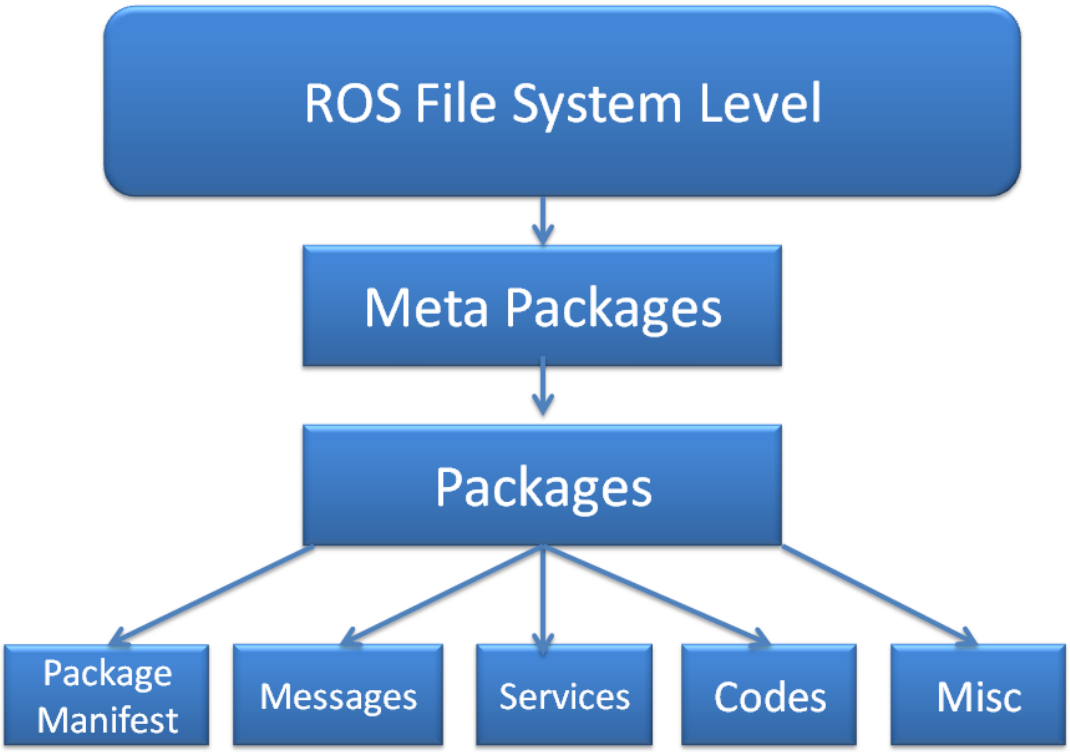
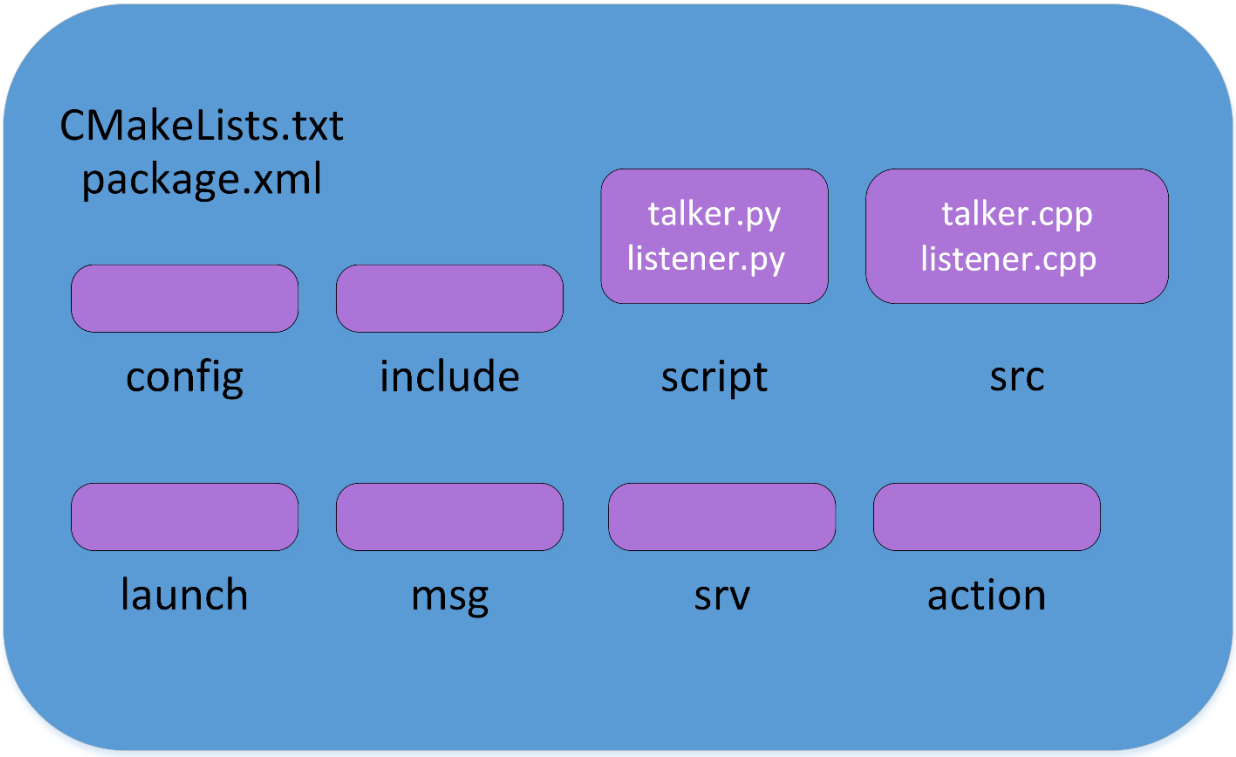
Chapter 1: Introduction to ROS

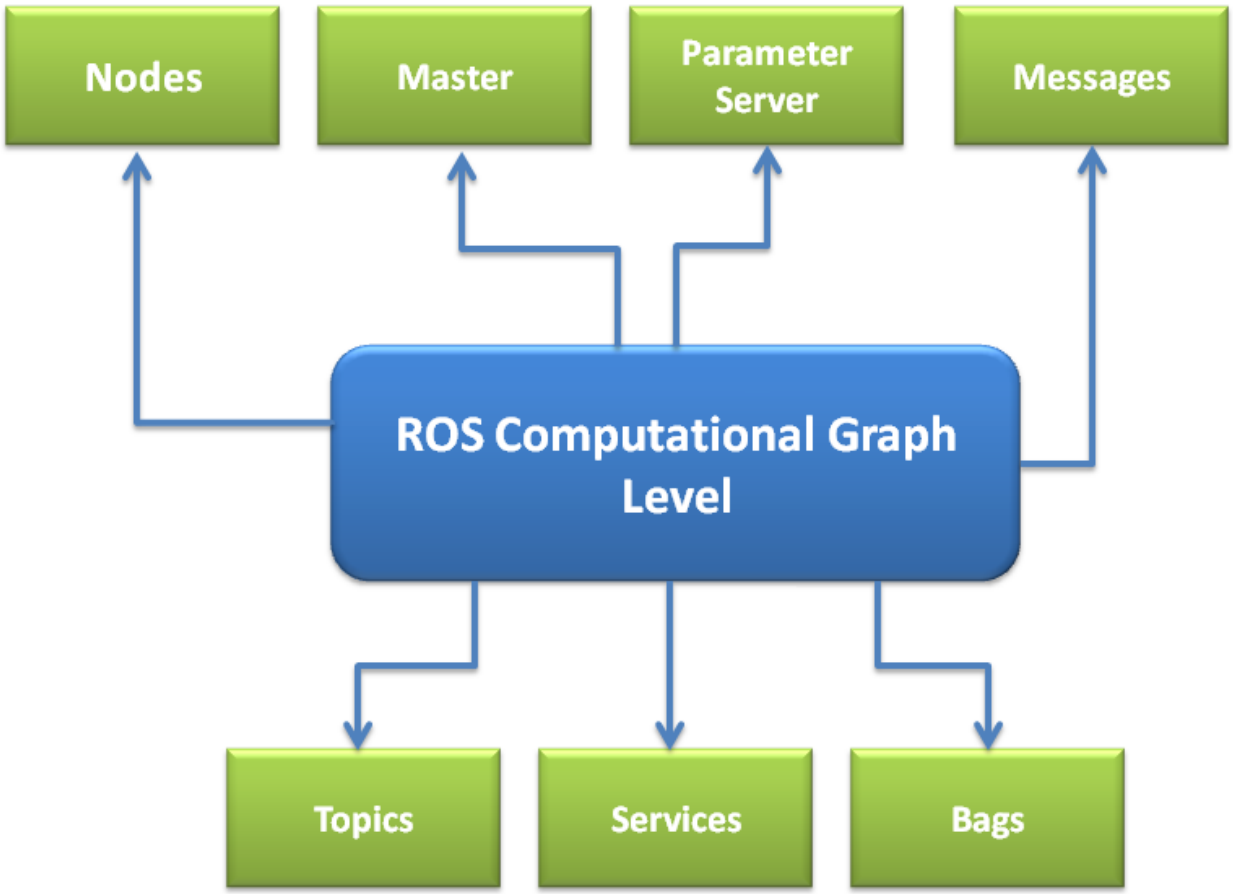


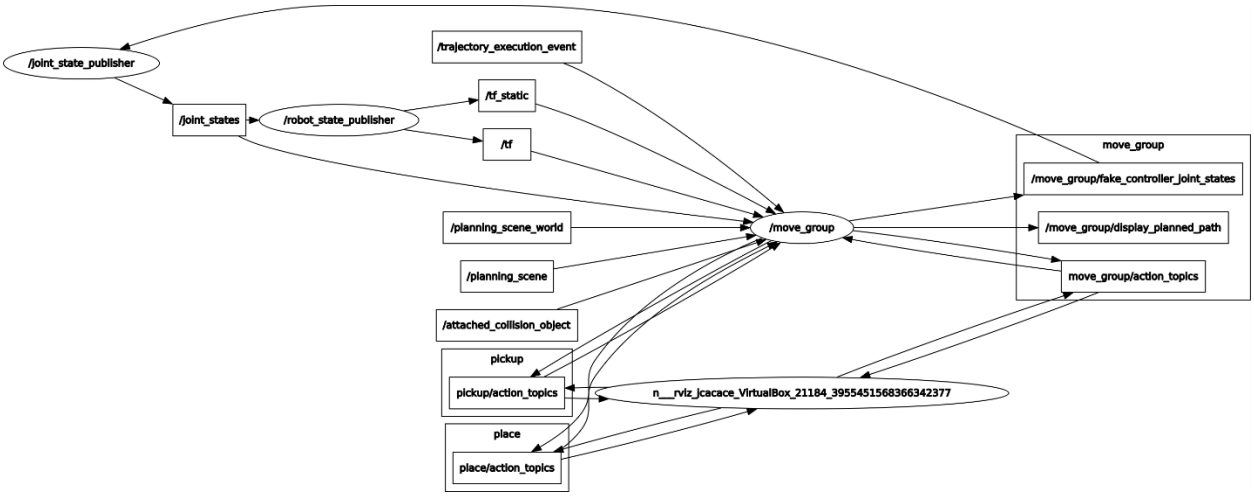
```
ros_pkg
├── action
│   └── demo.action
├── CMakeLists.txt
├── include
│   └── ros_pkg
│       └── demo.h
├── msg
│   └── message.msg
├── src
│   └── demo.cpp
└── srv
    └── service.srv
```

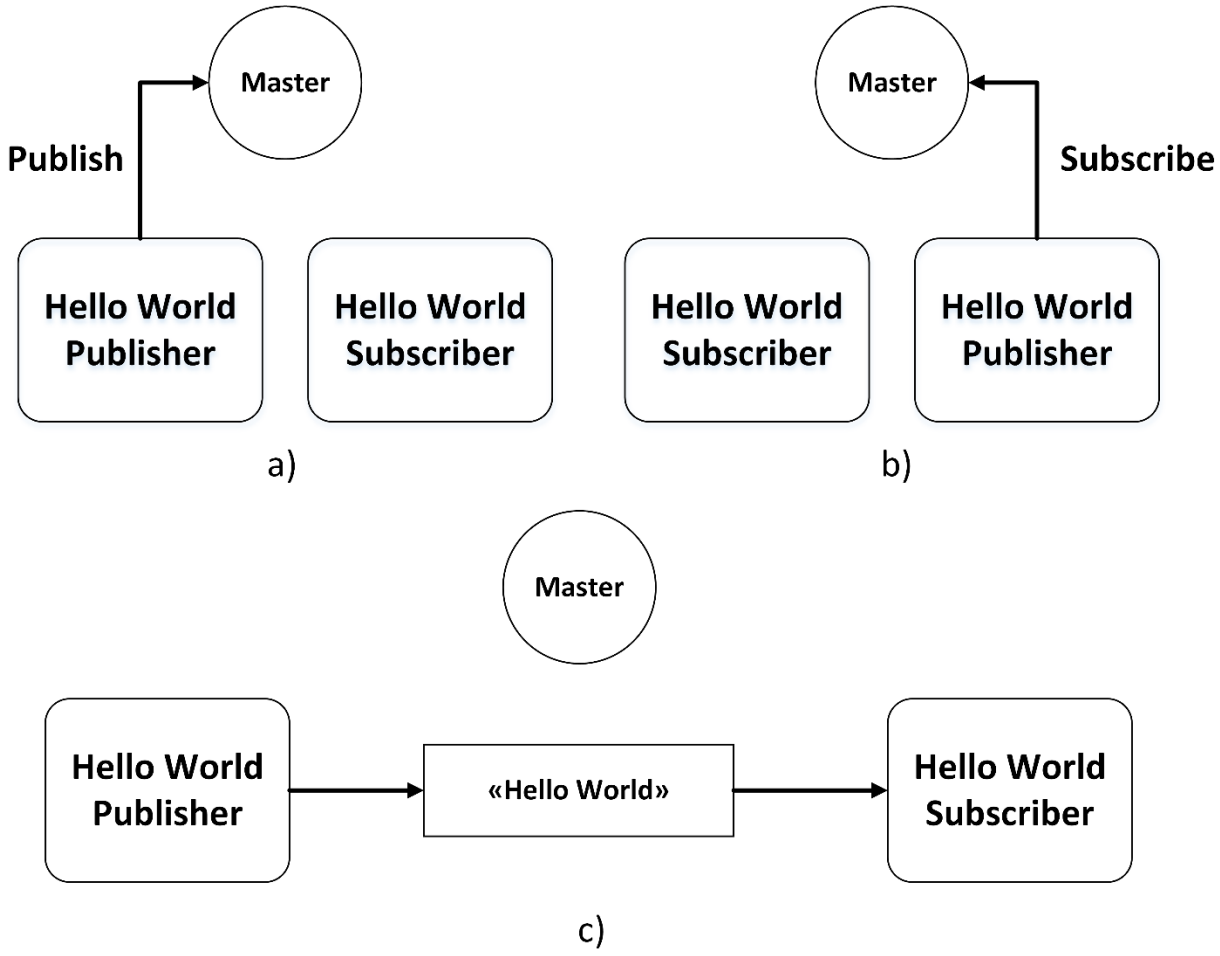


```xml
<?xml version="1.0"?>
<package>
  <name>hello_world</name>
  <version>0.0.1</version>
  <description>The hello_world package</description>
  <maintainer email="jonathan.cacace@gmail.com">Jonathan Cacace</maintainer>

  <buildtool_depend>catkin</buildtool_depend>
  <build_depend>roscpp</build_depend>
  <build_depend>rospy</build_depend>
  <build_depend>std_msgs</build_depend>

  <run_depend>roscpp</run_depend>
  <run_depend>rospy</run_depend>
  <run_depend>std_msgs</run_depend>

  <export>
  </export>
</package>
```

```xml
<?xml version="1.0"?>
<package>
    <name>navigation</name>
    <version>1.14.0</version>
    <description>
        A 2D navigation stack that takes in information from odometry, sensor
        streams, and a goal pose and outputs safe velocity commands that are sent
        to a mobile base.
    </description>
    ...
    <url>http://wiki.ros.org/navigation</url>
    ...
    <buildtool_depend>catkin</buildtool_depend>

    <run_depend>amcl</run_depend>
    ...
    <export>
        <metapackage/>
    </export>
</package>
```


Nodes
Master
Parameter Server
Messages
ROS Computational Graph Level
Topics
Services
Bags


/joint_state_publisher
/trajectory_execution_event
/joint_states
/robot_state_publisher
/tf_static
/tf
move_group
/move_group/fake_controller_joint_states
/planning_scene_world
/move_group
/move_group/display_planned_path
/planning_scene
move_group/action_topics
/attached_collision_object
pickup
pickup/action_topics
n__rviz_jcacace_VirtualBox_21184_3955451568366342377
place
place/action_topics




```
... logging to /home/jcacace/.ros/log/d0cdf7da-6667-11e7-a0a0-0800278bc65c/roslaunch-robot-31486.log
Checking log directory for disk usage. This may take awhile.                                        1
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

started roslaunch server http://robot:35683/
ros_comm version 1.12.7                                                                             2


SUMMARY
========

PARAMETERS
 * /rosdistro: kinetic
 * /rosversion: 1.12.7                                                                              3

NODES

auto-starting new master
process[master]: started with pid [31498]
ROS_MASTER_URI=http://robot:11311/                                                                  4

setting /run_id to d0cdf7da-6667-11e7-a0a0-0800278bc65c
process[rosout-1]: started with pid [31511]
started core service [/rosout]                                                                      5
```

Chapter 2: Getting Started with ROS Programming

```
Created file mastering_ros_v2_pkg/package.xml
Created file mastering_ros_v2_pkg/CMakeLists.txt
Created folder mastering_ros_v2_pkg/include/mastering_ros_v2_pkg
Created folder mastering_ros_v2_pkg/src
Successfully created files in /home/jcacace/mastering_ros_v2_pkg. Pleas
e adjust the values in package.xml.
```

```
jcacace@robot:~$ rosrun mastering_ros_demo_pkg demo_topic_pub
lisher
[ INFO] [1500276155.757008571]: 0
[ INFO] [1500276155.857052842]: 1
[ INFO] [1500276155.957062454]: 2
[ INFO] [1500276156.057095824]: 3
[ INFO] [1500276156.157087268]: 4
[ INFO] [1500276156.257505796]: 5
[ INFO] [1500276156.357532737]: 6
```

```
jcacace@robot:~$ rosrun mastering_ros_demo_pkg demo_topic_sub
scriber
[ INFO] [1500276156.057591945]: Recieved  [3]
[ INFO] [1500276156.157553762]: Recieved  [4]
[ INFO] [1500276156.257991575]: Recieved  [5]
[ INFO] [1500276156.358034728]: Recieved  [6]
[ INFO] [1500276156.457377162]: Recieved  [7]
[ INFO] [1500276156.557647552]: Recieved  [8]
[ INFO] [1500276156.658285212]: Recieved  [9]
```

```
jcacace@robot:~$ rosrun mastering_ros_demo_pkg demo_msg_publisher
[ INFO] [1500276387.166778705]: 0
[ INFO] [1500276387.166861438]: hello world
[ INFO] [1500276387.267694471]: 1
[ INFO] [1500276387.267855187]: hello world
[ INFO] [1500276387.368803935]: 2
[ INFO] [1500276387.368898128]: hello world
[ INFO] [1500276387.466853659]: 3
[ INFO] [1500276387.466933039]: hello world
```

```
jcacace@robot:~$ rosrun mastering_ros_demo_pkg demo_msg_subscriber
[ INFO] [1500276387.467496520]: Recieved  greeting [hello world ]
[ INFO] [1500276387.467579254]: Recieved  [3]
[ INFO] [1500276387.567331442]: Recieved  greeting [hello world ]
[ INFO] [1500276387.567382312]: Recieved  [4]
[ INFO] [1500276387.668345874]: Recieved  greeting [hello world ]
[ INFO] [1500276387.668564167]: Recieved  [5]
[ INFO] [1500276387.768672445]: Recieved  greeting [hello world ]
[ INFO] [1500276387.768753221]: Recieved  [6]
```

```
jcacace@robot:~/catkin_ws$ rosrun mastering_ros_demo_pkg demo_service_server
[ INFO] [1499857954.849054844]: Ready to receive from client.
[ INFO] [1499857956.626780527]: From Client  [Sending from Here], Server says [Received  Here]
[ INFO] [1499857956.727500536]: From Client  [Sending from Here], Server says [Received  Here]
[ INFO] [1499857956.827664441]: From Client  [Sending from Here], Server says [Received  Here]
[ INFO] [1499857956.933545057]: From Client  [Sending from Here], Server says [Received  Here]
[ INFO] [1499857957.027340860]: From Client  [Sending from Here], Server says [Received  Here]
[ INFO] [1499857957.127714980]: From Client  [Sending from Here], Server says [Received  Here]
[ INFO] [1499857957.227157798]: From Client  [Sending from Here], Server says [Received  Here]
[ INFO] [1499857957.328243221]: From Client  [Sending from Here], Server says [Received  Here]
[ INFO] [1499857957.427351564]: From Client  [Sending from Here], Server says [Received  Here]
[ INFO] [1499857957.527108113]: From Client  [Sending from Here], Server says [Received  Here]
```

```
jcacace@robot:~$ rosrun mastering_ros_demo_pkg demo_service_client
[ INFO] [1499857956.627200681]: From Client  [Sending from Here], Server says [Received  Here]
[ INFO] [1499857956.727860599]: From Client  [Sending from Here], Server says [Received  Here]
[ INFO] [1499857956.828064716]: From Client  [Sending from Here], Server says [Received  Here]
[ INFO] [1499857956.934237703]: From Client  [Sending from Here], Server says [Received  Here]
[ INFO] [1499857957.027558745]: From Client  [Sending from Here], Server says [Received  Here]
[ INFO] [1499857957.127958080]: From Client  [Sending from Here], Server says [Received  Here]
[ INFO] [1499857957.227397212]: From Client  [Sending from Here], Server says [Received  Here]
[ INFO] [1499857957.328513872]: From Client  [Sending from Here], Server says [Received  Here]
[ INFO] [1499857957.427616100]: From Client  [Sending from Here], Server says [Received  Here]
```

```
jcacace@robot:~/catkin_ws$ rosrun mastering_ros_demo_pkg demo_action_client 10 1
[ INFO] [1499861037.958432848]: Waiting for action server to start.
[ INFO] [1499861038.206812461]: Action server started, sending goal.
[ INFO] [1499861038.207104961]: Sending Goal [10] and Preempt time of [1]
[ INFO] [1499861039.209897255]: Action did not finish before the time out.
jcacace@robot:~/catkin_ws$
```

jcacace@robot: ~

```
jcacace@robot:~$ rosrun mastering_ros_demo_pkg demo_action_server
[ INFO] [1499861036.234953391]: Starting Demo Action Server
[ INFO] [1499861038.209617808]: /demo_action is processing the goal 10
[ INFO] [1499861038.209949156]: Setting to goal 0 / 10
[ INFO] [1499861038.413934495]: Setting to goal 1 / 10
[ INFO] [1499861038.609803856]: Setting to goal 2 / 10
[ INFO] [1499861038.809718825]: Setting to goal 3 / 10
[ INFO] [1499861039.009985643]: Setting to goal 4 / 10
[ INFO] [1499861039.210416071]: Setting to goal 5 / 10
[ WARN] [1499861039.210567039]: /demo_action got preempted!
```

```
started roslaunch server http://robot:34091/

SUMMARY
========

PARAMETERS
 * /rosdistro: kinetic
 * /rosversion: 1.12.7

NODES
  /
    publisher_node (mastering_ros_demo_pkg/demo_topic_publisher)
    subscriber_node (mastering_ros_demo_pkg/demo_topic_subscriber)

auto-starting new master
process[master]: started with pid [10348]
ROS_MASTER_URI=http://localhost:11311
```

rqt_console__Console - rqt

Console

Displaying 1552 messages

Fit Columns

#	Message	Severity	Node	Stamp	Topics	Location
#1552	Recieved [878]	Info	/subscriber_node	12:12:37.961994162 (2015-10-17)	/rosout	/home/robot/mastering_robotics_ws/..
#1551	878	Info	/publisher_node	12:12:37.961201394 (2015-10-17)	/numbers, /rosout	/home/robot/mastering_robotics_ws/..
#1550	Recieved [877]	Info	/subscriber_node	12:12:37.862119736 (2015-10-17)	/rosout	/home/robot/mastering_robotics_ws/..

```
ROS Distro index file associate with commit '43659b6409dcb545fd3d25c6d977f195cdf
f886a'
New ROS Distro index url: 'https://raw.githubusercontent.com/ros/rosdistro/43659
b6409dcb545fd3d25c6d977f195cdff886a/index.yaml'
Specified repository 'mastering_ros_demo_pkg' is not in the distribution file lo
cated at 'https://raw.githubusercontent.com/ros/rosdistro/43659b6409dcb545fd3d25
c6d977f195cdff886a/kinetic/distribution.yaml'
Could not determine release repository url for repository 'mastering_ros_demo_pk
g' of distro 'kinetic'
You can continue the release process by manually specifying the location of the
RELEASE repository.
To be clear this is the url of the RELEASE repository not the upstream repositor
y.
For release repositories on GitHub, you should provide the `https://` url which
should end in `.git`.
Here is the url for a typical release repository on GitHub: https://github.com/r
os-gbp/rviz-release.git
==> Looking for a release of this repository in a different distribution...
A previous distribution, 'indigo', released this repository.
Release repository url [https://github.com/qboticslabs/demo_pkg-release.git]: ht
tps://github.com/jocacace/demo_pkg-release.git
```

```
Given track 'kinetic' does not exist in release repository.
Available tracks: []
Create a new track called 'kinetic' now [Y/n]? Y
Creating track 'kinetic'...
Repository Name:
  upstream
    Default value, leave this as upstream if you are unsure
  <name>
    Name of the repository (used in the archive name)
  ['upstream']: mastering_ros_demo_pkg
Upstream Repository URI:
  <uri>
    Any valid URI. This variable can be templated, for example an svn url
    can be templated as such: "https://svn.foo.com/foo/tags/foo-:{version}"
    where the :{version} token will be replaced with the version for this releas
e.
  [None]: https://github.com/jocacace/mastering_ros_demo_pkg.git
```

```
==> Pulling latest rosdistro branch
remote: Counting objects: 99872, done.
remote: Compressing objects: 100% (38/38), done.
remote: Total 99872 (delta 35), reused 48 (delta 20), pack-reused 99809
Receiving objects: 100% (99872/99872), 29.62 MiB | 4.71 MiB/s, done.
Resolving deltas: 100% (64655/64655), done.
From https://github.com/ros/rosdistro
 * branch            master     -> FETCH_HEAD
==> git reset --hard 43659b6409dcb545fd3d25c6d977f195cdff886a
HEAD is now at 43659b6 Merge pull request #15521 from trainman419/bloom-diagnost
ics-32
==> Writing new distribution file: kinetic/distribution.yaml
==> git add kinetic/distribution.yaml
==> git commit -m "mastering_ros_demo_pkg: 0.0.3-0 in 'kinetic/distribution.yaml
' [bloom]"
[bloom-mastering_ros_demo_pkg-0 763d941] mastering_ros_demo_pkg: 0.0.3-0 in 'kin
etic/distribution.yaml' [bloom]
 1 file changed, 6 insertions(+)
==> Pushing changes to fork
Counting objects: 4, done.
Delta compression using up to 2 threads.
Compressing objects: 100% (3/3), done.
Writing objects: 100% (4/4), 458 bytes | 0 bytes/s, done.
Total 4 (delta 2), reused 0 (delta 0)
remote: Resolving deltas: 100% (2/2), completed with 2 local objects.
To https://7454b673dc9f5564070690111b8f170187884d73:x-oauth-basic@github.com/joc
acace/rosdistro.git
 * [new branch]      bloom-mastering_ros_demo_pkg-0 -> bloom-mastering_ros_demo_
pkg-0
<== Pull request opened at: https://github.com/ros/rosdistro/pull/15526
```

6 ■■■■■ kinetic/distribution.yaml

```
@@ -3531,6 +3531,12 @@ repositories:
        release: release/kinetic/{package}/{version}
      url: https://github.com/MarvelmindRobotics/marvelmind_nav-release.git
      version: 1.0.6-0
+ mastering_ros_demo_pkg:
+   release:
+     tags:
+       release: release/kinetic/{package}/{version}
+     url: https://github.com/jocacace/mastering_ros_demo_pkg.git
+     version: 0.0.3-0
  mav_comm:
    release:
      packages:
```

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Documentation

ROS (Robot Operating System) provides libraries and tools to help software developers create robot applications. It provides hardware abstraction, device drivers, libraries, visualizers, message-passing, package management, and more. ROS is licensed under an open source, BSD license.

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ROS:

Install
Install ROS on your machine.

Getting Started
Learn about various concepts, client libraries, and technical overview of ROS.

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Step-by-step instructions for learning ROS hands-on

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Info
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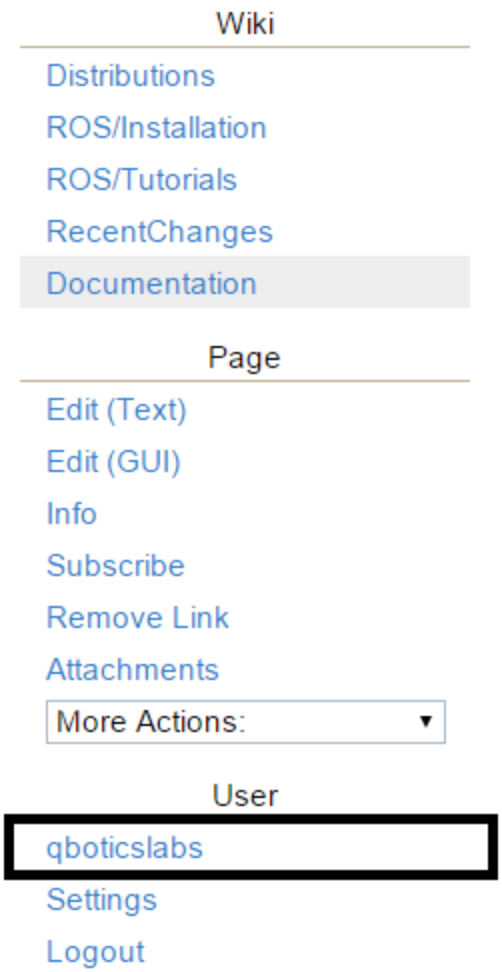


Thank you for your changes. Your attention to detail is appreciated.

Clear message

Mastering Robotics using ROS

Package Summary

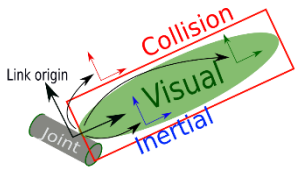
A demo package which has example codes demonstrating topic, service, custom messages and actionlib

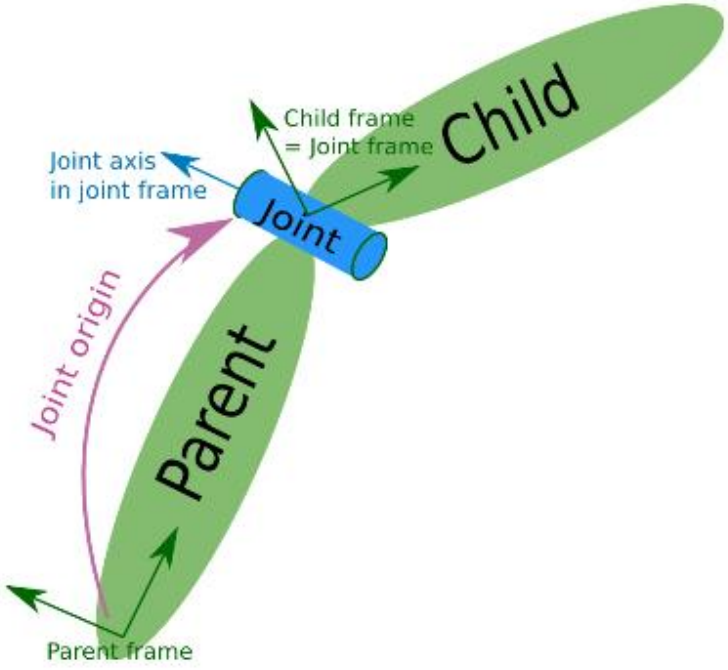
- Maintainer: Lentin Joseph <qboticslabsAT gmail DOT com>
- Author : Lentin Joseph < qboticslabs AT gmail DOT com>
- License : BSD
- Source : git https://github.com/qboticslabs/mastering_ros_demo_pkg.git

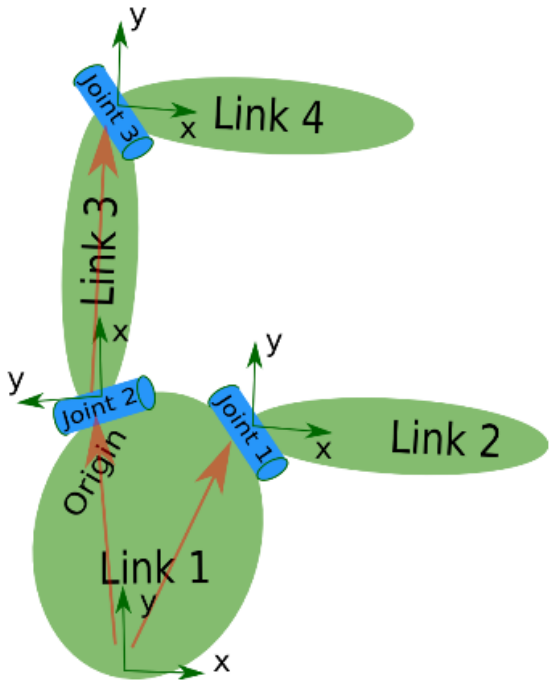
1. Installation

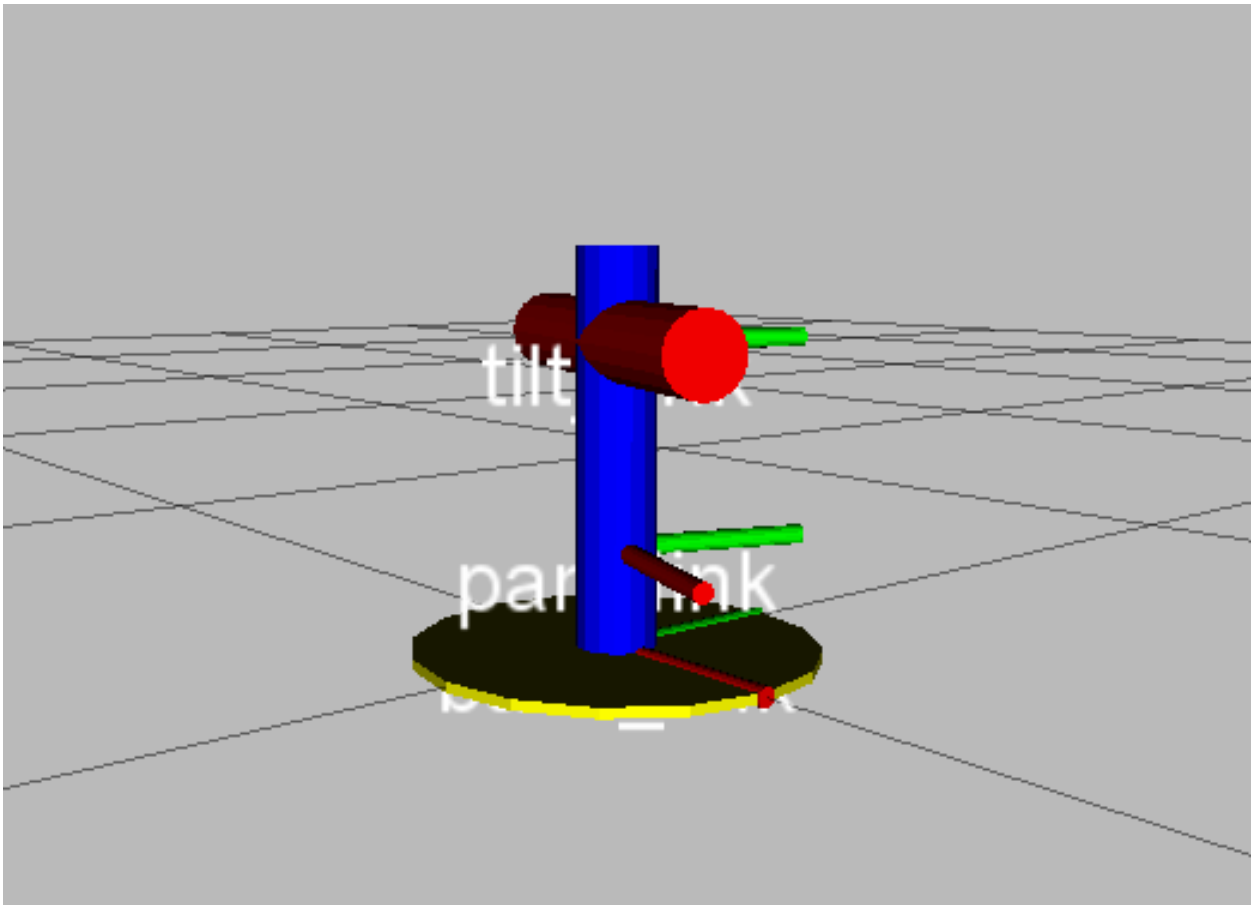
You can use git clone to install package.

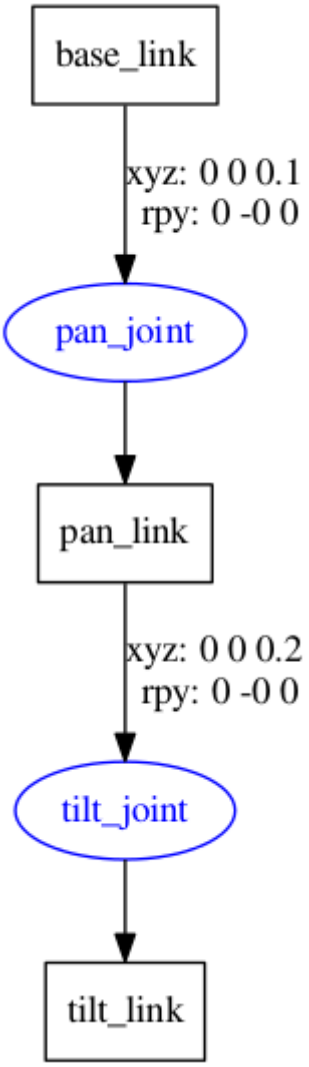
Chapter 3: Working with 3D Robot Modeling in ROS

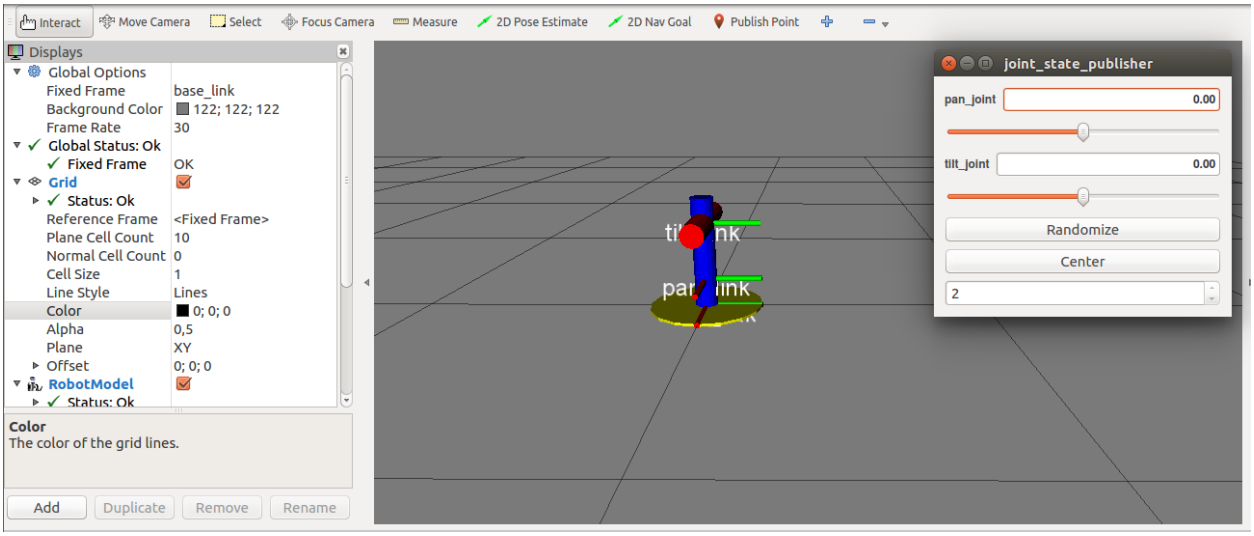


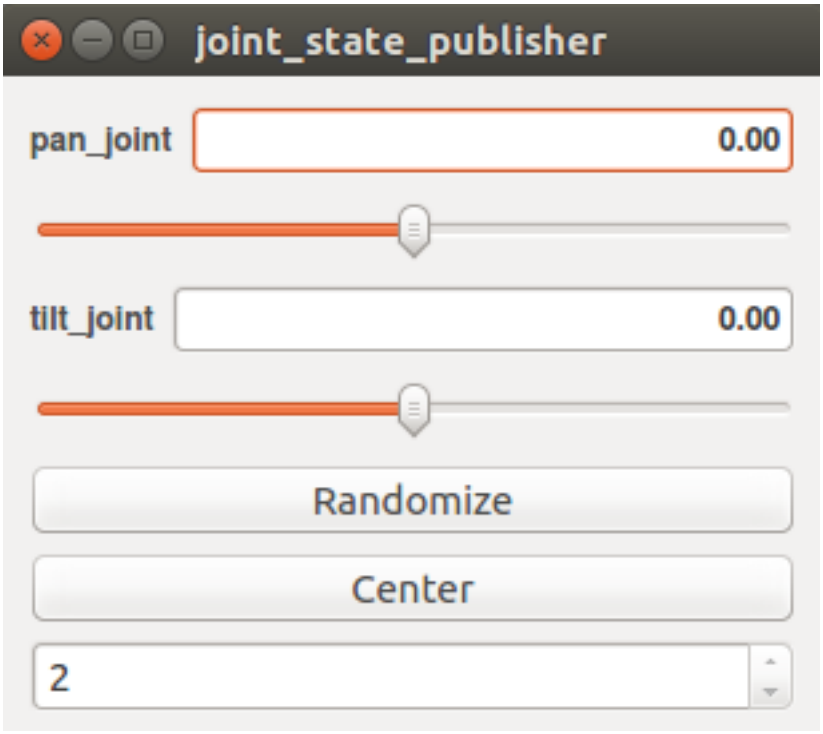


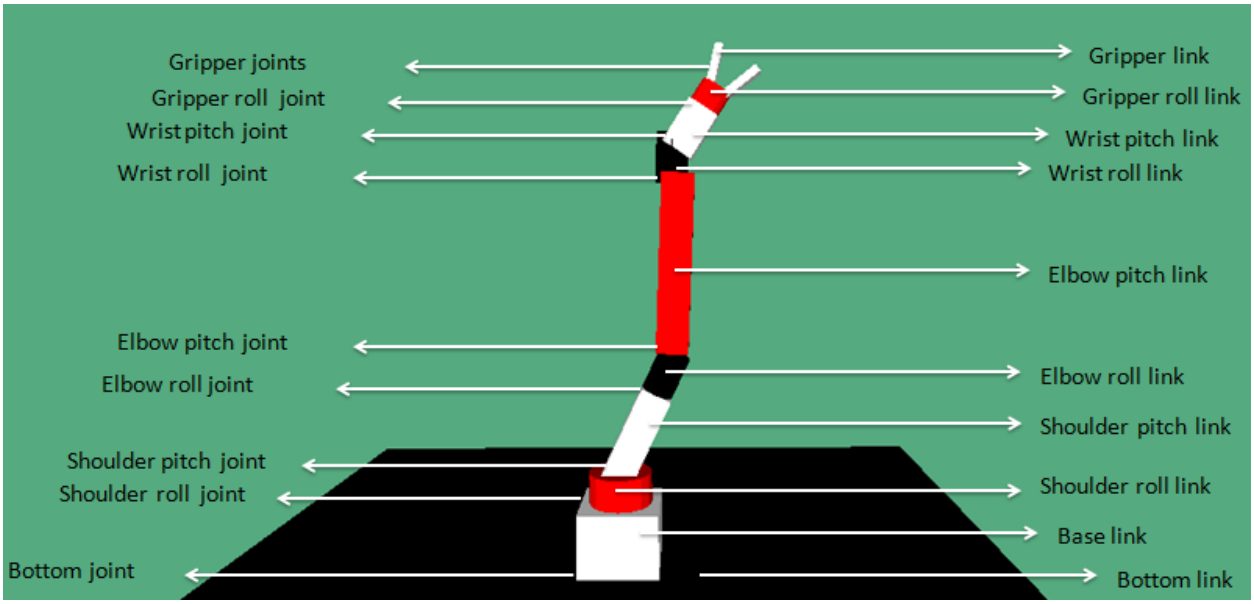

y
Joint 3
x
Link 4
Link 3
x
y
Joint 2
Origin
y
Joint 1
x
Link 2
Link 1
y
x

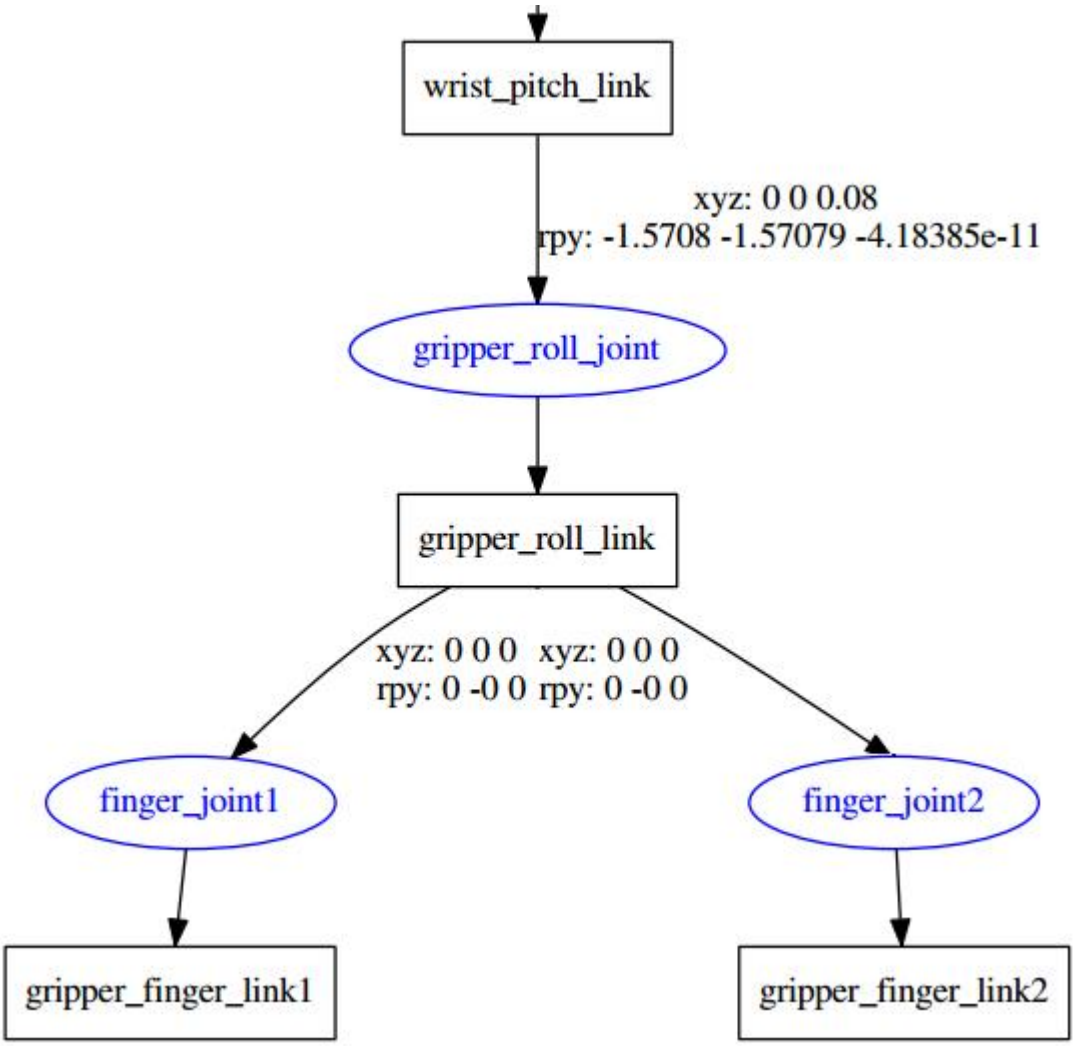


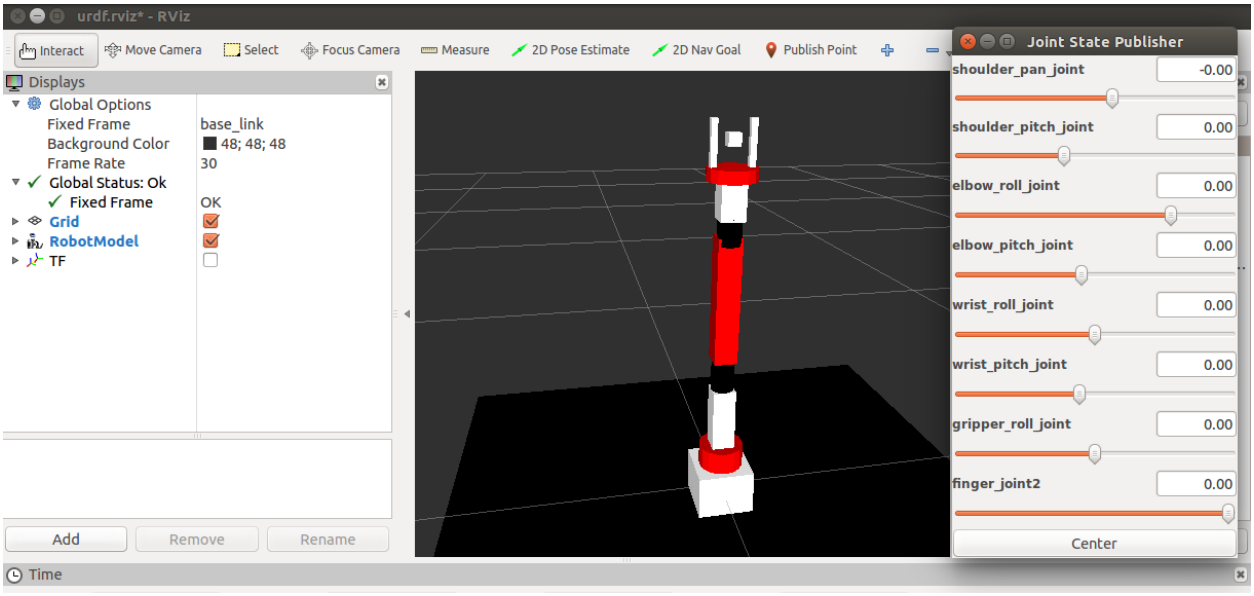

base_link
xyz: 0 0 0.1
rpy: 0 -0 0
pan_joint
pan_link
xyz: 0 0 0.2
rpy: 0 -0 0
tilt_joint
tilt_link

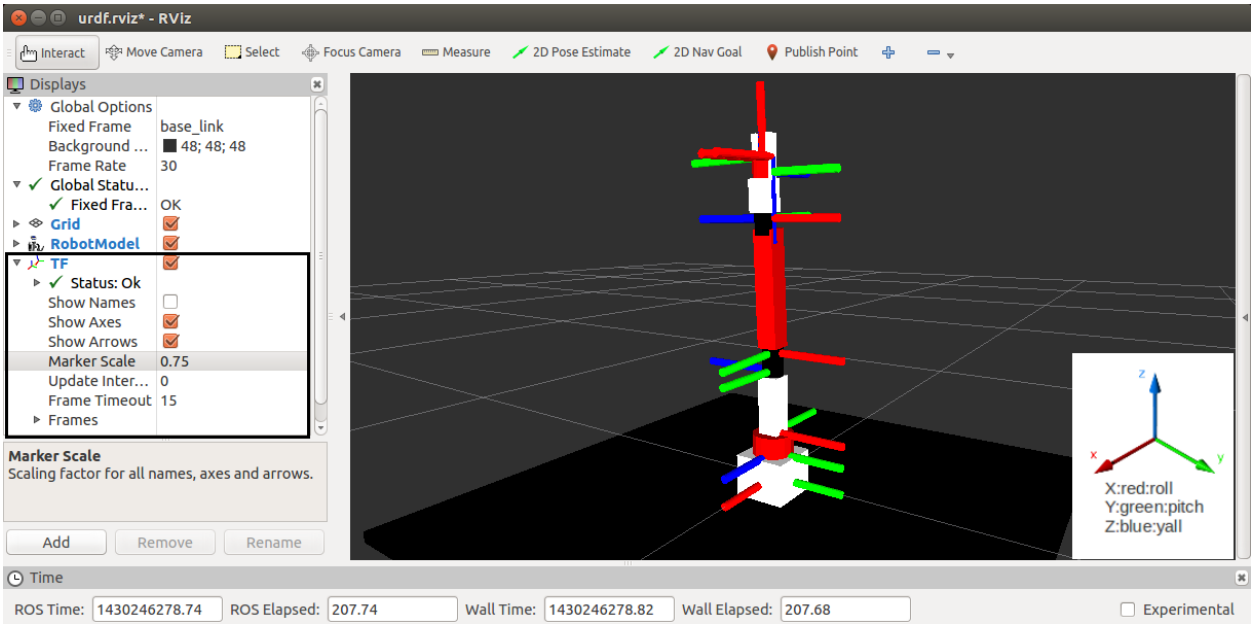

Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame
base_link
Background Color
122; 122; 122
Frame Rate
30
Global Status: Ok
Fixed Frame
OK
Grid
Status: Ok
Reference Frame
<Fixed Frame>
Plane Cell Count
10
Normal Cell Count
0
Cell Size
1
Line Style
Lines
Color
0; 0; 0
Alpha
0,5
Plane
XY
Offset
0; 0; 0
RobotModel
Status: Ok
Color
The color of the grid lines.
Add
Duplicate
Remove
Rename
joint_state_publisher
pan_joint
0.00
tilt_joint
0.00
Randomize
Center
2

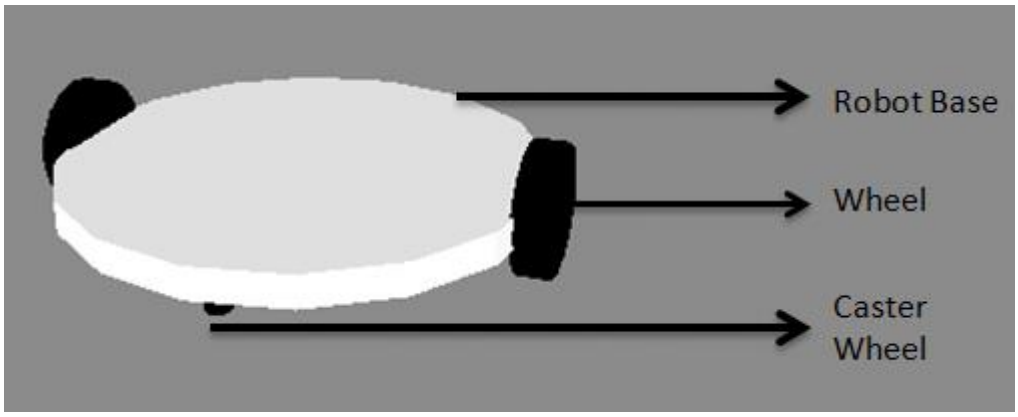

joint_state_publisher
pan_joint
0.00
tilt_joint
0.00
Randomize
Center
2

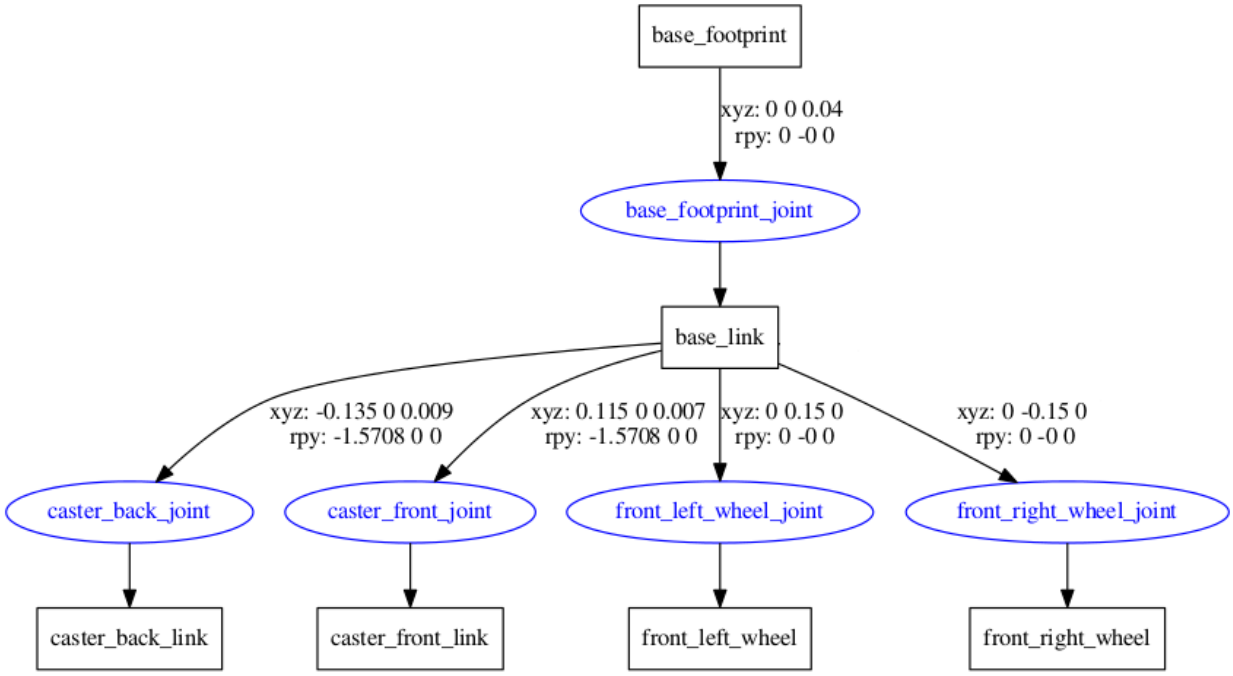

Gripper joints
Gripper roll joint
Wrist pitch joint
Wrist roll joint
Elbow pitch joint
Elbow roll joint
Shoulder pitch joint
Shoulder roll joint
Bottom joint
Gripper link
Gripper roll link
Wrist pitch link
Wrist roll link
Elbow pitch link
Elbow roll link
Shoulder pitch link
Shoulder roll link
Base link
Bottom link

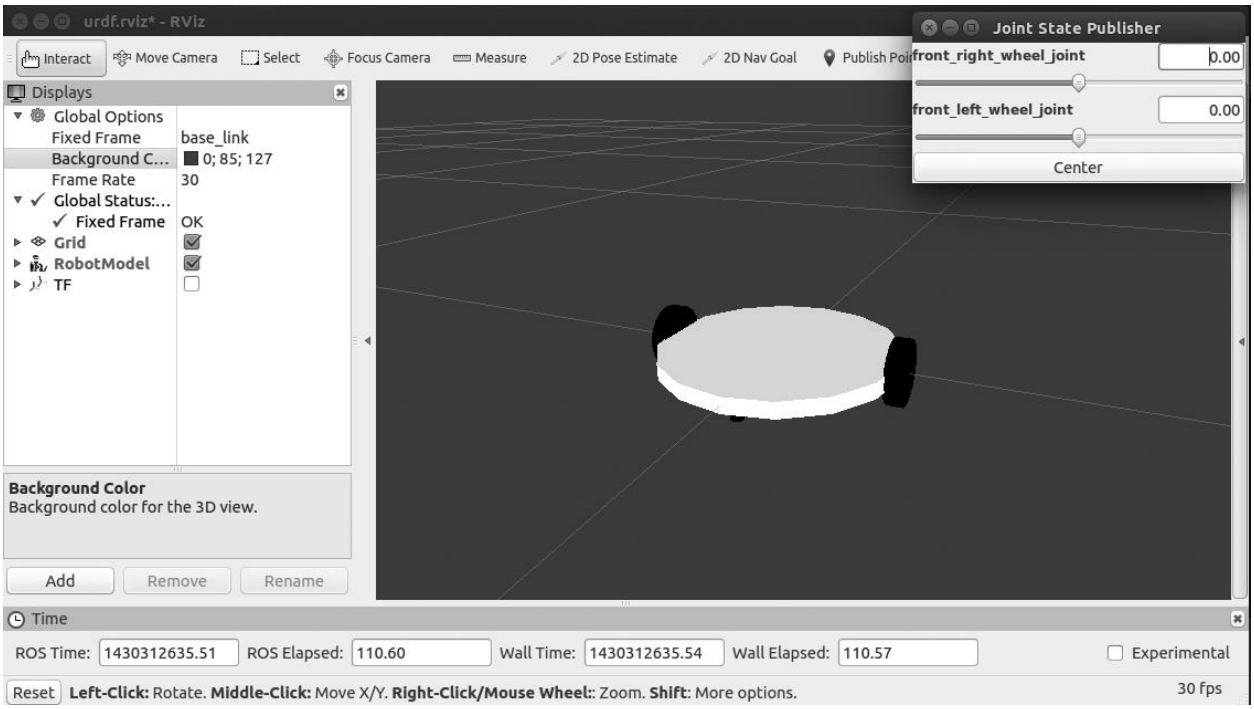

wrist_pitch_link
xyz: 0 0 0.08
rpy: -1.5708 -1.57079 -4.18385e-11
gripper_roll_joint
gripper_roll_link
xyz: 0 0 0 xyz: 0 0 0
rpy: 0 -0 0 rpy: 0 -0 0
finger_joint1
finger_joint2
gripper_finger_link1
gripper_finger_link2


urdf.rviz* - RViz
Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame
base_link
Background Color
48; 48; 48
Frame Rate
30
Global Status: Ok
Fixed Frame
OK
Grid
RobotModel
TF
Add
Remove
Rename
Time
Joint State Publisher
shoulder_pan_joint
-0.00
shoulder_pitch_joint
0.00
elbow_roll_joint
0.00
elbow_pitch_joint
0.00
wrist_roll_joint
0.00
wrist_pitch_joint
0.00
gripper_roll_joint
0.00
finger_joint2
0.00
Center

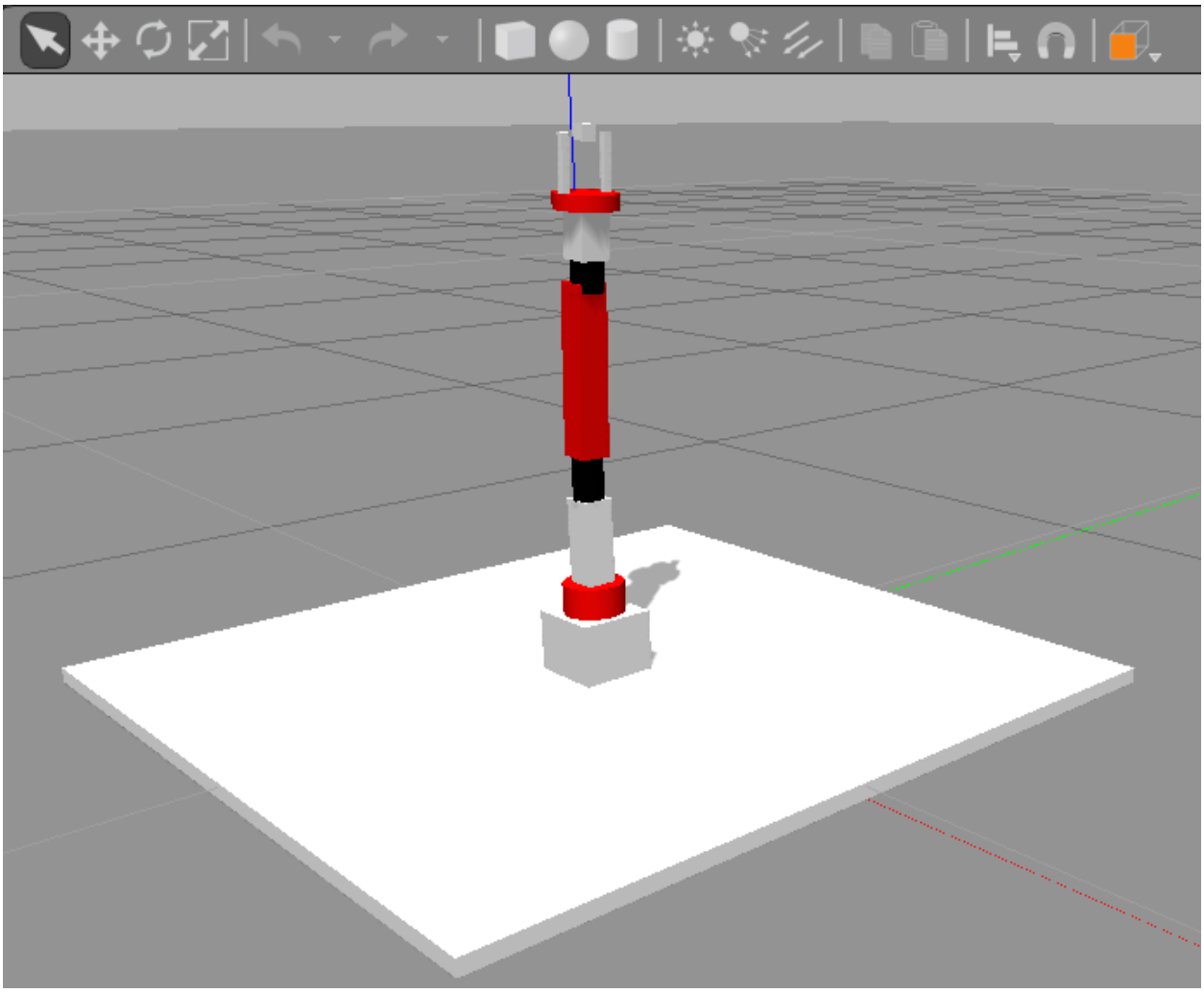

urdf.rviz* - RViz
Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame
base_link
Background ...
48; 48; 48
Frame Rate
30
Global Statu...
Fixed Fra...
OK
Grid
RobotModel
TF
Status: Ok
Show Names
Show Axes
Show Arrows
Marker Scale
0.75
Update Inter...
0
Frame Timeout
15
Frames
Marker Scale
Scaling factor for all names, axes and arrows.
Add
Remove
Rename
X:red:roll
Y:green:pitch
Z:blue:yall
Time
ROS Time:
1430246278.74
ROS Elapsed:
207.74
Wall Time:
1430246278.82
Wall Elapsed:
207.68
Experimental

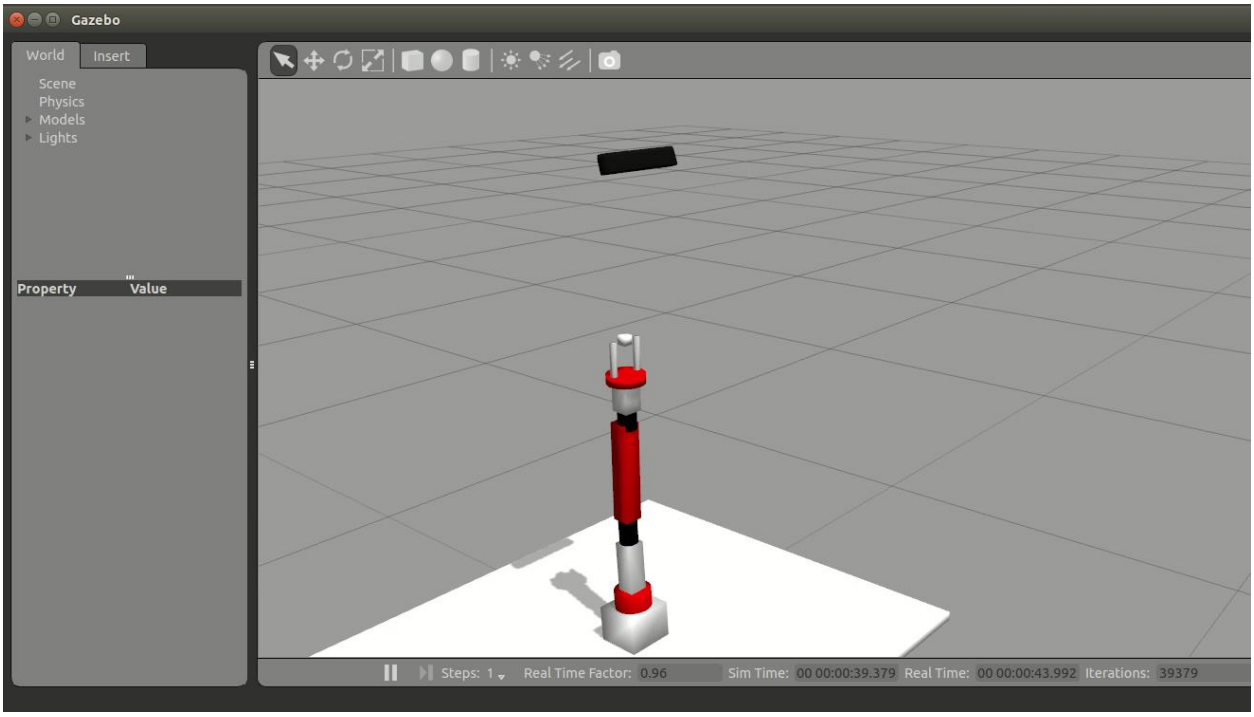

Robot Base
Wheel
Caster
Wheel


base_footprint
xyz: 0 0 0.04
rpy: 0 -0 0
base_footprint_joint
base_link
xyz: -0.135 0 0.009
rpy: -1.5708 0 0
xyz: 0.115 0 0.007
rpy: -1.5708 0 0
xyz: 0 0.15 0
rpy: 0 -0 0
xyz: 0 -0.15 0
rpy: 0 -0 0
caster_back_joint
caster_front_joint
front_left_wheel_joint
front_right_wheel_joint
caster_back_link
caster_front_link
front_left_wheel
front_right_wheel

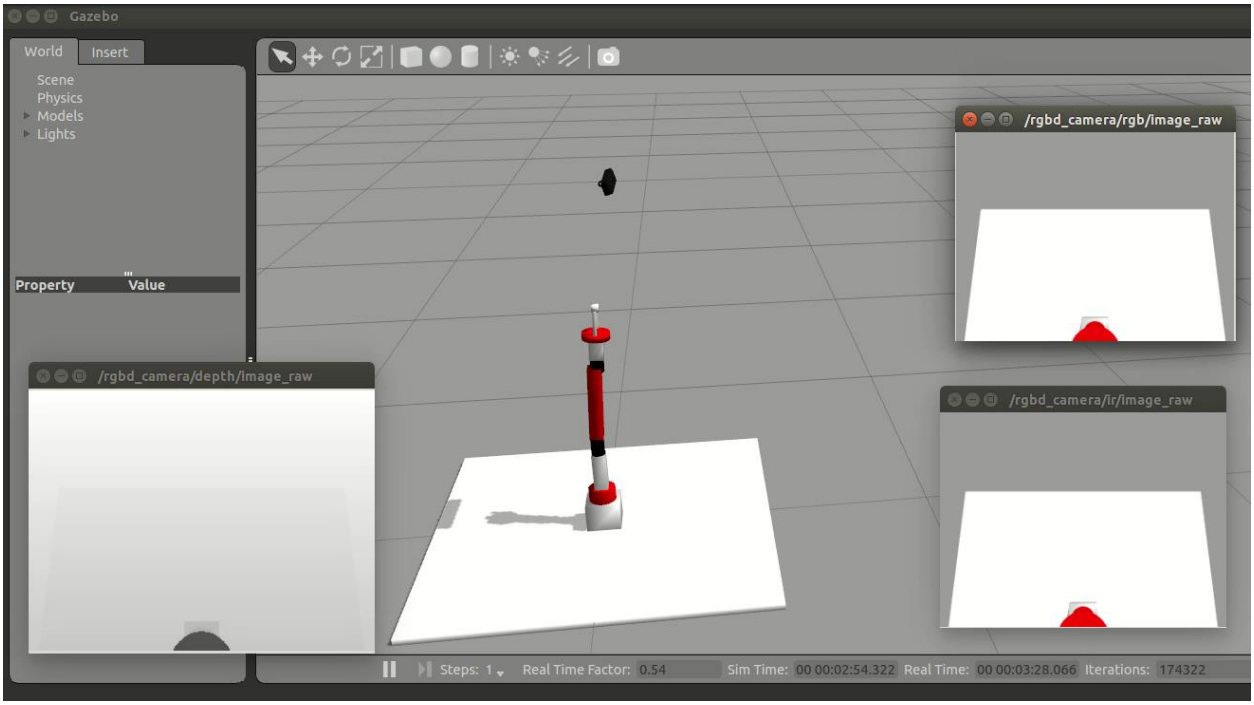

urdf.rviz* - RViz
Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Displays
Global Options
Fixed Frame
base_link
Background C...
0; 85; 127
Frame Rate
30
Global Status:...
Fixed Frame
OK
Grid
RobotModel
TF
Background Color
Background color for the 3D view.
Add
Remove
Rename
Joint State Publisher
front_right_wheel_joint
0.00
front_left_wheel_joint
0.00
Center
Time
ROS Time:
1430312635.51
ROS Elapsed:
110.60
Wall Time:
1430312635.54
Wall Elapsed:
110.57
Experimental
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click/Mouse Wheel:: Zoom. Shift: More options.
30 fps

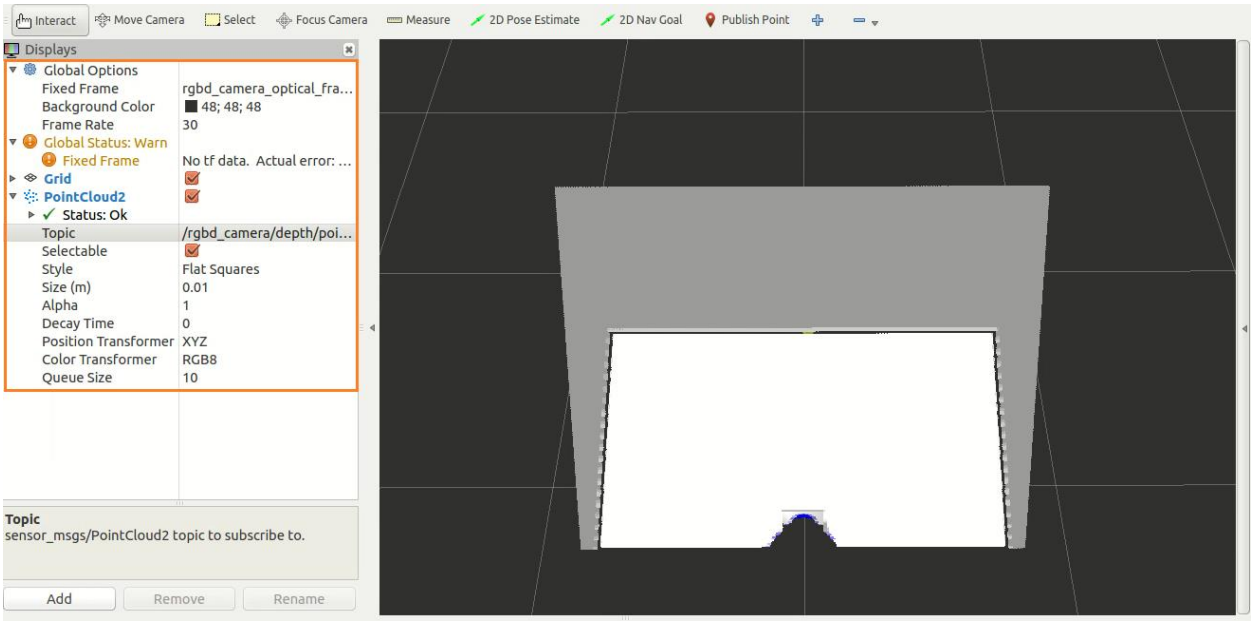
Chapter 4: Simulating Robots Using ROS and Gazebo

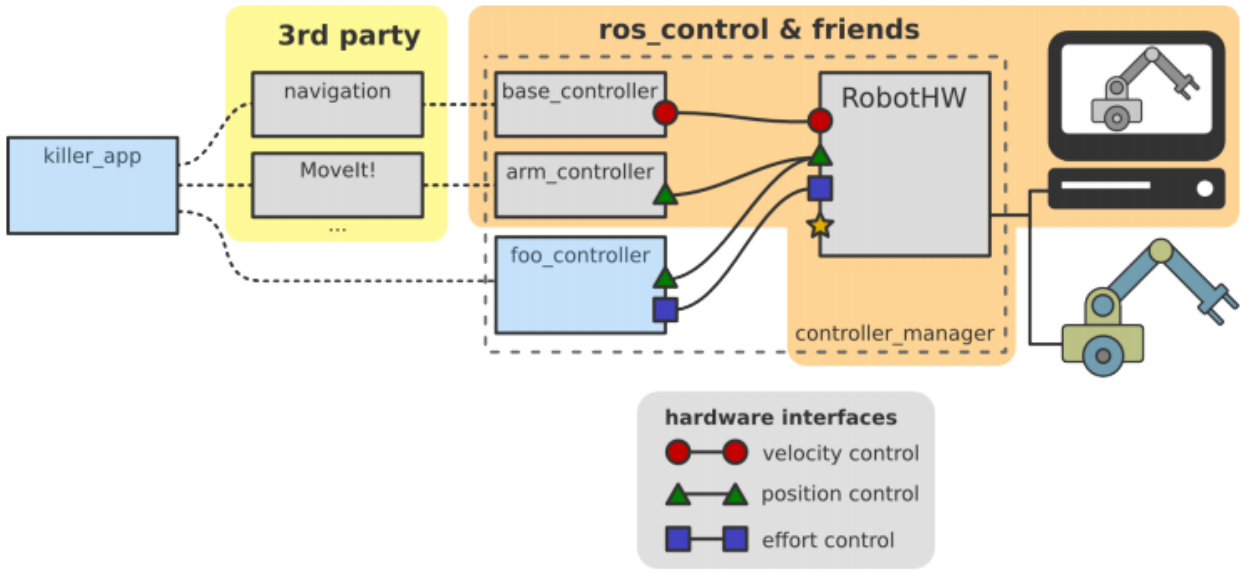


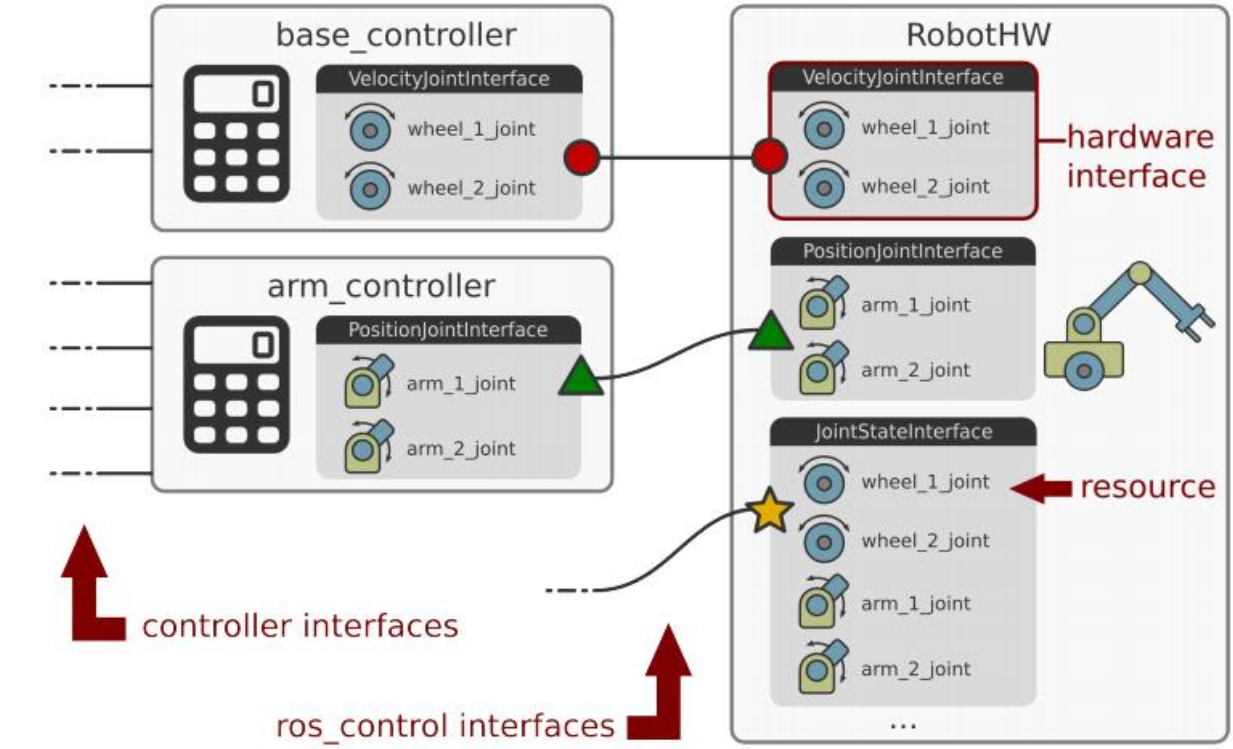



```
jcacace@robot:~$ rostopic list
/rgbd_camera/depth/image_raw
/rgbd_camera/ir/image_raw
/rgbd_camera/rgb/image_raw
```



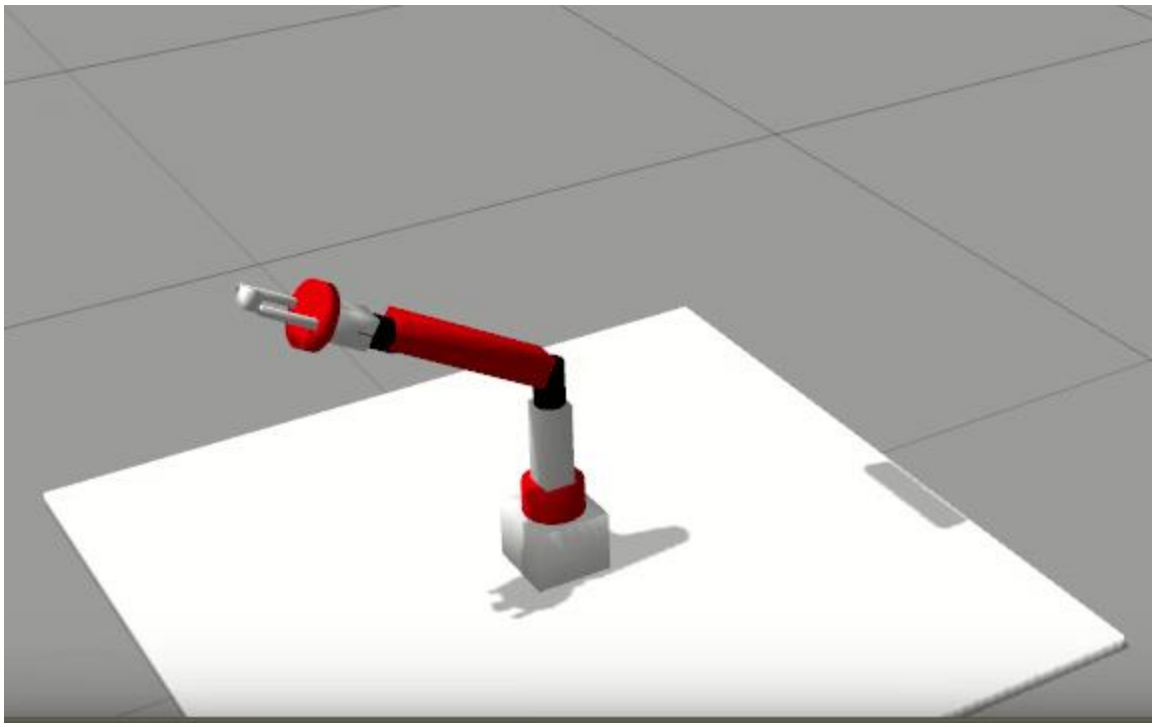

Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame
rgbd_camera_optical_fra...
Background Color
48; 48; 48
Frame Rate
30
Global Status: Warn
Fixed Frame
No tf data. Actual error: ...
Grid
PointCloud2
Status: Ok
Topic
/rgbd_camera/depth/poi...
Selectable
Style
Flat Squares
Size (m)
0.01
Alpha
1
Decay Time
0
Position Transformer
XYZ
Color Transformer
RGB8
Queue Size
10
Topic
sensor_msgs/PointCloud2 topic to subscribe to.
Add
Remove
Rename

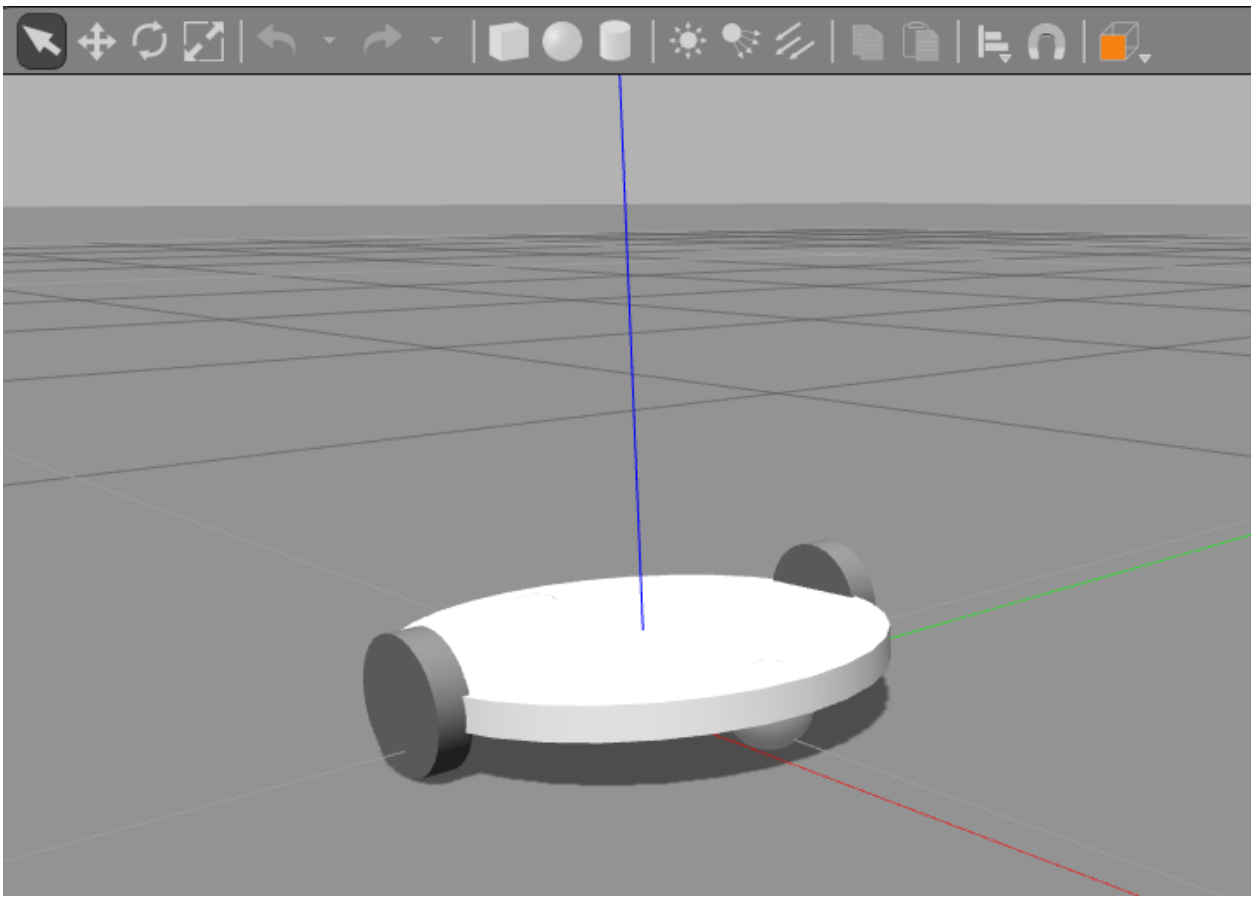

3rd party
navigation
MoveIt!
...
killer_app
ros_control & friends
base_controller
arm_controller
foo_controller
RobotHW
controller_manager
hardware interfaces
velocity control
position control
effort control

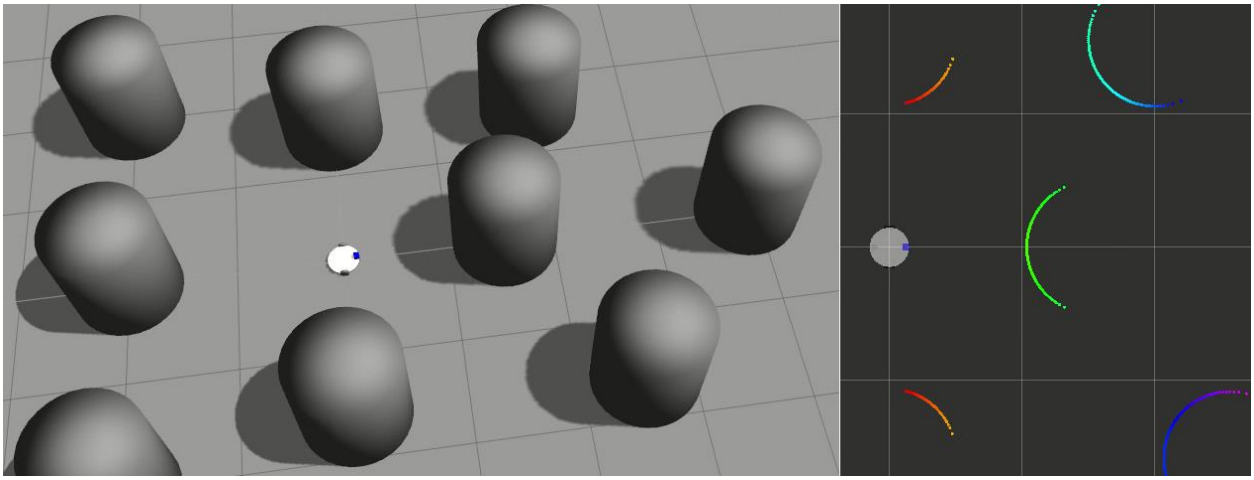


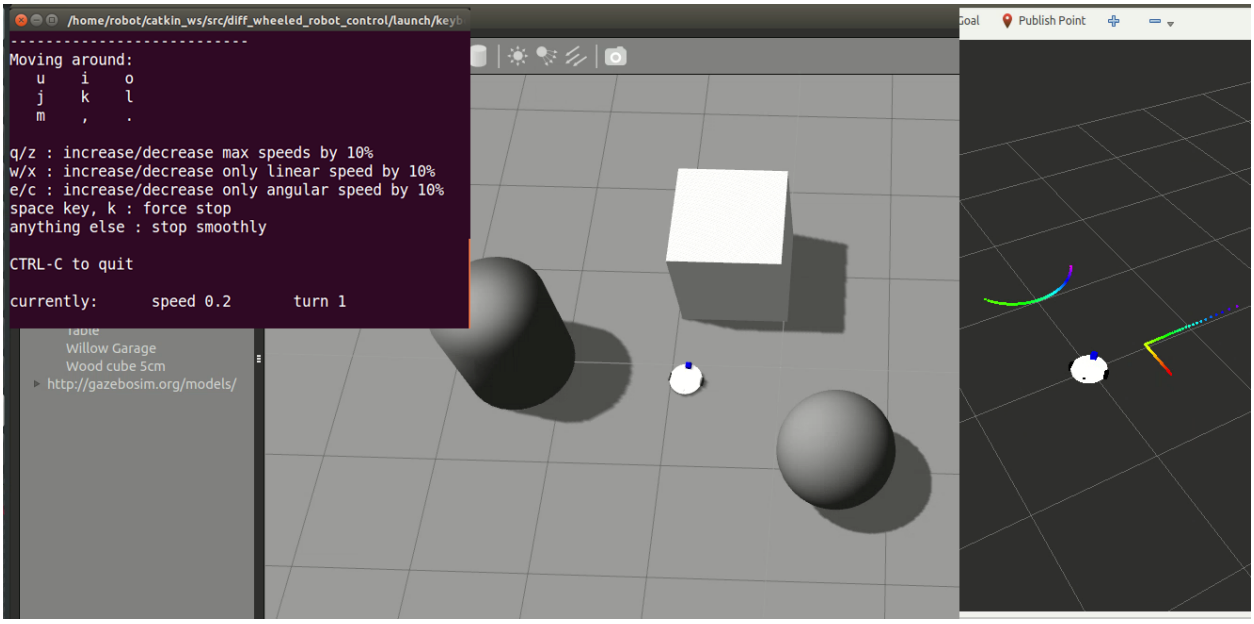

```
[ INFO] [1503389354.607765795, 0.155000000]: Loaded gazebo_ros_control.
[INFO] [1503389354.726844, 0.274000]: Controller Spawner: Waiting for service controll
er_manager/switch_controller
[INFO] [1503389354.728599, 0.276000]: Controller Spawner: Waiting for service controll
er_manager/unload_controller
[INFO] [1503389354.730271, 0.277000]: Loading controller: joint_state_controller
[INFO] [1503389354.812192, 0.355000]: Loading controller: joint1_position_controller
[INFO] [1503389354.896451, 0.433000]: Loading controller: joint2_position_controller
[INFO] [1503389354.905462, 0.442000]: Loading controller: joint3_position_controller
[INFO] [1503389354.914256, 0.451000]: Loading controller: joint4_position_controller
[INFO] [1503389354.921049, 0.458000]: Loading controller: joint5_position_controller
[INFO] [1503389354.928891, 0.466000]: Loading controller: joint6_position_controller
[INFO] [1503389354.935862, 0.473000]: Loading controller: joint7_position_controller
[INFO] [1503389354.944609, 0.482000]: Controller Spawner: Loaded controllers: joint_st
ate_controller, joint1_position_controller, joint2_position_controller, joint3_positio
n_controller, joint4_position_controller, joint5_position_controller, joint6_position_
controller, joint7_position_controller
[INFO] [1503389354.947569, 0.485000]: Started controllers: joint_state_controller, joi
nt1_position_controller, joint2_position_controller, joint3_position_controller, joint
4_position_controller, joint5_position_controller, joint6_position_controller, joint7_
position_controller
```

```
/seven_dof_arm/joint1_position_controller/command
/seven_dof_arm/joint2_position_controller/command
/seven_dof_arm/joint3_position_controller/command
/seven_dof_arm/joint4_position_controller/command
/seven_dof_arm/joint5_position_controller/command
/seven_dof_arm/joint6_position_controller/command
/seven_dof_arm/joint7_position_controller/command
```





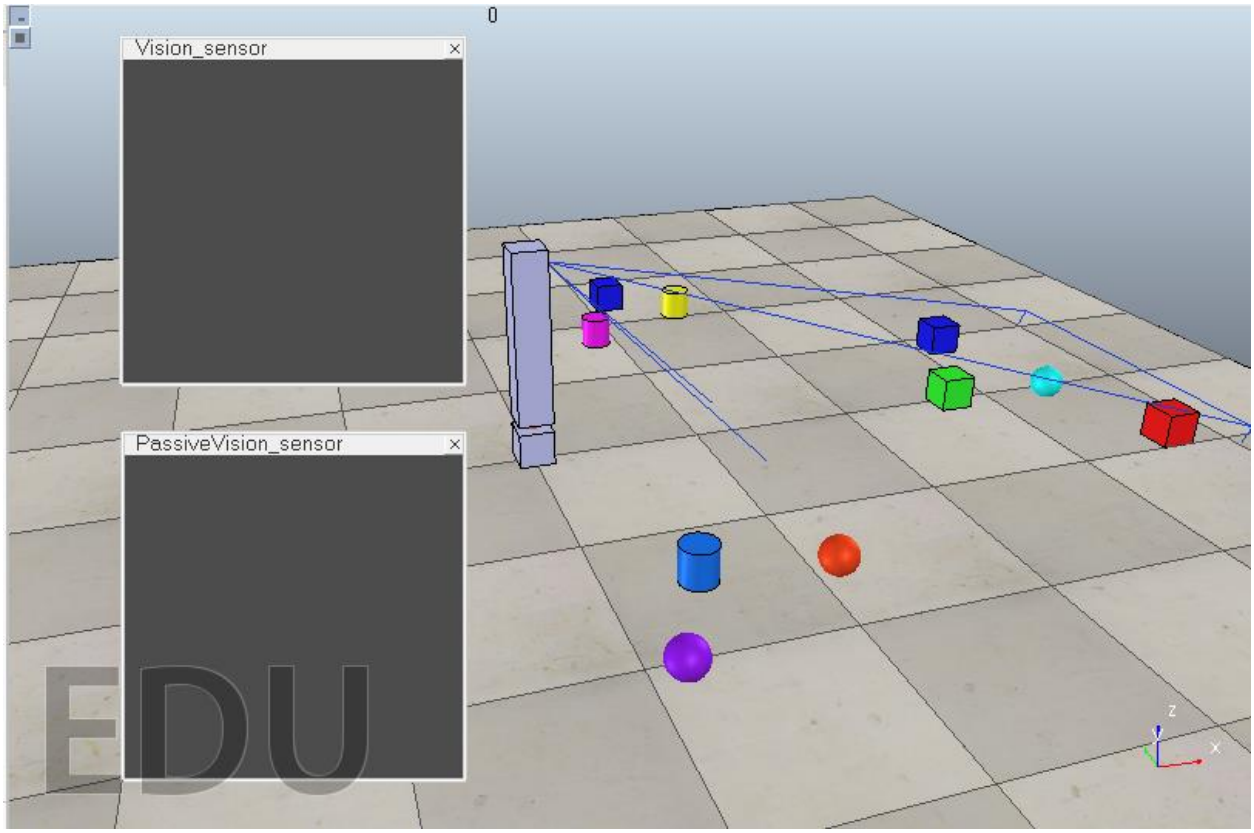


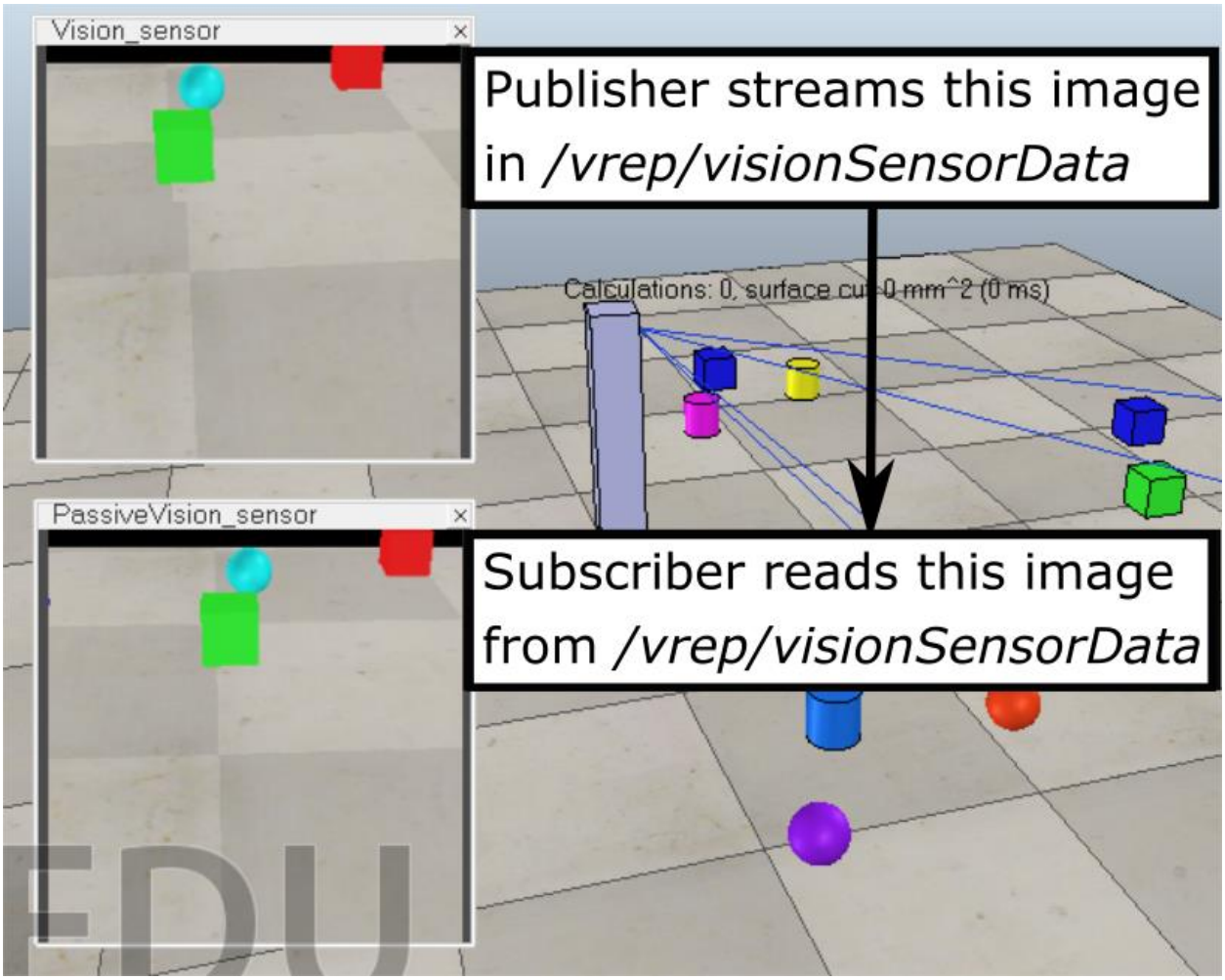

/home/robot/catkin_ws/src/diff_wheeled_robot_control/launch/keyb
Moving around:
u i o
j k l
m , .
q/z : increase/decrease max speeds by 10%
w/x : increase/decrease only linear speed by 10%
e/c : increase/decrease only angular speed by 10%
space key, k : force stop
anything else : stop smoothly
CTRL-C to quit
currently: speed 0.2 turn 1
Publish Point
Willow Garage
Wood cube 5cm
http://gazebosim.org/models/

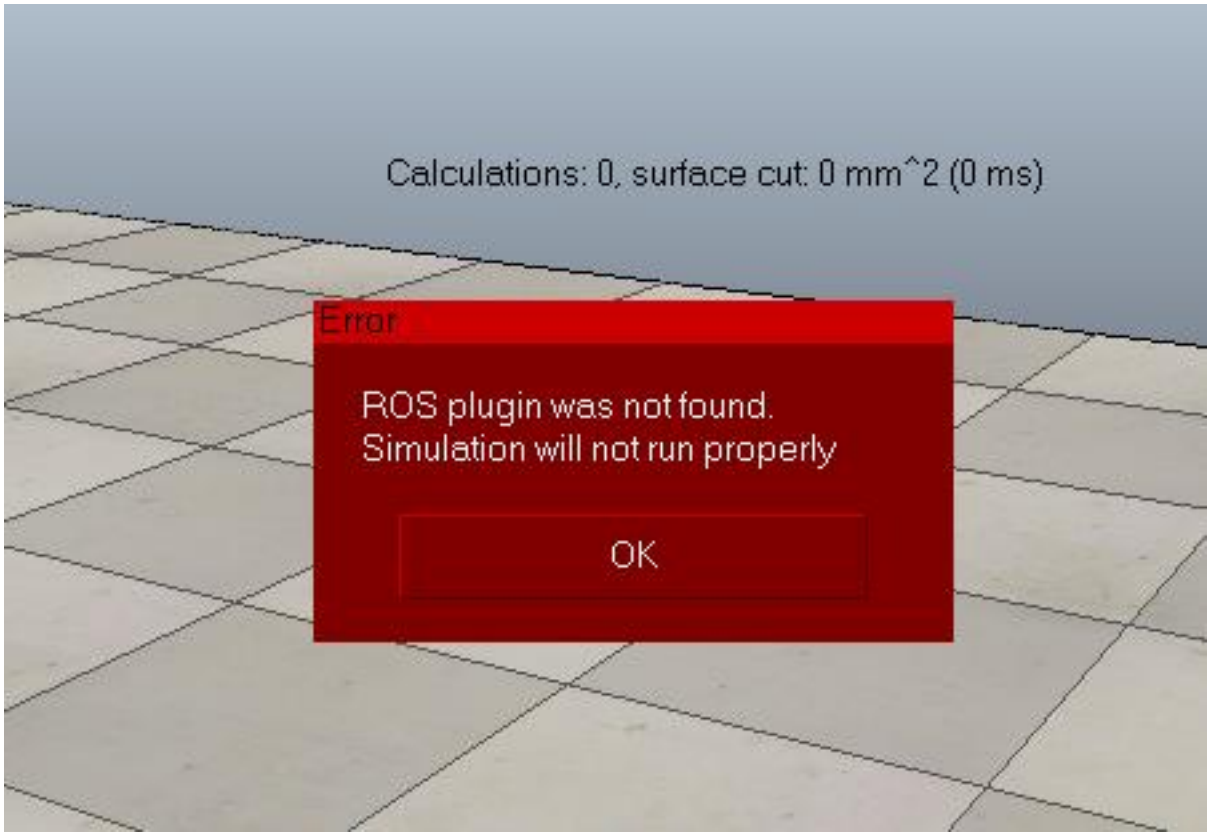
Chapter 5: Simulating Robots Using ROS and V-REP

```
jcacace@robot:~$ $VREP_ROOT/vrep.sh
Using the default Lua library.
Loaded the video compression library.
Add-on script 'vrepAddOnScript-addOnScriptDemo.lua' was loaded.
Simulator launched.
Plugin 'BubbleRob': loading...
Plugin 'BubbleRob': load succeeded.
Plugin 'Collada': loading...
Plugin 'Collada': load succeeded.
Plugin 'RemoteApi': load succeeded.
Plugin 'Ros': loading...
Plugin 'Ros': load succeeded.
```

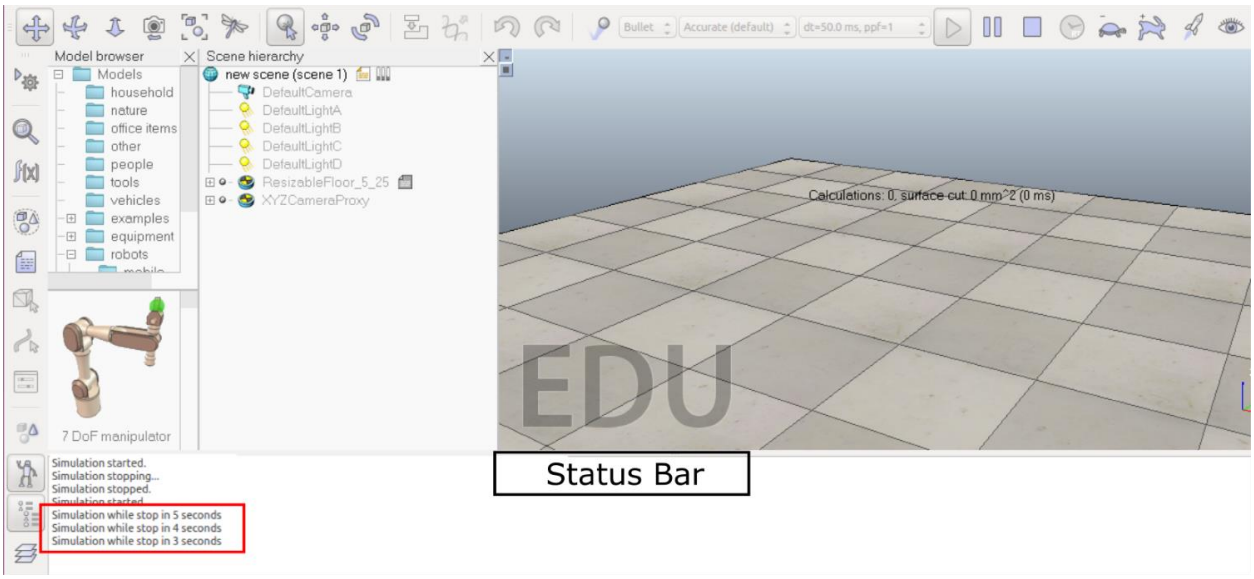
```
---
headerInfo:
  seq: 823
  stamp:
    secs: 1504261442
    nsecs: 363384144
  frame_id: ''
simulatorState:
  data: 1
simulationTime:
  data: 41.1496582031
timeStep:
  data: 0.0500000007451
---
```

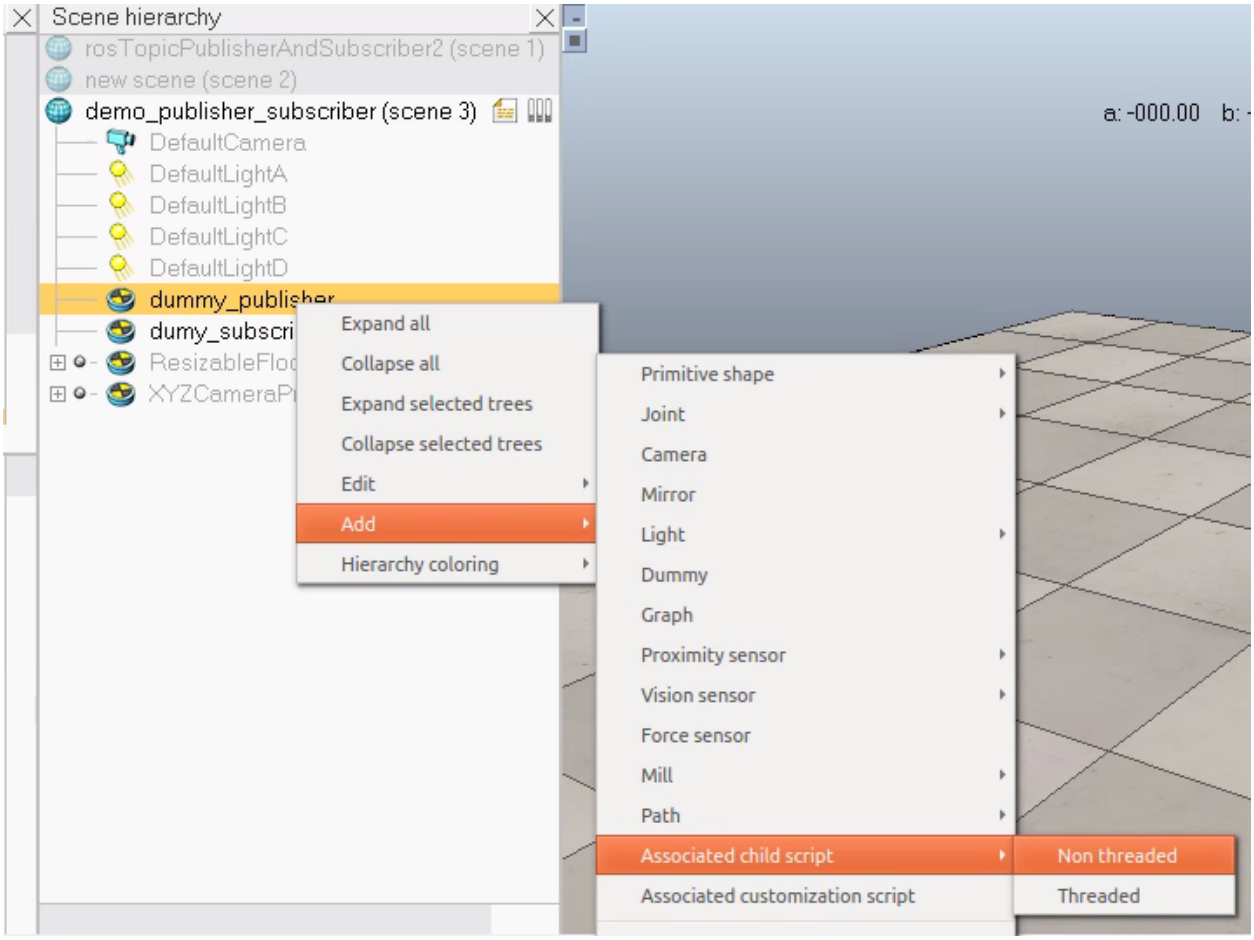

0
Vision_sensor
PassiveVision_sensor
EDU
z
x

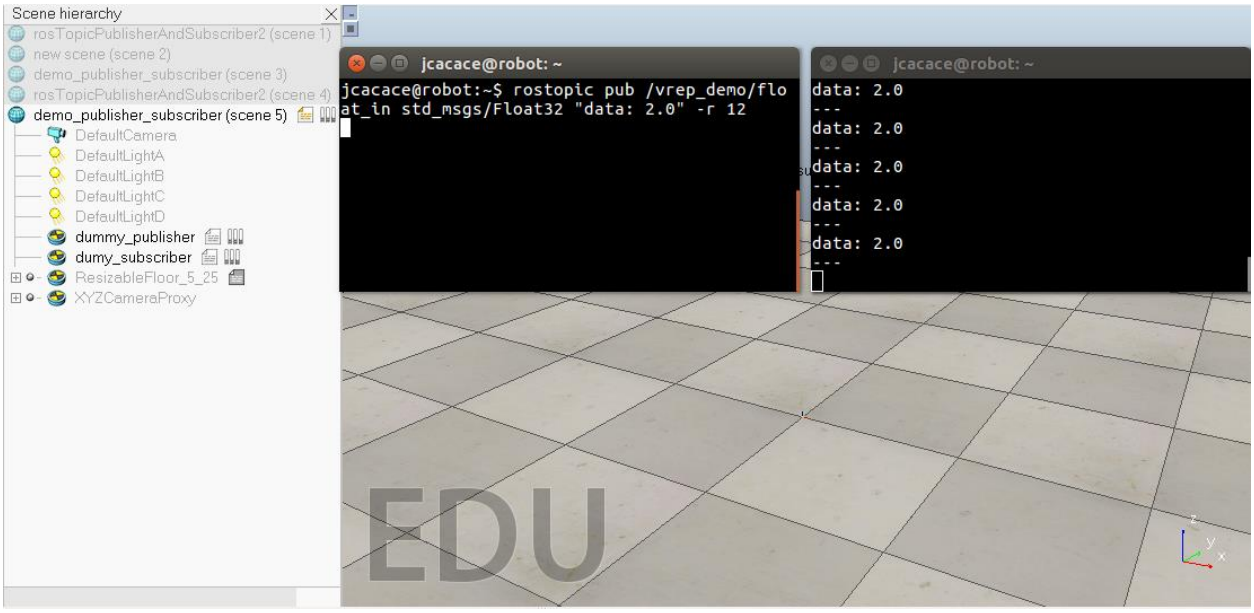

Vision_sensor
Publisher streams this image in /vrep/visionSensorData
PassiveVision_sensor
Subscriber reads this image from /vrep/visionSensorData



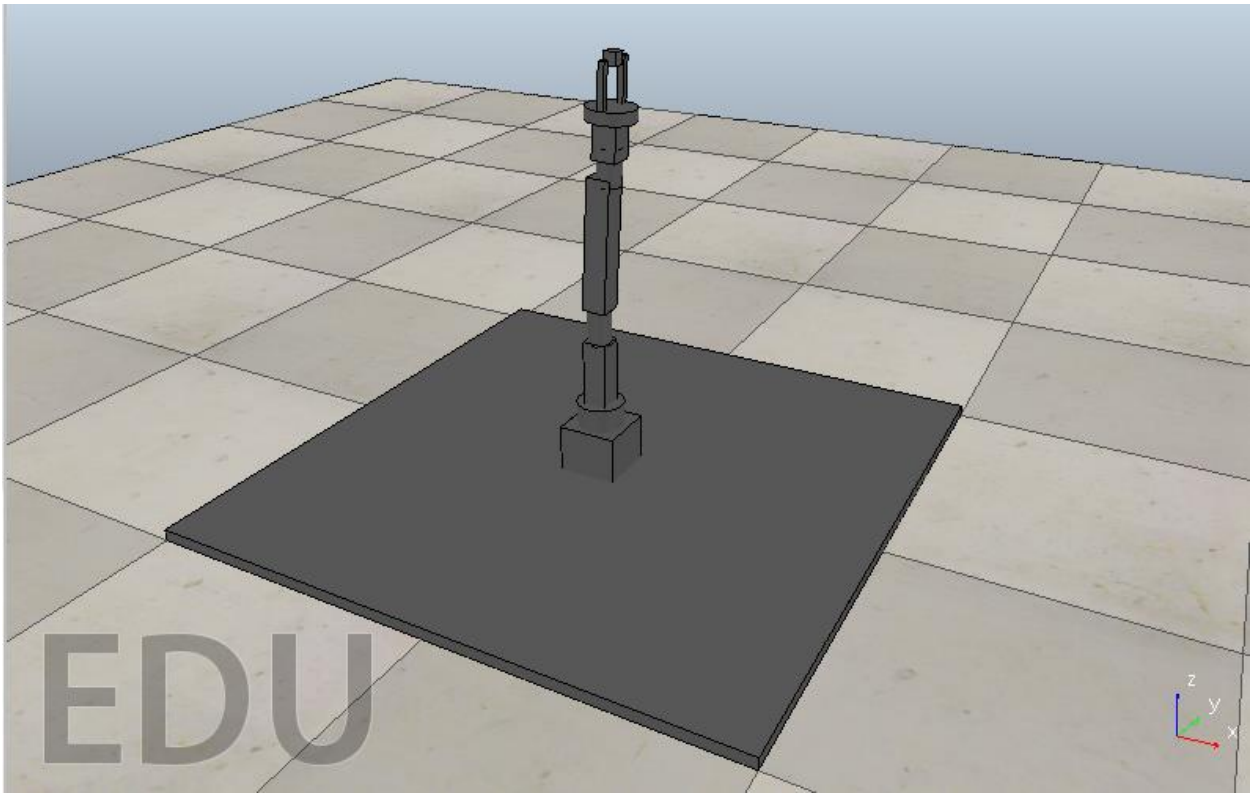

```
jcacace@robot:~$ rosnode list
/rosout
/vrep
```




Scene hierarchy
rosTopicPublisherAndSubscriber2 (scene 1)
new scene (scene 2)
demo_publisher_subscriber (scene 3)
DefaultCamera
DefaultLightA
DefaultLightB
DefaultLightC
DefaultLightD
dummy_publisher
dumy_subscri
ResizableFloo
XYZCameraP
a: -000.00 b:
Expand all
Collapse all
Expand selected trees
Collapse selected trees
Edit
Add
Hierarchy coloring
Primitive shape
Joint
Camera
Mirror
Light
Dummy
Graph
Proximity sensor
Vision sensor
Force sensor
Mill
Path
Associated child script
Associated customization script
Non threaded
Threaded


Scene hierarchy
rosTopicPublisherAndSubscriber2 (scene 1)
new scene (scene 2)
demo_publisher_subscriber (scene 3)
rosTopicPublisherAndSubscriber2 (scene 4)
demo_publisher_subscriber (scene 5)
DefaultCamera
DefaultLightA
DefaultLightB
DefaultLightC
DefaultLightD
dummy_publisher
dumy_subscriber
ResizableFloor_5_25
XYZCameraProxy
jcacace@robot: ~
jcacace@robot:~$ rostopic pub /vrep_demo/float_in std_msgs/Float32 "data: 2.0" -r 12
jcacace@robot: ~
data: 2.0
---
data: 2.0
---
data: 2.0
---
data: 2.0
---
data: 2.0

EDU



Scene Object Properties

Joint | Common

Configuration

Position is cyclic

Screw pitch [m/deg] +0.00e+00

Pos. min. [deg] -1.800e+02

Pos. range [deg] 3.600e+02

Position [deg] +0.000e+00

IK calculation weight 1.00

Max. step size [deg] 1.00e+01

Apply to selection

Mode

Torque/force mode

Hybrid operation

Adjust dependency equation

Apply to selection

Visual properties

Length [m] 0.150

Diameter [m] 0.020

Adjust color A

Adjust color B

Apply to selection

Dynamic properties

Show dynamic properties dialog

Joint Dynamic Properties

Motor properties

Motor enabled

Target velocity [deg/s]

Maximum torque [N*m] 3.0000e+02

Lock motor when target velocity is zero

Edit engine specific properties

Apply to selection

Control properties

Control loop enabled

Target position [deg] +0.0000e+00

Upper velocity limit [deg/s] 5.7296e+01

Custom control

Edit custom control loop

Position control (PID)

Proportional parameter 0.100

Integral parameter 0.000

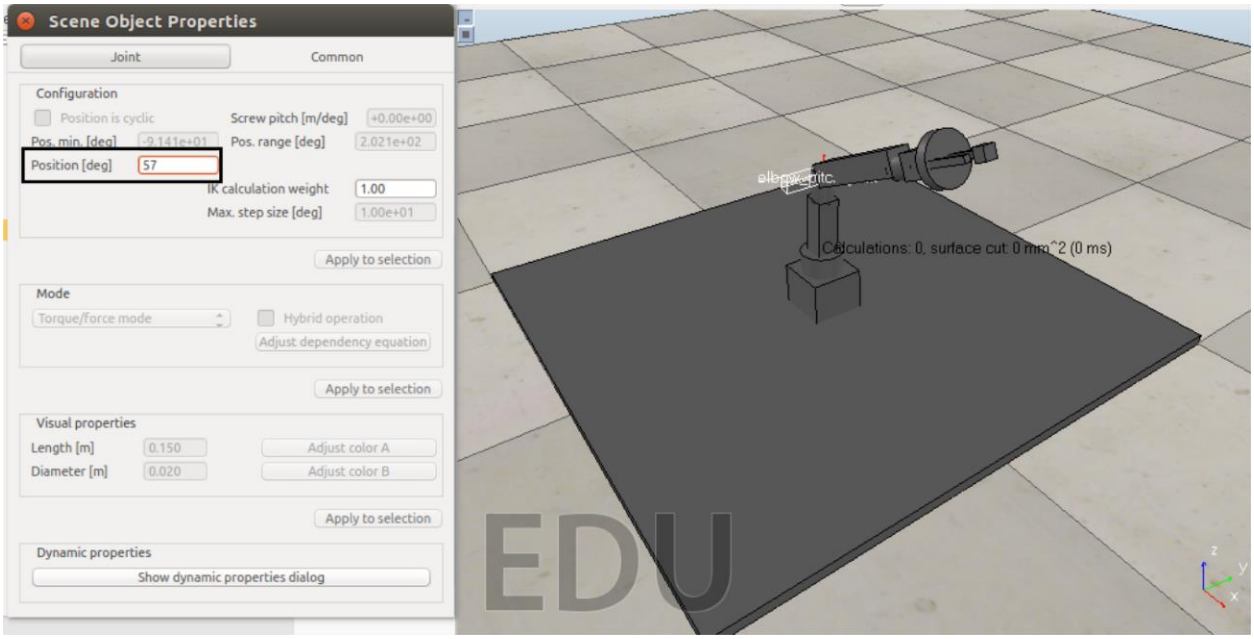
Derivative parameter 0.000

Spring-damper mode

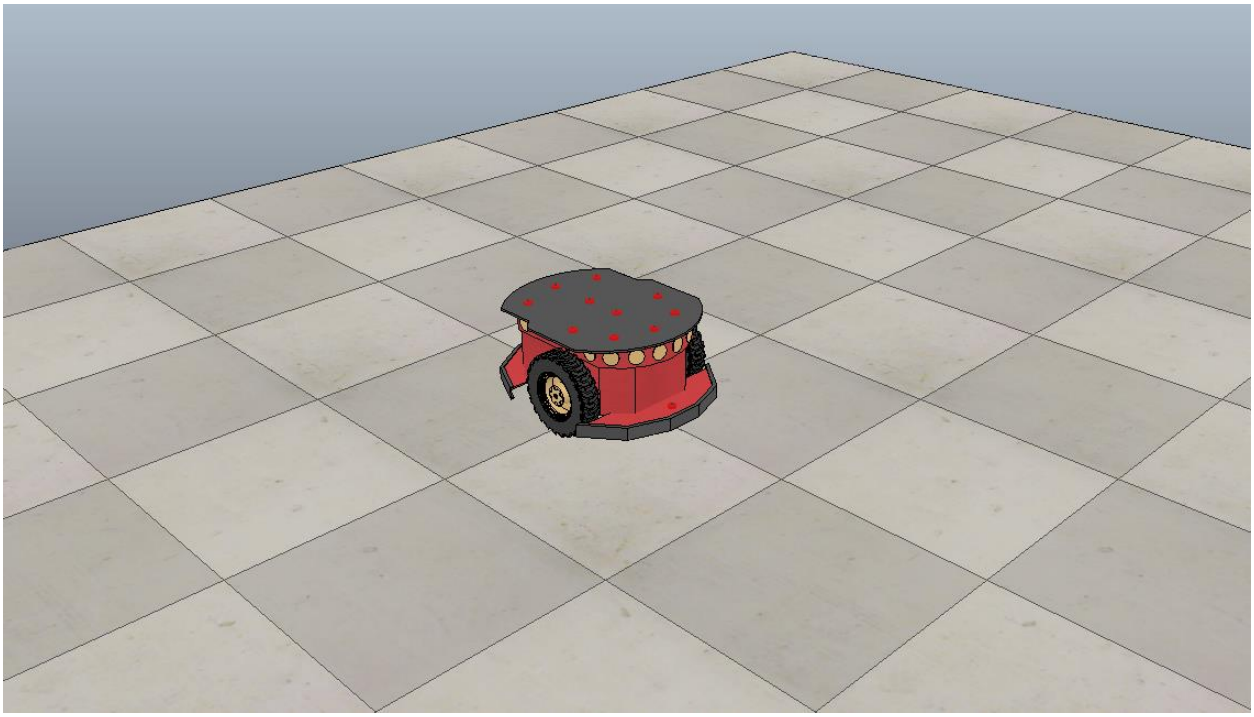
Spring constant K [N] 1.000e-01

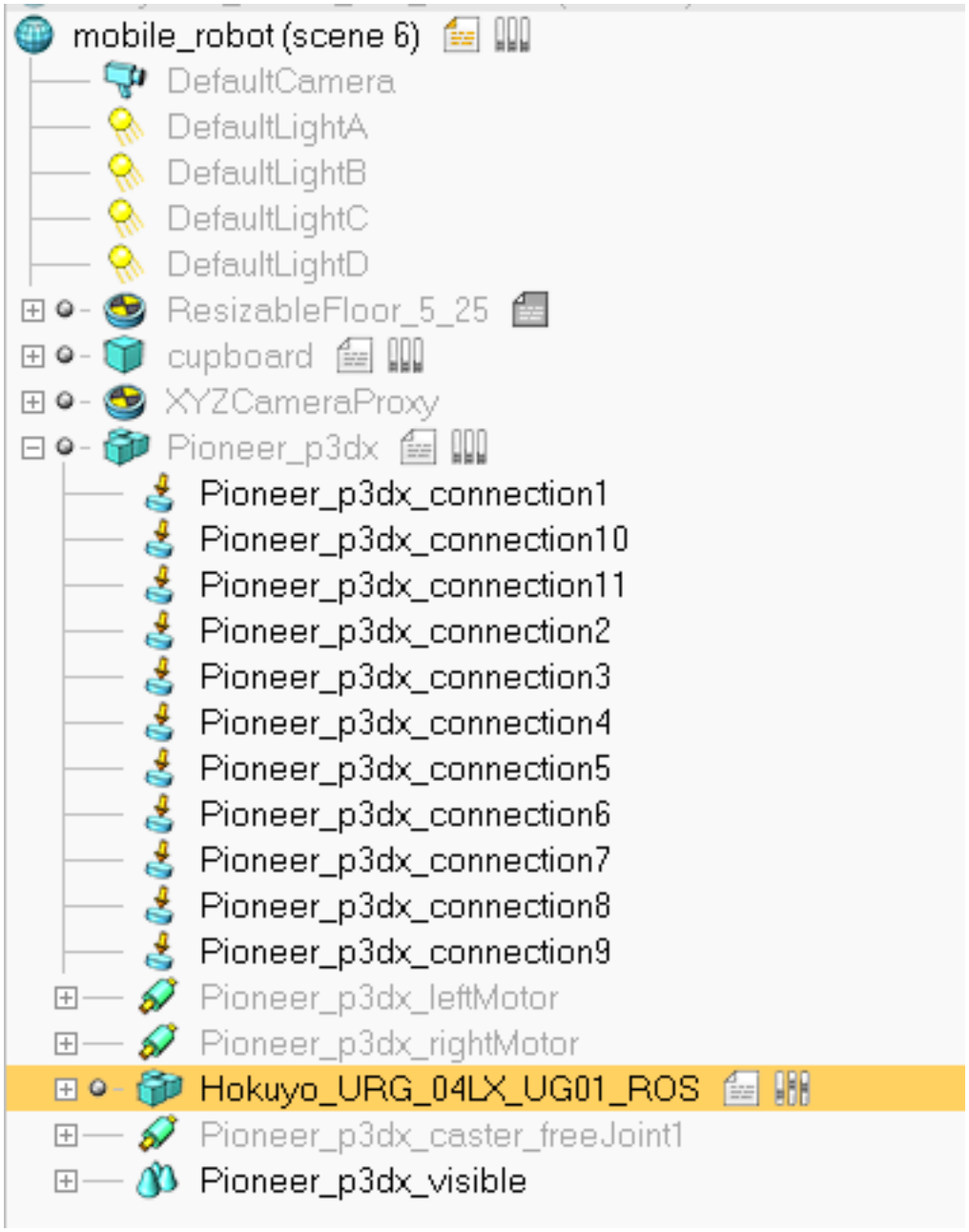
Damping coefficient C [N*s] 0.000e+00

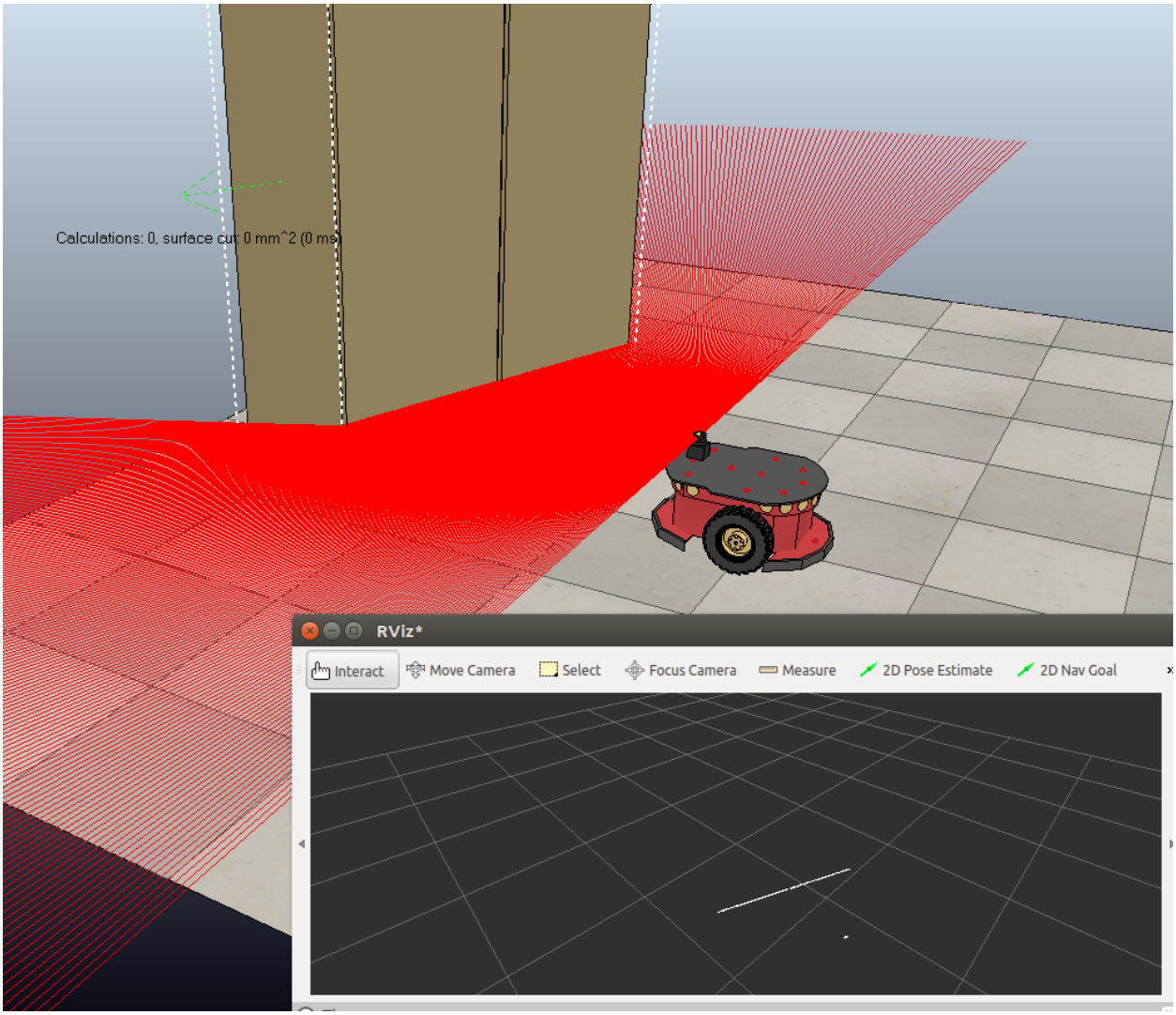
Apply to selection

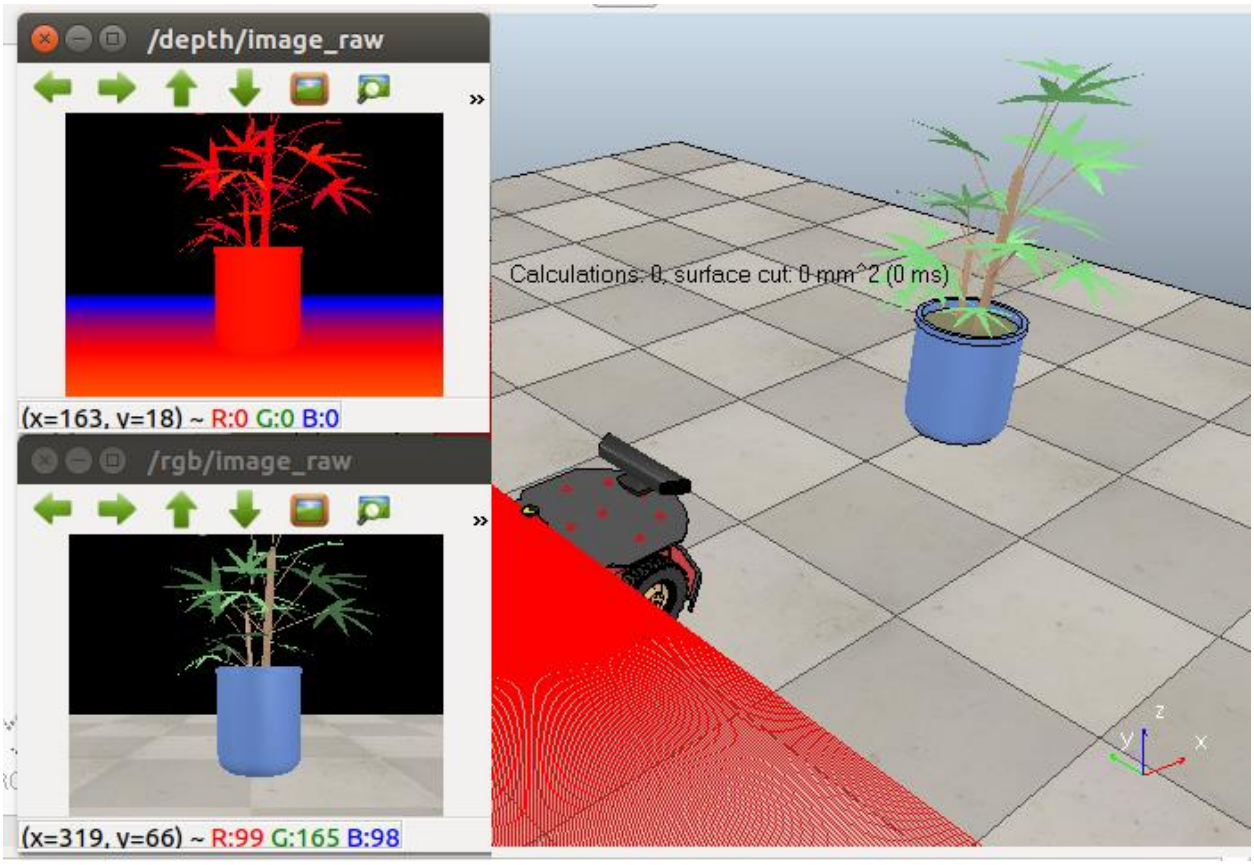


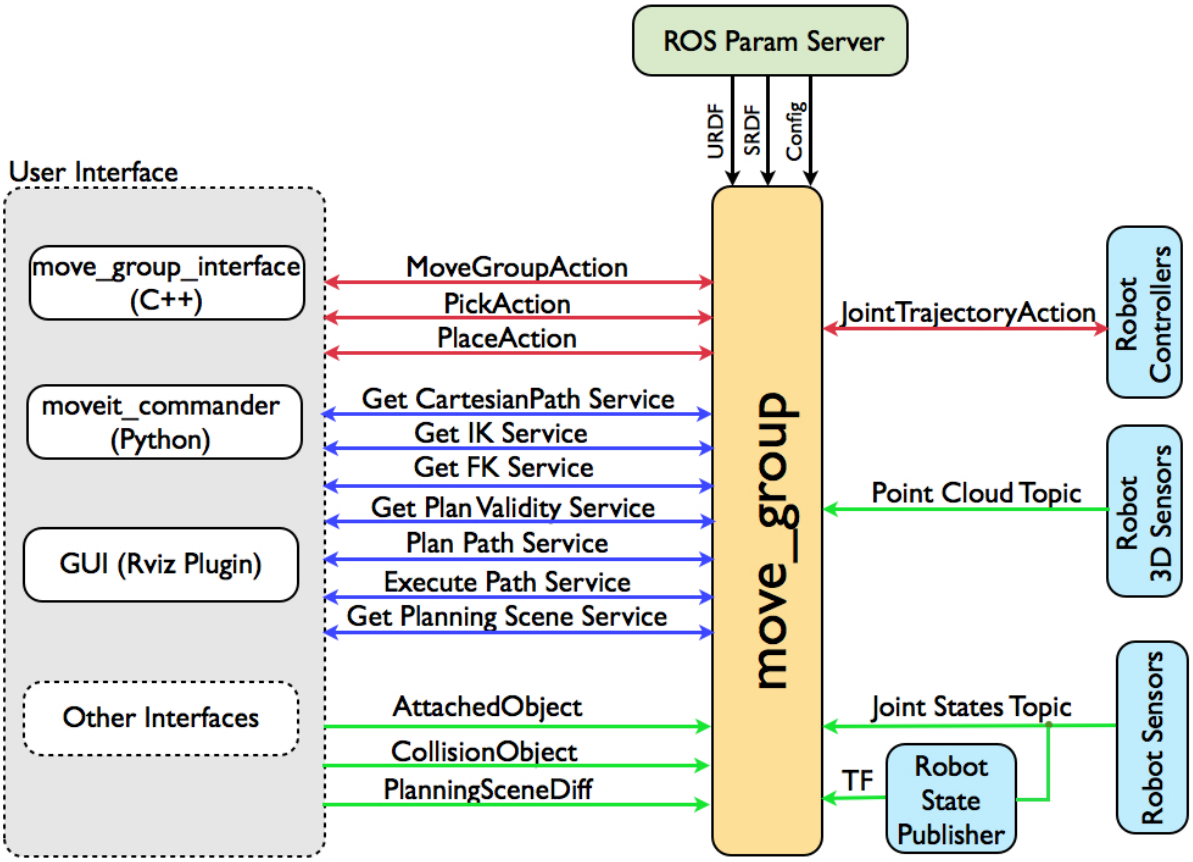

```
---
header:
  seq: 11900
  stamp:
    secs: 1504564905
    nsecs: 995165677
  frame_id: ''
name: ['elbow_roll_joint']
position: [-3.7127774703549 22e-06]
velocity: [-0.0002352813316974789]
effort: [-0.7412756085395813]
---
```

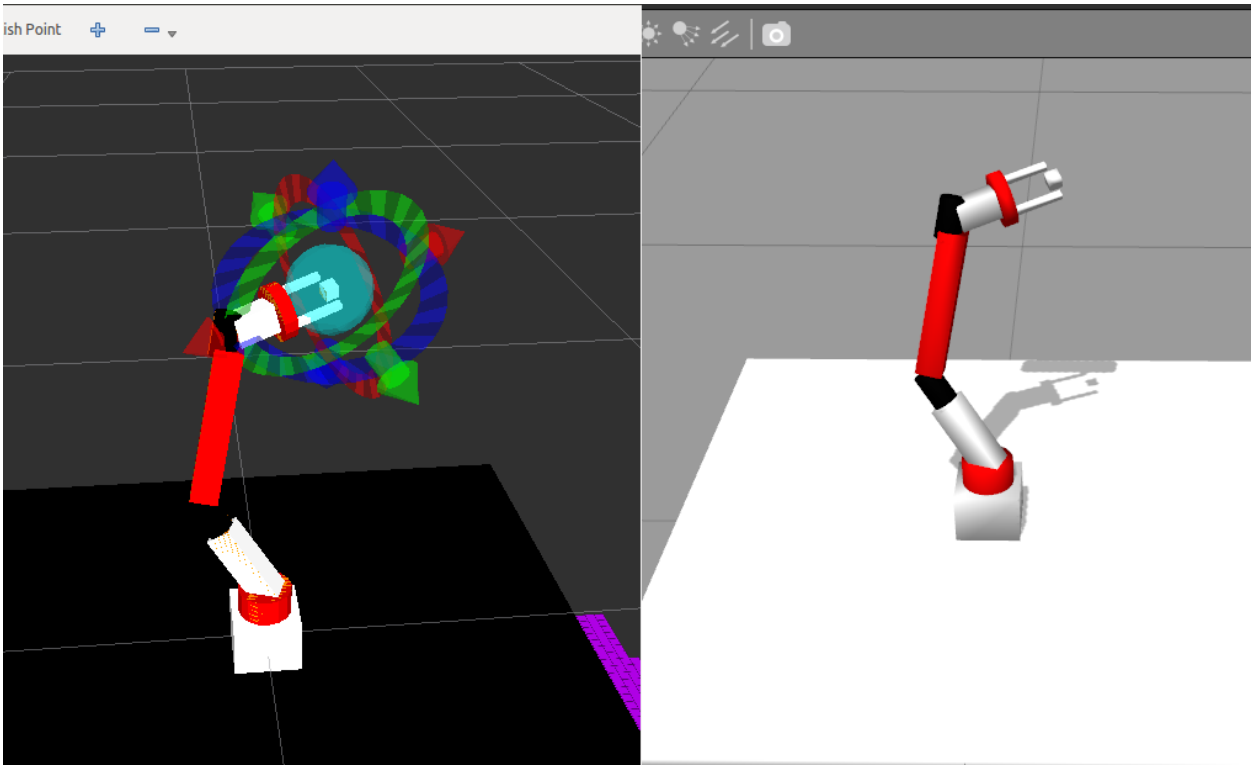


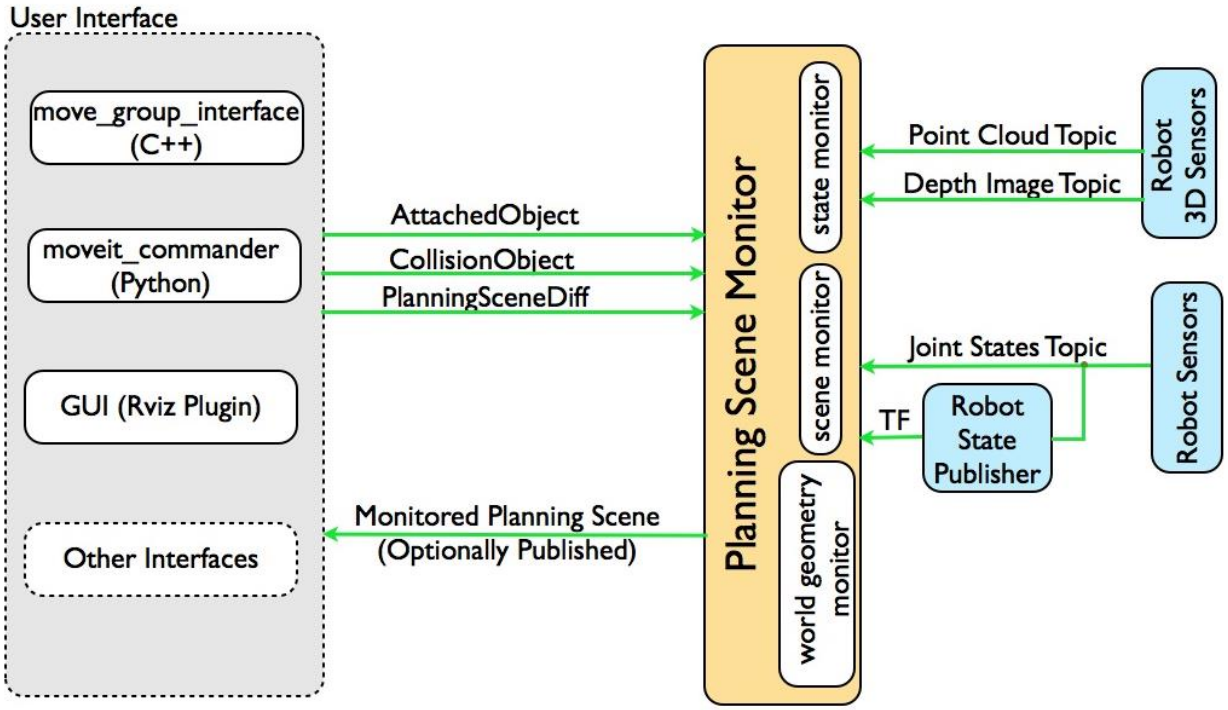

mobile_robot (scene 6)
DefaultCamera
DefaultLightA
DefaultLightB
DefaultLightC
DefaultLightD
ResizableFloor_5_25
cupboard
XYZCameraProxy
Pioneer_p3dx
Pioneer_p3dx_connection1
Pioneer_p3dx_connection10
Pioneer_p3dx_connection11
Pioneer_p3dx_connection2
Pioneer_p3dx_connection3
Pioneer_p3dx_connection4
Pioneer_p3dx_connection5
Pioneer_p3dx_connection6
Pioneer_p3dx_connection7
Pioneer_p3dx_connection8
Pioneer_p3dx_connection9
Pioneer_p3dx_leftMotor
Pioneer_p3dx_rightMotor
Hokuyo_URG_04LX_UG01_ROS
Pioneer_p3dx_caster_freeJoint1
Pioneer_p3dx_visible


Calculations: 0, surface cut: 0 mm^2 (0 ms)
RViz*
Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal


/depth/image_raw
(x=163, y=18) ~ R:0 G:0 B:0
/rgb/image_raw
(x=319, y=66) ~ R:99 G:165 B:98
Calculations: 0, surface cut: 0 mm^2 (0 ms)
z
y
x


ROS Param Server
URDF
SRDF
Config
User Interface
move_group_interface (C++)
moveit_commander (Python)
GUI (Rviz Plugin)
Other Interfaces
MoveGroupAction
PickAction
PlaceAction
Get CartesianPath Service
Get IK Service
Get FK Service
Get Plan Validity Service
Plan Path Service
Execute Path Service
Get Planning Scene Service
AttachedObject
CollisionObject
PlanningSceneDiff
move_group
JointTrajectoryAction
Point Cloud Topic
Joint States Topic
TF
Robot State Publisher
Robot Controllers
Robot 3D Sensors
Robot Sensors


ish Point


User Interface
move_group_interface (C++)
moveit_commander (Python)
GUI (Rviz Plugin)
Other Interfaces
AttachedObject
CollisionObject
PlanningSceneDiff
Monitored Planning Scene (Optionally Published)
Planning Scene Monitor
state monitor
scene monitor
world geometry monitor
Point Cloud Topic
Depth Image Topic
Robot 3D Sensors
Joint States Topic
TF
Robot State Publisher
Robot Sensors

Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
Author Information
Configuration Files

MoveIt Setup Assistant

Welcome to the MoveIt Setup Assistant! These tools will assist you in creating a MoveIt configuration package that is required to run MoveIt. This includes generating a Semantic Robot Description Format (SRDF) file, kinematics configuration file and OMPL planning configuration file. It also involves creating launch files for move groups, OMPL planner, planning contexts and the planning warehouse.

MoveIt!

Choose mode:

All settings for MoveIt are stored in a Moveit configuration package. Here you have the option to create a new configuration package, or load an existing one. Note: any changes to a MoveIt configuration package outside this setup assistant will likely be overwritten by this tool.

Create New MoveIt Configuration Package | Edit Existing MoveIt Configuration Package

Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
Author Information
Configuration Files

MoveIt Setup Assistant

Welcome to the MoveIt Setup Assistant! These tools will assist you in creating a MoveIt configuration package that is required to run MoveIt. This includes generating a Semantic Robot Description Format (SRDF) file, kinematics configuration file and OMPL planning configuration file. It also involves creating launch files for move groups, OMPL planner, planning contexts and the planning warehouse.

MoveIt!

Choose mode:

All settings for MoveIt are stored in a Moveit configuration package. Here

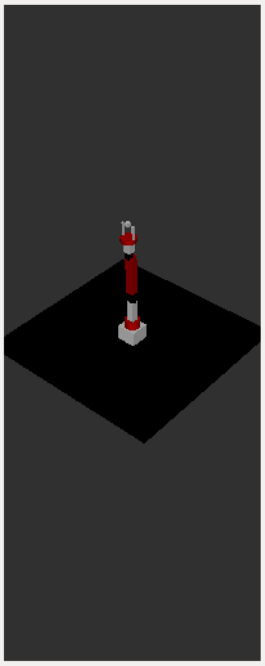
Load a URDF or COLLADA Robot Model

Specify the location of an existing Universal Robot Description Format or

astering_ros_robot_description_pkg/urdf/seven_dof_arm.xacro | Browse

Success! Use the left navigation pane to continue.

100% | Load Files



- Start
- Self-Collisions
- Virtual Joints
- Planning Groups
- Robot Poses
- End Effectors
- Passive Joints
- Author Information
- Configuration Files

Optimize Self-Collision Checking

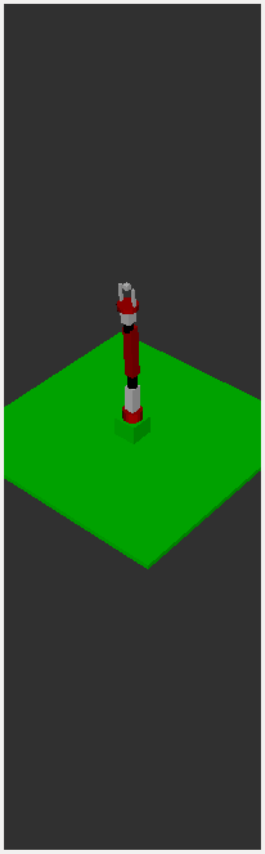
The Default Self-Collision Matrix Generator will search for pairs of links on the robot that can safely be disabled from collision checking, decreasing motion planning processing time. These pairs of links are disabled when they are always in collision, never in collision, in collision in the robot's default position or when the links are adjacent to each other on the kinematic chain. Sampling density specifies how many random robot positions to check for self collision. Higher densities require more computation time.

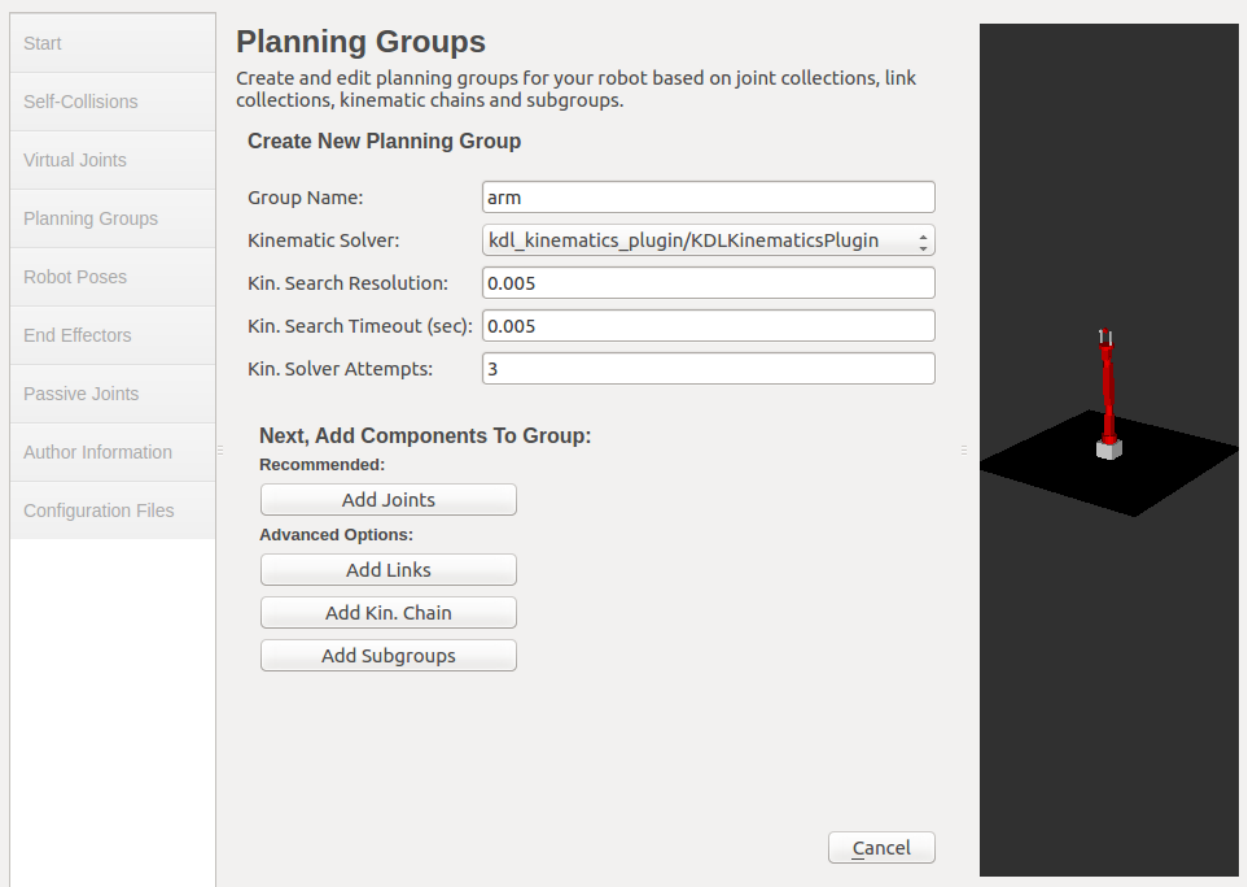
Sampling Density: Low — High 10000

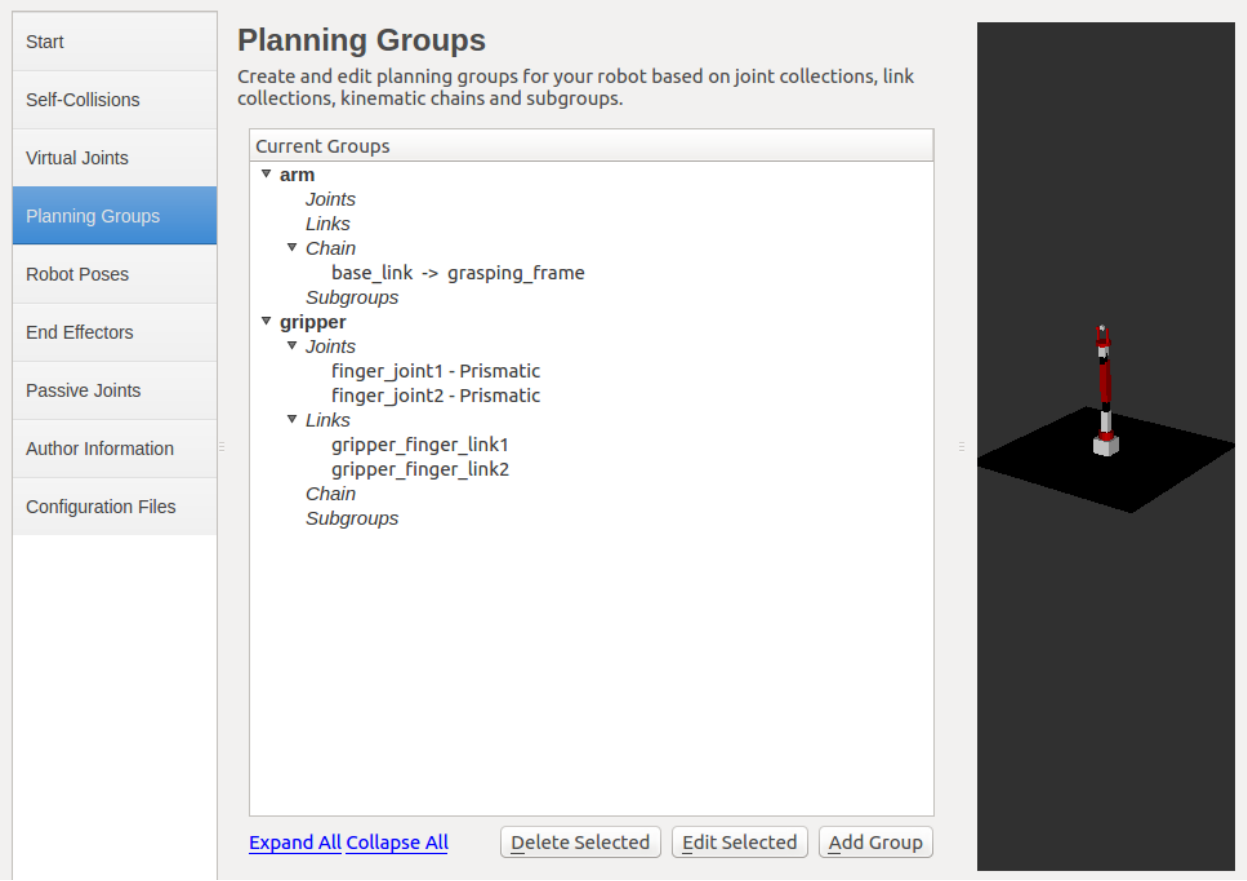
Min. collisions for "always"-colliding p 95% Generate Collision Matrix

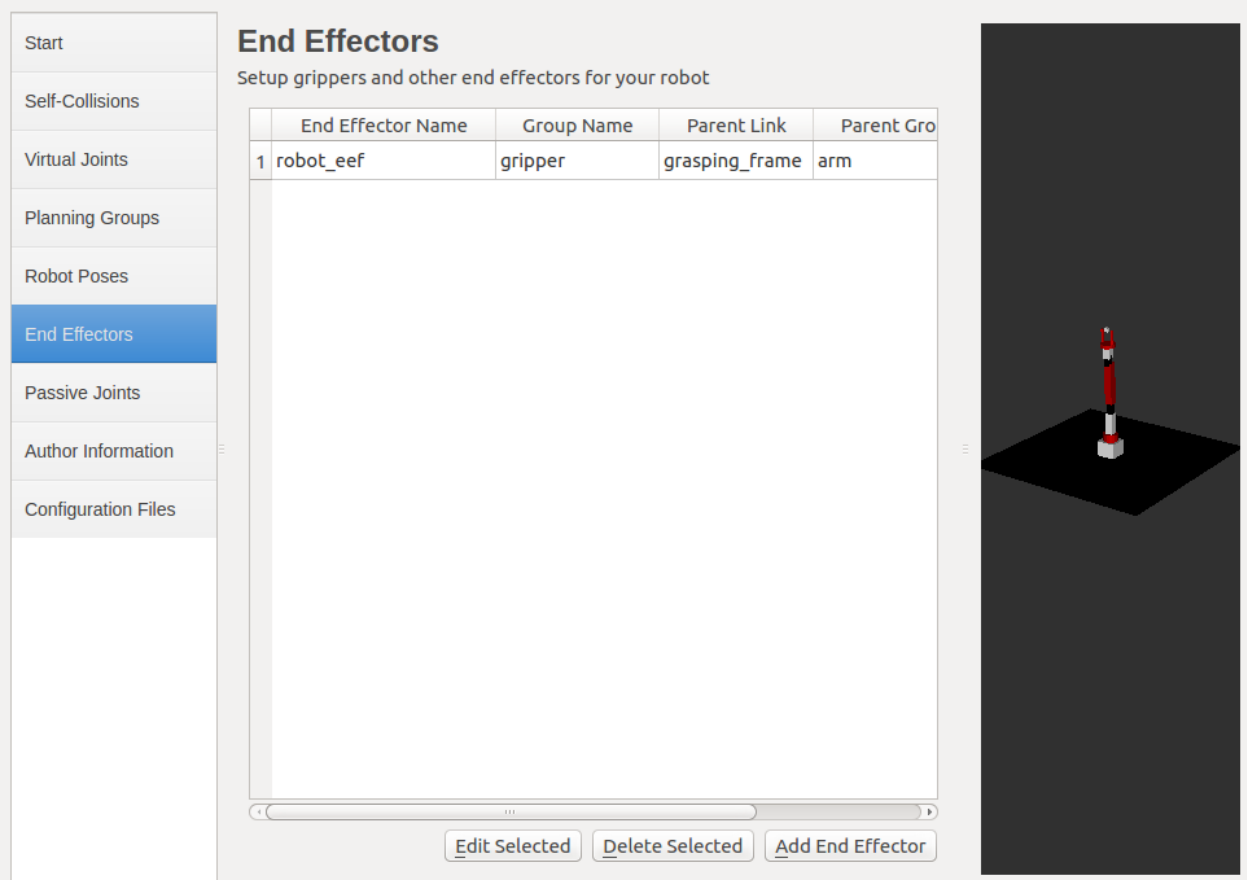
	Link A	Link B	Disabled	ɛason to Disab
1	base_link	bottom_link	☑	Adjacent Li…
2	base_link	elbow_roll…	☑	Never in Co…
3	base_link	grasping_fr…	☑	Never in Co…
4	base_link	gripper_fin…	☑	Never in Co…
5	base_link	gripper_fin…	☑	Never in Co…
6	base_link	gripper_rol…	☑	Never in Co…
7	base_link	shoulder_p…	☑	Adjacent Li…
8	base_link	wrist_pitch…	☑	Never in Co…
9	base_link	wrist_roll_l…	☑	Never in Co…
10	bottom_link	elbow_roll…	☑	Never in Co…
11	bottom_link	shoulder_p…	☑	Never in Co…

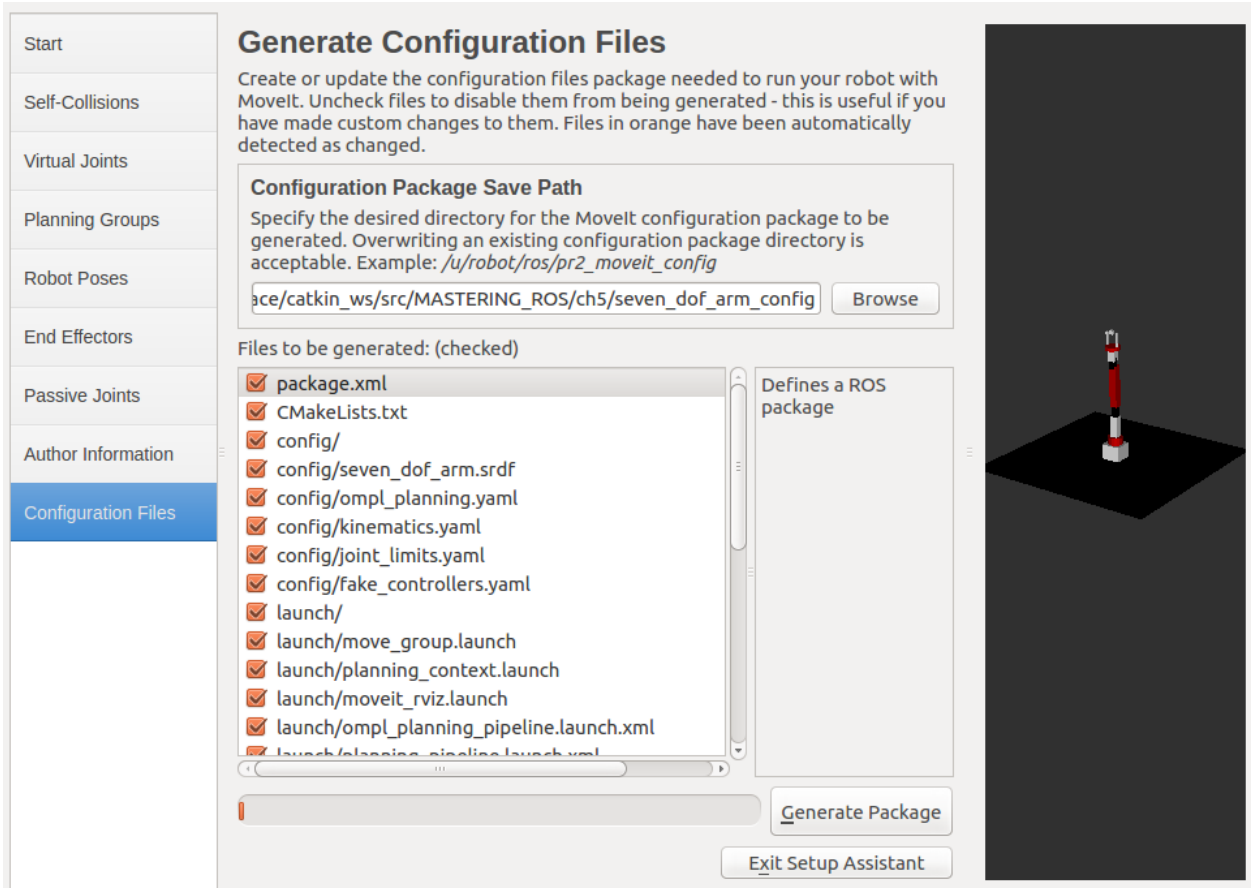
link n… ☐ show enabled pairs ◉ linear view ○ matrix view Revert

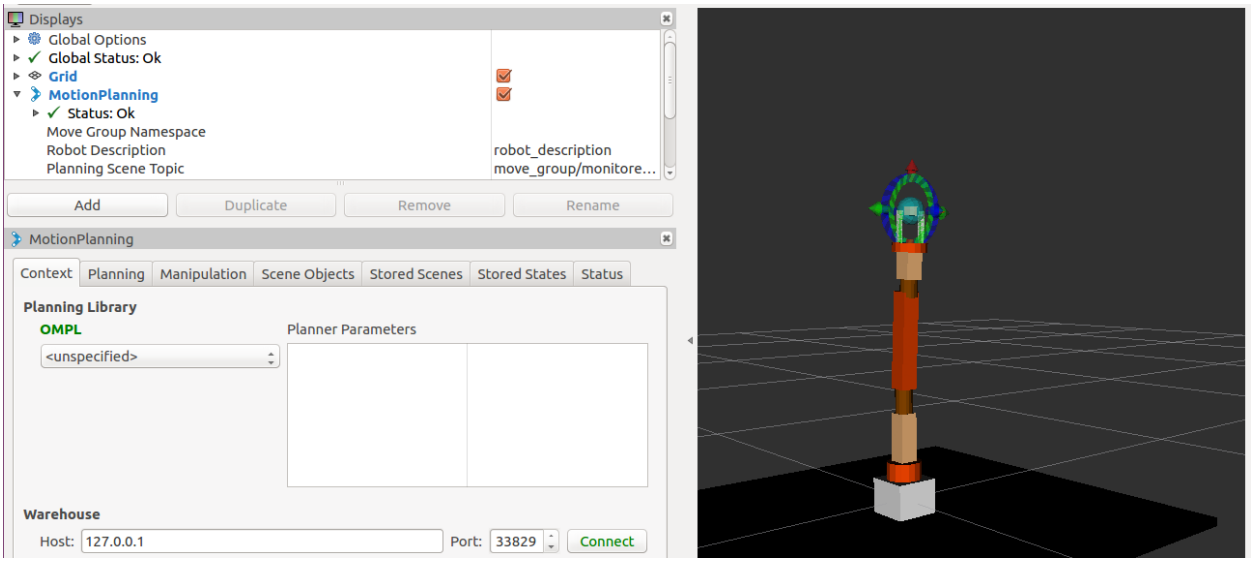


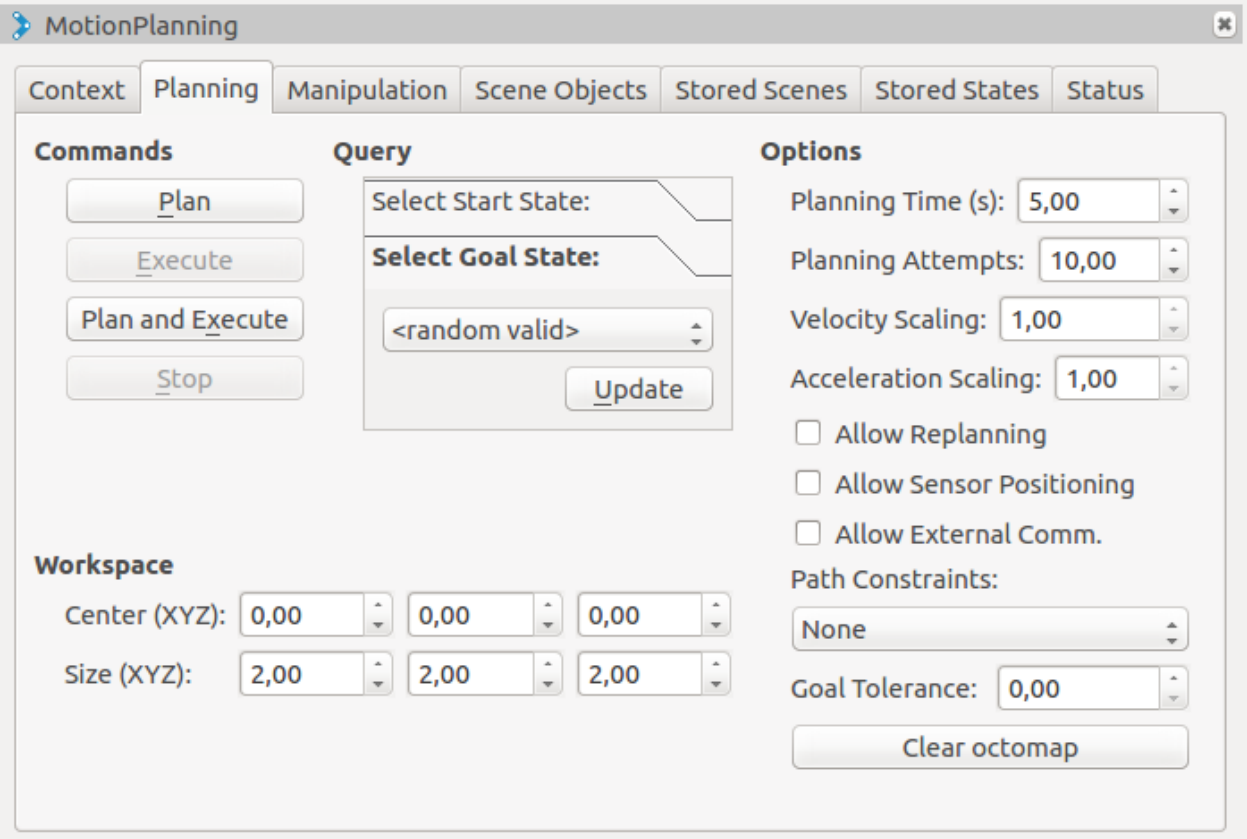

Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
Author Information
Configuration Files
Planning Groups
Create and edit planning groups for your robot based on joint collections, link collections, kinematic chains and subgroups.
Create New Planning Group
Group Name:
arm
Kinematic Solver:
kdl_kinematics_plugin/KDLKinematicsPlugin
Kin. Search Resolution:
0.005
Kin. Search Timeout (sec):
0.005
Kin. Solver Attempts:
3
Next, Add Components To Group:
Recommended:
Add Joints
Advanced Options:
Add Links
Add Kin. Chain
Add Subgroups
Cancel

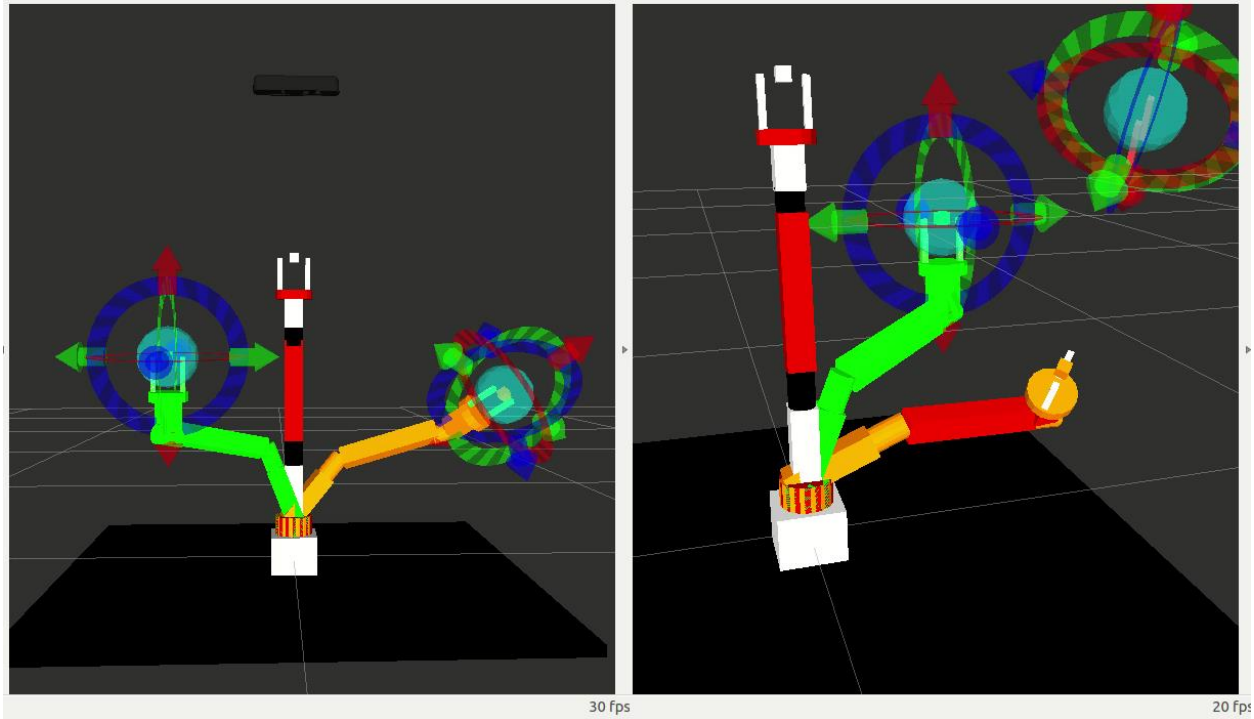

Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
Author Information
Configuration Files
Planning Groups
Create and edit planning groups for your robot based on joint collections, link collections, kinematic chains and subgroups.
Current Groups
arm
Joints
Links
Chain
base_link -> grasping_frame
Subgroups
gripper
Joints
finger_joint1 - Prismatic
finger_joint2 - Prismatic
Links
gripper_finger_link1
gripper_finger_link2
Chain
Subgroups
Expand All Collapse All
Delete Selected
Edit Selected
Add Group

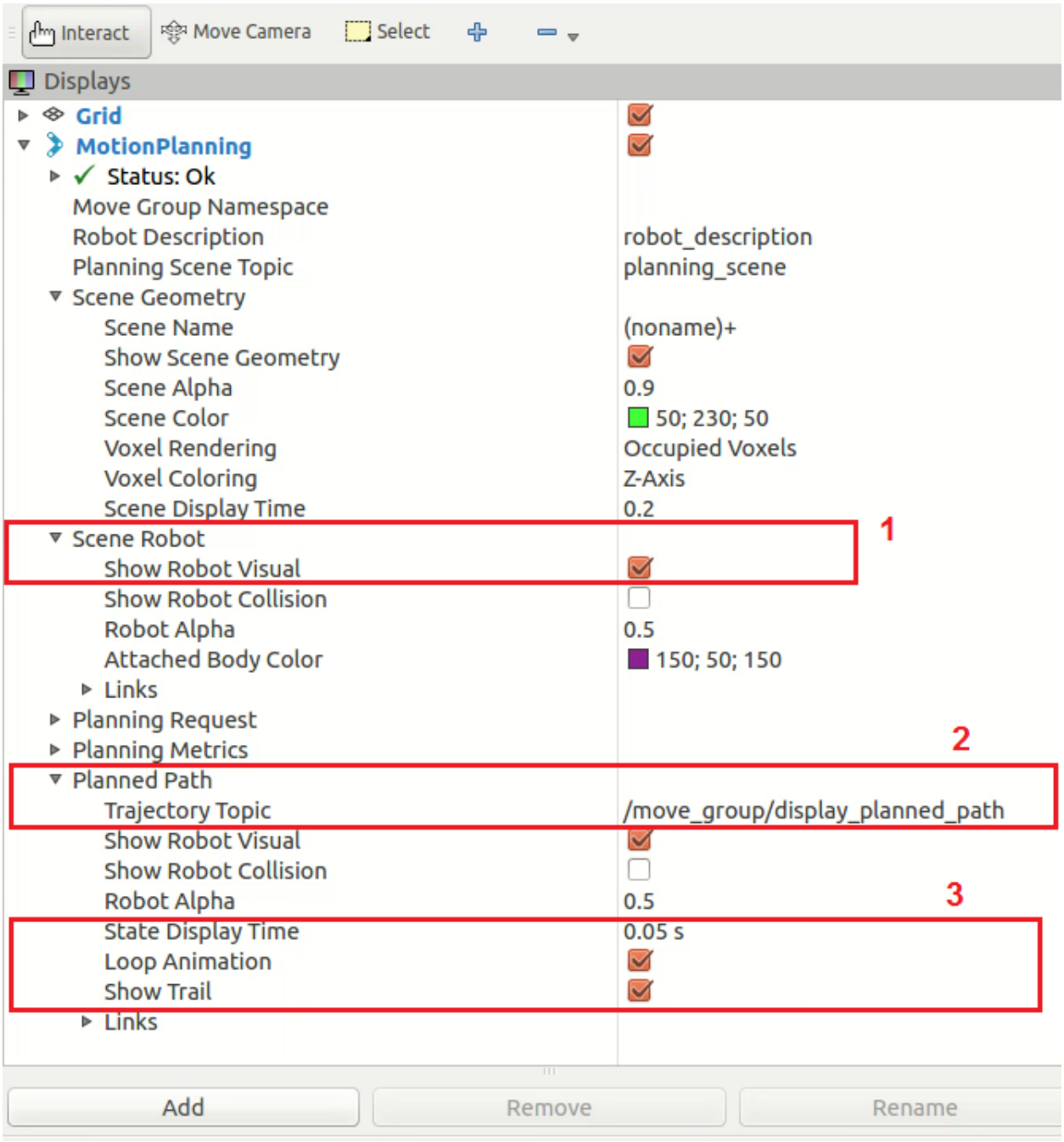

Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
Author Information
Configuration Files
End Effectors
Setup grippers and other end effectors for your robot
End Effector Name
Group Name
Parent Link
Parent Gro
1
robot_eef
gripper
grasping_frame
arm
Edit Selected
Delete Selected
Add End Effector


Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
Author Information
Configuration Files
Generate Configuration Files
Create or update the configuration files package needed to run your robot with MoveIt. Uncheck files to disable them from being generated - this is useful if you have made custom changes to them. Files in orange have been automatically detected as changed.
Configuration Package Save Path
Specify the desired directory for the MoveIt configuration package to be generated. Overwriting an existing configuration package directory is acceptable. Example: /u/robot/ros/pr2_moveit_config
ace/catkin_ws/src/MASTERING_ROS/ch5/seven_dof_arm_config
Browse
Files to be generated: (checked)
package.xml
CMakeLists.txt
config/
config/seven_dof_arm.srdf
config/ompl_planning.yaml
config/kinematics.yaml
config/joint_limits.yaml
config/fake_controllers.yaml
launch/
launch/move_group.launch
launch/planning_context.launch
launch/moveit_rviz.launch
launch/ompl_planning_pipeline.launch.xml
Defines a ROS package
Generate Package
Exit Setup Assistant

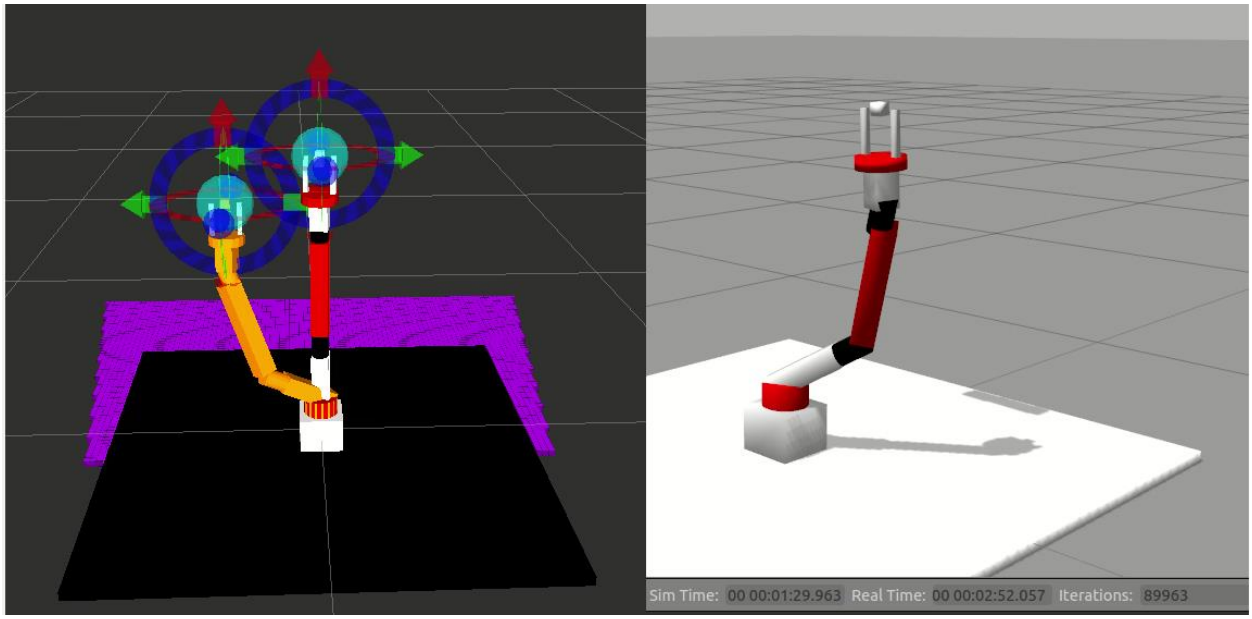

Displays
Global Options
Global Status: Ok
Grid
MotionPlanning
Status: Ok
Move Group Namespace
Robot Description
robot_description
Planning Scene Topic
move_group/monitore...
Add
Duplicate
Remove
Rename
MotionPlanning
Context
Planning
Manipulation
Scene Objects
Stored Scenes
Stored States
Status
Planning Library
OMPL
<unspecified>
Planner Parameters
Warehouse
Host: 127.0.0.1
Port: 33829
Connect


MotionPlanning
Context
Planning
Manipulation
Scene Objects
Stored Scenes
Stored States
Status
Commands
Plan
Execute
Plan and Execute
Stop
Query
Select Start State:
Select Goal State:
<random valid>
Update
Options
Planning Time (s): 5,00
Planning Attempts: 10,00
Velocity Scaling: 1,00
Acceleration Scaling: 1,00
Allow Replanning
Allow Sensor Positioning
Allow External Comm.
Path Constraints:
None
Goal Tolerance: 0,00
Clear octomap
Workspace
Center (XYZ): 0,00 0,00 0,00
Size (XYZ): 2,00 2,00 2,00


30 fps
20 fps


Interact
Move Camera
Select
Displays
Grid
MotionPlanning
Status: Ok
Move Group Namespace
Robot Description
robot_description
Planning Scene Topic
planning_scene
Scene Geometry
Scene Name
(noname)+
Show Scene Geometry
Scene Alpha
0.9
Scene Color
50; 230; 50
Voxel Rendering
Occupied Voxels
Voxel Coloring
Z-Axis
Scene Display Time
0.2
Scene Robot
1
Show Robot Visual
Show Robot Collision
Robot Alpha
0.5
Attached Body Color
150; 50; 150
Links
Planning Request
Planning Metrics
2
Planned Path
Trajectory Topic
/move_group/display_planned_path
Show Robot Visual
Show Robot Collision
Robot Alpha
0.5
3
State Display Time
0.05 s
Loop Animation
Show Trail
Links
Add
Remove
Rename

▼ Planning Request	
Planning Group	arm
Show Workspace	☐
Query Start State	☑
Query Goal State	☑
Interactive Marker Size	0
Start State Color	0; 255; 0
Start State Alpha	1
Goal State Color	250; 128; 0
Goal State Alpha	1
Colliding Link Color	255; 0; 0
Joint Violation Color	255; 0; 255



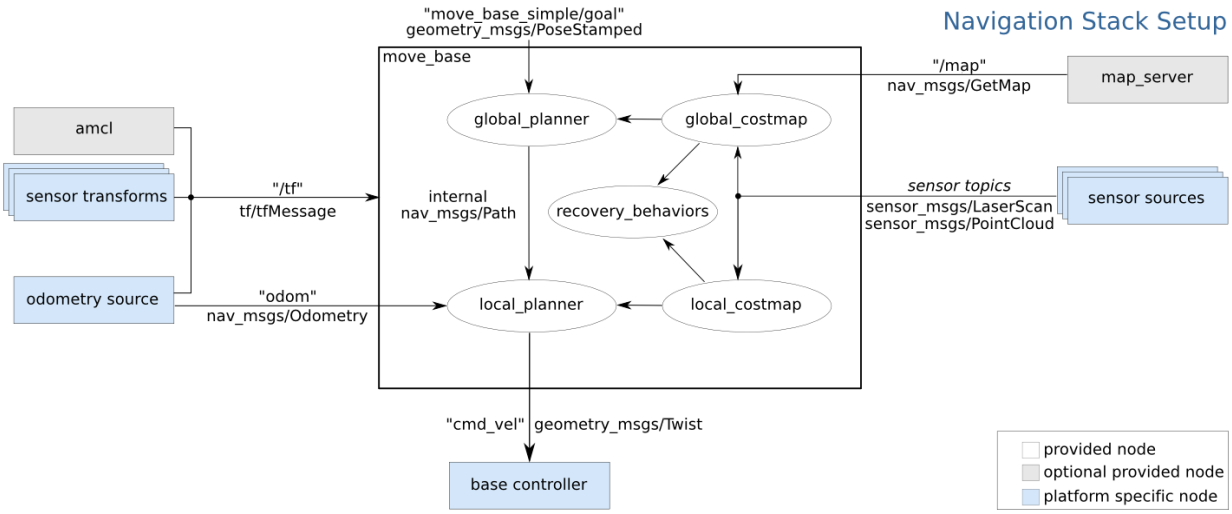

```
/seven_dof_arm/gripper_controller/command
/seven_dof_arm/gripper_controller/follow_joint_trajectory/cancel
/seven_dof_arm/gripper_controller/follow_joint_trajectory/feedback
/seven_dof_arm/gripper_controller/follow_joint_trajectory/goal
/seven_dof_arm/gripper_controller/follow_joint_trajectory/result
/seven_dof_arm/gripper_controller/follow_joint_trajectory/status
/seven_dof_arm/gripper_controller/state
/seven_dof_arm/joint_states
/seven_dof_arm/seven_dof_arm_joint_controller/command
/seven_dof_arm/seven_dof_arm_joint_controller/follow_joint_trajectory/cancel
/seven_dof_arm/seven_dof_arm_joint_controller/follow_joint_trajectory/feedback
/seven_dof_arm/seven_dof_arm_joint_controller/follow_joint_trajectory/goal
/seven_dof_arm/seven_dof_arm_joint_controller/follow_joint_trajectory/result
/seven_dof_arm/seven_dof_arm_joint_controller/follow_joint_trajectory/status
/seven_dof_arm/seven_dof_arm_joint_controller/state
/tf
/tf_static
/trajectory_execution_event
```

```
 [1505806707.153599116, 0.343000000]: Added FollowJointTrajectory controller for seven_dof_ar
ller
 [1505806707.153740538, 0.343000000]: Returned 2 controllers in list
 [1505806707.205783246, 0.347000000]: Trajectory execution is managing controllers
 'move_group/ApplyPlanningSceneService'...
 'move_group/ClearOctomapService'...
 'move_group/MoveGroupCartesianPathService'...
 'move_group/MoveGroupExecuteTrajectoryAction'...
 'move_group/MoveGroupGetPlanningSceneService'...
 'move_group/MoveGroupKinematicsService'...
 'move_group/MoveGroupMoveAction'...
 'move_group/MoveGroupPickPlaceAction'...
 'move_group/MoveGroupPlanService'...
 'move_group/MoveGroupQueryPlannersService'...
 'move_group/MoveGroupStateValidationService'...
```

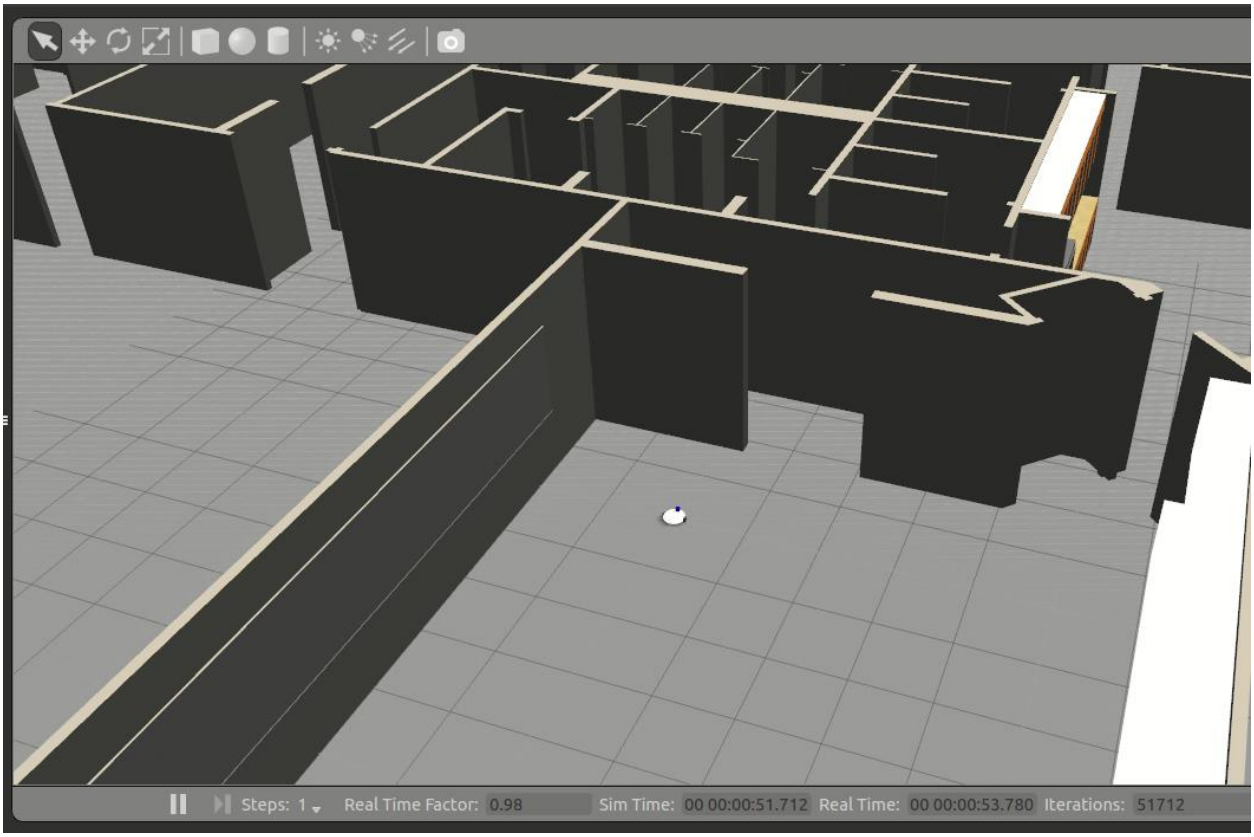
1

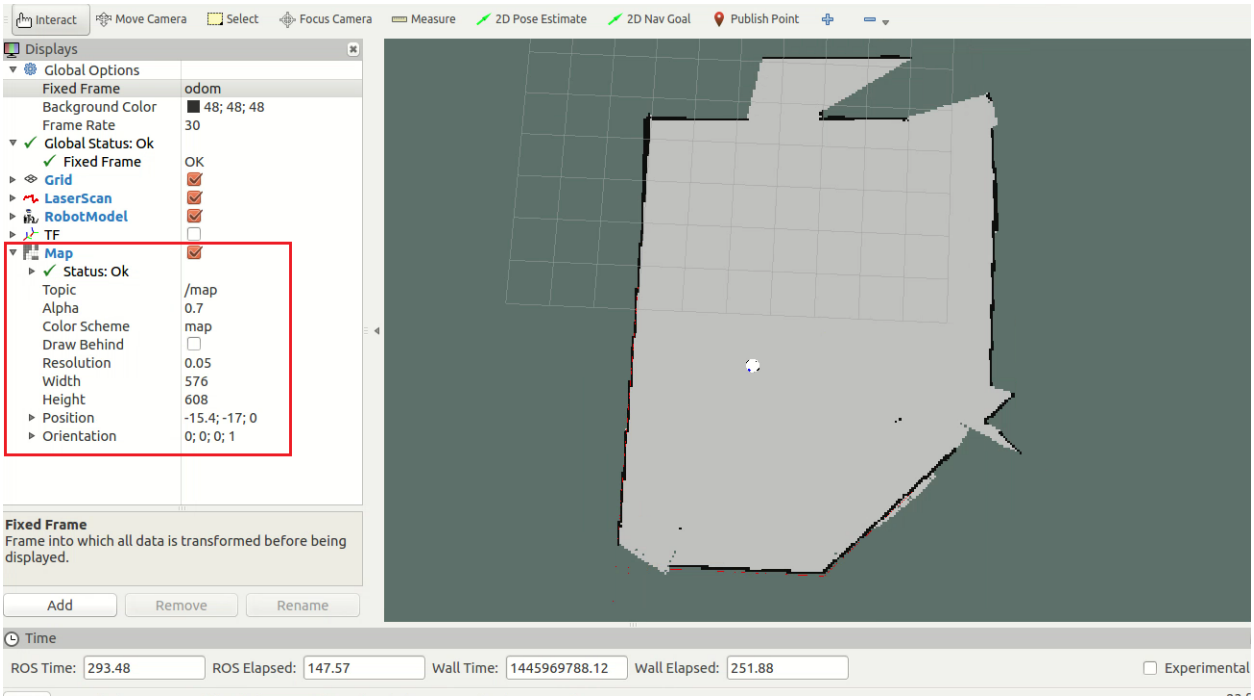
```
 [1505806835.903571251, 36.978000000]: arm[RRTkConfigDefault]: Starting planning with 1 state
astructure
 [1505806835.994742622, 36.997000000]: arm[RRTkConfigDefault]: Created 21 states
 [1505806836.036028021, 37.004000000]: arm[RRTkConfigDefault]: Created 38 states
 [1505806836.038435520, 37.005000000]: ParallelPlan::solve(): Solution found by one or more t
41 seconds
```

2

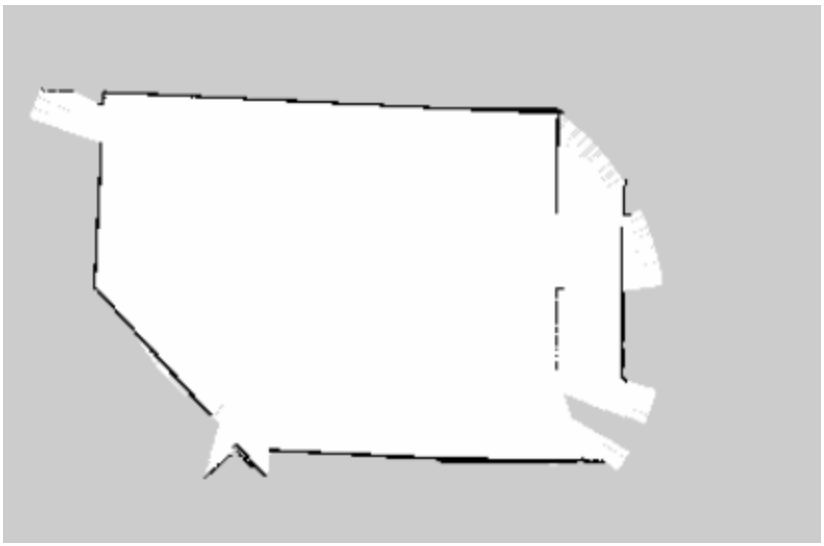



```
[ INFO] [1505810240.049575967, 15.340000000]: Loading from pre-hydro parameter style
[ INFO] [1505810240.168699314, 15.381000000]: Using plugin "static_layer"
[ INFO] [1505810240.384469019, 15.449000000]: Requesting the map...
[ INFO] [1505810240.663457937, 15.552000000]: Resizing costmap to 288 X 608 at 0.050000 m/pix
[ INFO] [1505810240.871384865, 15.650000000]: Received a 288 X 608 map at 0.050000 m/pix
[ INFO] [1505810240.897210021, 15.656000000]: Using plugin "obstacle_layer"
[ INFO] [1505810240.913185546, 15.660000000]:     Subscribed to Topics: scan bump
[ INFO] [1505810241.183408917, 15.714000000]: Using plugin "inflation_layer"
[ INFO] [1505810241.592248141, 15.851000000]: Loading from pre-hydro parameter style
[ INFO] [1505810241.730240828, 15.900000000]: Using plugin "obstacle_layer"
[ INFO] [1505810241.978042290, 16.015000000]:     Subscribed to Topics: scan bump
[ INFO] [1505810242.124180243, 16.057000000]: Using plugin "inflation_layer"
[ INFO] [1505810242.504991688, 16.191000000]: Created local_planner dwa_local_planner/DWAPlannerROS
[ INFO] [1505810242.518319734, 16.198000000]: Sim period is set to 0.20
[ INFO] [1505810244.343111055, 16.967000000]: Recovery behavior will clear layer obstacles
[ INFO] [1505810244.546680028, 17.020000000]: Recovery behavior will clear layer obstacles
[ INFO] [1505810244.697982461, 17.046000000]: odom received!
```

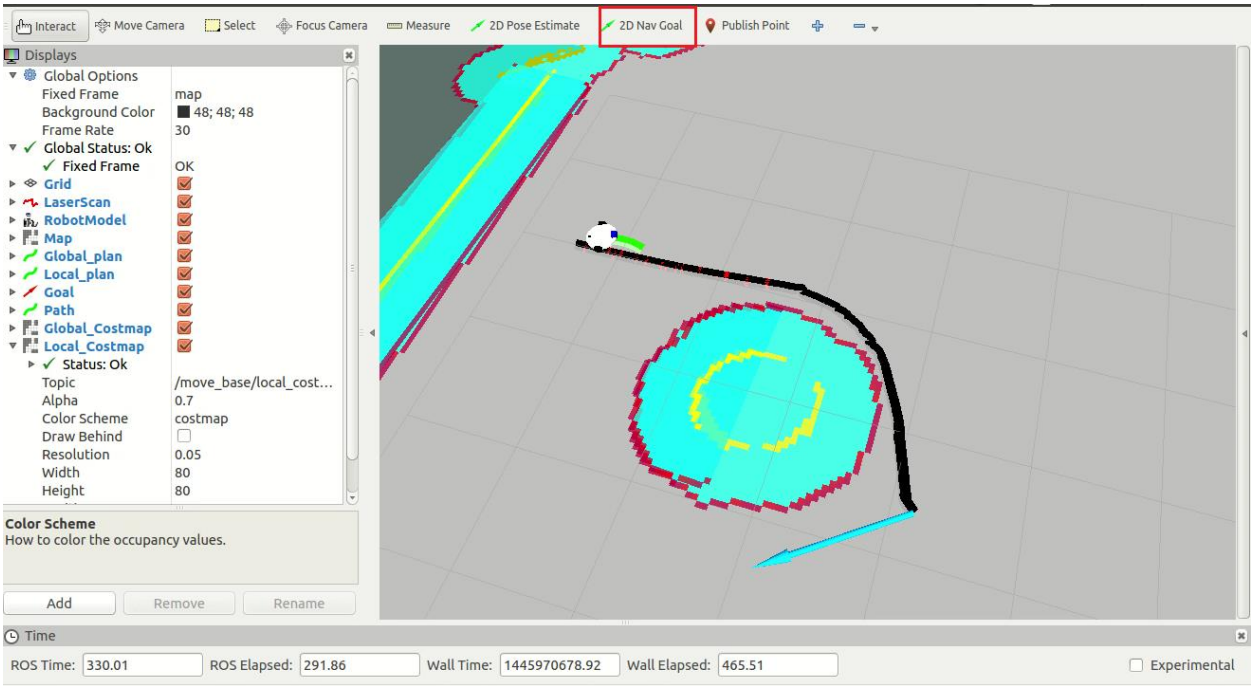


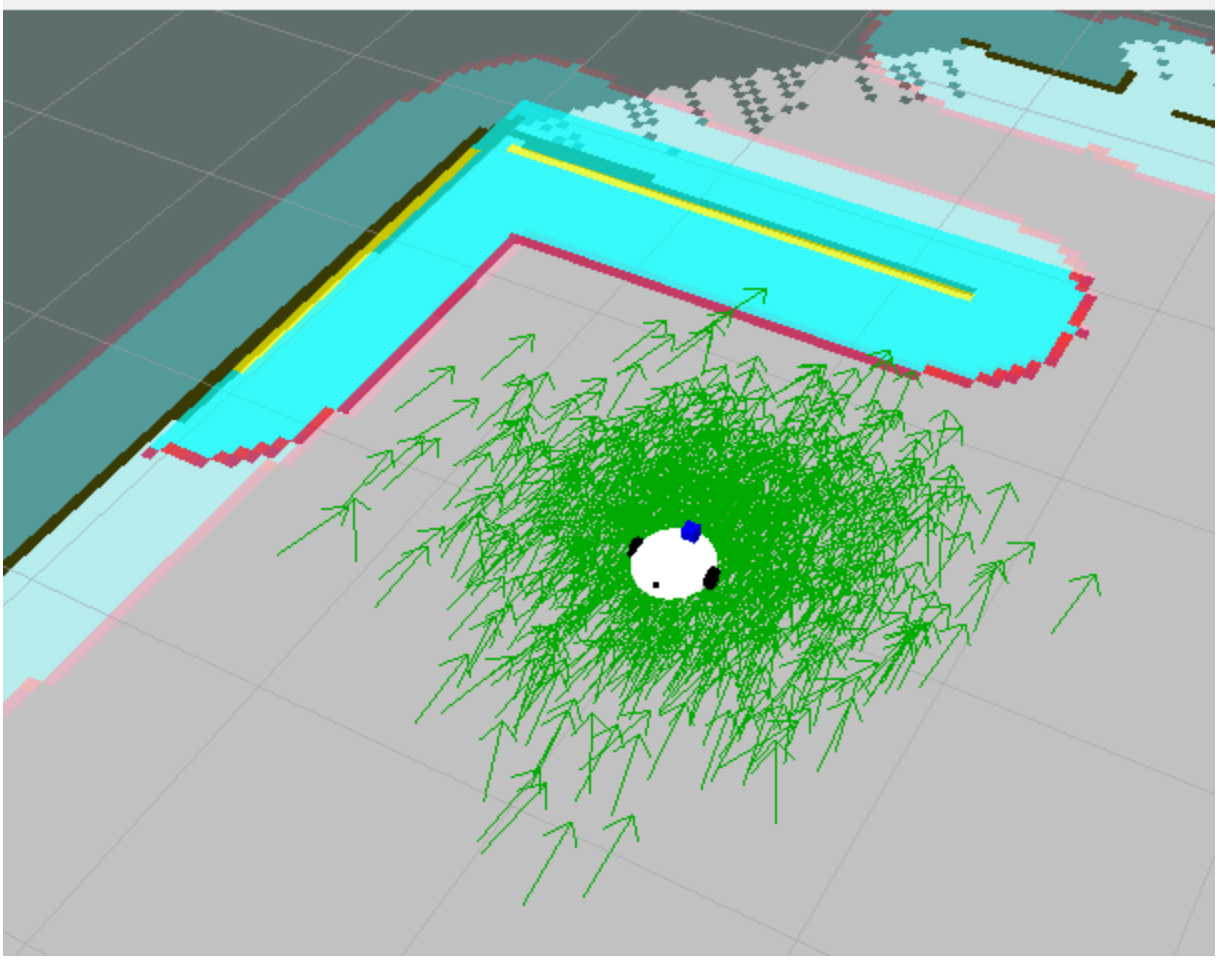



```
jcacace@robot:~$ rosrun map_server map_saver -f willo
[ INFO] [1505810794.895750258]: Waiting for the map
[ INFO] [1505810795.117276658, 21.621000000]: Received a 288 X 608 map @ 0.050 m/pix
[ INFO] [1505810795.119888038, 21.621000000]: Writing map occupancy data to willo.pgm
[ INFO] [1505810795.138065942, 21.632000000]: Writing map occupancy data to willo.yaml
[ INFO] [1505810795.138632329, 21.632000000]: Done
```

