Individual Lab Report 08

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16-682 MRSD Project 2

Team B: Space Robot

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Individual Progress

During this week, I was still working on April Tags to get the localization of our camera. I have successfully integrated the results from running the MIT C++ source code to the ROS. Then I used the ROS talker to read the results and used the ROS listener to catch them.

The information about the results of april tags contains distance, X, Y, Z and three angles. I could use them to get the localization of the camera since we already knew the location information about the april tags. We could also know the translation vector and rotation matrix. Then finally we could have the homograph matrix. And if we know the homograph between the camera and april tags and the homograph matrix between the camera and center of the robot, we could know the homograph between the center of the robot and april tags. This is our aim. Since by using the camera to take the april tags as input then you can get the localization of the center of the robot by using this computer vision knowledge. See the result in figure 1.

I also redesigned the shafts for our linear actuations since the original ones are too long for the new design of our robot. So I went to the machine shop and used the lathe to adjust them. I reduced the size from 9 inches to 6 inches.

Challenges/Issues

The most difficulty part for me is to understand how ROS works. At first I was totally confused about how to create ROS nodes because it needs to adjust the CMakeList.txt file. Since I am not so familiar with “make” file. I asked classmates for help. I first tried my best to understand the basic example from the tutorial then to mimic another ROS node by myself.

And at first, I decided to integrate the whole MIT C++ source to the ROS. However, after trying for some times I found it was too difficulty for me because MIT C++ source was using openCV. I needed to adjust the CMakeList.txt file in order to matching using openCV. This step was not as easy as mimicking any more. I knew myself could not figure it out in two weeks.

After having a meeting with our group, we decided to just integrate the results from after running MIT C++ source to the ROS. Specifically, I just saved the results to a localization.txt file. And then I created a simple ROS talker to read that localization.txt file. After the talker giving out the information by reading from that file, I have the ROS

listener to catch them.

Another problem for me is about adjusting the shafts for the linear actuation. We had glued our gear key tightly in the slot of the shafts before. So this time we failed to get these gear keys out. The new gear keys were a little bended. We had no time to order a new one for this demo. So we just assembled the bended gear key into the new shaft's slot. Even we glued tightly, we still have found that that linear actuation was not as smooth as before because gear key was not totally flat.

Cross-reference/Teamwork

Brian has been designing and manufacturing our magnetic foot. And right now the test result showed that a foot with three pieces of magnets stacking inside could hold strength to 1kg. That was a promising result to us.

Nate has designed our new power distribution board together with Brian. And he also completed printing majority of the whole robot. The new version of the robot reduced the size about 50%. And also because of ABS material, the robot reduced nearly 80% of the weight for the robot frame.

Dipta was working together with me on the localization part of our robot. He was more focusing on the connecting WI-FI camera by adjusting using the MIT C++ source code

Plans/Future Work

I will still work on the localization of our robot. Then I will help Brian to add this part of the code to our whole software system. And I will also help Nate to get another backup shaft machined. Since Nate will finish printing the robot, we can do the assembly of the hardware in the next week.

Figures

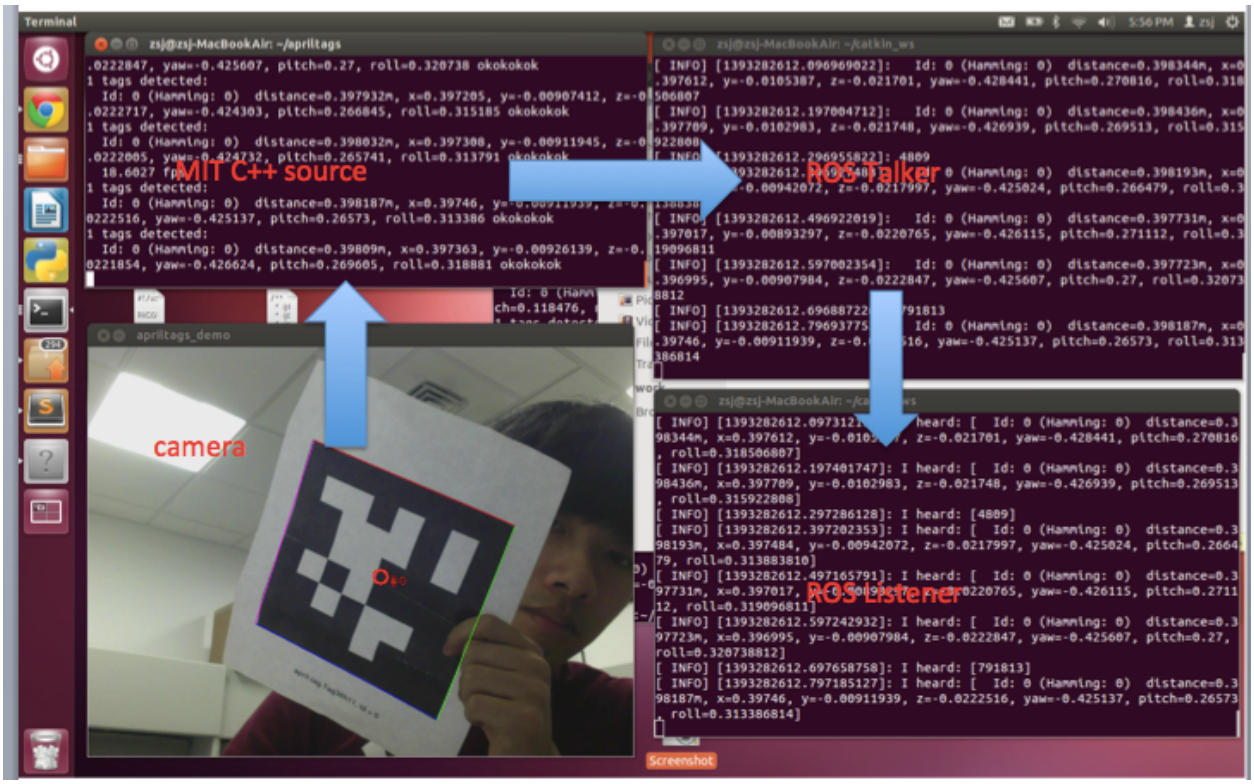

Figure1: the whole process of getting localization of the camera by using april tags