CS223 - Lab 5 - Preliminary Report

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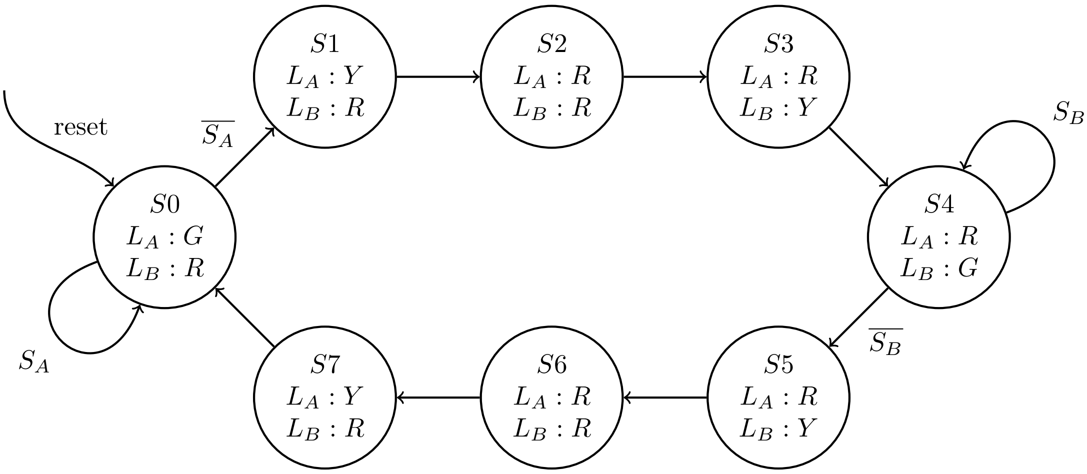
Traffic Light System

Moore Machine State Transition Diagram



State Encodings

State	Encoding		
	N_2	N_1	N_0
$S0$	0	0	0
$S1$	0	0	1
$S2$	0	1	0
$S3$	0	1	1
$S4$	1	0	0
$S5$	1	0	1
$S6$	1	1	0
$S7$	1	1	1

Output Encodings

Output	Encoding		
	Y_2	Y_1	Y_0
G	0	1	1
Y	0	0	1
R	1	1	1

State Transition Table

State	Inputs		Next State
	S_A	S_B	
$S0$	0	X	$S1$
$S0$	1	X	$S0$
$S1$	X	X	$S2$
$S2$	X	X	$S3$
$S3$	X	X	$S4$
$S4$	X	0	$S5$
$S4$	X	1	$S4$
$S5$	X	X	$S6$
$S6$	X	X	$S7$
$S7$	X	X	$S0$

State			Inputs		Next State		
N_2	N_1	N_0	S_A	S_B	N'_2	N'_1	N'_0
0	0	0	0	X	0	0	1
0	0	0	1	X	0	0	0
0	0	1	X	X	0	1	0
0	1	0	X	X	0	1	1
0	1	1	X	X	1	0	0
1	0	0	X	0	1	0	1
1	0	0	X	1	1	0	0
1	0	1	X	X	1	1	0
1	1	0	X	X	1	1	1
1	1	1	X	X	0	0	0

Output Table

State			Output					
N_2	N_1	N_0	L_A			L_B		
			L_{A2}	L_{A1}	L_{A0}	L_{B2}	L_{B1}	L_{B0}
0	0	0	0	1	1	1	1	1
0	0	1	0	0	1	1	1	1
0	1	0	1	1	1	1	1	1
0	1	1	1	1	1	0	0	1
1	0	0	1	1	1	0	1	1
1	0	1	1	1	1	0	0	1
1	1	0	1	1	1	1	1	1
1	1	1	0	0	1	1	1	1

State Logic

$$N_2' = N_2\overline{N_0} + N_2\overline{N_1} + \overline{N_2}N_1N_0$$

$$N_1' = N_1\overline{N_0} + \overline{N_1}N_0 = N_1 \oplus N_0$$

$$N_0' = N_1\overline{N_0} + \overline{N_2}\,\overline{N_1}\,\overline{N_0}\,\overline{S_A} + N_2\overline{N_1}\,\overline{N_0}\,\overline{S_B}$$

Output Logic

$$L_{A2} = N_2 \oplus N_1 + N_1\overline{N_0}$$

$$L_{A1} = N_2 \oplus N_1 + \overline{N_0}$$

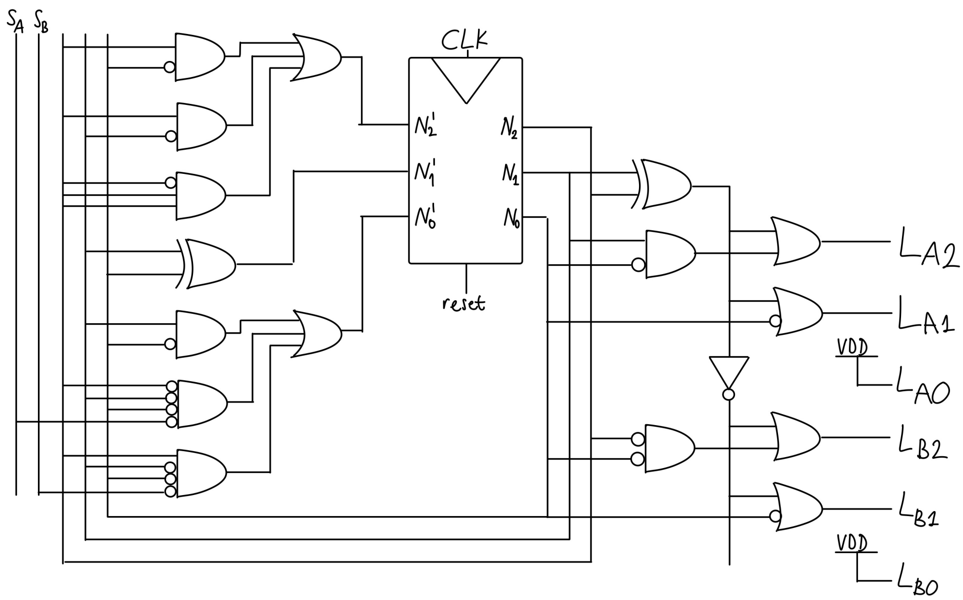
$$L_{A0} = 1$$

$$L_{B2} = \overline{N_2 \oplus N_1} + \overline{N_2}\,\overline{N_0}$$

$$L_{B1} = \overline{N_2 \oplus N_1} + \overline{N_0}$$

$$L_{B0} = 1$$

Finite State Machine Schematic



Answer to question This machine has 8 states so i need $\lceil \log_2 8 \rceil = 3$ flipflops.

Output Using Decoder