

# Individual Lab Report 5

---

**Name** : Ardy Dipta Nandaviri Giri  
**Team B** : Space Jockey  
**Team members** : Brian Boyle, Nathaniel Chapman, Songjie Zong  
**ILR05**  
**Submission date** : November 19, 2013

## 1. Introduction

This report gives a brief description of our team progress along with my individual contribution so far towards the MRSD project. After our last progress review on November 7, 2013, I was helping doing the assembly of the robot and continue making some examples of sticky foot. In the main project my role is to develop the electrical board including the power distribution board, main controller board and also circuit board for each subsystem.

## 2. Individual Progress & Challenges

### 2.1. Power Distribution Board – Board Testing

I was planning to finalize the power distribution board by assembling, soldering the parts and testing it in this week. Unfortunately, the parts other than the PCB board had not arrived as scheduled due to some technical issues on the ordering. So I did the testing on the PCB board using multi meter to check whether all of the routes have been successfully connected as designed. Nothing was short-circuit or unconnected. PCB board is shown on figure 1. However, though the PCB board was not ready, we tested the linear actuators and servo controller using power supply in the lab.

### 2.2. Foot Mold Design

Designing the foot mold for casting the sticky material is challenging. After the previous progress report, Songjie has designed the footpad as seen in figure 2. I did the casting on that footpad as seen in figure 3. After mixing the materials and placing the foot face-down on a plate where the V-10 poured in, the bond between the sticky foot and the plate was so strong and I found a hard time detaching it from the plate after leaving it for a night. So I tried to detach it using knife, which resulted in rough surface on the footpad as seen in figure 3. This roughness is not good for its attaching ability because we would want the surface as flat and as clean as possible to maximize the ability to attach.

I designed a new foot mold as seen in figure 4. My idea is putting the foot upside down, placing the mold on the top of it, and then pouring the V10 in it. I would like to make flat

surface by letting it free and only touches air while casting. However, after having a discussion with Brian and Songjie, we came up with Brian's idea to add a retaining wall around each toe, so that the resistance to shear forces help to hold the pad in place. Songjie and I worked together to build this foot as seen in figure 5. After fabricated that in mechanical engineering dept, we did the casting as seen in figure 6. The result is much better than the previous one.

### **2.3. Assembly the Robot**

After finished creating the chassis of the robot using laser cutter, I helped Nate and Brian to assemble the front and rear part of the robot. This task was challenging because Nate was absent due to sickness on Saturday, so I helped Brian to work on that by referring from the CAD design. The result can be seen in figure 7.

### **Things I have learned**

I learned that the surface of the footpad with V10 material has to be really flat and clean to optimize its ability to stick. Creating the foot mold has deepened my understanding of the behavior of the V10. Assembling the robot chassis also helped my understanding about the movement of the robot

## **3. Cross-referencing with the work of fellow team members**

While waiting for the parts of the power distribution board, I was doing testing of the power distribution PCB board connection. The rest of the team was focused on doing their role. Brian was focused on programming the gait generation and improving the GUI using Qt. Songjie continued designing the footpad, and Nate focused on designing the chassis of the robot.

I also helped Brian and Nate to assembly the robot chassis and doing the testing on the linear actuator and the servos.

Together with Songjie, we designed a new foot mold and casted the sticky materials on the new footpad design. At the end, we came up with Brian's idea about creating mold like a ring for each foot.

## **4. Plans / goals for following week**

My future work for the project is to design and develop the electrical system of the robot including the power, main processor, motor controllers and sensors. For the next following week I will help the team to assemble the PCB board and test to know how much the efficiency it can provide, and measure the current that is needed for each electrical subsystem such as: Arduino DUE, servo controller, and servos.

I will also work together with Songjie and Brian to improve the footpad so that it can achieve better adhesiveness.

