Individual Lab Report 4

Christian Heaney-Secord

Team G-Bobs the Builders

Teammates-Michael O'Connor, Eric Newhall, Guillermo Cidre

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Individual Progress:

Since the last checkpoint, I spent the majority of my efforts working on designing and manufacturing the subassembly for the part picker upper. I made some CAD models for the subassembly, one of which included the acrylic circle that we used to connect the servomotor and the electromagnet. I also worked a lot with the laser cutter, creating different profiles for various pieces. Some of which included spacers used between the L-brackets and the rack, the servomotor mount, and the connector between the electromagnet and servomotor. I also used the countersink drill to create indents in the acrylic for the countersink bolt heads to fit in. Lastly, I played a major part in installing the subassembly. I screwed in various bolts to mount certain connections. Examples being the L-brackets that connected the rack and pinon with the acrylic servomotor mount, the acrylic mount for the servomotor, and the connector between the servomotor and electromagnet. You can see the complete subassembly in Figure 1.

Challenges/Issues:

One of the issues that we ran into was that the weight of our subassembly was so large that it caused our motor to spin when the system was at rest. This is a major problem because the motor will continue spinning until our subassembly lowers to the ground. The motor spinning without a command input also makes it difficult for our software to pinpoint the location of our part picker upper. We proposed a couple of solutions for this problem. We proposed installing a limit switch to tell the motor to turn on when the rack and pinion lower past a certain point without any input commands, writing a code that would tell the motor to turn on if the motor started rotating on its own, and decreasing the weight of the subassembly. We determined that decreasing the weight of the subassembly would be the most effective way to solve this issue because the other two solutions would cause the subassembly to "bounce" which was problematic. We believe that the best way to lower the weight of the subassembly would be to install a smaller electromagnet. The size of our current electromagnet is unnecessarily large.

Another issue that I ran into occurred when installing the countersink bolts and nuts into the piece of acrylic that ran in between the servomotor and electromagnet. To start, the two countersink bolt sizes in stock with the machine shop were either too long or too short for the ends to fit into the finite amount of space between the end of the acrylic and the servomotor. So, we had to take the longer countersink bolt and cut it to the appropriate length. This cut made it significantly harder to screw the nut onto the bolt because it wasn't a perfectly clean cut due to the nature of the tool used. Additionally, we did not take into account the very small amount of space between the piece of acrylic and the servomotor. These two factors made it very difficult to screw the nut onto the end of the countersink bolt. However, after a lot of trial and error I was able to screw two nuts onto the bolts. We were hoping to install four sets of countersink bolts and nuts but we found that two sets were sufficient.

Cross-Referencing:

This past week I collaborated with Mike in creating a design for the part picker upper subassembly. We also went into the machine shop to manufacture the various parts used for our subassembly. Mike made the CAD models for a lot of the pieces of acrylic that we used for the

design and used the drill press to put holes into the L-brackets that we used as a connection for the various parts.

While Mike and I did the majority of the work to assemble the part picker upper, Guillermo and Eric worked to operate the motor controls using their computers. They were able to create a program that allowed the user to specify the location of the subassembly based upon their input into the program. Eric also worked on power supply, installing camera libraries, and the website. Guillermo also worked on the serial communications.

Figures:

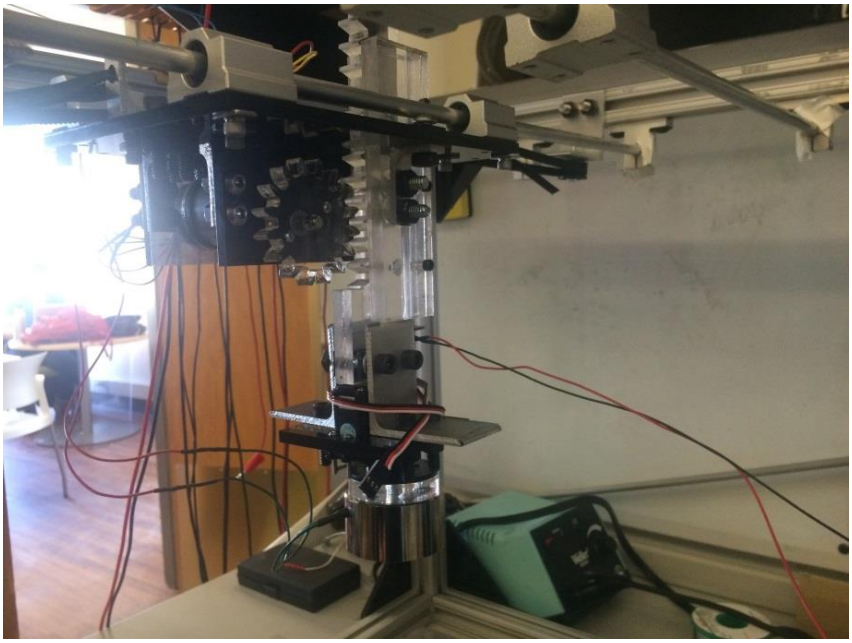

Figure 1: Part Picker Upper Subassembly

Future plans:

For the upcoming week we plan on installing our wire cutter subassembly. The actual wire unspooling and cutting will be placed outside of our rail system. But once the wire is cut we will move one of the rail systems at the top of our design (the one not being used for the part picker upper) over to the cut wire, have the cut wire drop down a chute, and move the rail system to the appropriate location that will drop the wire onto the part.

Individually, I am working on hashing out the ideas of our design for the wire cutting subassembly and manufacturing it. I will CAD a model of a sleeve that we will put around one of the handles of the bolt cutters that we bought. The sleeve will serve as a connection between the lead screw and the bolt cutter handle so that the lead screw can successfully actuate the wire cutter. I will also CNC machine this piece for use. There are number of things that we are trying to work out with our design. One thing that we did not account for was the difficulty in unraveling our wire. We planned on simply rotating the spool using a motor and having the wire drop down a chute as it unraveled. However, the wire will not continuously go down this chute without further actuation. So, we need to figure out a better design for how we will go about unraveling the wire.