Course Learning Objectives:

- Foundation of ROS Framework
- Understanding of important robotic software topics
- Hands on experience developing ROS nodes
- Applications in computer vision for robotics
- Understanding of perception, path planning, visualization, etc
- Experience working and coding for embedded Linux

[Link to Syllabus](cse.ucsd.edu/~cbarngrover)
Class Schedule
- LOCATION: CSE 2154
- TIME: Tu/Th 11:00 – 12:20

Professor Chris Barngrover
- cbarngrover@eng.ucsd.edu
- Office Hours
  - LOCATION: 2114
  - TIME: Tu/Th 10:00 – 11:00

Teaching Assistants:
- Ankur Jain – anj022@eng.ucsd.edu
- Sakthi Sivaraman – srsivara@eng.ucsd.edu
- Office Hours: TBD
Assignments
Grades
Syllabus

Q&A, Discussion, etc
Lecture Slides
Syllabus

ted.ucsd.edu
piazza.com/ucsd/fall2015/cse291854628
Assignment 1: Read “ROS: an open-source Robot Operating Systems” and turn in a two paragraph summary. Install Ubuntu 14.04 on your personal computer. [5% of grade – 1 week]

Assignment 2: Install ROS Indigo Igloo on your personal laptop on the Ubuntu partition. Follow ROS tutorials 2-20. Create a package to control TurtleSim and write your initials. [10% of grade – 1 week]

Assignment 3: Install Stage and experiment with simulation environment. Create your own Stage map based on classroom. Install TurtleBot Simulator. Create a package to control simulator and mimic a Roomba and use SLAM to generate a map. [15% of grade – 1.5 weeks]
Assignment 4: Install Ubuntu 14.04 and ROS Indigo Igloo on BBB. Install USB camera and integrate with ROS. Use OpenCV to process image stream and look for motion. [20% of grade 1.5 weeks]

Assignment 5: Interface BBB to iRobot Create 2 via serial. Create ROS node to receive commands and execute on iRobot. Create controller node on your team laptop to send commands over WiFi from user input (keyboard or other). [20% of grade – 2 weeks]
Robot Project: Each team will propose a task that their robot will attempt to complete – think DARPA Challenge. The robot will be a iRobot Create2 with a BBB and a camera at minimum – other sensors encouraged. The semi-autonomous robot will be sent high level commands from a base station laptop that also includes visualization of the robot in rviz. [30% of grade]
SYLLABUS

Week 0
(1) Course Intro and ROS Overview
   Assignment 1 – 1 week

Week 1
(2) ROS Setup and Core Concepts
(3) Topics, Services, Launch
   Assignment 2 – 1 week

Week 2
(4) Guest Lecture and Discussion
(5) Stage, rviz, TurtleBot Simulator
   Assignment 3 – 1.5 weeks

Week 3
(6) Navigation and SLAM
(7) Custom Messages, Bags, RQT, Git

Week 4
(8) BBB and OpenCV Intro
   Assignment 4 – 1.5 weeks
(9) OpenCV and Perception

Week 5
(10) Sensors and Protocols
(11) iRobot Create and Multi-ROS
   Assignment 5 & Robot Project

Week 6
(12) Robot Project Proposals
(13) Robot Project Proposals

Week 7
(14) Workspaces and Transform (tf)
(15) Control, Robot Model, Point Clouds

Week 8
(16) ActionLib, PluginLib, Nodelets
(17) MoveIt and Gazebo

Week 9
(18) Guest Lecture - Robotic Applications

Week 10
(19) Guest Lecture - Robotic Applications
(20) Robot Project Video Screenings