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ENGR 250

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Digital Logic Design Lab #6

Introduction

In this lab, we were asked to design and analysis Finite State Machines, from that, we expected to get proficiency in requirement analysis, logic design, implementation, and testing processes.

Experiment #1. Delay Circuit

In This experiment, we were asked design and implement a 2~4 seconds delay using 74LS374 and NE 555.
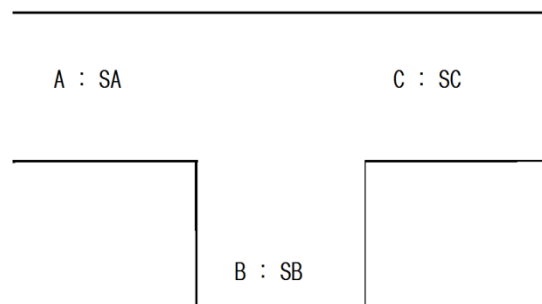
Schematics:
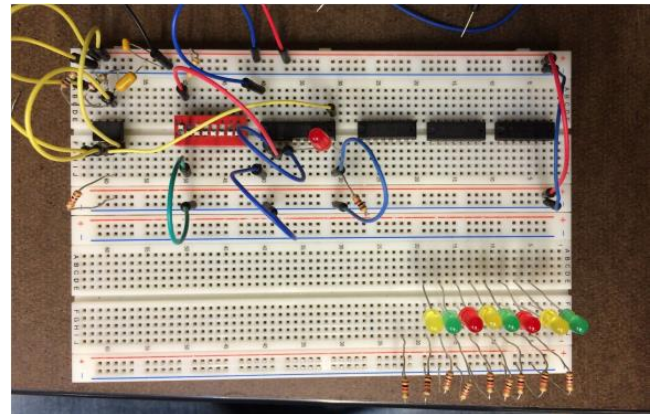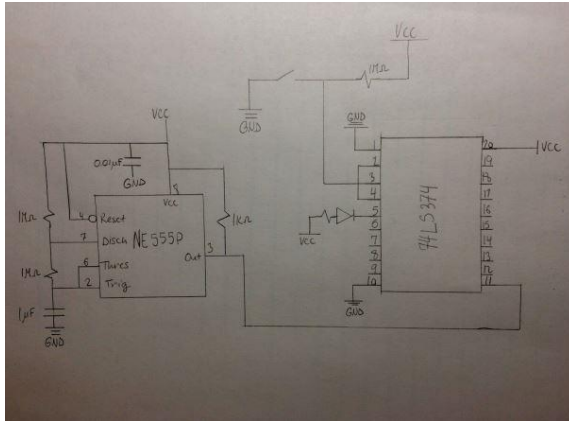
When we turned on or off the switch turning, we could see the diode was turn or off after approximately 2~4 seconds.
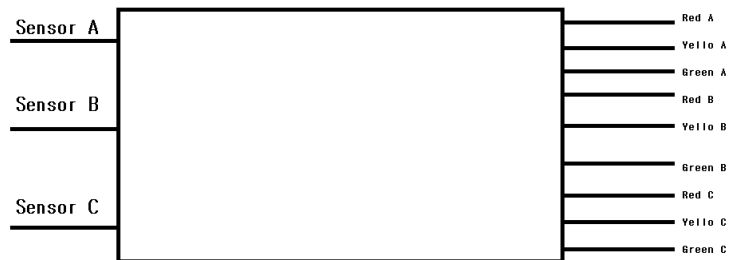
Experiment #2. Intersection Control Signal System with Time Delay

In this lab, we were asked to design a three way intersection that is need of a traffic signal control system. The intersection is divided by the three ways. Also, three different lights(Red, Yellow, Green) are set in each of ways.
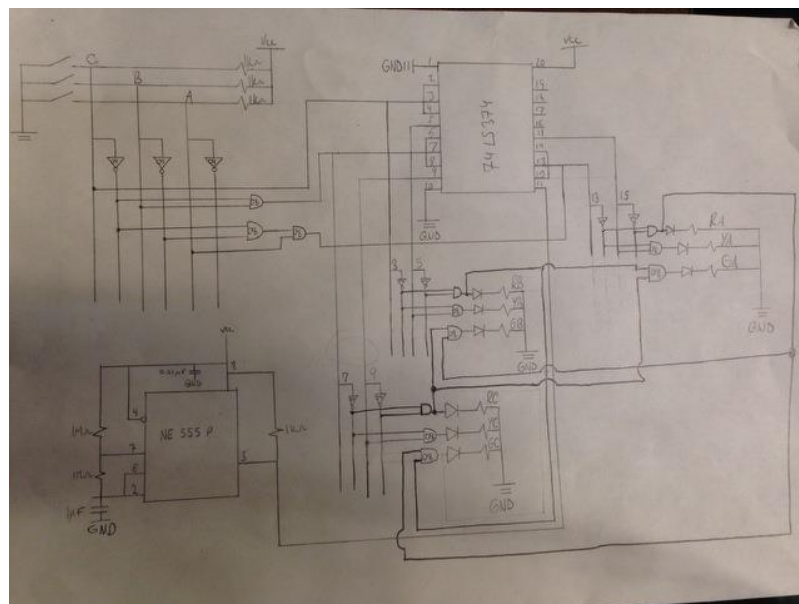
Intersection

