

# ECGR 4101/5101, Fall 2018: Lab 4

## Simple UART Communications on the Tiva Board

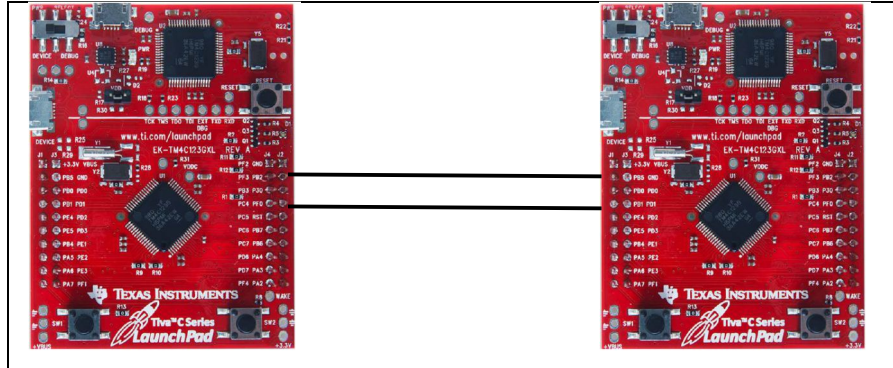
Version 1.0 – 10/16/2018

### Learning Objectives:

This lab will show students how to utilize UART. In this lab, we will be connecting one Tiva board to another Tiva board via a single data wire and a ground wire (minimum 6"). Button presses on one board will toggle through the lights of the other board.

### Hardware:

Use two Tiva boards. If you do not have two Tiva boards, use an MSP430 as the sending board.



### Software Control:

The general objective of this lab is to have a single button press on board #1 cause the LED lights to cycle to the next color of the sequence red -> blue -> green -> red-> blue -> ..... You will use a UART to send a data byte from Board #1 to Board #2.

- 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 7 for how to use the UARTs.

**Compose one application that runs on both the sender and receiver.** Use a configuration pin to determine whether the code is running on the sender or receiver board. Use one General-Purpose I/O (or PIO) that can use a jumper at run-time to select the appropriate behavior. For example, you can tie a pin to ground to indicate that the program running on the Tiva board is the sender or tie that pin to Vcc to indicate that the Tiva board is the one receiving the byte of data.

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.
- Both Tiva Boards must use the same exact code. (not applicable if you are using the MSP430 board).
- A SW2 button press on board #1 will cause the board to send the data byte 0xAA to board 2 via a UART.

- When board #2 receives data byte 0xAA, it will rotate from one color LED to the next in the sequence (red ->blue->green->red->.....).
- SW2 debouncing is handled.
- MSP430 board/box/cable is returned. Note: students in ECGR3090/4090 who already turned in the board should indicate that on the checkoff sheet.

### **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 collect your demonstration sheet **and MSP430 board/box** used for previous labs. Upload the \*.c file to Canvas – only one lab partner needs to submit the code.

# Embedded Systems Lab Demonstration Validation Sheet

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

Lab Number:	Lab 4 – UART on Tiva		
Team Members	Team Member 1:		
	Team Member 2:		
Date:			

## Lab Requirements

REQ Number	Objective	Self-Review	TA Review
1	Both Tiva Boards must use the same exact code. (not applicable if you are using the MSP430 board)		
2	A SW2 button press on board #1 will cause the board to send the data byte 0xAA to board 2 via a UART.		
3	When board #2 receives data byte 0xAA, it will rotate from one color LED to the next in the sequence (red ->blue->green->red->.....).		
4	SW2 debouncing is handled.		
5	MSP430 board/box/cable is returned. Note: students in ECGR3090/4090 who already turned in the board should indicate that here: _____		