Ian Rosado

Team B

Teammates:
Stephanie Chen, Trevor Decker, Ian Hartwig

ILR03

2/19/15

Individual Progress

Since the last ILR, I have worked to create a prototype of the gripping mechanism as well as continued to refine the CAD model of our entire design. Creating the prototype consisted of working with Steph to help her get started on creating a model of the prototype in Solidworks, and then helping to finish the model before laser cutting the acrylic with Trevor. I also created the model for and 3d printed collar mechanism that we used for the prototype. Once everything was printed and cut, Steph and I assembled the prototype including the motor, which required finding a motor coupler and tapping the collar that we had printed. Once the prototype was assembled, Trevor and Ian helped us get the stepper motor wired and controlled.

I have also continued to work on the CAD model to figure out the specifics of how the robot will fit together and to try to identify problems that we may have overlooked in our design

Challenges/Issues

Creating the prototype of the gripper has helped us identify some issues with the design and to iterate to improve it. Most of our problems stemmed form the shaft coupler that we used, which we largely overlooked when designing. One problem is that the coupler was slightly off-center, which caused the gripper to sway back and forth as it closed or opened. While this wasn't an immediate problem, it could cause issues when attempting to control the robot.

The main issue that we had was with the setscrews used to hold the shaft coupler in place. For just moving the grippers, the setscrew was sufficient, but once the grippers came into contact with the 8-20, the loads in the system cause the coupler to slide on the shaft, or for the coupler to pop off of the shaft completely. The forces load experienced by the coupler is demonstrated in Figure 1. To solve this, we could use a setscrew that goes all the way through the shaft or a retaining ring, or change the design so that there is less axial load on the motor shaft.
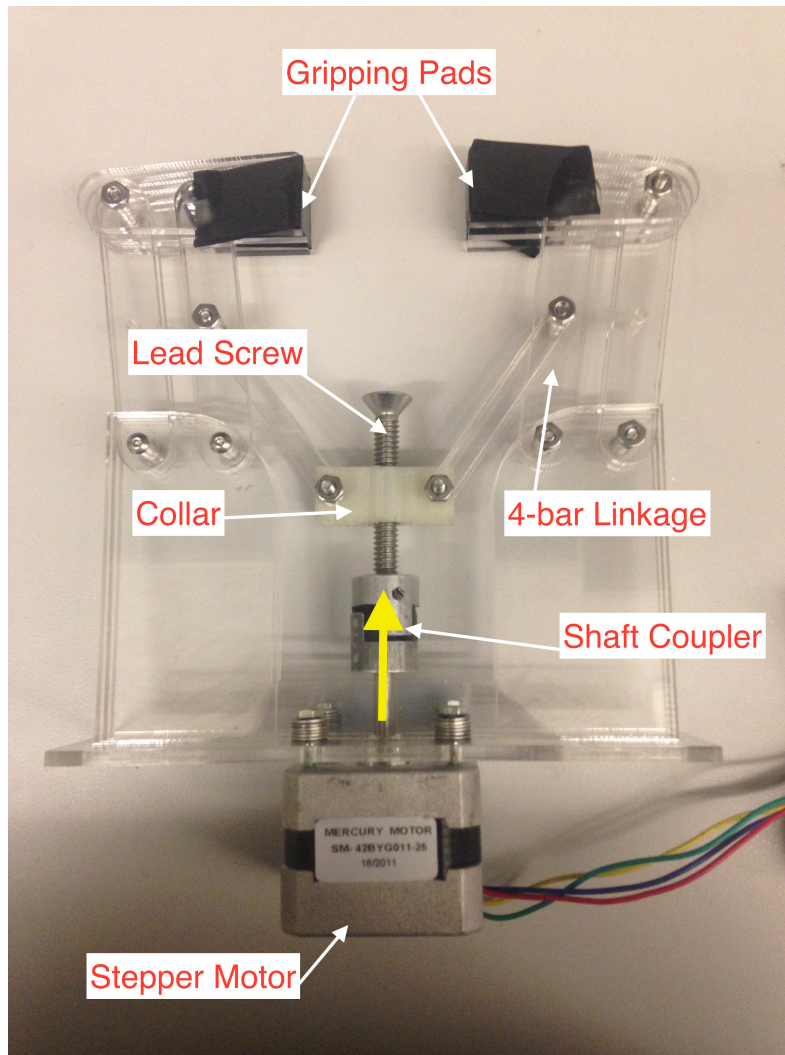
Figure 1: Labeled diagram of the gripper prototype. The yellow arrow depicts the direction of the load experienced by the shaft coupler that causes it to "pop off".

Teamwork

I worked very closely with Steph on the creation of the prototype for this week. She did a lot of the computer design for the prototype and worked with me to assemble and test the finished product. We also worked with Ian so that he could find the correct motors to use and order them. Ian also iterated on our mechanical design in order to come up with some clever solutions to issues that we were having. Trevor worked with Ian to brainstorm ideas for the final design (in particular, the method for transferring torque form our main motor to the ends of the robot). Trevor also helped us create a program to control the motor for the prototype and continued to work on his simulation and computer vision projects.

Steph has also been compiling content for the website, and Trevor and Ian will put all of her content online soon.

Future Plans

Some immediate steps are to iterate on the gripper design to solve some of the issues that we had with the prototype, as well as finishing up the cad model of the entire robot in order to find issues that we may have overlooked. We have ordered components that we will need to start assembling the sliding mechanism, so that we can make a prototype for that. Trevor and Ian will start work on the control system for the robot in general soon, but the immediate goal is to figure out the mechanical side of things in order to be sure that the design is valid.