

Individual Lab Report 04

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16-681 MRSD Project

Team B: Space Robot

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Individual Progress

During this week, I further refined our sticky-foot design and 3D printed two with the attached rigging that we have a easy test by hanging weights. And also I kept building the main chassis(see figure 1).

Because is my first time to use the 3D print machine so I am not so familiar with the properties of the printing materials it used and also the strain and stress distribution in the model that was printed. So first version of our foot is so weak that will easily broke. So I redesign the model by improving the size and thickness together with adding fillet and chamfer. Also in order to have a better casting with the sticky material, I made small extrudes (see figure 2) at the bottom of the foot so that the bottom surface will mixed together with the sticky material during the casting. This can help void the sticky material peeling from foot itself.

After getting the second version of our foot, Dipta and I started casting yesterday, still waiting for the result. Actually we have done second casting last week by using a plastic circle cover, this time we improved the casting quality. We have tried to attach this cover to the wall and really need a big force to remove it.

Challenges/Issues

One of the challenges is that we are still putting too much time on the design of our sticky foot. Since this is the key innovation and most difficult part in our robot system, we need to figure out because all the other subsystems related to this subsystem. We have met with Dimi and Mettin, actually we still didn't have a very convinced answer to ourselves.

So this part is highly risk part that will bring a big influence to our whole system. Right now after this presentation, we decided to ignore this detail first and started to build whole frame of our robot. Nate and I had figured out middle chassis, linear motion system and also the details of ball joints together. And we already ordered the parts we need from McMaster. So we will fabricate other components in machine shop and try to finish the assembly as soon as possible.

Another problem is that 3D printing machine still has so many limitations, for example it has the limitation of the material for printing. And also it takes a long time for printing. I printed two feet for 13 hours, so it was really not so convenient for iterations.

Because of this problem, we decided to lathe or mill the component instead of 3D printing for the components that have large volume or that require high quality of distribution of strain and stress

Cross-reference/Teamwork

During this week, Dipta and Nate were the main people charging for finalizing our power distribution board and sending it in for fabrication.

Nate also designed linear motion system for our robot and helped place what should be our final parts order for this semester to complete the prototype. He gave the presentation this time.

Brian was still working on the software part of our system. During this week, he improved the integration of ROS into our software suite. Now he was able to adapt our GUI into an RQT plugin that could run within the ROS environment.

Plans/Future Work

For the next coming week, I will together with Nate focus on 3D modeling, fabricating and also assembly. Because now for the whole robot system, mechanical part is a little behind the time schedule. Since I am the main role in charging of this part, I need to try my best to catch the whole schedule.

And for past few weeks, we were putting too much attention to details rather than building the whole frame of our robot system. During this presentation, Prof John also mentioned about this problem. We will change our plan because Prof John's suggestion seems more reasonable. That is at the same time we are still thinking and trying to figure out how to attach and peel by foot design for our robot, we should also fabricate and assembly other components.

So next week, I will finalize our 3D model and consider ordering of parts that need to buy from McMaster and fabricate the main body out as soon as possible. So we can leave out at least more than one week to have a roughly frame of our whole robot system and can have time to iterate.

