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Lab 4 Report
ECE 2031 L07
12 Feb 2022

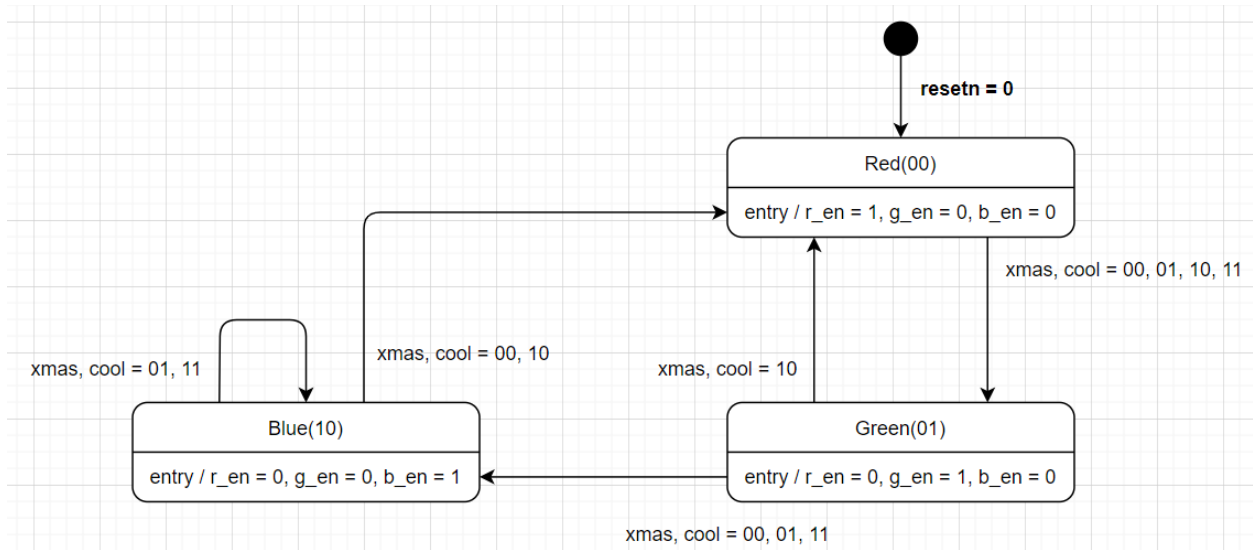


Figure 1. UML state diagram implementing three states (Red, Green, Blue), two inputs (xmas, cool), and three outputs (r_en, g_en, b_en) state machine.

TABLE 1

STATE TRANSITION TABLE FOR STATE MACHINE OF DECORATIVE LIGHT SYSTEM

State Name	Q1	Q0	
Red	0	0	- (your reset state, red lights on)
Green	0	1	- (the state to turn green lights on)
Blue	1	0	- (the state to turn blue lights on)

Current State	Q1	Q0	xmas	cool	Next State	Q1+	Q0+	r_en	g_en	b_en
Red	0	0	0	0	Green	0	1	1	0	0
Red	0	0	0	1	Green	0	1	1	0	0
Red	0	0	1	0	Green	0	1	1	0	0
Red	0	0	1	1	Green	0	1	1	0	0
Green	0	1	0	0	Blue	1	0	0	1	0
Green	0	1	0	1	Blue	1	0	0	1	0
Green	0	1	1	0	Red	0	0	0	1	0
Green	0	1	1	1	Blue	1	0	0	1	0
Blue	1	0	0	0	Red	0	0	0	0	1
Blue	1	0	0	1	Blue	1	0	0	0	1
Blue	1	0	1	0	Red	0	0	0	0	1
Blue	1	0	1	1	Blue	1	0	0	0	1
unused	1	1	0	0	x	x	x	x	x	x
unused	1	1	0	1	x	x	x	x	x	x
unused	1	1	1	0	x	x	x	x	x	x
unused	1	1	1	1	x	x	x	x	x	x

