**Memo to:** Randy Larimer

**From:** Johnny Gaddis

**Date:** 1/22/17

**Regarding:** EELE 465, Lab 1

**Summary:**

The purpose of lab 1 was to use the HCS908QG to run a decoder that clocks 4 devices. A transceiver and a Flip-flop were used to read in values from a keypad, and then LED’s were flashed using two more Flip-flops based on keypad input. This task was accomplished using branching: when a key is pressed we jump to a specific subroutine. In each specific subroutine, I constantly branch to two subroutines: one for writing to the LEDs and one for Polling for keypress. This lab led to a greater understanding of the HCS908QG while showing students practical uses of microcontrollers.

**Setup:**

The wiring required for this lab was the biggest part of the setup. A 4-bit bus was connected to four non MCU devices. Two Flip-Flops were set up to set the LEDs, while a Flip-Flop and a transceiver read inputs from a keypad. The code was setup to have subroutines to constantly poll for keypad input and place a global variable on the LEDs.

**Static LED Solution:**

The first solution was to flash the LEDs with a static value. This was achieved by selecting the LED devices and storing a static value to them. This solution was straight forward and showed that the circuit was wired up correctly and that we can read inputs from A, B, C, and D.

**Pattern Solution:**

The patterns required for this project were harder to achieve. Values for LED sates were saved in ROM so that they could be referenced. Once a pattern was selected, the value would be loaded in with an offset form the H:X register. Once the pattern is complete the value in the H:X register resets to 0. This solution worked wonderfully and all patterns were achieved.

**Final Thoughts:**

This lab went according to plan. The research required for this lab was relatively minimal. The only minor hiccup I had was that when D was pressed sometimes the controller would freeze. This was fixed with a slightly (50ms) longer keypress.

**Appendix A Flowcharts:**

C:\Users\johnn\Downloads\Lab1_flowchart.jpg

Figure 1: Interrupt Routine and Program Flow