Open Source Robotics

17 September 2013

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Open Source Robotics Foundation

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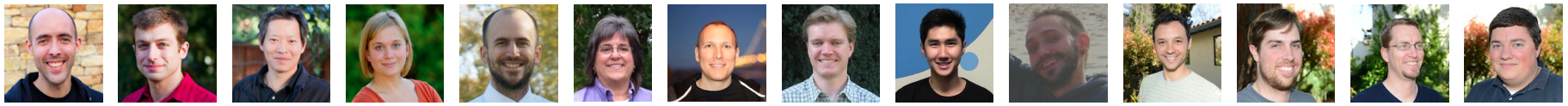
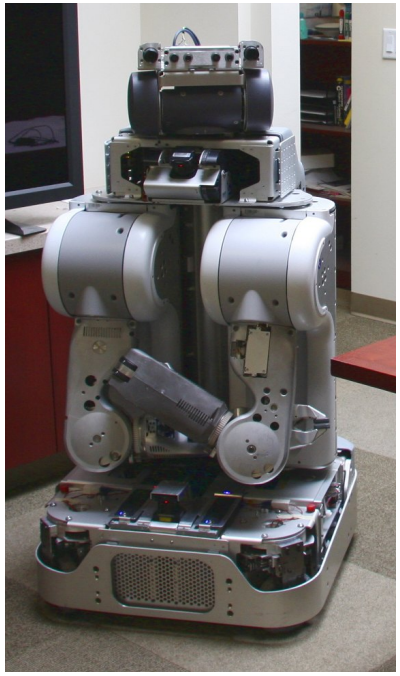
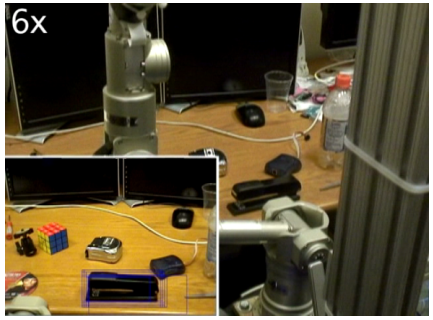


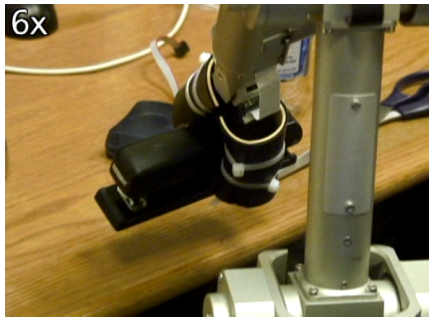
"...to support the development, distribution, and adoption of open source software for use in robotics research, education, and product development."

http://osrfoundation.org

ROS: The Early Days (c.2007)





