ECE 3710 Lab 4 – Fall 2018

Due Date: Week of October 8 before the beginning of your lab section

Objectives

The purposes of this lab are to gain experience:

1. Interfacing the microcontroller with a Liquid Crystal Display (LCD)
2. Programming microcontrollers in C
3. Understanding and adding to existing code

Overview

For this lab, you will be adding C functions to a library that controls the LCD included on the STM32L476 Discovery Board.

Preparation

1. Come with the following:
    a. ECE 3710 Lab Kit
    b. STM32L476 Discovery Board
    c. Textbook
2. Read Chapter 17 of the textbook; **pay special attention to Figure 17-10 on page 437**.
3. Review Chapters 6 and 25 of the STM32L4x5 Reference Manual
4. Familiarize yourself with stm32l4xx.h (especially things related to LCD), LCD.h, LCD.c, and main.c that are included in the lab materials.

Pre-Lab

1. **Prelab Pass-off:** The code to initialize the LCD clock is provided to you in LCD.h and LCD.c. The function is LCD_Clock_Init(). Review this function thoroughly. Make sure you understand the reasoning behind every line of this function. Pass-off your understanding of LCD_Clock_Init() to the TA.

Procedure

1. **In this lab, we will use the Internal High Speed Oscillator (HSI) as the clock source. Your LCD will not work on the default MSI clock.** Look at Chapter 6 of the STM32L4x5 Reference Manual to learn how to manipulate the Clock Control Register (RCC_CR) appropriately.

2. You are required to implement five functions in LCD.c (reference Figure 17-10 in textbook). Develop appropriate pseudocode for each function:

    a. LCD_PIN_Init() enables GPIO clocks and configures GPIO pins as the alternative function 11 (LCD). This is the "LCD Clock Initialization" block in Figure 17-10.

    b. LCD_Configure() performs the LCD configuration. This is the "LCD Configuration" block in Figure 17-10. **Remember to enable the display request in the LCD status register before exiting this function.**

    c. LCD_DisplayName() displays the first six letters of your last name by populating the LCD RAM directly **without calling any other functions**. Hint – look at line 602 of stm32l476xx.h.

    d. LCD_DisplayString() sets up the LCD_RAM and displays the input string on the LCD.

    e. LCD_Clear() clears the LCD screen.

3. **Pass-off** – Demonstrate working LCD_Display_Name(), LCD_Display_String(), and LCD_Clear() functions to the TA.

Documentation

Prepare your lab report following the same style and rubric that you've followed in previous labs.

Hint

The Keil C compiler needs access to library headers such as core_cm4.h. If you get compiler errors complaining that this (or other similar) files cannot be found, click on

Project -> Options for Target 'Target 1'. Click on the C/C++ tab and add the include path for these libraries. On my PC, the path looks like this: