TRAFFIC LIGHT CONTROL

By: Jason Fisher, Melvin Pulianthuruthil, Merna Aziz, Joseph Yatooma

DIGITAL LOGIC DESIGN

Instructor: Dr. Llamocca

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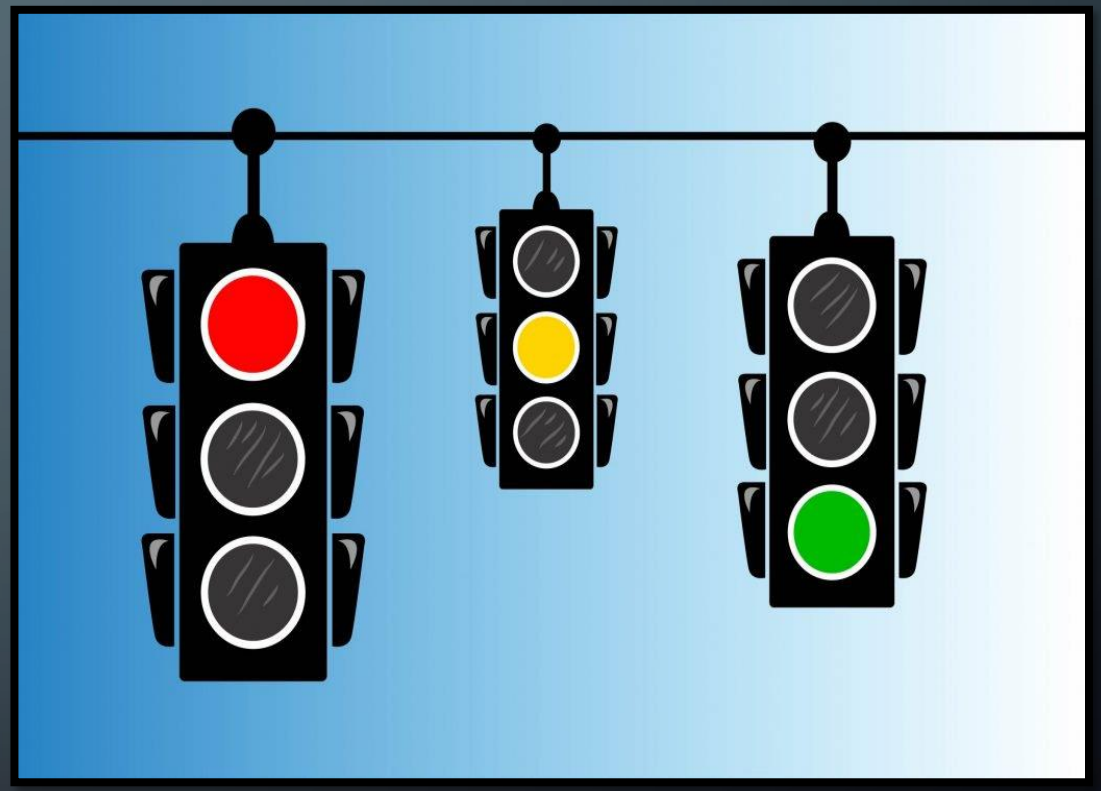
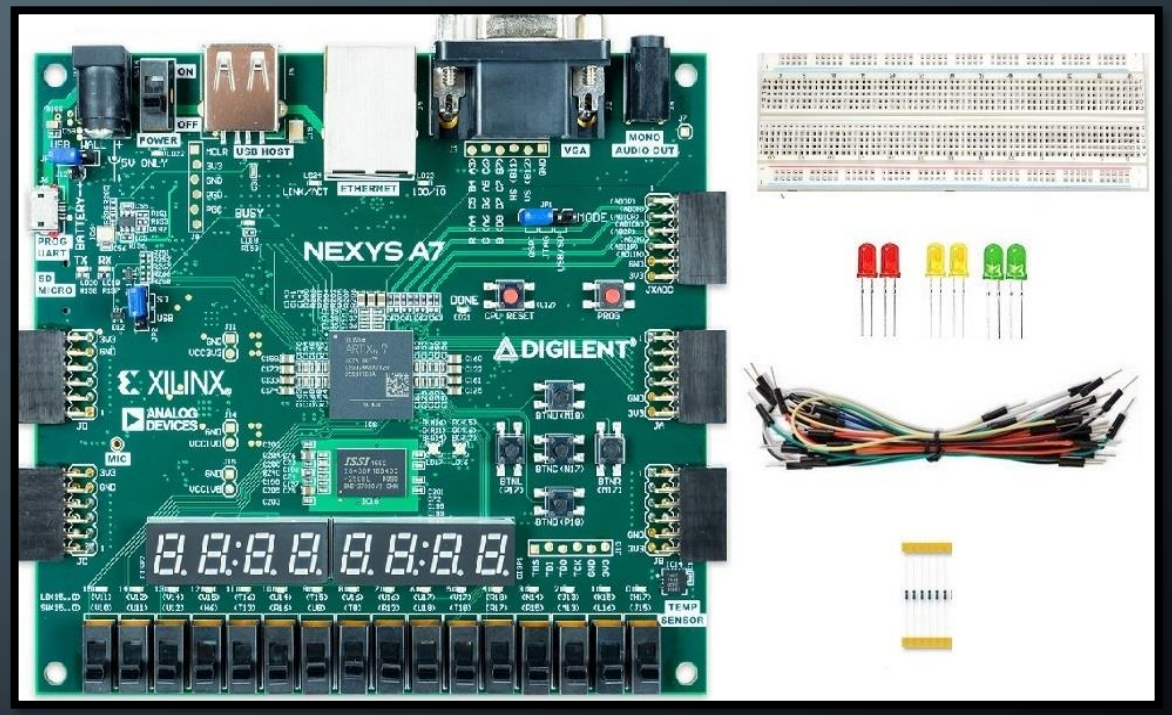
INTRODUCTION

