EECE 5520 Microprocessor II Embedded System Design
LAB 1 Traffic Light w/4 Digit 7 Segment Display
Professor Liang-Min Wang

Team Members
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Purpose
This lab is to design a controller for traffic lights that face one traffic direction. There are three colors of lights, represented with Red, Yellow, and Green LEDs. The traffic lights operate in the following patterns:

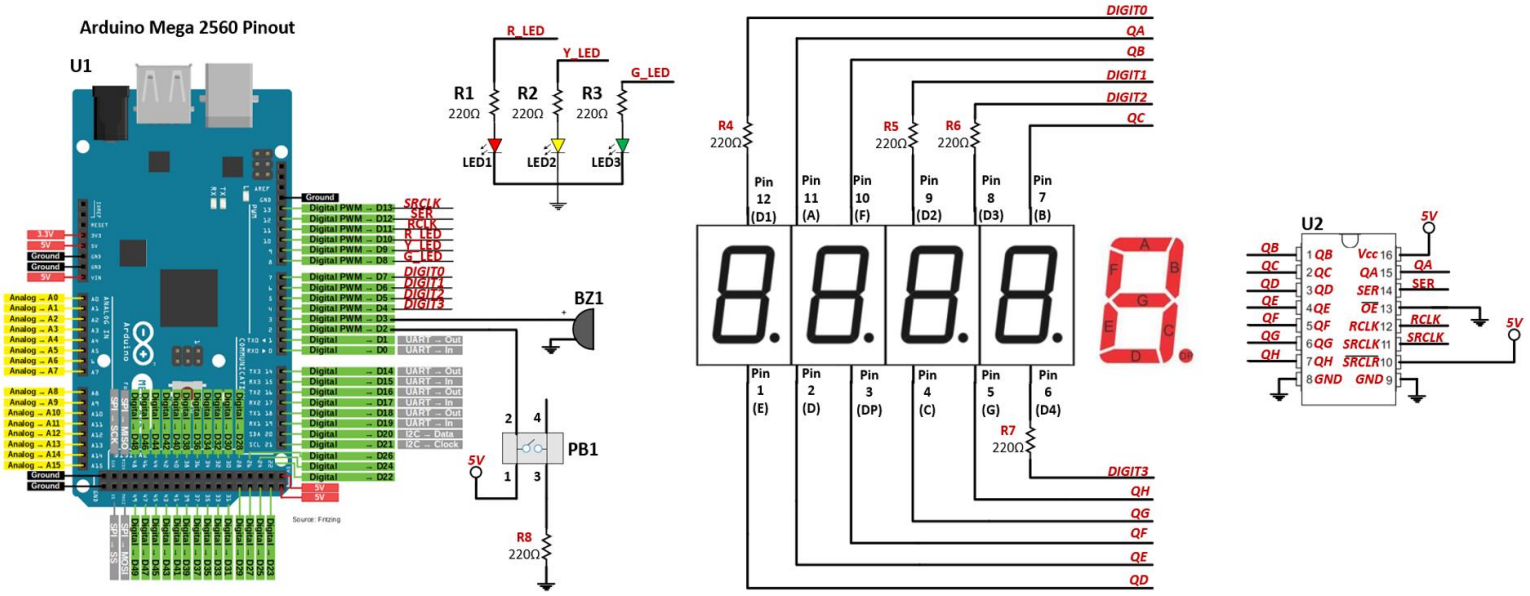
1) At the start of the system (power up), the Red light flashes (1-second on then 1-second off) until a button is pressed.
2) The Red light stays on for 20 seconds before the Green light is turned on.
3) The Green light stays on for 20 seconds before switching the Yellow light on.
4) The Yellow light stays on for 3 seconds (Y1); then the Yellow light blinks (on/off 200msec) for 3 seconds (Y2) before switching back to Red light.
5) The R-G-Y1-Y2 pattern continues until the system is powered off.
6) An active buzzer beeps for 3 seconds before a light is changed.
7) A four-digit 7-Segment display shows the time (in seconds) remaining for each light. Number is displayed in hex-decimal.

Team Member Responsibility
Bhargavi Upperla – Tasked with constructing the LED connections, Push Button connection, and Active Buzzer connection.
Rishab Vyas – Tasked with creating the code for the for the traffic light project.
Jairus Morrow – Tasked with creating the schematic and testing the code for 4-digit 7 segment display.

Materials

Traffic Light State Machine BOM		
REFERENCE DESIGNATOR	***QTY***	***DESCRIPTION***
U1	1	Arduino Mega 2560
U2	1	8-Bit Shift Registers (SN74HC595N)
U3	1	4 Digit 7 Segment Display
R1, R2, R3, R4, R5, R6, R7, R8	8	220Ω Resistor
LED1, LED2, LED3	3	Red, Green, Yellow LEDs
PB1	1	Push Button Switch
BZ1	1	Active Buzzer

Schematic



Results & Conclusion

During our project we encountered several issues. We destroyed an 8-bit Shifter due to misconnection. There was also an issue regarding a faulty active buzzer that would not sound when actuated. Also, we experienced an unexpected behavior from our design that was attributed to mislabeling a portion of the schematic. In the midst of our adversities, we made significant progress to complete the project. We utilized a state machine library that allowed us to easily implement our requirements and we navigated our busy schedules to put together a solid all-around effort.

YouTube Video Link Demonstration: https://youtu.be/Sy8hxDKD4YM