Ian Rosado

Team B

Teammates:
Stephanie Chen, Trevor Decker, Ian Hartwig

ILR02

2/12/15

Individual Progress

Since the Last checkpoint, I have worked on creating a CAD model of our current design in order to figure out spacing and placement of components. This entails piecing together the different aspects of the design that we currently have decided on and filling in the areas that we have not discussed.

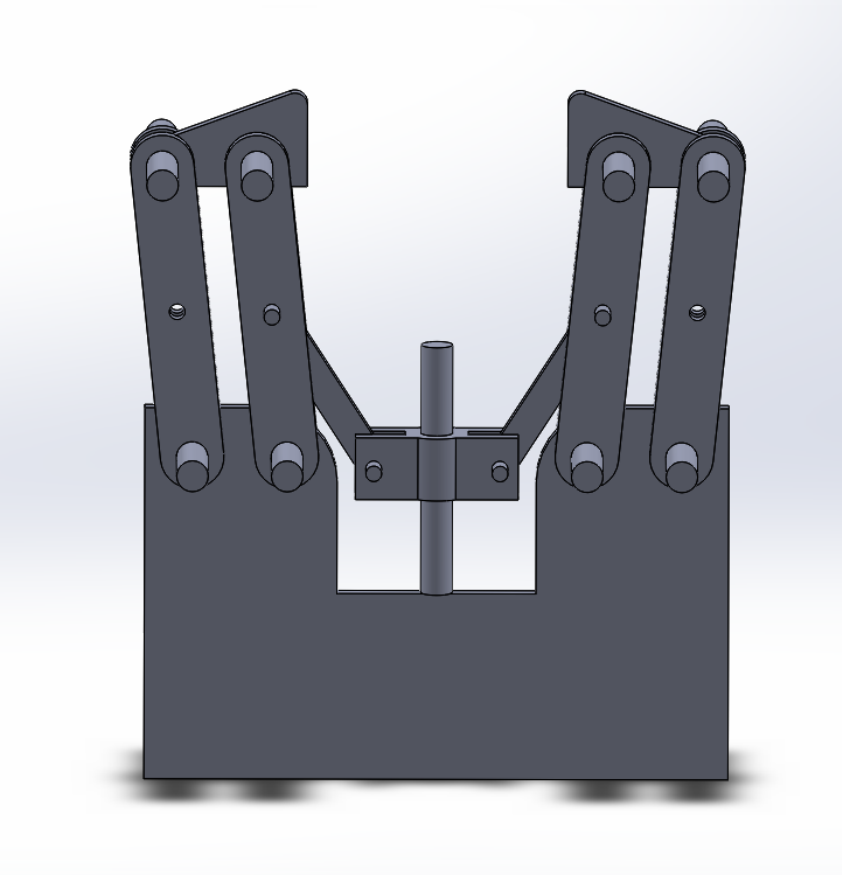

Figure 1: Rendering of rudimentary CAD model for gripping mechanism.

One aspect of the design that we have yet to decide on is the linear slide method that we will use. One option is to make out own mechanism, which will be cheaper, but may end up being difficult due to the tight tolerances and high strength we will need. Another option is to purchase a slide elsewhere and incorporate, but this looks to be very expensive, so I am looking to see if there are any cost-effective options.

For the motors lab, I helped set up the circuitry by assembling the motor controller and helping to figure out the wiring of the different motors and controllers. I then helped to debug the code, though Ian and Trevor were much more effective at this aspect.

Challenges/Issues

Many of our issues came from creating a GUI for the motors lab, which entailed transferring data from the Arduino that we used to the computer. Figuring out how to transfer this serial data quickly enough to be considered "real time" took a while. We also initially underestimated the requirements of the lab, and only after we had declared

ourselves finished several days ahead of time did we realize that we still had much more work to do.

Some issues that we experienced with the hardware of the lab had to do with noise in our sensors. In particular, our infrared sensor was very noisy, and the values we received from our flex sensor were inconsistent and hard to replicate. We were able to implement some simple filters to lessen these issues, but we were not able to filter out all of the noise completely.

For the final design of the robot, one issue we are having is finding motors that will be strong enough for some of our joints (in particular, rotating the robot while only one side is clamped to the window), while still being light enough to be carried around with the robot. The solution to this will probably involve moderately strong motors and very high gear ratios, which may slow the robot down, but will allow us to perform the actions required.

Teamwork

At this point, we have begun to split up the responsibilities for the final design. While I work on CAD and the sliding mechanism, Stephanie has designed our gripping mechanism and has started to look into different materials or methods for best sticking to the window frame. She has been talking to a professor here at CMU about "Gecko Adhesives", which seem to be a promising option.

Trevor has been working on a simulation of the system so that can have a proof of concept before we even build any prototypes. He has also received a camera recently so that he can start working on computer vision techniques which we will use for sensing the edges of the window before we grip them.

Ian H. has researched motors and gearboxes that we can use for some of our joints that will require higher torque, and he is almost ready to place an order for those motors so that we can start testing and prototyping.

For the motor lab, Steph and I helped with the assembly and wiring, while Ian and Trevor wrote the code that controlled the motors in different ways. Trevor created the Matlab GUI while Ian implemented the motor controllers that we used, and then all four of us worked to debug the code and test the system once we were done.

Future Plans

Our plan is to have the entire initial design decided upon and specified by the end of this weekend, which may happen a few days late, but still relatively soon. My immediate next step is to create a model of Steph's gripping mechanism so that we can create a prototype and validate the design. Steph is also researching adhesives or gripping materials. I am contacting vendors of linear slides to try and find a cheaper option for us, while also coming up with designs that we could manufacture ourselves. Trevor is going to start implementing computer vision and I am going to work with him on the simulation to make it as accurate as possible. Ian will order some of the motors we plan to use and the whole team will work on creating a gearbox that will allow us to test the motor and know the limits on weight that we will have.