

Individual Lab Report

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Team E

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Individual Progress

The last few weeks have been spent trying to get our planning software and hardware reading for a full picking demo. The first part of this was to update the planning scene to reflect the new stand and lighting frame. This type of task has become common, so once Mike and Akshay provided me with the models I completed this quickly.

I also continued work on the linear actuator. We received the last few connectors, so I assembled the remaining hardware and began working on the software necessary for the new controller configuration. Unfortunately, our motor controller broke and a new one is being procured. I was unable to verify that my code worked.

After that, I began to work on finding poses necessary for taking images of the bins, and a few poses that are useful as waypoints for picking. Figure 1 shows the planning scene during a test run, and Figure 2 shows the physical robot during a partial test run (no suction).

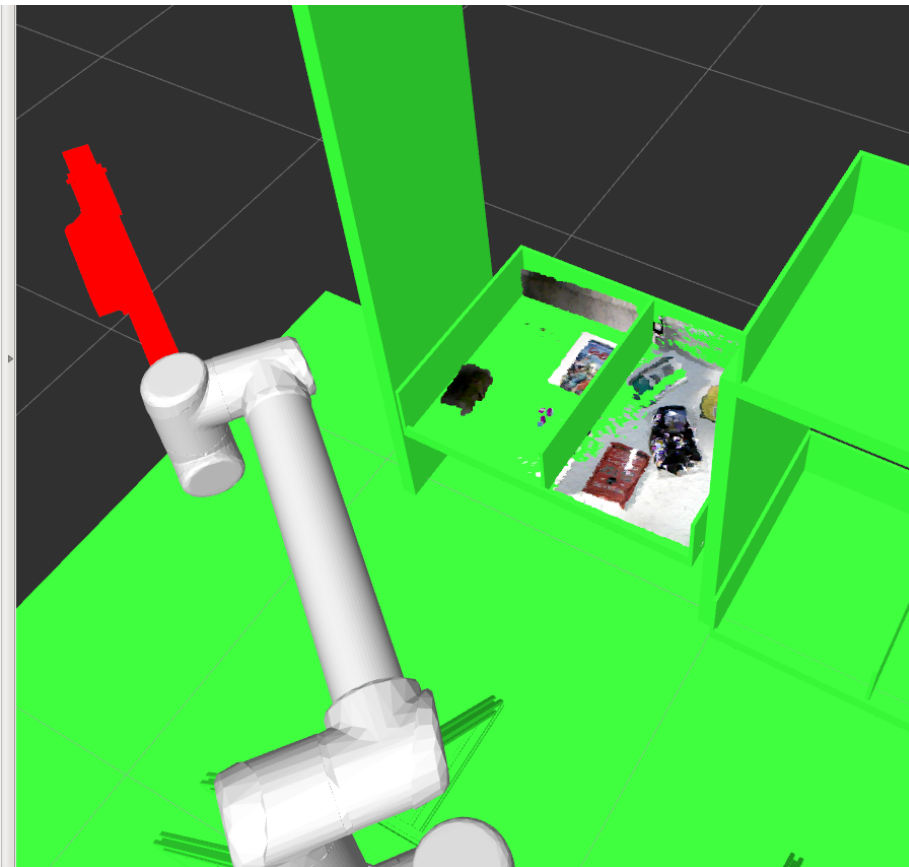


Figure 1. The planning scene with items superimposed.



Figure 2. The arm taking an image of items during a partial test run.

I also made the switch to SPBL planners, which have much more consistent results than RRT due to the algorithms that each use. Our current status is fairly slow, but I predict that will improve as we create our experience graph. I have been holding off on this task in anticipation of more tweaks to the planning scene as our shelf design becomes final.

Challenges

The biggest challenge I faced for this PR was that our motor controller for the linear actuator broke. This issue has caused the controller to not power on and may be due to a broken regulator for the reference voltage of the controller. The worst part is that we have apparently violated the warranty

of the controller by plugging in power directly into the board without any kind of regulation. It is possible that the noisy power cycles broke the regulator

We are also having an issue with our planners making plans that rotate the end effector 360 degrees. This means that the vacuum hose may wrap around the end effector or items that are being picked may become cantilevered and fall off. In the past, this was averted by joint limits, but we need the extra reach that unlimited joints provide. We are working with SBPL to create more complex constraints.

Teamwork

Akshay worked on integrating Faster RCNN as well as further work on grasping. Akshay's work allows us to classify objects with Faster RCNN and FCN in tandem during a run, which lets us use both their strengths.

Leo has successfully used perch to identify items using images from the Asus camera and data from Amazon in a way that is indicative of the competition. Leo also modified our item classifier to work on the GPU, which massively improves speed.

Mike has made preliminary shelf design decisions and is in contact with multiple parts distributors. Mike has also procured electromagnets and has performed a brief viability study.

Jin has collected enough training data to identify items with an adequate level of accuracy. The accuracy level is very reliable when only the items within one bin are considered.

Future Work

I need to get the linear actuator up and running as soon as possible so that a full pick run can be completed.

I must continue work with SBPL to fix the joint constraint issue. As of right now, this limits our ability to take images of the top bins.