Mini Project
Setup of Software Development Environment for Robot Programming

Assigned: Jan 29, 2014
Due Dates: February 10, 23:59:59

Introduction

In this mini project, the objective is to set up the software development environment on your own computer. This project is an opportunity for you to get ready for the upcoming projects using the Baxter robot to solve the Amazon Picking Challenge and understand open source software packages for robotics applications. This project must be done individually, although group discussion is highly encouraged.

Development Environment Setup

Note: if you don’t want a physical installation, you can use Oracle VM VirtualBox to install a virtual machine under Windows or Mac OS X.

1. Follow the Workstation Setup tutorial for the Baxter robot to set up the software development environment on your computer: [http://sdk.rethinkrobotics.com/wiki/Workstation_Setup](http://sdk.rethinkrobotics.com/wiki/Workstation_Setup)
   Please note that you are required to use 32-bit Ubuntu 14.04 and ROS Indigo!

2. Get started with ROS using the Turtlesim tool. Follow the tutorial: [http://wiki.ros.org/turtlesim](http://wiki.ros.org/turtlesim) to play with ROS and understand how ROS works. You are required to submit a screenshot of a working turtlesim window for grading (e.g., Fig. 2).

3. Install Point Cloud Library (PCL, v1.7.2) in Ubuntu 14.04 for 3D robot perception.

4. Finish the tutorial on Plane Model Segmentation and submit a snapshot (e.g., Fig. 3):
   [http://pointclouds.org/documentation/tutorials/planar_segmentation.php#planar-segmentation](http://pointclouds.org/documentation/tutorials/planar_segmentation.php#planar-segmentation)
   The input data table_scene_lms400.pcd can be downloaded: [https://raw.githubusercontent.com/PointCloudLibrary/data/master/tutorials/table_scene_lms400.pcd](https://raw.githubusercontent.com/PointCloudLibrary/data/master/tutorials/table_scene_lms400.pcd)
5. Install OpenCV 2.4.9.0 in Ubuntu 14.04 for 2D robot perception.

6. Finish the tutorial on Feature Detection using a Baxter robot picture and submit a snapshot:
   http://docs.opencv.org/doc/tutorials/features2d/feature_detection/feature_detection.html
   The Baxter picture that can be downloaded from:
   http://inside.mines.edu/~hzhang/Courses/CSCI598A-Spring15/Projects/Project-1/BaxterCSM.jpg

   Figure 3. Snapshot of plane segmentation.

Submission and Grading

The Mini Project has a single due date: **23:59:59, February 10, 2015**. The project report must be submitted to the Blackboard before the due time.

**Submission:** The content required to be included in the submission is listed as follows:

1. 40/100: A snapshot of a working turtlesim in ROS under Ubuntu;
2. 25/100: A snapshot of plane model segmentation using PCL;
3. 25/100: A snapshot of feature detection results using OpenCV;
4. 10/100: Your ideas to apply these open source packages, including ROS, PCL, and OpenCV on Baxter robots to address the Amazon Picking Challenge.

**Report Guidelines:** As part of your completed project, a report (1-2 pages) is required. Your paper must be formatted using LaTex and the standard 2-column IEEE conference paper format.

- **File styles:**
  http://www.ieee.org/conferences_events/conferences/publishing/templates.html

- An example of the paper format is available:
  http://inside.mines.edu/~hzhang/Courses/CSCI598A-Spring15/Projects/FormatExample.pdf