EE 444/645
<div align="right">02/02/2017</div>

Lab #1: MSP430: Clocks and Digital I/O

Report due: *Thursday, February 9, by 2:00 pm*

INTRODUCTION

The main goal of this laboratory is to get familiar with the TI MSP-EXP430F5438A experimenter's board, CrossStudio, and the process of downloading, executing, and debugging programs on MSP430-based boards. In addition, you will use Digital IO capabilities of MSP430, timers, and interrupts to measure time intervals.

EQUIPMENT

CrossStudio for MSP430, TI MSP-EXP430F5438A board, Agilent mixed-signal oscilloscope

ASSIGNMENT

Set the MCLK of MSP430 as close as possible to 25 MHz and capture it using an oscilloscope to make sure you are running at the correct frequency. You might have to adjust the core voltage using the provided *IncrementVcore* function. Add also *DecrementVcore* to your project and play with different values. Measure VCORE voltage (there's a test point on the board) for all levels of PMMCOREV and compare it to the voltage levels listed in the datasheet.

Write a program that precisely measures the time between two consecutive button presses. Your program should use interrupts and *Timer A* to implement this functionality. For this assignment, it is acceptable to set the break point in order to check the time measurement results, or to display the results inside the debugger.

Use an oscilloscope to <u>confirm</u> the results of your time measurements. The easiest way to do this is to toggle or set/reset a pin at the boundaries of the code section(s) for which you want to measure the execution time(s). Check carefully the datasheet for the MSP-EXP430F5438A board to find available pins. Read the entire assignment before you start working on it.

<div align="center" style="color:red">Demonstrate the functionality of the program to the instructor/TA.</div>

REQUIREMENTS

Use the lab report template provided on Blackboard. The report should also include:
- A listing of your program with a reasonable amount of comments
- Vcore voltage measurements (comparison table, one of the oscilloscope screens to show the setup).
- Comparisons of the measurements obtained using the MSP430 timer and the oscilloscope measurements; include relevant oscilloscope images.

<div align="center" style="color:red">PLEASE SUBMIT YOUR REPORTS THROUGH BLACKBOARD</div>