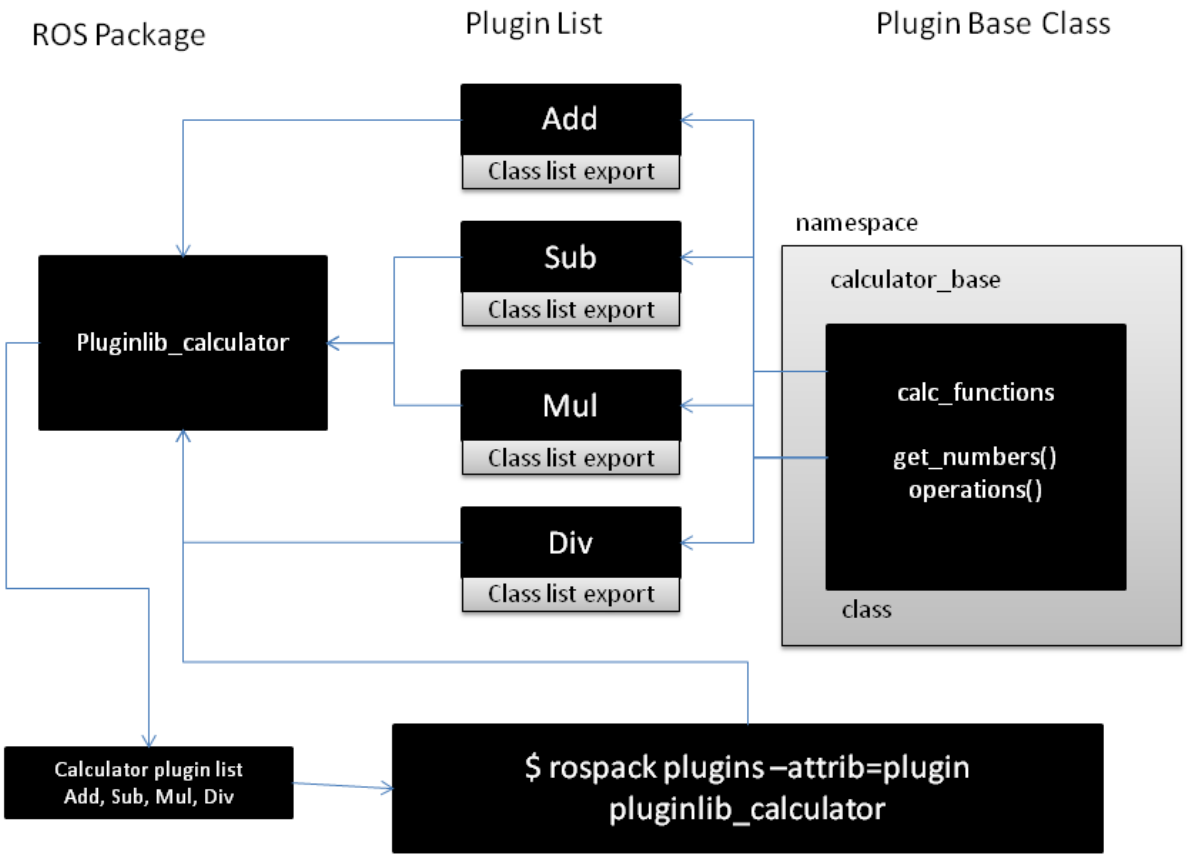


```
[ INFO] [1505821904.100025792, 139.365000000]: Using plugin "static_layer"
[ INFO] [1505821904.277281445, 139.434000000]: Requesting the map...
[ INFO] [1505821904.489128458, 139.541000000]: Resizing costmap to 512 X 480 at 0.050000 m/pix
[ INFO] [1505821904.667453907, 139.643000000]: Received a 512 X 480 map at 0.050000 m/pix
[ INFO] [1505821904.675176680, 139.648000000]: Using plugin "obstacle_layer"
[ INFO] [1505821904.681719452, 139.648000000]:     Subscribed to Topics: scan bump
[ INFO] [1505821904.813327088, 139.699000000]: Using plugin "inflation_layer"
[ INFO] [1505821905.081866940, 139.802000000]: Using plugin "obstacle_layer"
[ INFO] [1505821905.194340020, 139.871000000]:     Subscribed to Topics: scan bump
[ INFO] [1505821905.323469494, 139.903000000]: Using plugin "inflation_layer"
[ INFO] [1505821905.674954354, 140.036000000]: Created local_planner dwa_local_planner/DWAPlannerROS
[ INFO] [1505821905.689447045, 140.040000000]: Sim period is set to 0.20
[ INFO] [1505821907.560275254, 141.046000000]: Recovery behavior will clear layer obstacles
[ INFO] [1505821907.785016235, 141.138000000]: Recovery behavior will clear layer obstacles
[ INFO] [1505821907.949123108, 141.197000000]: odom received!
```





Chapter 7: Working with pluginlib, Nodelets, and Gazebo Plugins




```
jcacace@robot:~$ rospack plugins --attrib=plugin pluginlib_calculator
pluginlib_calculator /home/jcacace/catkin_ws/src/MASTERING_ROS/ch6/pluginlib_calculator/calculator_
plugins.xml
```

```
jcacace@robot:~$ rosrun pluginlib_calculator calculator_loader
[ INFO] [1506769896.353657043]: Triangle area: 20.00
[ INFO] [1506769896.353796789]: Substracted result: 0.00
[ INFO] [1506769896.353853201]: Multiplied result: 100.00
[ INFO] [1506769896.353886772]: Division result: 1.00
```

```
jcacace@robot:~$ rosrun nodelet nodelet manager __name:=nodelet_manager
[ INFO] [1506775149.019457792]: Initializing nodelet with 2 worker threads.
```

```
jcacace@robot:~/catkin_ws$ rosrun nodelet nodelet load nodelet_hello_world/Hello
[ INFO] [1506776968.889742876]: Loading nodelet /nodelet1 of type nodelet_hello_
pings:
```

```
jcacace@robot:~$ rostopic list
/nodelet1/msg_in
/nodelet1/msg_out
/nodelet_manager/bond
/rosout
/rosout_agg
```

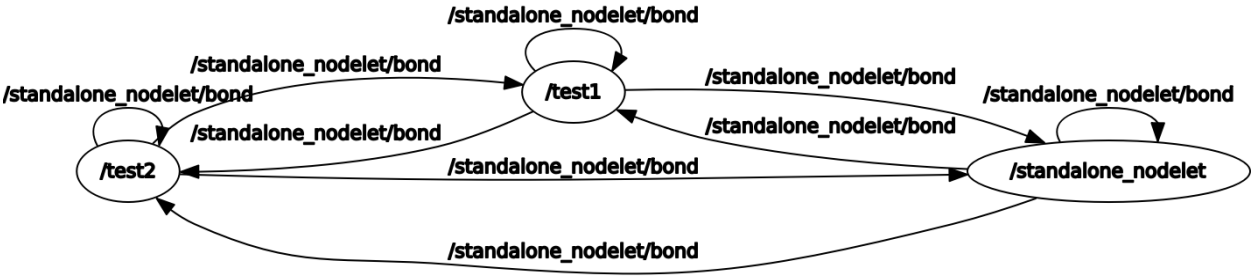
```
jcacace@robot:~$ rostopic pub /nodelet1/msg_in std_msgs
/String "Hello"
publishing and latching message. Press ctrl-C to termin
ate
```

jcacace@robot: ~

```
jcacace@robot:~$ rostopic echo /nodelet1/msg_out
data: Hello
```

```
[ INFO] [1506951118.603857605]: Loading nodelet /test2 of type nodelet_hello_world/Hello to manager
 standalone_nodelet with the following remappings:
[ INFO] [1506951118.606768479]: Loading nodelet /test1 of type nodelet_hello_world/Hello to manager
 standalone_nodelet with the following remappings:
[ INFO] [1506951118.610320371]: waitForService: Service [/standalone_nodelet/load_nodelet] has not
been advertised, waiting...
[ INFO] [1506951118.613444334]: waitForService: Service [/standalone_nodelet/load_nodelet] has not
been advertised, waiting...
[ INFO] [1506951118.627001318]: Initializing nodelet with 2 worker threads.
[ INFO] [1506951118.632595864]: waitForService: Service [/standalone_nodelet/load_nodelet] is now a
vailable.
[ INFO] [1506951118.634985422]: waitForService: Service [/standalone_nodelet/load_nodelet] is now a
vailable.
```

```
jcacace@robot:~$ rostopic list
/rosout
/rosout_agg
/standalone_nodelet/bond
/test1/msg_in
/test1/msg_out
/test2/msg_in
/test2/msg_out
jcacace@robot:~$ rosnode list
/rosout
/standalone_nodelet
/test1
/test2
```

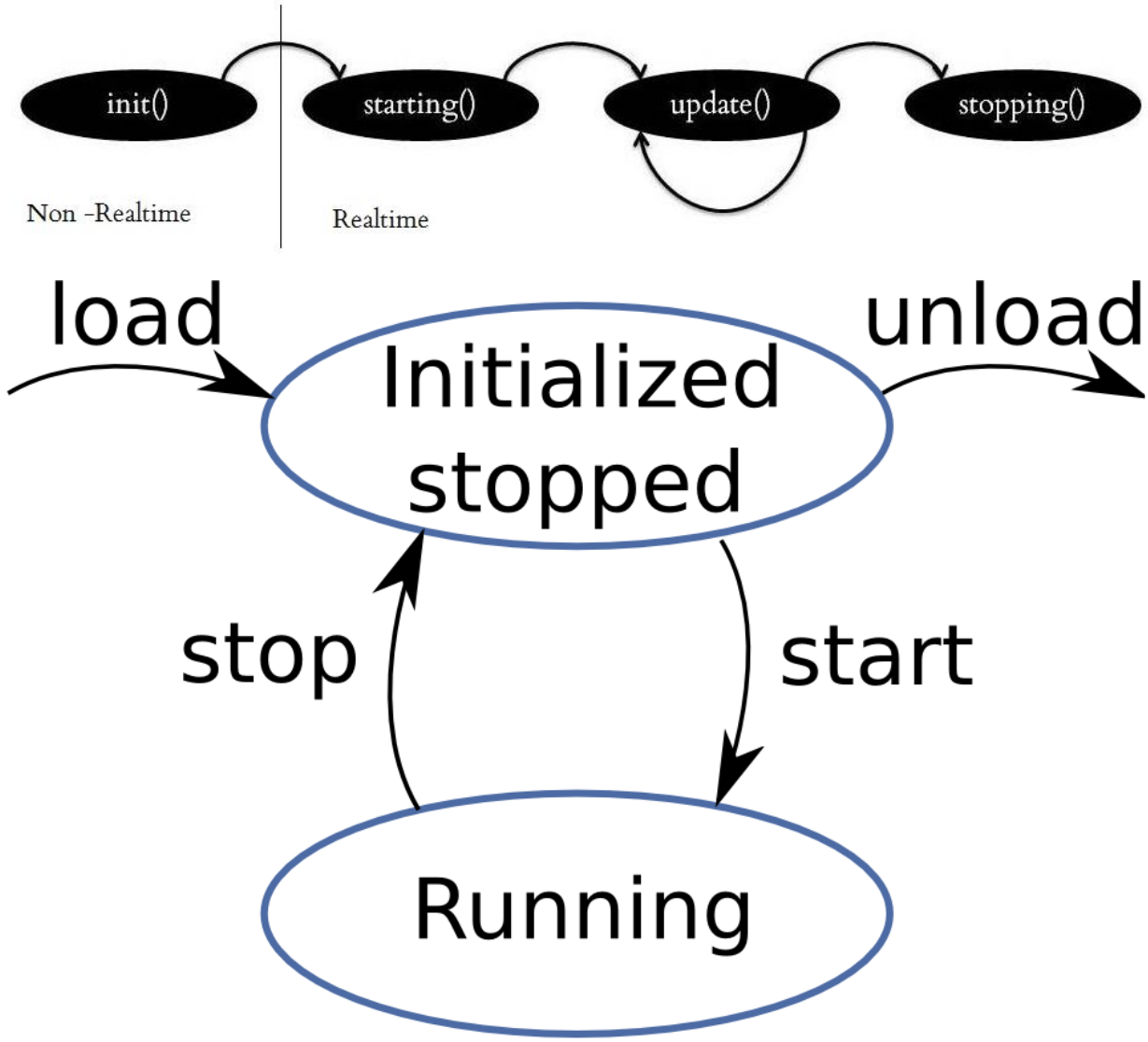



```
jcacace@robot:~/catkin_ws/src/MASTERING_ROS/ch6/gazebo_basic_world_plugin$ gzserver hello.world  --verbose
Gazebo multi-robot simulator, version 7.0.0
Copyright (C) 2012-2016 Open Source Robotics Foundation.
Released under the Apache 2 License.
http://gazebosim.org

[Msg] Waiting for master.
[Msg] Connected to gazebo master @ http://127.0.0.1:11345
[Msg] Publicized address: 10.0.2.15
Hello World!
```

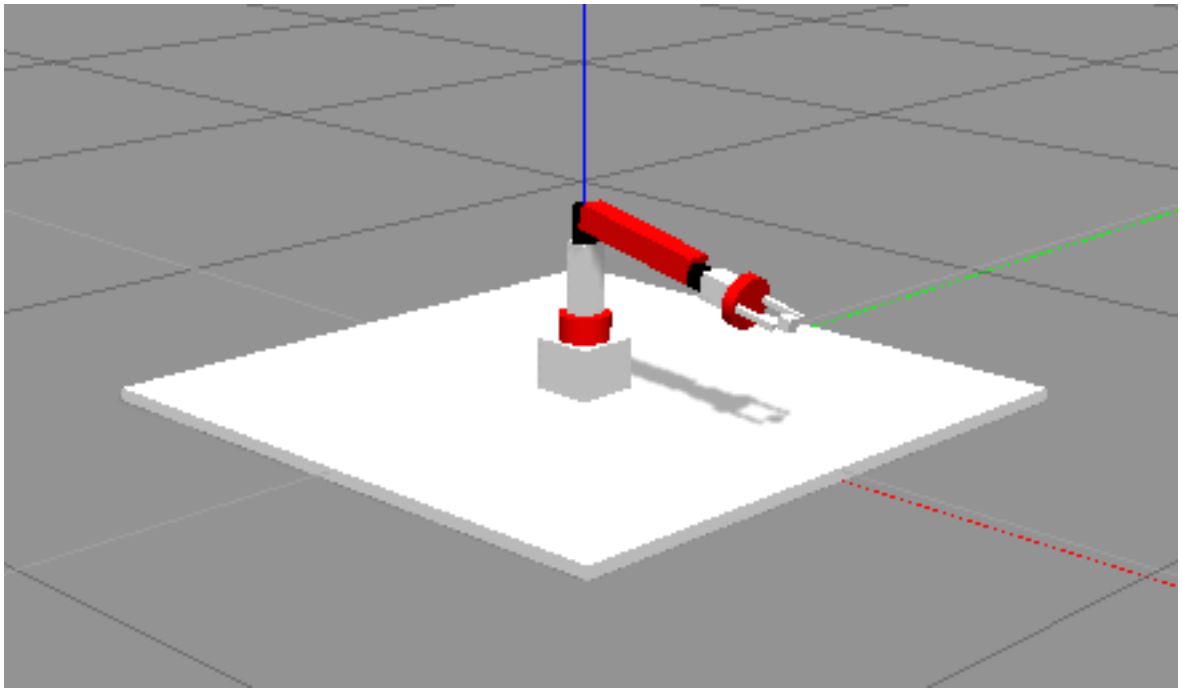
default | gazebo / examples / plugins /

..

- animate_joints
- animate_pose
- camera
- custom_messages
- factory
- gui_overlay_plugin_spawn
- gui_overlay_plugin_time
- hello_world
- mainwindow_example
- model_move
- model_push
- model_visuals
- parameters
- projector
- system_gui_plugin

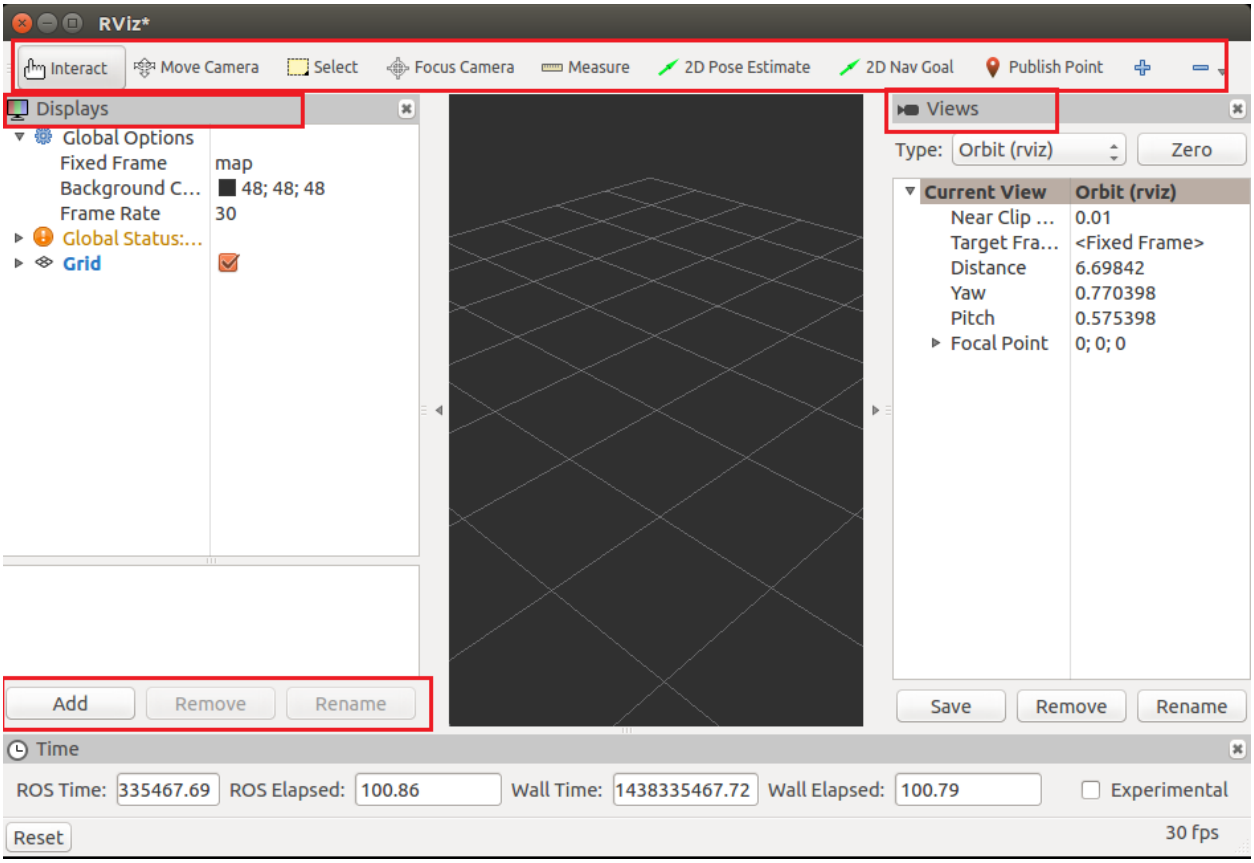


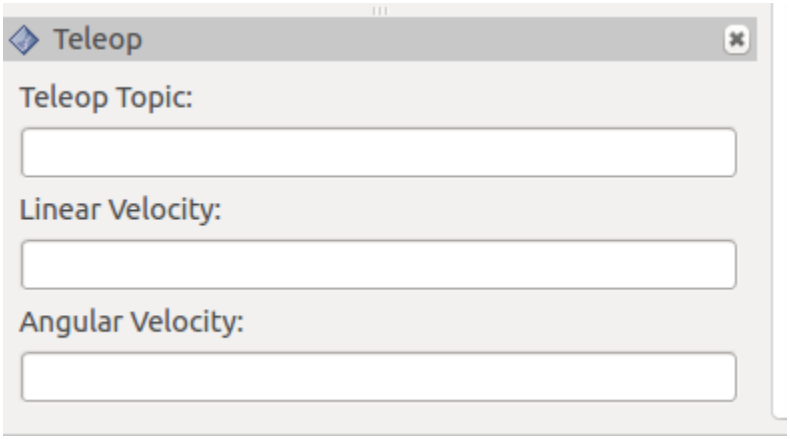

```
jcacace@robot:~$ rospack plugins --attrib=plugin controller_interface
my_controller /home/jcacace/catkin_ws/src/MASTERING_ROS/ch7/my_controller/controller_plugins.xml
joint_trajectory_controller /opt/ros/kinetic/share/joint_trajectory_controller/ros_control_plugins.xml
position_controllers /opt/ros/kinetic/share/position_controllers/position_controllers_plugins.xml
effort_controllers /opt/ros/kinetic/share/effort_controllers/effort_controllers_plugins.xml
diff_drive_controller /opt/ros/kinetic/share/diff_drive_controller/diff_drive_controller_plugins.xml
joint_state_controller /opt/ros/kinetic/share/joint_state_controller/joint_state_plugin.xml
```

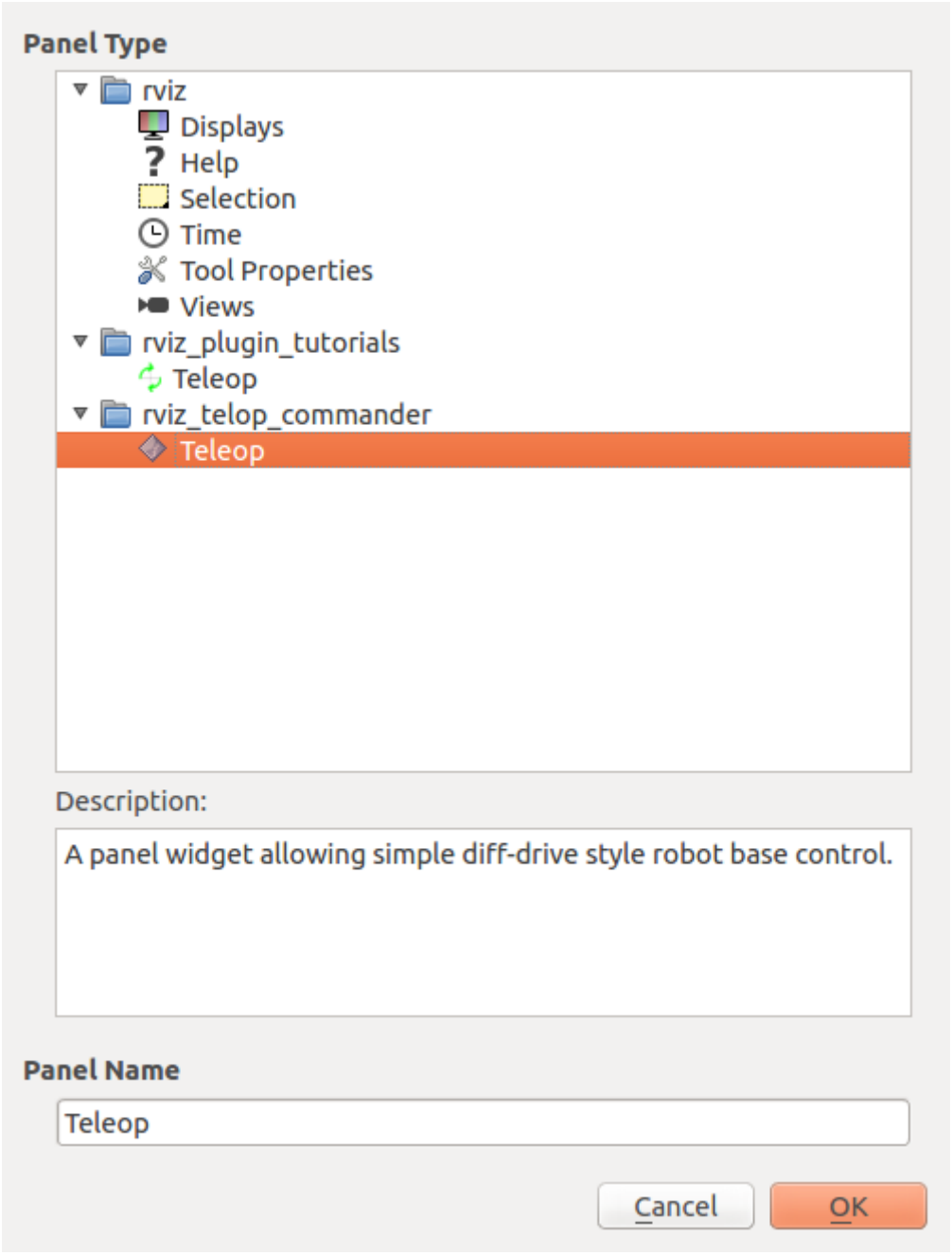


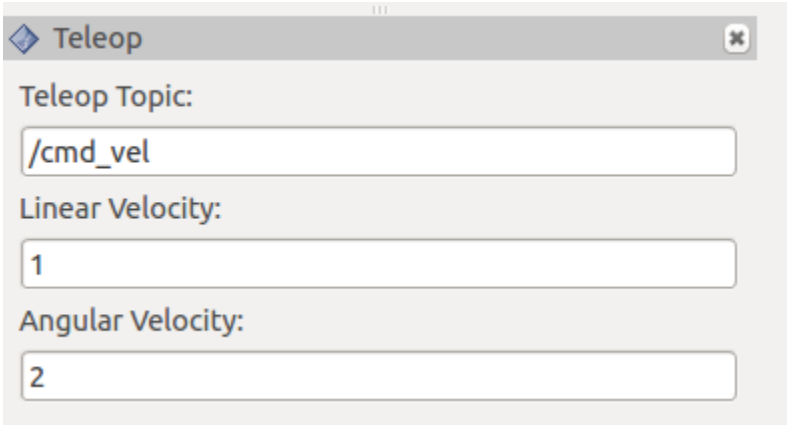
```
jcacace@robot:~$ rosservice call /controller_manager/list_controllers
controller:
  -
    name: my_controller_name
    state: running
    type: my_controller_ns/MyControllerClass
    claimed_resources:
      -
        hardware_interface: hardware_interface::PositionJointInterface
        resources: ['elbow_pitch_joint']
```

```
jcacace@robot:~$ rosservice call /controller_manager/switch_controller "start_controllers:
- ''
stop_controllers:
- 'my_controller_name'
strictness: 0"
ok: True
jcacace@robot:~$ rosservice call /controller_manager/list_controllers
controller:
  -
    name: my_controller_name
    state: stopped
    type: my_controller_ns/MyControllerClass
    claimed_resources:
      -
        hardware_interface: hardware_interface::PositionJointInterface
        resources: ['elbow_pitch_joint']
```


RViz*
Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame
map
Background C...
48; 48; 48
Frame Rate
30
Global Status:...
Grid
Add
Remove
Rename
Views
Type:
Orbit (rviz)
Zero
Current View
Orbit (rviz)
Near Clip ...
0.01
Target Fra...
<Fixed Frame>
Distance
6.69842
Yaw
0.770398
Pitch
0.575398
Focal Point
0; 0; 0
Save
Remove
Rename
Time
ROS Time:
335467.69
ROS Elapsed:
100.86
Wall Time:
1438335467.72
Wall Elapsed:
100.79
Experimental
Reset
30 fps


Teleop
Teleop Topic:
Linear Velocity:
Angular Velocity:

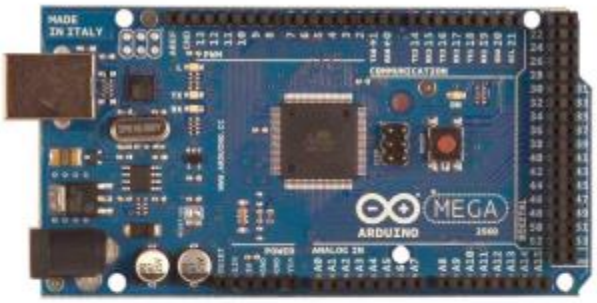

Panel Type
rviz
Displays
Help
Selection
Time
Tool Properties
Views
rviz_plugin_tutorials
Teleop
rviz_telop_commander
Teleop
Description:
A panel widget allowing simple diff-drive style robot base control.
Panel Name
Teleop
Cancel
OK



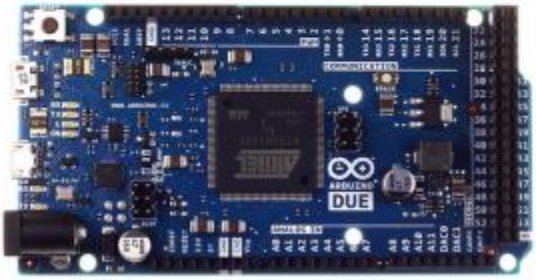

```
jcacace@robot:~/catkin_ws$ rostopic echo /cmd_vel
linear:
  x: 1.0
  y: 0.0
  z: 0.0
angular:
  x: 0.0
  y: 0.0
  z: 2.0
---
linear:
  x: 1.0
  y: 0.0
  z: 0.0
angular:
  x: 0.0
  y: 0.0
  z: 2.0
---
linear:
  x: 1.0
  y: 0.0
  z: 0.0
angular:
  x: 0.0
  y: 0.0
  z: 2.0
```

Chapter 9: Interfacing I/O Boards, Sensors, and Actuators to ROS

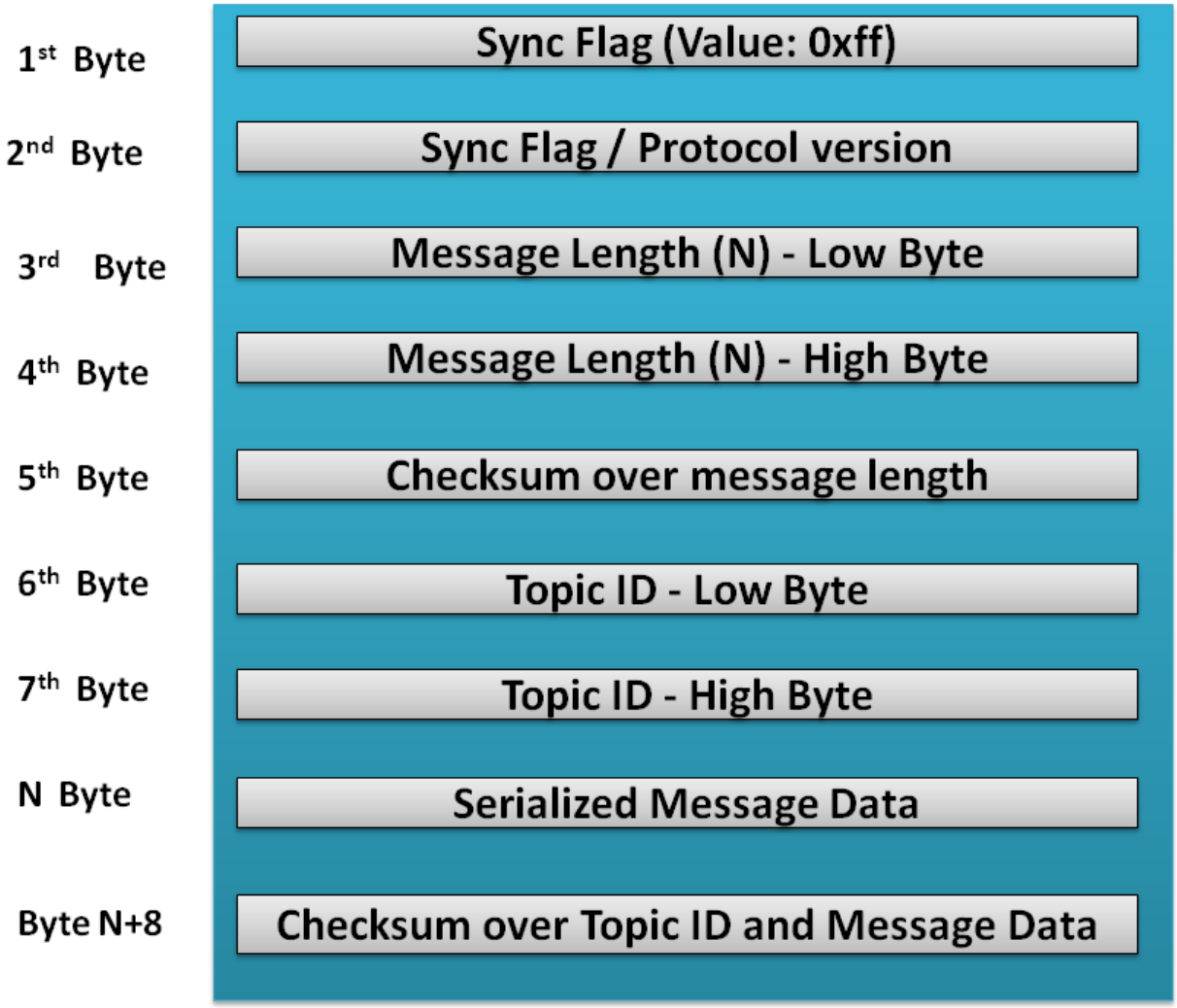
Beginner: Arduino UNO

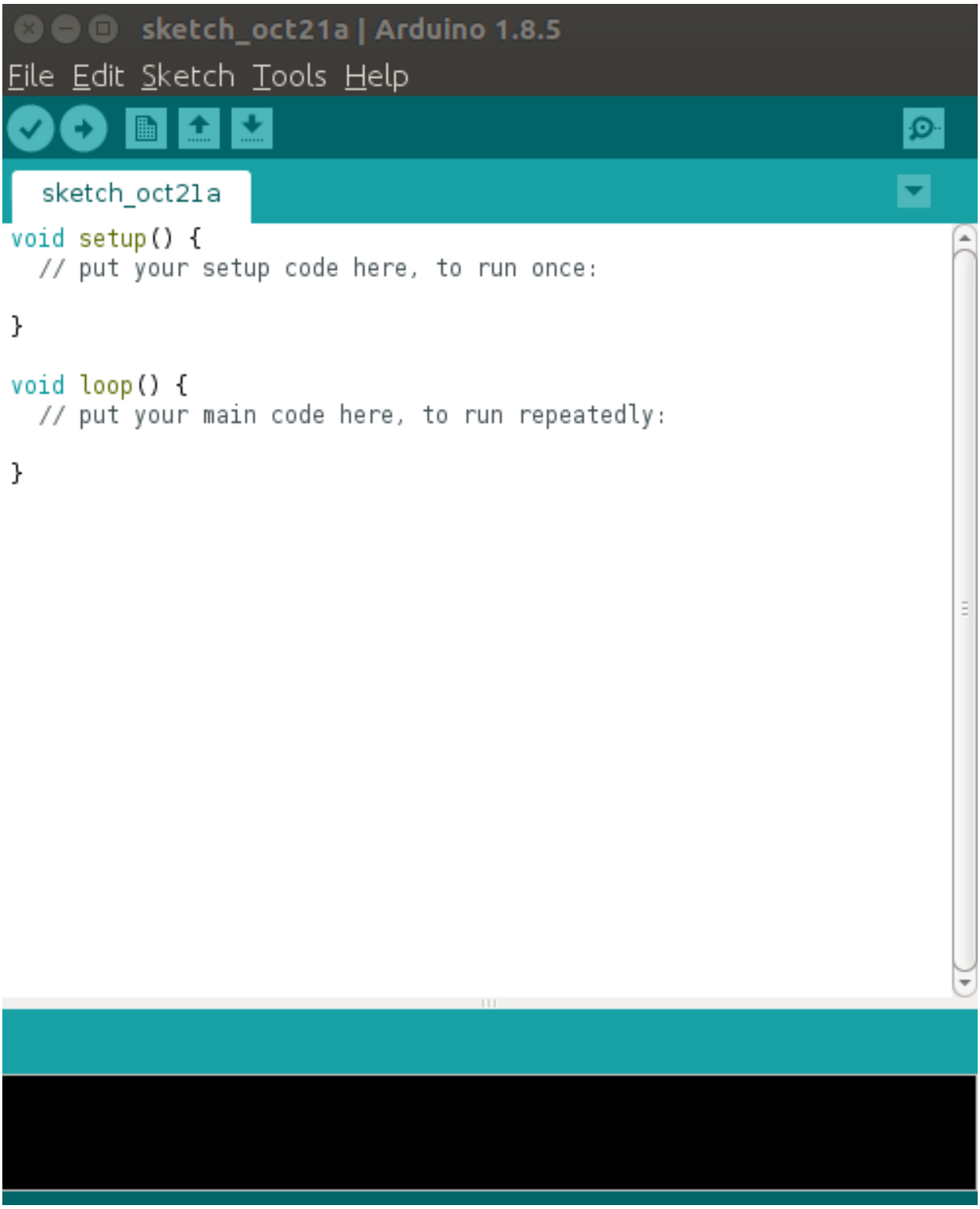


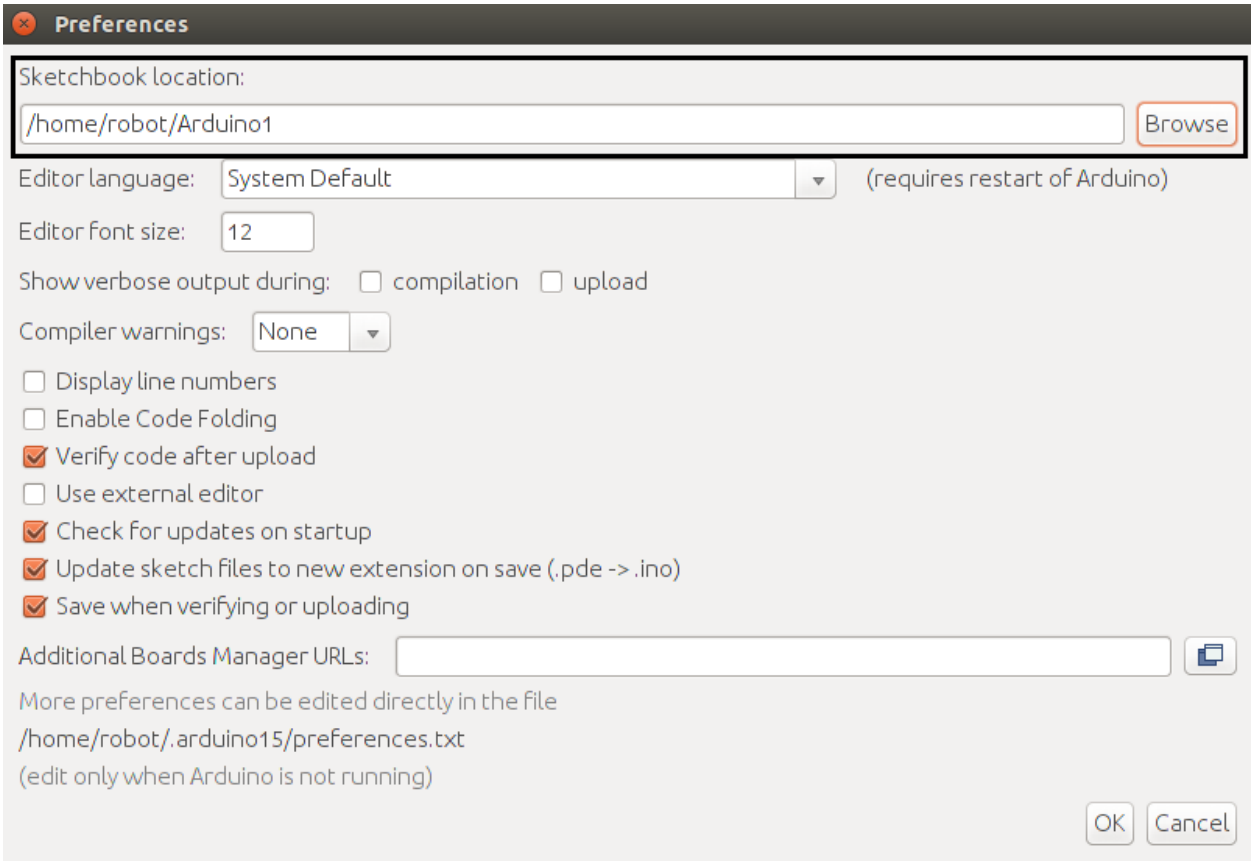
Intermediate: Arduino Mega

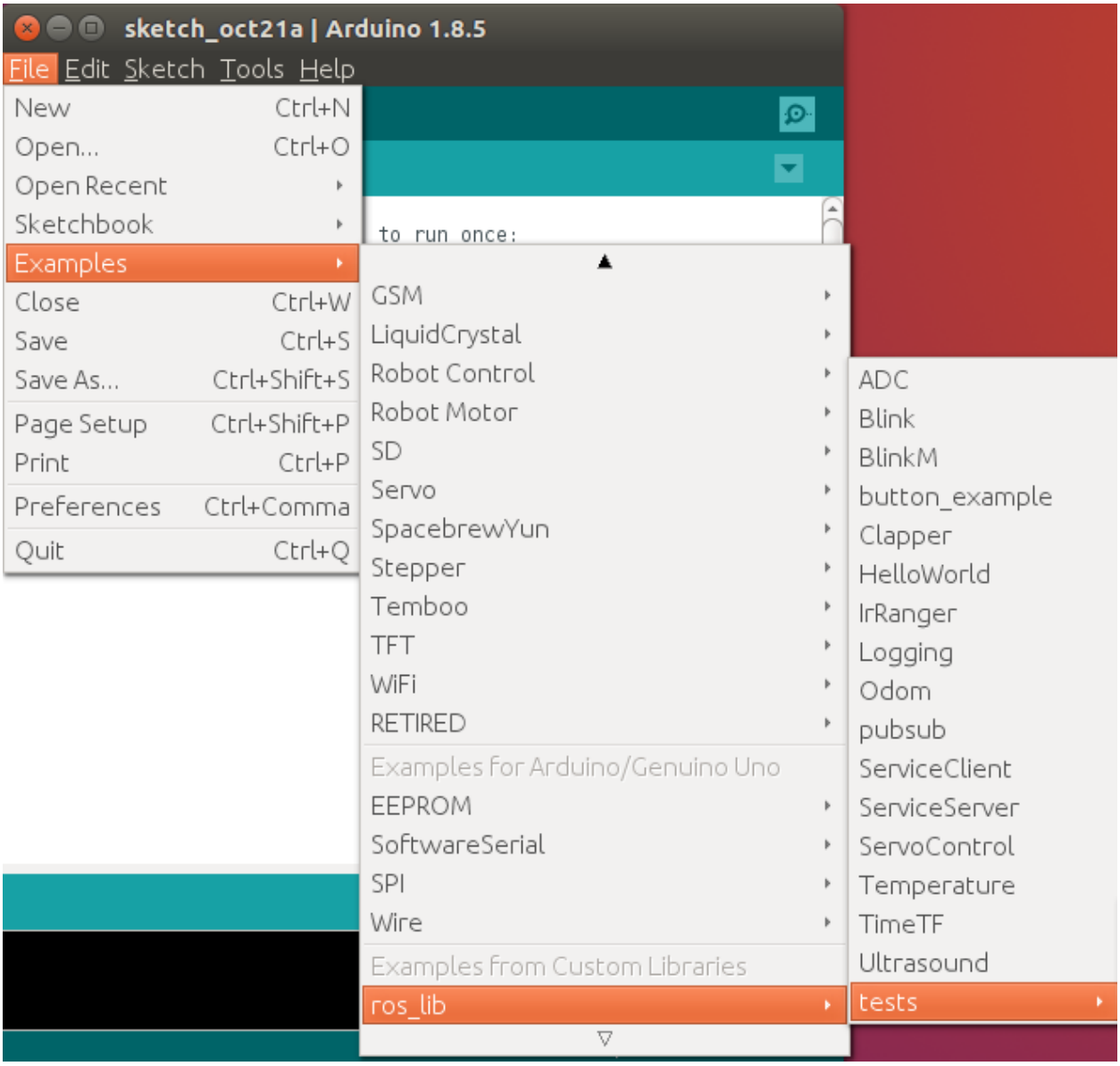


Advanced: Arduino DUE


1st Byte
Sync Flag (Value: 0xff)
2nd Byte
Sync Flag / Protocol version
3rd Byte
Message Length (N) - Low Byte
4th Byte
Message Length (N) - High Byte
5th Byte
Checksum over message length
6th Byte
Topic ID - Low Byte
7th Byte
Topic ID - High Byte
N Byte
Serialized Message Data
Byte N+8
Checksum over Topic ID and Message Data

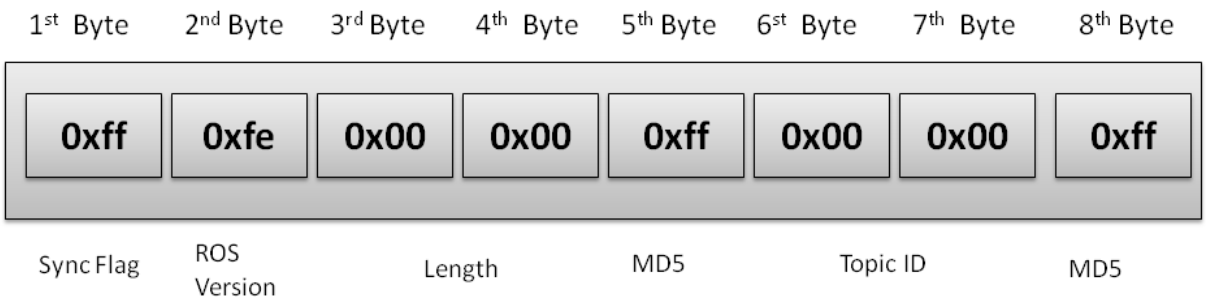

sketch_oct21a | Arduino 1.8.5
File Edit Sketch Tools Help
sketch_oct21a
void setup() {
// put your setup code here, to run once:
}
void loop() {
// put your main code here, to run repeatedly:
}


Preferences
Sketchbook location:
/home/robot/Arduino1
Browse
Editor language:
System Default
(requires restart of Arduino)
Editor font size:
12
Show verbose output during:
compilation
upload
Compiler warnings:
None
Display line numbers
Enable Code Folding
Verify code after upload
Use external editor
Check for updates on startup
Update sketch files to new extension on save (.pde -> .ino)
Save when verifying or uploading
Additional Boards Manager URLs:
More preferences can be edited directly in the file
/home/robot/.arduino15/preferences.txt
(edit only when Arduino is not running)
OK
Cancel

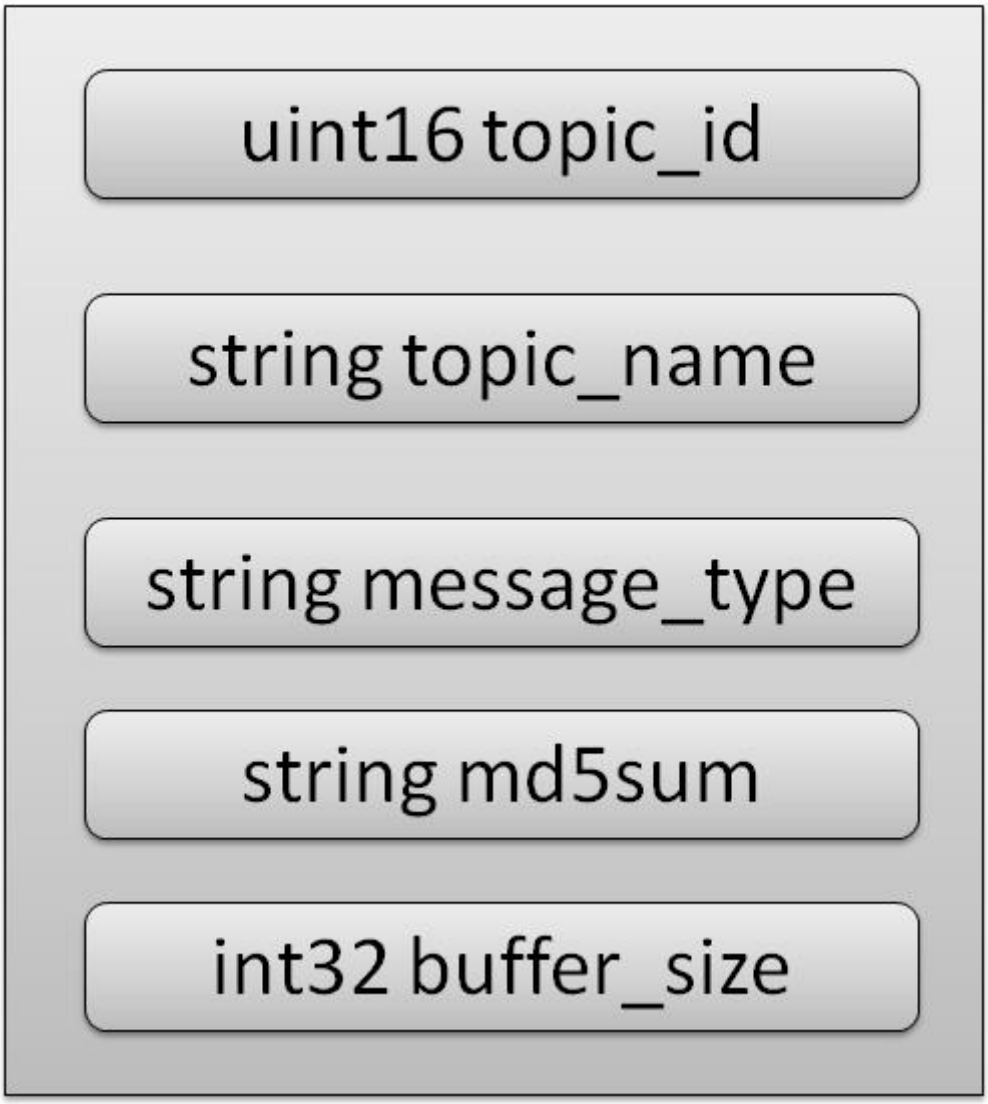


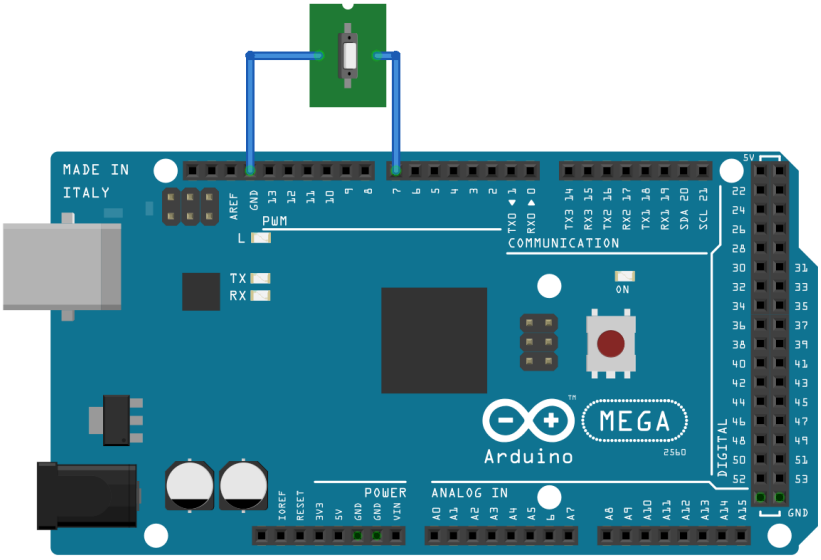

```
[INFO] [WallTime: 1438880620.972231] ROS Serial Python Node
[INFO] [WallTime: 1438880620.982245] Connecting to /dev/ttyACM0 at 57600 baud
[INFO] [WallTime: 1438880623.117417] Note: publish buffer size is 512 bytes
[INFO] [WallTime: 1438880623.118587] Setup publisher on chatter [std_msgs/String
]
[INFO] [WallTime: 1438880623.132048] Note: subscribe buffer size is 512 bytes
[INFO] [WallTime: 1438880623.132745] Setup subscriber on talker [std_msgs/String
```

Query Packet

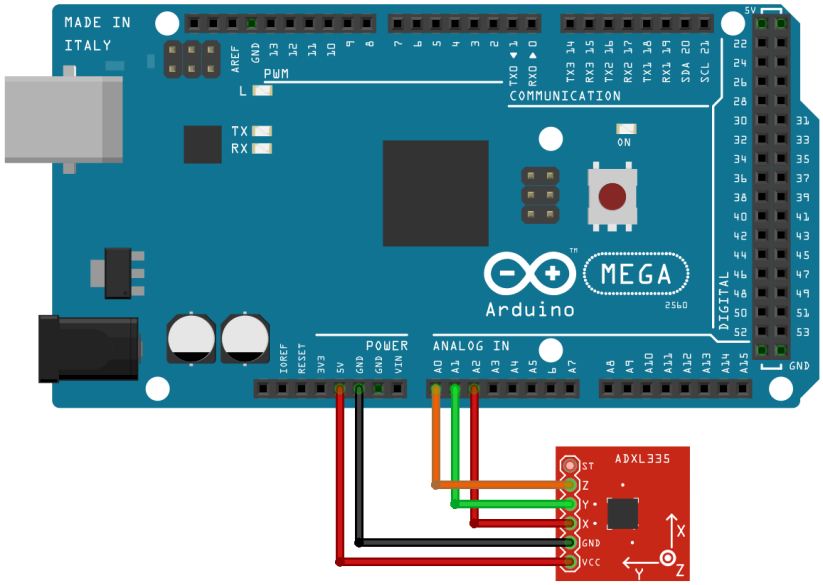


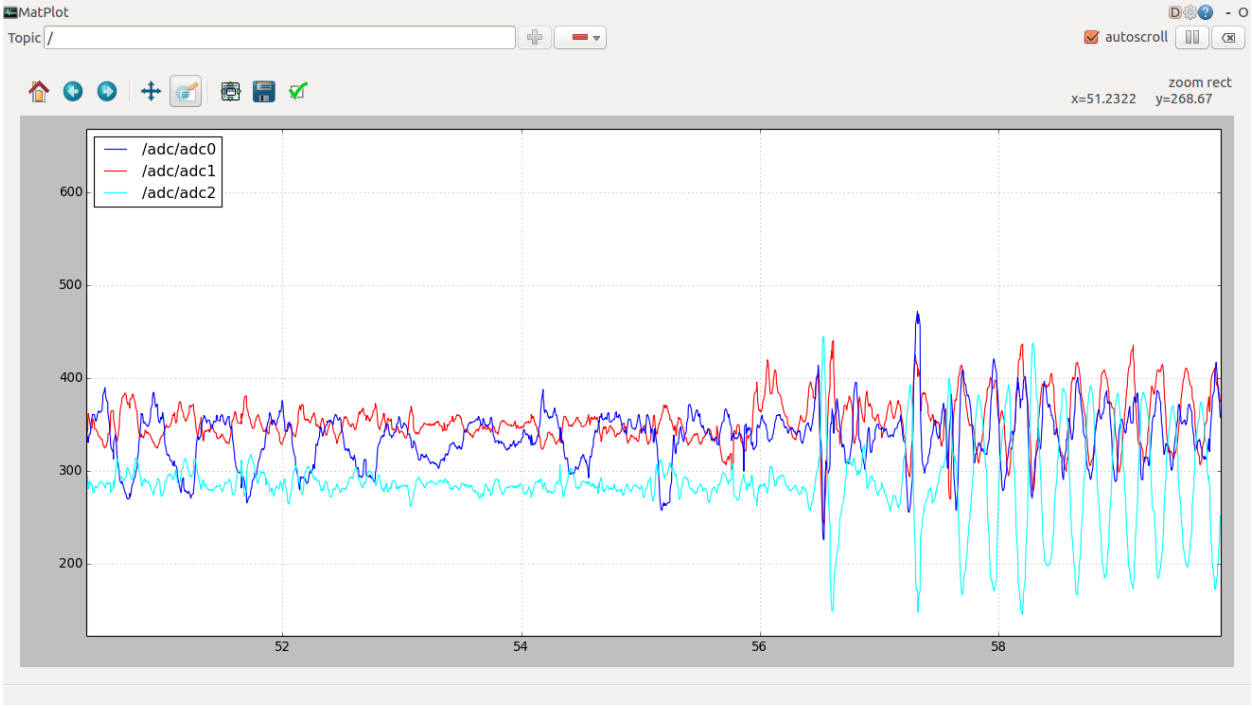
Response Packet

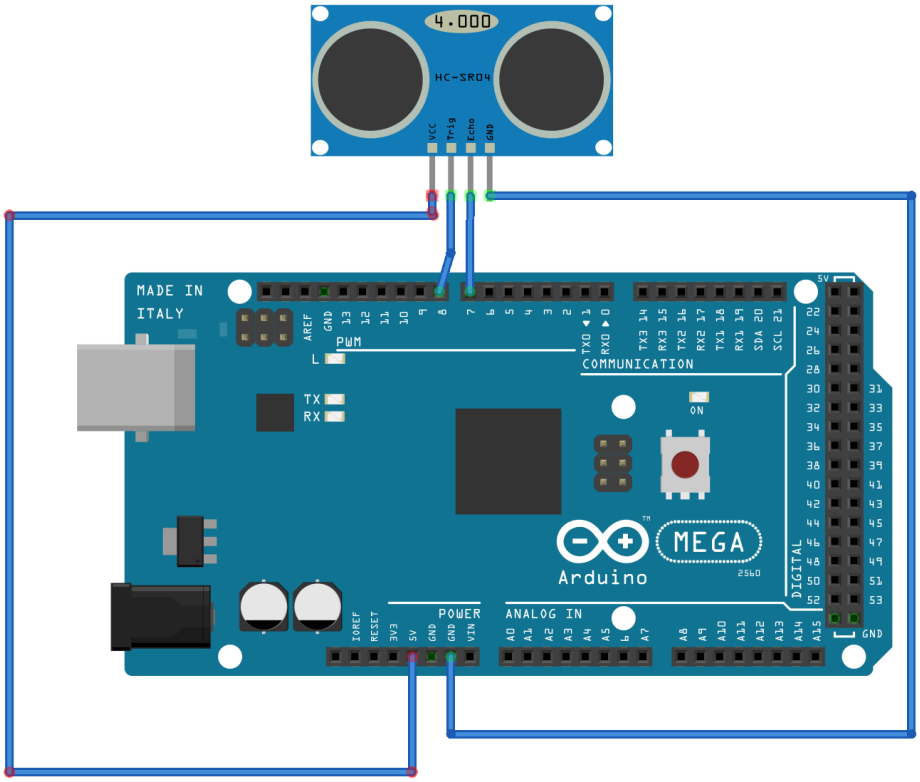


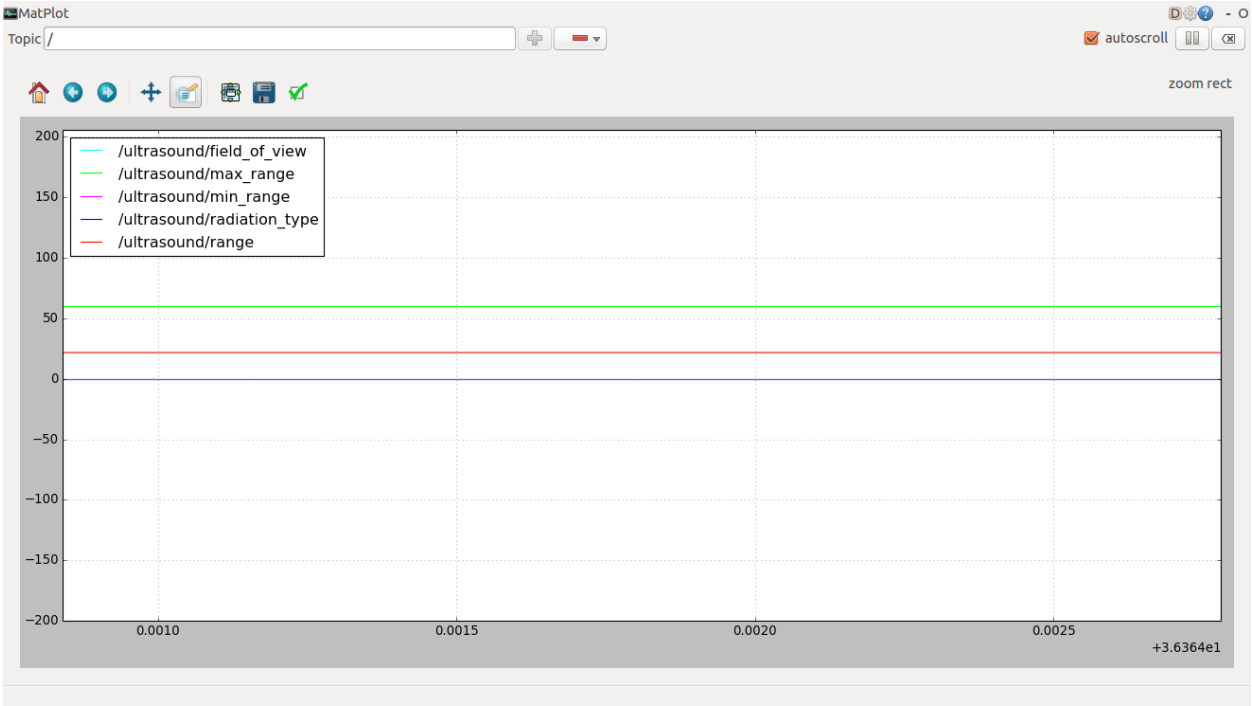


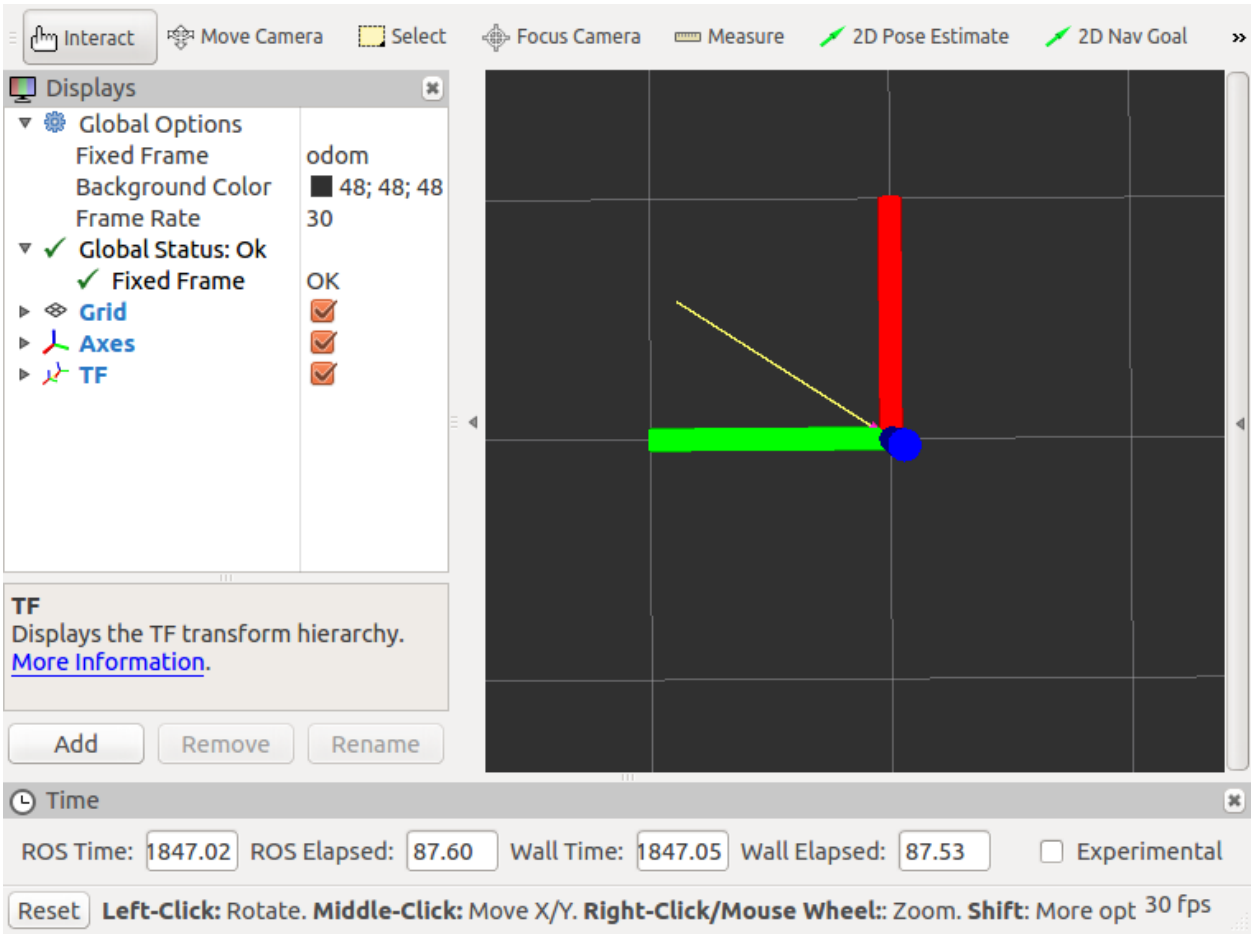

```
---
data: False
---
data: True
---
data: False
---
data: False
---
data: True
---
```


MADE IN
ITALY
PWM
COMMUNICATION
POWER
ANALOG IN
DIGITAL
MEGA
Arduino
ADXL335
ST
Z
Y
X
GND
VCC

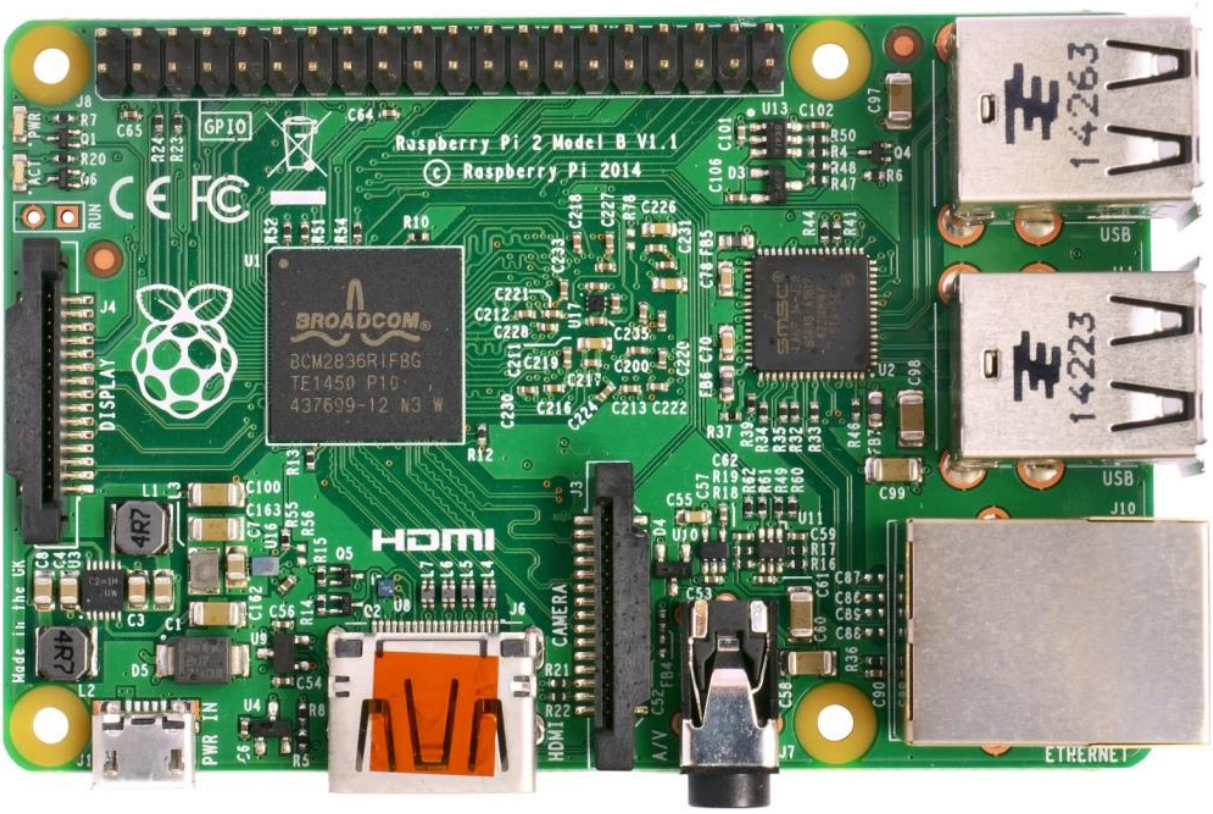

MatPlot
Topic /
autoscroll
zoom rect
x=51.2322 y=268.67
/adc/adc0
/adc/adc1
/adc/adc2
600
500
400
300
200
52
54
56
58

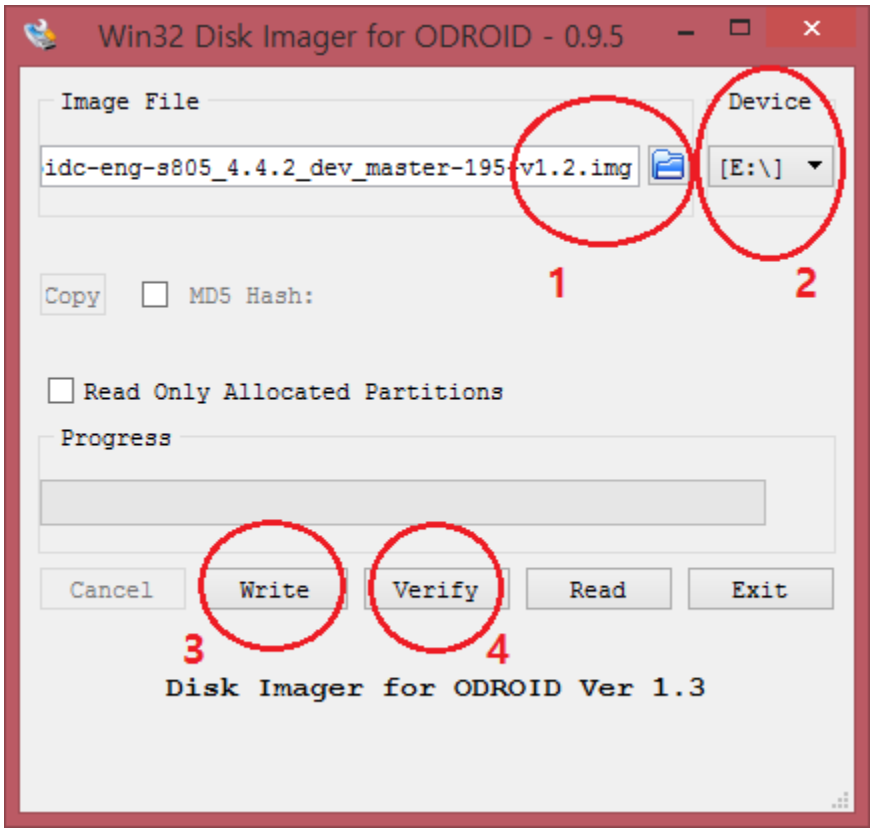

4.000
HC-SR04
VCC
Trig
Echo
GND
MADE IN
ITALY
PWM
COMMUNICATION
TX
RX
ON
MEGA
Arduino
2560
POWER
ANALOG IN
DIGITAL

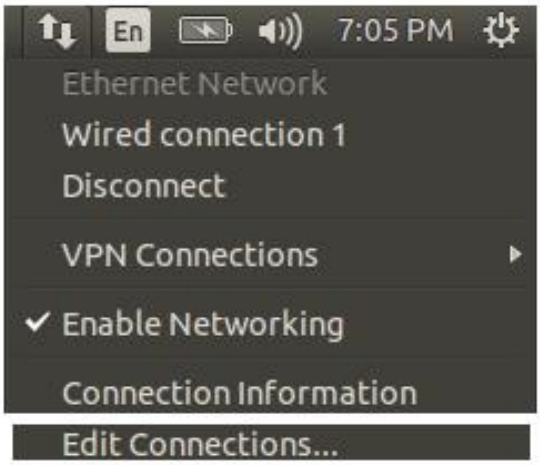

MatPlot
Topic /
autoscroll
zoom rect
/ultrasound/field_of_view
/ultrasound/max_range
/ultrasound/min_range
/ultrasound/radiation_type
/ultrasound/range
200
150
100
50
0
−50
−100
−150
−200
0.0010
0.0015
0.0020
0.0025
+3.6364e1


Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Displays
Global Options
Fixed Frame
odom
Background Color
48; 48; 48
Frame Rate
30
Global Status: Ok
Fixed Frame
OK
Grid
Axes
TF
TF
Displays the TF transform hierarchy.
More Information.
Add
Remove
Rename
Time
ROS Time:
1847.02
ROS Elapsed:
87.60
Wall Time:
1847.05
Wall Elapsed:
87.53
Experimental
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click/Mouse Wheel:: Zoom. Shift: More opt
30 fps

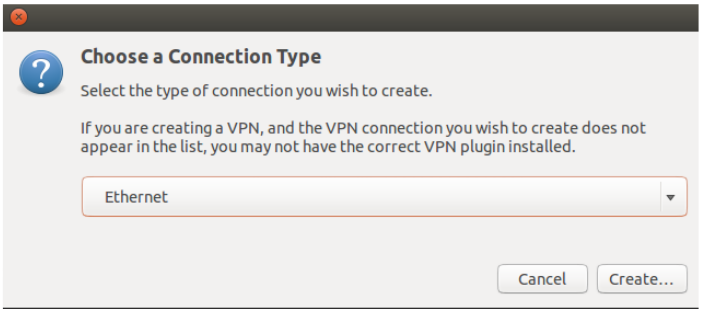
AWA
ODROID-XU4
BACKUP
UART
USB
POWER
FAN
ALIVE
μSD
Exynos

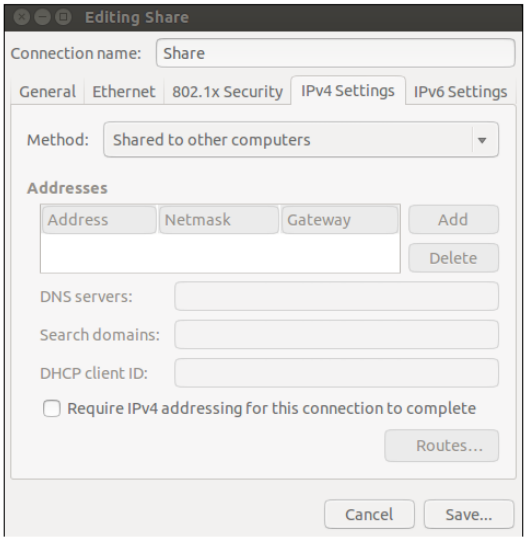

Raspberry Pi 2 Model B V1.1
© Raspberry Pi 2014
BROADCOM
BCM2836RIFBG
GPIO
DISPLAY
HDMI
CAMERA
USB
USB
ETHERNET
PWR IN

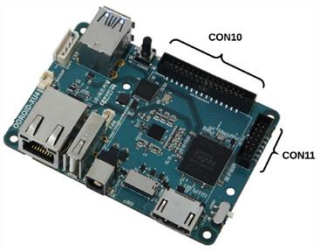

Win32 Disk Imager for ODROID - 0.9.5
Image File
idc-eng-s805_4.4.2_dev_master-195-v1.2.img
Device
[E:\]
1
2
Copy
MD5 Hash:
Read Only Allocated Partitions
Progress
Cancel
Write
Verify
Read
Exit
3
4
Disk Imager for ODROID Ver 1.3


En
7:05 PM
Ethernet Network
Wired connection 1
Disconnect
VPN Connections
Enable Networking
Connection Information
Edit Connections...

