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Team E: PLAID Teammates:
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1. Individual progress

I take over the task of migrating turntable code and get it done because original owner can't figure it out how to do it. Basically we only need to subscribe "image_color" and "points" and save files by using openCV. However, I get into trouble when I try to save images for twelve bins. The image and point cloud data could not be updated, and the pictures are all the same for twelve bins. The reason is that callback function **for one rosnode** in ROS is synchronized, which means no two or above callbacks could be executed at the same time. When saving image callback is called, it is a blocking call and hence image and point cloud callback won't be executed. My solution for such issue is that I try to save only one point cloud file and one image file for each saving image callback, which means I try to give other callback a chance to be executed (updating point cloud and image in this case)

I also collaborate with Akshay to localize apriltag position and segment bin point cloud. Getting Apriltag position is trivial since we could just get Apriltag package running and subscribe the output topic of Apriltag. After getting the position of Apriltag, we could segment point cloud by using bin size and bin position regarding to Apriltag. The figure 1 shows the segmented apriltag point cloud, which could be used for segmenting bin point cloud. However, to complete the perception pipeline, we still need to extract color information from segmented bin point cloud and feed it into caffe classifier.

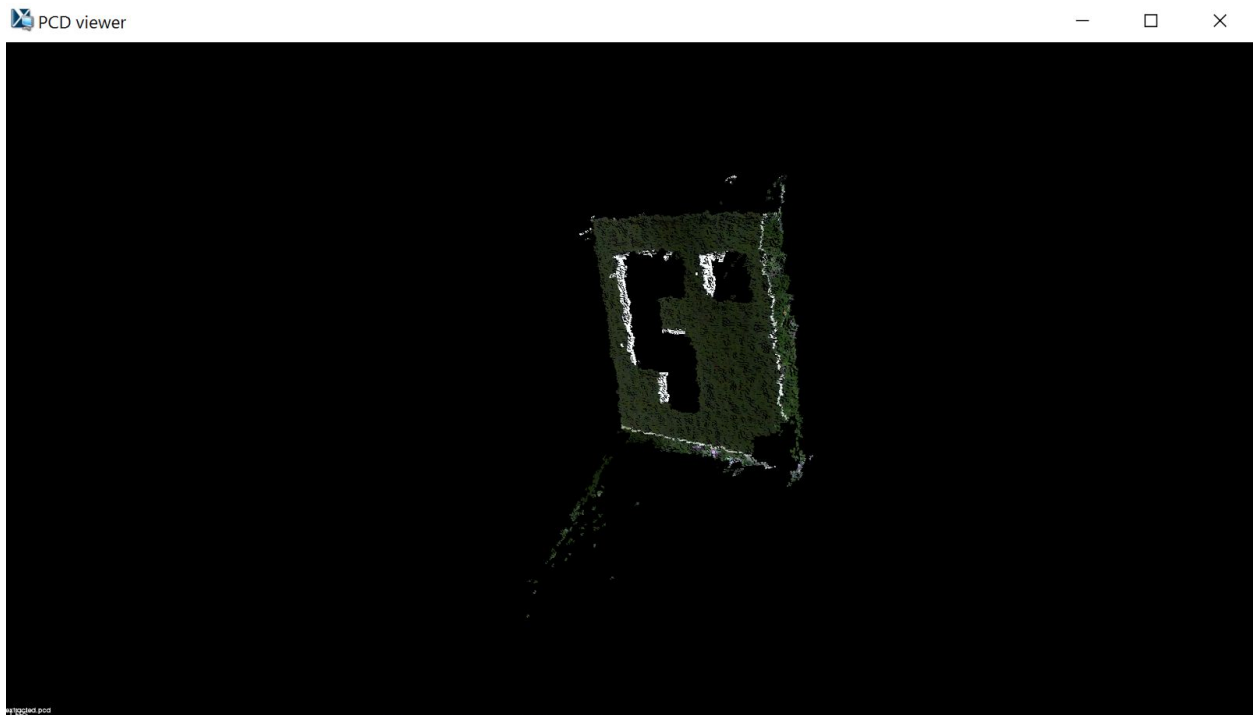


Figure 1. Apriltag Point Cloud Segmentation based on the POSE information

2. Challenges

We will design a new storage system according to new Amazon Robotic Challenge rules, and it will be a huge plus if we could take advantages of it. Moreover, because every sub-system design depends on it we need to create a prototype before the end of this semester. It means we need to sketch out the shelf draft under time pressure, but optimal design takes time to figure it out. Fortunately, Dimi gave us a lot of mechanical ideas, but we still need to work harder to mitigate the risk.

There are only two weeks left before FVE, and we are still running behind for perception sub-system. Also, we have to handle final exams and lots of homework before the end of semester. I think we need to manage our time better to be more efficient.

3. Teamwork

For progress review 4, we focus on different domains and break down the tasks as follows:

- Michael Beck – Gripper. Fabricated design for 1-DOF gripper. Draft STL for new shelf and integrate into planning scene.
- Akshay Bhagat – Perception and gripper. Worked with Che-Yen to segment point cloud for each bin. Contacted with Universal Robot for UR10.
- Matt Lauer – Arm Planning. Train E-graph for planning. Implemented rostopic to control vacuum by roserial.
- Che-Yen Lu – Software Architecture and Perception. Collaborate with Akshay to localize the Apriltag and segment point cloud for each bin. Migrated picture taking functionality from turntable package to current codebase.
- Jin Zu – Perception. Helped Michael with shelf prototype.

4. Future plans

To meet the goal of Fall Validation Experiment, I will try to integrate perception system. We want to show the prototype of whole perception pipeline, including taking picture for each bin, segmenting object point cloud from specific bin and classification for object point cloud. Also, we hope super-pixel segmentation will be implemented before FVE.

Recently, we try to recruit MSCV people to work with us. If one or two of them are willing to join us. It will be really helpful for perception team since we are all lack of experience.

For APC 2017, we will draft competition proposal before December 2. Perhaps use last year's video so that we could focus on the implementation. As for the sensor

selection for FVE, we have decided to use Kinect since there is no point cloud issue for Kinect now.