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Team G, Bobs the Builders

Teammates:

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Individual Progress

The first task for this week was improving the design for the wire cutter. The issue with the wire cutter was that it would bend the tip of the wire after the cut was made. When the next piece of wire was feed the bent tip would miss the cutters which meant that only a single wire could be cut before the system had to be remade. I worked with Michael to redesign the system so that instead of pulling one handle of the wire cutter to the side, both cutters would be pulled to the center. Now when the wire was cut it would not be bend and multiple pieces could be cut in a row. I then worked on replacing the rubber bands used in the wire feeder with smaller ones to prevent jamming. Also, the part placer had been using a DC motor to raise and lower the parts which had the problem of having no holding power while stationary. I replaced the motor with a servo which resolved the issue. While making this replacement I noticed that the servo for the magnet on the part placer could not rotate the full 180 degrees that we needed. I changed the servo with another servo that had a larger range of motion. FInally, I worked with Guillermo to test and program a sequence for the lab demo. We had to wire and run four stepper motors, two DC motors, and one servo.

Challenges

There are still several issues with the wire cutters even after the improvements we made this week to the system. One problem is that the encoders we are using do not return to zero when a cut is performed and the system attempts to reset. The encoders should read 0 before the cut, then go to 1850 when the cut is made, then 0 again when the motor is again in it's initial location. However, there is approximately a difference of 500 in the encoder readings when we manually return the cutters to the initial state. Also, there is an issue in the consistency of the cut. Sometimes the wire cutters stop early before the cut is complete. Other times the wire cutters never reach the max encoder reading an attempt to cut the wire indefinitely. We believe that it will be possible to resolve all of these issues in software and that no physical changes will need to be made to the cutters. An alternative solution would be to use a different sensor on the motor other than an optical encoder that would give more precise data. Our group has a large, unused stepper motor that we plan to test to see if it would be capable of cutting the wire.

Teamwork

Christian worked on solving the problems that the team had with the revolver the previous week. The revolver was prone to jamming and additional parts needed to be made for the revolver to interface with the wire cutter. Christian 3D printed parts to connect the systems and reassembled the revolver with new pieces of acrylic. Now the revolver is working with very few issues. Michael worked on constructing the new wire cutter. A new head for the motor was cut. Different sized wire cutters were purchased, machined, and mounted. These changes meant that the wire feeder system had to be lowered so that the wire would reach the new cutters. Guillermo helped with the changes that needed to be made to the wire feeder. Also, Guillermo worked on the software for the demonstration.

Figures

The wire feeder uses a single DC motor to turn four wheels with rubber bands in the same direction (see Fig. 1). The front and back of the feeder of a slot to control the direction that the wire enters and leaves from. THis ensures that the wire will go directly in front of the wire cutter. The cutter head can be seen to the left of figure 1. The piece of wire then falls into a white PVC pipe which takes the wire to the revolver. In figure 2 we

can see the motor that is controlling the wire cutter. The motor pulls two pieces of string to the center of the motor to close the cutters.

Figure 1: wire cutter and wire feeder from above

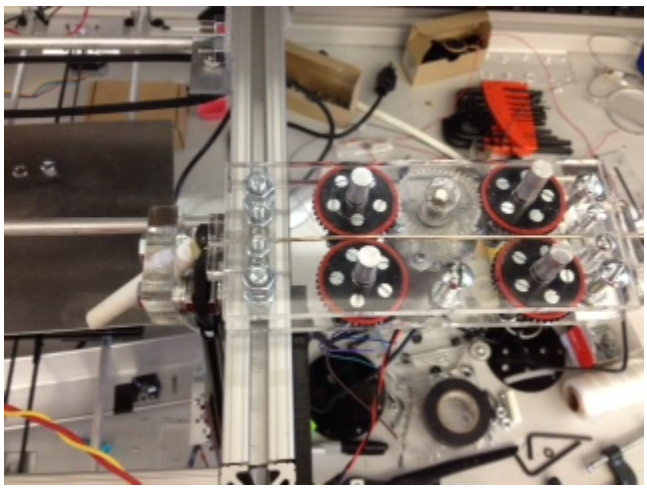

Figure 2: DC Motor controlling wire cutter

Plans

Next week the group would like to show a complete hopper that is able to bring pieces in front of the camera. We would then like to be able to show the parts being flipped if the camera detects that they are upside down. These will be the last two subsystems that need to be completed before the entire system will be functional. However, We do not believe an entire start to finish run will be complete until two weeks from now. The reason for this delay is that we are waiting on a magnet for the part flipper that will not arrive anytime soon.

I will be working on ensuring the website is properly up to date for the next website check. Then I will be making the assembly for flipping parts after they have been seen by the camera. Michael and Christian will be working on completing the hopper and will be working on different part agitation methods. Guillermo will be working on all of the software mostly independently since my laptop is no longer functional.