CSCI 4302/5302: Advanced Robotics

Homework 2: due 16. February, 11:59 p.m. to GitHub.

Learning objective: Cultivate basic skills with ROS, the Robot Operating System.

ROS, the Robot Operating System, serves as middleware and a convenient hardware abstraction layer when working with mobile platforms, sensors, and algorithms. It runs on top of a BSD/Linux kernel in user space.

The CS Foundation provides a virtual machine containing Linux distribution in the form of Ubuntu 16.04, which is compatible with the most recent version of ROS known as Kinetic Kane. The following homework is written for that setup, but it may also be completed if you have your own Linux installation with a different distribution.

Your assignment for this week and next is to complete the following Tutorials:

1. Installing and Configuring Your ROS Environment.
2. Navigating the ROS Filesystem
3. Creating a ROS Package
4. Building a ROS Package
5. Understanding ROS Nodes
6. Using `rqt_console` and `roslaunch` (2.2 onward only)
7. Understanding ROS Topics
8. Writing a Simple Publisher and Subscriber (C++ or Python)
9. Examining the Simple Publisher and Subscriber
10. Understanding ROS Services and Parameters
11. Creating a ROS msg and a ROS srv
12. Writing a Simple Service and Client (C++ or Python)
13. Examining the Simple Service and Client

What you turn in:

- Write and test a publisher node that publishes a *topic* and subscriber node that subscribes to *topic*. Over 300 messages, measure the length of time it takes for the subscriber to receive *topic* once published (using checksums or otherwise) and generate a histogram of these arrival times.
- Write and test a server node that provides a *service* and client node that calls this *service*. Over 300 messages, measure the length of time it takes for the client to receive from the server the message with its response and generate a histogram of these arrival times.
- Turn in your code project to the course GitHub.
  - Create a **private** repository named after your IdentiKey login.
  - Add the files to the repo, commit them, add the remote repo, and push your files and your repo to the server.
  - Make sure to include an image or document showing the histograms of arrival times in your repo.

Resources:

- CS Foundation VM
- ROS Installation Documentation
- ROS Standard Messages