Network Connections
Name
Last Used
Add
Ethernet
Wired connection 1
1 minute ago
Edit...
Delete...
Close


Choose a Connection Type
Select the type of connection you wish to create.
If you are creating a VPN, and the VPN connection you wish to create does not appear in the list, you may not have the correct VPN plugin installed.
Ethernet
Cancel
Create...


Editing Share
Connection name:
Share
General
Ethernet
802.1x Security
IPv4 Settings
IPv6 Settings
Method:
Shared to other computers
Addresses
Address
Netmask
Gateway
Add
Delete
DNS servers:
Search domains:
DHCP client ID:
Require IPv4 addressing for this connection to complete
Routes...
Cancel
Save...


CON10
CON11

ODROID XU4 Pin Layout (CON10)

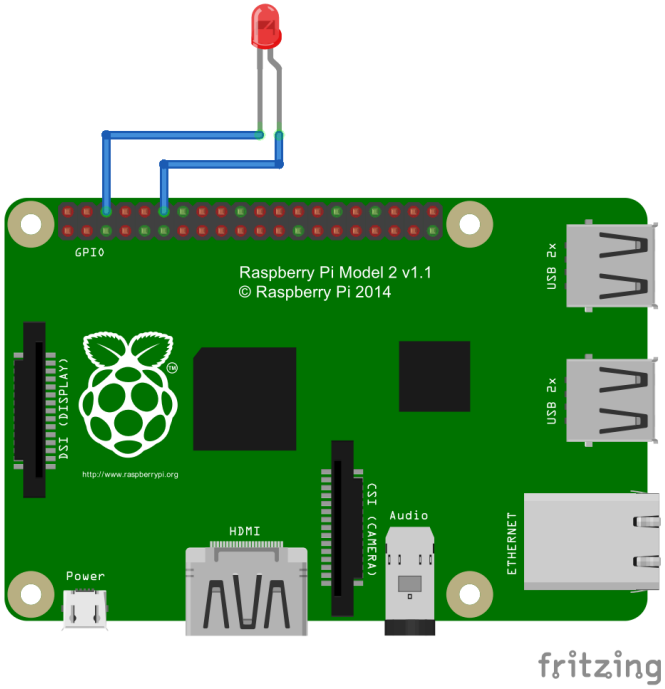
WiringPi GPIO#	Name(GPIO#)	Label	HEADER		Label	Name(GPIO#)	WiringPi GPIO#
		5V0	1	2	GND		
	ADC_0.AIN0	AIN0	3	4	#173	UART0_RTS	1
0	UART_CTS	#174	5	6	#171	UART0_RxD	16
12	MOSI_SPI1	#192	7	8	#172	UART0_TxD	15
13	MISO_SPI1	#191	9	10	#189	CLK_SPI1	14
10	CSN_SPI1	#190	11	12	PRWON		
2	GPIO	#21	13	14	#210	SCL.i2c	9
7	GPIO	#18	15	16	#209	SDA.i2c	8
3	GPIO	#22	17	18	#19	GPIO	4
22	GPIO	#30	19	20	#28	GPIO	21
26	GPIO	#29	21	22	#31	GPIO	23
	ADC_0.AIN3	AIN3	23	24	#25	GPIO	11
5	SCL_i2c	#23	25	26	#24	GPIO	6
27	SDA_i2c	#33	27	28	GND	GND	
		1V8	29	30	GND	GND	

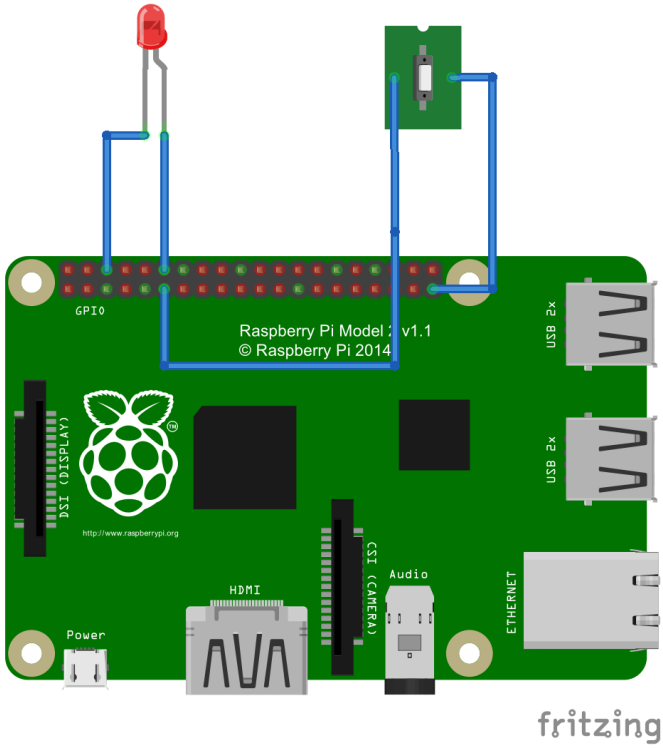
ODROID XU4 Pin Layout (CON11)

WiringPi GPIO#	Name(GPIO#)	Label	HEADER		Label	Name(GPIO#)	WiringPi GPIO#
		5V0	1	2	GND		
		1V8	3	4	#173	SDA_i2c_5	30
	GPIO	#34	5	6	#171	SCL_i2c_5	31
	SCLK_i2s_0	#225	7	8	#172	GND	
	CDCLK_i2s_0	#226	9	10	#189	SDO_i2s_0	
	LRCK_i2s_0	#227	11	12	PRWON	SDI_i2s_0	

P1: The Main GPIO connector							
WiringPi Pin	BCM GPIO	Name	Header		Name	BCM GPIO	WiringPi Pin
		3.3v	1	2	5v		
8	Rv1:0 - Rv2:2	SDA	3	4	5v		
9	Rv1:1 - Rv2:3	SCL	5	6	0v		
7	4	GPIO7	7	8	TxD	14	15
		0v	9	10	RxD	15	16
0	17	GPIO0	11	12	GPIO1	18	1
2	Rv1:21 - Rv2:27	GPIO2	13	14	0v		
3	22	GPIO3	15	16	GPIO4	23	4
		3.3v	17	18	GPIO5	24	5
12	10	MOSI	19	20	0v		
13	9	MISO	21	22	GPIO6	25	6
14	11	SCLK	23	24	CE0	8	10
		0v	25	26	CE1	7	11
WiringPi Pin	BCM GPIO	Name	Header		Name	BCM GPIO	WiringPi Pin

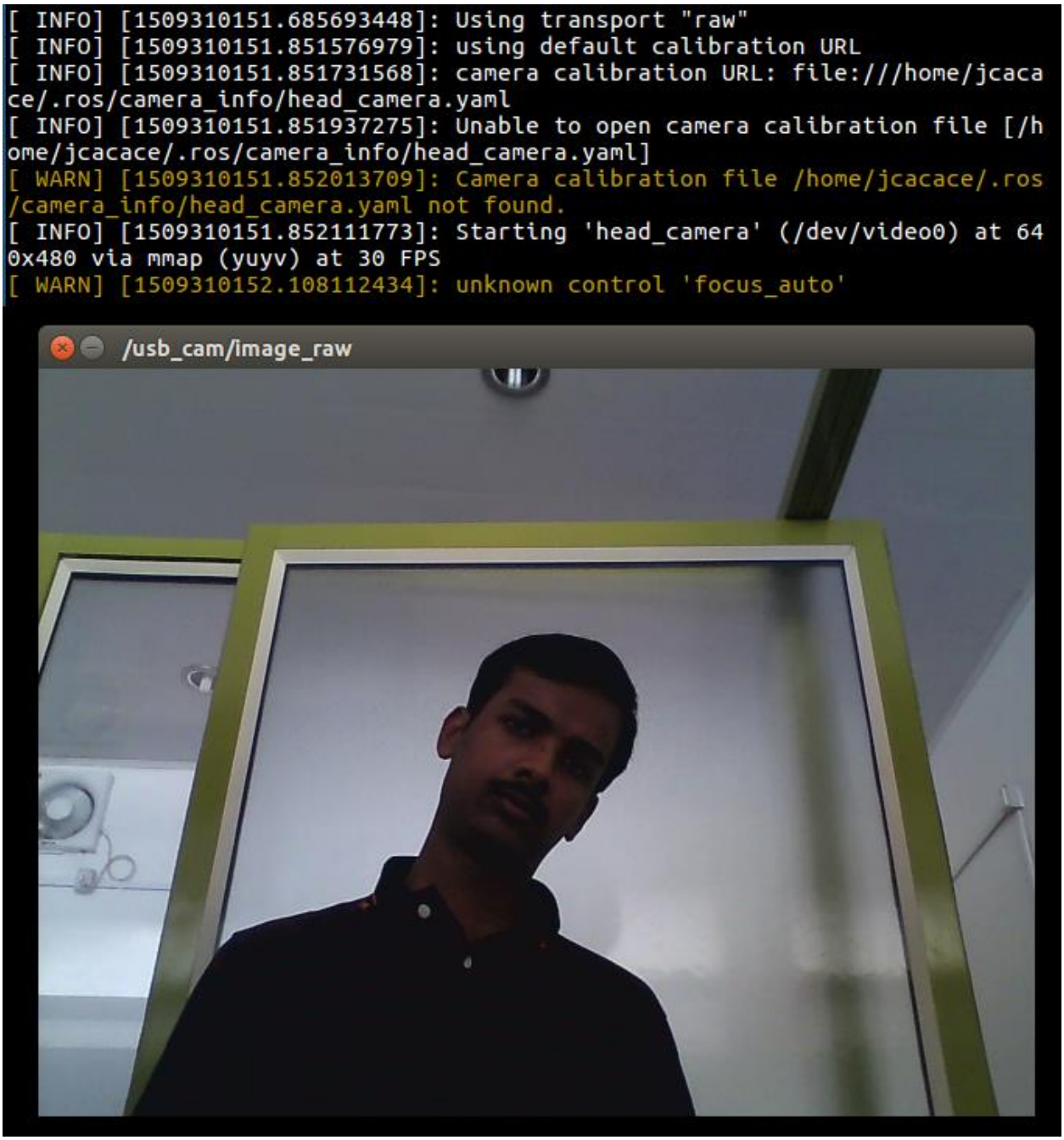
P5: Secondary GPIO connector (Rev. 2 Pi only)							
WiringPi Pin	BCM GPIO	Name	Header		Name	BCM GPIO	WiringPi Pin
		5v	1	2	3.3v		
17	28	GPIO8	3	4	GPIO9	29	18
19	30	GPIO10	5	6	GPIO11	31	20
		0v	7	8	0v		
WiringPi Pin	BCM GPIO	Name	Header		Name	BCM GPIO	WiringPi Pin



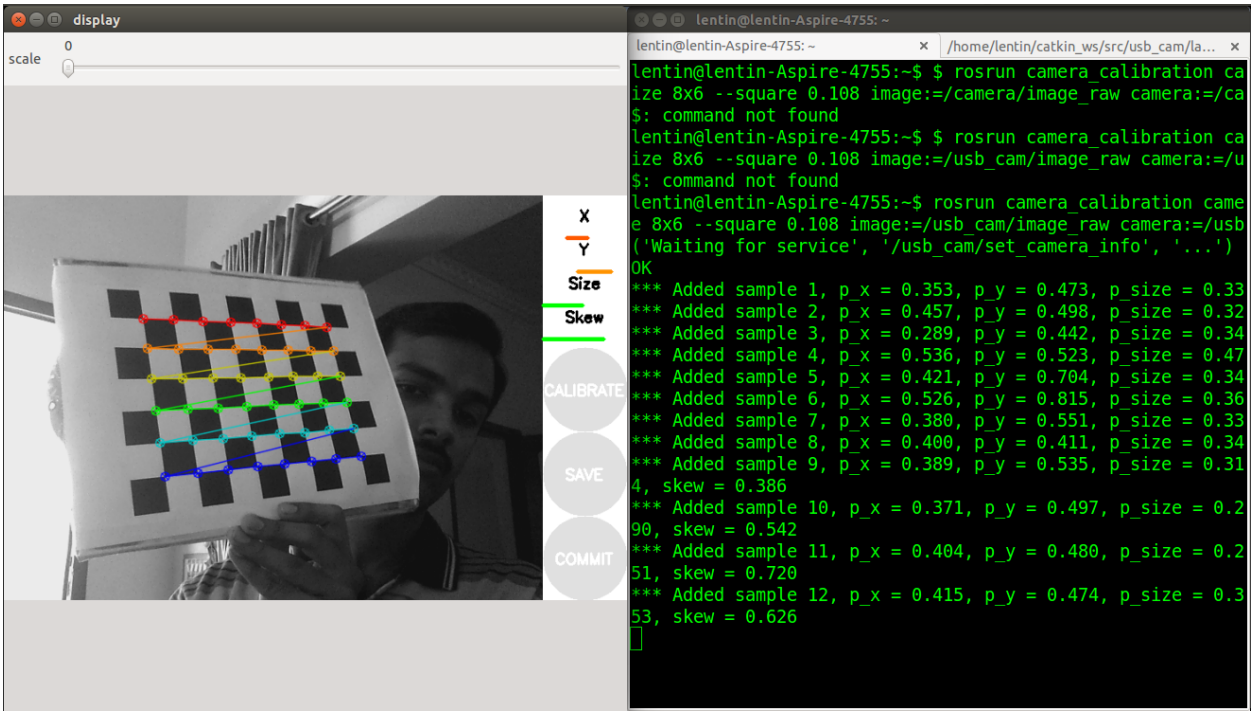

GPIO
Raspberry Pi Model
v1.1
© Raspberry Pi 2014
USB 2x
USB 2x
DSI (DISPLAY)
http://www.raspberrypi.org
CSI (CAMERA)
Audio
ETHERNET
HDMI
Power
fritzing

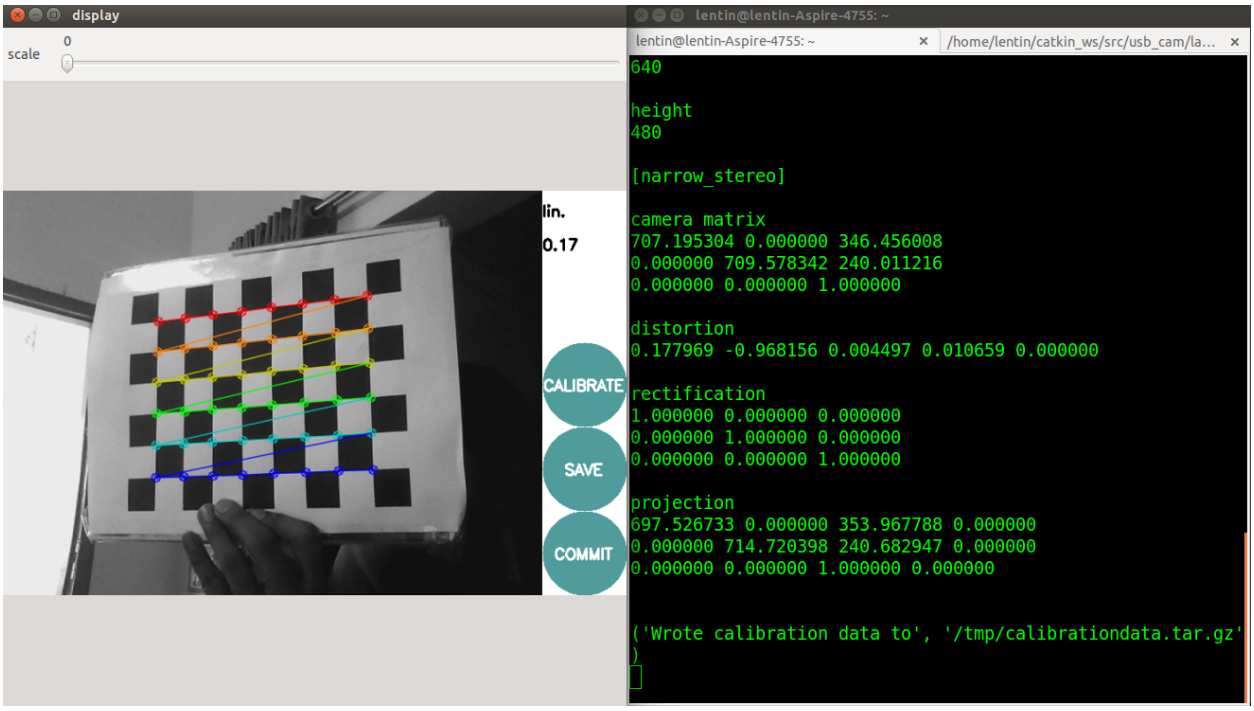
AX-12W
AX-12A
AX-18A
RX-24F
MX-28
MX-64
MX-106

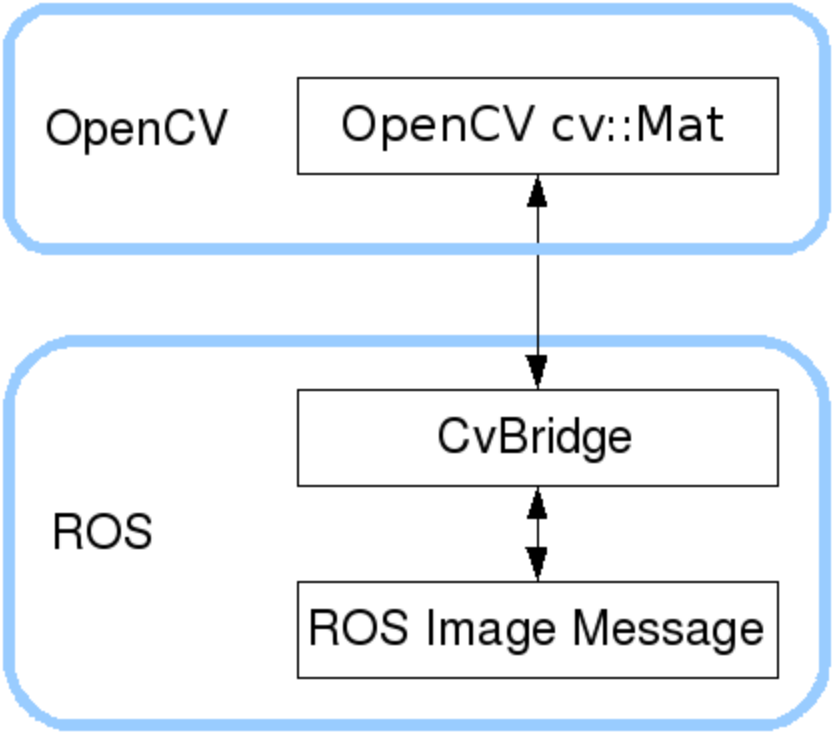
Chapter 10: Programming Vision Sensors Using ROS, Open CV, and PCL



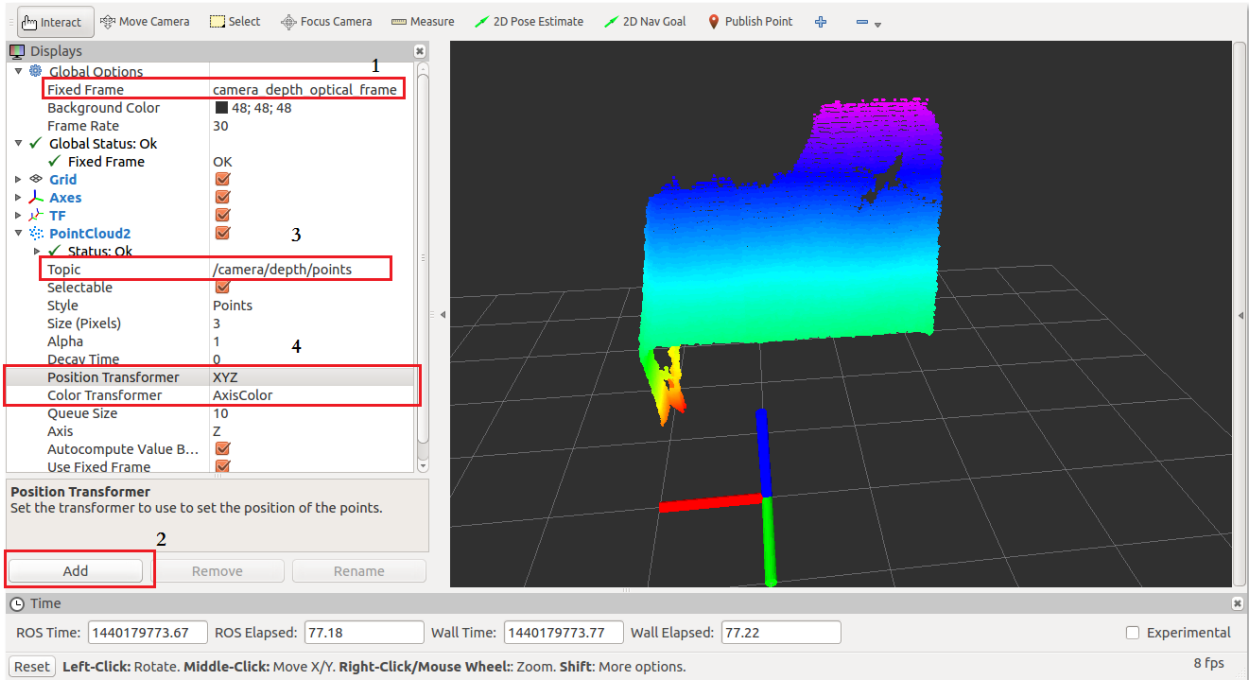
```
/image_view/output
/image_view/parameter_descriptions
/image_view/parameter_updates
/rosout
/rosout_agg
/usb_cam/camera_info
/usb_cam/image_raw
/usb_cam/image_raw/compressed
/usb_cam/image_raw/compressed/parameter_descriptions
/usb_cam/image_raw/compressed/parameter_updates
/usb_cam/image_raw/compressedDepth
/usb_cam/image_raw/compressedDepth/parameter_descriptions
/usb_cam/image_raw/compressedDepth/parameter_updates
/usb_cam/image_raw/theora
/usb_cam/image_raw/theora/parameter_descriptions
/usb_cam/image_raw/theora/parameter_updates
```

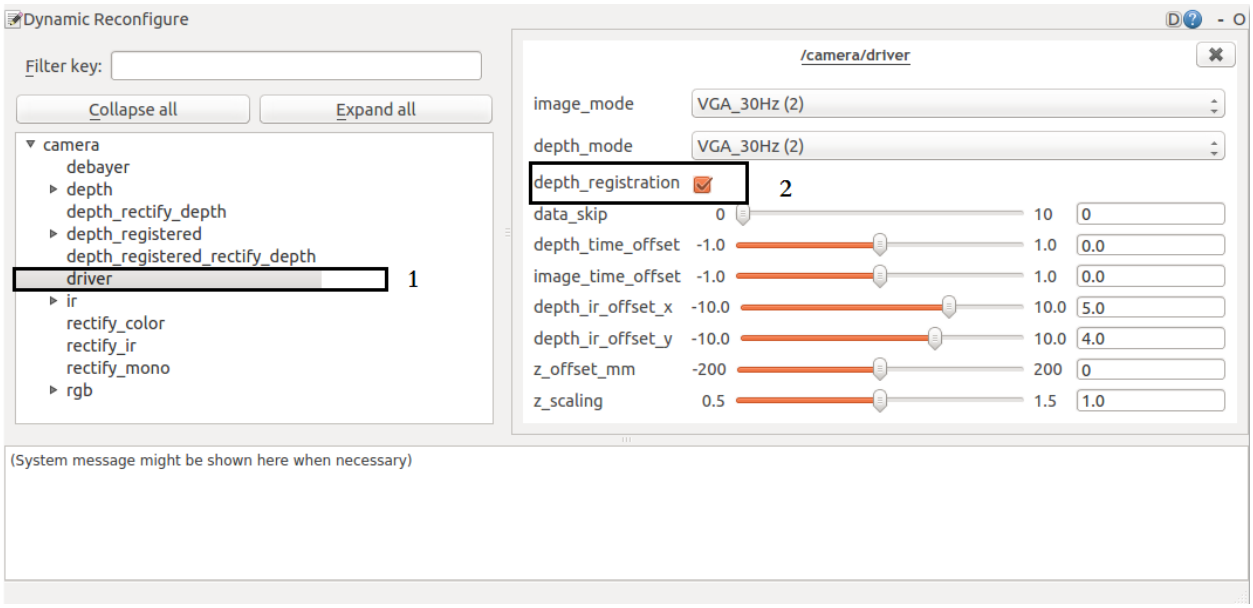


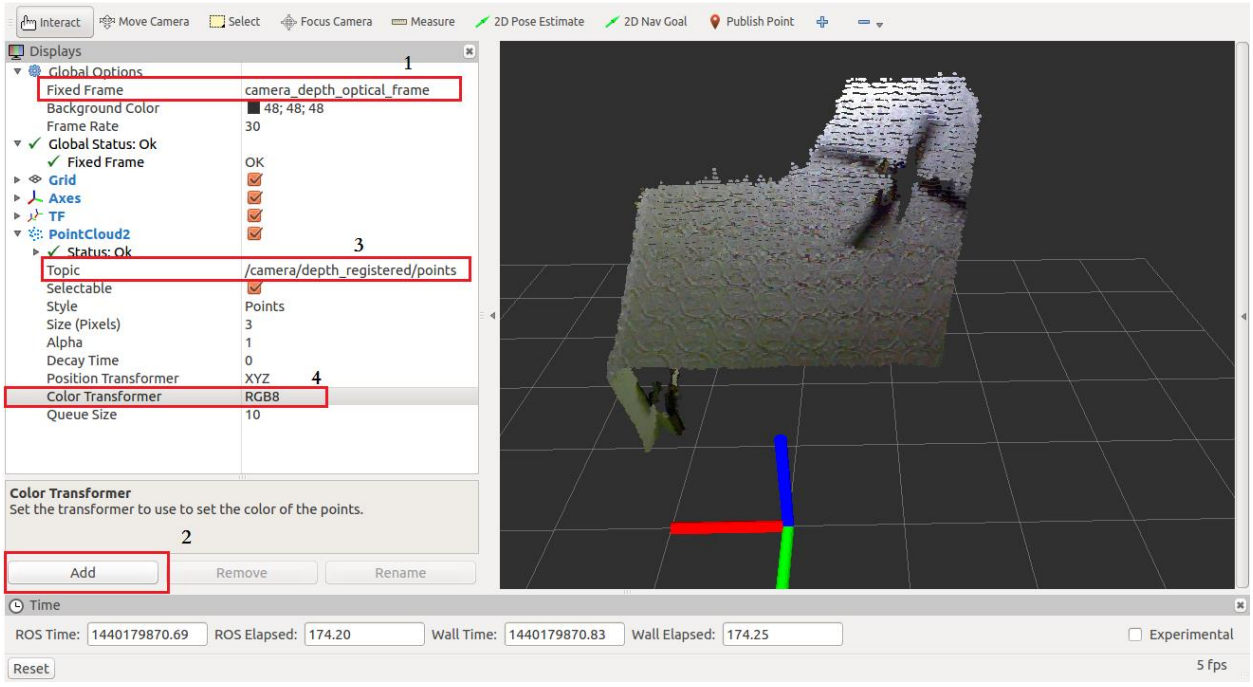

display
scale
0
lin.
0.17
CALIBRATE
SAVE
COMMIT
lentin@lentin-Aspire-4755: ~
lentin@lentin-Aspire-4755: ~
/home/lentin/catkin_ws/src/usb_cam/la...
640
height
480
[narrow_stereo]
camera matrix
707.195304 0.000000 346.456008
0.000000 709.578342 240.011216
0.000000 0.000000 1.000000
distortion
0.177969 -0.968156 0.004497 0.010659 0.000000
rectification
1.000000 0.000000 0.000000
0.000000 1.000000 0.000000
0.000000 0.000000 1.000000
projection
697.526733 0.000000 353.967788 0.000000
0.000000 714.720398 240.682947 0.000000
0.000000 0.000000 1.000000 0.000000
('Wrote calibration data to', '/tmp/calibrationdata.tar.gz'
)


OpenCV
OpenCV cv::Mat
ROS
CvBridge
ROS Image Message

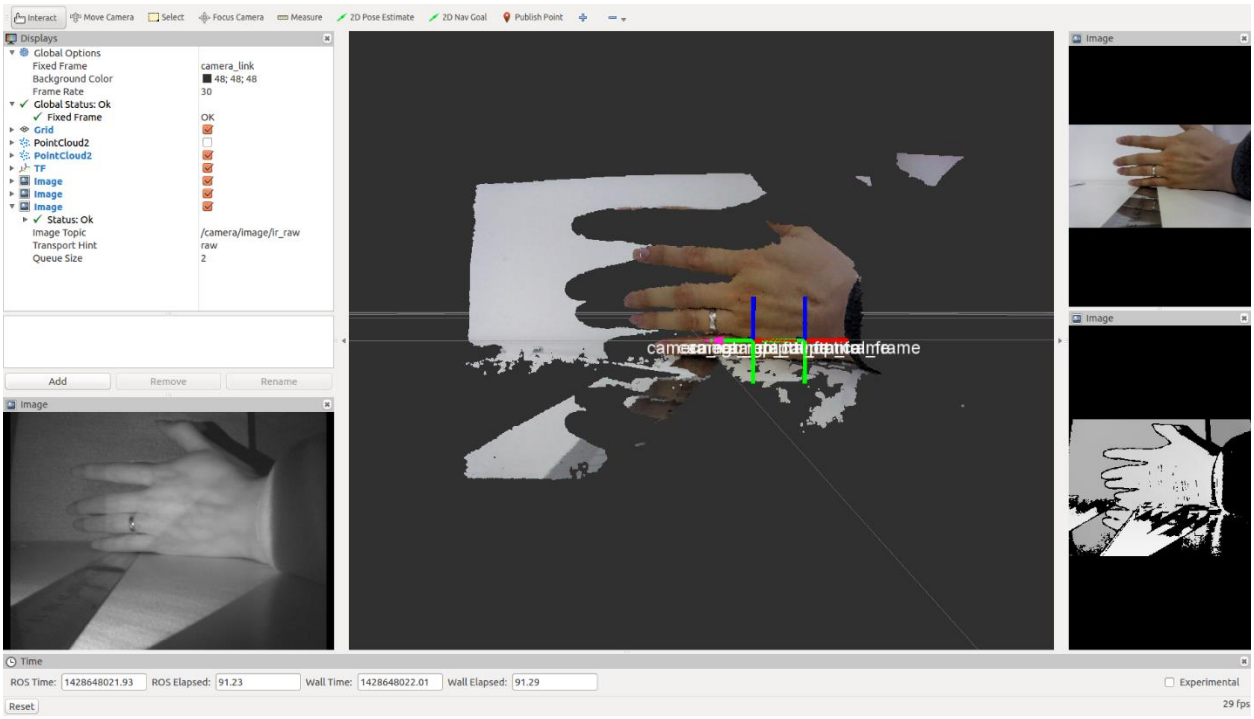
XBOX 360
KINECT
ASUS

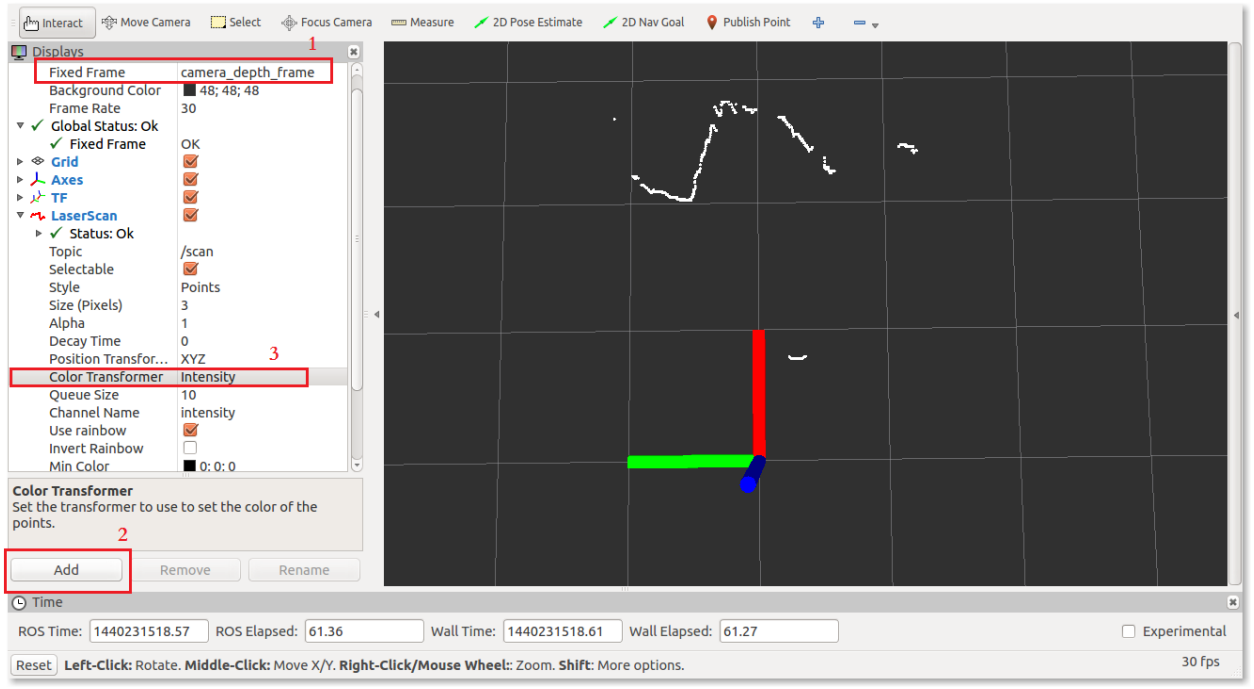

Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame
camera_depth_optical_frame
Background Color
48; 48; 48
Frame Rate
30
Global Status: Ok
Fixed Frame
OK
Grid
Axes
TF
PointCloud2
Status: Ok
Topic
/camera/depth/points
Selectable
Style
Points
Size (Pixels)
3
Alpha
1
Decay Time
0
Position Transformer
XYZ
Color Transformer
AxisColor
Queue Size
10
Axis
Z
Autocompute Value B...
Use Fixed Frame
1
2
3
4
Position Transformer
Set the transformer to use to set the position of the points.
Add
Remove
Rename
Time
ROS Time:
1440179773.67
ROS Elapsed:
77.18
Wall Time:
1440179773.77
Wall Elapsed:
77.22
Experimental
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click/Mouse Wheel:: Zoom. Shift: More options.
8 fps


Dynamic Reconfigure
Filter key:
Collapse all
Expand all
camera
debayer
depth
depth_rectify_depth
depth_registered
depth_registered_rectify_depth
driver
ir
rectify_color
rectify_ir
rectify_mono
rgb
1
/camera/driver
image_mode
VGA_30Hz (2)
depth_mode
VGA_30Hz (2)
depth_registration
2
data_skip 0 10 0
depth_time_offset -1.0 1.0 0.0
image_time_offset -1.0 1.0 0.0
depth_ir_offset_x -10.0 10.0 5.0
depth_ir_offset_y -10.0 10.0 4.0
z_offset_mm -200 200 0
z_scaling 0.5 1.5 1.0
(System message might be shown here when necessary)

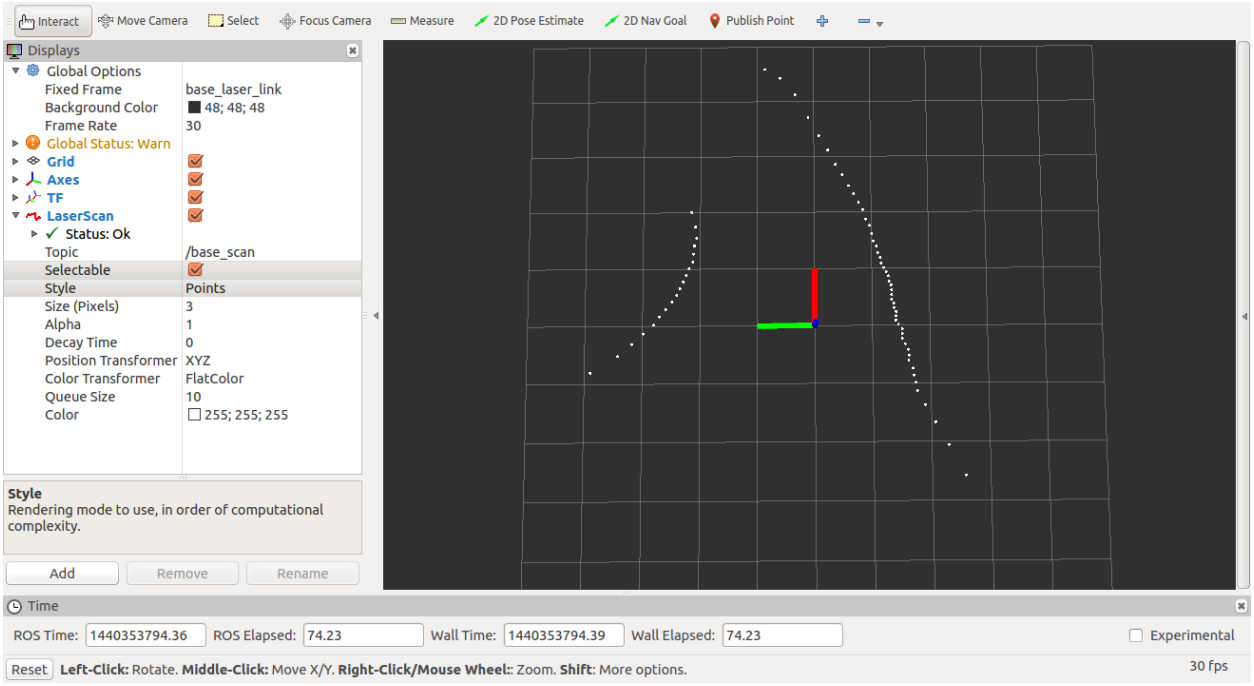

Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
1
Fixed Frame camera_depth_optical_frame
Background Color 48; 48; 48
Frame Rate 30
Global Status: Ok
Fixed Frame OK
Grid
Axes
TF
PointCloud2
Status: Ok
3
Topic /camera/depth_registered/points
Selectable
Style Points
Size (Pixels) 3
Alpha 1
Decay Time 0
Position Transformer XYZ
4
Color Transformer RGB8
Queue Size 10
Color Transformer
Set the transformer to use to set the color of the points.
2
Add
Remove
Rename
Time
ROS Time: 1440179870.69
ROS Elapsed: 174.20
Wall Time: 1440179870.83
Wall Elapsed: 174.25
Experimental
Reset
5 fps

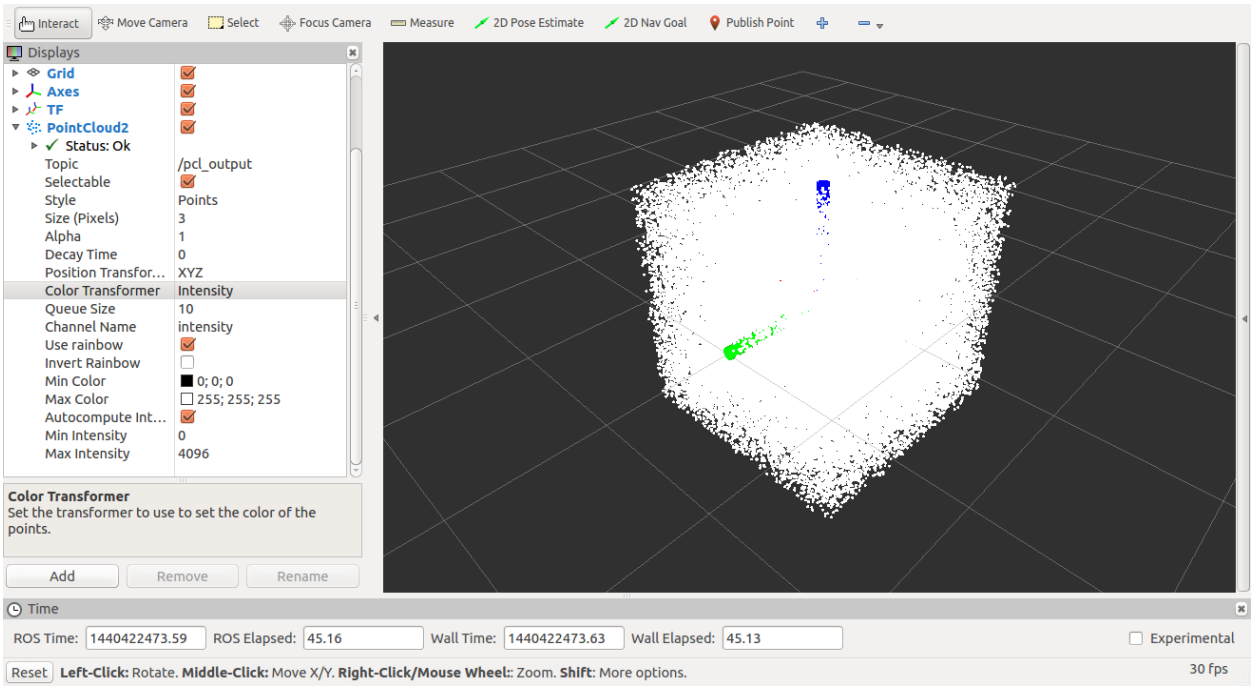
CREATIVE

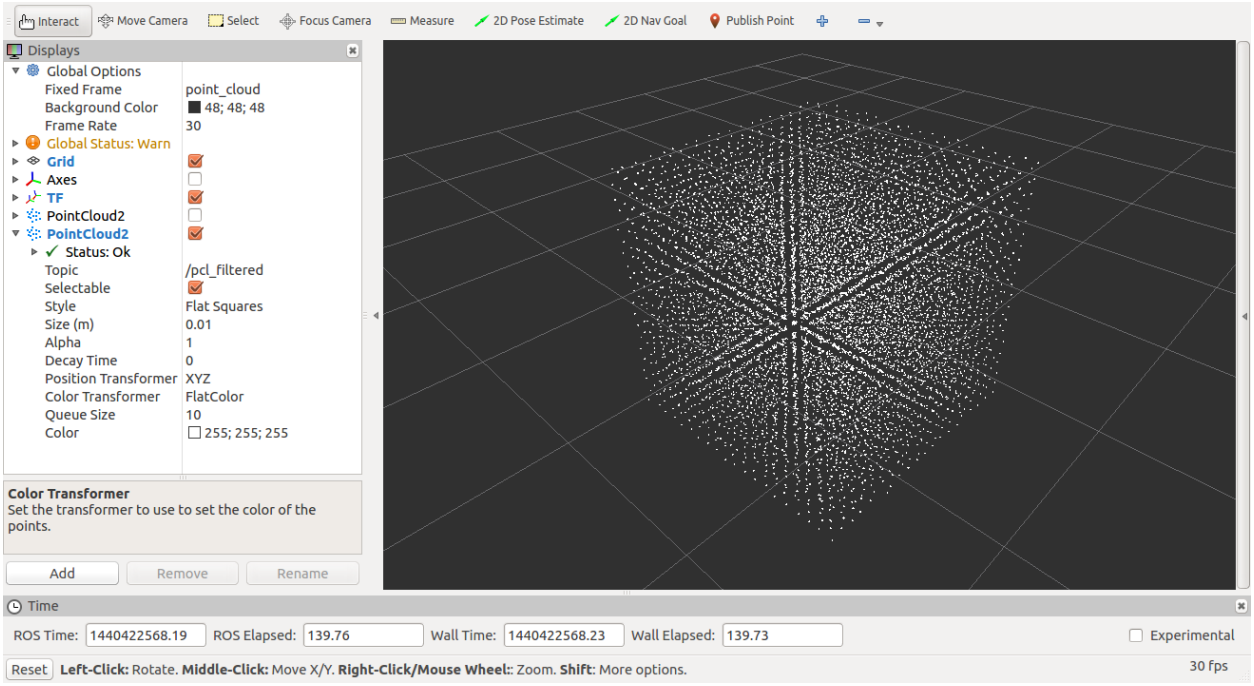

Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame
camera_link
Background Color
48; 48; 48
Frame Rate
30
Global Status: Ok
Fixed Frame
OK
Grid
PointCloud2
PointCloud2
TF
Image
Image
Image
Status: Ok
Image Topic
/camera/image/ir_raw
Transport Hint
raw
Queue Size
2
Add
Remove
Rename
Image
Image
Image
Time
ROS Time: 1428648021.93
ROS Elapsed: 91.23
Wall Time: 1428648022.01
Wall Elapsed: 91.29
Experimental
Reset
29 fps

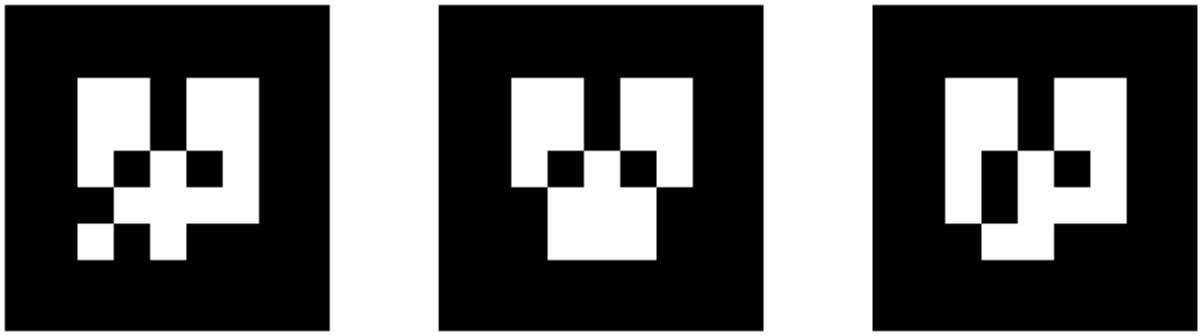

Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
1
Fixed Frame
camera_depth_frame
Background Color
48; 48; 48
Frame Rate
30
Global Status: Ok
Fixed Frame
OK
Grid
Axes
TF
LaserScan
Status: Ok
Topic
/scan
Selectable
Style
Points
Size (Pixels)
3
Alpha
1
Decay Time
0
Position Transfor…
XYZ
3
Color Transformer
Intensity
Queue Size
10
Channel Name
intensity
Use rainbow
Invert Rainbow
Min Color
0; 0; 0
Color Transformer
Set the transformer to use to set the color of the points.
2
Add
Remove
Rename
Time
ROS Time: 1440231518.57
ROS Elapsed: 61.36
Wall Time: 1440231518.61
Wall Elapsed: 61.27
Experimental
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click/Mouse Wheel:: Zoom. Shift: More options.
30 fps

HOKUYO


Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame base_laser_link
Background Color 48; 48; 48
Frame Rate 30
Global Status: Warn
Grid
Axes
TF
LaserScan
Status: Ok
Topic /base_scan
Selectable
Style Points
Size (Pixels) 3
Alpha 1
Decay Time 0
Position Transformer XYZ
Color Transformer FlatColor
Queue Size 10
Color 255; 255; 255
Style
Rendering mode to use, in order of computational complexity.
Add
Remove
Rename
Time
ROS Time: 1440353794.36
ROS Elapsed: 74.23
Wall Time: 1440353794.39
Wall Elapsed: 74.23
Experimental
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click/Mouse Wheel:: Zoom. Shift: More options.
30 fps


Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Grid
Axes
TF
PointCloud2
Status: Ok
Topic /pcl_output
Selectable
Style Points
Size (Pixels) 3
Alpha 1
Decay Time 0
Position Transfor… XYZ
Color Transformer Intensity
Queue Size 10
Channel Name intensity
Use rainbow
Invert Rainbow
Min Color 0; 0; 0
Max Color 255; 255; 255
Autocompute Int…
Min Intensity 0
Max Intensity 4096
Color Transformer
Set the transformer to use to set the color of the points.
Add
Remove
Rename
Time
ROS Time: 1440422473.59
ROS Elapsed: 45.16
Wall Time: 1440422473.63
Wall Elapsed: 45.13
Experimental
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click/Mouse Wheel:: Zoom. Shift: More options.
30 fps





```
/tag_detections
/tag_detections_image
/tag_detections_image/compressed
/tag_detections_image/compressed/parameter_descriptions
/tag_detections_image/compressed/parameter_updates
/tag_detections_image/compressedDepth
/tag_detections_image/compressedDepth/parameter_descriptions
/tag_detections_image/compressedDepth/parameter_updates
/tag_detections_image/theora
/tag_detections_image/theora/parameter_descriptions
/tag_detections_image/theora/parameter_updates
/tag_detections_pose
/tf
```

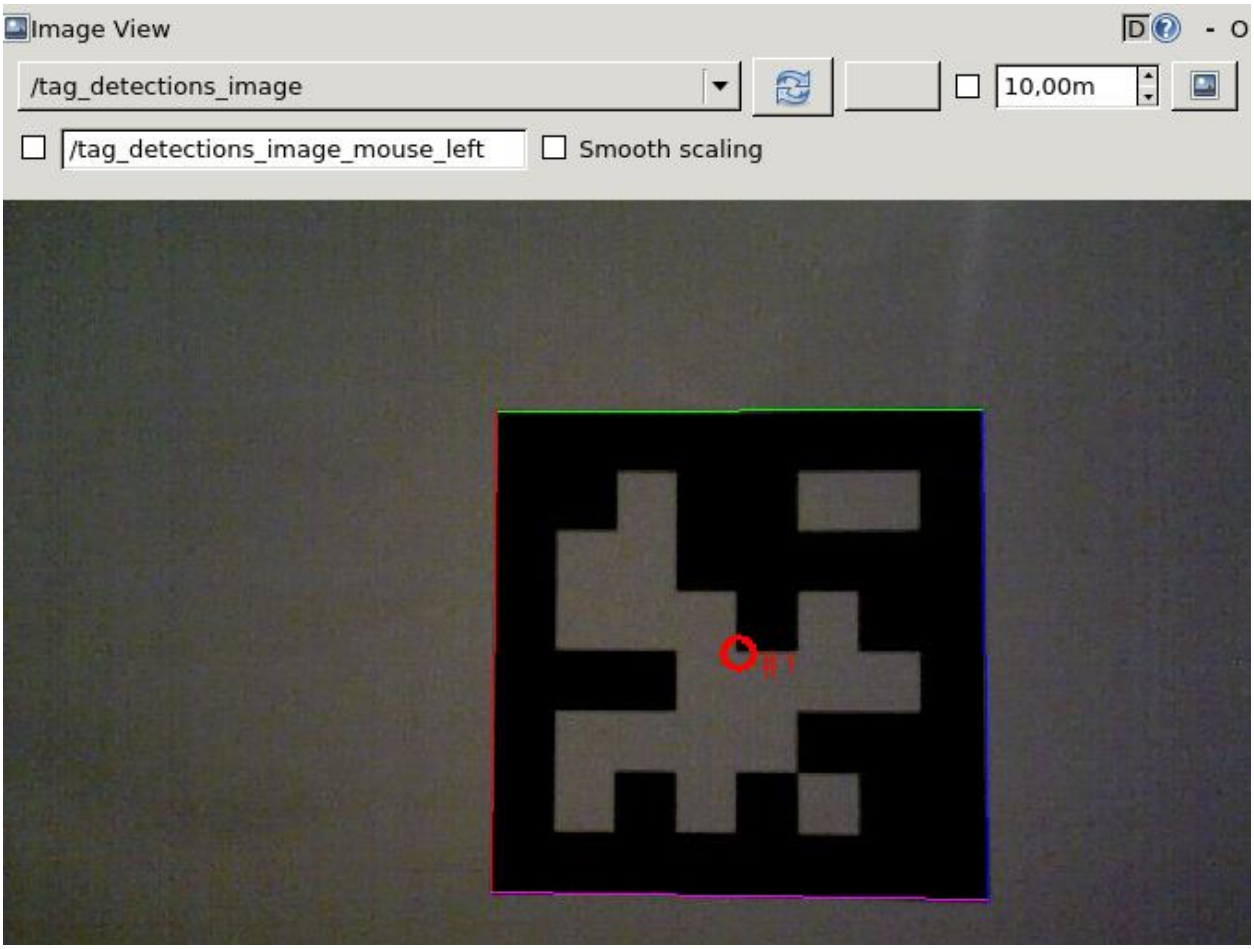


Image View
/tag_detections_image
10,00m
/tag_detections_image_mouse_left
Smooth scaling

```
detections:
  -
    id: 1
    size: 0.08
    pose:
      header:
        seq: 55709
        stamp:
          secs: 1510415864
          nsecs: 148304216
        frame_id: camera_rgb_optical_frame
      pose:
        position:
          x: 0.0201272971812
          y: -0.02393358631
          z: 0.383437954847
        orientation:
          x: 0.713140734773
          y: -0.681737860948
          z: 0.153311144456
          w: 0.0562092015923
---
```

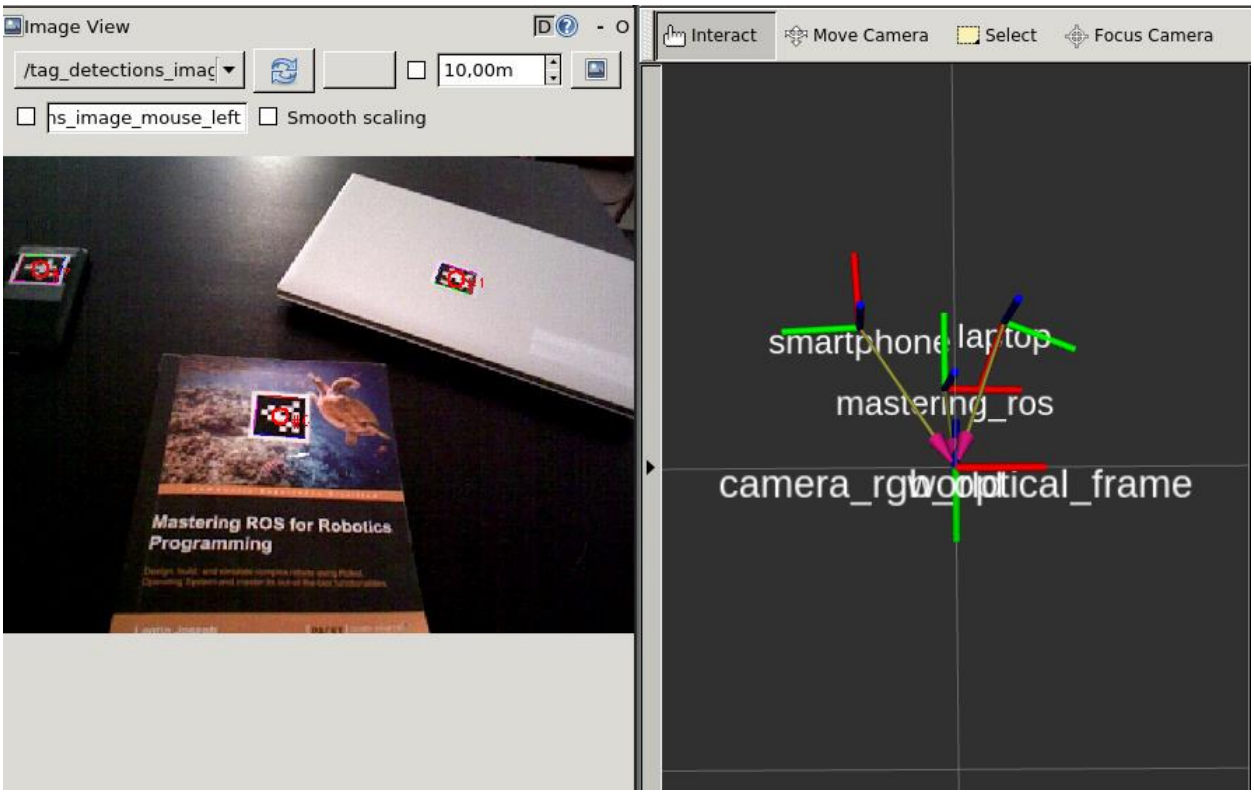
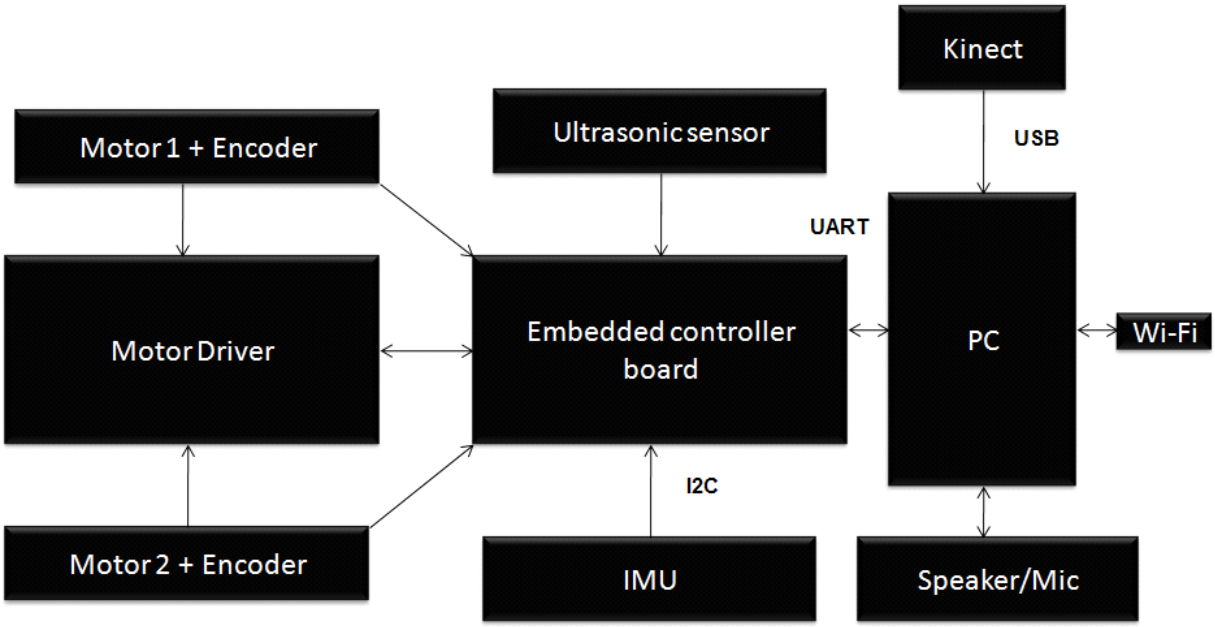
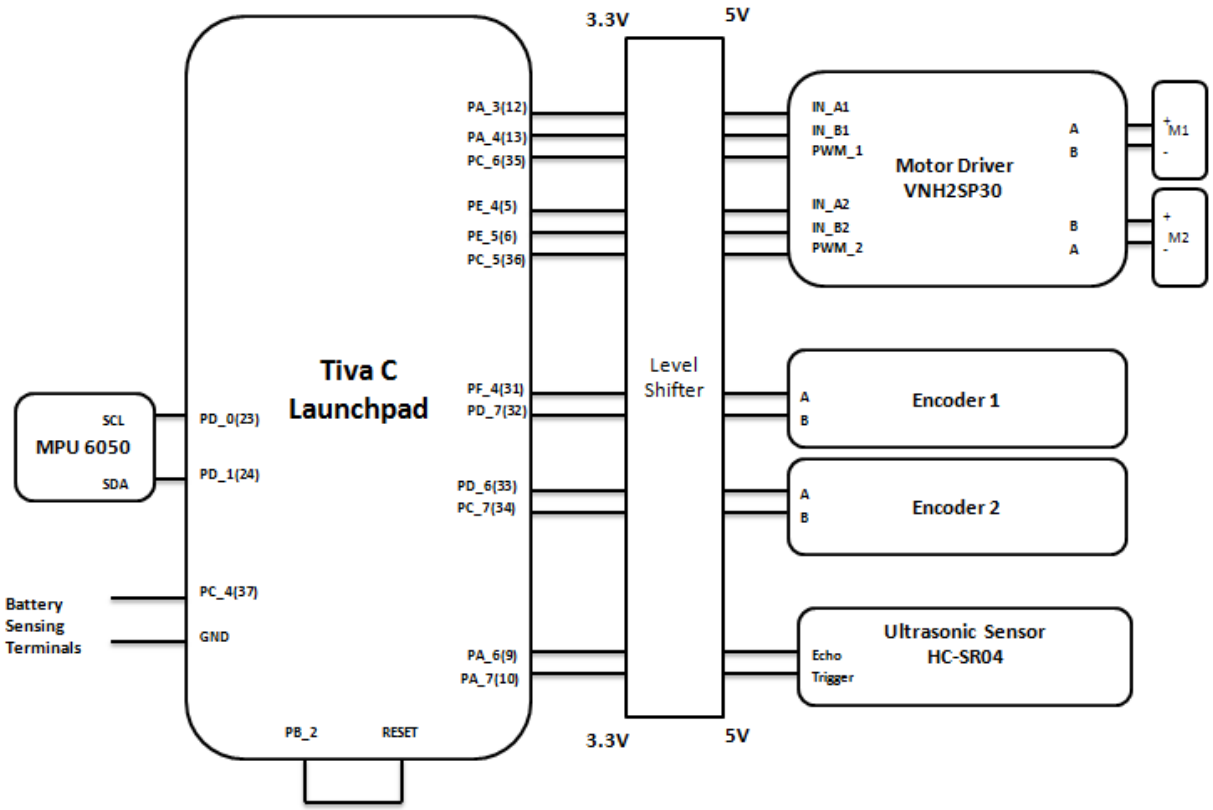


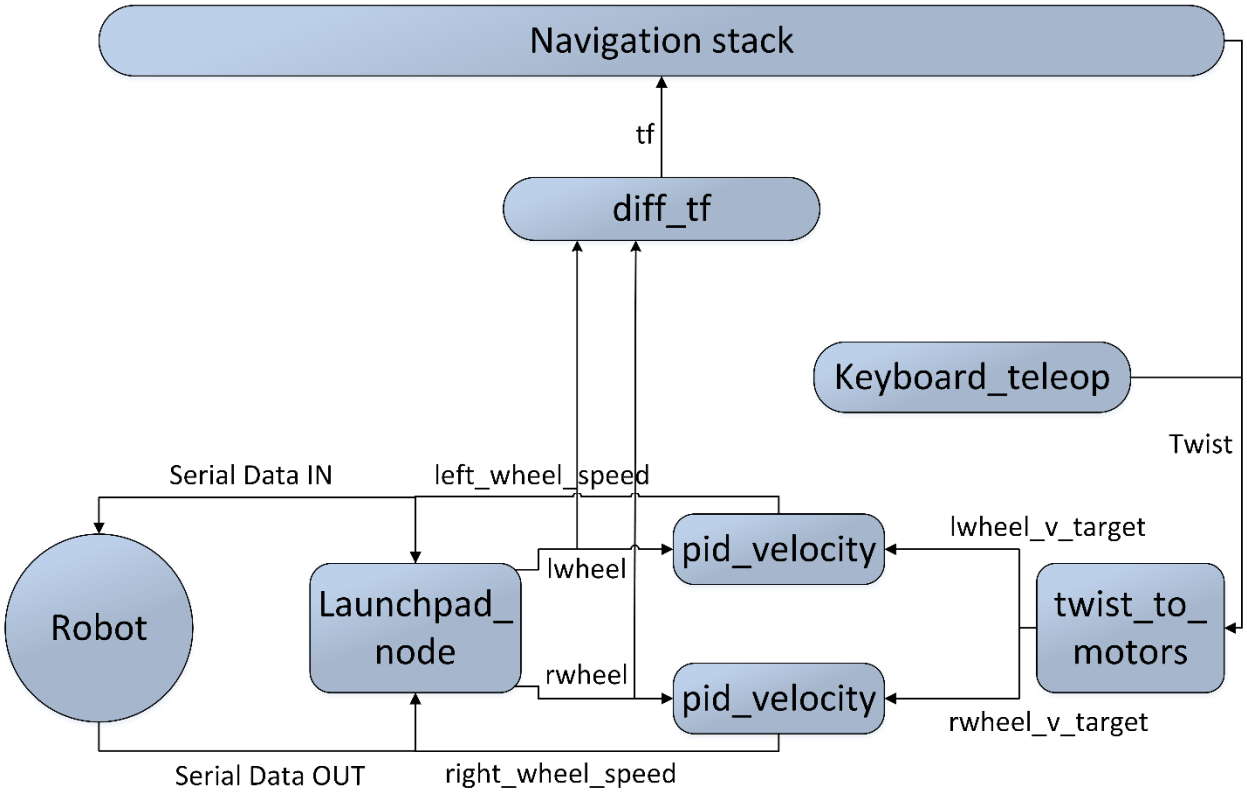
Image View
/tag_detections_imag
10,00m
hs_image_mouse_left
Smooth scaling
Mastering ROS for Robotics Programming
Interact
Move Camera
Select
Focus Camera
smartphone
laptop
mastering_ros
camera_rgb_optical_frame

