ECGR 4101/5101, Fall 2006: Lab 6

Timers and Interrupts

Learning Objectives

This lab will introduce you to using timers and interrupts on the 30626P-SKP board to light LEDs.

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 Woodward 203 or your own PC to do this lab experiment. The machines in Woodward 203 already have the software tools loaded. Answer these questions in the lab report:

1. How many timers (minimum) could you use?
2. How many interrupts must you use for the lab?
3. What are the values needed in two 16-bit timer SFRs to get a time of 1 second?

Laboratory Assignments

In this lab you will be programming the timers and using interrupts. 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.

1. The program should rely on interrupts.
2. The switches will turn on and off the timers.

Steps

1. Follow the steps given in lab 1 and 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 SKP16C62P.
Req. 2 – The code is well commented and easy to follow
Req. 3 – Pressing SW1 will start the three timers with their initial countdown values and all LEDs turned off.
Req. 4 – Pressing SW2 will stop the three timers and keep the LEDs lit in their current state.
Req. 5 – When running, one timer will toggle the green LED once every second (one second on, one second off).
Req. 6 – When running, one timer will toggle the yellow LED once every three seconds.
Req. 7 – When running, one timer will toggle the red LED once every seven second.
Req. 8 – All timers and switches MUST use interrupts. Once the hardware is initialized, the processor should do nothing in a while loop.

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 . . . .