Individual Lab Report 1

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Team G-Bobs the Builders

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IRL01

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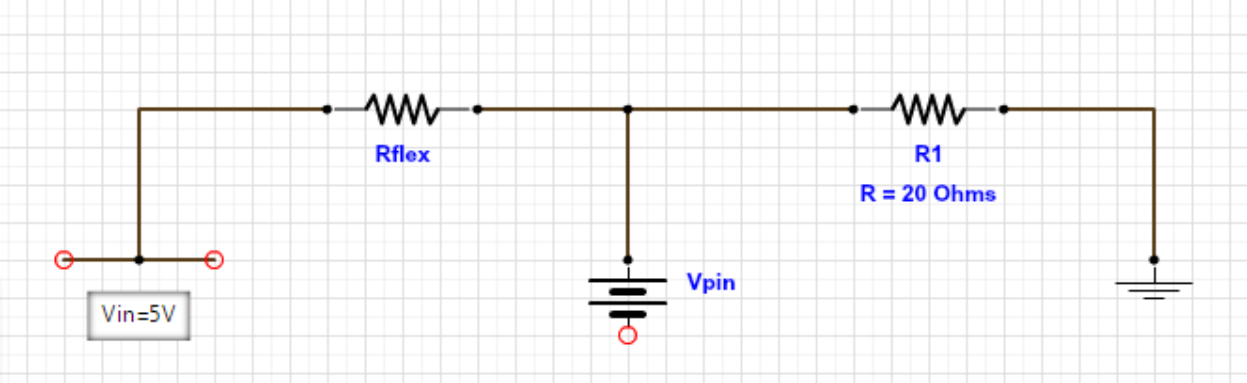
Individual Progress:

Since the last checkpoint, I helped work on the sensors lab, contributing primarily to the flex force sensor. I did the wiring for the flex sensor, determining the appropriate magnitude of resistor needed for the circuit. The resting resistance of the flex sensor was 22.29 Kilo ohms so I chose the resistance of R1 to be 20 Kilo ohms since they needed to be approximately the same magnitude. Below is a diagram depicting the circuit.



We write an equation to solve for the current going through the whole circuit, which is:

$$I = \frac{V_{in}}{R_{flex} + R_1}$$

We also write an equation for the current based upon the voltage drop from Vpin to ground:

$$I = \frac{V_{out}}{R_1}$$

Combining the two equations we get:

$$R_{flex} = \frac{V_{in} * R_1}{V_{pin}} - R_1$$

Vpin is an input voltage going into the Arduino, R_1 is a 20 ohm resistor, and $V_{in}$is a 5 Volt input voltage. We use these values to calculate the resistance of the flex sensor. We use the calculated resistance of the flex sensor at this specific point in time to find the correlating angle of flexion by the sensor.

For the mock-up, I helped laser cut the parts of acrylic needed for the L-brackets that connected to the 80/20. I also helped assemble the 80/20 with the parts of acrylic and the preliminary cardboard structure of our design. Additionally, I thought of a more efficient way to flip the part. Originally we planned on picking up the part with the electro-magnet and then putting it in a slide that would re-orientate the part. We then planned on picking up the part again after this process in order to put the part on the tray. We felt that this method would be problematic due to the high risk of error in the system's ability to successfully flip the part over. We were also worried about the amount of time needed to flip the part. Our new design consists

of having the part come to a stop at a specific position in front of the camera. We plan on having a slide that the part goes down and a stopper with a very low coefficient of restitution at the end of the slide to ensure that the part stops at the appropriate location. Once the camera determines the appropriate orientation of the part we will plan on having a motor powered trap door drop the part down one of two slides depending upon the orientation of the part. One slide will be a tightly spaced quarter circle that will flip the part and the other slide will be a straight slide that moves the part a certain location for the next process of the system.

Challenges/Issues:

One of the issues that we had this week was not purchasing enough t-nuts for the screws that connected the 80/20 with the L-brackets. We ended up finding nuts and bolts in the machine shop that we could use to help us connect the L-brackets with the 80/20.

Another issue we faced was trying to make an accurate representation of our design out of cardboard. We could not follow our preliminary design as closely as we would have wanted because the cardboard material we were using didn't allow us to make things in such detail. For instance, rather than building a trap-door for the shoot we built a pivot table that would drop the part into the appropriate shoot.

Cross-Referencing:

For the sensors lab, while I wired the flex sensor and did the math to understand the conceptual workings of the circuit, Eric and Guillermo did the majority of the coding to produce real-time data for the flex-sensor.

While I helped in deciding the parts that we needed for our design, Mike was in charge of ordering most of the parts.

Future plans:

For the upcoming week we will be working on the motor lab together. Personally, I will try to take a bigger role in writing the code for the circuit than I did for the sensor lab. As more of our parts come in we will continue to work on assembling our machine and seeing how everything comes together. I will also be working with Mike to find a good hopper design that will allow the parts to fall through the slot in a short amount of time.