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LAB REPORT 1

This lab introduced us to the basics of the breadboard prototyping station and the Arduino. An Arduino is a system supporting the embedded processor control.

To set up and start our experiment, we obtain the breadboard, an Arduino kit and a box of wires. The breadboard is plugged in and all the appropriate switches are set to TTL or +5. To understand how the breadboard is wired underneath, and above, we first locate the Logic operators on the right-hand side of the breadboard. These logic operators can tell us whether the voltage from a particular location in the breadboard has high or low voltage. A wire is connected to one of the logic indicators and the other side of the wire then is plugged into different locations of interest on the breadboard to see if the location is GND or +5 volts. I found out that the breadboard's wires are laid out in the manner where the first one is +5 volts and then the adjacent one is GND followed by ten that are not any and then there's another GND followed by +5 volts. This pattern is repeated for all the four segments on the breadboard. The ten wiring's that are inactive in between can be used to make all the four remaining wires either +5 volts or GND if you plug a wire from one of the outer respective wires to the fifth wire.

Now using that knowledge, I plugged in one of the wires to +5 volts and into the 5^{th} wire in a row of my choice. I did the same with the GND. I took an LED light and plugged in the long side of the LED into the +5 volts row and short side to the GND row. This is because the current only flows in one direction and won't work if plugged backwards. A picture showing my circuit is attached.

For the next circuit, instead of the +5 volts, I connect the output on the TTL function generation wire on the left side of the breadboard. When I change the period knob, the blinking of the LED light goes faster or slower. When it's on 1 Hz, it blinks slowly and when on 5 Hz, it blinks faster in comparison. Hz is the frequency in which the current is moving.

In the next experiment, we introduce a logic gate. I find a chip that has a 7404 on it which tells me it's a NOT switch. I connect the two LED circuits that I had together on the switch. The first right row when the chip is placed upright tis connected to the +5 volts while the left last one is connected to GND. The first left one is then connected to the first LED circuit. The second left is connected to the other LED circuits and to one of the logic switches. When turning the switch on or off, you see the only one of the lights on. The 7404 IC shows that only one of the lights will be on at any moment. This experiment can be seen in the attached video.

In the next experiment we use the IC 7408 chip which is an AND logic chip. I connect the +5 volts and GND wires to the top right and bottom left respectfully like before. The first left is connected to one of the logic switches and the second left is connected to a separate logic switch. The third left is then connected to the LED light to complete this circuit. As seen in the video attached, the light will only turn on if both the logic switches are turned on. This corresponds with out logic truth table of AND.

For my last experiment, I download the IDE software to my laptop and connect it to the Arduino. I further wire pin the 13 on Arduino to the second input pin on the AND gate. I connect a wire from GND on the AND gate to the GND on the Arduino. In the IDE on my laptop I type in the code as shown on the handout. When I click the upload button, the TxRx chip on the Arduino blinks twice to show that the circuit is starting. When I play around with the A and B

values in the code and decrease them, the LED blinks faster while when I increase them, it blinks slower. If I change the P value, TxRx blinks twice and the LED does not light up. If I unplug the tether between the laptop and Arduino, nothing works. When I insert the GND into the power section of the Arduino, the Arduino is working on its own and the difference between the two configurations is that I don't need the breadboard for it to work since it's using the energy from my laptop.

Thus, the lab was concluded after seeing how and if the NOT and AND gates work as shown in truth tables. The familiarity with Arduino and the breadboard also increased intensely.