VisNav Exercise 01

Introduction to ROS

Dr. Jürgen Sturm

Jakob Engel   Christian Kerl
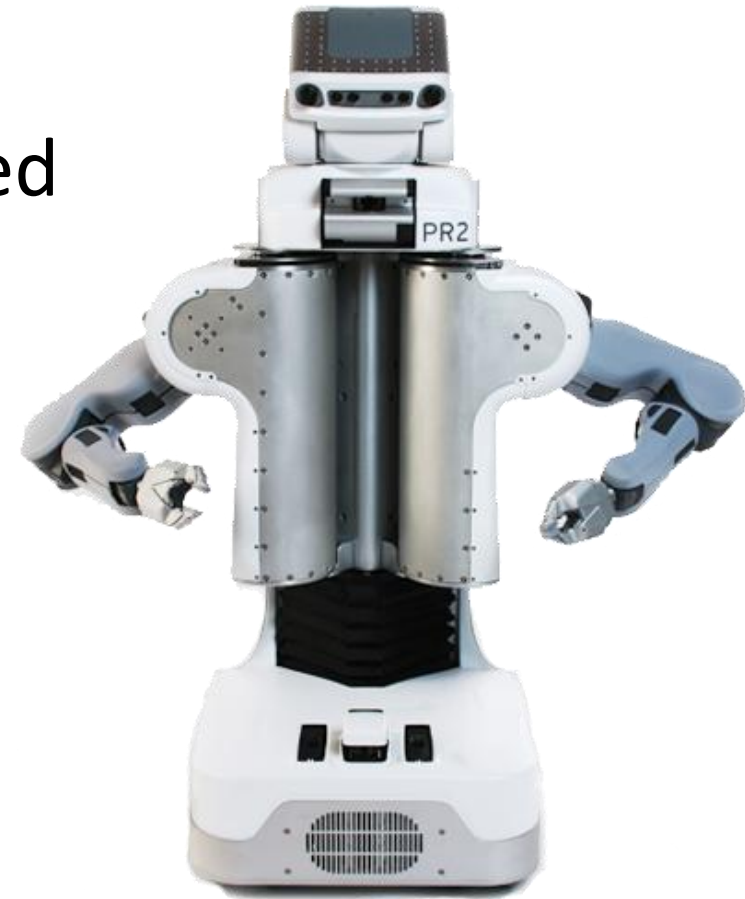
What is ROS?

- **R**obot **O**perating **S**ystem

- Open-Source Middleware for Robotics

- Drivers, Communication, Package System, …

- Supports C++, Python, …

ROS in Numbers

- 175+ organizational/individual contributors

- 90+ types of robots supported

- 3699+ packages

Concepts – Nodes

- Every ROS-enabled program is a node

- Registers with ROS master

- Unique name

Concepts – Master

- Registry for
  - Nodes
  - Topics
  - Services
  - Parameters

- One instance per system

Concepts – Topics

- Message channel between nodes

- Unique name

$$/\text{ardrone}/\text{front}/\text{image\_raw}$$

namespace   name

- Fixed type

```
sensor_msgs/Image
```

Concepts – Topics

- Node sending messages is a **publisher**

- Node receiving messages is a **subscriber**

- Topic has to be **advertised** beforehand

- Multiple publishers/subscribers per topic possible

Concepts – Bags

- Containers to store messages

- Supports recording and playback of messages

- Good for testing, debugging, logging

Tools – roscore

- Starts the ROS master

Tools – rosrun/roslaunch

- Starts a node

$$\text{rosrun} \underbrace{\texttt{ardrone\_autonomy}}_{\text{package}} \underbrace{\texttt{ardrone\_driver}}_{\text{node}}$$

- Important environment variable
  - **$ROS_PACKAGE_PATH**

Tools – rostopic

- **rostopic**
  - **list**   – display available topics
  - **info**   – show details of a topic
  - **hz**   – measure publishing rate
  - **echo**   – print messages

Tools – rosbag+rxbag

- **rosbag**
  - **record**   – create new bag file
  - **play**   – playback a bag
  - **info**   – display details about a bag

- **rxbag** – GUI to view bag files

Tools – rviz

- Visualization tool