ROS - The Robotic Operating System

ME 4140 - Introduction to Robotics - Fall 2018

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 tabletop 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:

Turlebot

Pinoeer LX

Aubo Arm