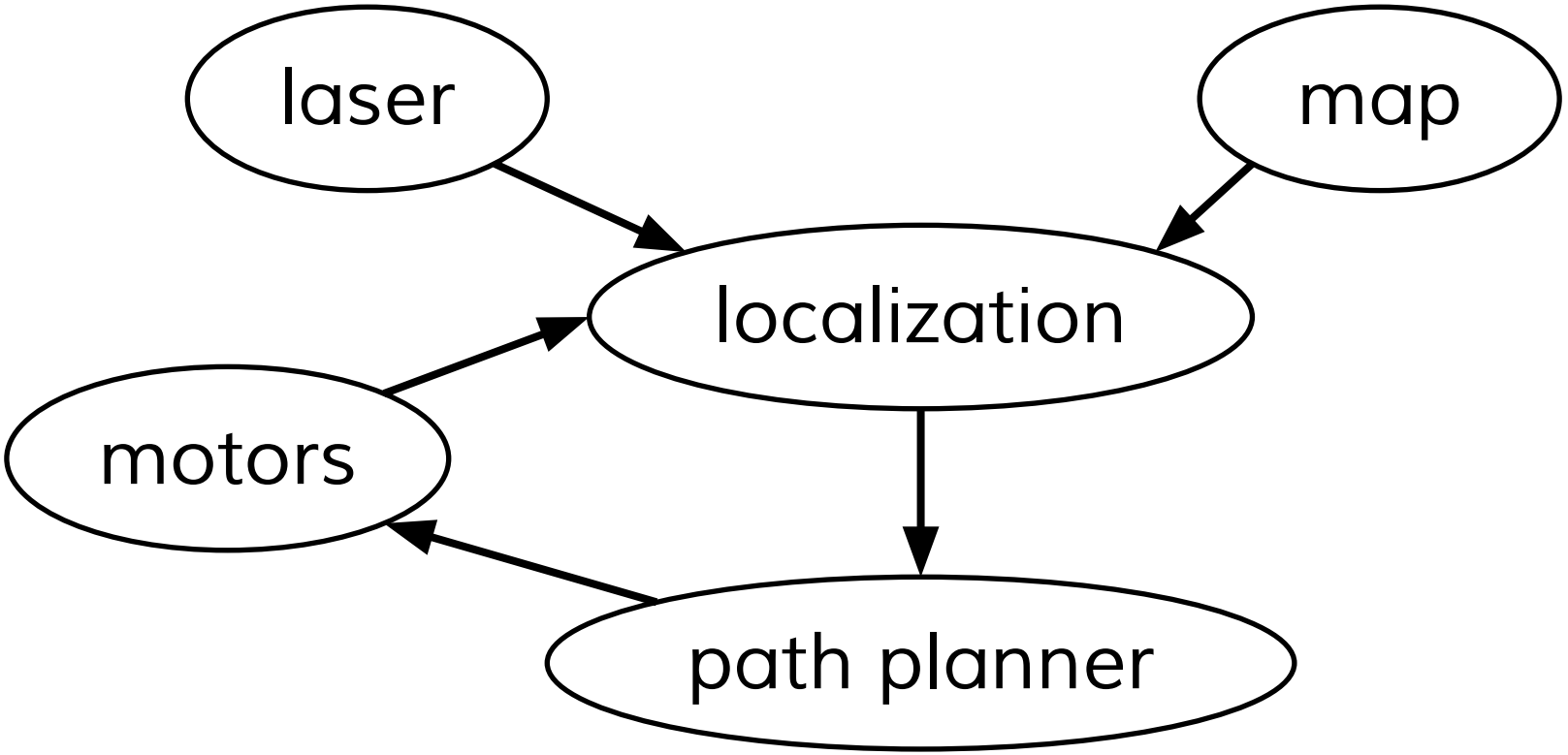


"please fetch the stapler from my office"

Integrative AI = lots of integration work

How can we reduce the pain?

ROS: Dynamic Computation Graphs



bubbles = POSIX processes. **no pre-defined structure.**
start / stop / restart / crash / debug independently
arrows = peer-to-peer message streams
replace any component with your own!
open-source is a starting point for rapid-prototyping

ROS Tools

knowledge base

motion planning

navigation

vision

sensor fusion

hardware drivers

browser plugins

GUIs

logging / playback

speech

plotting

mapping

real-time visualization

embedded bridge

android bridge

task planning

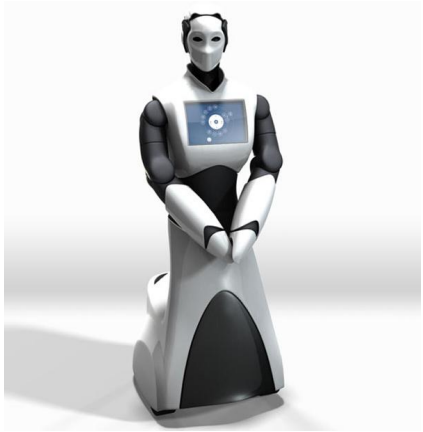
simulation

ROS Tools: Hardware Drivers

- cameras
- depth cameras
- laser scanners
- robots
- audio
- inertial units
- GPS
- joysticks
- etc...

