CSC 230 Assignment 4 Part 2

Spring 2016

Submissions due on April 1, 2016.

This assignment has two parts:

1) **Written Part**: A small written part is available on the Connex site: Tests&Quizzes.
2) **Programming Part**: Will be submitted via the Assignments link on the Connex site.

Objectives

- Gain confidence with "C" programming.
- Create effective subroutines/functions.
- Use peripherals: the LCD, timer interrupts and buttons

Academic Integrity

Prior to submitting your assignment, carefully read the University policy on Academic Integrity: http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/PoAcI.html

Assignment 4: Programming Part [25]

Recall that in Lab 8 and Lab 9 you wrote "C" code to use the LCD display, buttons and timers. This programming exercise is to combine all this functionality into one to produce a **stop watch**. You can reuse the code from main.c of Lab8, button.c and timer_interrupt.c of Lab9 and all the LCD driver files for this purpose. Your program should do the following:

1. Use a timer to generate interrupts at every one second. Choose the timer initial value and scaling factors appropriately.
2. The Interrupt service routine will maintain three counters, hours, minutes and seconds.
3. These counters are updated appropriately based on the interrupt.
4. Display the time as "hr:min:sec" format on Line 1 of display, two digits for each.
5. Display the same time on Line 2 of the display.
6. When a button is pressed (any button), the display in Line 2 is paused while the time in Line 1 continues to increment every second.
7. When a button is pressed again (any button), the time displayed in Line 2 resumes and syncs with the same time as Line1.
8. If you wish you can also implement a sub-second counter and display as "hr:min:sec.sub_sec"
9. Note that the display program takes ASCII characters for display. So if you need to display a number you need to convert that into equivalent ASCII string. For example to display the number 59, you may not be able to pass the value of 59 directly to the LCD. Instead it should be converted to two ASCII characters, as 53 (for 5) and 57 (for 9).
10. **Submit your "main.c" program on conneX**

Grading note:

a. If you submit a program that does not compile you will receive 0 for that part of the assignment.