Dylan Thornburg
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Tuesday 5:15-8 PM

Lab 1

Intro:

This Lab was about creating a circuit in real life based on the hypothetical circuit in the prelab. We used logic gates, a piezo speaker, motion sensor, switches, and LEDs to achieve our goal.

Answers to P1:

To turn the red light on, you have 5V going to it. In order to turn the green light on, you need the ground wire to carry away 5V of electricity. Thus, the red leds must be connected internally to ground and the green leds must be connected internally to 5V.
1. 5 volts for both.
   5V-Red Light   Ground-Green Light
As the switch moves up and down, the red and green lights alternate, with only one being on at a time depending on if the switch is up or down.

When setting the clock to 1, the lights alternate every one second meaning the red led turns on every 2 seconds or 15 times in 30 seconds. When turned up to 10, the light alternates at a faster rate. When turned up to 100, the light switches so fast the human eye cannot see it and it just looks like two lights are on. At 100k, the other lights start to light up a bit. We believe this is due to electricity leaking out of the circuit and into other lights as it is switching so fast.

Procedures and Conclusion:

We had numerous hurdles to work through during our construction. Our speaker was faulty so we used a second LED in place of it and we had trouble getting our motion sensor to work as expected. The actual logic gates themselves were not much of a challenge.

The circuit we created on the actual breadboard was much like the circuits we created in our pre-labs shown in figure 1 and 2. We used two logic gates, an and and a or gate which were used to turn on the light if the switch is on or if motion is detected, and the second light on if the switch was on and the motion was detected.. Our final circuit is shown in figure 3.

Answering Questions

If the alarm system goes off as soon as motion is detected, then literally anything that causes motion or even occasional errors in the detector would set off the alarm. This means there is a problem with the "and" gate where it always acts as if the switch is on even if it isn't. You could check this by seeing if the state of the switch affects/doesn't affect the alarm.