Chapter 11: Building and Interfacing Differential Drive Mobile Robot Hardware in ROS

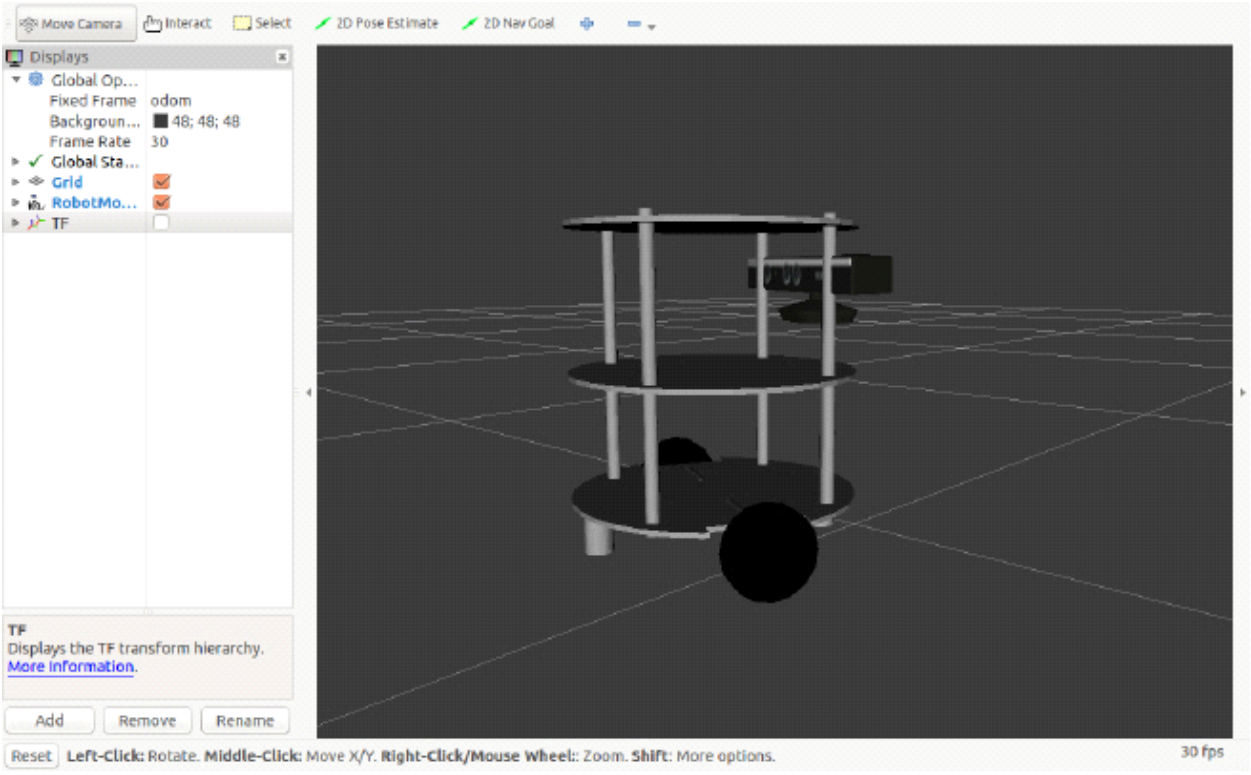


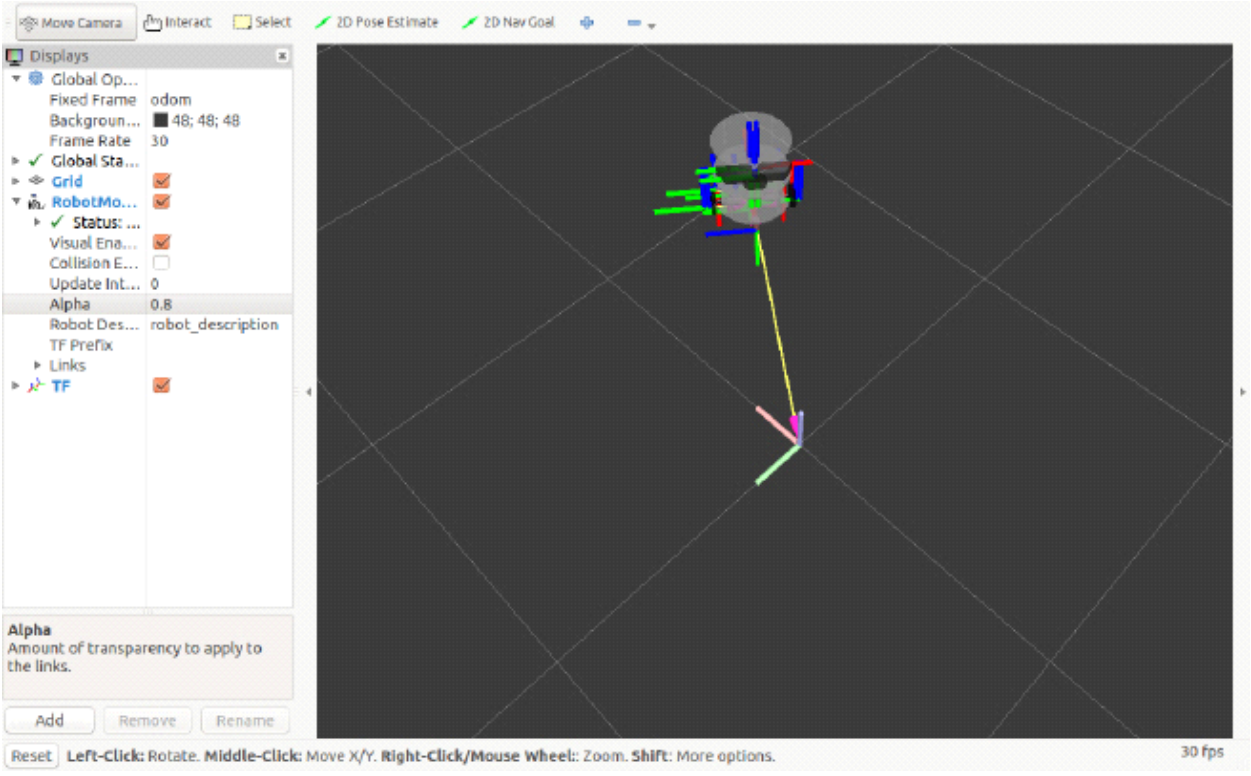

3.3V
5V
Tiva C
Launchpad
PA_3(12)
PA_4(13)
PC_6(35)
PE_4(5)
PE_5(6)
PC_5(36)
PF_4(31)
PD_7(32)
PD_6(33)
PC_7(34)
PA_6(9)
PA_7(10)
PB_2
RESET
PD_0(23)
PD_1(24)
PC_4(37)
GND
SCL
MPU 6050
SDA
Battery
Sensing
Terminals
Level
Shifter
3.3V
5V
IN_A1
IN_B1
PWM_1
IN_A2
IN_B2
PWM_2
Motor Driver
VNH2SP30
A
B
B
A
+
M1
-
+
M2
-
A
B
Encoder 1
A
B
Encoder 2
Ultrasonic Sensor
HC-SR04
Echo
Trigger

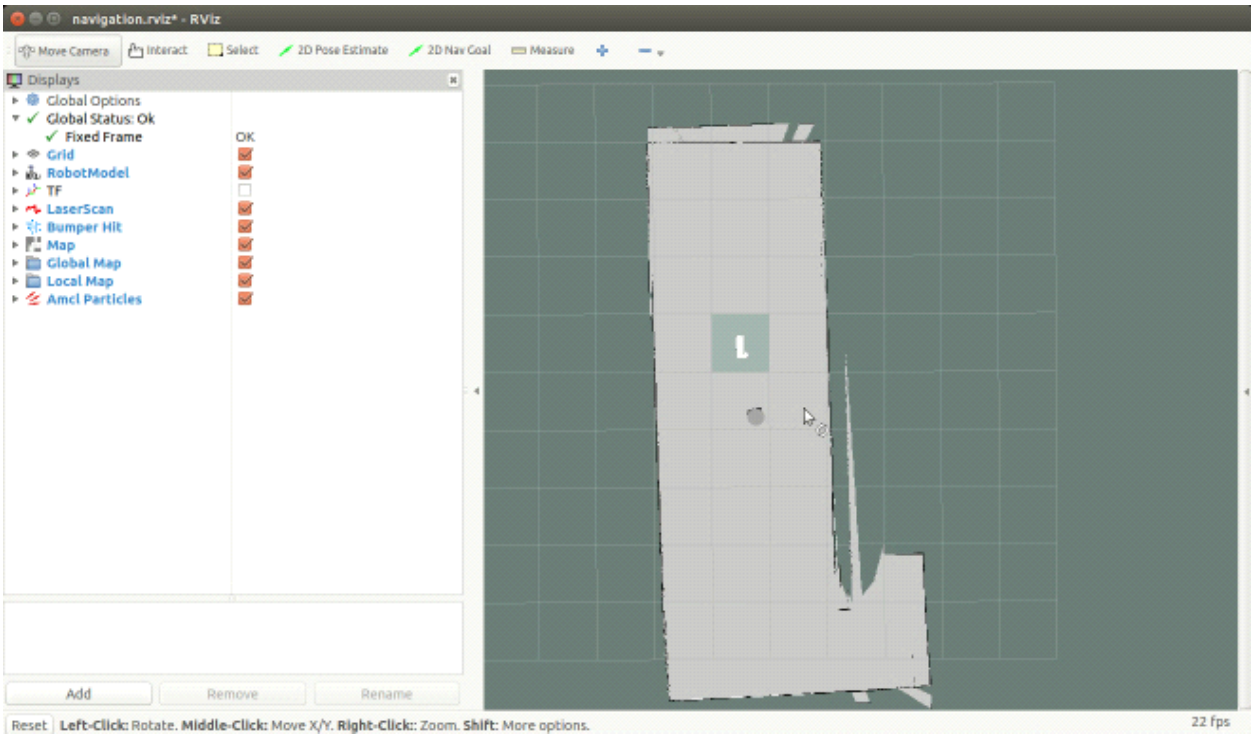
```
b       0.00
t       66458239        0.05
e       0       0
u       10
s       0.00    0.00
i       -0.68   -0.47   -0.40   0.40
b       0.00
t       66511681        0.05
e       0       0
u       10
s       0.00    0.00
i       -0.68   -0.47   -0.40   0.40
b       0.00
t       66566051        0.05
e       0       0
u       10
s       0.00    0.00
i       -0.68   -0.47   -0.40   0.40
b       0.00
t       66620423        0.05
e       0       0
u       10
s       0.00    0.00
```



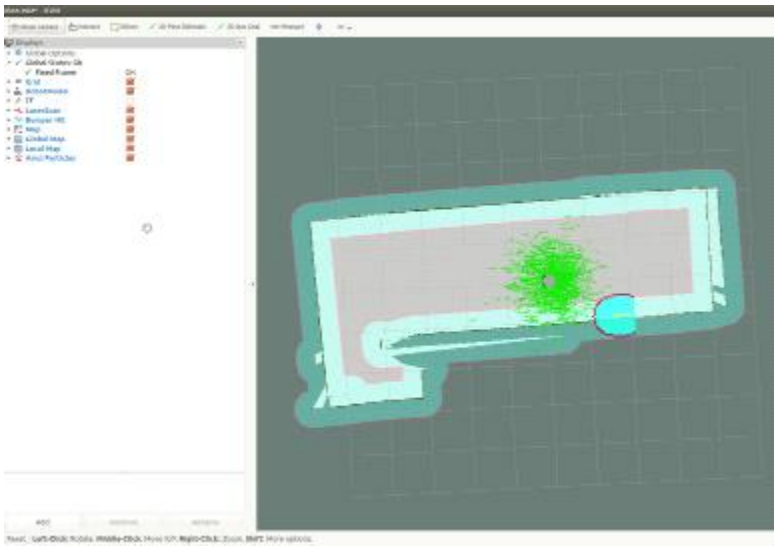
```
lentin@lentin-Aspire-4755:~$ rostopic list
/battery_level
/cmd_vel_mux/input/teleop
/imu/data
/joint_states
/left_wheel_speed
/lwheel
/lwheel_vel
/lwheel_vtarget
/odom
/qw
/qx
/qy
/qz
/right_wheel_speed
/rosout
/rosout_agg
/rwheel
/rwheel_vel
/rwheel_vtarget
/serial
/tf
/ultrasonic_distance
```

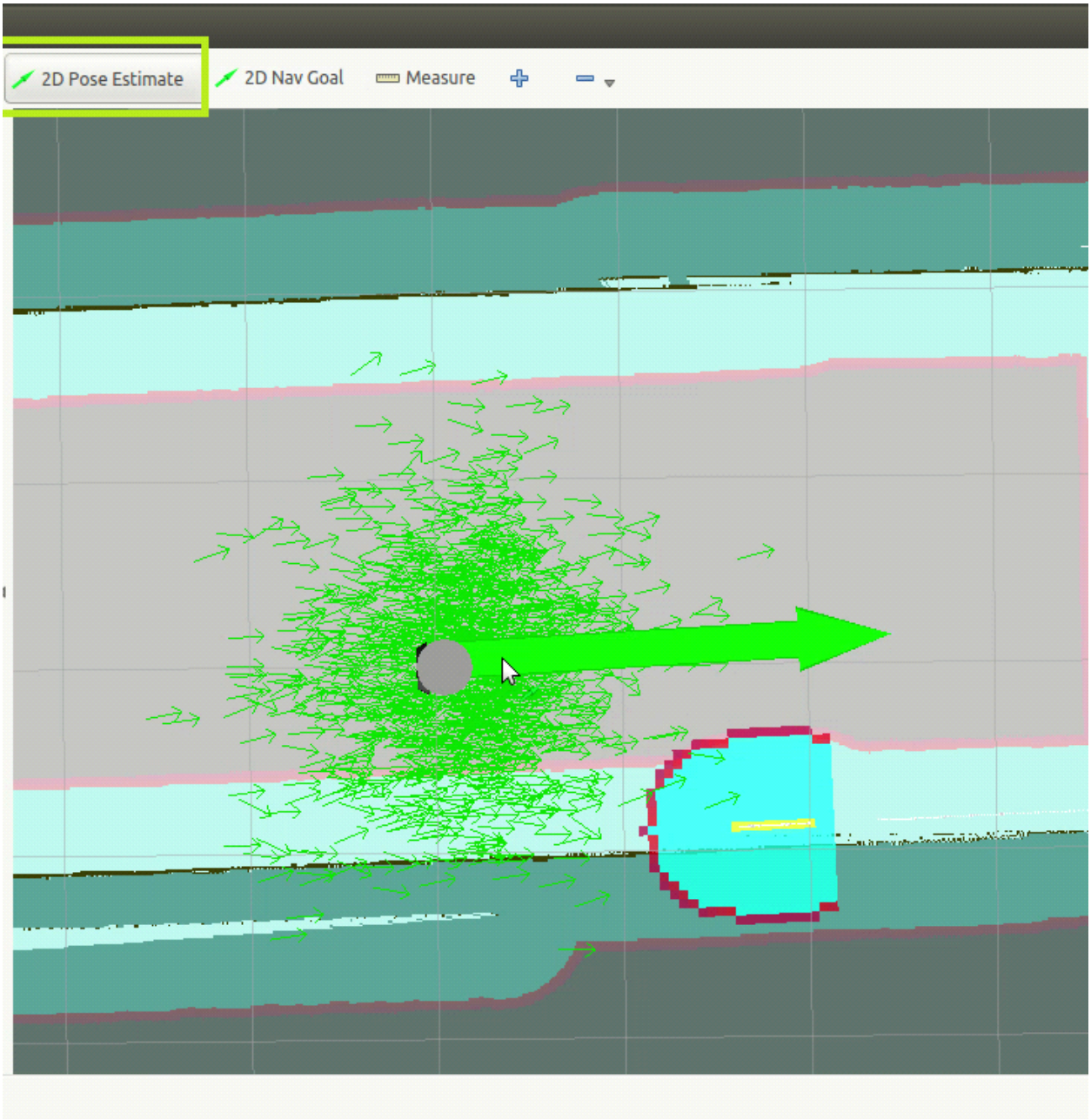

Move Camera
Interact
Select
2D Pose Estimate
2D Nav Goal
Displays
Global Op...
Fixed Frame
odom
Backgroun...
48; 48; 48
Frame Rate
30
Global Sta...
Grid
RobotMo...
TF
TF
Displays the TF transform hierarchy.
More information.
Add
Remove
Rename
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click/Mouse Wheel:: Zoom. Shift: More options.
30 fps

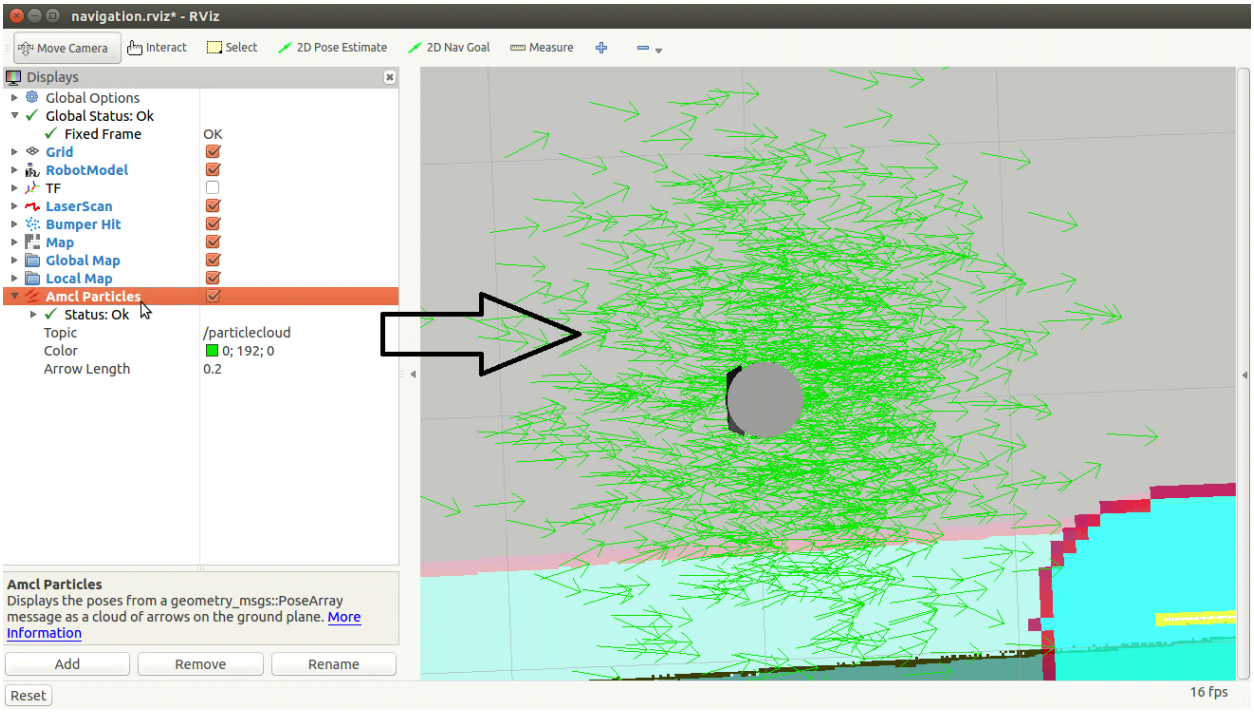

Move Camera
Interact
Select
2D Pose Estimate
2D Nav Goal
Displays
Global Op...
Fixed Frame
odom
Backgroun...
48; 48; 48
Frame Rate
30
Global Sta...
Grid
RobotMo...
Status: ...
Visual Ena...
Collision E...
Update Int...
0
Alpha
0.8
Robot Des...
robot_description
TF Prefix
Links
TF
Alpha
Amount of transparency to apply to the links.
Add
Remove
Rename
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click/Mouse Wheel:: Zoom. Shift: More options.
30 fps

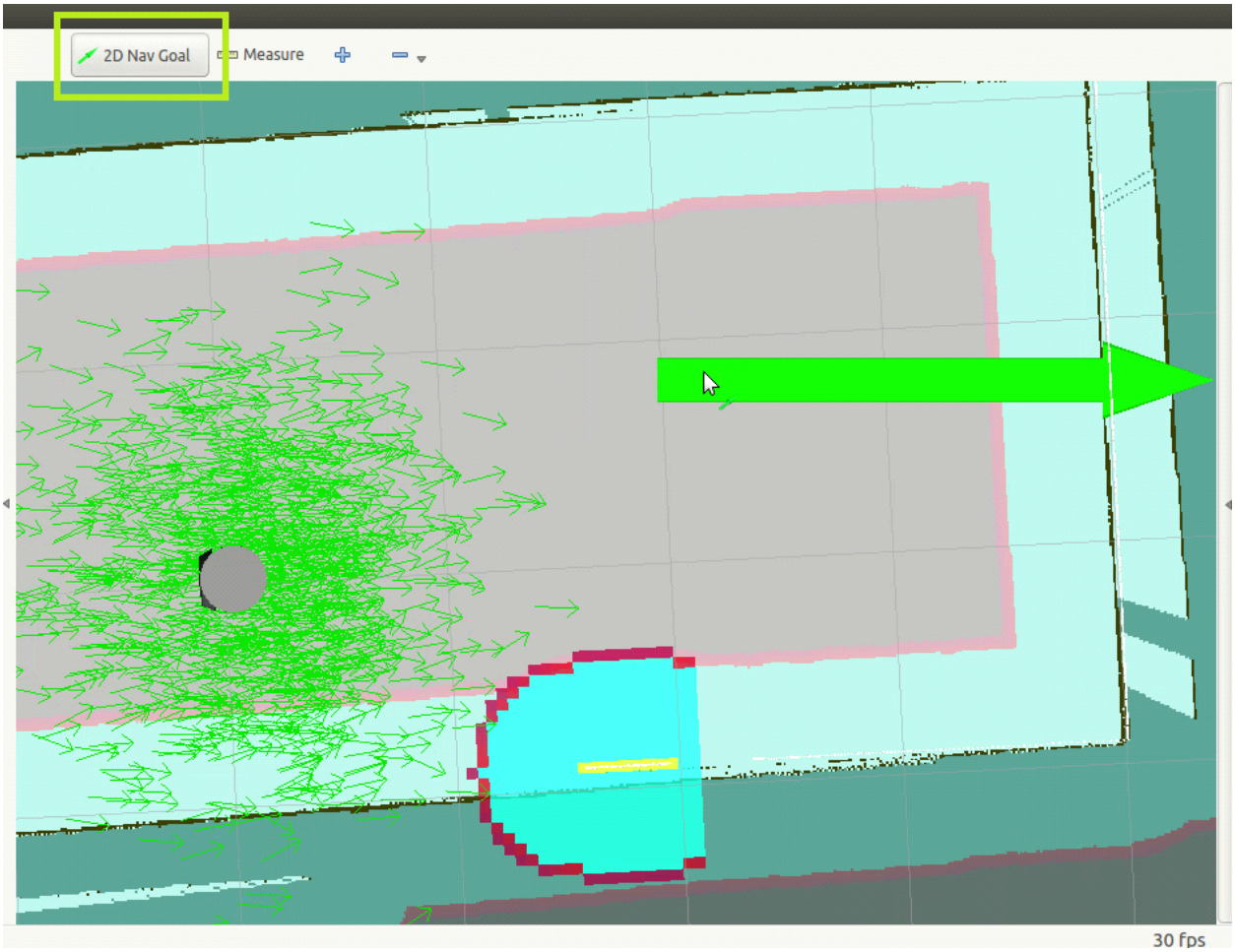


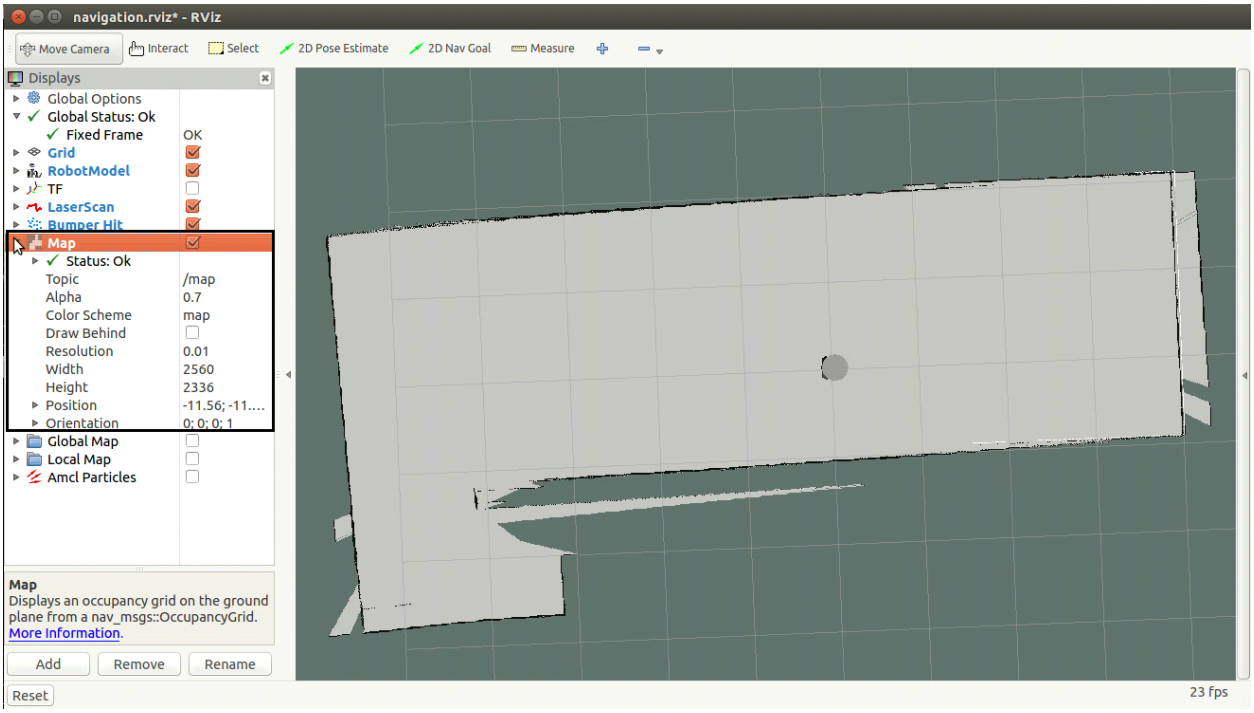

```
lentin@lentin-Aspire-4755:~$ rosrun map_server map_saver -f room
[ INFO] [1441544530.992319268]: Waiting for the map
[ INFO] [1441544531.226293214]: Received a 2560 X 2336 map @ 0.010 m/pix
[ INFO] [1441544531.226483203]: Writing map occupancy data to room.pgm
[ INFO] [1441544531.497796388, 101.846000000]: Writing map occupancy data to room.yaml
[ INFO] [1441544531.498148723, 101.846000000]: Done
```

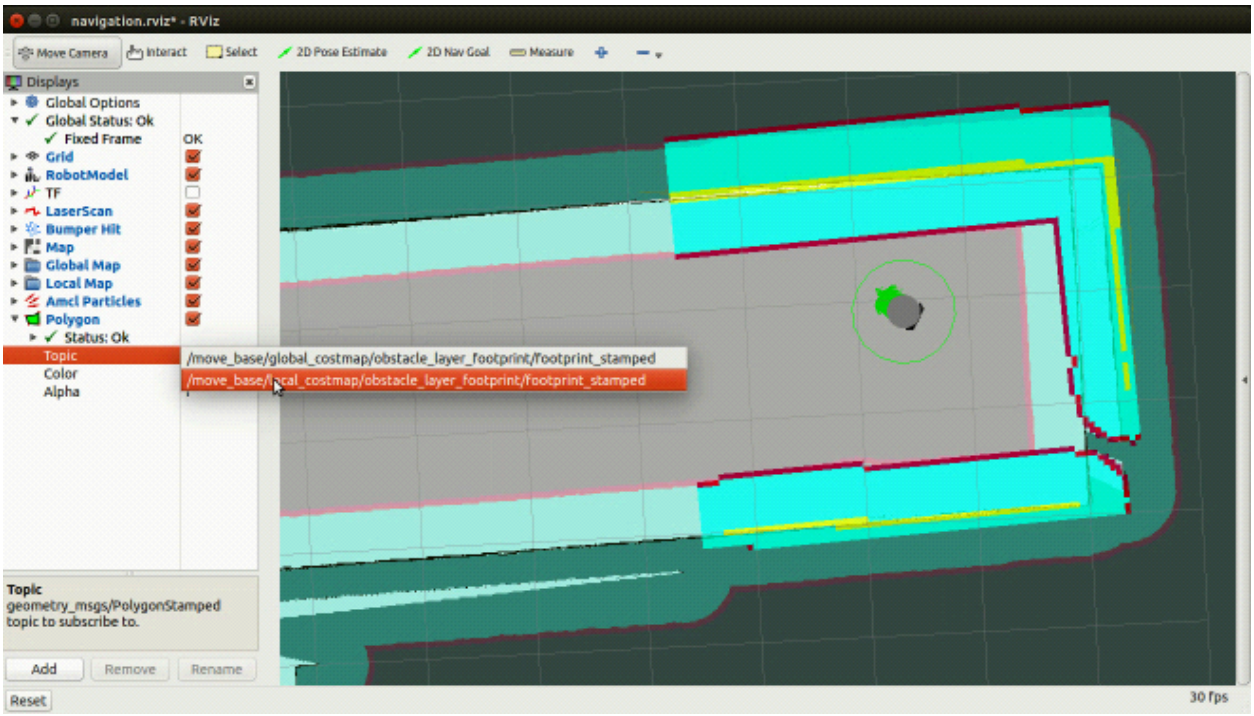


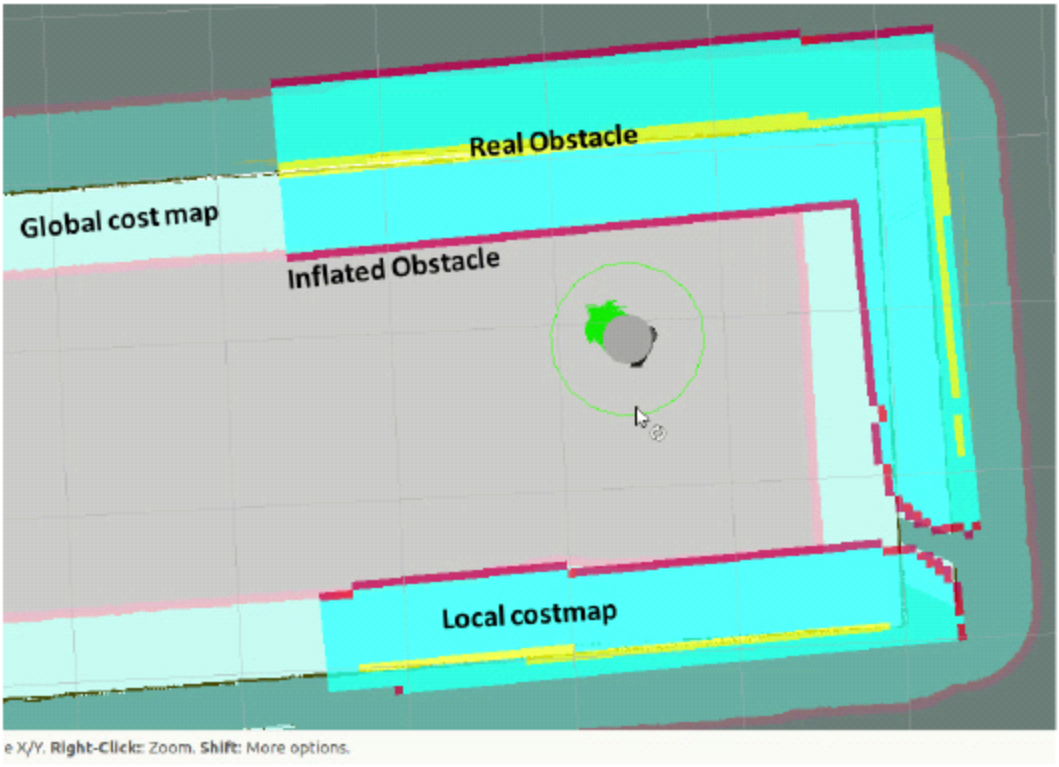

2D Pose Estimate
2D Nav Goal
Measure

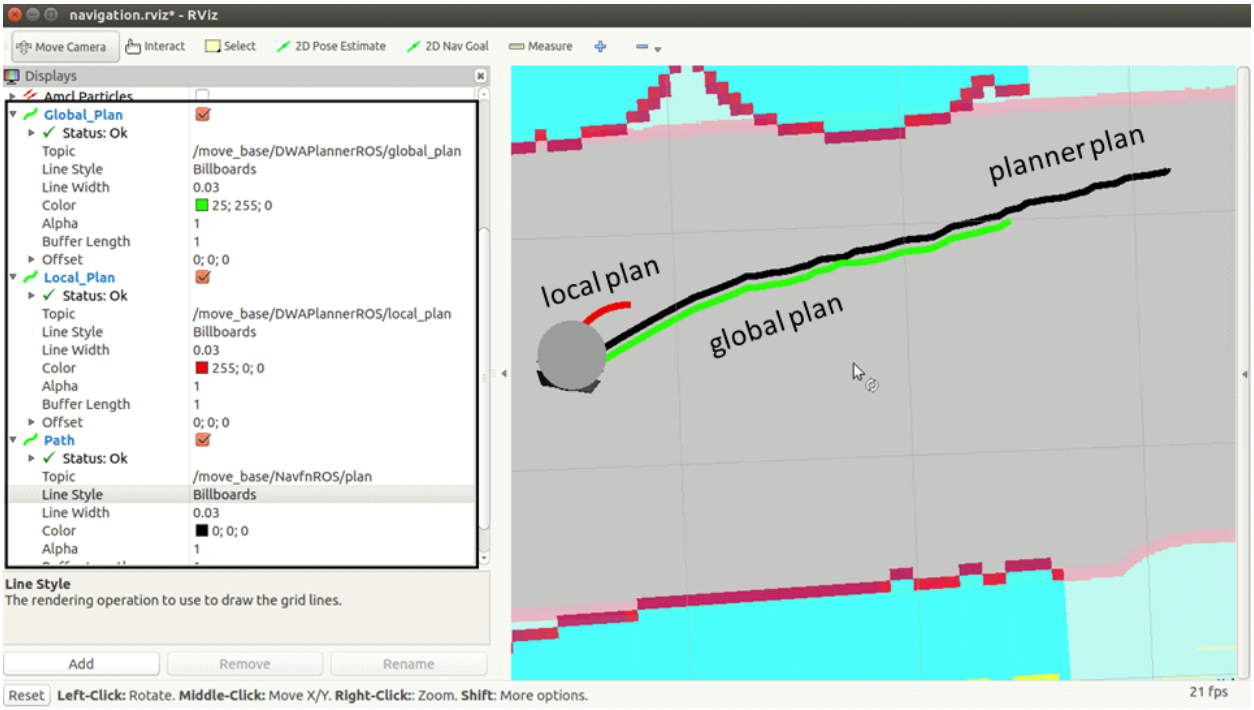

navigation.rviz* - RViz
Move Camera
Interact
Select
2D Pose Estimate
2D Nav Goal
Measure
Displays
Global Options
Global Status: Ok
Fixed Frame
OK
Grid
RobotModel
TF
LaserScan
Bumper Hit
Map
Global Map
Local Map
Amcl Particles
Status: Ok
Topic
/particlecloud
Color
0; 192; 0
Arrow Length
0.2
Amcl Particles
Displays the poses from a geometry_msgs::PoseArray message as a cloud of arrows on the ground plane. More Information
Add
Remove
Rename
Reset
16 fps

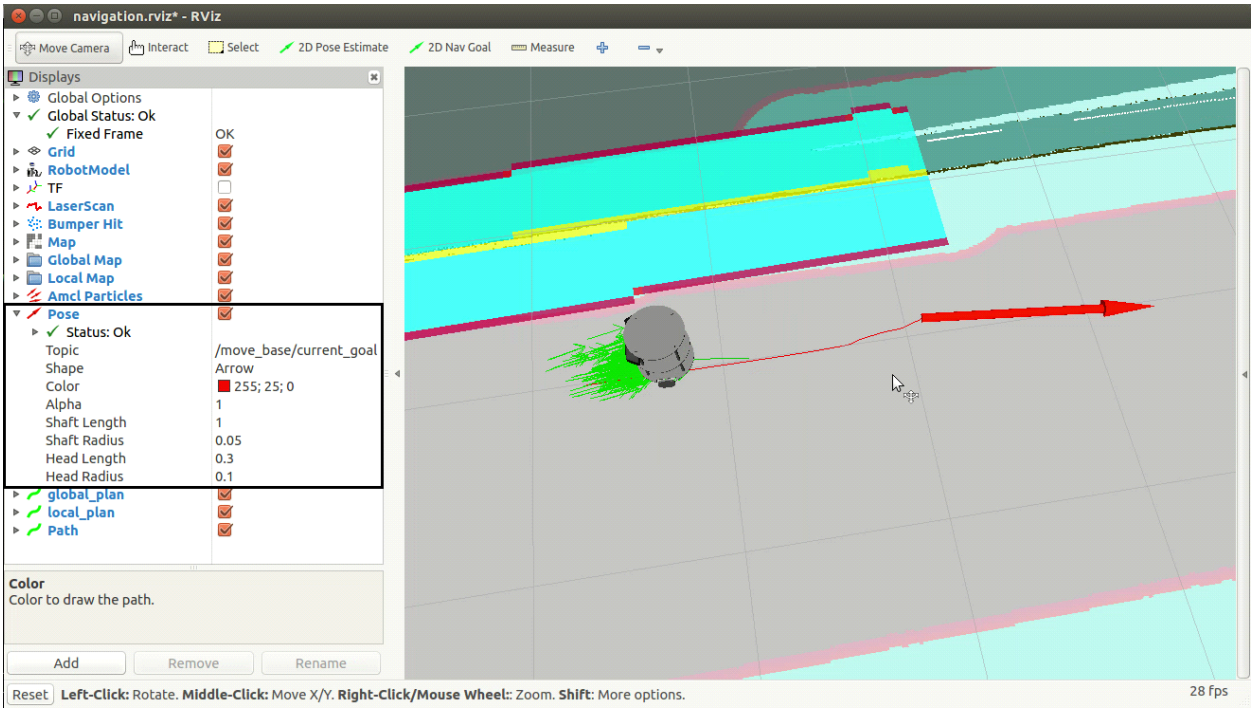

2D Nav Goal
Measure
30 fps

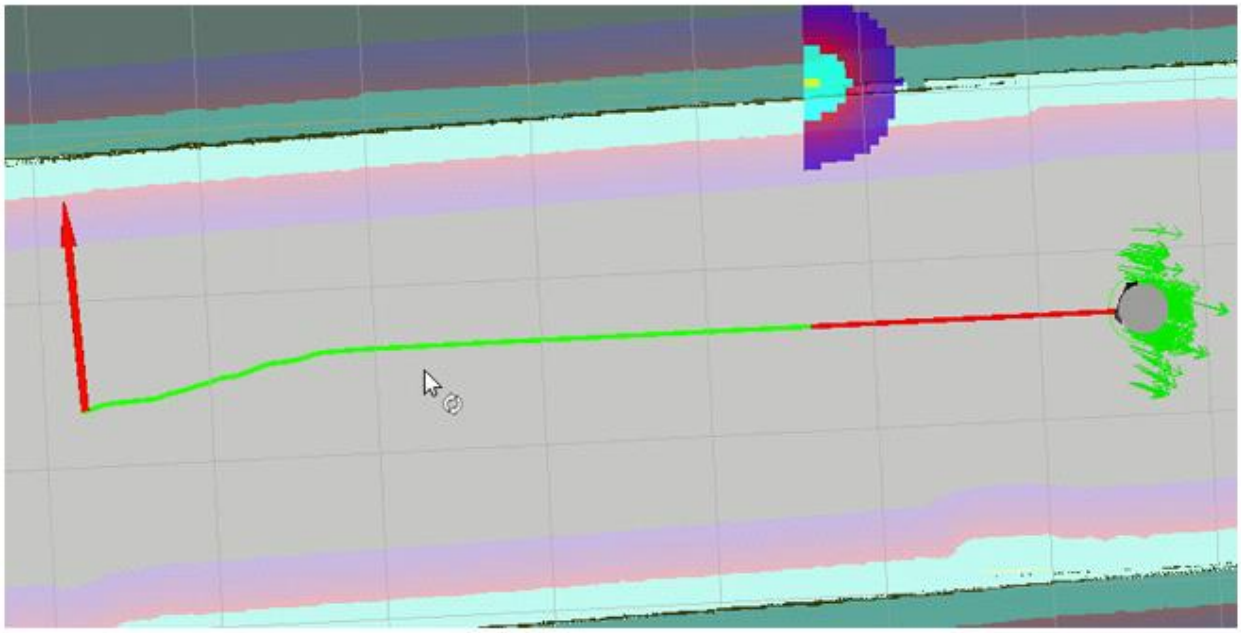

navigation.rviz* - RViz
Move Camera
Interact
Select
2D Pose Estimate
2D Nav Goal
Measure
Displays
Global Options
Global Status: Ok
Fixed Frame
OK
Grid
RobotModel
TF
LaserScan
Bumper Hit
Map
Status: Ok
Topic
/map
Alpha
0.7
Color Scheme
map
Draw Behind
Resolution
0.01
Width
2560
Height
2336
Position
Orientation
0; 0; 0; 1
Global Map
Local Map
Amcl Particles
Map
Displays an occupancy grid on the ground plane from a nav_msgs::OccupancyGrid.
More Information.
Add
Remove
Rename
Reset
23 fps


navigation.rviz* - RViz
Move Camera
Interact
Select
2D Pose Estimate
2D Nav Goal
Measure
Displays
Global Options
Global Status: Ok
Fixed Frame
OK
Grid
RobotModel
TF
LaserScan
Bumper Hit
Map
Global Map
Local Map
Amcl Particles
Polygon
Status: Ok
Topic
Color
Alpha
/move_base/global_costmap/obstacle_layer_footprint/footprint_stamped
/move_base/local_costmap/obstacle_layer_footprint/footprint_stamped
Topic
geometry_msgs/PolygonStamped
topic to subscribe to.
Add
Remove
Rename
Reset
30 fps

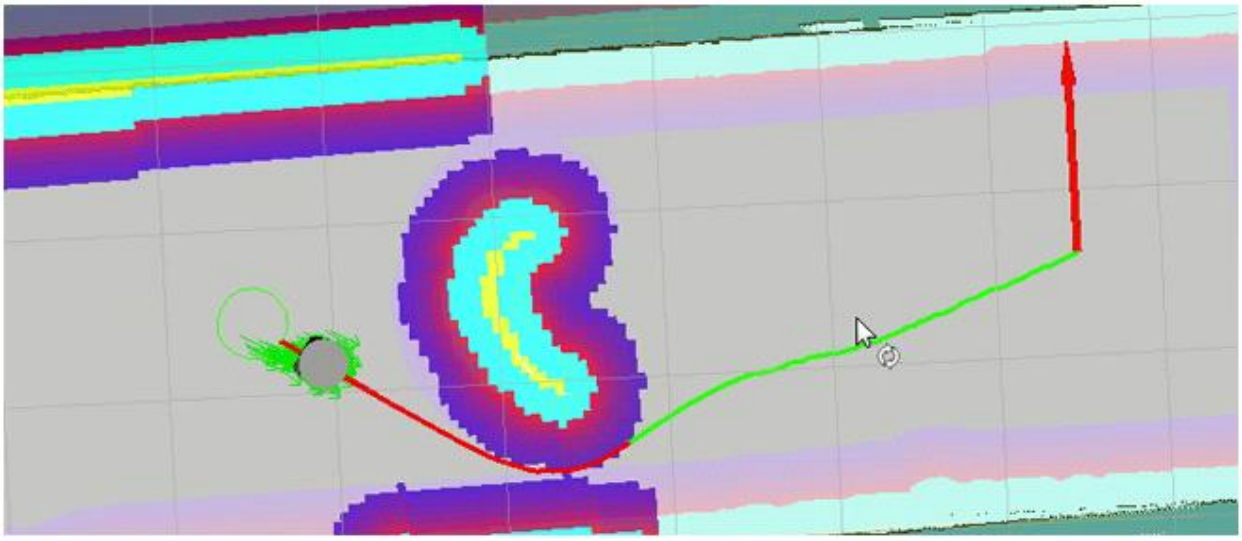

Real Obstacle
Global cost map
Inflated Obstacle
Local costmap
e X/Y. Right-Click: Zoom. Shift: More options.


navigation.rviz* - RViz
Move Camera
Interact
Select
2D Pose Estimate
2D Nav Goal
Measure
Displays
Amcl Particles
Global_Plan
Status: Ok
Topic /move_base/DWAPlannerROS/global_plan
Line Style Billboards
Line Width 0.03
Color 25; 255; 0
Alpha 1
Buffer Length 1
Offset 0; 0; 0
Local_Plan
Status: Ok
Topic /move_base/DWAPlannerROS/local_plan
Line Style Billboards
Line Width 0.03
Color 255; 0; 0
Alpha 1
Buffer Length 1
Offset 0; 0; 0
Path
Status: Ok
Topic /move_base/NavfnROS/plan
Line Style Billboards
Line Width 0.03
Color 0; 0; 0
Alpha 1
Line Style
The rendering operation to use to draw the grid lines.
Add
Remove
Rename
planner plan
local plan
global plan
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click:: Zoom. Shift: More options.
21 fps

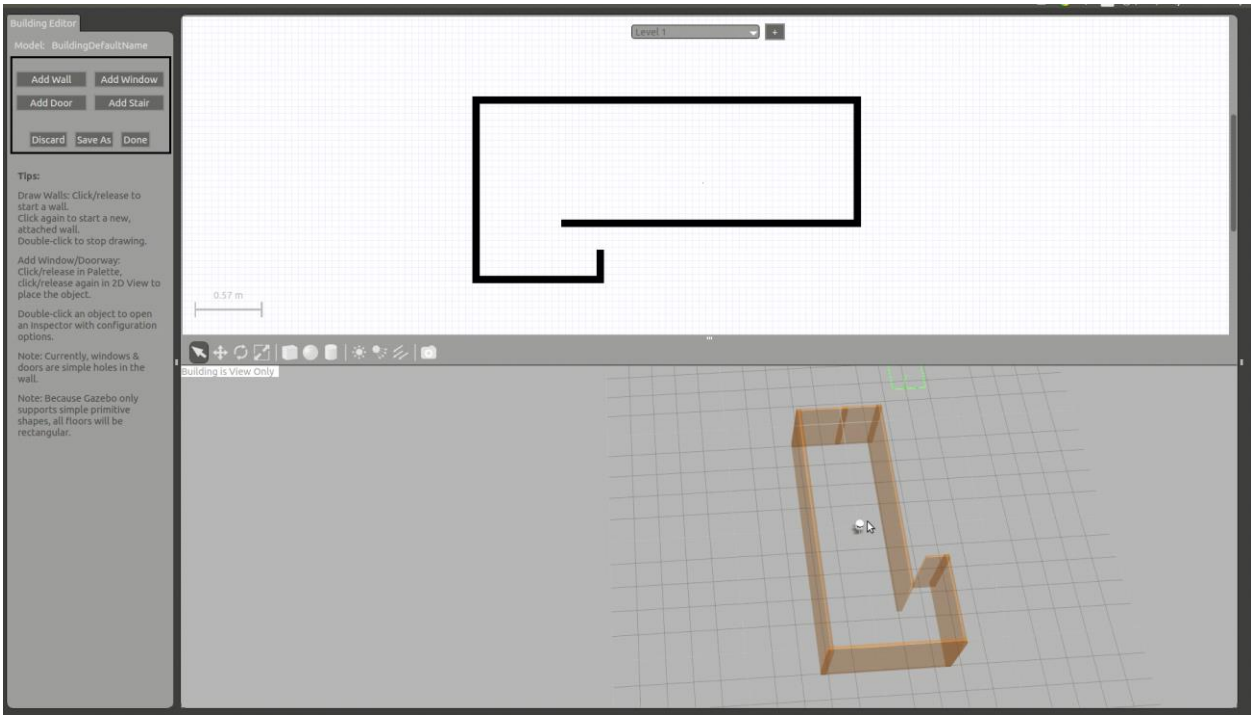

navigation.rviz* - RViz
Move Camera
Interact
Select
2D Pose Estimate
2D Nav Goal
Measure
Displays
Global Options
Global Status: Ok
Fixed Frame
OK
Grid
RobotModel
TF
LaserScan
Bumper Hit
Map
Global Map
Local Map
Amcl Particles
Pose
Status: Ok
Topic
/move_base/current_goal
Shape
Arrow
Color
255; 25; 0
Alpha
1
Shaft Length
1
Shaft Radius
0.05
Head Length
0.3
Head Radius
0.1
global_plan
local_plan
Path
Color
Color to draw the path.
Add
Remove
Rename
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click/Mouse Wheel:: Zoom. Shift: More options.
28 fps

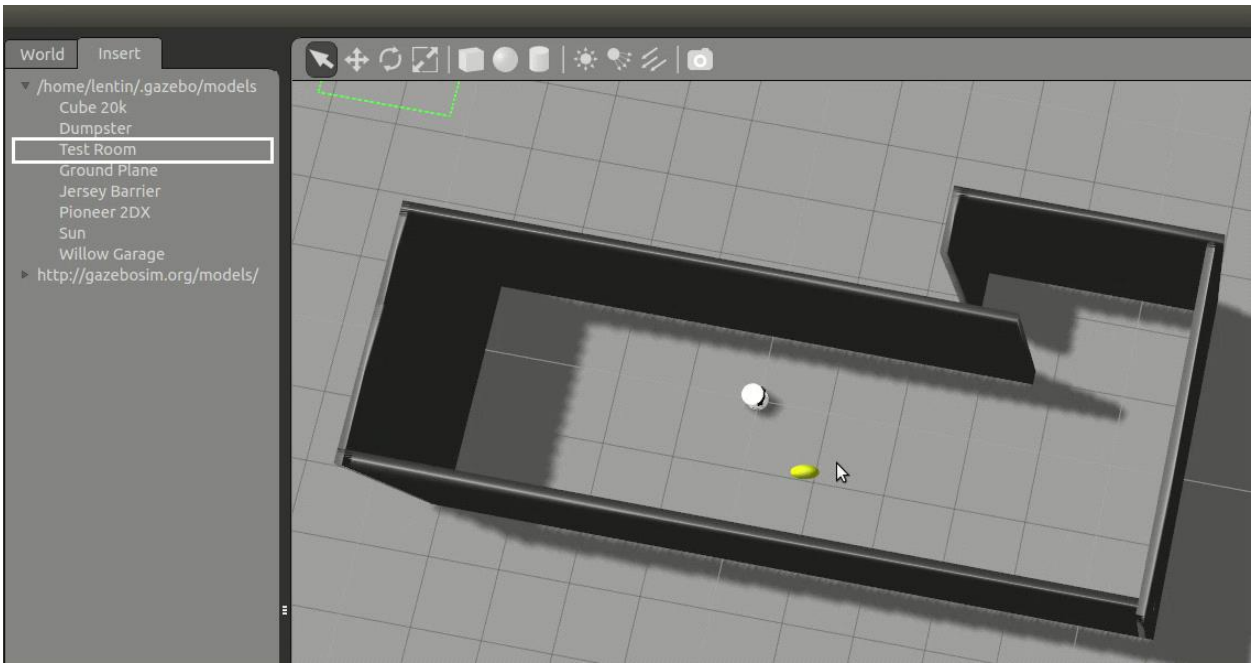


No obstacle

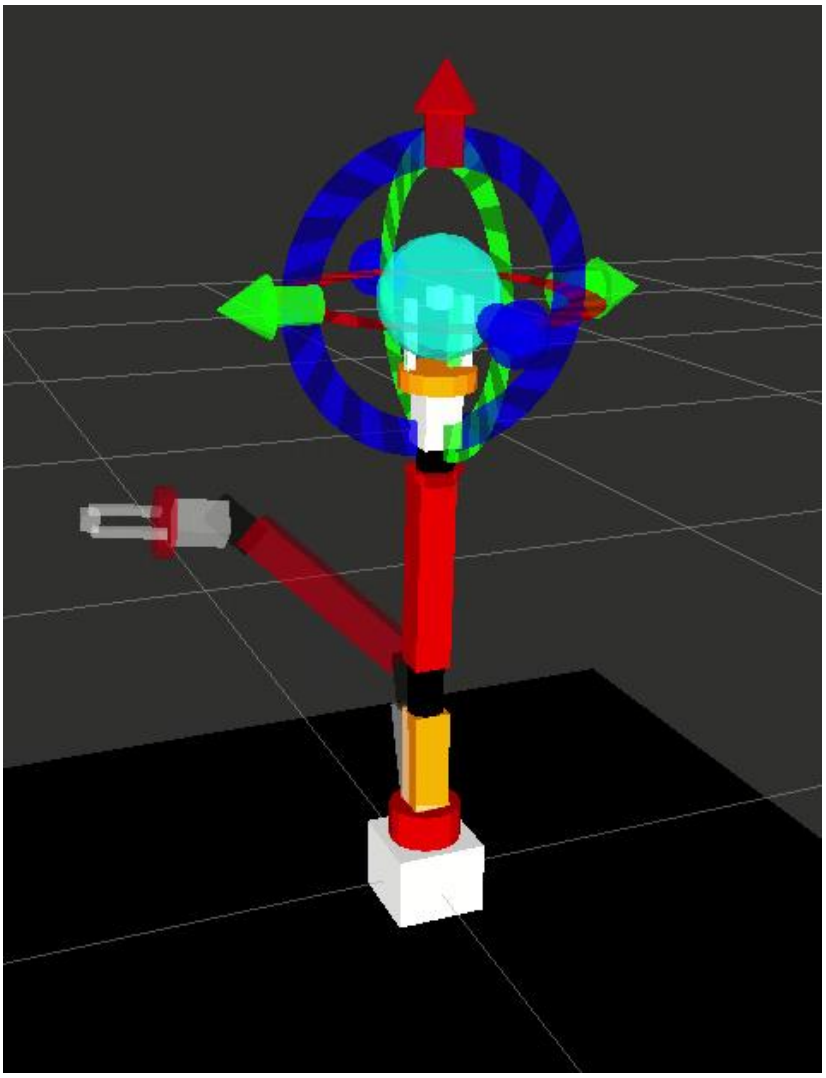


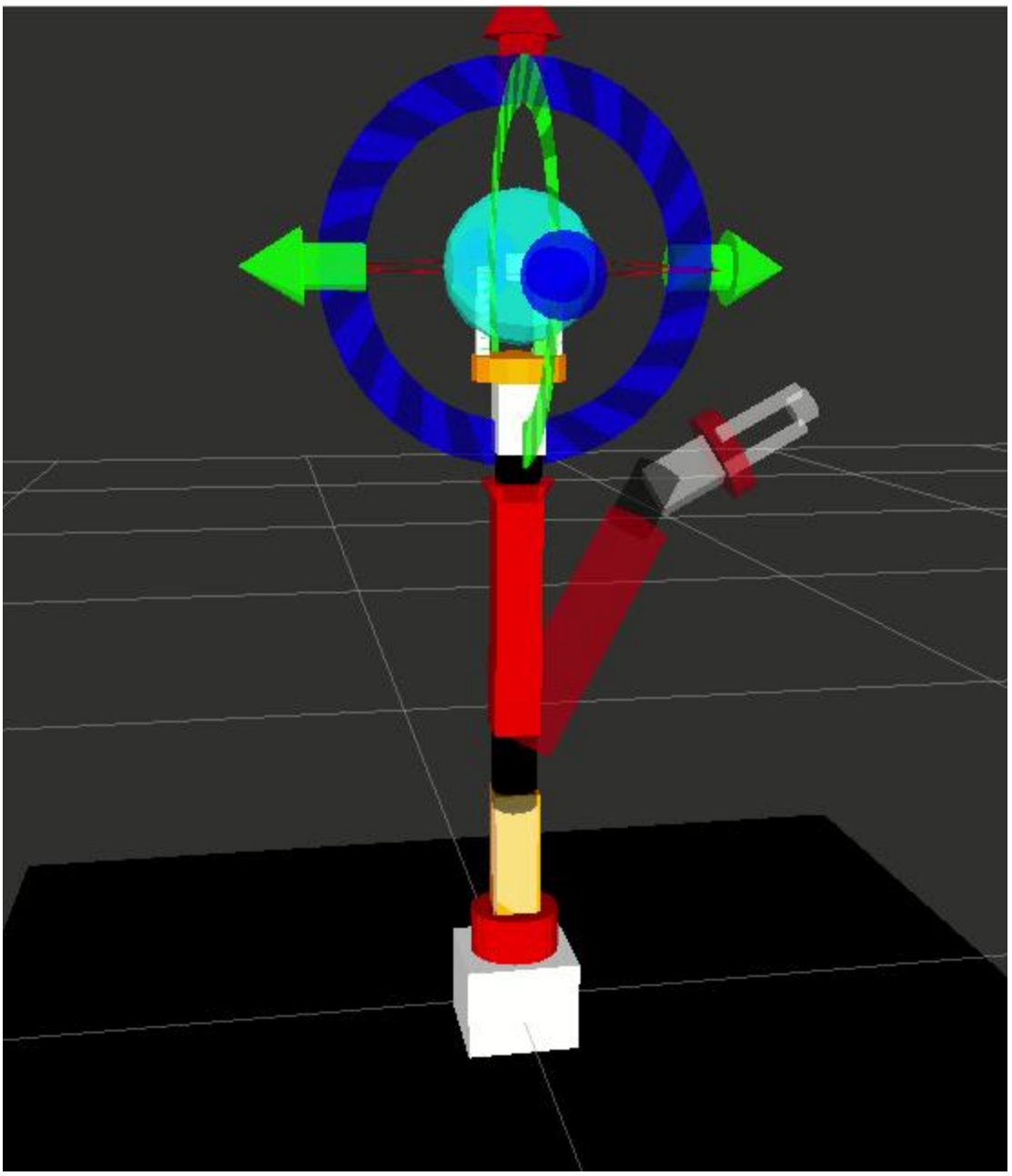
With obstacle

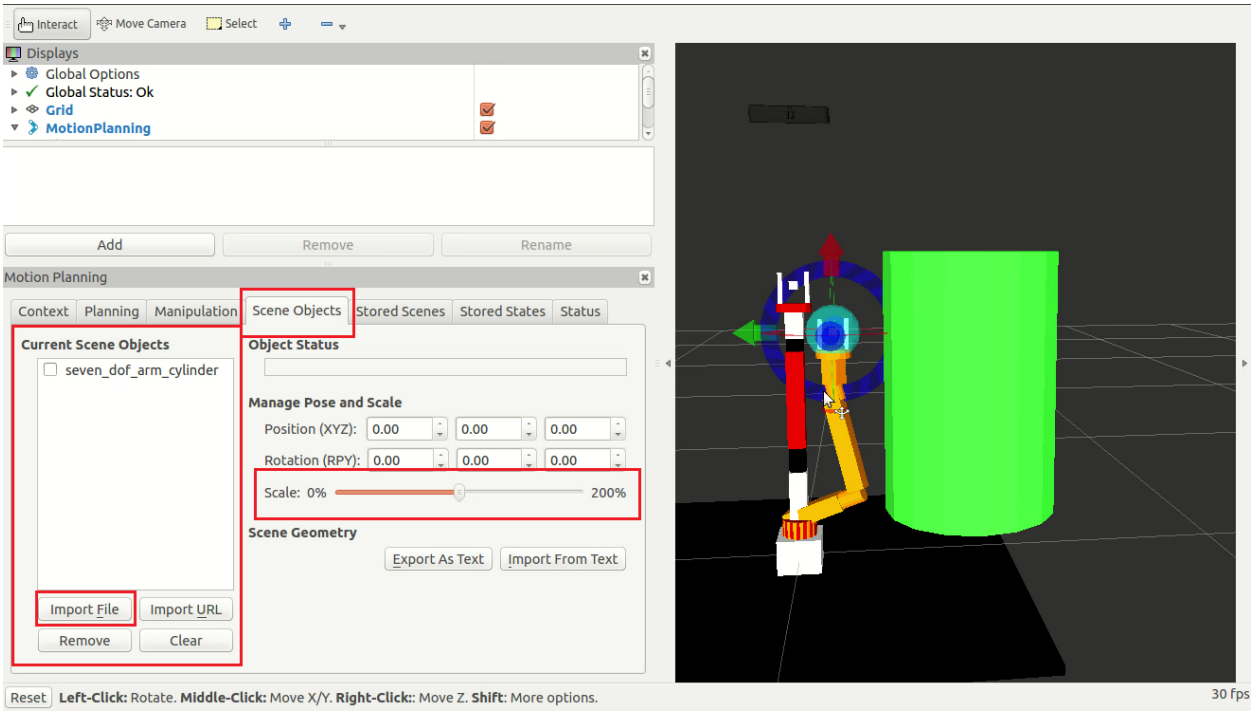

Building Editor
Model: BuildingDefaultName
Add Wall
Add Window
Add Door
Add Stair
Discard
Save As
Done
Tips:
Draw Walls: Click/release to start a wall.
Click again to start a new, attached wall.
Double-click to stop drawing.
Add Window/Doorway: Click/release in Palette, click/release again in 2D View to place the object.
Double-click an object to open an Inspector with configuration options.
Note: Currently, windows & doors are simple holes in the wall.
Note: Because Gazebo only supports simple primitive shapes, all floors will be rectangular.
Level 1
0.57 m
Building is View Only

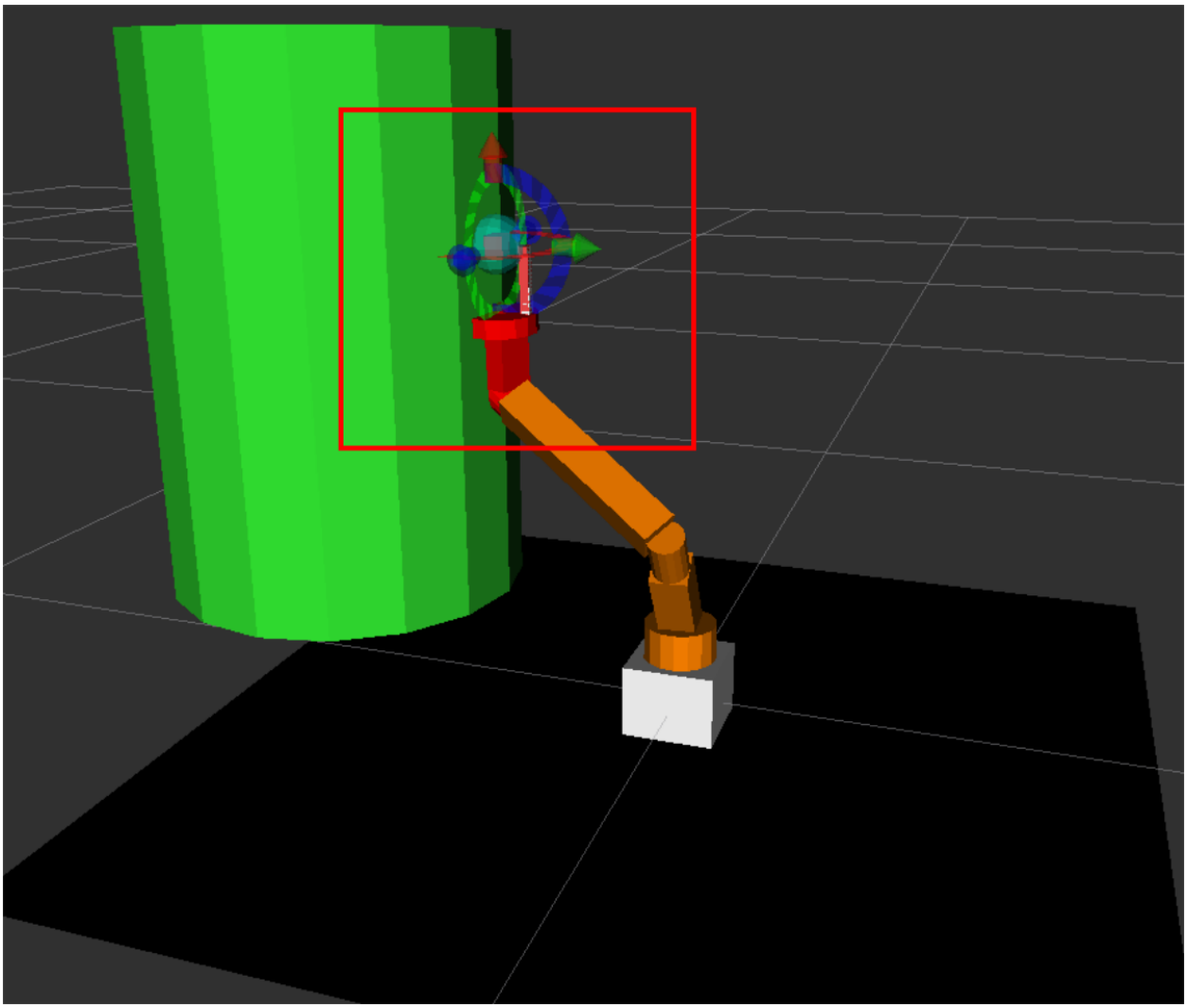

World
Insert
/home/lentin/.gazebo/models
Cube 20k
Dumpster
Test Room
Ground Plane
Jersey Barrier
Pioneer 2DX
Sun
Willow Garage
http://gazebosim.org/models/

Chapter 12: Exploring the Advanced Capabilities of ROS-MoveIt!

