RBOT 250 Labs: Robot Manipulation, Planning, and Control.

Instructor: Dr. Ogunmolu

Rabb Graduate School of Continuing Studies

Brandeis University, Waltham, MA

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Prerequisites

- A Working Knowlegde of C++: Occasionally, we would dabble into using the C++ 1z standards in our coding styles
- A working knowledge of the python programming language
- A working knowledge of the robot operating system (ROS) middleware.
- To ease setup for labs, a dockerized environment has been provided for you that has all the tools you need to get a jumpstart most of the lab exercises in the notes.

Loading the Docker Environment

- Ensure you have a Ubuntu OS. For now, any distro from 14.04+ would do.
- To download and install the Ubuntu OS, hop over to the Ubuntu download page: https://ubuntu.com/download/desktop and follow the download and installation instructions
- When you are done installing ubuntu, be sure to install the docker environment
- Go to this webpage, choose your Ubuntu version, browse to pool/stable/, choose amd64, armhf, arm64, ppc64el, or s390x, and download the .deb file for the Docker Engine - Community version you want to install.

- Install Docker Engine - Community, changing the path below to the path where you downloaded the Docker package.
  - sudo dpkg -i /path/to/package.deb
- Confirm that your installation runs by testing the hello-world-run image: docker run hello-world
- Further instructions can be found on this webpage.

- When you are done, there is a docker image that is already prepared for your use for most of the simulations we would use in this course.
- It can be pulled like so:
  - "docker pull lakehanne/brandeis:melodic"
- Run the image: "docker run -ti –rm

  lakehanne/brandeis:melodic -v /tmp/.X11-unix:/tmp/.X11-unix:ro -e DISPLAY=$DISPLAY –privileged -v /dev/bus/usb:/dev/bus/usb"
- This would launch the image together with usb access and access to your xorg server. The ros installation is at "/opt/ros/melodic" and the catkin workspace is located at "/home/rbot250/catkin_ws/src". This is the directory from which all tutorials shall be launched.

ROS Introduction

- An easier way to run would be to launch the ‘docker-run‘ executable available here: ‘https://github.com/lakehanne/Shells/blob/master/docker-run’.
- Follow the instructions that the bash script gives you
- Note that to compile, I have installed the catkin-build tools globally in the image which you can use as follows:
  - ‘catkin build’
  - You can also run catkin build with the alias ‘cb’
  - To compile just a single package, say dr_kdl, run ‘cb dr_kdl’
- Now that you have the ros environment setup, why don’t you start playing around with the tutorials at ROS Tutorials Page.