- Two way intersection light system
    - 1- Day time / longer time needed for transitions.
    - 2- Night time / shorter time needed for transitions.
- Used Nexys A7 board to control the light during the day
- LED's, FSM, Clock Divider were used.
- 4s counter.
- Seven Segment Display.
- Switch to determine the mode.
- Stopwatch to communicate the time till the next transition.



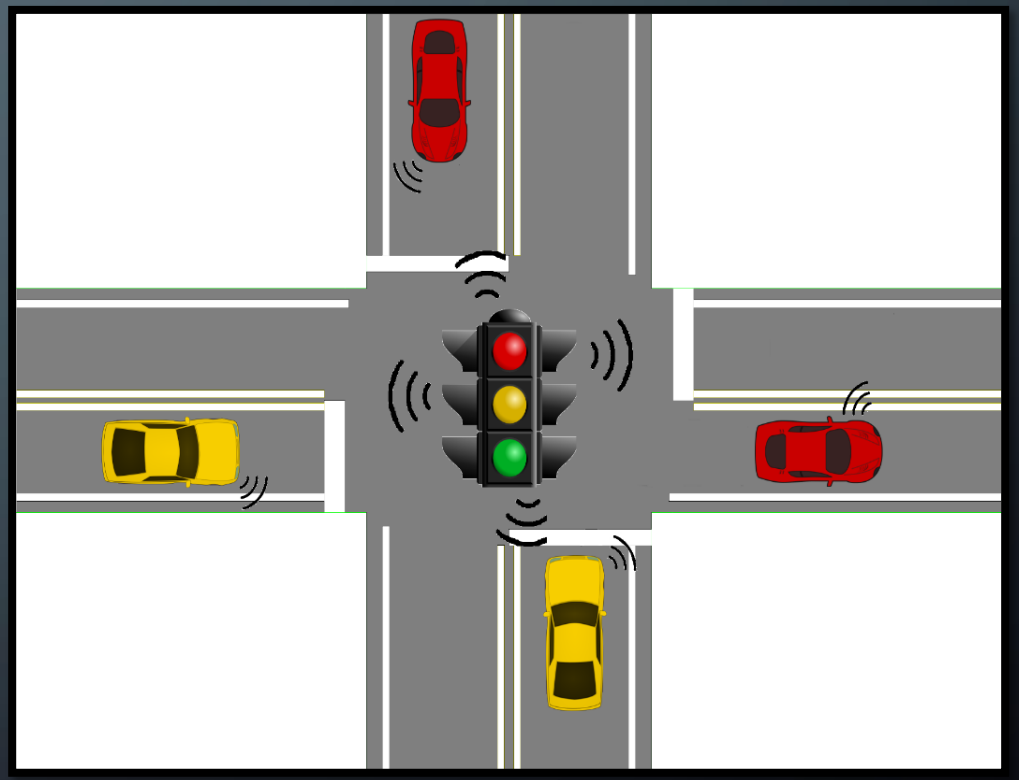
What we used to build the traffic light?