## 6. Figure(s)

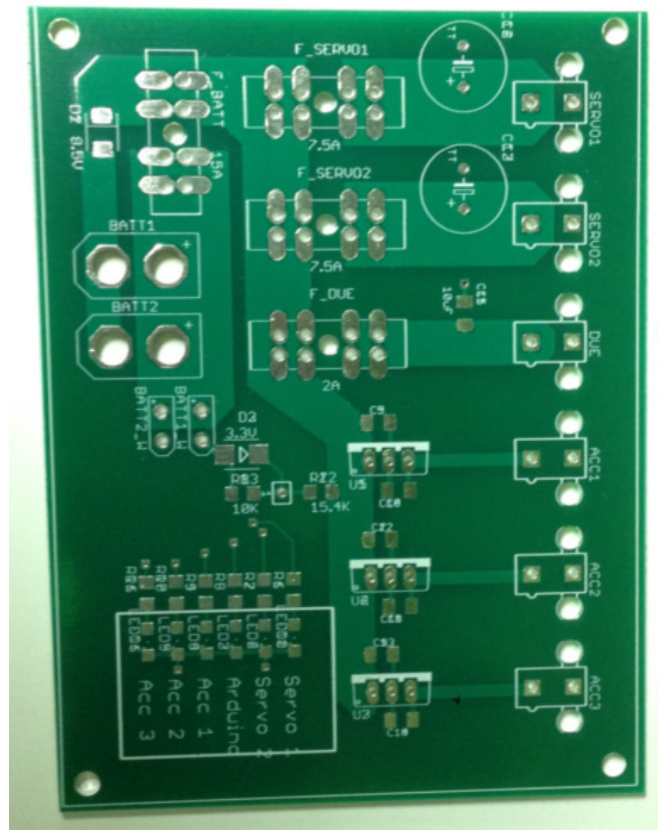


Figure 1. Power Distribution Board - PCB Board

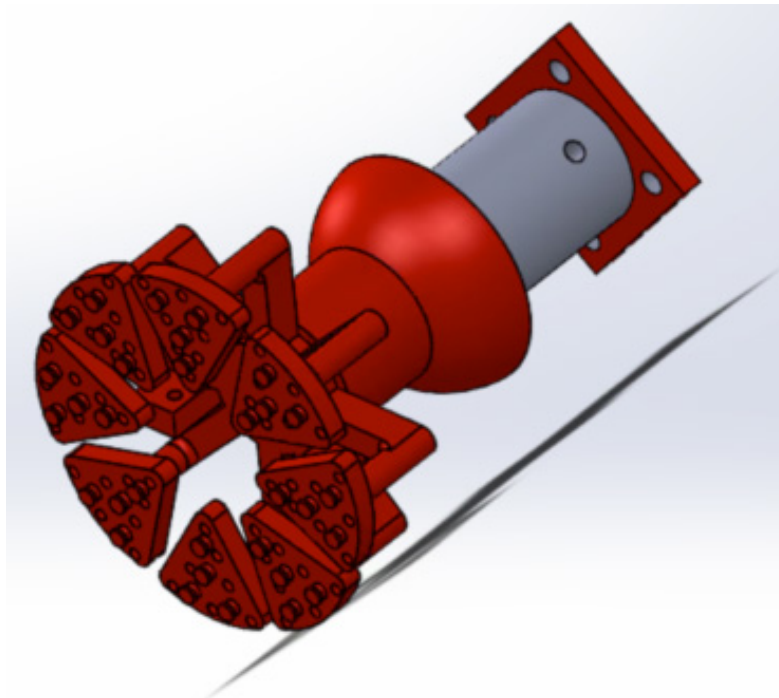


Figure 2. Foot Pad v1

