

## HW Assignment #7

This lab-based assignment will introduce you to assembly programming and will reinforce the following concepts: interrupt-based programming, I/O, timers, and the clock system. The experiment involves re-writing the program from HW 4.2 using the MSP430 assembly language. Specifically:

**Create an assembly program that runs on the MSP430 that will blink LED1 (port 1 pin 0) at a rate of exactly 1 Hz (meaning one cycle per second). The LED should be on for a fraction  $x$  of the cycle and off for a fraction  $1-x$  of the cycle. Select two values of  $x$  between and specify your choice. The program should execute an interrupt subroutine in response to pushing button P1.1 and as a result increase the rate at which LED1 (port 1 pin 0) blinks. Your program should increase the rate at which LED1 blinks for 4 button presses. On the fifth button press the program should reset the LED1 blink rate to 1 Hz.**

The knowledge you gain in this lab and subsequent labs should be transferrable to other microcontrollers.

**A skeleton program has been provided for your convenience. Re-name each .s43 file by removing the “\_skeleton” portion in the filename. You should fill in the missing segments in the following files:**

**mainasm.s43  
configureClocks.s43  
configurePorts.s43  
configureTimer.s43**

*Deliverables:*

- A .zip file including the completed assembly files with comments.

*Resources Required:*

- TI MSP430FR6989 Launchpad and the IAR Embedded Workbench Integrated Design Environment
- MSP430 Microcontroller Basics by John Davies, Newnes, 2008. ISBN: 978-0-7506-8276-3
- MSP430FRxx Family: User's Guide by Texas Instruments.
- MSP430FR6989 datasheet.
- ENEE 4710 lecture notes on assembly programming.