- Breadbord.
- Resistors.
- Wires.
- 2X Red, 2X Yellow and 2X Green LED's.
- Nexys A7 board.
- Vivado code.
- Traffic light design.

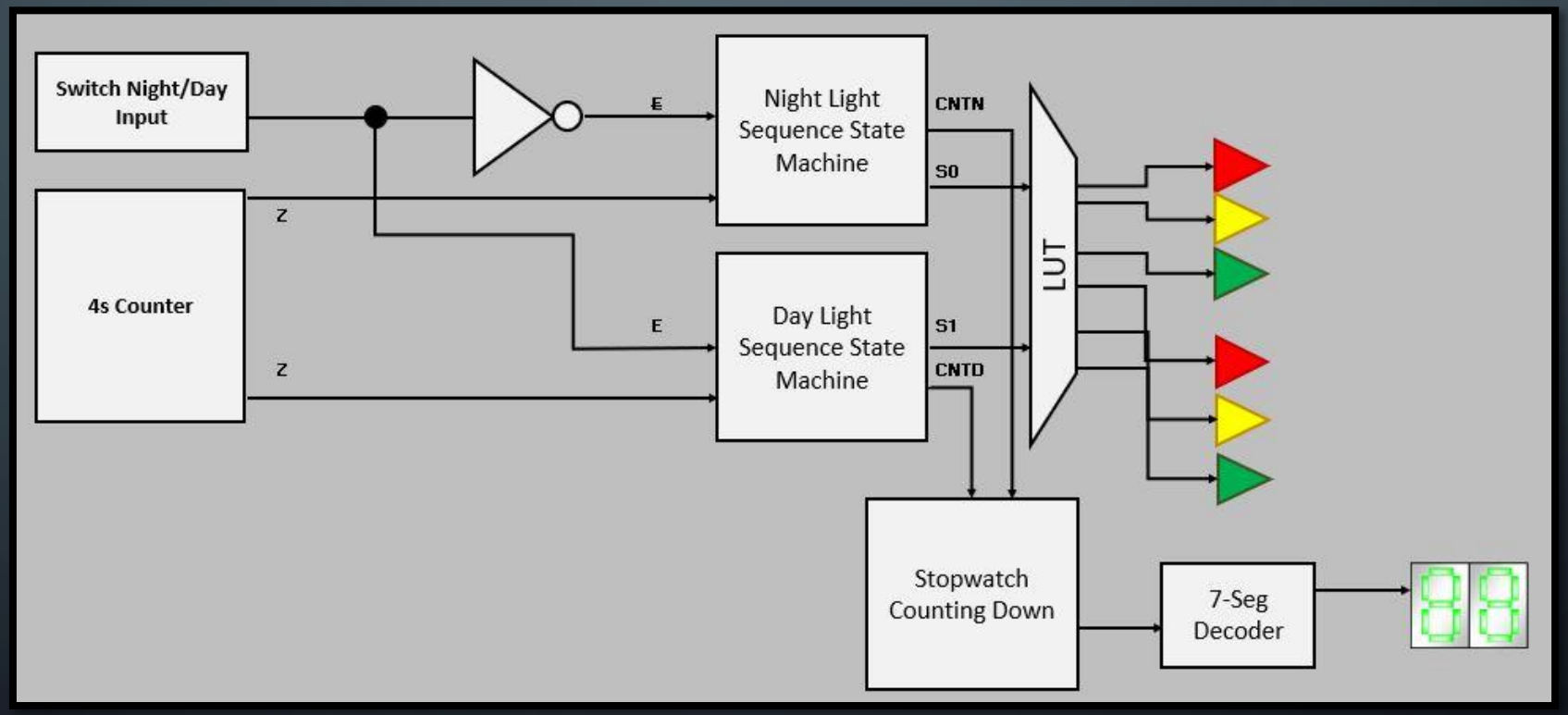


How does it work?

- Create a traffic light control system by controlling the transition period of the lights during the day and the night.
- During the day the traffic light cycle lasts 24sec.
- During the night, the traffic light cycle lasts for 16sec.
- In when switching between modes the lights go yellow for 4sec.



TRAFFIC LIGHT CONTROL CIRCUIT



Day State Machine States

Day State Machine States							
Current State	Inputs		Next State	Output 1	Output 2	Out 3	Out 4
	E	Z		GREEN/YELLOW/RED	GREEN/YELLOW/RED	b	CNTD
0	0	X	0	010	010	0	11
0	1	0	0	010	010	0	11
0	1	1	1	010	010	0	11
1	0	X	13	100	001	0	10
1	1	0	1	100	001	0	10
1	1	1	2	100	001	1	10
