

# **Individual Lab Report I**

----Motor Control

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16-681 MRSD Project

Team B: Space Robot

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## Individual Progress

During this period, my main role in this lab was to finish the force sensor and potentiometer to control DC motor and servo motor. I integrated sensors and motors together on the breadboard. Because of the individual task1, I have already learned basic knowledge about how to use Arduino Uno. So it was not so tough to me again this time. I used the force sensor to control DC motor rotating in two directions and also the speed (see figure 1). When I press it with a small force on the force sensor, DC motor will start to rotate in clockwise. If I keep increasing the force, DC motor will decrease its speed and then at some point it will change the rotation direction to anticlockwise.

I also involved in DC motor position control and velocity control together with Dipta, helping him write part of code and debug the code.

I made an appointment with Pro.f Metin Sitti from mechanical engineering department for our MRSD project and visited him together with Dipta. We discussed about the ideas of different kinds of robots, like Waalbot, Tankbot and AWIMR. I also made a research about the materials that used for the aircraft and discussed with him about his research of the dry-adhesive materials.

## Challenges/Issues

There are mainly two issues that really took us a long time.

The first one is for the position control of DC motor. Dipta and I spent long time for debugging and finally found that we made a mistake about calculating the value of the “encoderPos”. And also we haven’t made our PID control so perfect that our DC motor still vibrates after reaching the desired position.

Another issue was terrible. After we figured out the position control and velocity control of DC motor independently. When Nate was doing the assembly of this part of the code to the total final file, it just didn't work any more. We tried many times and still got errors. So we failed this part during the lab demo. And today Nate told us the problem of this issue was that we hadn’t created the correct pointer to the DC motor control part in the final file for the code so that led the memory problem for the laptop.

## Cross-reference/Teamwork

This lab was coordinated as a group effort. However, especially thanks Brian and Nate. They two are the main guys who charged for assembling our codes together and debugging. This took really a long time. Brain mainly focused on fancy GUI for our motor control lab (see figure2). Nate is charging for the assembly of our codes. He created different channels both for our lab inputs and outputs so that channels can easily be picked up and matched to each other and then work. This made our whole system more convenient. Dipta finished the encoder part of DC motor, also position control and the velocity control of it. And he also connected the circuits for the whole motor lab.

## **Plans/Future Work**

In the coming week, our group will focus on finalizing our design idea for our robot. Dipta and I have already met with Prof. Metin Sitti from mechanical engineering department and discussed about the Waalbot, Tankbot and AWIMR. They are designed for different environment situations. For example, Waalbot can only be used for flat wall and Tankbot can navigate and climb up obstacles.

I plan on creating Solidworks design for a basic leg for our robot, and also will order for the “V10-Smooth” dry-adhesive materials. If possible we will try to see how well this material works. Brian will create GUI Mockup for our future whole system. Dipta and Nate will order some hobby motors and other parts to start building a bench-squid and also trade studies on batteries and motors for the robot.

