

Final Project Title

Traffic Light Control System

List of Authors (Chinsung Kuo, Zhiwei Li, Mark Tarnicki, Jijian Chen)

Electrical and Computer Engineering Department
School of Engineering and Computer Science
Oakland University, Rochester, MI

e-mails: ckuo@oakland.edu, zli@oakland.edu, mjtarnicki@oakland.edu, jjchen@oakland.edu,

Abstract —

The project that we chose was to design a traffic light control system. This traffic light control system is suitable for the intersections of the main road and branch road. The purpose to this project is to use the knowledge we obtained from the classroom and laboratories to simulate a real life situation. Traffic lights are basically found everywhere in the world and is a perfect example to use as a project. One of the main purposes to this project is to figure out a code that will display led lights which will be represented by switches at different times which will be represented by a clock at a given scenario. Also, another main purpose to the project is not only writing a code but writing a code that will work and program to our board and function to simulate a traffic light system. This will be a great learning experience because with many things in life, it will be a trial and error system with a code that will work or not work and programmable changes may need to be made.

I. INTRODUCTION

Many items that we have taken away from the classroom will be used in our simulation. We will use the FSM, counter cycle, decoder, and segment to build a project showing how a traffic light system works. We will use these tools that we learned in class to build something we use every day and protects us from causing accidents on roads. We will use the "ISE design suit" to program and use XC7A100T board to show how it works. Our group chose this traffic light control system because we have all agreed that traffic lights are a big part of our life and rarely do people look back in their rearview mirror after driving through an intersection and try to figure out how does that device really work. This may seem like a simple three light operation but in reality there is much more to it than three lights turning on and off.

II. METHODOLOGY

A. Design goals

In the design of our project, we are going to use a switch in place of photo sensors as figure1. Photo sensors are used currently at some intersections to speed up the flow of traffic. The following instances are examples we will be using in our project. If main road has car, the timer will start counting down 40 seconds and then turn yellow. Now the timer will start counting 4 seconds and turn from yellow to red. On the other hand, if branch road has car, the timer will start counting down 30 seconds and then turn yellow. Then the timer will start counting 4 seconds and turn from yellow to red.

A: Main Road, B: Branch Road

A: Green; B: Red	S1 : 40 seconds
A: Yellow; B: Red	S2 : 4 seconds
A: Red; B: Green	S3 : 30 seconds
A: Red; B: Yellow	S4 : 4 seconds

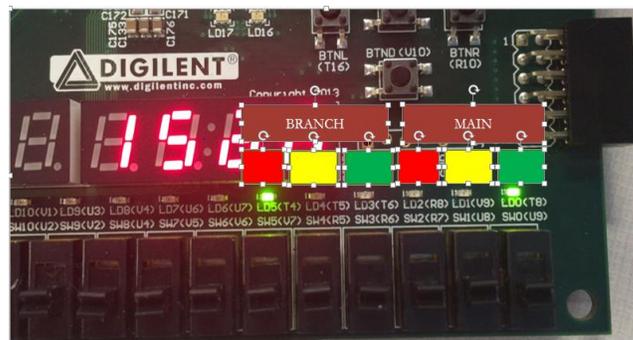


Figure1

B. Understanding The 7-Segement Display

We display 4 characters at the same time and use them for the counter down display.

C. The counter structure setup as figure3

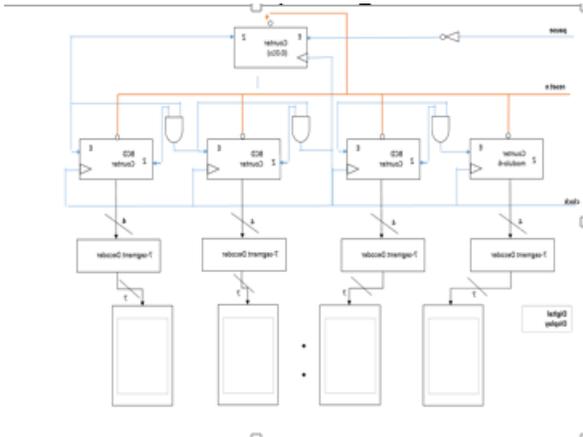


Figure 2

D. The FSM structure setup

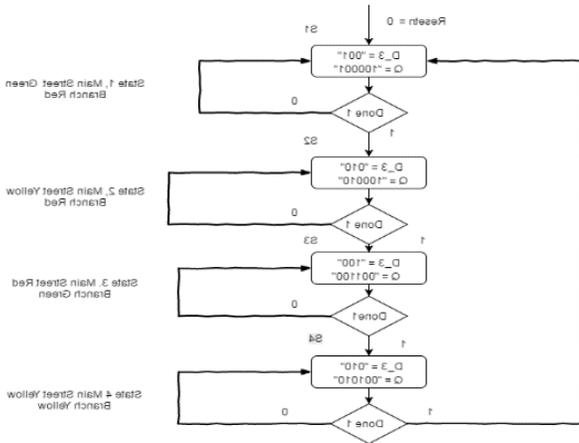


Figure 3

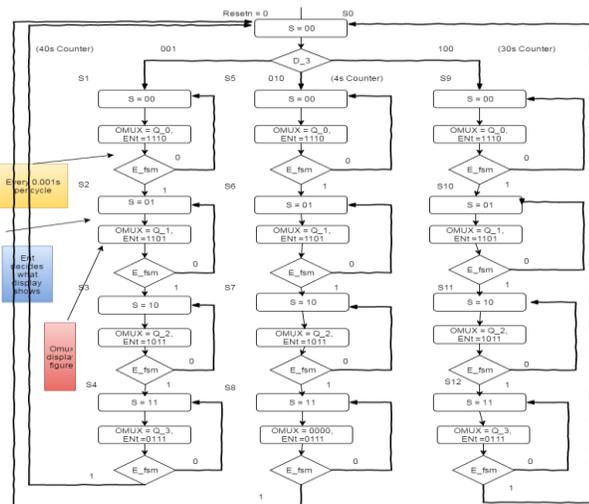


Figure 4

III. EXPERIMENTAL SETUP

We will use the "ISE design suit" to program and use XC7A100T to show how the program works.

- 1) Main Traffic lights condition: g/r, y/r, r/g, r/y
- 2) Branch Traffic lights condition: g/r, y/r, r/g, r/y
- 3) 3 leds for Main signals
- 4) 3 leds for Branch signals
- 5) 4 digit display for counter

We expected to be able to write exactly what we wanted on the 7-segment display, and allow 4 digital displays to be shown correctly.

IV. RESULTS

After implementing our final code, we could reach our desired goal. The counter will be performed in the process of changing of the traffic control lights. They are displayed in figure 5.



Figure 5

Conclusions

In this project we developed a traffic light controller based on given specifications. We chose to address the controller into a two part design. One part controlled the traffic state transitions, and the other controlled the length of time for each state. Each part was addressed separately by creating a state diagram and assigning values to variables. The process was painful, however, we were successful to implement the state machine and the output of the countdown time display.

REFERENCES

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