

## Lab 5: GPIOs; Switches and LED Interfaces

### Develop Your First Project

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#### **Preparation**

- Review the content of lecture 8, 9, 10, 11

#### **References**

- Getting Started with the Tiva TM4C123G LaunchPad Workshop Student Guide and Lab Manual (Chapter 1 and Chapter 3) (Canvas -> Reference Materials -> TM4C123G\_LaunchPad\_Workshop\_Workbook.pdf)
- TivaWare Peripheral Driver Library User's Guide (Canvas-> Reference Materials -> SW-TM4C-DRL-UG-2.1.0.12573.pdf)
- Tiva TM4C123GH6PM Microcontroller Data Sheet (Canvas-> Reference Materials)

#### **Purpose**

The purpose of this lab is to familiarize you with the TM4C123 microcontroller, GPIO configuration, switch and LED interface, and software development procedure. You will develop a complete system which allows the microcontroller to interface with two LEDs and a switch on the LaunchPad and then implement the designed system in C program.

#### **System Requirements**

The system has two input switches (SW1 and SW2) and two output LEDs (red and green LEDs). Overall functionality of this system is described in the following rules.

- 1) If SW1 is pressed, the green LED will be toggled every half second (the red LED will be off).
- 2) If SW1 is not pressed, the red LED will be toggled every half second (the green LED will be off).
- 3) Whenever SW2 is pressed (no matter SW1 is pressed or not), all LEDs will be off.

Basically you need to figure out which IO ports you need to configure, and how to configure them. You also need to know how to implement specific delay, looping, and if-then.

#### **Demonstration and Submission**

You will have one week to complete the lab. You can discuss with your group members and complete the lab work together. Every group will need to write and submit a lab report to Canvas->Labs->Lab5 report submission. The lab report should include

- The students' names, emails and IDs

- System specifications (based on the system requirement, which ports do you need to configure, how to configure them, any special actions needed? How to generate specific delay?)
- The flow chart of your design
- The C program listing with **detailed comments for each line of code**. You are allowed to use PinMux and TivaWare library defined functions in your implementation.
- The execution results of your program (how did you evaluate your implementation and verify your system correctness? your observations, any supplemental images).
- Discussion and suggestions: Through your lab experiments, what have you learned? Do you have any suggestions for future labs, lectures or improvement on the learning experiences?

If you finish the lab experiments during the lab time, please demonstrate your results to the instructor. The instructor may ask questions regarding your program. After the demonstration, you can leave. **The latest demonstration time will be the beginning of next lab. The lab report is due at 6pm on the day of your next lab.**

Again, you can work with your group members on all the lab activities, but make sure you understand all the materials.