Graded Mateen's report

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EGR 24L Introduction of Circuit Analysis Laboratory
Professor Yu Zheng
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Group#1

Project#1: Logic Circuit Design

Introduction:

This was the first project we were assigned, and it consisted of an objective to make a circuit that behaves like an on/off switch. The objective was to design a circuit with multiple switches and lights. These switches and lights would act as manual light switch (S), outdoor light (L), a motion detector (M), and an alarm (A). We were given conditions and had to make a truth table to accommodate. We had to use NAND gates, but my team wanted to try with NOR gates for the added challenge.

Procedure:

How we come up with the design:

1) We were writing out logic that was given from problem statement, then we added logic to the truth table from the problem statement.

2) Next, we were using truth table as reference to observe the input and output and we decide which gate we will use to create a circuit by using a Boolean algebra identity, discrete math sum of products and Karnaugh map(K-map) to simplify the circuit design.

3) After we got the idea of circuit design, we first started to use NAND gates only. However, we encourage each other for more challenging NOR gate. Please see truth table and circuit design at Appendixes.

Conclusion:

This was challenging, because we had to manage time and work as a group out of class. We had trouble figuring out if the wiring was off or if was the gates that were faulty. After many observations and new gates, we got the project to work using NOR gates. The truth table was a huge part of the project. We drew up many versions of the truth tables and went through trials and errors to find one that worked with the project.

WRITE UP:

- Our designs were made by following our truth tables and setting up the circuit to where it could be easily worked on if something happened. The NOR gates could be faulty, so our circuit was designed to easily get in and out with repairs. We found a truth table that worked with the conditions and built our circuit on that.

- We learned a lot about how to use NAND and NOR gates. This project helped us understand the usage and importance. We worked through many diagrams and tables, and doing so, also helped put into perspective what steps are needed to successfully make a working circuit.

Appendixes:

Truth table

D	M	S	L	A
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	1	1
1	0	0	0	0
1	0	1	1	0
1	1	0	0	0
1	1	1	1	0

Preliminary Circuit using AND, OR and or NOT

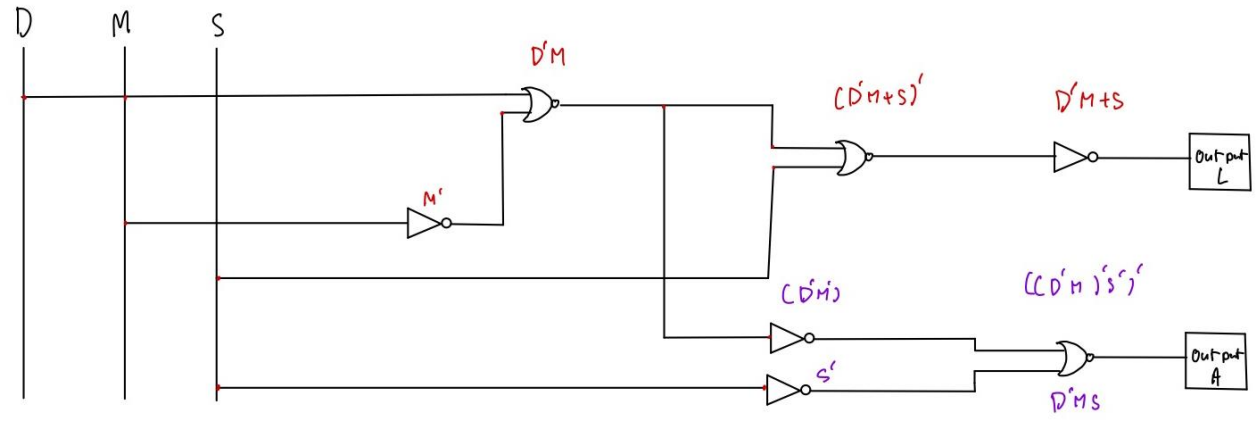
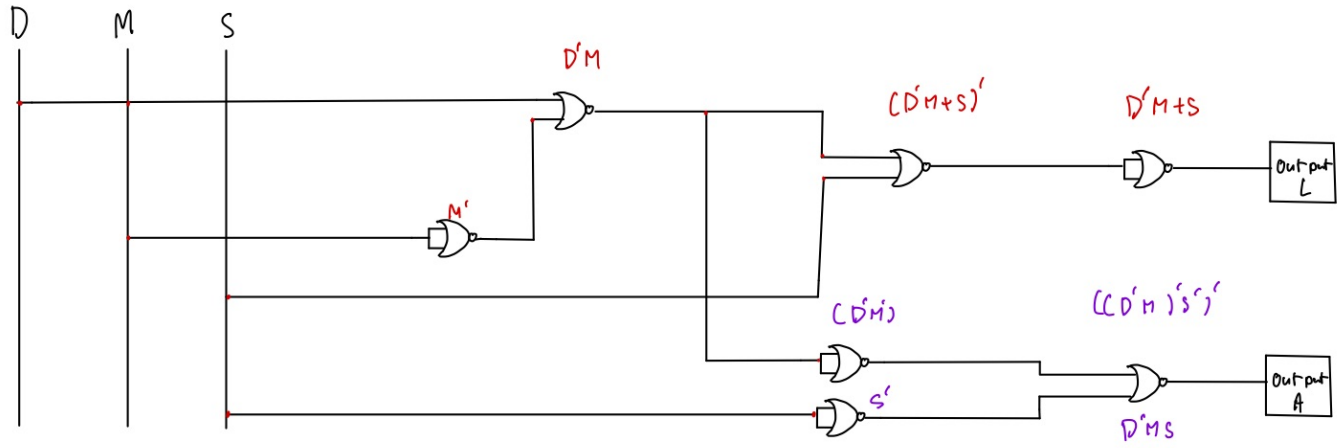


Figure 1: initial design

We were planning to do NAND gate at beginning; however, we encourage each other to do something more challenging which is NOR gate.



Final Circuit Diagram using NOR only.