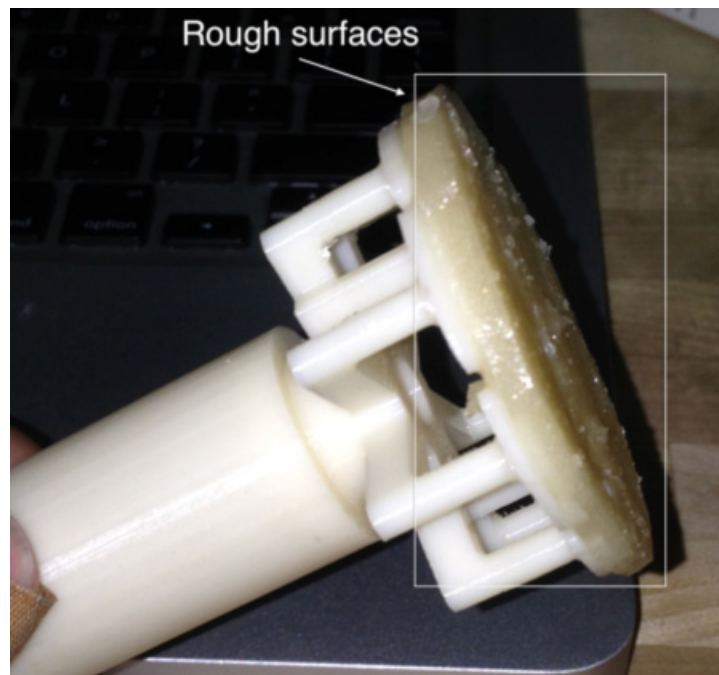


Figure 3. Foot Casting v1

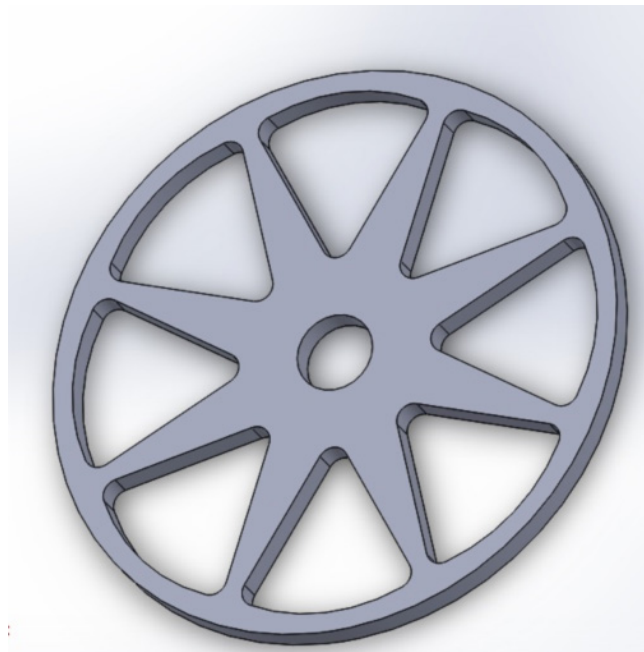


Figure 4. Foot Mold v2



Figure 5. Foot Pad v2