## Figures

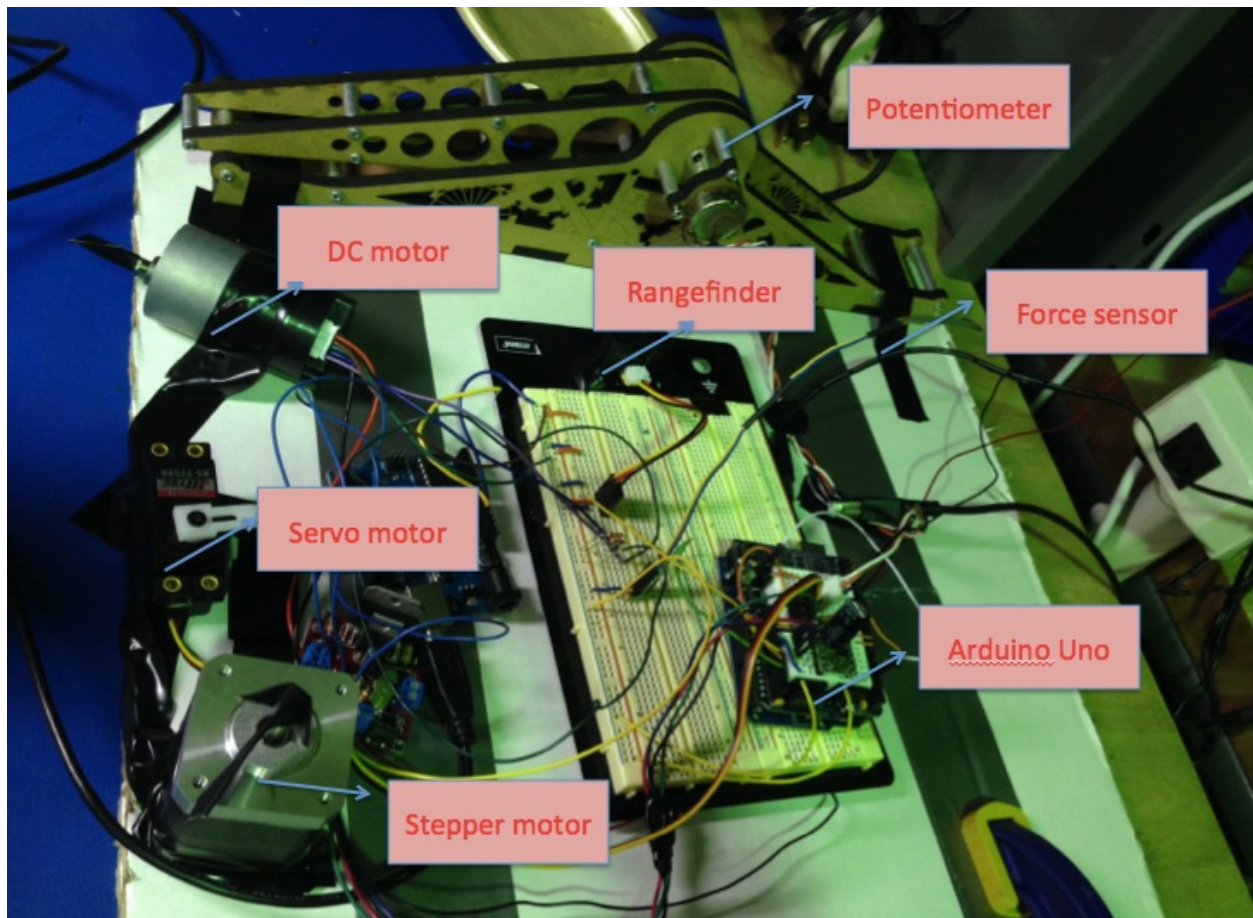


Figure1: Motor control setup

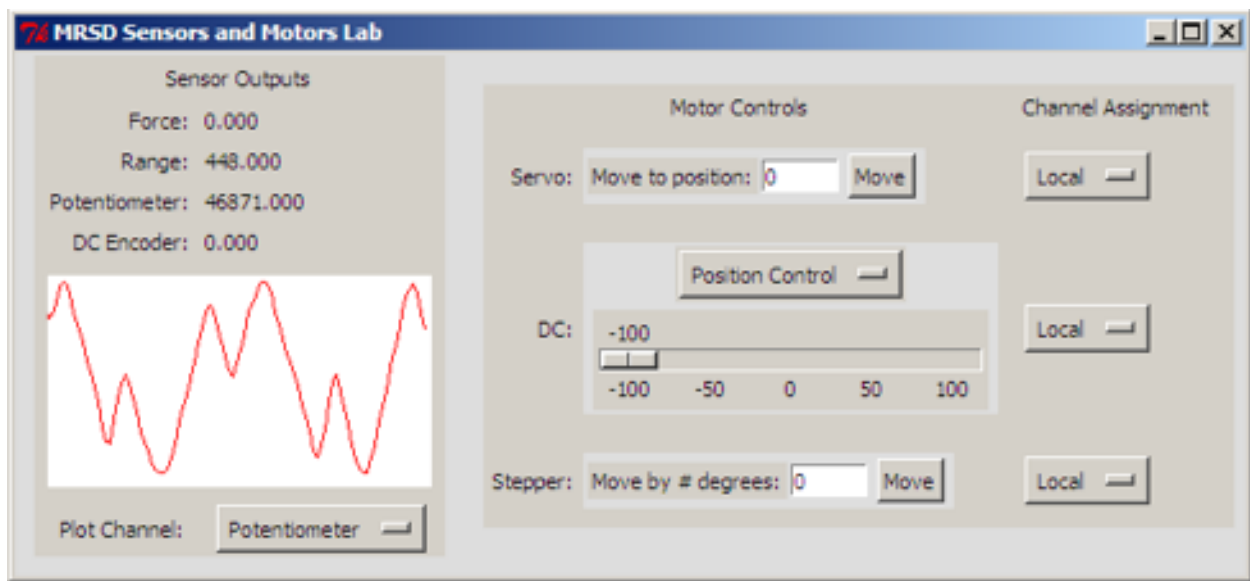


Figure 2: GUI of motor control lab