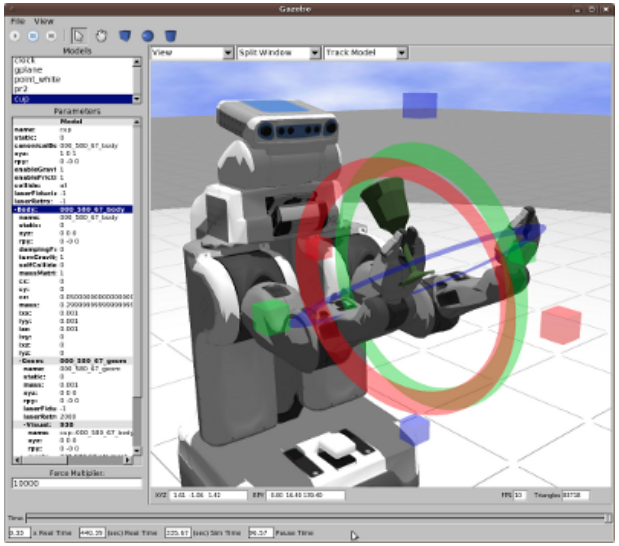
ROS Tools: 2D Navigation

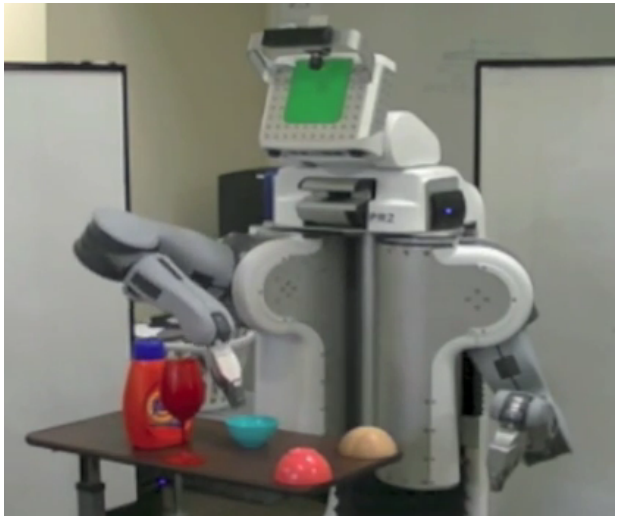
- localization
- path planning
- 3D obstacle avoidance
- mapping (SLAM)



ROS Tools: Motion Planning

- kinematic modeling
- integrated sensing
- constraint generation
- trajectory smoothing
- trajectory following
- GUI plugins



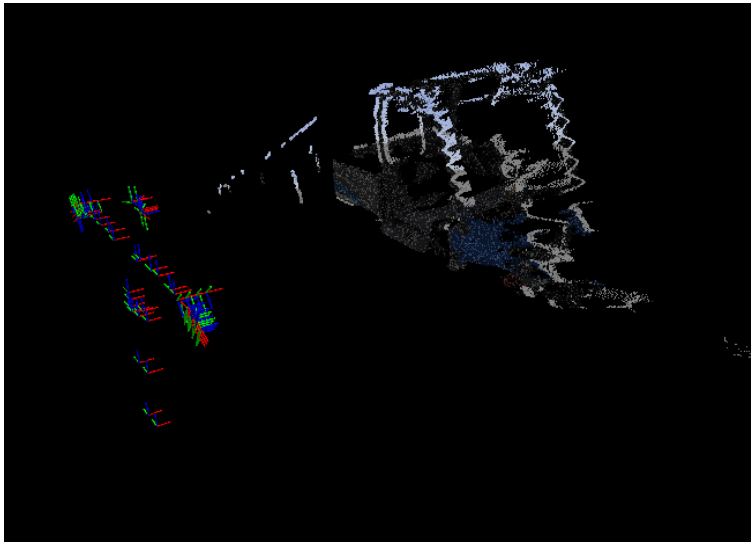


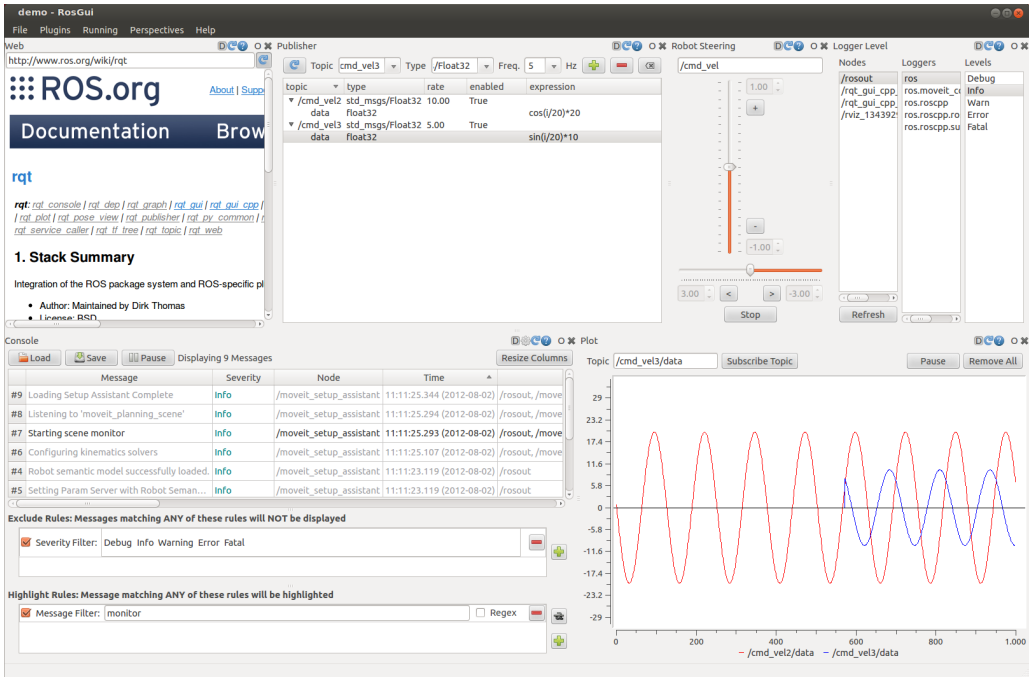
MoveIt!

