Christopher Brant
C19816588
Due on 9/21/2017

ECE 3270 Microcontroller Interfacing Lab
Lab 2: Application of a Digital Latch

Abstract

This experiment was designed to help familiarize our selves with how data latches work again, as well as be a more complex circuit than Lab 1. Specifically, this lab utilized 2 digital inputs, as well as a push button, a data latch, and 4 LEDs to illustrate how a data latch can be applied with a microcontroller.

Introduction

This experiment utilized multiple hardware components as well as specifically written software for completion. Two digital inputs, a push button, a dadta latch, and 4 LEDs were used all together to create a circuit that showed a 2 bit number on the first 2 LEDs and another 2 bit number on the second 2 LEDs. The second number will mirror the first number as soon as the push button is pressed and will hold that value until the next press. The 2 digital inputs were used to write the first number's value.

Experimental Procedures

- First the circuit is wired together with 2 LEDs coming out of the data latch, 2 LEDs coming out of the microcontroller and into the data latch, the 2 DIO going into the microcontroller, the push button input going into the microcontroller, and then the push button output going from the microcontroller to the enable pin on the latch.
- Then it was ensured that any of the pins that needed to be connected to a 5V power source, were also connected to 5V tolerant pins.
- Next the code was written to write to the first two LEDs and to enable the data latch when the push button is pressed so the second two LEDs obtain values.
- Then the circuit was tested to ensure it worked, using the NI ELVIS II digital writer to write the bits.

Results

It was observed in this experiment that a data latch could be used to store values until it is desired for them to change. It was also observed that the push button must be wired to a 5V source using a 220 ohm resistor, as if it is wired to a 3.3V source then it will always read low which will seem to be a short of the button. No values needed to be tabulated or calculations done for this experiment.

Discussion

It can be concluded from this experiment that to ensure that a push button reads low when wired to show low when pushed, it must be wired to a 5V source before being wired into a 5V tolerant pin on the microcontroller. It was expected that a 3.3V source would still show high through the 220 ohm resistor, however the microcontroller was reading a 2.8V signal when not pressed as always low. Areas

where this experiment could improve could be to define the necessary voltage needs for each component explicitly in the experiment parameters itself for ease of understanding.

Conclusions

To quickly summarize the above-discussed conclusions, it would be best to state that it was observed and can be concluded from this experiment that the data latch will hold the most recent values it has been enabled to hold until the enable is once again turned on. As well, a push button must be wired to the correct voltage to achieve a change in input reading. Lastly, the code necessary to program the microcontroller based on the desired inputs and outputs must be specific and write specific input bits to specific output bits as well as it must specify the necessary output and input bits for each port.

Figures and Tables

```
1  /* Christopher Brant
2   * ECE 3720 Microcontroller Interfacing Lab
3   * Lab 2: Application of a Digital Latch
4   * 9/14/17
5   */
6
7  #include <plib.h>
8
9  int main(void)
10 {
11     TRISB = 0x40;
12
13     TRISC = 0xC0;
14
15     while(1)
16     {
17         LATBbits.LATB1 = PORTCbits.RC6;
18         LATBbits.LATB2 = PORTCbits.RC7;
19
20         if (PORTBbits.RB6 == 0)
21             LATBbits.LATB7 = 1;
22         else
23             LATBbits.LATB7 = 0;
24     }
25 }
```

Figure 1: Main function used in programming this specific circuit

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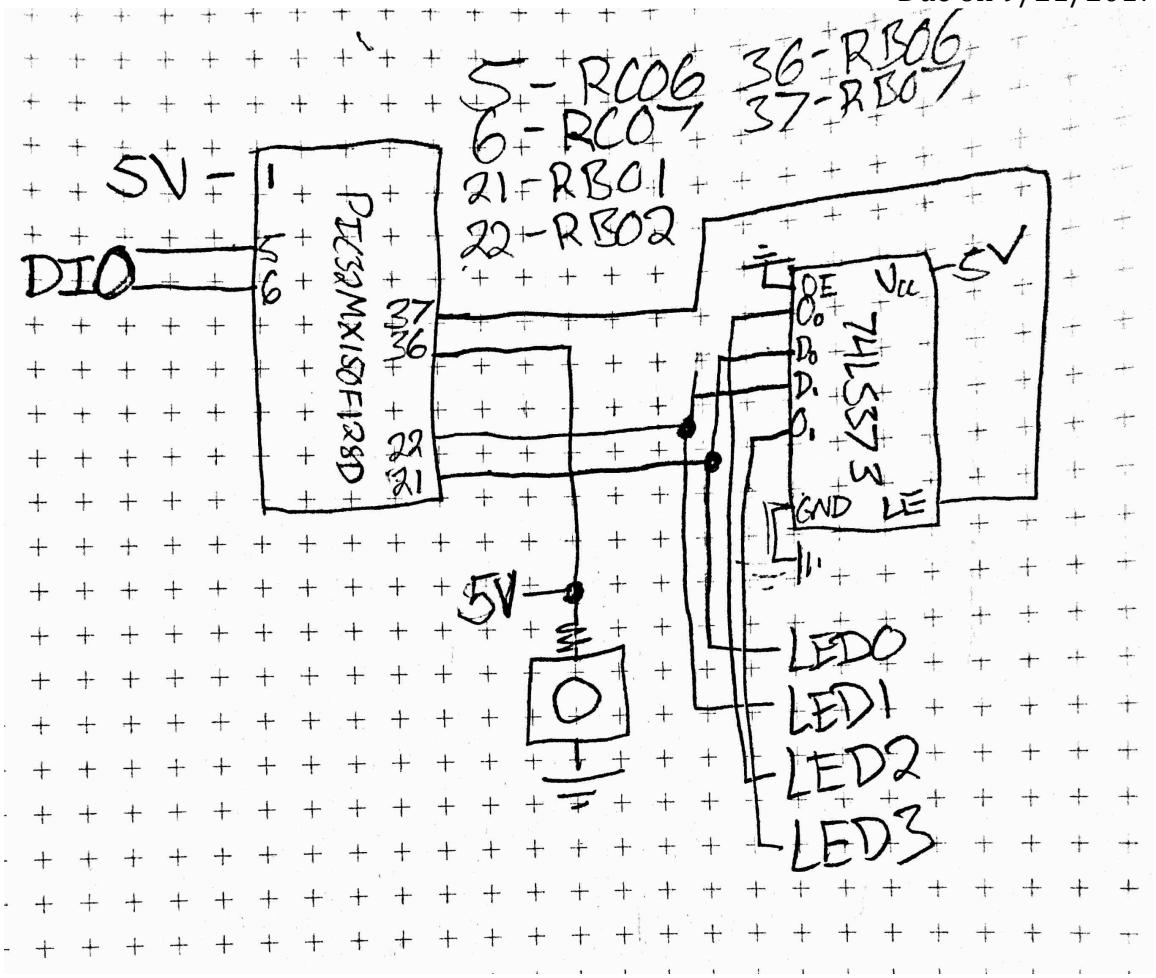

Figure 2: Circuit Diagram with all components and labeled pins