ECGR 4101/5101, Fall 2018: Lab 3

Using the Analog to Digital Converter on the TIVA Board

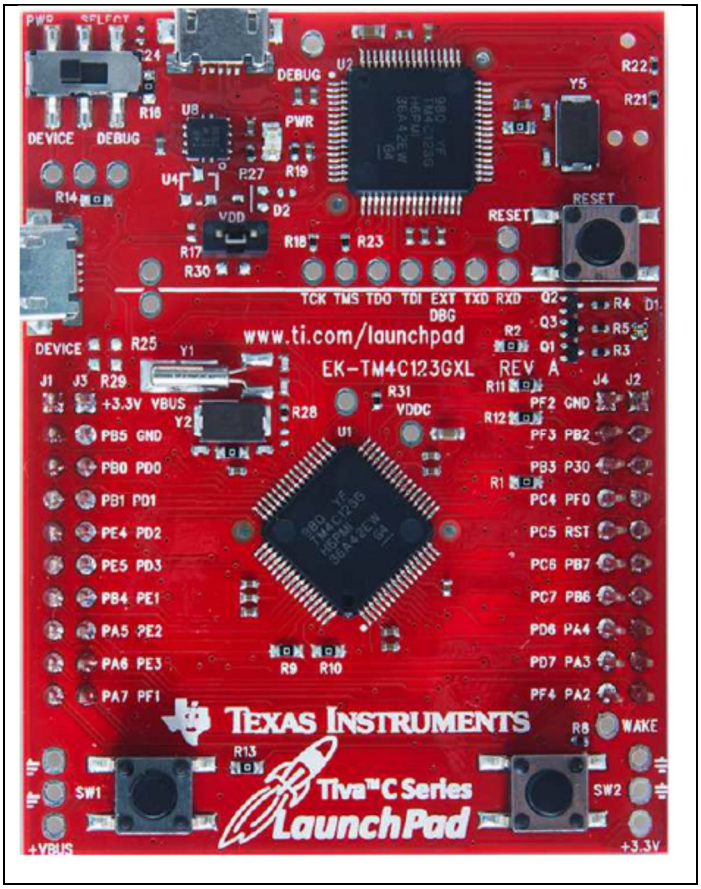
Version 1.0 – 9/21/2018

Learning Objectives:

This lab will show students how to utilize the analog to digital converter (ADC). In this lab, we will be connecting a potentiometer to an ADC input pin, reading the analog value, then expressing that voltage on an LED array bar. We will do the same with a photo resistor.

Hardware:

For this lab exercise, you will need to use the same daughterboard we used in Lab 2. Remember you must add a wire between pin 3 of Jumper 1 (port PB0) and pin 7 of Jumper 2 (PD0/AIN7). See the addenda sheet for specific information (hand-drawn mapping of MSP430 and TIVA Launchpad board pins).



Of note is that, unlike the MSP430 which had most port pins next to each other, the TIVA board has port pins that are not necessarily contiguous. You will need to ensure you activate the correct ports and light the correct pins of these ports.

You will need to use SW2 again to switch between the potentiometer and the photo resistor. Note that SW2 is on the other side of the TIVA board (compared to the MSP430 board).

Software Control:

The general concepts of how to activate a GPIO for this board (i.e. LEDs) can be found in the document "Embedded Systems Design using the TM4C LaunchPad Development Kit" found on the ECGR4101/5101 Canvas main page. Refer to "Getting Started" section for instructions on how to use the IDE tools. Refer to Experiment 1 for how to light an LED.

You will need to control the ADC differently on the TIVA Board compared to the MSP430 board. Refer to Experiment 4 in the same document for the instructions on how to set up the ADCs. While you do not need to use interrupts, you are welcome to do so.

You should understand all of the concepts associated with this lab. This lab is emphasizing that programming the ARM processor can be made easy by using the macro and include files provided by TI.

Requirements:

- The code must be written in C using Code Composer Studio
- The ARM Processor reads analog voltages from a potentiometer
- The ARM Processor reads analog voltages from a photo resistor
- The input displaced is selected based on toggling the SW2.
- The LED Bar Properly displays the scaled voltage representation (one LED at a time)
- LEDs do not oscillate between to lights when inputs are unchanged

To Demo and Submit:

To submit, have the demonstration sheet below printed off. Demonstrate your working (or partially working) code to the TA. After grading, the TA will take your demonstration sheet **and soldered board** and save for grading. Upload the *.c file to Canvas.

Embedded Systems Lab Demonstration Validation Sheet

This sheet should be modified by the student to reflect the current lab assignment being demonstrated

Lab Number:	Lab 3 – ADC on TIVA
Team Members	Team Member 1: Team Member 2:
Date:	

Lab Requirements

REQ Number	Objective	Self-Review	TA Review
1	ADC voltages are properly read from POT		
2	ADC voltages are properly read from photo resistor		
3	Input voltage to display is toggled by pressing the SW2		
4	The LED Bar lights up and can be controlled properly		
5	The ADC Value is scaled properly and displayed on the LED Bar (one LED at a time)		
6	LEDs do not oscillate between to lights when inputs are unchanged		