Sensor A — Sensor B — Sensor C

Red A, Yello A, Green A, Red B, Yello B, Green B, Red C, Yello C, Green C

Equations:

Green A = C

Green B = BC'

Green C = AB'C'

Schematics

Truth table

SA	SB	SC	GA	RA	GB	RB	GC	RC
0	0	0	1	0	1	1	1	0
0	0	1	1	0	1	0	0	1
0	1	0	1	0	0	1	1	0
0	1	1	1	0	1	0	0	1
1	0	0	0	1	1	0	1	0
1	0	1	1	0	1	0	0	1
1	1	0	1	0	0	1	1	0
1	1	1	1	0	1	0	0	1

Implemented circuit
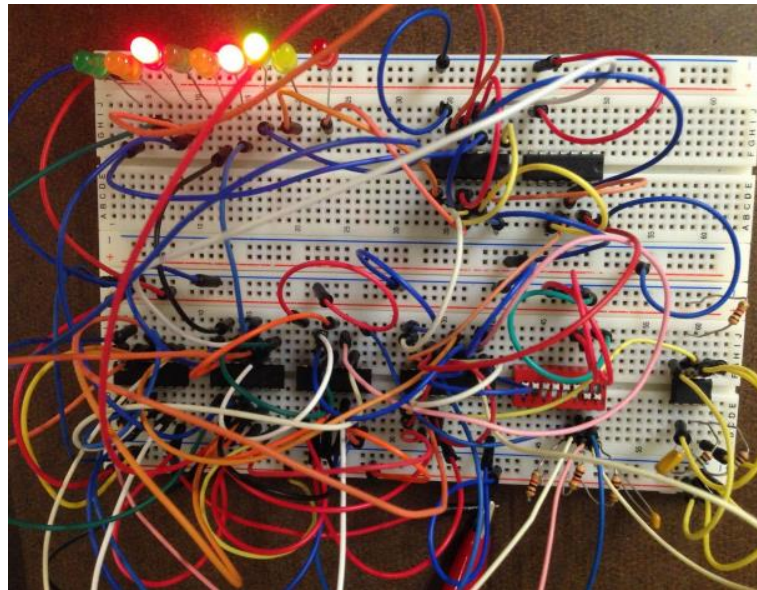
Some logic behind the circuit
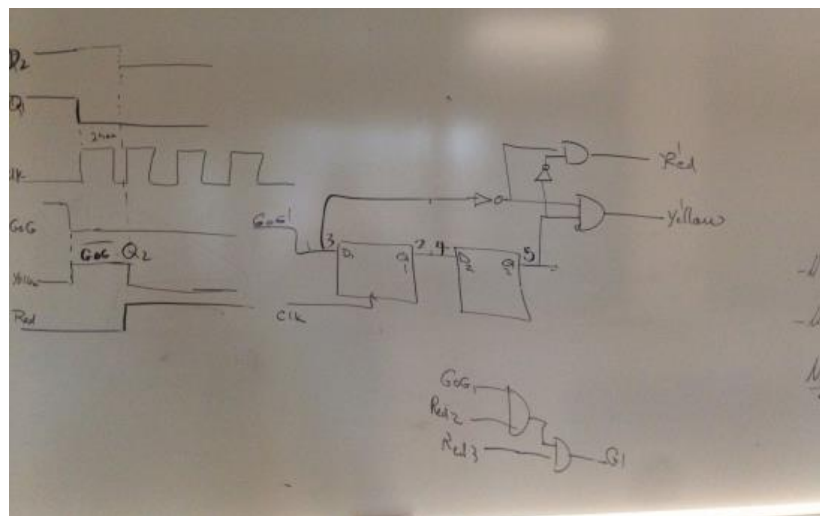
Actually, at first, we were sure about our schematics but the circuit did not work (I think we tried to make it more than 10 times) so that we checked our schematics by professor Izad and could change our schematics correctly. Above schematics is the correct one.

Learn from these experiments.

From this lab, we learned how to make a 2 second clock pulse using 74LS374 and NE 555. Actually, in the intersection experiment, we tried to do experiment many times, however, we could get change it correctly by asking from Izad. From that, we could realize that our connecting way was wrong in our schematics.

Conclusion (New experiment)

Actually, during this quarter, we did total 6 labs in ENGR 250 class. However, personally, I think this lab is the most complex lab among these things. We used most of idea that we learned it so far and we added the new idea that is about a delay of around 10 seconds by using the two chips(NE 555 and 74LS374). By this lab, I could realize much deeply about the time delaying by using chips.