Autonomous Systems

ROS practical session (week of 25.09)

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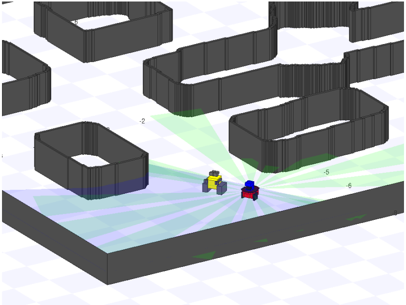
Stage simulator[1]

- Stage is a robot simulator from Richard Vaughan and contributors (1998-2009)
- Simulates a population of mobile robots, sensors and objects in a two-dimensional bitmapped environment



[1] http://playerstage.sourceforge.net/index.php?src=stage

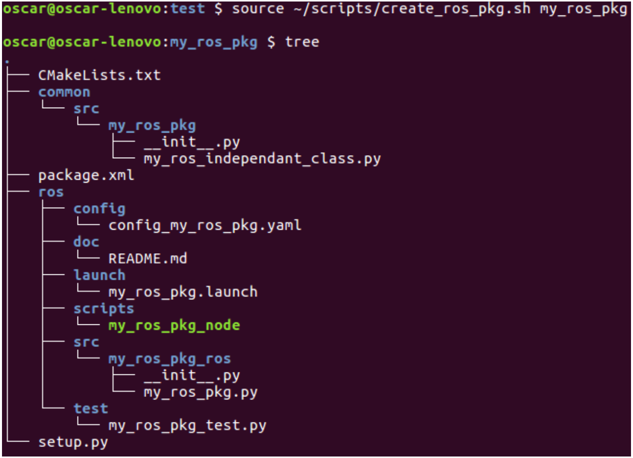
rosbash[2]

- Offers a set of shell commands for using ros with bash (linux terminal)
- Most popular include:
- roscd pkg_name (cd to that pkg easily)
- rosed pkg_name filename (quickly edit a file)
- roscat pkg_name filename (quickly visualize a file in terminal)
- enables tab completion on: roslaunch, rosparam, rosnode, rostopic, rosservice, rosmsg, rossrv, rosbag.

[2] `http://wiki.ros.org/rosbash`

ROS pkg structure[3]

- ROS packages tend to follow a common structure
- For python code it will look like this:



```
oscar@oscar-lenovo:test $ source ~/scripts/create_ros_pkg.sh my_ros_pkg

oscar@oscar-lenovo:my_ros_pkg $ tree

.
├── CMakeLists.txt
├── common
│   └── src
│       └── my_ros_pkg
│           ├── __init__.py
│           └── my_ros_independant_class.py
├── package.xml
├── ros
│   ├── config
│   │   └── config_my_ros_pkg.yaml
│   ├── doc
│   │   └── README.md
│   ├── launch
│   │   └── my_ros_pkg.launch
│   ├── scripts
│   │   └── my_ros_pkg_node
│   ├── src
│   │   └── my_ros_pkg_ros
│   │       ├── __init__.py
│   │       └── my_ros_pkg.py
│   └── test
│       └── my_ros_pkg_test.py
└── setup.py
```

[3] http://wiki.ros.org/Packages

Rviz[4]

- Powerful tool for topic visualization
- Useful for debugging
- launch using : rosrun rviz rviz (a roscore must be running)
- Can publish some topics (2D pose estimate, 2D nav goal, Point)
- Is recommended to comply with ROS standard topics to enable topic visualization

`https://www.youtube.com/watch?v=i--Sd4xH9ZE`

[4] `http://wiki.ros.org/rviz`

rostopic[5]

- Displays information about ROS topics
- Most useful:
- rostopic list (get a list of active topics)
- rostopic echo topic_name
- rostopic info topic_name (get topic type, publishers and subscribers)
- rostopic pub topic_name topic_type msg_press_tab! (publish a topic from console), options:
  - no args (latched)
  - -r float_number (at a certain rate)
  - - -once (latch for 3 secs, then dies)
- rostopic hz topic_name (get the publish frequency rate)

[5] http://wiki.ros.org/rostopic

rosrun[6]

- Part of rosbash suite
- requires a roscore running on your system
- Usage: rosrun pkg_name executable_name
- It will run ONLY executable files
- About files being executable (important!)
  - make sure your python nodes (i.e. my_python_node.py) are executable
  - check by doing: ls -l , if it has an x is executable (i.e. -rwxr–r–)
  - alternatively, if your terminal has colors, the file shows green when doing ls
  - rosrun will also look for your compiled c++ executables (under devel/lib/pkg_name)
- i.e. rosrun roscpp_tutorials talker

[6] http://wiki.ros.org/rosbash#rosrun

parameter server[7]

- Is a shared, multi-variate dictionary that is accessible via network API
- Nodes can use this server to store or retrieve parameters during runtime
- Is not high performance
- Globally viewable
- Usage from terminal: rosparam set param_name param_value, rosparam get param_name
- Usage from python api: rospy.set_param(param_name, param_value), rospy.get_param("param_name")
- Demo, set and get parameters

[7] http://wiki.ros.org/Parameter%20Server

roslaunch[8]

- A tool for easily launching multiple ROS nodes
- Implemented to be used with XML syntax
- Allows to set parameters in param server
- Can run other launch files inside launch files
- Run syntax: roslaunch pkg_name my_file.launch
- By default runs a roscore if no one is found (not recommended, always run a separate roscore)
- Usage: include $<?xmlversion = "1.0"? >$ at the top of your launchfile
- Create a launch file from scratch (demo)

[8] http://wiki.ros.org/roslaunch

Thank you!
Questions? :)

If you have a question please create a Github issue so that we can all benefit from the posted answers under:

`https://github.com/socrob/autonomous_systems/issues`