

Individual Lab Report

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Team E

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Individual Progress

My primary goals were to implement planning as a service for more generic tasks and to generate some poses to help with sensor selection.

Planning for generic tasks involves changing the values associated with a planning service call and how those calls are handled. Specifically for the perception branch, there was a need to visit certain bins at certain angles.

To accomplish this, I the relevant bin data as parameters for the move arm message. When the move arm service was called it would parse that message in different ways depending on which of the parameters was filled out. To keep this system loosely coupled a seperate parsing function was made which will send pose data to the move arm function in a consistent way.

The poses necessary for the sensor selection were generated by speaking with Jin about her perception needs and a fair bit of trial and error to get the poses just right. Once the poses were selected there was relatively little integration trouble due to the earlier changes to the planning code. Jin simply had to select the desired bin and angle in her service call.

Figure 1 shows the simulated robot taking a picture of bin four at angle one (looking down). Figure 2 shows the image taken when the program was run on the actual robot.

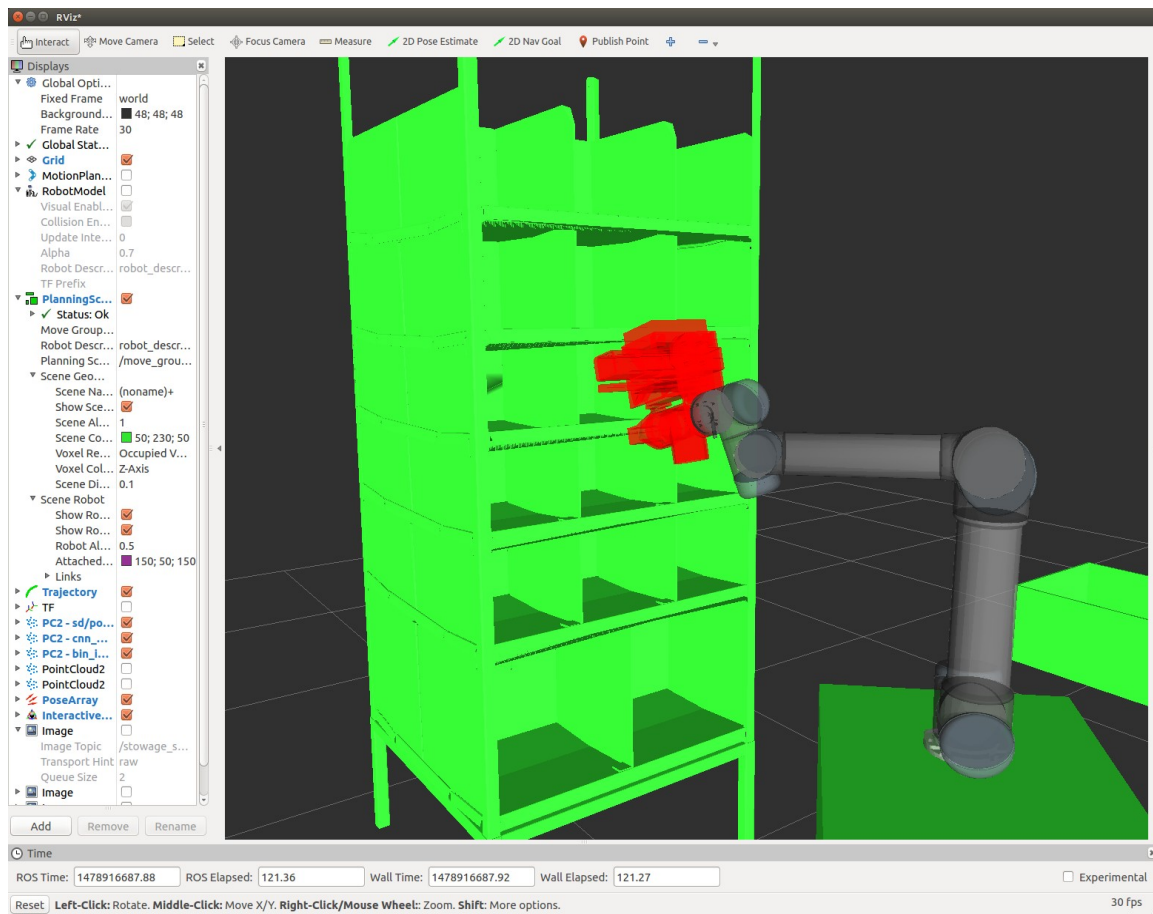


Figure 1. The robot taking pictures in simulation.



Figure 2. The actual picture taken for bin four, angle one.

Another small task from this week was incorporating the new end effector mount in the planning scene. Mike supplied me with the new stl file and a short time later I was able to make plans for a more accurate depiction of the mount.

Challenges:

In the very beginning of altering the move arm service I was unsure of exactly how others would be interfacing with my code. This nearly caused me to botch the integration with Jin. Leo sat down with me and Jin and explained exactly how our code should be communicating and I made some important changes to my code. This simply cost some time, but I was happy that Leo took initiative as the software architect and kept Jin and I on track.

Generating the pose list for the sensor selection was surprisingly difficult. With some help from Mike, I was able to determine that the joint limits set in the robot urdf file were significantly limiting our configuration space. When I expanded those limits I found that plans would occasionally include multiple end effector rotations. This was not acceptable, so we determined what minimum allowable movement was necessary and set the joint limits to just beyond that. This allowed us to generate plans for much higher points and generate the needed pose list.

Teamwork

Jin's primary focus was generating a set of images from different sensors to collect point cloud images. She wrote a program that controlled planning and perception in order to collect the needed images for the Kinect. We had planned to also collect these images for the Intel Realsense, but there are constant issues getting that to work. Right now, the driver has been fixed, but for some reason point cloud fidelity is poor.

Akshay and Michael have been working to fabricate the 1 DOF gripper by next week. This week they were able to complete the design and to start some preliminary fabrication on critical components such as the suction head and the actuator mount.

Leo has implemented a basic state machine, which was used to run the

sensor selection program that Jin and I worked on. Leo has also worked on the vision system and is able to identify some items with high confidence using Caffe.

Future Plans

In the week I intend to integrate the Arduino Nano in ROS and control our suction head actuator as well as the vacuum relay. This will be a basic demo, and when our PCB comes in we can have a full rig set up and integrated.

I also plan to simulate the new pod design concept we have made over the last week. It is likely that this pod will change, but we need to check the configurability of the new pod as soon as possible in simulation.

I will also write the first draft of our proposal for entry in the Amazon Picking Challenge.

Further out, there is still the need to simulate the extra DOF of the linear base and simulate a finalized base design.