

Laboratory 3

(Due date: October 24th)

OBJECTIVES

- ✓ Learn how to use interrupts, other related Assembly Language instructions.
- ✓ Learn how to use C/Assembly Language Programming with Code Warrior.
- ✓ Learn how to interface Hardware interrupt.
- ✓ Learn how to configure an input PORT to issue Interruptions.

FIRST ACTIVITY (50/100)

- Create a new project (**lab3a**). You can use the provided template (`lab3a.c`) or create a new one.
- In this activity you will write a program in C & Assembly Language to complete the following:
 1. Write an C function `IRQ_EN()` using inline ASM instructions that enables the IRQ interrupt in edge sensitive mode.
 2. Call `IRQ_EN()` from the main C program. Enable global interrupt within the C program.
 3. In the main C program, create an infinite loop that visibly flashes the RGB LED on the Dragon board. Pick your favorite color and the frequency of flashing (use delays).
 4. Write the interrupt service routine `IRQ_ISR` as a C function such that when the interrupt occurs, a 7-segment display (anyone) on the Dragon12-Light Board toggles between displaying 1 and 0 (at the beginning, start with 0).
- Note: `lab3a.c` must include a subroutine for displaying hex values 1 and 0 on a 7 segment display.
- Implement the delays using a function written in Assembly language.
- Use Signal Generator & Oscilloscope to interface with Hardware interrupt pin PE1 (IRQ pin)
- **Demonstrate that your code works to the TA and submit the working code to the Moodle Submission page**

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Date: _____

SECOND ACTIVITY (50/100)

- Create a new project (**lab3b**). Create your own `.c` file this time.
- In this activity, you will write a program in C & Assembly Language to complete the following:
 1. Write an C function using inline ASM instructions that enables PORTH interrupt in edge sensitive mode
 2. In main C file, have an infinite loop that visibly flashes the RGB LED on the Dragon12-Light Board. Pick your favorite color and frequency of flashing (use delays).
 3. Write the interrupt service routine in C such that when the PORTH interrupt occurs, a 7-segment display (anyone) toggles between displaying 1 and 0 (at the beginning, start with 0).
- Implement the delays using a function written in Assembly language.
- What will happen if both IRQ & PORTH interrupts are enabled together?
Demonstrate that your code works to the TA and submit the working code to the Moodle Submission page

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Date: _____

HINTS

- I bit in CCR register used to enable/disable interrupt
- Interrupt control register (INTCR register) is used to enable IRQ interrupt & configure it either as falling edge or level sensitive.
- For interfacing to RGB LED, 7 segment Displays, DIP Switch, Pushbuttons, etc., see the schematic and manual of your development board.
- Look at the Interrupt Vector for the port you want to configure for interruptions.