

Initialization and GPIO

E.R.T.S. Lab

1 Lab Objective

1. Understand IO operation in TMS4C123GXL
2. Get acquainted with using on-board RGB LED and User Switches
3. Generating delay using SysCtlDelay()

2 Pre-requisite

This lab assumes you have completed Lab-0, which means you are aware of creating new project in CCS, making required configurations, technique to load and run user written program on the board and you have run the demo code of LED blink (given in Lab-0).

3 Problem Statement

In this lab you have to use switch SW1, SW2 and RGB LED present on Tiva C series board. You have to create a new project (instructions for project creation in lab-0 handout) and use lab-1.c file.

1. Use switch SW1 to Turn on Red LED on first switch press, Green LED on second switch press and Blue LED on third switch press. Repeat the same cycle next switch press onwards. Note that LED should remain on for the duration switch is kept pressed i.e. LED should turn off when switch is released. Show the result to TA.
2. Use switch SW2 and sw2Status (a variable). Your program should increment sw2Status by one, every time switch is pressed. Note how the value of sw2Status changes on each switch press. Use debugger and add sw2Status to “Watch Expression” window. Does the value of sw2Status increment by one always? Show the result to TA. Note: Define sw2Status as a global variable and in debug perspective use continuous refresh option

(You will find Continuous Refresh button on top of the Expression Window). You can use step debugging or breakpoints to check the variable value.

Hint: *To add variable to Expression Window, select and right click the variable name and select “Add Watch Expression”. To view Expression Window, click on View button from CCS menu bar and select Expressions.*

3. Configure SW1 and SW2 such that:
Every time SW1 is pressed toggle delay of LED should cycle through approximately 0.5s, 1s, 2s (Of any one color).
Every time SW2 is pressed color of LED should cycle through Red, Green and Blue.

4 Relevant Theory

1. Download the document available in the resource section: Texas Instrument “TM4C123G LaunchPad Workshop - Student Guide and Lab Manual”. You should go through Chapter-3. “Introduction to TivaWare, Initialization and GPIO” of the Manual.
2. You will use TivaWare Peripheral Driver Library, an API written by Texas Instrument to access different peripherals and functionality of ARM Cortex-M based micro controller. User Guide for Peripheral Driver Library can be downloaded from resource section.

5 Procedure

1. Include all the relevant header files in your code. Ensure that the following header files are present:

```
include "inc/hw_types.h"
include "inc/hw_memmap.h"
include "driverlib/sysctl.h"
include "driverlib/gpio.h"
include "inc/hw_ints.h"
include <time.h>
```
2. Make sure you unlock Port F pins 0 and 4 to register SW2 and SW1 switch press. Please refer to section 3 of student guide and lab manual given below as a resource for a code sequence to unlock these pins.
3. "SysCtlDelay(6700000)" generates a delay of about 500ms, use this to generate other delays.

6 Demo and Submissions

- You will be issued a take-away kit to work on the experiment.
- You have to get your output verified by your TA on the lab day.
- You have to make a **Github** account for this course. Name your repository as CS684/CS308-XXXX (eg: XXXX=2017).
- You should have a folder in the repository with name "**Experiments**".
- Create a new folder within "Experiments" called "**Lab1**".
- Upload a well documented code of the experiment along with your name and roll number every week after you have completed the experiment.