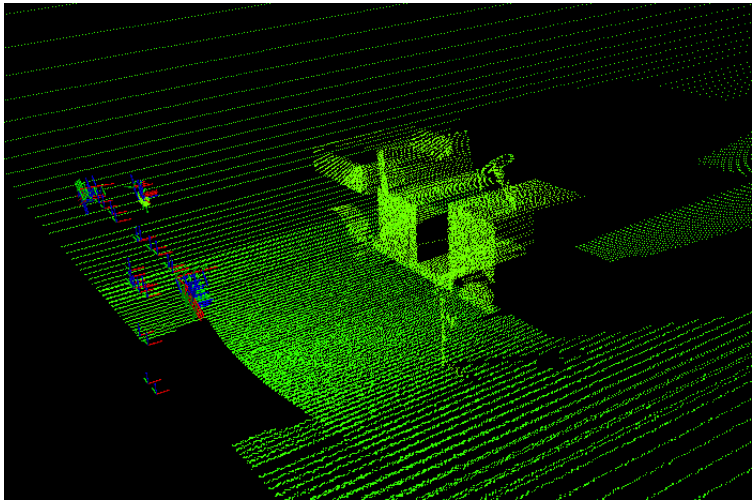
http://moveit.ros.org

ROS Tools: Visualization

- Qt- and plugin-based
- plot common datatypes
- live 3D visualizations

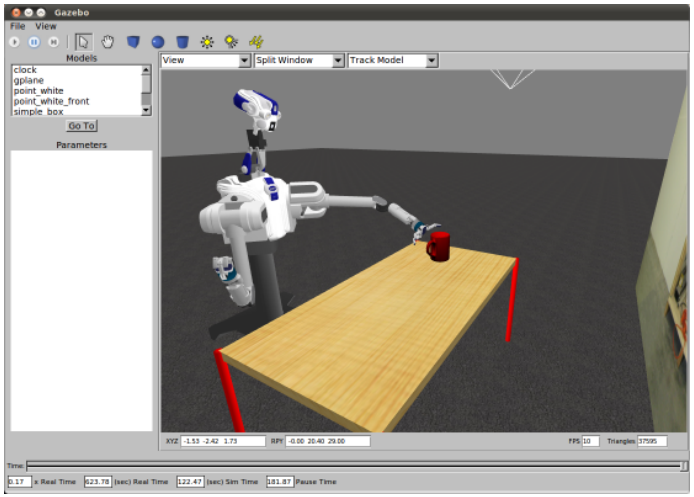


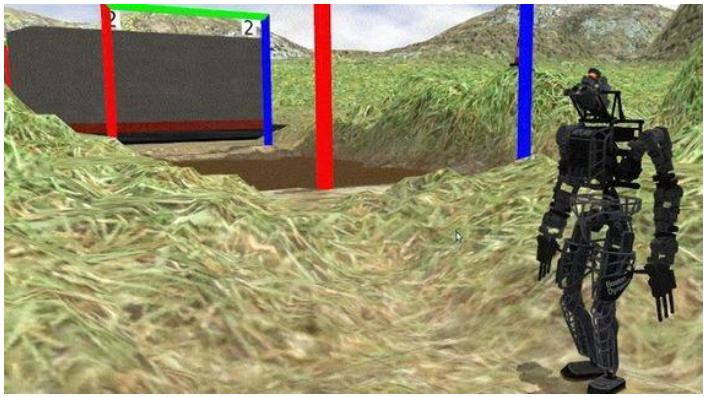


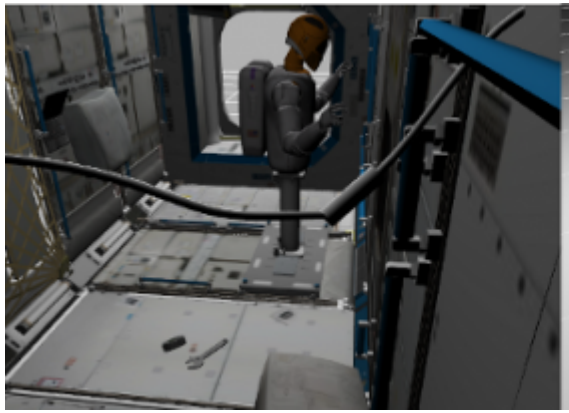


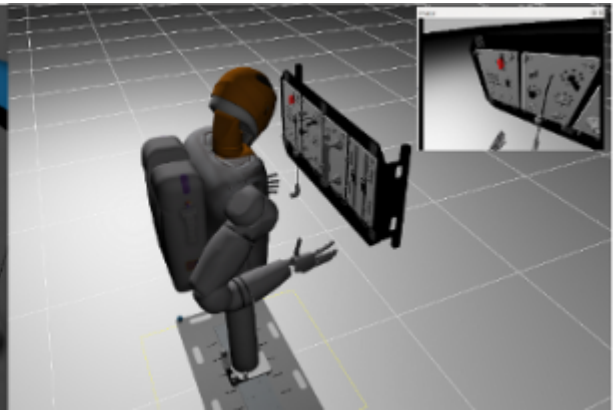
ROS Tools: Simulation

- Gazebo: 3D dynamic
- Stage: 2D navigation, static
- Many more talk to ROS
- Everything downstream can't tell the difference