If the alarm is constantly turning on, that means that the motion detector could be detecting motion at all times when it should not be. Also, the alarm could be hooked up to the 5V directly thus resulting in it always being on whenever the breadboard is on. By making sure the "and" gate is hooked up correctly, and the speaker is hooked up correctly, you could fix the issue.
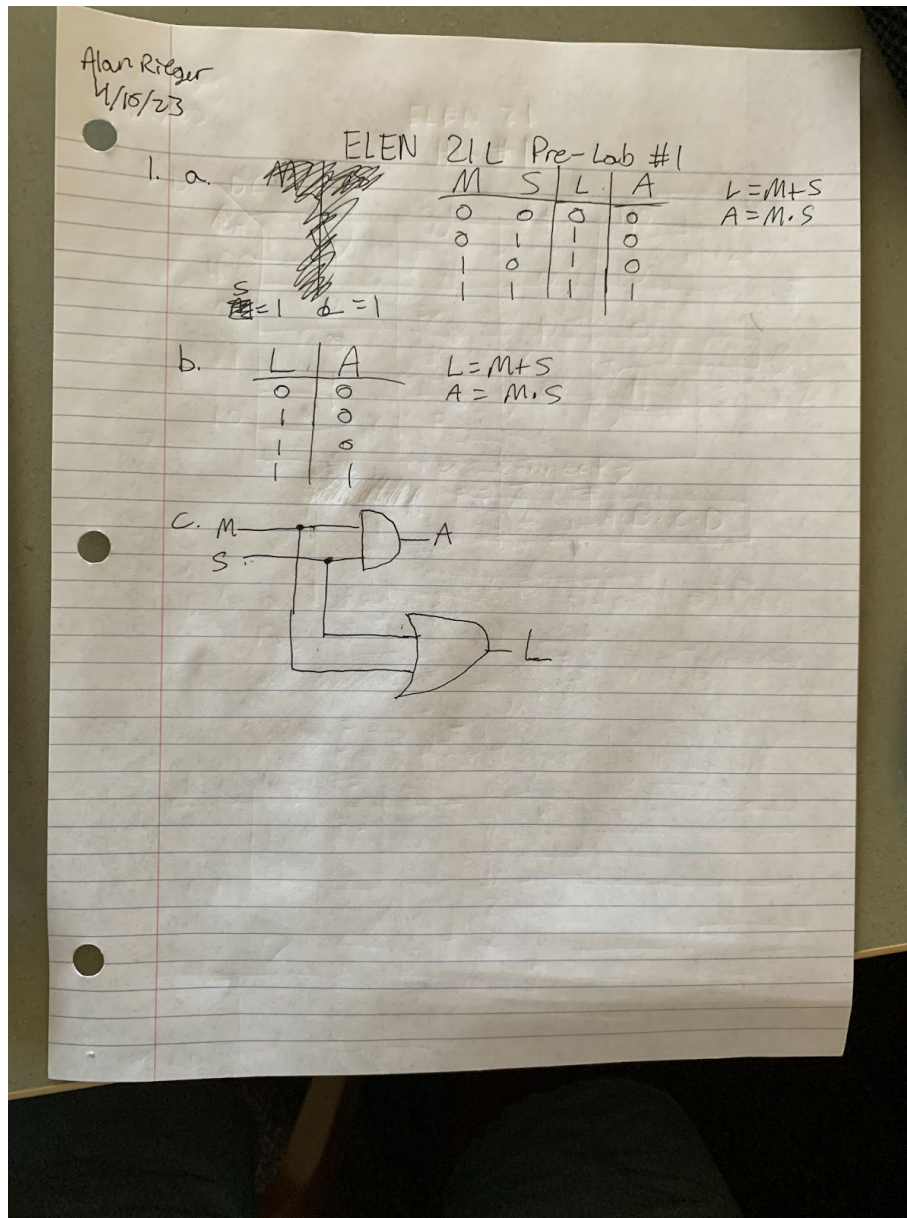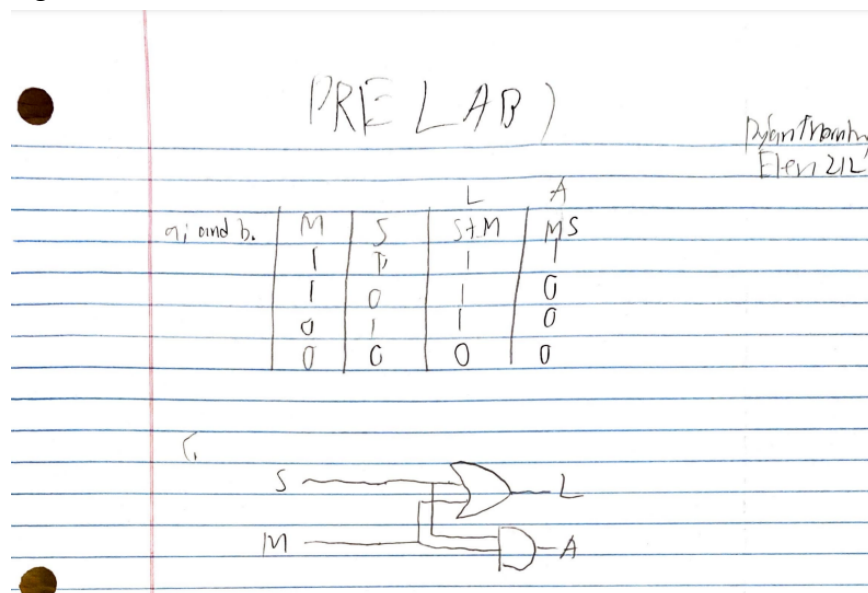
Figure 1

Figure 2

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PRE LAB)

			L	A
a, and b.	M	S	S+M	M S
	1	D	1	0
	1	0	1	0
	0	1	1	0
	0	0	0	0

c.

S ———⟩ L
M ———⟩ A

Figure 3