconds, send the temperature of the board to the PC using the string "Temperature = xx.x degrees F" where xx.x is the degrees in Fahrenheit to the precision of tenths (minimum 00.0 degrees, maximum 99.9 degrees).

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 . . . .