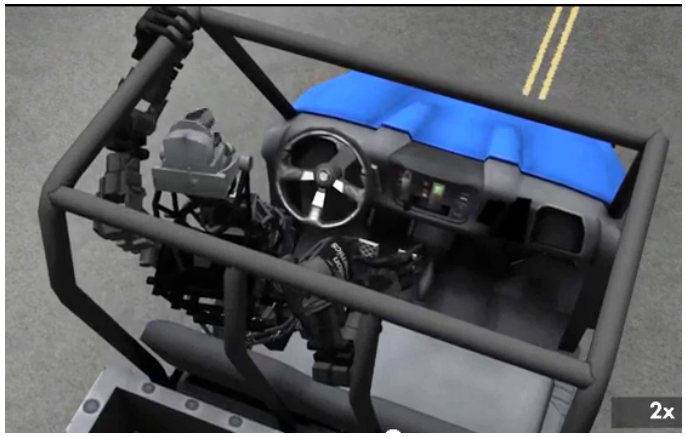


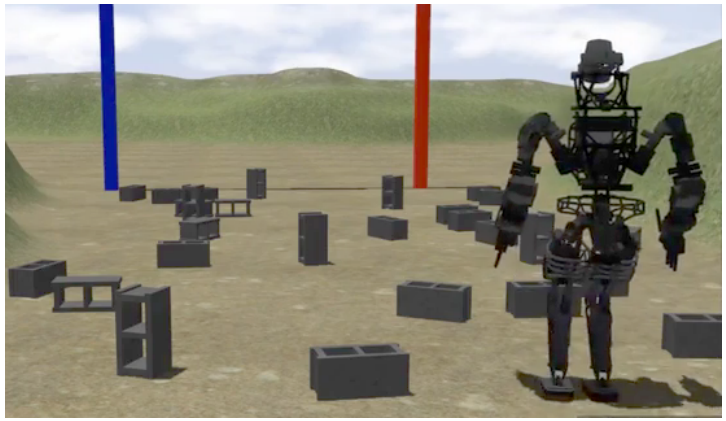


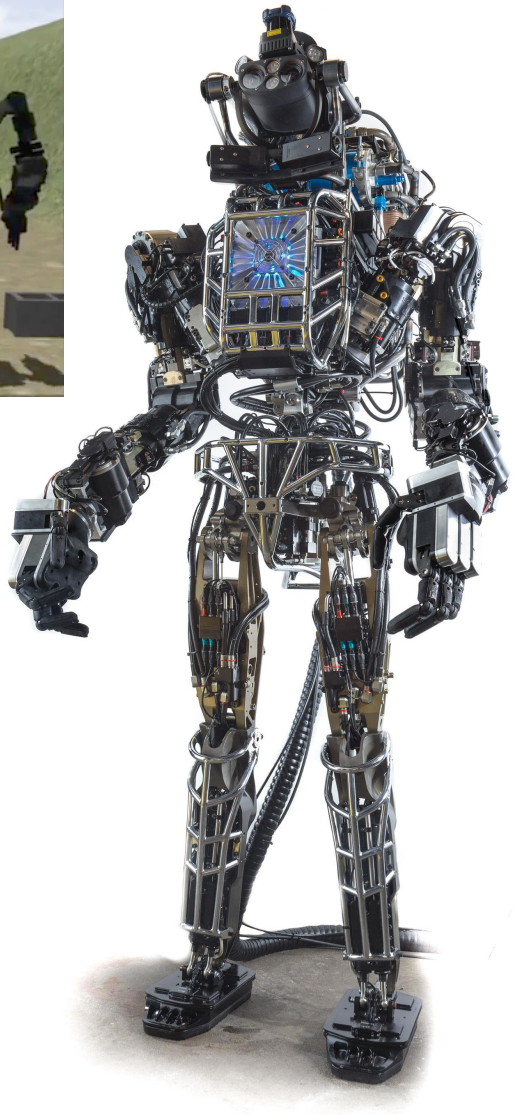


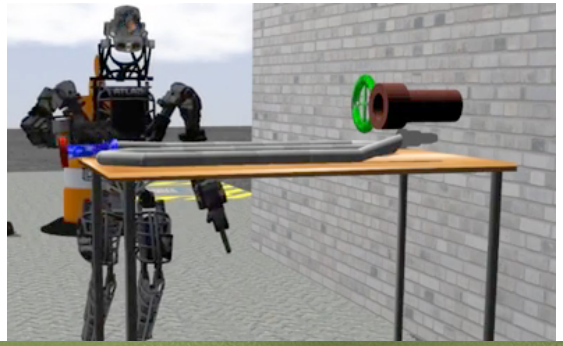