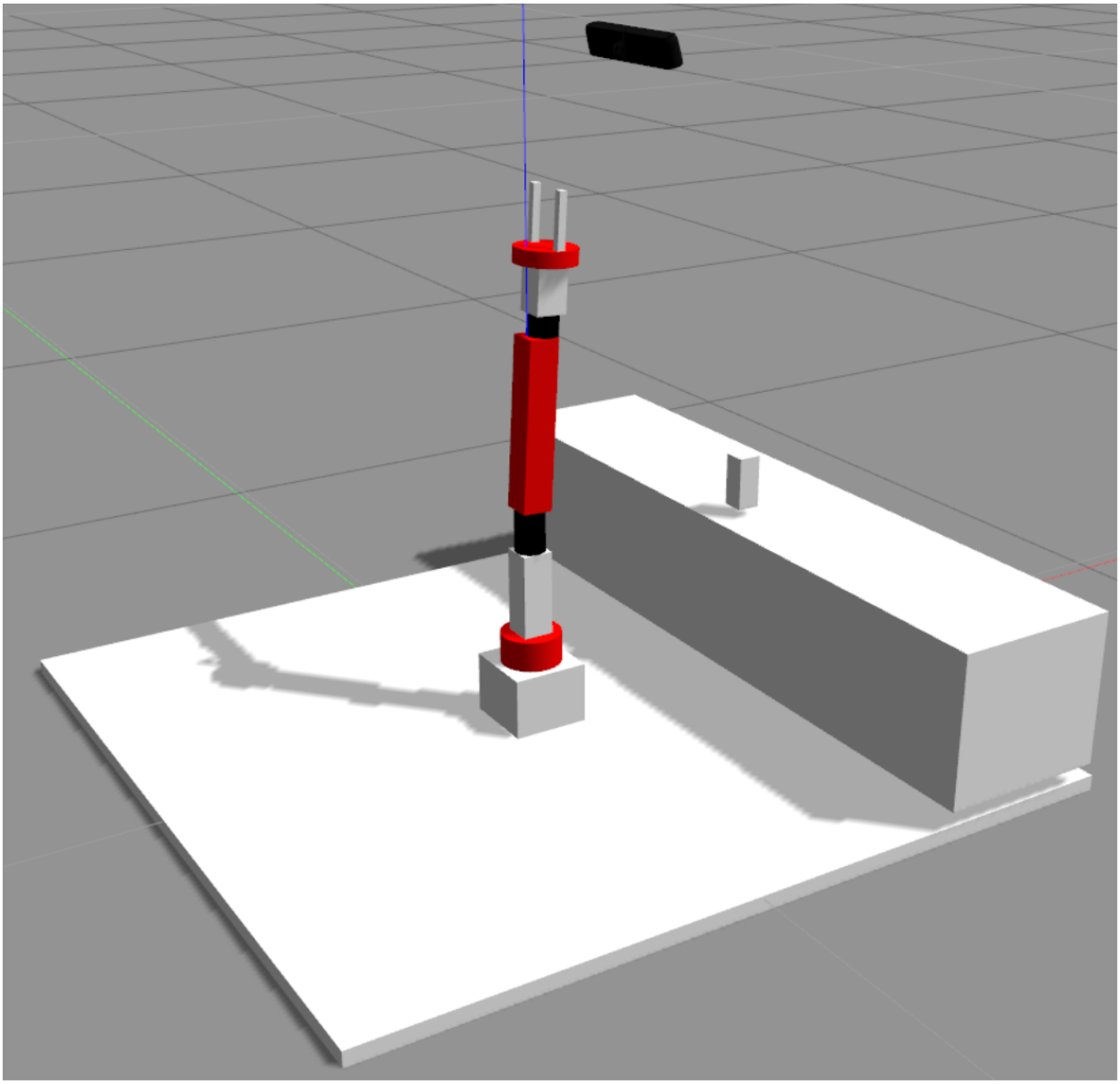




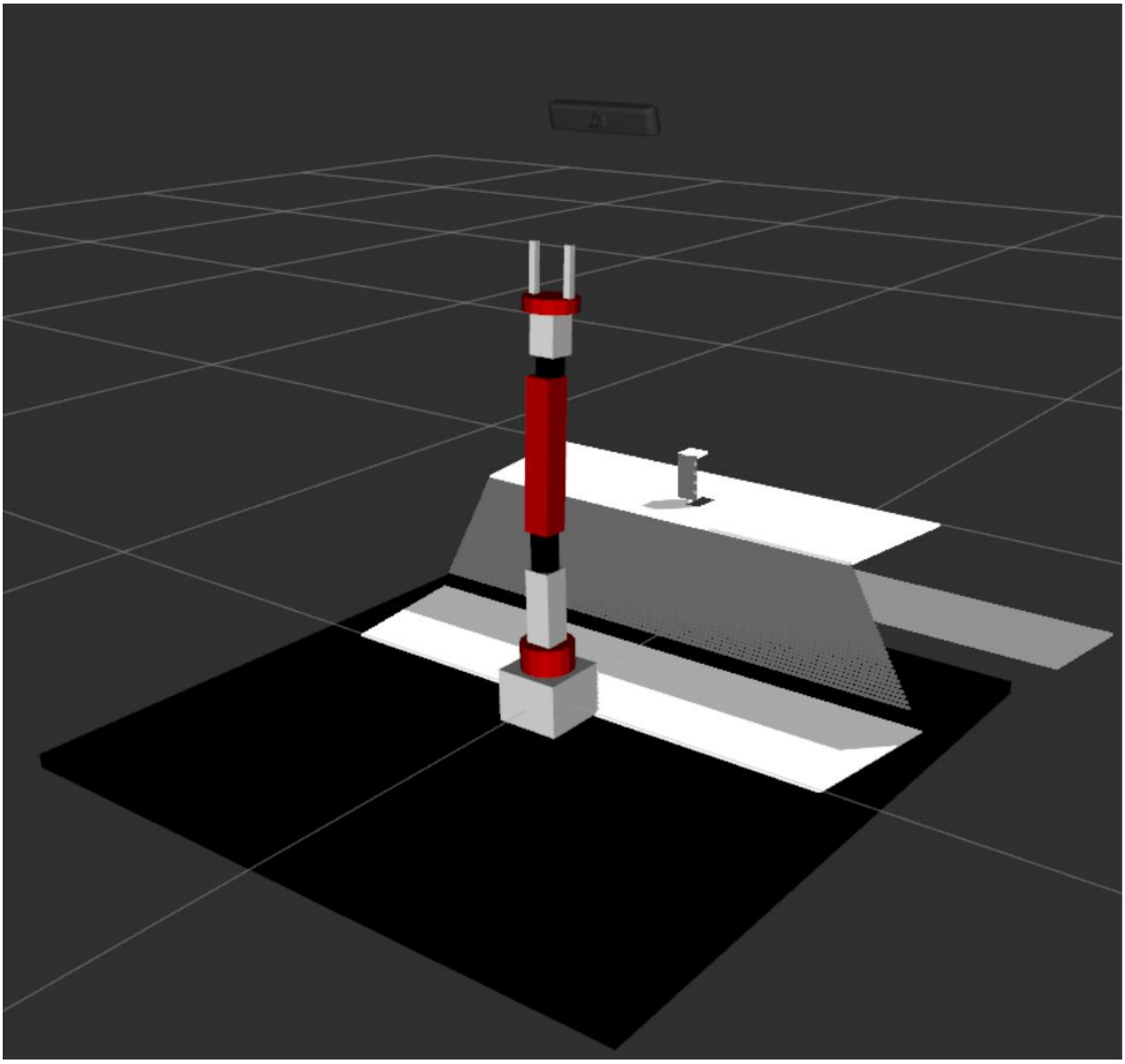

Interact
Move Camera
Select
Displays
Global Options
Global Status: Ok
Grid
MotionPlanning
Add
Remove
Rename
Motion Planning
Context
Planning
Manipulation
Scene Objects
Stored Scenes
Stored States
Status
Current Scene Objects
seven_dof_arm_cylinder
Import File
Import URL
Remove
Clear
Object Status
Manage Pose and Scale
Position (XYZ):
0.00
0.00
0.00
Rotation (RPY):
0.00
0.00
0.00
Scale: 0%
200%
Scene Geometry
Export As Text
Import From Text
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click:: Move Z. Shift: More options.
30 fps

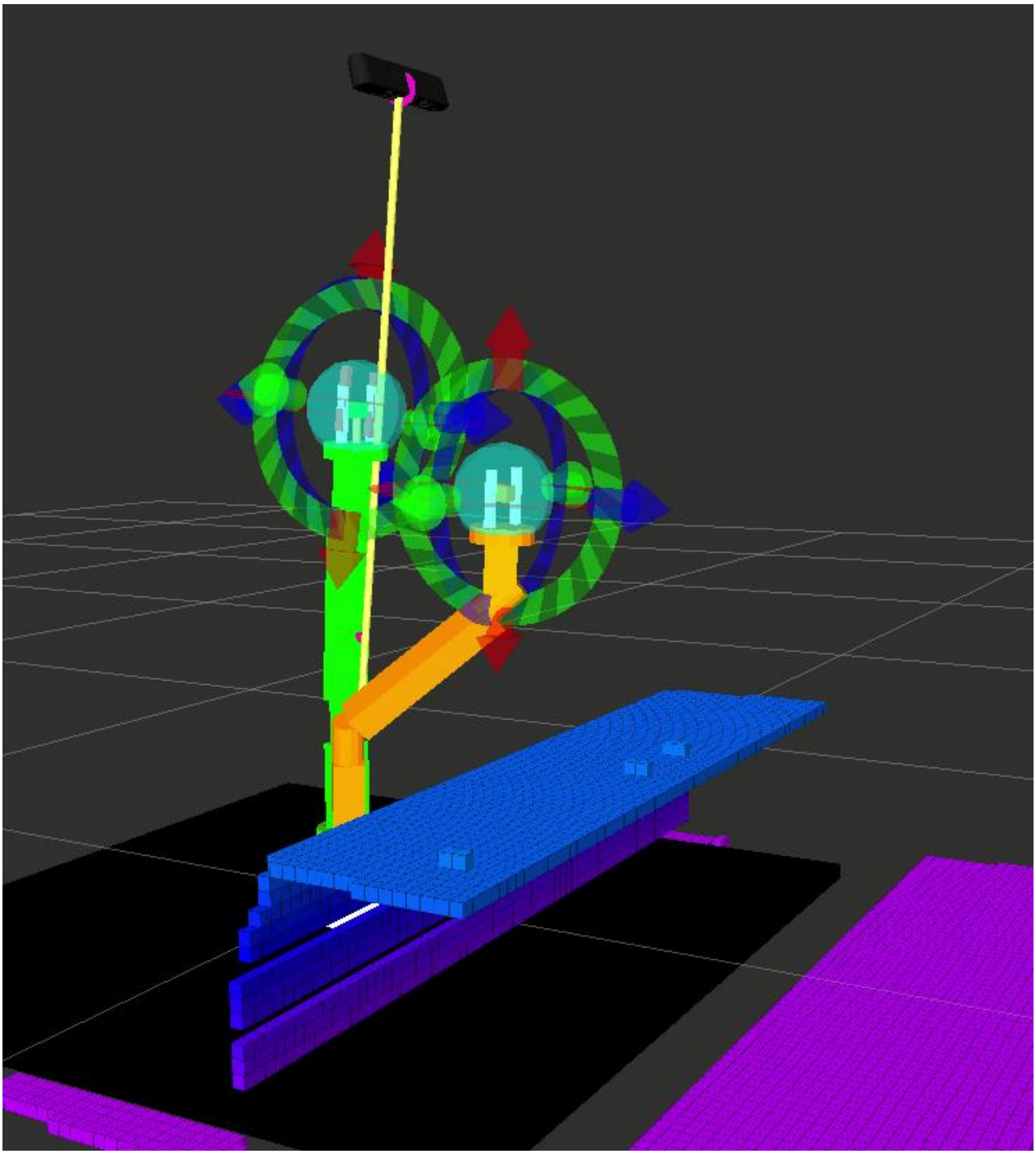


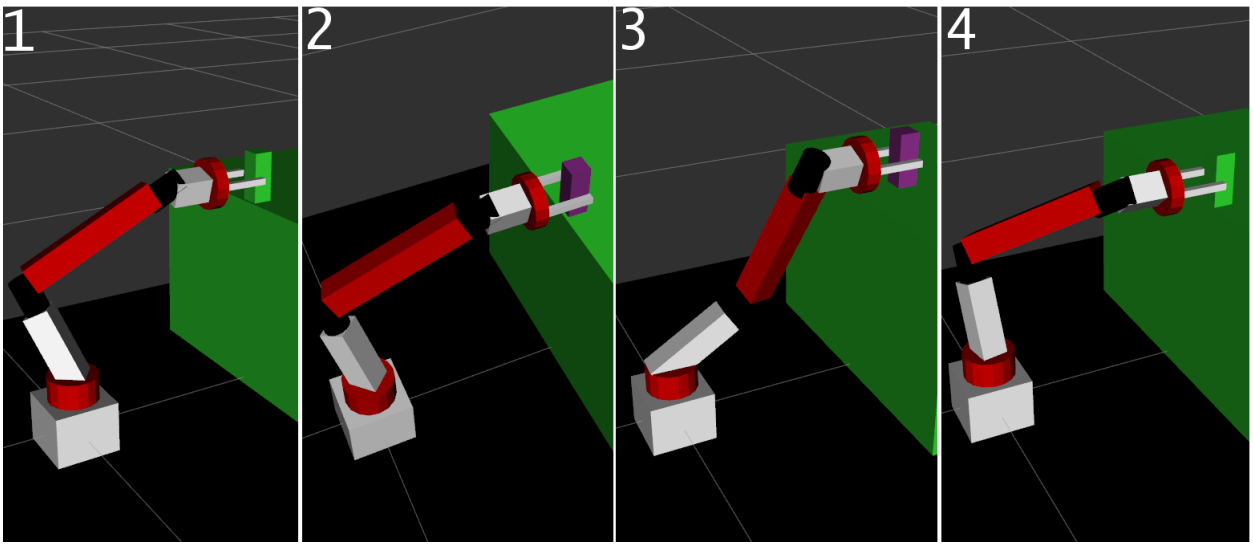
```
[ INFO] [1512837566.744018279]: 1. Self collision Test: not in self collision
[ INFO] [1512837566.744073739]: 2. Self collision Test(Change the state): in
[ INFO] [1512837566.744108096]: 3. Self collision Test(In a group): in
[ INFO] [1512837566.744122925]: 4. Collision points valid
[ INFO] [1512837566.744167799]: 5. Self collision Test: in self collision
[ INFO] [1512837566.744179527]: 6 . Contact between: elbow_pitch_link and wrist_pitch_link
[ INFO] [1512837566.744227589]: 6. Self collision Test after modified ACM: not in self collision
[ INFO] [1512837566.744262790]: 6. Full collision Test: not in collision
```

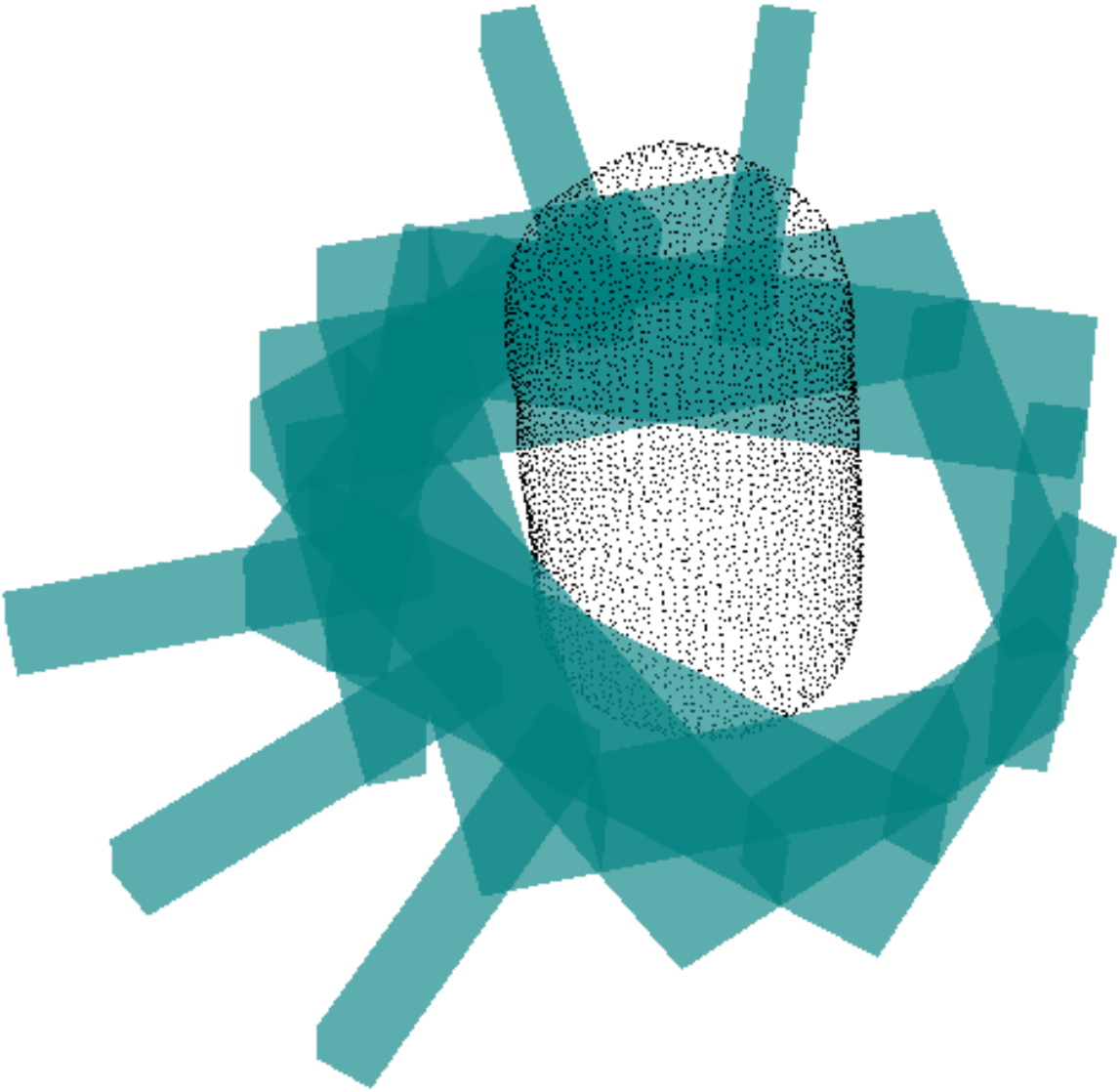


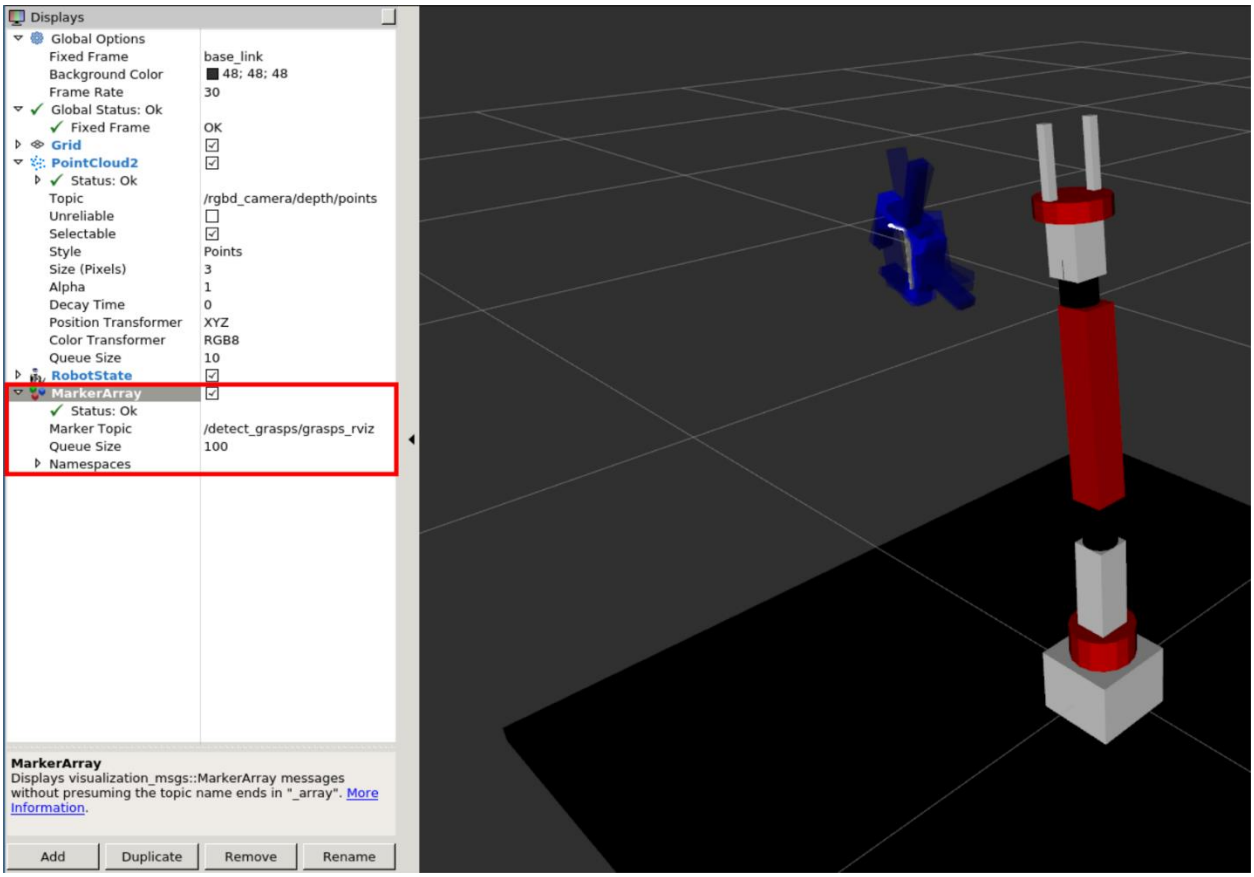
```
/rgbd_camera/depth/camera_info
/rgbd_camera/depth/image_raw
/rgbd_camera/depth/points
/rgbd_camera/ir/camera_info
/rgbd_camera/ir/image_raw
/rgbd_camera/ir/image_raw/compressed
/rgbd_camera/ir/image_raw/compressed/parameter_descriptions
/rgbd_camera/ir/image_raw/compressed/parameter_updates
/rgbd_camera/ir/image_raw/compressedDepth
/rgbd_camera/ir/image_raw/compressedDepth/parameter_descriptions
/rgbd_camera/ir/image_raw/compressedDepth/parameter_updates
/rgbd_camera/ir/image_raw/theora
/rgbd_camera/ir/image_raw/theora/parameter_descriptions
/rgbd_camera/ir/image_raw/theora/parameter_updates
/rgbd_camera/parameter_descriptions
/rgbd_camera/parameter_updates
/rgbd_camera/rgb/camera_info
/rgbd_camera/rgb/image_raw
/rgbd_camera/rgb/image_raw/compressed
/rgbd_camera/rgb/image_raw/compressed/parameter_descriptions
/rgbd_camera/rgb/image_raw/compressed/parameter_updates
/rgbd_camera/rgb/image_raw/compressedDepth
/rgbd_camera/rgb/image_raw/compressedDepth/parameter_descriptions
/rgbd_camera/rgb/image_raw/compressedDepth/parameter_updates
/rgbd_camera/rgb/image_raw/theora
/rgbd_camera/rgb/image_raw/theora/parameter_descriptions
/rgbd_camera/rgb/image_raw/theora/parameter_updates
/rgbd_camera/rgb/points
```





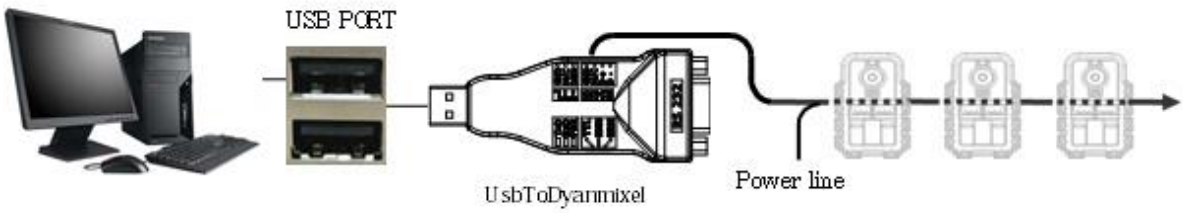

1
2
3
4

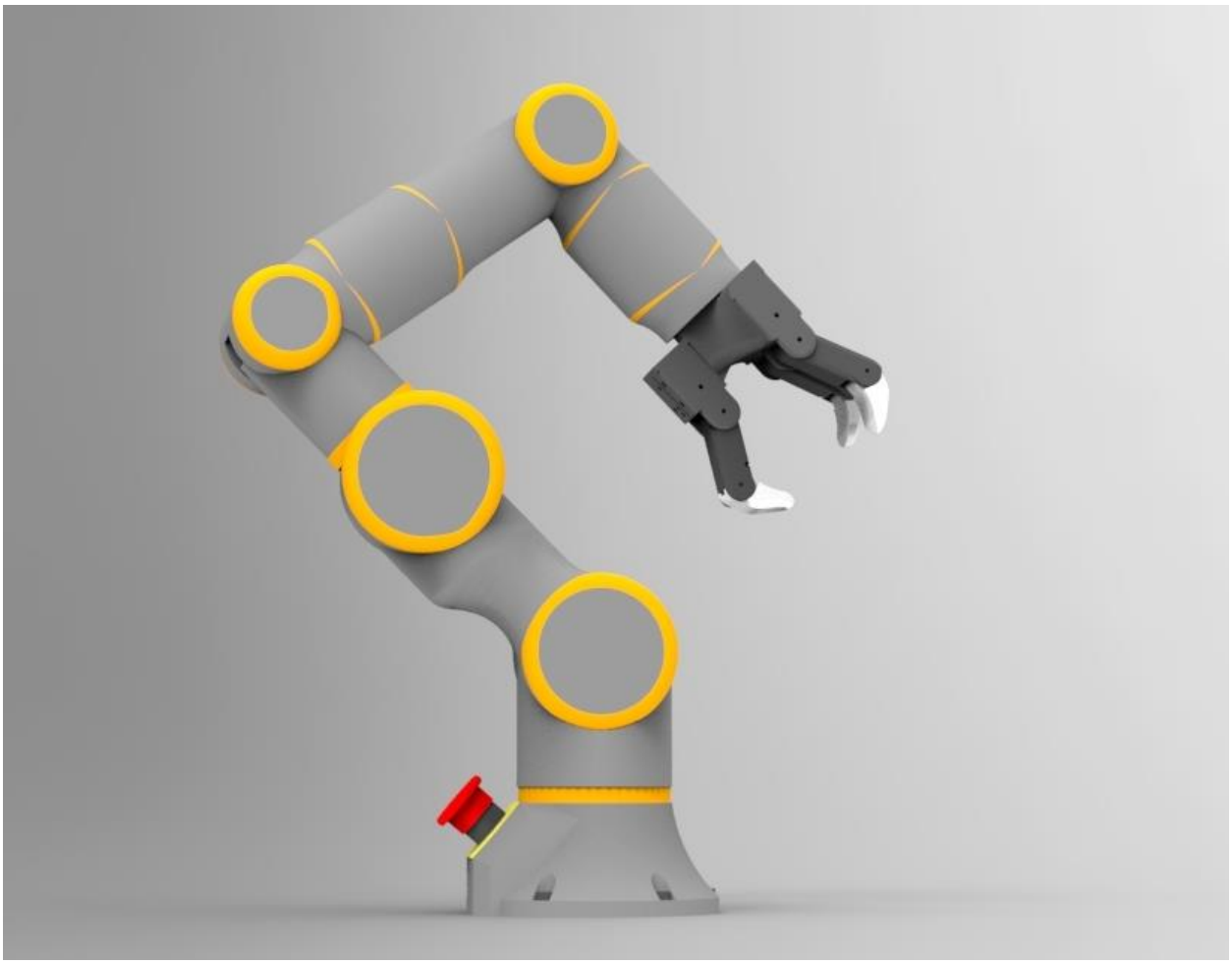




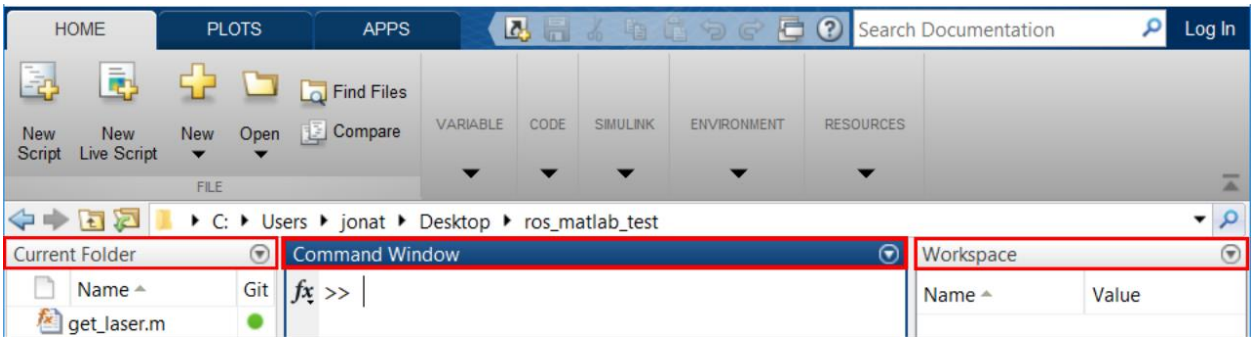
Dynamixel Servo

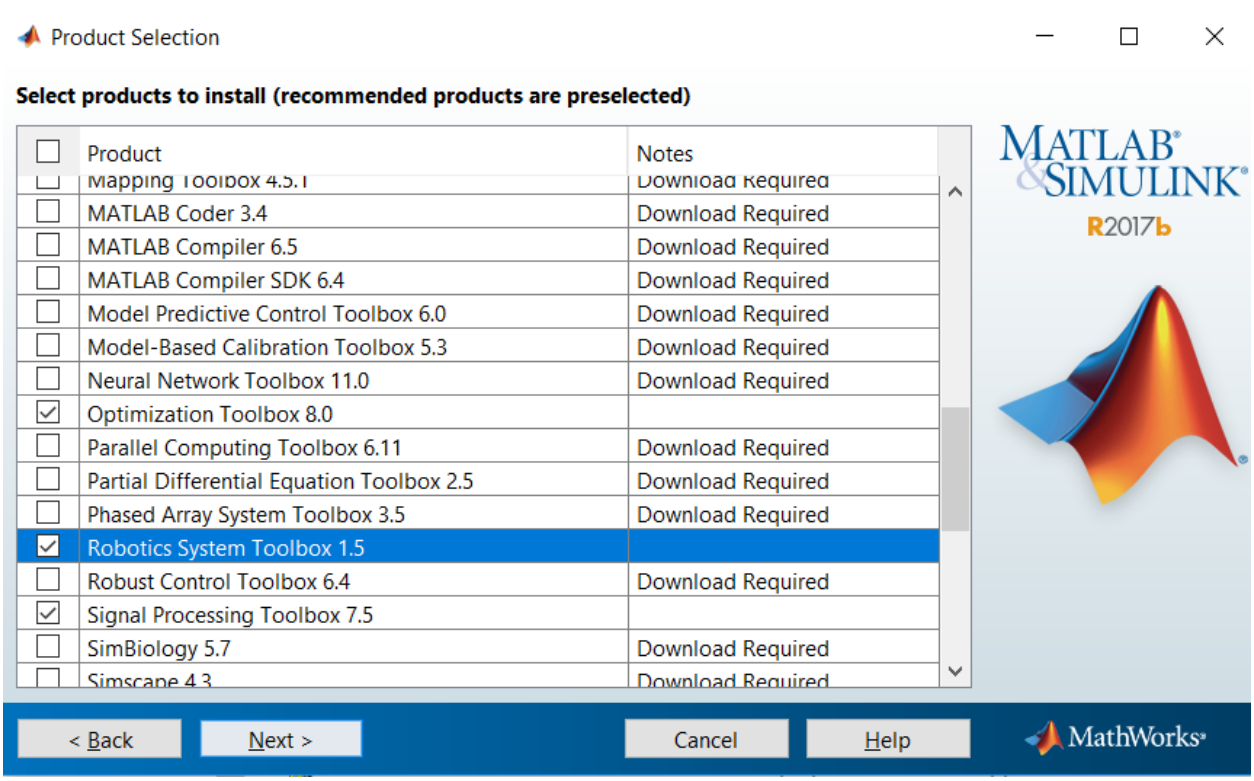
USB To Dynamixel

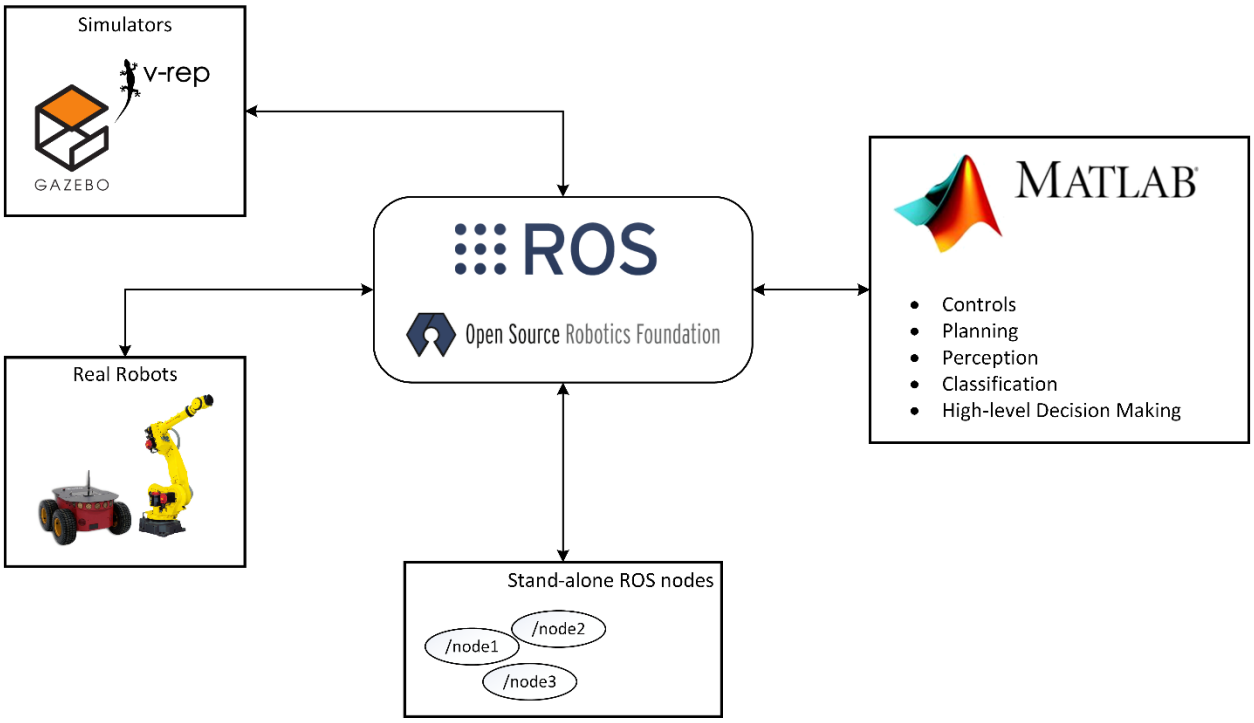

USB PORT
UsbToDyanmixel
Power line



Chapter 13: Using ROS in MATLAB and Simulink





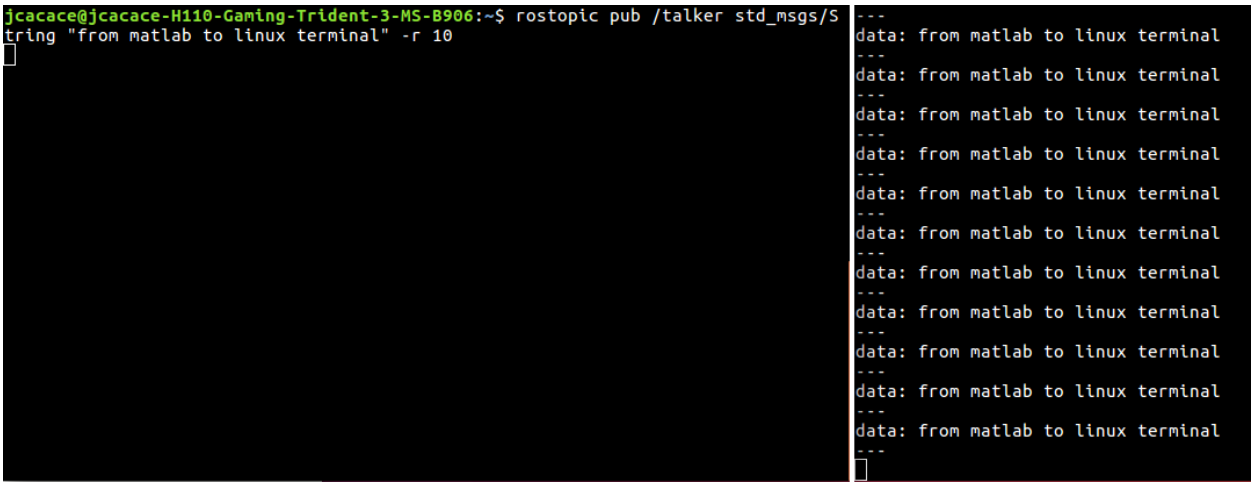

Simulators
v-rep
GAZEBO
ROS
Open Source Robotics Foundation
MATLAB
Controls
Planning
Perception
Classification
High-level Decision Making
Real Robots
Stand-alone ROS nodes
/node1
/node2
/node3

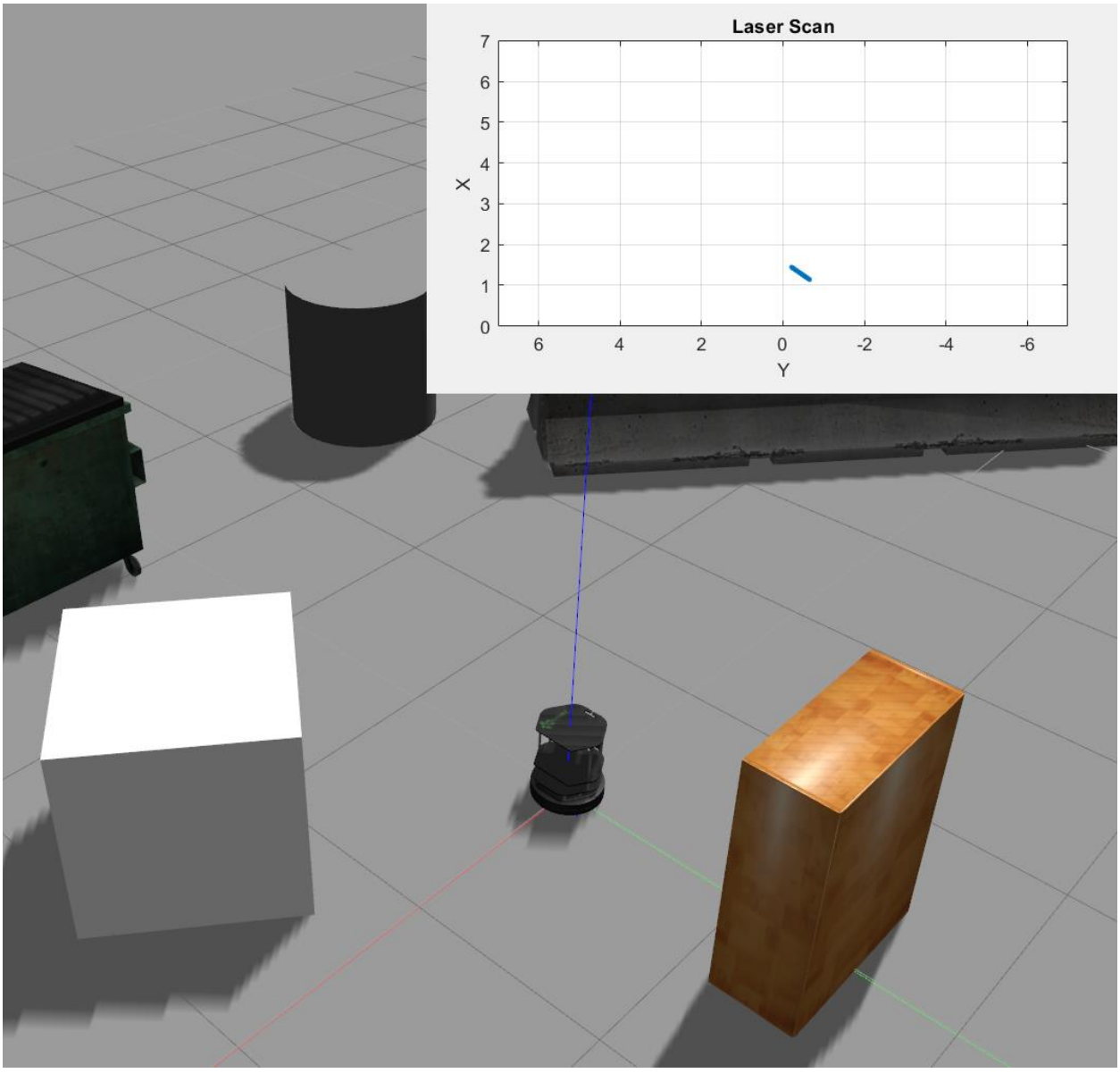
```
>> help robotics.ros
  ros (Robot Operating System)
    rosinit             - Initialize the ros system
    rosshutdown         - Shut down the ros system

    rosmessage          - Create a ros message
    rospublisher        - Create a ros publisher
    rossubscriber       - Create a ros subscriber
    rossvcclient        - Create a ros service client
    rossvcserver        - Create a ros service server
    rosactionclient     - Create a ros action client
    rostype             - View available ros message types

    rosaction           - Get information about actions in the ros network
    rosmsg              - Get information about messages and message types
    rosnode             - Get information about nodes in the ros network
    rosservice          - Get information about services in the ros network
    rostopic            - Get information about topics in the ros network

    rosbag              - Open and parse a rosbag log file
    rosparam            - Get and set values on the parameter server
    rosrate             - Execute loop at fixed frequency using ros time
    rostf               - Receive, send, and apply ros transformations

    rosduration         - Create a ros duration object
    rostime             - Access ros time functionality

    ros functionality is part of Robotics System Toolbox.
    Type "help robotics" for more information.
```

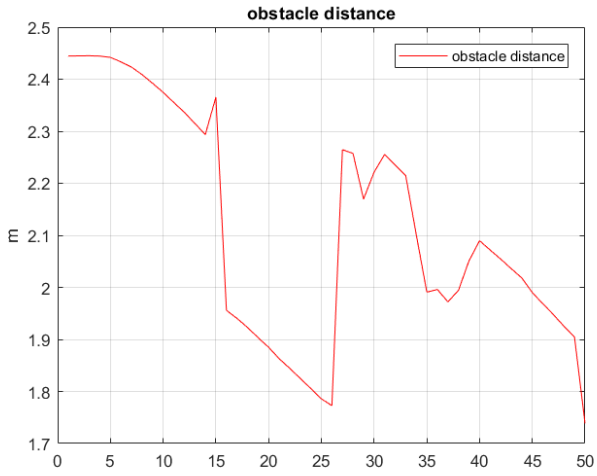
```
>> rosinit
Initializing ROS master on http://DESKTOP-40TG18P:11311/.
Initializing global node /matlab_global_node_16208 with NodeURI http://DESKTOP-40TG18P:61762/
>> rosnode list
/matlab_global_node_16208
```

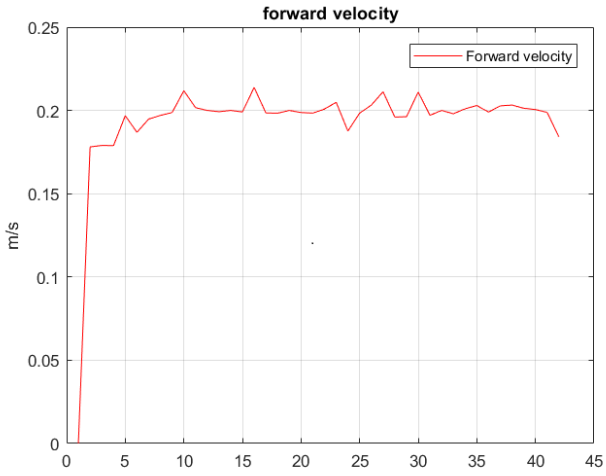
```
Scheda LAN wireless Wi-Fi:

   Suffisso DNS specifico per connessione: lan
   Indirizzo IPv6 locale rispetto al collegamento . : fe80::cc11:c374:70f8:a4c4%11
   Indirizzo IPv4. . . . . . . . . . . . : 192.168.1.130
   Subnet mask . . . . . . . . . . . . . : 255.255.255.0
   Gateway predefinito . . . . . . . . . : 192.168.1.254
```

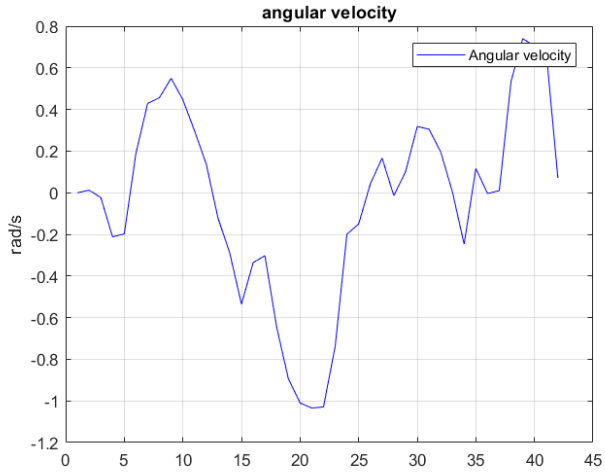
```
>> setenv('ROS_MASTER_URI', 'http://192.168.1.131:11311');
>> rosinit
The value of the ROS_MASTER_URI environment variable, http://192.168.1.131:11311, will be used to connect
Initializing global node /matlab_global_node_75920 with NodeURI http://192.168.1.130:61991/
>> rosnode list
/matlab_global_node_75920
/rosout
```

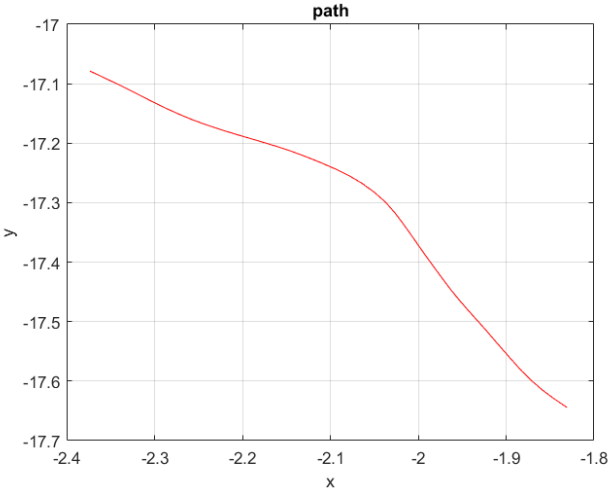


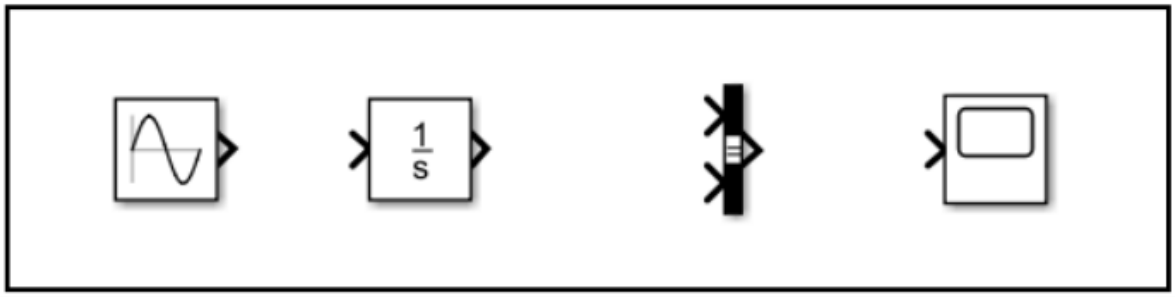

Laser Scan
X
Y
7
6
5
4
3
2
1
0
6
4
2
0
-2
-4
-6

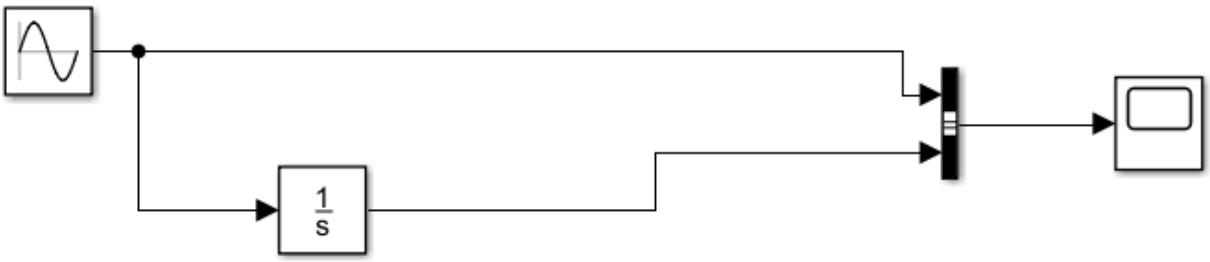

obstacle distance
obstacle distance
m
2.5
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
0
5
10
15
20
25
30
35
40
45
50

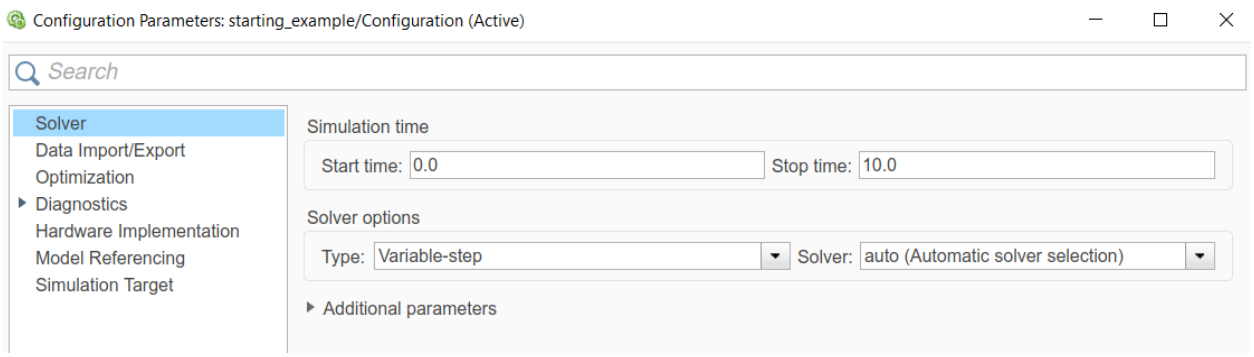

forward velocity
Forward velocity
m/s
0.25
0.2
0.15
0.1
0.05
0
0
5
10
15
20
25
30
35
40
45

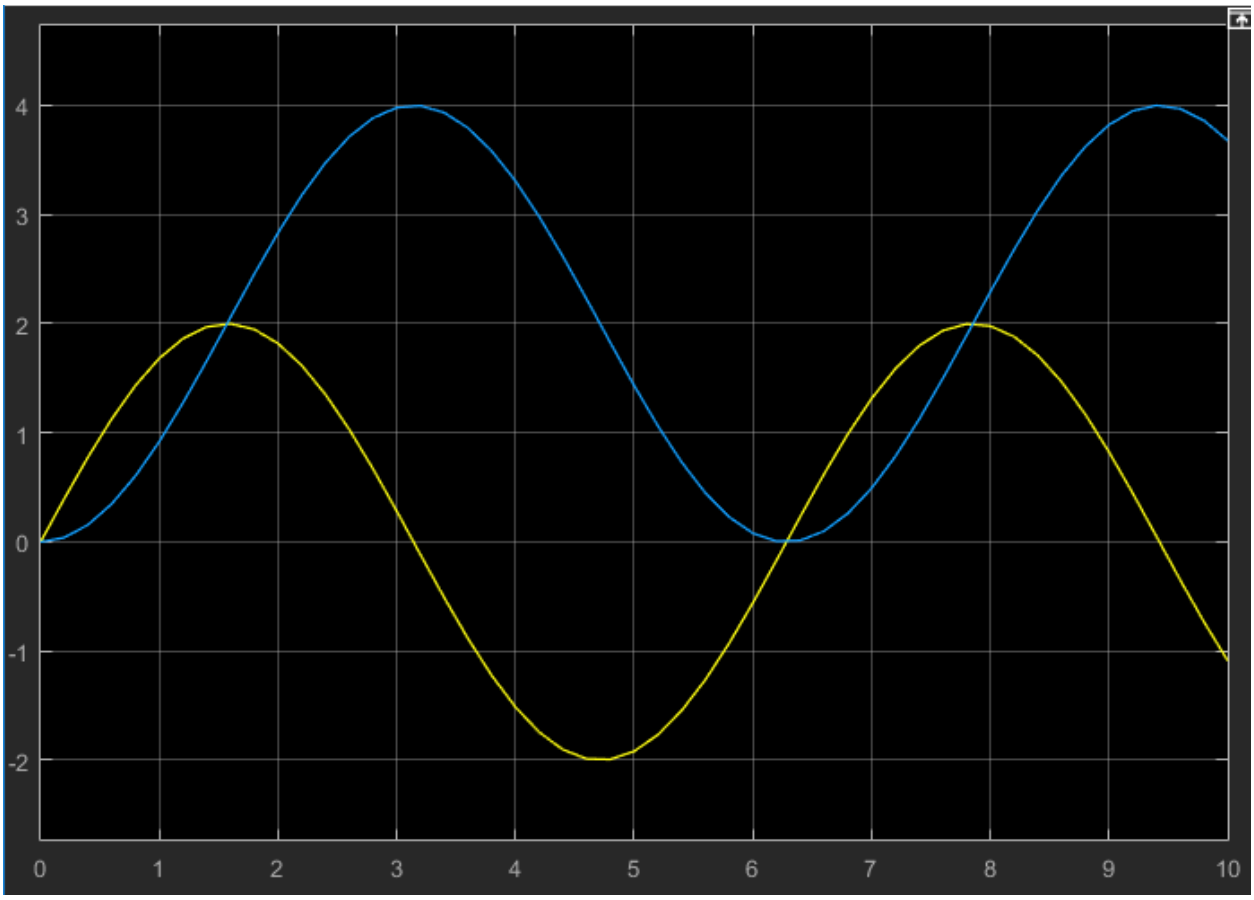

angular velocity
Angular velocity
rad/s
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
0
5
10
15
20
25
30
35
40
45

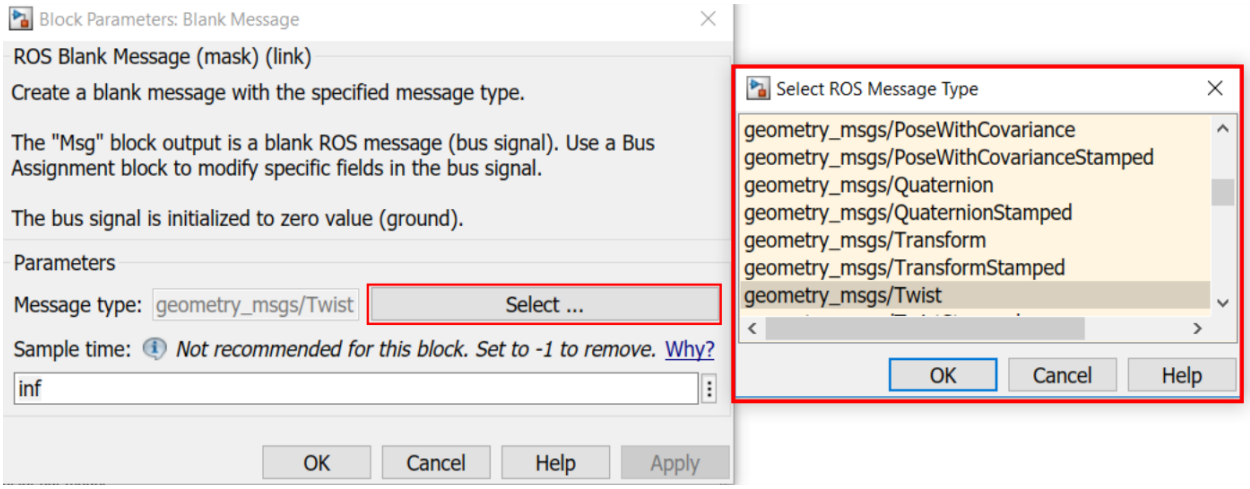

path
y
-17
-17.1
-17.2
-17.3
-17.4
-17.5
-17.6
-17.7
-2.4
-2.3
-2.2
-2.1
-2
-1.9
-1.8
x


1
s

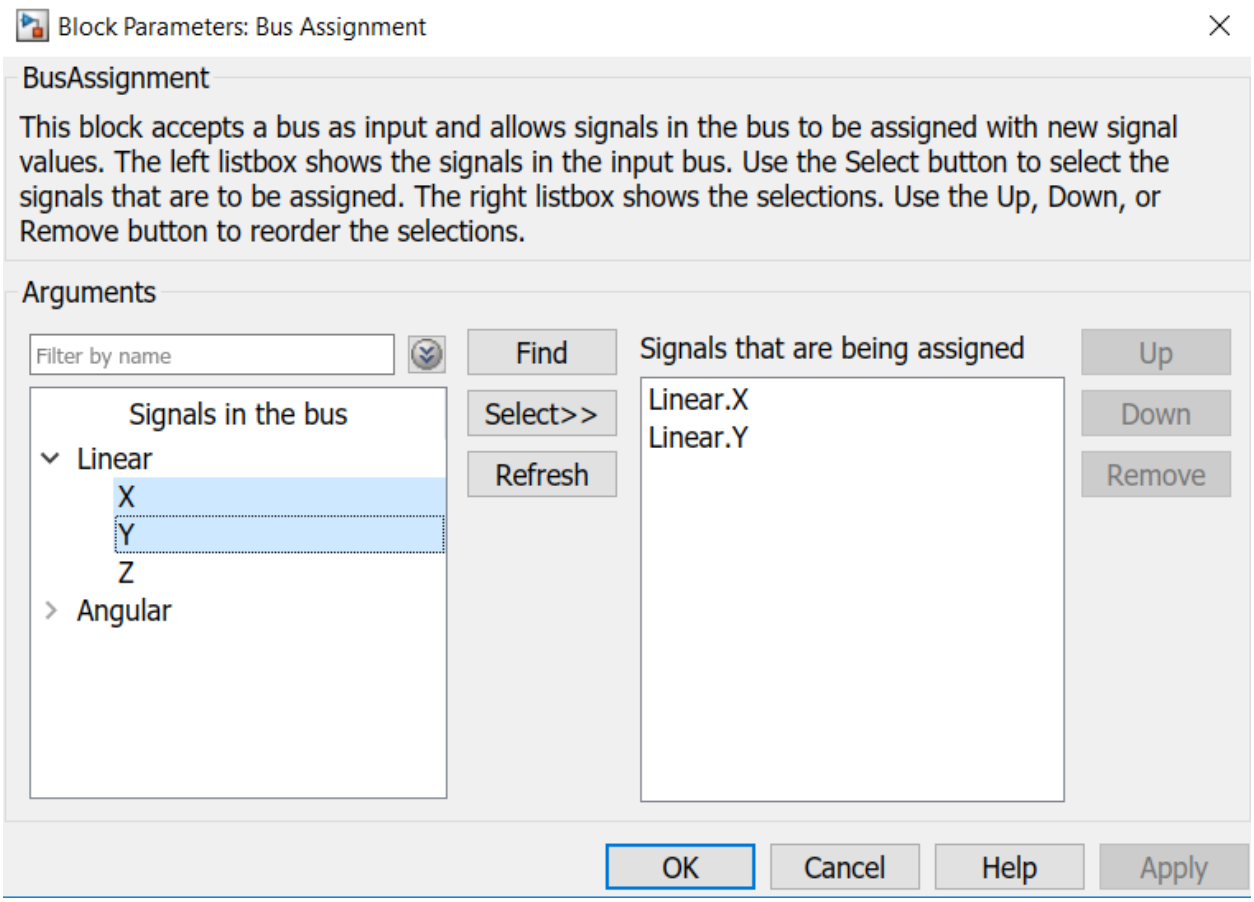

1
s

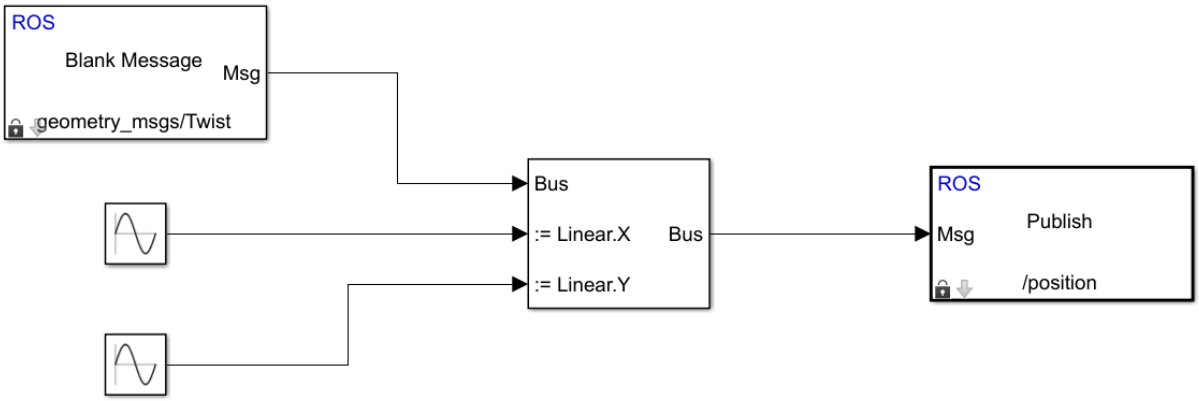

Configuration Parameters: starting_example/Configuration (Active)
Search
Solver
Data Import/Export
Optimization
Diagnostics
Hardware Implementation
Model Referencing
Simulation Target
Simulation time
Start time: 0.0
Stop time: 10.0
Solver options
Type: Variable-step
Solver: auto (Automatic solver selection)
Additional parameters


4
3
2
1
0
-1
-2
0
1
2
3
4
5
6
7
8
9
10


Block Parameters: Blank Message
ROS Blank Message (mask) (link)
Create a blank message with the specified message type.
The "Msg" block output is a blank ROS message (bus signal). Use a Bus Assignment block to modify specific fields in the bus signal.
The bus signal is initialized to zero value (ground).
Parameters
Message type: geometry_msgs/Twist
Select ...
Sample time: Not recommended for this block. Set to -1 to remove. Why?
inf
OK
Cancel
Help
Apply
Select ROS Message Type
geometry_msgs/PoseWithCovariance
geometry_msgs/PoseWithCovarianceStamped
geometry_msgs/Quaternion
geometry_msgs/QuaternionStamped
geometry_msgs/Transform
geometry_msgs/TransformStamped
geometry_msgs/Twist
OK
Cancel
Help

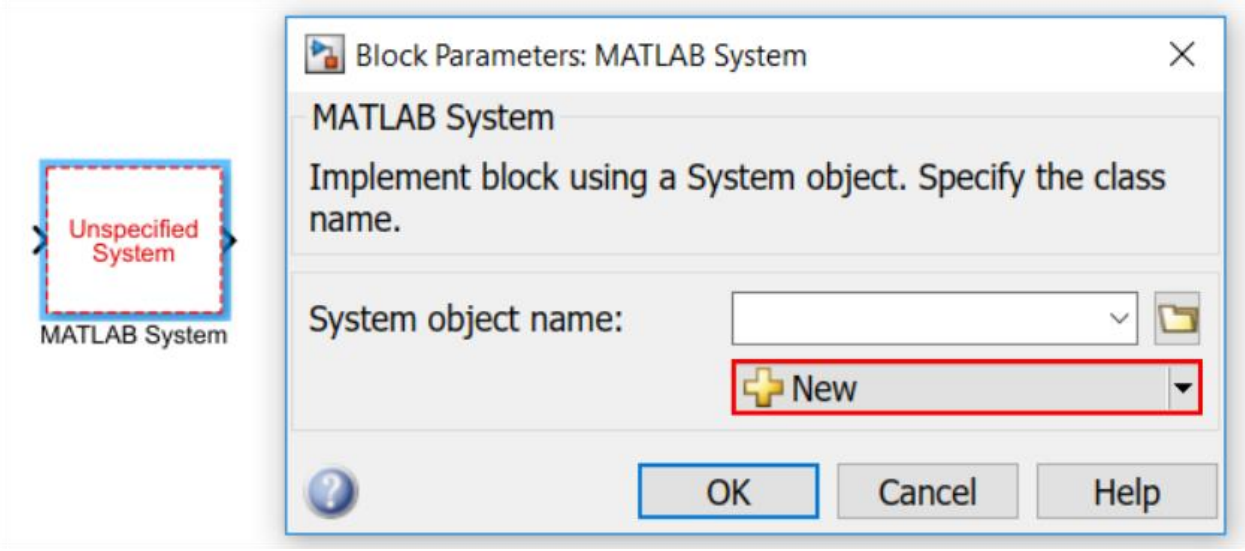
Block Parameters: Publish
ROS Publish (mask) (link)
Send messages to a ROS network.
The "Msg" block input accepts a ROS message (bus signal).
To select from a list of available topics, set "Topic source" parameter to "Select from ROS network" and use the "Select..." button. The message type for the selected topic is set automatically.
To enter a custom topic, set "Topic source" to "Specify your own". Use the "Topic" parameter to specify the name, and the "Select..." button to select the message type.
Configure network addresses
Main
Code Generation
Topic source:
Specify your own
Topic:
/position
Message type:
geometry_msgs/Twist
Select ...
OK
Cancel
Help
Apply

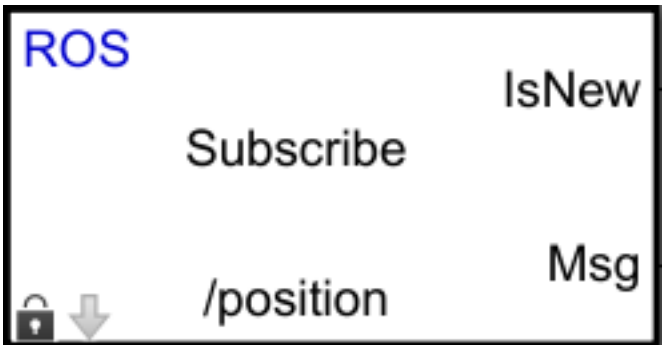


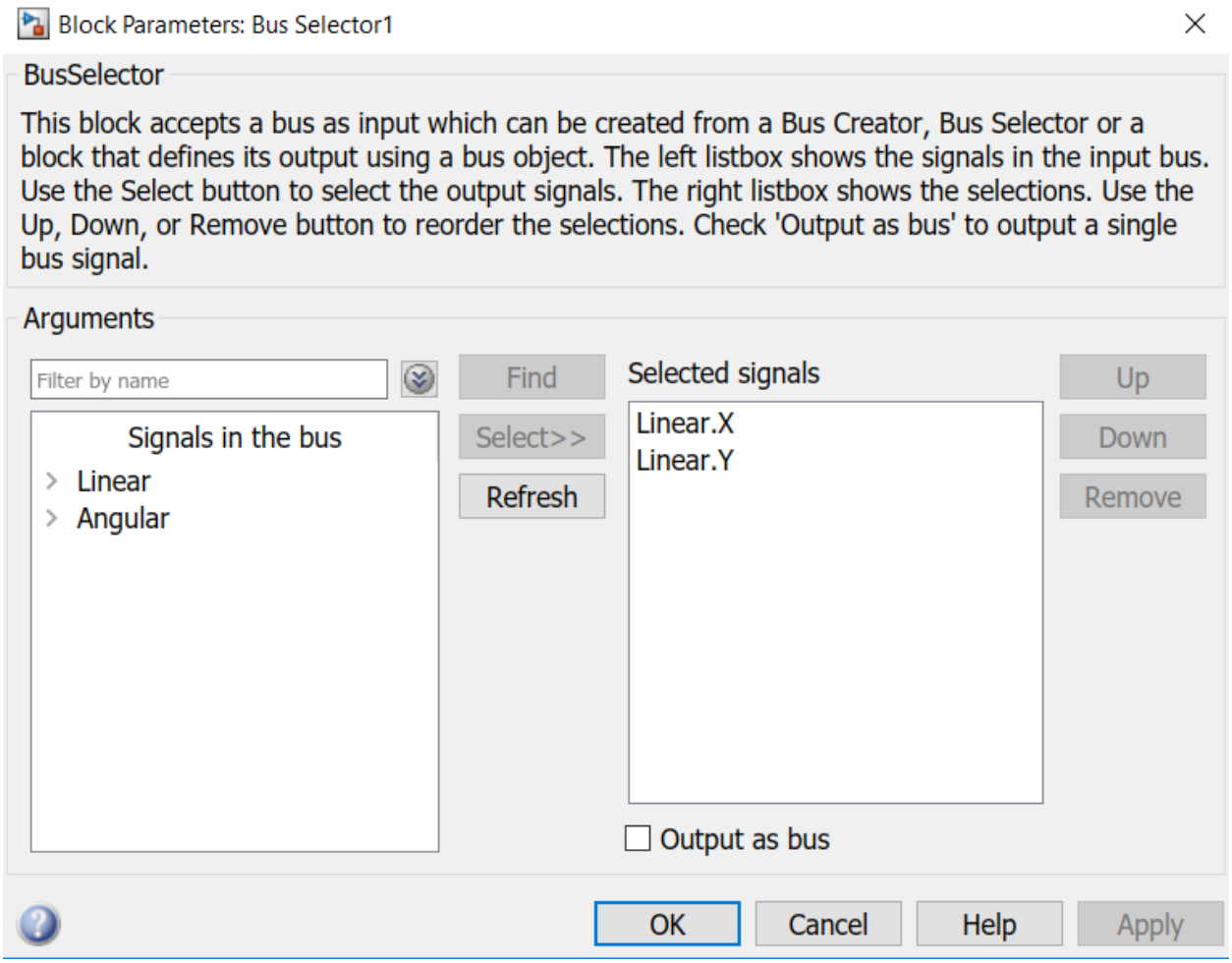


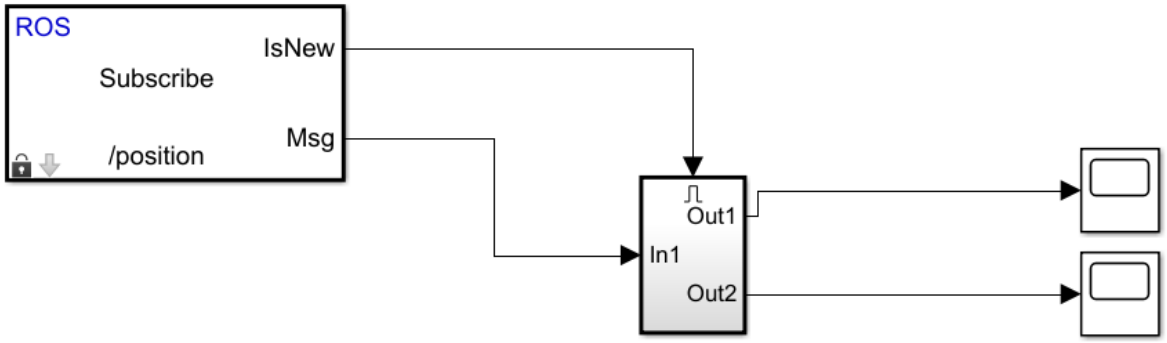
ros_rate

-- ros_rate implements rate control for our model

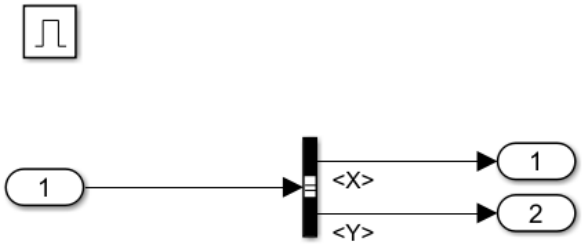

Unspecified System
MATLAB System
Block Parameters: MATLAB System
MATLAB System
Implement block using a System object. Specify the class name.
System object name:
New
OK
Cancel
Help