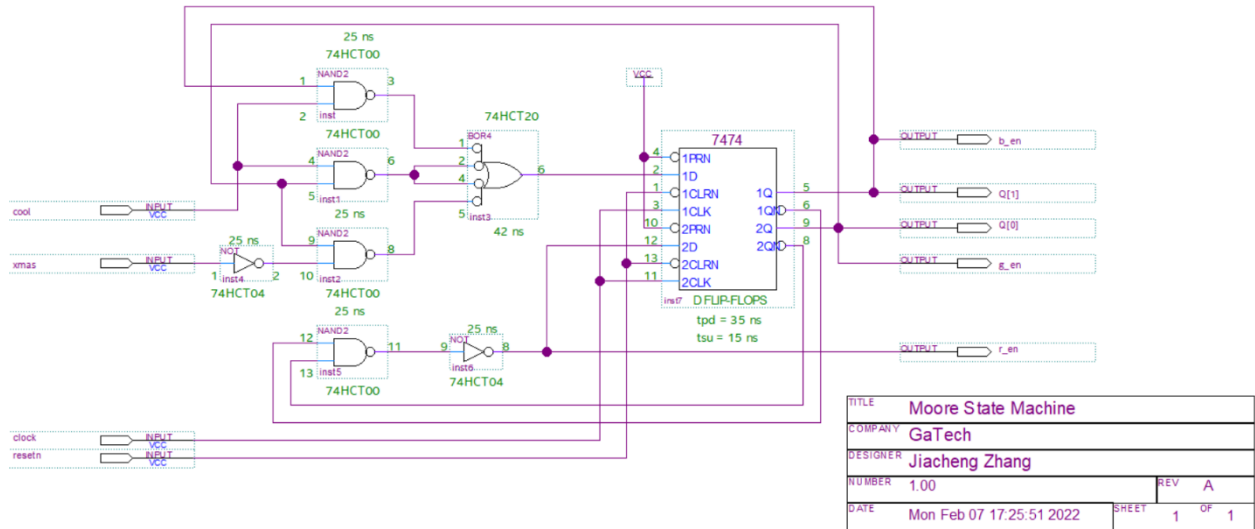


Figure 2. Schematic of a state machine with chips' pin number annotation implementing a decorative light system.

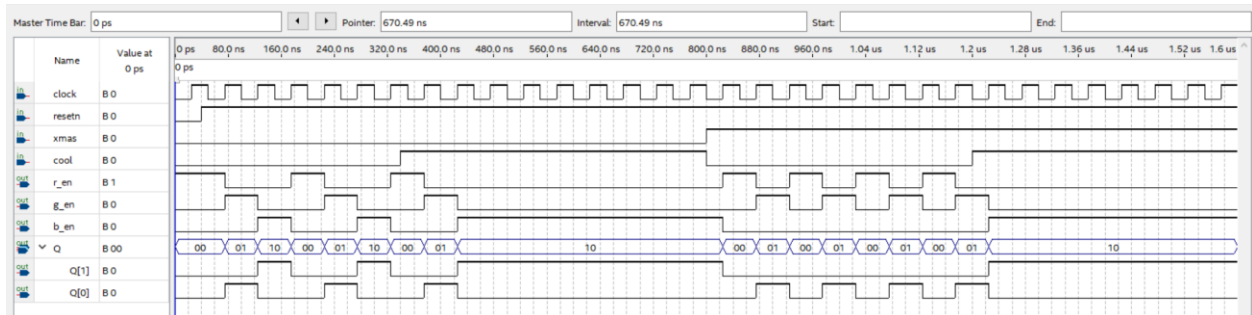


Figure 3. A simulation waveform for all possible input and output combinations of the decorative light system.