Showcase: DARPA Virtual Robotics Challenge

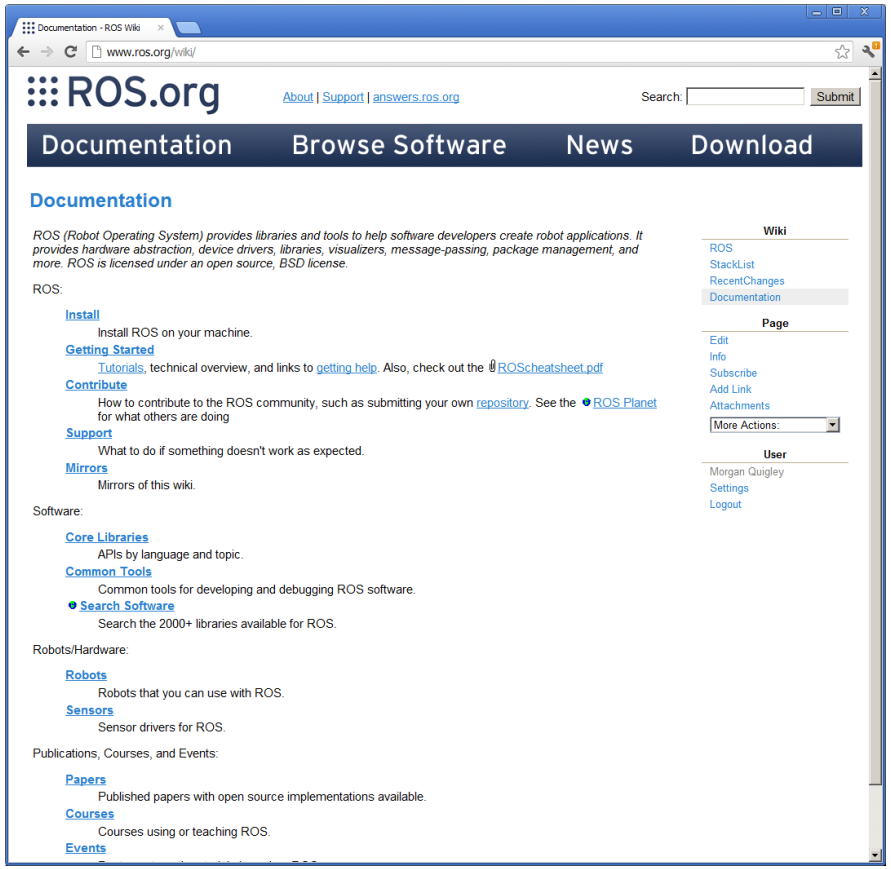








http://ros.org



http://answers.ros.org