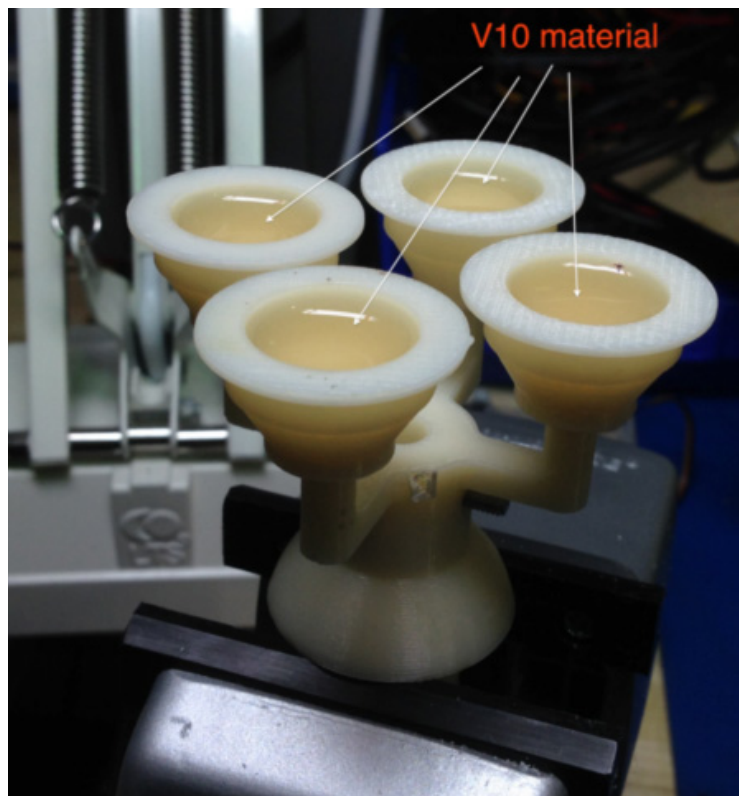


Figure 6. Casting in Footpad v2



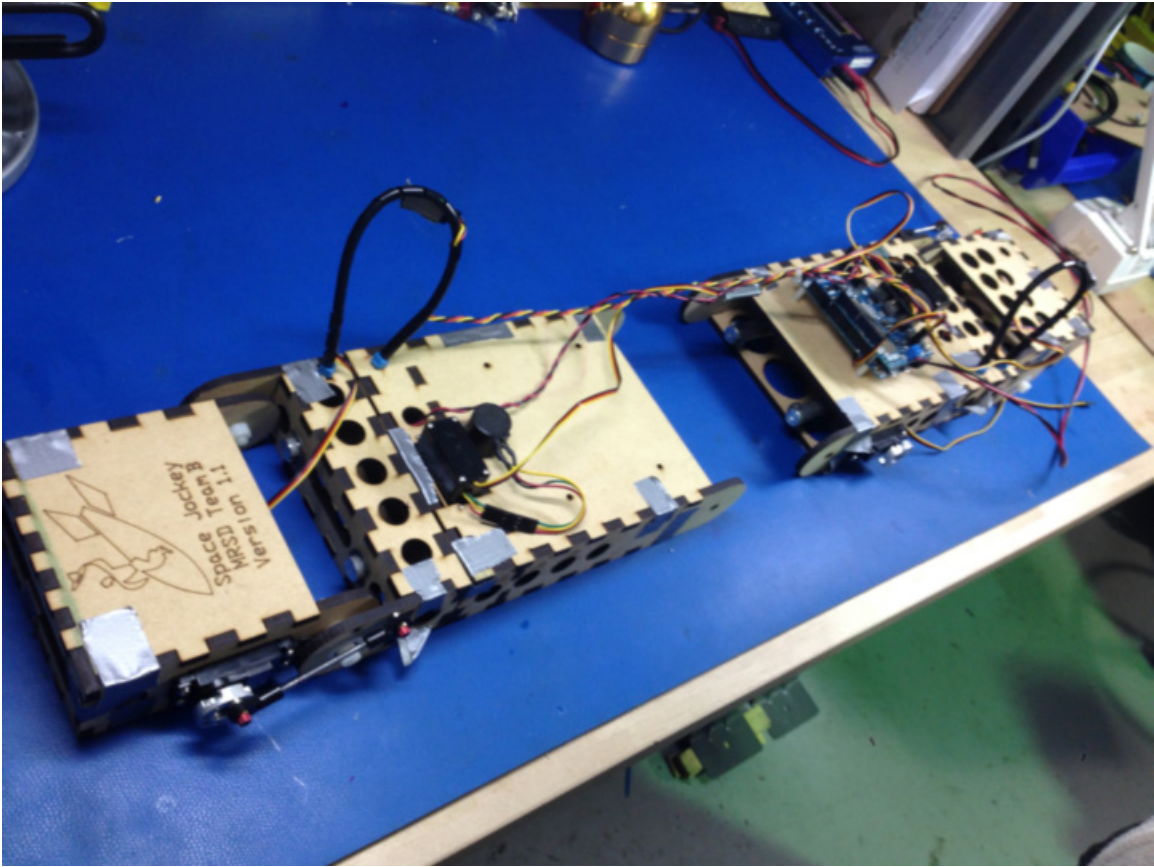


Figure 7. Assembly of the robot