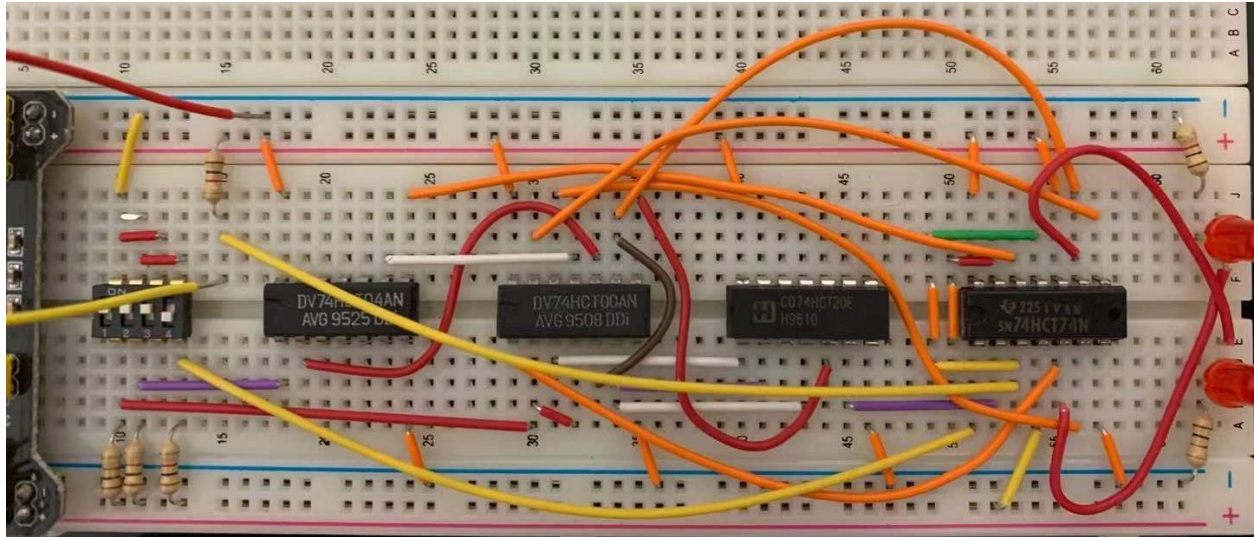


Figure 4. Breadboard circuit implementing the state machine of a decorative light system. The 1st, 2nd, and 4th switches respectively represent the signal “cool,” “xmas,” and “resetrn.” The yellow wire is the clock signal. The two LED lights are the current state indicator.

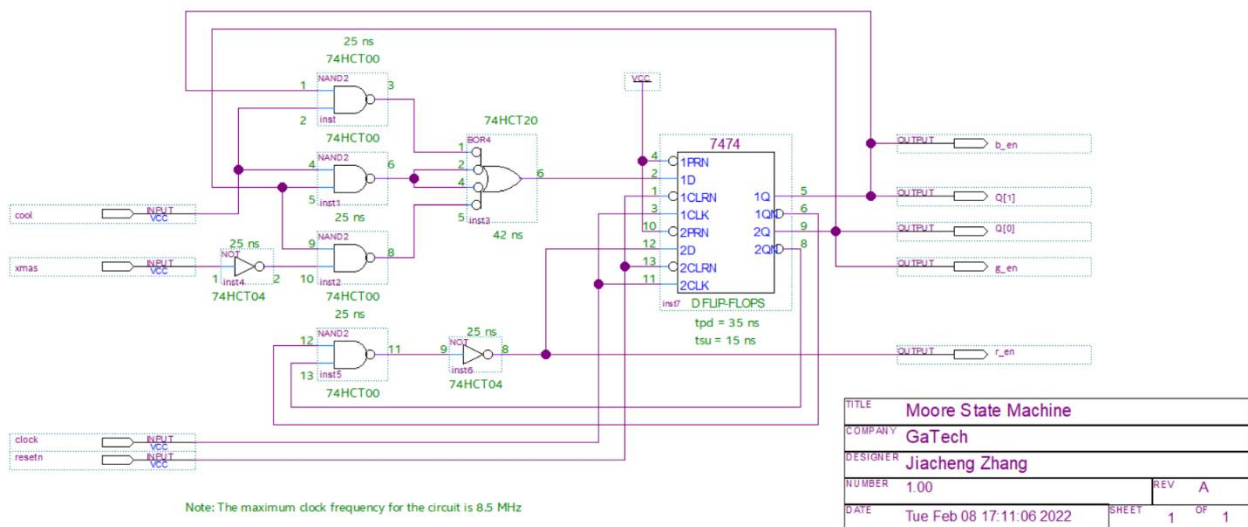


Figure 5. Schematic of a state machine with chips’ type and propagation delay implementing a decorative light system. The maximum clock frequency for the circuit is 8.5 MHz.