2	0	X	13	100	001	0	10
2	1	0	2	100	001	0	10
2	1	1	3	100	001	1	10
3	0	X	13	100	001	0	10
3	1	0	3	100	001	0	10
3	1	1	4	100	001	1	10
4	0	X	13	100	001	0	10
4	1	0	4	100	001	0	10
4	1	1	5	100	001	1	10
5	0	X	13	100	001	0	10
5	1	0	5	100	001	0	10
5	1	1	6	100	001	1	10
6	0	X	13	010	001	0	10
6	1	0	6	010	001	0	10
6	1	1	7	010	001	1	10
7	0	X	13	001	100	0	10
7	1	0	7	001	100	0	10
7	1	1	8	001	100	1	10
8	0	X	13	001	100	0	10
8	1	0	8	001	100	0	10
8	1	1	9	001	100	1	10
9	0	X	13	001	100	0	10
9	1	0	9	001	100	0	10
9	1	1	10	001	100	1	10
10	0	X	13	001	100	0	10
10	1	0	10	001	100	0	10
10	1	1	11	001	100	1	10
11	0	X	13	001	100	0	10
11	1	0	11	001	100	0	10
11	1	1	12	001	100	1	10
12	0	X	13	001	010	0	10
12	1	0	12	001	010	0	10
12	1	1	1	001	010	1	10
13	X	1	0	010	010	1	10
13	X	0	13	010	010	1	10
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Night State Machine States