Figures

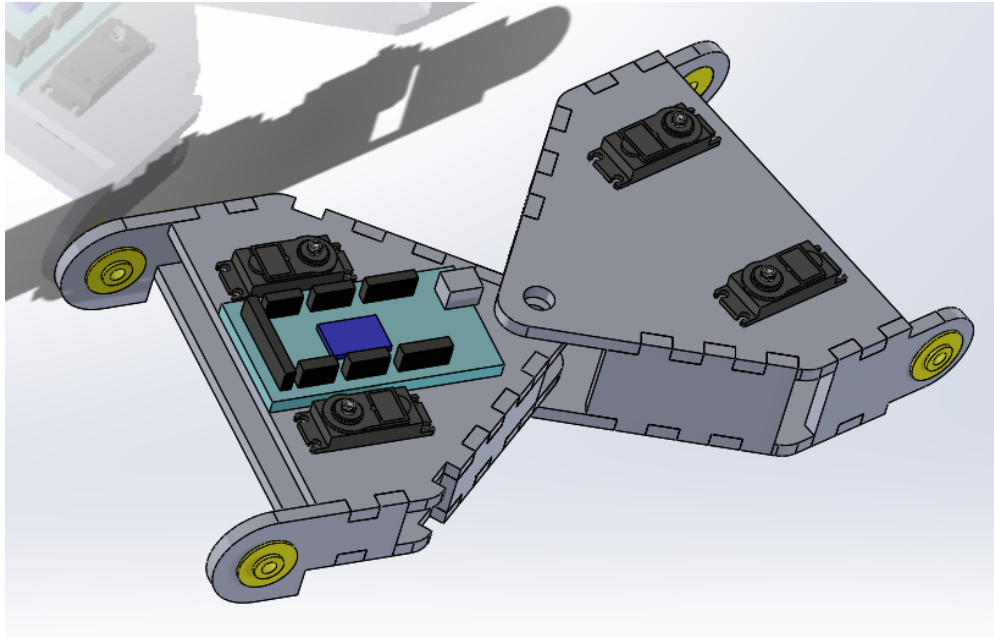


Figure1: middle segment for our robot

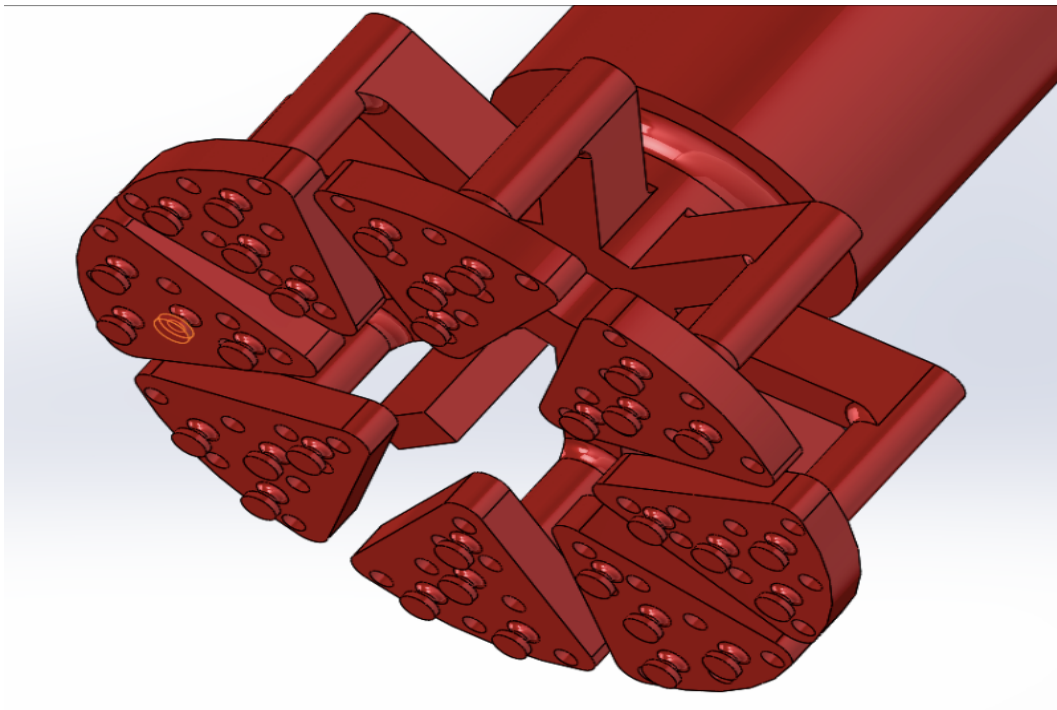


Figure2: extrudes on the bottom surface of the foot