EECE 144
Fall 2011

Lab Report #3
Section 4
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Submitted by:

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1 Description/Objectives

The objective of this lab is to implement a logic function using actual hardware. The basic interfacing circuits using switches and outputs using LEDs are also introduced.

2 Procedure

Equation 1 will be used as the logic function for this lab. The first step is to build a truth table definition (Figure 1). The next step is to implement the logic function using Logisim [1]. This will help as a guide for connecting hardware and can also be used to verify the truth table in Figure 1. The chips being used only have two inputs so the gates in Logisim should also use only two inputs.

$$ac + a'b + ab'c' \tag{1}$$

The inputs to the chips will be in the form of mechanical switches. If the switch is connected from the source voltage (5 volts) to the chip it will read the high value correctly but it will not read low correctly because the open circuit is not equivalent to low. To remedy this issue a pull down resistor is used to connect the pin at the chip to ground. A 1k resistor works well for this, larger values such as 10k may not work properly.

$ac + a'b + ab'c'$			
a	b	c	z (out)
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	1

Figure 1: Truth table of outputs for the function $ac + a'b + ab'c'$.

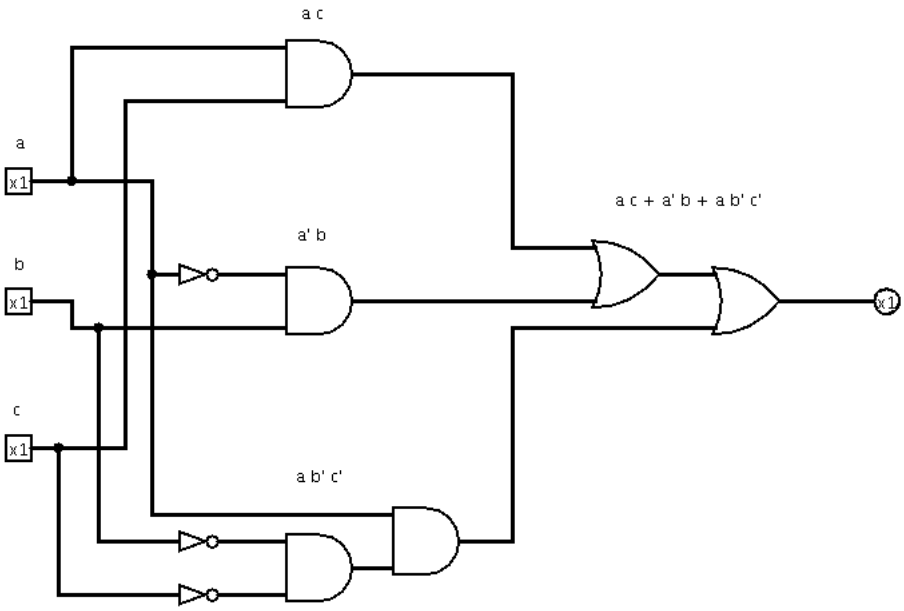

Figure 2: Logic circuit $ac + a'b + ab'c'$ defined in Logisim.

The outputs from the chips will be used to drive a LED. For the LEDs used in this lab the current should be approximately 20 mA if we assume that the diode behaves as a short with no voltage drop. Using Ohm's Law ($V = i \cdot R$) and a source voltage of 5 volts this results in a resistor of 250 ohms. Select the resistor nearest to this value or larger.

3 Observations

4 Conclusion

5 References

[1] Logisim, "Logisim, a graphical tool for designing and simulating logic circuits." `http://ozark.hendrix.edu/~burch/logisim/`, 2011.