Concordia University
Department of Computer Science and Software Engineering

SOEN422 Fall 2021

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Lab 4 (5%)

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Hardware Interrupts and Interrupt Service Routines

Purpose

This lab aims to provide exercises on hardware interrupts, interrupt service routines (ISRs), and a 8-bit timer. It will have three tasks.

Task 1 [1%]: Write an ISR for an external interrupt that turns off a LED

Write a while (true) loop that turns on the onboard LED and then delays five seconds. Use the pin INT0/D2 (PD2) as an output to turn off the onboard LED if the pin PD2 is pulled low with a jump wire. Perform this task using bare-metal C/C++.

Task 2 [2%]: Write an ISR for a pin change interrupt that turns off or on a LED

Write a while (true) loop that toggles the pin D2 (PD2) as an output and then delays one second. Use the pin PCINT0/D8 (PB0) as an input connected to pin D2 (PD2). The ISR must check if it should turn the onboard LED on or off. Use bare-metal C/C++.

Task 3 [2%]: Write an ISR for a 8-bit timer

For this task, the while (true) loop has an empty block (nothing in it). Using the 8-bit Timer0/Counter0, set the prescaler to 256 and the timer to CTC mode to get an interrupt every 4 milliseconds. Make a volatile counter to blink the onboard LED every 0.5 second. Do not use delays for this exercise. Use bare-metal C/C++.

Individual Lab Report Submission

Each student is expected to create a `.zip` file that he will upload to Moodle for grading. The following is expected in the archive:

- A folder containing your source code
- A report in **.PDF** format, no other formats will be accepted

The individual lab report is expected to contain the following for each task:

1. Your code must be commented on by explaining the logic behind it.
   The code for each task should be in separate source files.
2. Discussion and conclusion.

Create a `.zip` file with the following signature:
Soen422_LabSection_Lab4_Lastname_StudentID.zip

Due 11:59 PM - Monday, November 1, 2021