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CPE 406
Assignment 1
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Assignment Description:

This assignment had us interface an 8255A programmable chip to an ATMEGA 2560. In order to achieve this, we had to design a decoder circuit that interfaced with the chip such that the address of the chip was 0xC800-0xC803. This involved creating a memory map, truth table, and a Boolean equation for the circuit. Then once we assembled and tested the circuit we were tasked with creating a ANSI C program which interfaced the ATMEGA 2560 to the 8255A and made sure that the pins 8255A-PA0 and 8255A-PC0 output the value being input into 8255A-PB0.

Problems Encountered:

I came across quite a few problems this project. First and foremost, I didn't learn as much as I should have in CPE 301 and as a result I couldn't figure out how to make the code work with my Arduino until I saw some other people's code. At that point I had the Arduino interfacing through the DDRA, PinA, DDRC, PinC, and others when in reality we must initialize the external memory registers and then the chip does the rest for us. Once I got my code correct my two main issues were that my decoder didn't work due to misplaced lines and that I left the RESET on the 8255A floating. Additionally, I ended up needing to prescale the system clock by 2 in order for the system to work smoothly.

Lessons Learned:

This project did a great job reintroducing me to embedded systems and I feel like I have a much higher knowledge of the subject than I ever had in CPE 301. Mainly I learned how to correctly interface the ATMEGA to various peripheral devices and how memory I/O works.

Description of Completed Lab:

The final project took many hours of troubleshooting but eventually I connected the board to the function generator and output a 4Hz square

wave to receive an output on the LED's connected to all 3 necessary pins. The corresponding sections are:

1. The memory map, truth table, Boolean equation, and circuit diagram is printed and stapled to the homework.
2. The completed code which defines the registers being manipulated, initializes the input and outputs in the setup() function, and makes sure the input at PB0 is routed out of PA0 and PC0 is printed and stapled to the homework.
3. Here are pictures of my circuit output and of the oscilloscope reading. You can see in the circuit picture that all three lights are blinking in unison, representing PA0, PB0, and PC0. The oscilloscope reading shows the waveform for PA0 in yellow and the waveform for the PB0 input in blue.

