VisNav Exercise 01

Introduction to ROS

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What is ROS?

- **Robot** Operating **System**

- 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

```
/ardrone/front/image_raw
```

- 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

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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
  
  rosrun ardrone_autonomy ardrone_driver

- 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