

ROS - The Robotic Operating System

ME 4140 - Introduction to Robotics - Fall 2019

What is ROS? :

1. *The Robot Operating System (ROS) is 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.* - ROS
2. Software Framework for Robotics Development
3. *not* what you may think when you hear *operating system*

What are the benefits of using ROS? :

1. Hardware/Software Compatibility
2. Multi-threading and Parallel Processing
3. Open Source Community (BSD)
4. Higher Level Robotics Development

Where did ROS come from? :

1. Originally developed at Stanford (mid 2000s)
2. Continued by Willow Garage (2007)
3. Maintained by an international community of open source developers (present)
4. *The ROS ecosystem now consists of tens of thousands of users worldwide, working in domains ranging from table-top hobby projects to large industrial automation systems.*
- ROS

How Does it Work? :

1. ROS is based on a system of connected *nodes*
2. Each node represents a different element in the robotic system
 - Laser
 - Drive Kinematics
 - Navigation
 - Manipulator
 - etc.
3. Each node can have corresponding source code, executables, and data files.
4. Software Languages
 - C++
 - Python
 - *markup languages* such as XML and YAML
5. Nodes communicate or share information in different ways.
 - Topics - *publish* and *subscribe* to specific information.
 - Parameter Server - Static Data
 - Services - RPC - Single Request
6. The parallel processing and message passing is handled by ROS.



Videos:

Turtlebot

Pioneer LX

Aubo Arm