2017-11405 방승원

Traffic Light Controller

State Encoding (Explanation of states)

S0 : CS = [0, 0, 0] -> OUT = [0, 0, 1, 0, 1, 0, 0] (Initial State – Highway Green)

S1 : CS = [0, 0, 1] -> OUT = [0, 1, 0, 0, 1, 0, 0] (Highway Green -> Yellow, when FS=1 and HS=0)

S2 : CS = [0, 1, 0] -> OUT = [0, 0, 0, 1, 1, 0, 0] (Highway Left)

S3 : CS = [0, 1, 1] -> OUT = [1, 0, 0, 0, 0, 0, 1] (Farm Road Left)

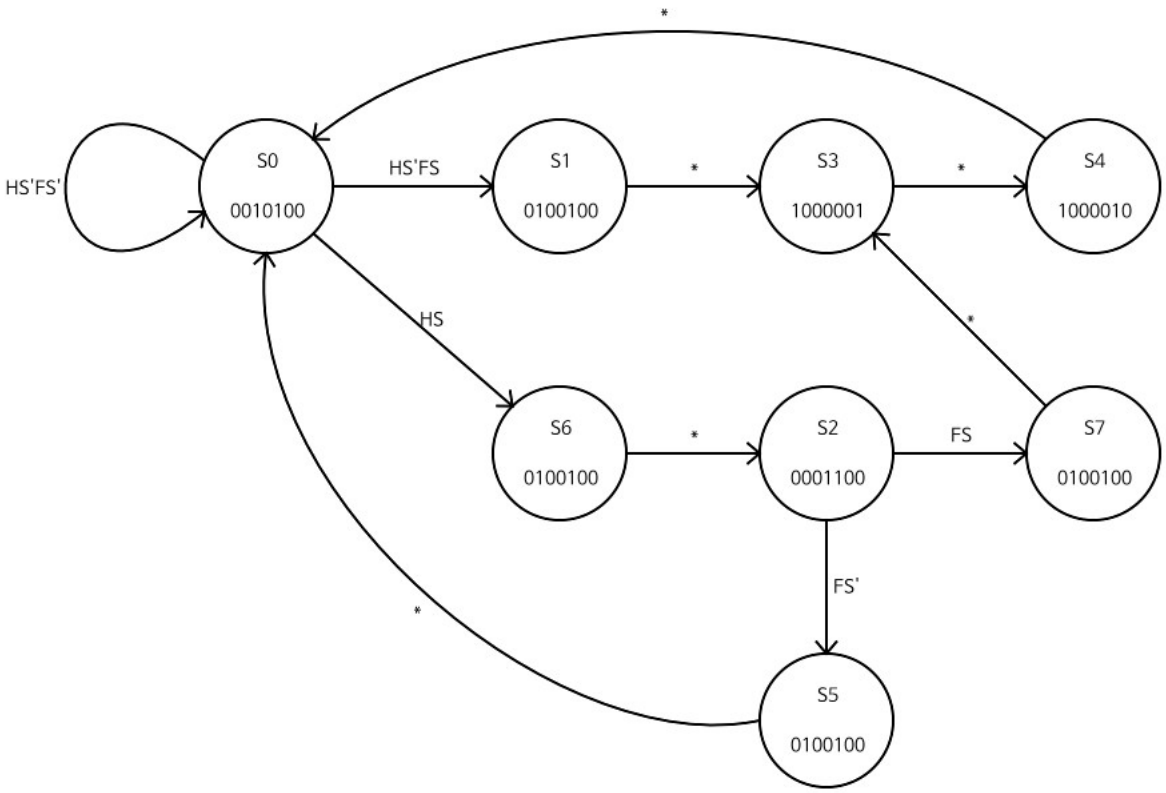
S4 : CS = [1, 0 ,0] -> OUT = [1, 0, 0, 0, 0, 1, 0] (Farm Road Left -> Yellow)

S5 : CS = [1, 0, 1] -> OUT = [0, 1, 0, 0, 1, 0, 0] (Highway Left -> Yellow, when FS=0)