Night State Machine States							
Current State	Inputs		Next State	Output 1	Output 2	Out 3	Out 4
	E	Z		GREEN/YELLOW/RED	GREEN/YELLOW/RED	a	CNTN
0	0	X	0	010	010	0	11
0	1	0	0	010	010	0	11
0	1	1	1	010	010	0	11
1	0	X	9	001	100	0	01
1	1	0	1	001	100	0	01
1	1	1	2	001	100	1	01
2	0	X	9	001	100	0	01
2	1	0	2	001	100	0	01
2	1	1	3	001	100	1	01
3	0	X	9	001	100	0	01
3	1	0	3	001	100	0	01
3	1	1	4	001	100	1	01
4	0	X	0	001	010	0	01
4	1	0	4	001	010	0	01
4	1	1	5	001	010	1	01
5	0	X	9	100	001	0	01
5	1	0	5	100	001	0	01
5	1	1	6	100	001	1	01
6	0	X	9	100	001	0	01
6	1	0	6	100	001	0	01
6	1	1	7	100	001	1	01
7	0	X	9	100	001	0	01
7	1	0	7	100	001	0	01
7	1	1	8	100	001	1	01
8	0	X	9	010	001	0	01
8	1	0	8	010	001	0	01
8	1	1	1	010	001	1	01
9	X	1	0	010	010	0	01
9	X	0	9	010	010	0	01
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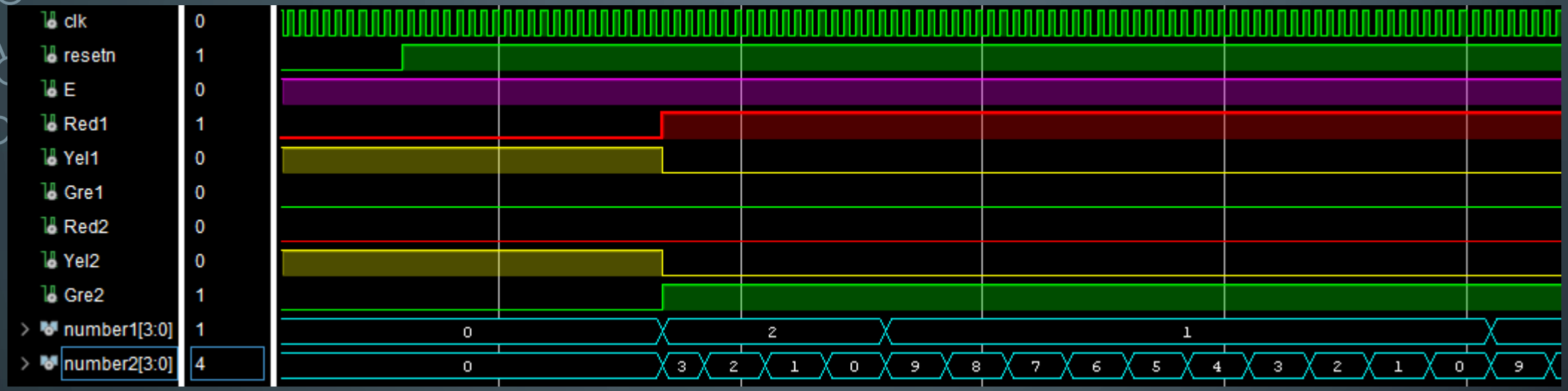
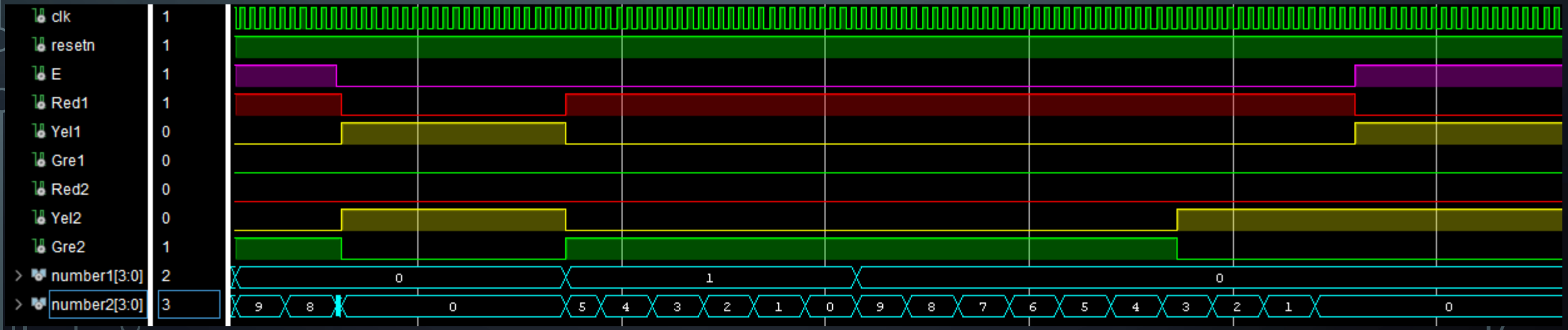
TIMING SIMULATION





Challenges!

- Running simulations of a real time system in Vivado had to convert back and forth from ns to sec.
- Determining the sequence to change between night and day mode.

DEMONSTRATION

- Need a picture of our project here