Carleton UNIVERSITY

Department of Systems and Computer Engineering

SYSC-3310: Laboratory 6

Timer

As this lab needs the physical board, this will be a group lab. Each group should submit one deliverable set mentioning the group number and students' names/IDs.
Any student in the group can submit the deliverable but make sure to write all student names of the group.

*The lab deliverable is **one-weeks** due from your lab session date.*

Lab 5 - Timer

In this lab, you will exercise 2 things: programming interrupts and configuring/using the timers. It's assumed you are already well versed in I/O.

Things to look out for:

Configuring timer(s) correctly.
Configuring interrupts correctly.
Implementing ISRs correctly.
All other required configurations
Correct program behavior

Create a new project in Keil, named "Lab5".

In this project, you should:

1. Disable the Watchdog timer!
2. Configure the switches (P1.1 and P1.4) as inputs, **using pull-up internal resistors**.
3. Configure switch interrupts. This has to be done at port level (device), NVIC, and CPU (consult lecture slides and Reference Manual).
4. Configure the LEDs (P1.0 and P2.0, P2.1, P2.2) as outputs.
5. Initialize LEDs states (all turned off).
6. Configure Timer A (16 bits) accordingly.
7. Implement switch and timer ISRs.

Button 1 toggles between LEDs. When the button is pressed, the currently selected LED retains its state, and we begin updating the other LED as described below in BEHAVIOR.

Button 2 pauses/resumes the system. When paused, if LEDs were off, they should remain off. If LEDs were on (or in a certain color), they should remain on (or in a certain color). When system resumes, BEHAVIOR continues as if no pause had occurred.

BEHAVIOR: assuming system is not paused, the currently selected LED should switch to the next state every second. E.g., if the Red LED is currently selected, it toggles on and off every second. If the RGB LED is selected, it changes to the next color every second. This has to be implemented with Timer interrupts.

NOTE: when the system is paused, no Timer interrupt should occur.

Deliverables

To get the marks for this lab, submit the following:

1) Your project folder in a single zip file. Name your project zip file like this: **Lab6Proj_<Group_number>.zip**
   Your zip folder MUST include the entire Keil project folder
2) A ***video*** that shows a DEMO of your project testing on the board.
3) A single page that includes
   a. Half page summary of what you have done and learned from this lab
   b. Your group number and students' names/IDs