

ME 696
Marine Robotics and ROS
Fall 2018
MF 11-12
TBD

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Overview

Marine Robotics and ROS is a graduate level course in applied marine robotics with a strong emphasis on robotic programming using the Robot Operating System (ROS).

At its core, ROS is a publish-and-subscribe network that provides a “flexible framework for writing robot software. It is a collection of tools, libraries, and conventions that aim to simplify the task of creating complex and robust robot behavior across a wide variety of robotic platforms.”¹ Most ROS tools libraries and add-ons are written in python, or C++, but ROS does provide APIs for other programming languages (e.g. Matlab).

This is an applied, project-based course. **You are expected to learn heuristically and to take control, as grad students should, of your learning objectives.** You will learn the fundamentals of ROS usage and programming through online lectures and tutorials and develop mastery of ROS usage and programming by application through three projects in support of the Kanaloa Marine Robotics Team. Potential example projects include but are not limited to creating a hardware interface driver; creating visualization and interface tools using rviz, gazebo, or similar software; creating simulation environments; creating image processing and recognition tools; modifying existing ROS tools for use in a Marine environment; and creating tools for path planning, obstacle avoidance, and other autonomous behaviors.

Required Resources:

- ROS Kinetic Kame
 - Recommend Ubuntu 16.04, Python 2.7

Assignments and Grading

Late work will not be accepted.

Tutorial Mastery	5%
Project 1	25%
Project 2	30%
Project 3	40%

¹ <http://www.ros.org/#>

References:

- General
 - www.ros.org
 - [Wiki.ros.org](http://wiki.ros.org)
 - <http://wiki.ros.org/ROS/Tutorials>
- Kinetic Packages
 - http://www.ros.org/browse/list.php?package_type=package&distro=kinetic
- Conventions
 - <http://www.ros.org/repos/rep-0000.html>
 - http://wiki.ros.org/ROS/Patterns/Conventions#Naming_ROS_Resources
- Style guides
 - <http://wiki.ros.org/StyleGuide>
 - <http://wiki.ros.org/DevelopersGuide>
 - <http://wiki.ros.org/CppStyleGuide>
 - <http://wiki.ros.org/PyStyleGuide>
 - <http://www.ros.org/repos/rep-0008.html>
 - <http://wiki.ros.org/JavaScriptStyleGuide>
 - <https://github.com/leggedrobotics/styleguide>
- Best Practices
 - Never edit files in /opt/ros/...
 - <http://wiki.ros.org/ROS/Patterns>
 - http://robohow.eu/_media/meetings/first-integration-workshop/ros-best-practices.pdf
 - https://github.com/leggedrobotics/ros_best_practices/wiki
- Lectures
 - <http://wiki.ros.org/Courses>
 - EthZurich Robotic Systems Lab – Programming for Robotics – ROS
 - <http://www.rsl.ethz.ch/education-students/lectures/ros.html>
 - Robocademy – Robotics Programming using ROS
 - <https://www.youtube.com/channel/UCcq36rtM7vxkSom0lmHBsmQ/videos>
 - Edx Hello (Real) World with ROS
 - <https://www.edx.org/course/hello-real-world-with-ros-robot-operating-system>