S6 : CS = [1, 1, 0] -> OUT = [0, 1, 0, 0, 1, 0, 0] (Highway Green -> Yellow, when HS=1)

S7 : CS = [1, 1, 1] -> OUT = [0, 1, 0, 0, 1, 0, 0] (Highway Left -> Yellow, when FS=1)

State Diagram



State Transition Table

CS[2]	CS[1]	CS[0]	HS	FS	NS[2]	NS[1]	NS[0]
0	0	0	0	0	0	0	0
0	0	0	0	1	0	0	1
0	0	0	1	X	1	1	0
0	0	1	X	X	0	1	1
0	1	0	X	1	1	1	1
0	1	0	X	0	1	0	1
0	1	1	X	X	1	0	0
1	0	0	X	X	0	0	0
1	0	1	X	X	0	0	0
1	1	0	X	X	0	1	0
1	1	1	X	X	0	1	1

Output Table

CS[2]	CS[1]	CS[0]	OUT[6]	OUT[5]	OUT[4]	OUT[3]	OUT[2]	OUT[1]	OUT[0]
0	0	0	0	0	1	0	1	0	0
0	0	1	0	1	0	0	1	0	0
0	1	0	0	0	0	1	1	0	0
0	1	1	1	0	0	0	0	0	1
1	0	0	1	0	0	0	0	1	0
1	0	1	0	1	0	0	1	0	0
1	1	0	0	1	0	0	1	0	0
1	1	1	0	1	0	0	1	0	0

NS[2] = CS[2]' CS[1]' CS[0]' HS + CS[2]' CS[1] CS[0]' FS + CS[2]' CS[1] CS[0]' FS' + CS[2]' CS[1] CS[0]

= CS[2]' CS[1]' CS[0]' HS + CS[2]' CS[1] CS[0]' + CS[2]' CS[1] CS[0]

= CS[2]' CS[1]' CS[0]' HS + CS[2]' CS[1]

NS[1] = CS[2]' CS[1]' CS[0]' HS + CS[2]' CS[1]' CS[0] + CS[2]' CS[1] CS[0]' FS + CS[2] CS[1] CS[0]' + CS[2] CS[1] CS[0]

= CS[2]' CS[1]' CS[0]' HS + CS[2]' CS[1] CS[0]' FS + CS[2]' CS[1]' CS[0] + CS[2] CS[1]

NS[0] = CS[2]' CS[1]' CS[0]' HS' FS + CS[2]' CS[1]' CS[0] + CS[2]' CS[1] CS[0]' FS + CS[2]' CS[1] CS[0]' FS' + CS[2] CS[1] CS[0]

= CS[2]' CS[1]' CS[0]' HS' FS + CS[0] (CS[2]' CS[1]' + CS[2] CS[1]) + CS[2]' CS[1] CS[0]'

= CS[2] CS[1]' CS[0]' HS' FS + CS[0] (CS[1] ◉ CS[2]) + CS[2]' CS[1] CS[0]'

OUT[6] = CS[2]' CS[1] CS[0] + CS[2] CS[1]' CS[0]'

OUT[5] = CS[2]' CS[1]' CS[0] + CS[2] CS[1]' CS[0] + CS[2] CS[1] CS[0]' + CS[2] CS[1] CS[0]

= CS[1]' CS[0] + CS[2] CS[1]

OUT[4] = CS[2]' CS[1]' CS[0]'

OUT[3] = CS[2]' CS[1] CS[0]'

OUT[2] = CS[2]' CS[1]' CS[0]' + CS[2]' CS[1]' CS[0] + CS[2]' CS[1] CS[0]' + CS[2] CS[1]' CS[0] + CS[2] CS[1] CS[0]' + CS[2] CS[1] CS[0]

= CS[2]’ CS[1]’ + CS[1] CS[0]’ + CS[2] CS[0]

OUT[1] = CS[2] CS[1]’ CS[0]’

OUT[0] = CS[2]’ CS[1] CS[0]

Schematic