TO: Profs. J. Hung and V. Nelson

FROM: Noah Niedzwiecki and Mike Norton

SECTION: Tuesday 3:30

DATE: 25 January 2019

SUBJECT: Lab 2 Exercise

***Overview:***

The focus of this lab was to gain more experience programming and debugging the STM32L100RC Discovery microcontroller’s I/O ports using the Keil and WaveForms software. To exercise familiarity with the board, a C-Language program was designed to act as a continuous decade (0 to 9, or 9 to 0), up/down counter. Two inputs were used on the microcontroller: one that acted as a start/stop, and the other to count up or down. Four LEDs (DIO7-DIO4) represented the binary count value, and all I/O connections from the Discovery board were routed to the EEBoard so the status could be observed. The program was debugged using several breakpoints strategically placed on critical Boolean expressions that determined the functionality of the code.

***Testing Procedure***

Before testing the code’s functionality, all Discovery I/O connections were verified to be fault free. The pin connectivity list can be seen in Table 1.

Once the wiring tasks were completed, the code was uploaded to the board and executed. The first iteration of the program did not work, so a debugging session was entered to find the faults. By stepping through the code, it was observed that the two switches were not behaving correctly. This was corrected by editing the Boolean expression that compared the input data register values to bit-masked hexadecimal values rather than binary 1 or 0. After rebuilding the program, the LED’s lit up to represent the counter binary value and the switches were correctly controlling the counter state as intended. Once the program was operational, the variables “Sw1”, “Sw2”, and “Counter” were observed through the Watch Window to see if they matched what was displayed in the Memory Window. The tested results that were observed indeed verified that the program was operating correctly.

***Summary***

The goal of Lab Session 2 was to gain more familiarity with the lab equipment, and design a simple decrement/increment counter using C-Programming Language. Once the counter was operational, different testing methods were executed in order to verify functionality. This exercise clarified some confusion regarding the steps required to initialize the I/O connections, in order to achieve the preferred state. The use of bit-masking also provided some much needed practice in C-Programming, in order to obtain a functioning counter. Future lab sessions will build upon these tasks.

Discovery GPIO, PA1→ EEBoard DIO0

Discovery GPIO, PA2→ EEBoard DIO1

Discovery GPIO, PC0→ EEBoard DIO4

Discovery GPIO, PC1→ EEBoard DIO5

Discovery GPIO, PC2→ EEBoard DIO6

Discovery GPIO, PC3→ EEBoard DIO7

***Table 1:*** *Pin Connectivity Assignments*