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SECTION: Tuesday 3:30

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SUBJECT: Labs 3 and 4

The past two weeks consisted of developing code for lab three and modifying certain details to meet the requirements for lab four. The code implemented a system with two one-bit inputs and two four-bit outputs, and its functionality was modified. Significant effort was also made to improve code structure, and the different general functionalities of the code were split into modular files.

For the code used in lab three, the two outputs were decade counters that counted in opposite directions of one another. The two four-bit outputs were pins PC[7:4] and PC[3:0], which will be referred to as count two and count one respectively. The two inputs were pins PA1 and PA2, which respectively controlled enable and counting direction. Pin PA1 was an active high enable, while a low value on PA2 caused count one to count up (causing count two to count down) and a high value caused count one to count down (causing count two to count up). This system was analyzed by connecting PA[2:1] to DIO[1:0] and PC[7:0] to DIO[11:4] on the EEBoard, while driving inputs and outputs using the Waveforms software.

The system created in lab four also consisted of two inputs and two four-bit counters, but various changes, including the addition of two LED outputs, were made. In this case, the two counters were independent of one another. Count one (PC[3:0]) always counted up at an interval of 0.5s, while the direction of count two (PC[7:4]) depended on the state of the system. It should also be noted that count two counted with a period of 1s. PA0 (the user button on the board) and PA1 were the inputs, where each was a falling-edge triggered interrupt. Activating pin PA0 caused the board’s blue LED (PC8) to toggle and count two to count down. Activating pin PA1 caused the board’s green LED (PC9) to toggle and count two to count up. Pins PC8 and PC9 were connected to DIO12 and DIO13 respectively, while keeping the same connections used in the previous lab between the EEBoard and the other pins.

**Testing Procedure**

The program was loaded onto the Discovery board, and the pin connections between it and the EEBoard were inserted. For lab three, functionality was verified by using Waveforms StaticIO to drive PA1 high and occasionally toggle PA2. For lab four, the counts and two LEDs were observed while toggling PA0 or PA1 at various times.

**Results**

For lab three, PA1 being driven high caused count one to count up when PA2 was low and count down when PA2 was high. While PA1 was driven low, the count would hold as desired. Also, count two always counted in the opposite direction of count one as expected.

In lab four, a pulse on pin PA0 toggled PC8 and caused count two to count down, while a pulse on pin PA1 toggled PC9 and caused count two to count up. While this happened, count one remained counting up independently as desired.

**Summary**

Overall, the code worked as designed and according to the specifications. The process provided familiarity with various system interfaces, like the NVIC, and setting up and handling interrupts. The modularization of the code will also assist in rapid, efficient development in future projects.