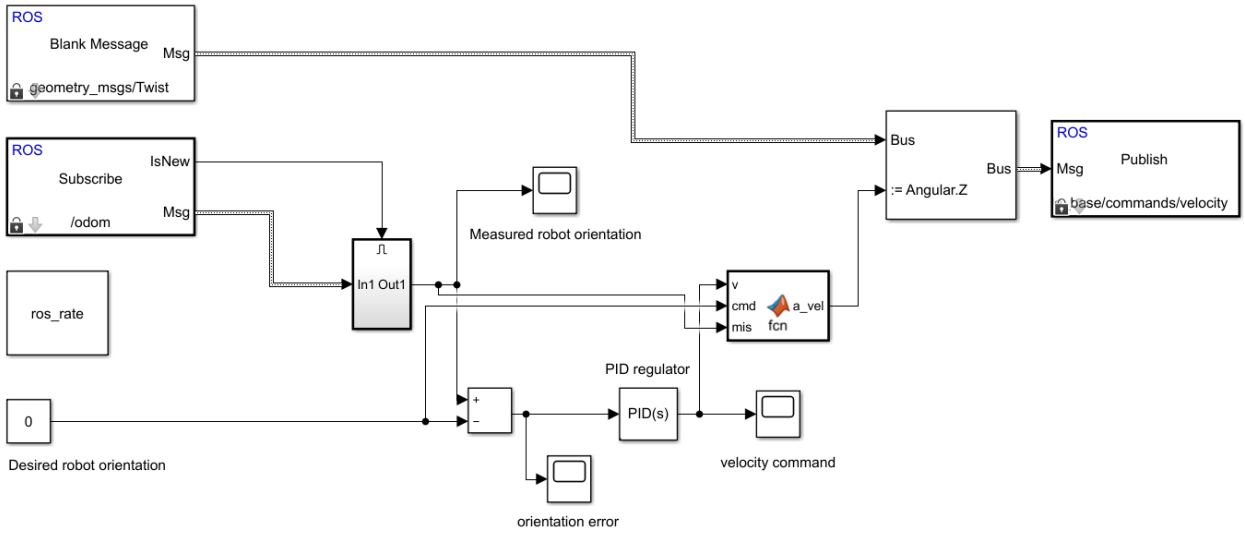

ROS
IsNew
Subscribe
Msg
/position

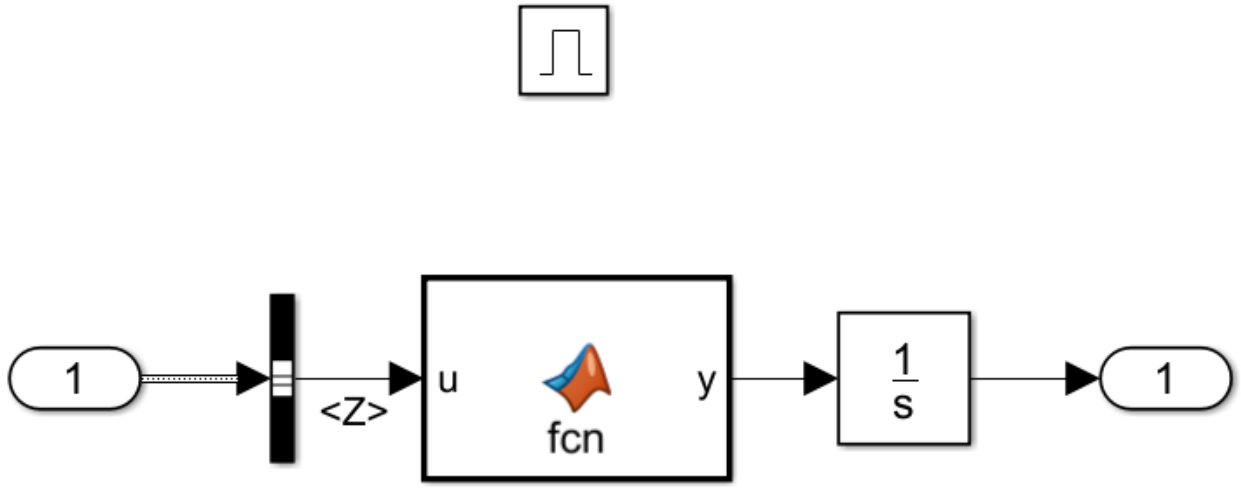

Block Parameters: Bus Selector1
BusSelector
This block accepts a bus as input which can be created from a Bus Creator, Bus Selector or a block that defines its output using a bus object. The left listbox shows the signals in the input bus. Use the Select button to select the output signals. The right listbox shows the selections. Use the Up, Down, or Remove button to reorder the selections. Check 'Output as bus' to output a single bus signal.
Arguments
Filter by name
Find
Selected signals
Up
Signals in the bus
Select>>
Linear.X
Linear.Y
Down
Linear
Refresh
Remove
Angular
Output as bus
OK
Cancel
Help
Apply

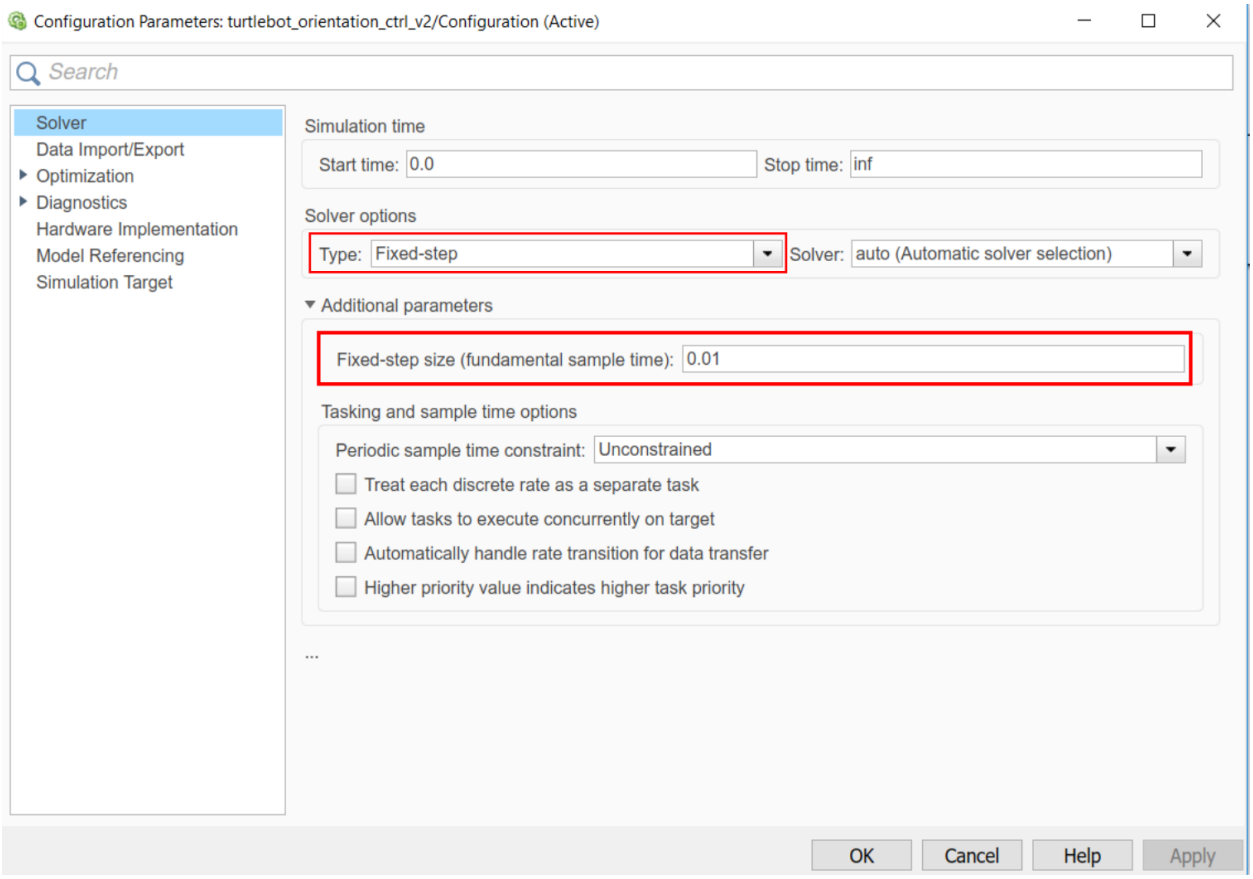


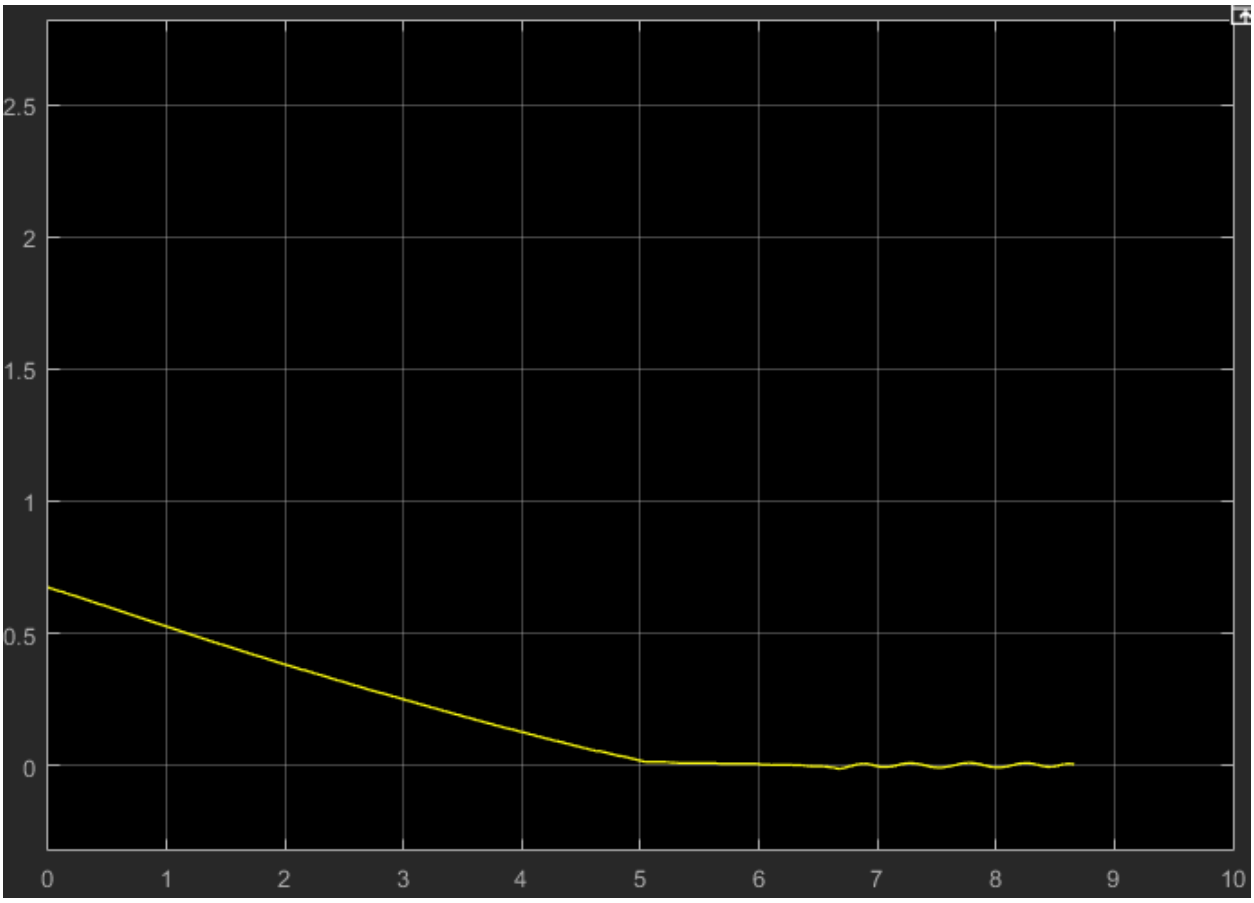
-- Subsystem who implement the bus selector



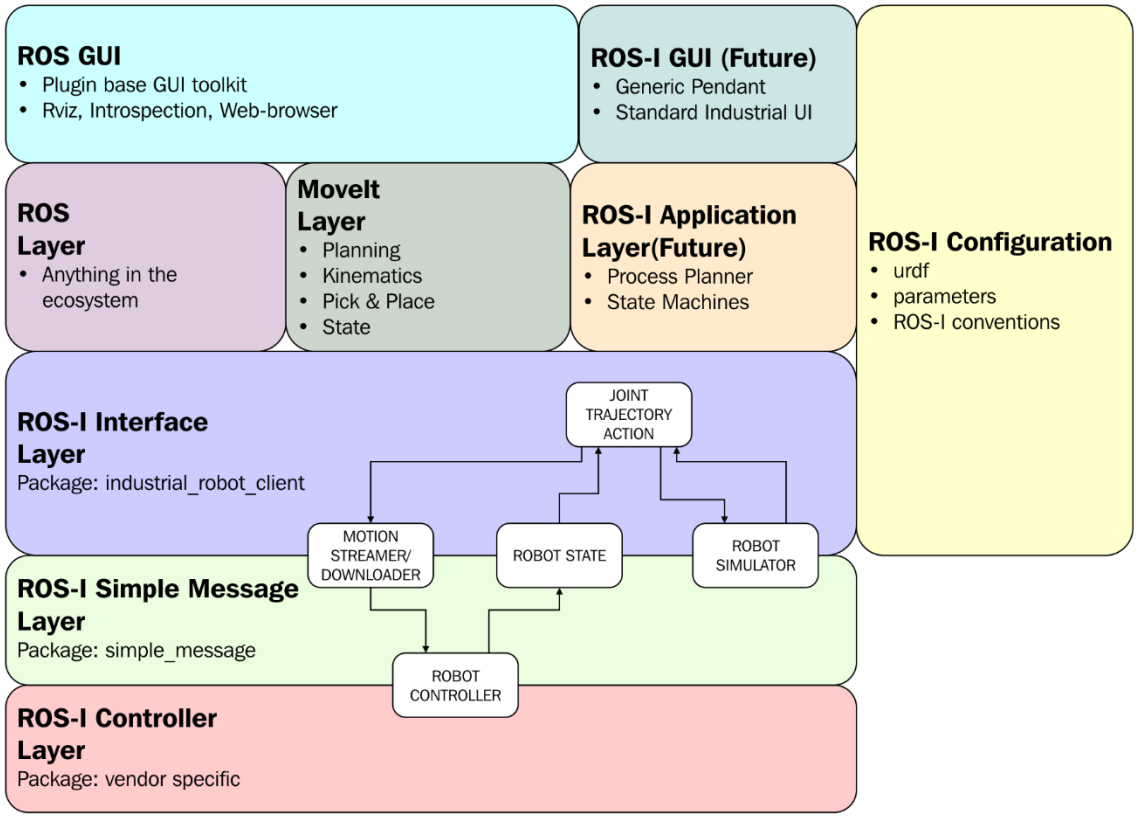



1
<Z>
u
fcn
y
1
s
1

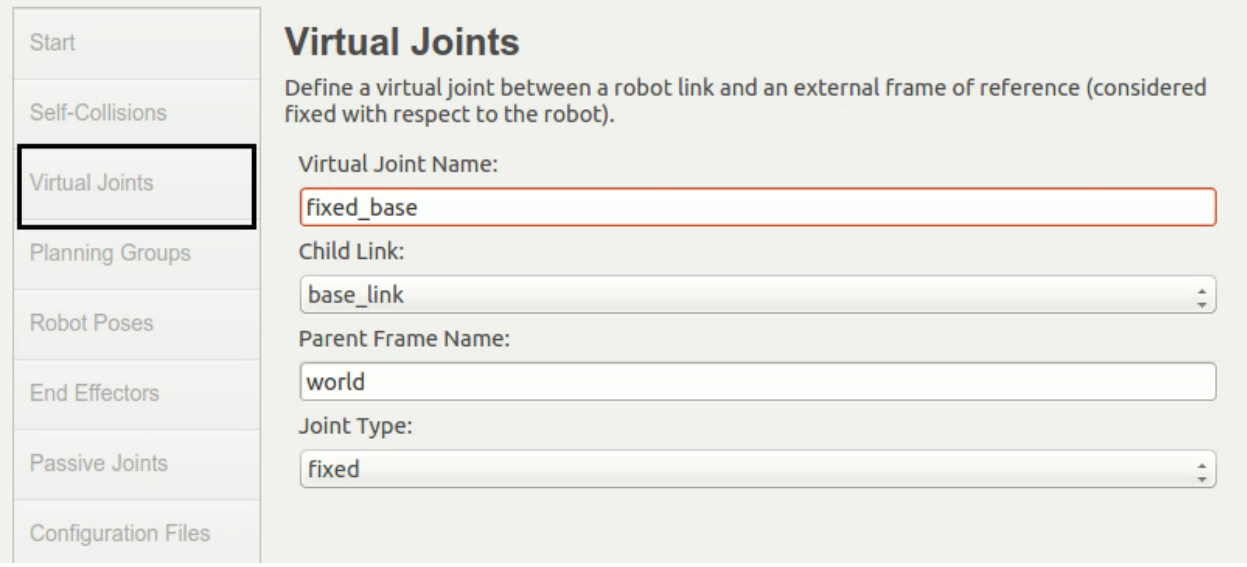

Configuration Parameters: turtlebot_orientation_ctrl_v2/Configuration (Active)
Search
Solver
Data Import/Export
Optimization
Diagnostics
Hardware Implementation
Model Referencing
Simulation Target
Simulation time
Start time: 0.0
Stop time: inf
Solver options
Type: Fixed-step
Solver: auto (Automatic solver selection)
Additional parameters
Fixed-step size (fundamental sample time): 0.01
Tasking and sample time options
Periodic sample time constraint: Unconstrained
Treat each discrete rate as a separate task
Allow tasks to execute concurrently on target
Automatically handle rate transition for data transfer
Higher priority value indicates higher task priority
...
OK
Cancel
Help
Apply

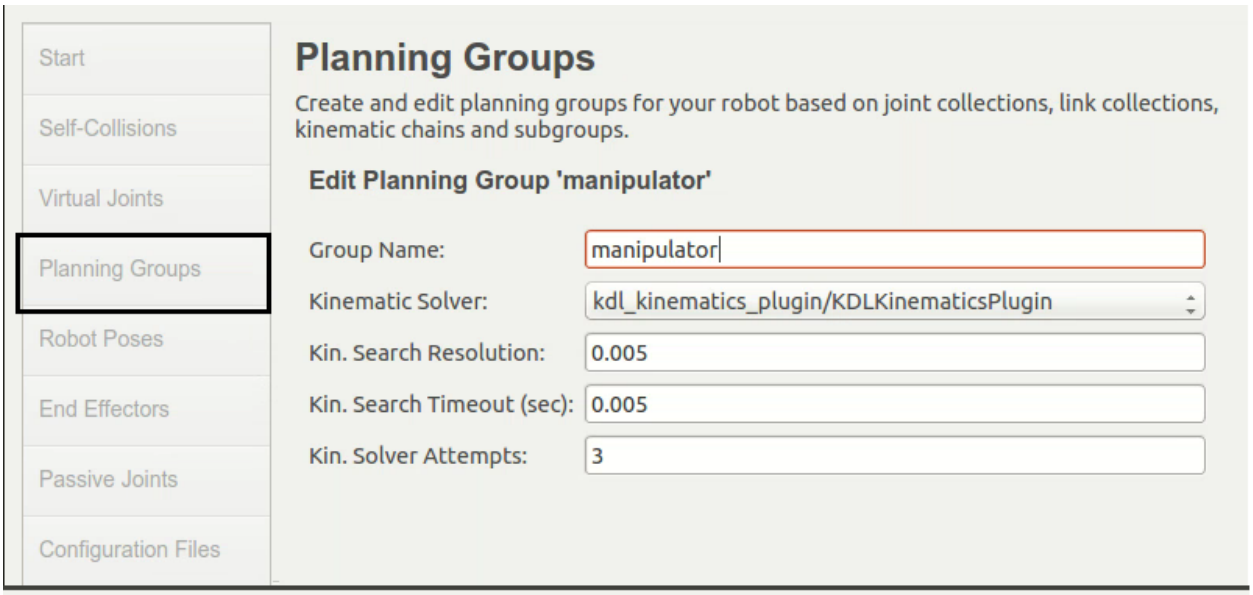

2.5
2
1.5
1
0.5
0
0
1
2
3
4
5
6
7
8
9
10

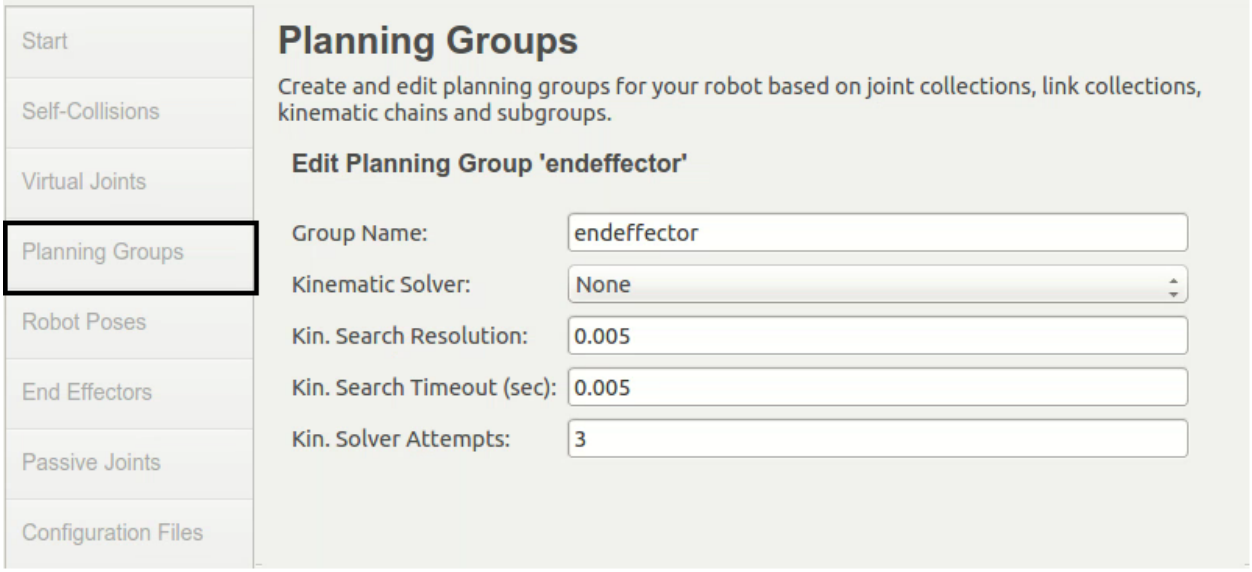
Chapter 14: ROS for Industrial Robots

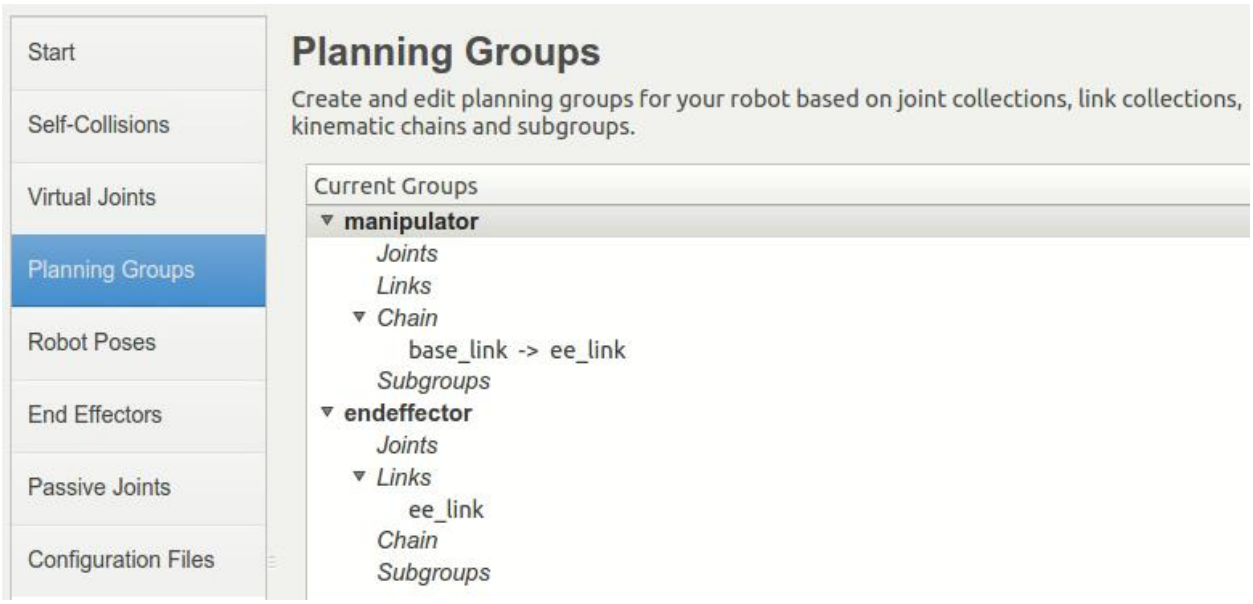


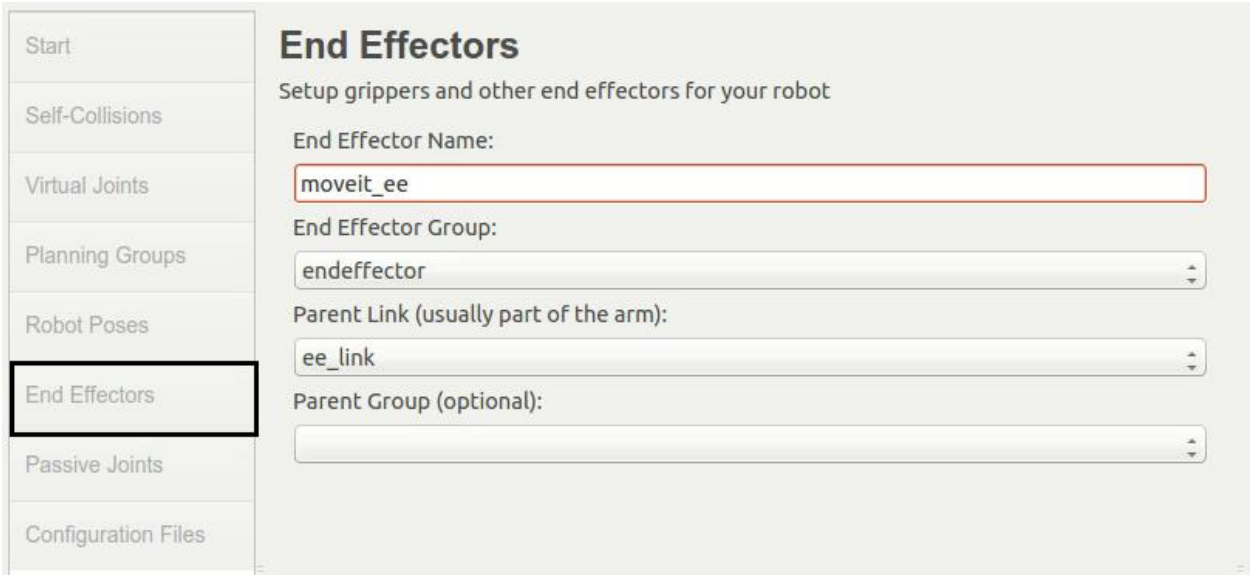
ROS-Industrial High Level Architecture - Rev 0.02.vsd

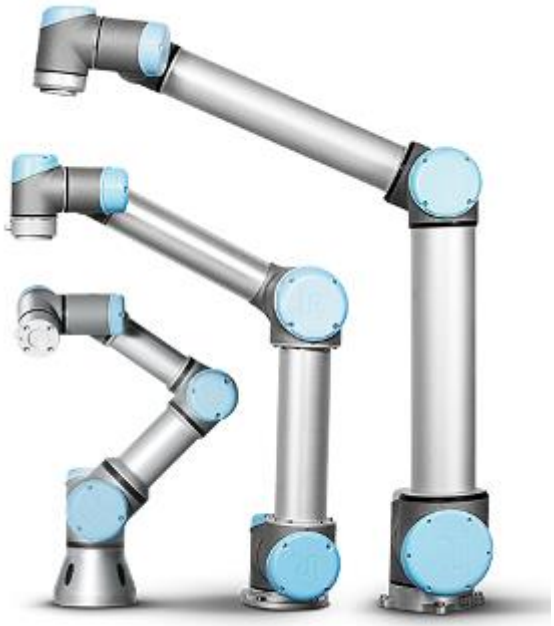

Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
Configuration Files
Virtual Joints
Define a virtual joint between a robot link and an external frame of reference (considered fixed with respect to the robot).
Virtual Joint Name:
fixed_base
Child Link:
base_link
Parent Frame Name:
world
Joint Type:
fixed

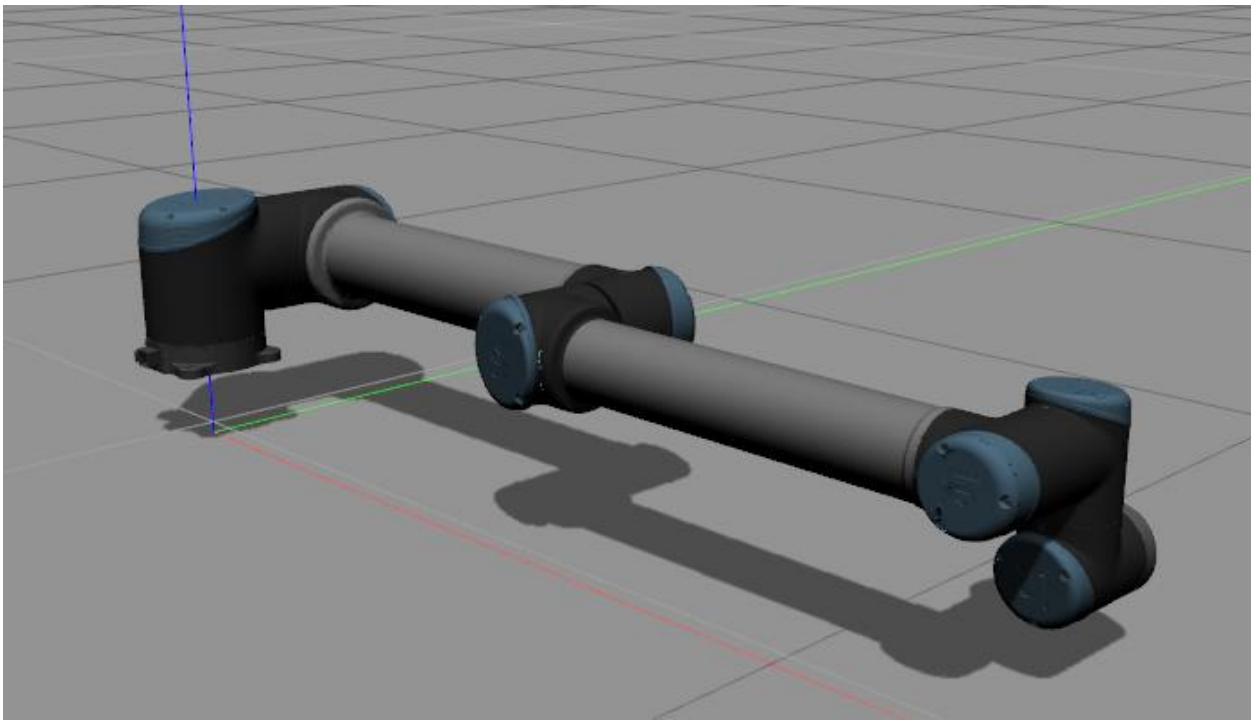

Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
Configuration Files
Planning Groups
Create and edit planning groups for your robot based on joint collections, link collections, kinematic chains and subgroups.
Edit Planning Group 'manipulator'
Group Name:
manipulator
Kinematic Solver:
kdl_kinematics_plugin/KDLKinematicsPlugin
Kin. Search Resolution:
0.005
Kin. Search Timeout (sec):
0.005
Kin. Solver Attempts:
3


Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
Configuration Files
Planning Groups
Create and edit planning groups for your robot based on joint collections, link collections, kinematic chains and subgroups.
Edit Planning Group 'endeffector'
Group Name:
endeffector
Kinematic Solver:
None
Kin. Search Resolution:
0.005
Kin. Search Timeout (sec):
0.005
Kin. Solver Attempts:
3


Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
Configuration Files
Planning Groups
Create and edit planning groups for your robot based on joint collections, link collections, kinematic chains and subgroups.
Current Groups
manipulator
Joints
Links
Chain
base_link -> ee_link
Subgroups
endeffector
Joints
Links
ee_link
Chain
Subgroups


Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
Configuration Files
End Effectors
Setup grippers and other end effectors for your robot
End Effector Name:
moveit_ee
End Effector Group:
endeffector
Parent Link (usually part of the arm):
ee_link
Parent Group (optional):





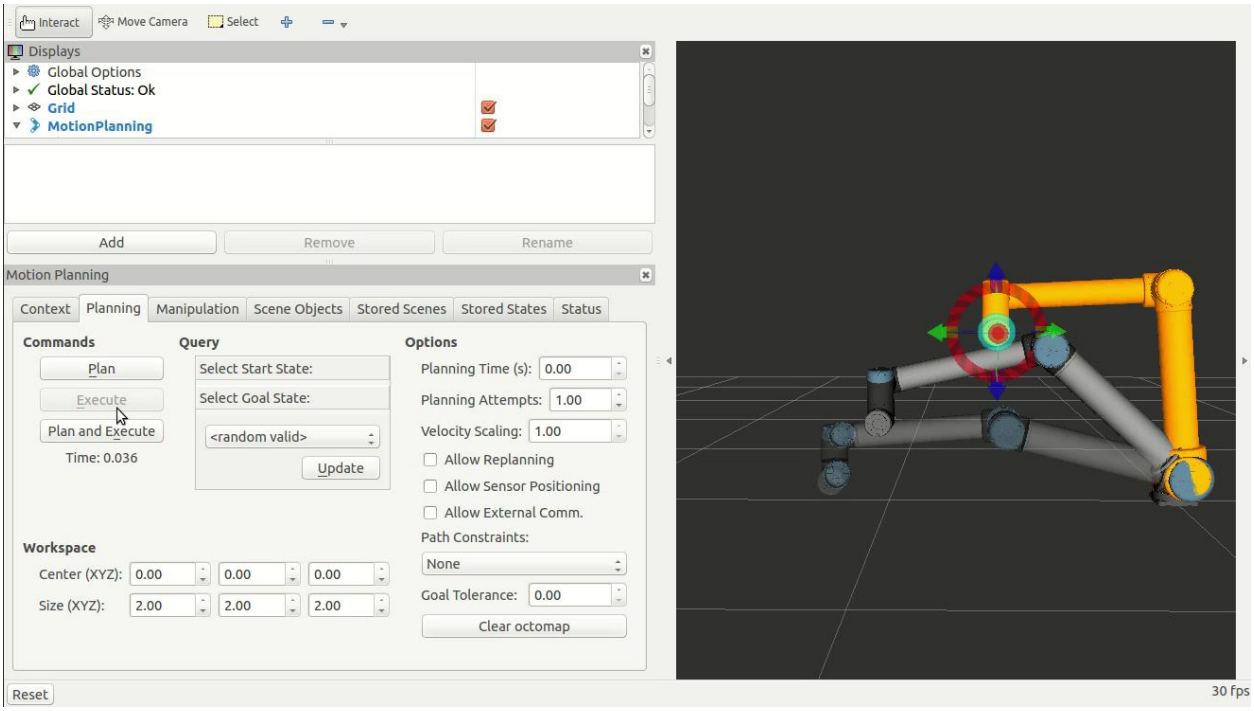
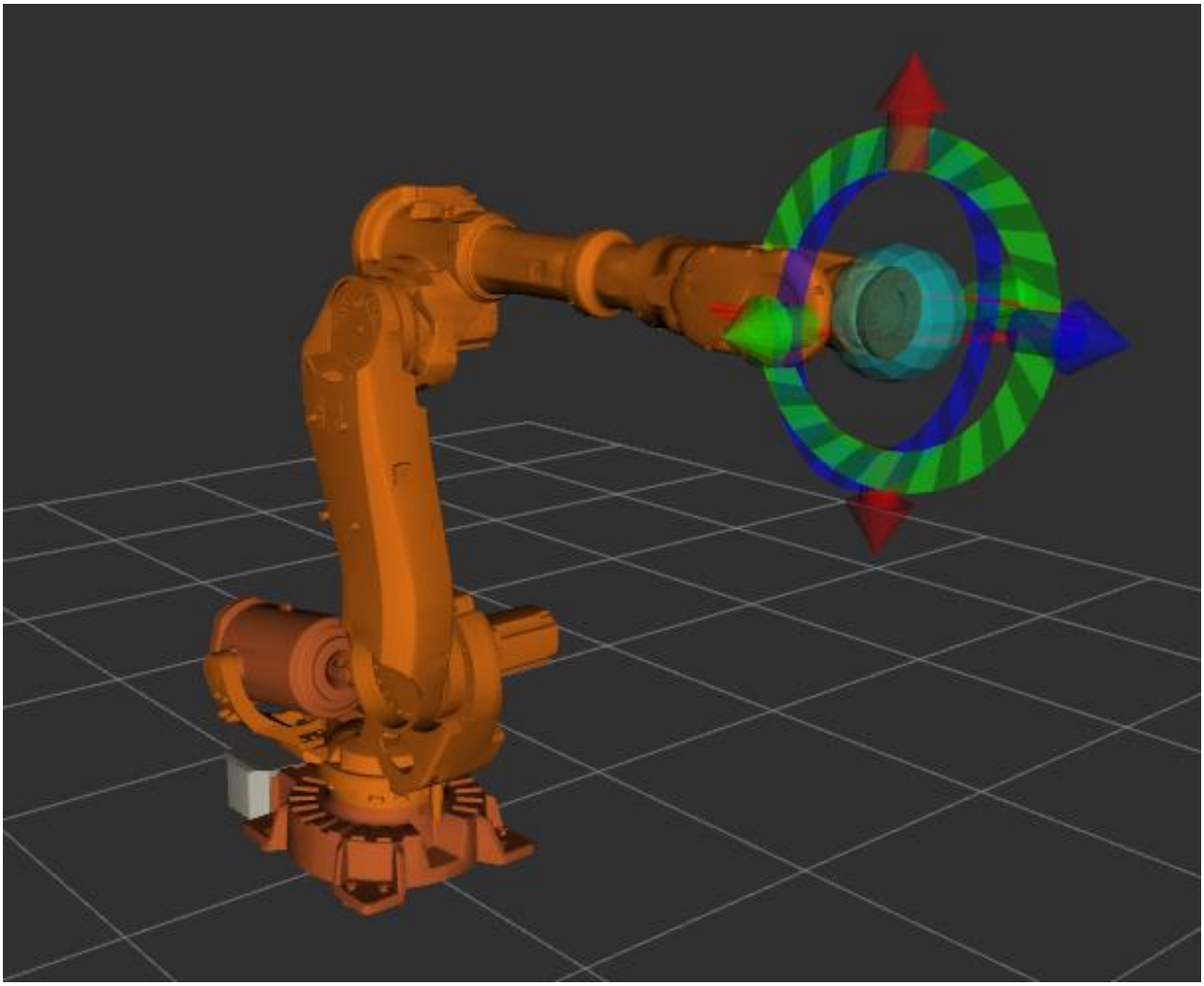
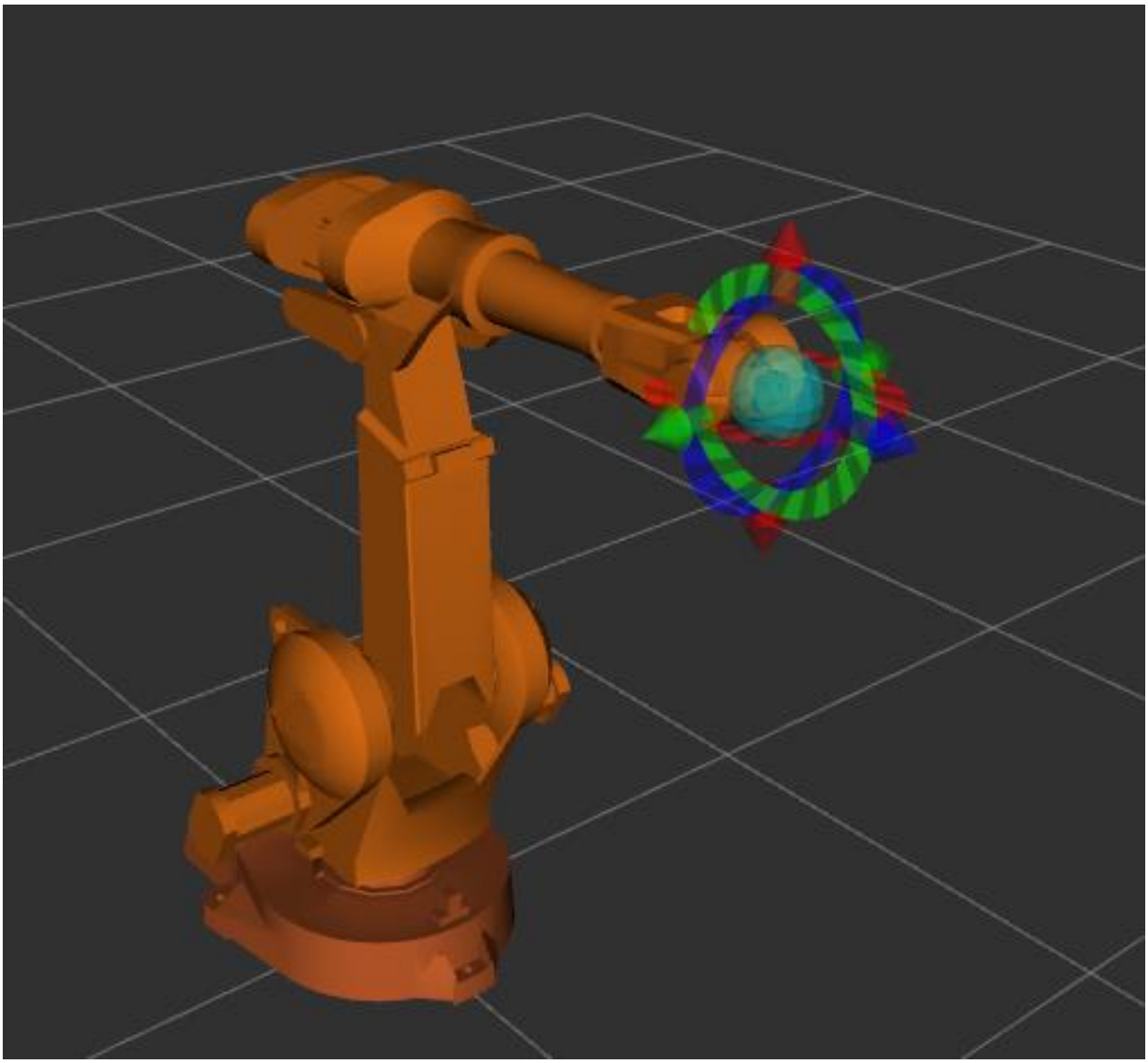
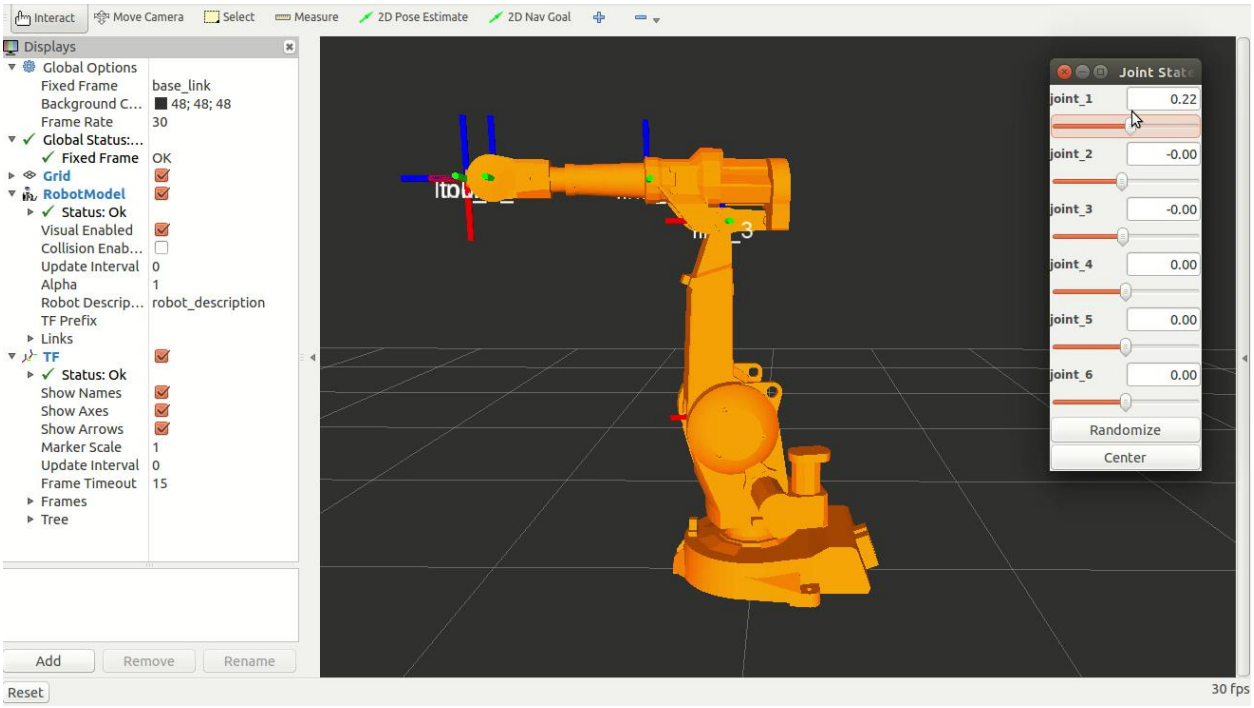


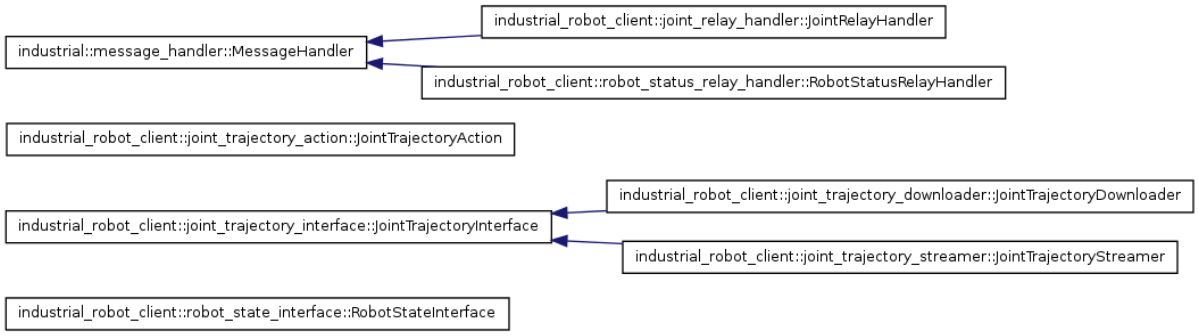
ABB IRB 2400

ABB IRB 6640






Interact
Move Camera
Select
Measure
2D Pose Estimate
2D Nav Goal
Displays
Global Options
Fixed Frame
base_link
Background C...
48; 48; 48
Frame Rate
30
Global Status:...
Fixed Frame
OK
Grid
RobotModel
Status: Ok
Visual Enabled
Collision Enab...
Update Interval
0
Alpha
1
Robot Descrip...
robot_description
TF Prefix
Links
TF
Status: Ok
Show Names
Show Axes
Show Arrows
Marker Scale
1
Update Interval
0
Frame Timeout
15
Frames
Tree
Add
Remove
Rename
Reset
Joint State
joint_1
0.22
joint_2
-0.00
joint_3
-0.00
joint_4
0.00
joint_5
0.00
joint_6
0.00
Randomize
Center
30 fps

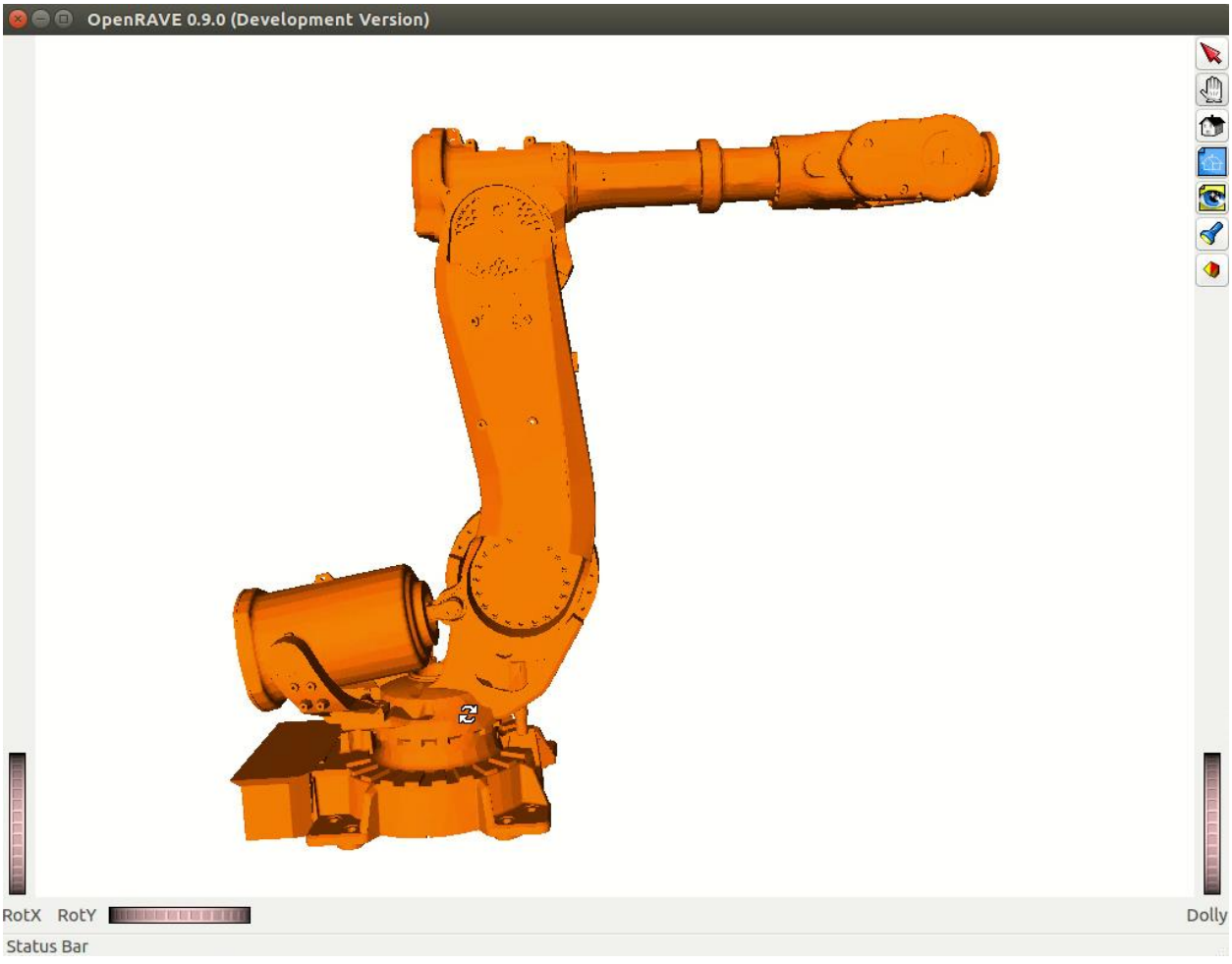

industrial_robot_client::joint_relay_handler::JointRelayHandler
industrial::message_handler::MessageHandler
industrial_robot_client::robot_status_relay_handler::RobotStatusRelayHandler
industrial_robot_client::joint_trajectory_action::JointTrajectoryAction
industrial_robot_client::joint_trajectory_downloader::JointTrajectoryDownloader
industrial_robot_client::joint_trajectory_interface::JointTrajectoryInterface
industrial_robot_client::joint_trajectory_streamer::JointTrajectoryStreamer
industrial_robot_client::robot_state_interface::RobotStateInterface

Where is the source code: /home/jcacace/openrave

Where to build the binaries: /home/jcacace/openrave/build

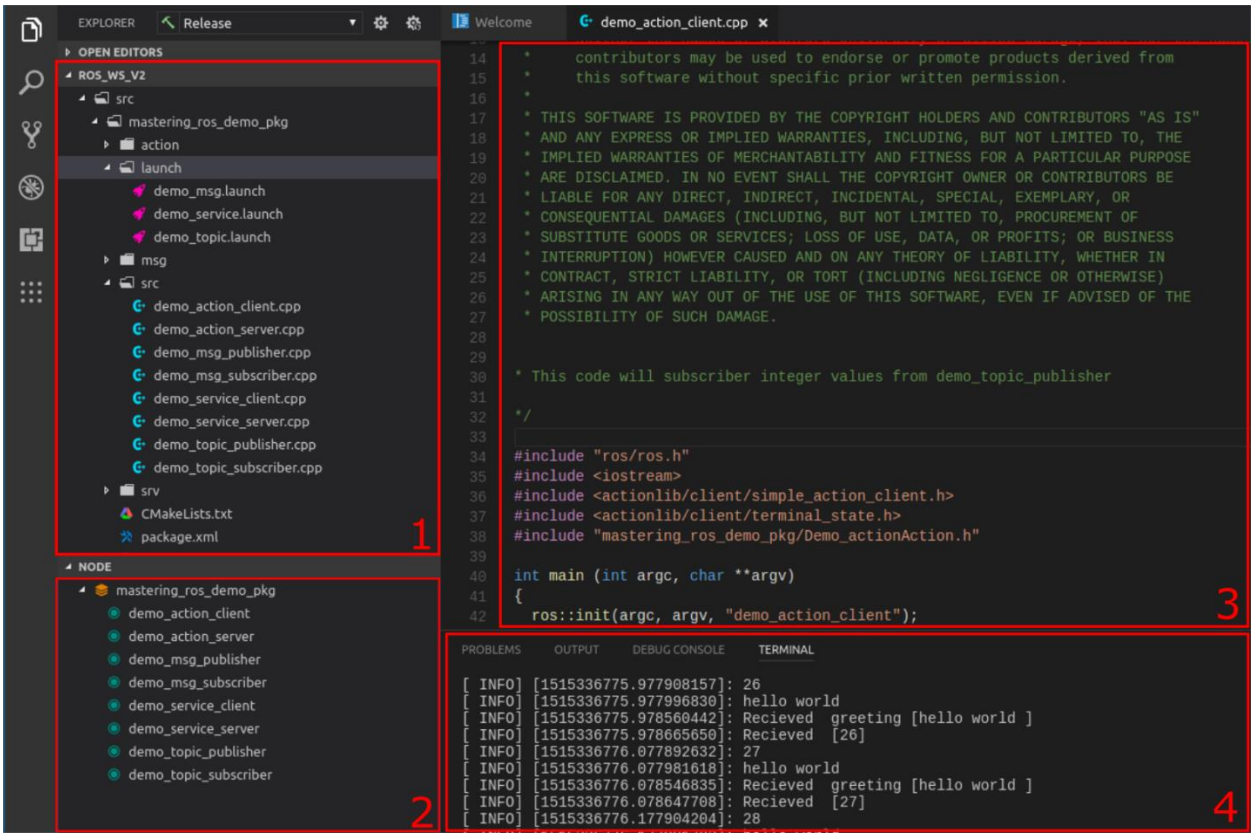
Search:

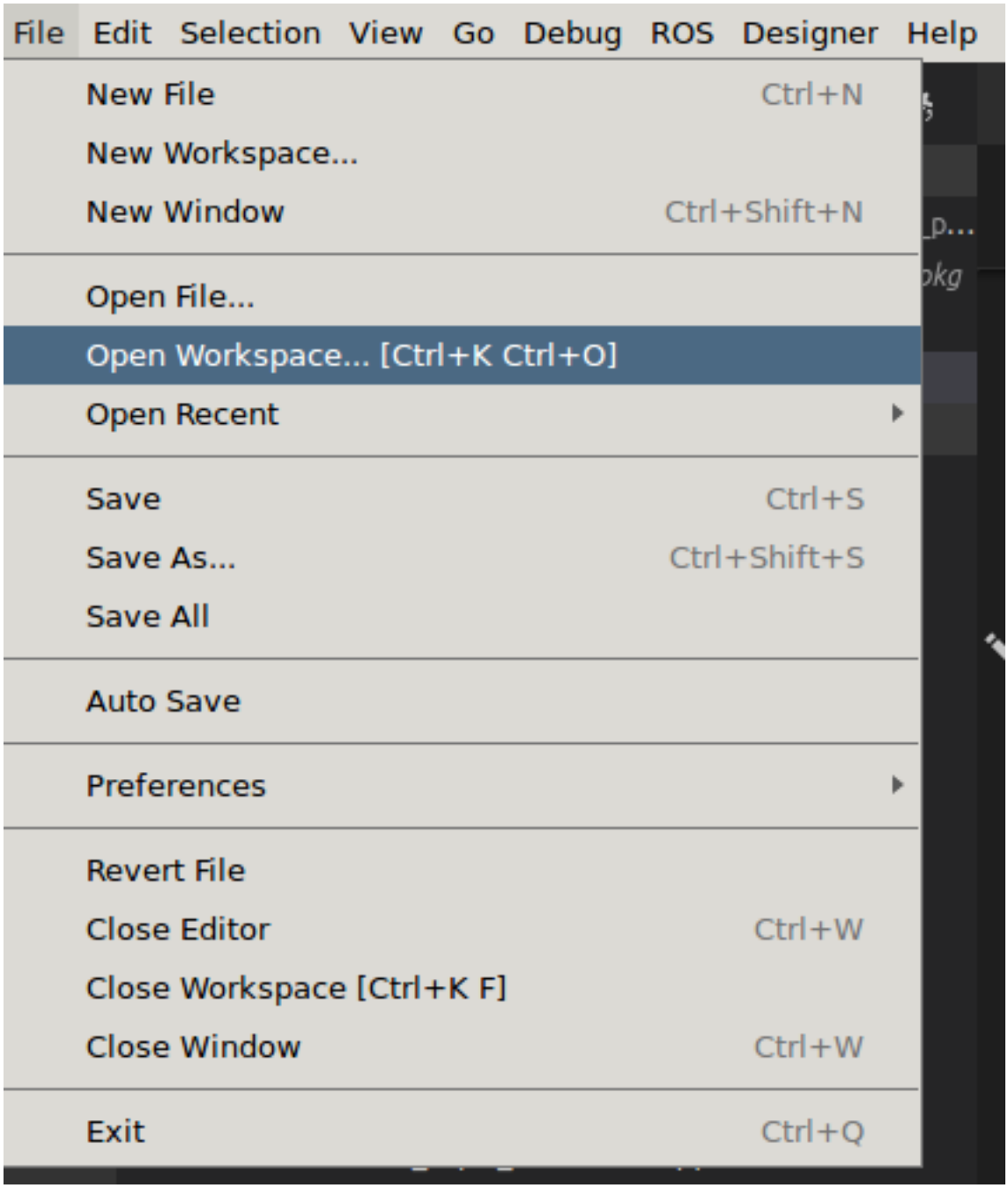
Name	Value
OPENRAVE_PLUGIN_LOGGING	☑
OPENRAVE_PLUGIN_MOBYRAVE	☑
OPENRAVE_PLUGIN_ODERAVE	☑
OPENRAVE_PLUGIN_PQPRAVE	☑
OPENRAVE_PLUGIN_QTCOINRAVE	☑
OPENRAVE_PLUGIN_QTOSGRAVE	☑
OPENRAVE_PLUGIN_RMANIPULATION	☑
OPENRAVE_PLUGIN_RPLANNERS	☑
OPENRAVE_PLUGIN_TEXTSERVER	☑
OPENRAVE_PYTHON_INSTALL_ABSOLUTE_DIR	/usr/local/lib/python2.7/dist-packages
OPENRAVE_SHARE_DIR	share/openrave-0.9
OPENTHREADS_INCLUDE_DIR	OPENTHREADS_INCLUDE_DIR-NOTFOUND
OPENTHREADS_LIBRARY	OPENTHREADS_LIBRARY-NOTFOUND
OPENTHREADS_LIBRARY_DEBUG	OPENTHREADS_LIBRARY_DEBUG-NOTFOUND
OPT_ACCURATEMATH	☑
OPT_BUILD_PACKAGES	☐
OPT_BUILD_PACKAGE_DEFAULT	☑
OPT_BULLET	☑
OPT_CBINDINGS	☑
OPT_COLLADA	☑
OPT_DOUBLE_PRECISION	☑
OPT_EXTRA_ROBOTS	☑
OPT_FCL_COLLISION	☑
OPT_FLANN	☐
OPT_IKFAST_FLOAT32	☑
OPT_LOG4CXX	☑
OPT_MATLAB	☐
OPT_OCTAVE	☐
OPT_ODE_COLLISION	☑

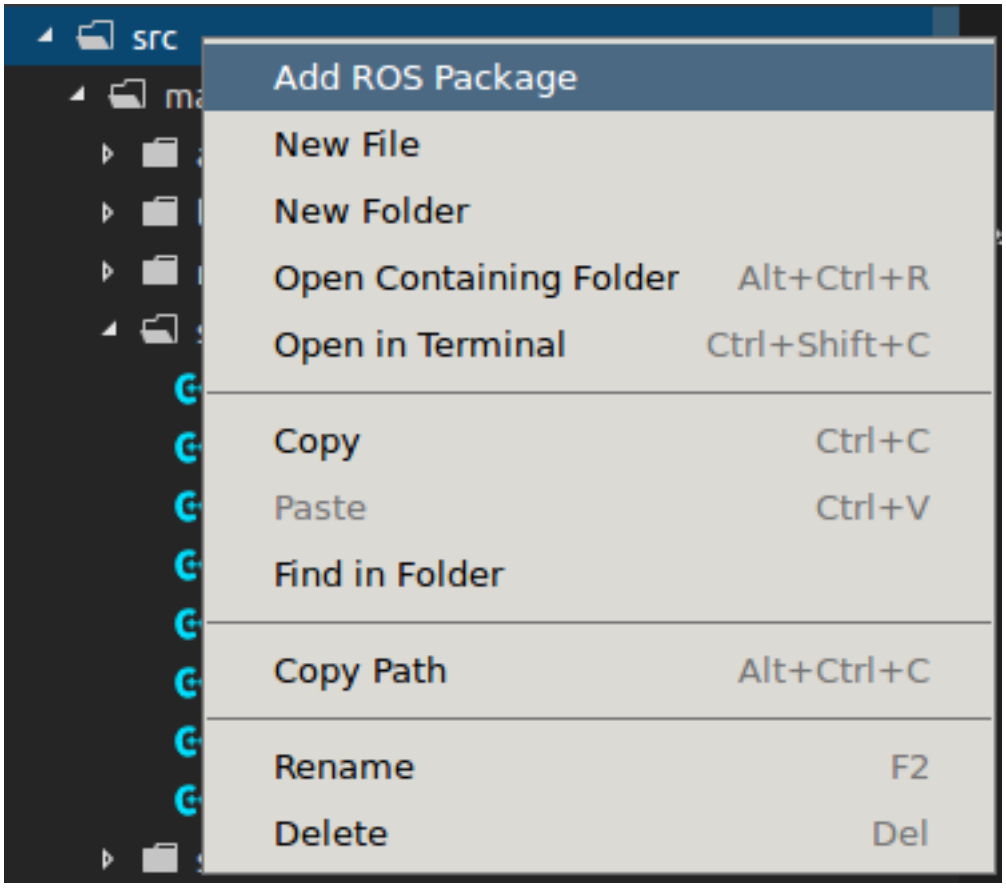


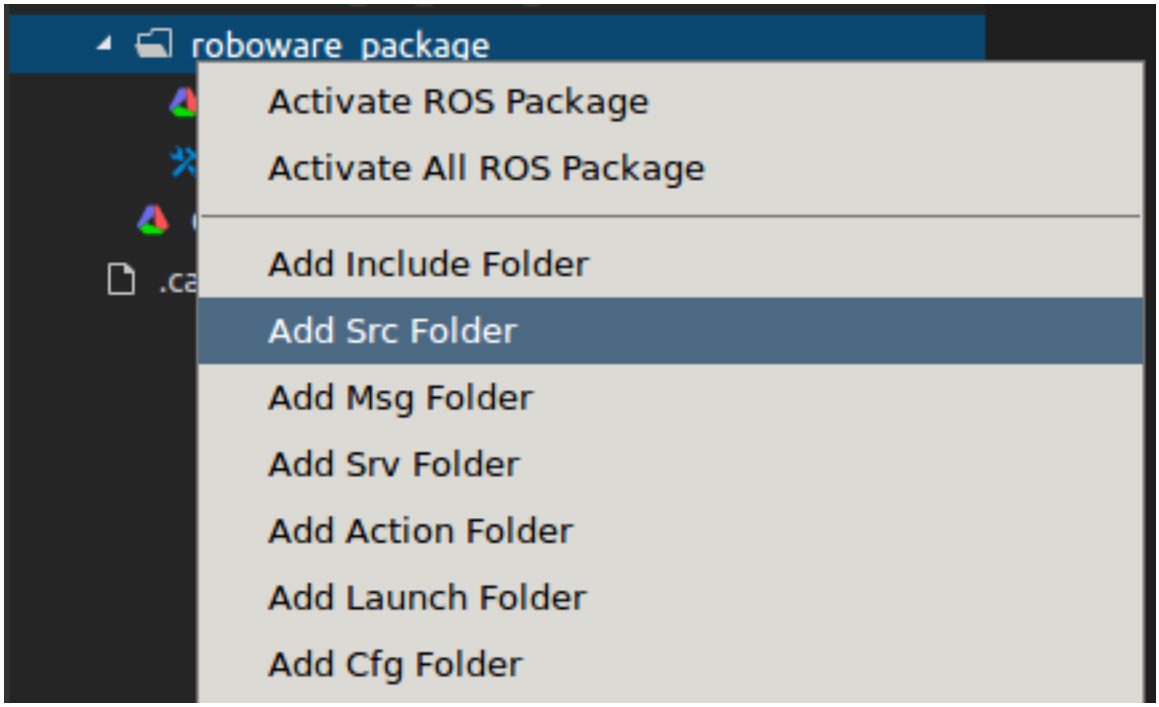

```
IKFast Plugin Generator
Loading robot from 'abb_irb6640_moveit_config' package ...
Creating plugin in 'abb_irb6640_moveit_plugins' package ...
  found 1 planning groups: manipulator
  found group 'manipulator'
  found source code generated by IKFast version 268435529

Created plugin file at '/home/jcacace/ros_ws/src/MASTERING_ROS/ch13/abb_irb6640_moveit_plugins/src/abb_irb6640_manipulator_ikfa
st_moveit_plugin.cpp'

Created plugin definition at: '/home/jcacace/ros_ws/src/MASTERING_ROS/ch13/abb_irb6640_moveit_plugins/abb_irb6640_manipulator_m
oveit_ikfast_plugin_description.xml'

Overwrote CMakeLists file at '/home/jcacace/ros_ws/src/MASTERING_ROS/ch13/abb_irb6640_moveit_plugins/CMakeLists.txt'

Modified package.xml at '/home/jcacace/ros_ws/src/MASTERING_ROS/ch13/abb_irb6640_moveit_plugins/package.xml'

Modified kinematics.yaml at /home/jcacace/ros_ws/src/abb_irb6640_moveit_config/config/kinematics.yaml

Created update plugin script at /home/jcacace/ros_ws/src/MASTERING_ROS/ch13/abb_irb6640_moveit_plugins/update_ikfast_plugin.sh
```

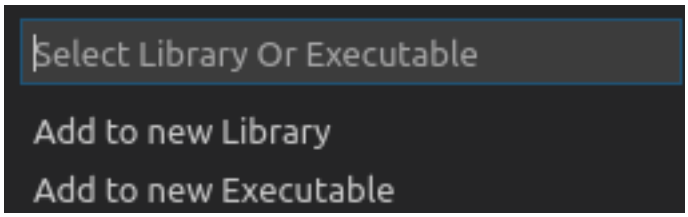
Chapter 15: Troubleshooting and Best Practices in ROS



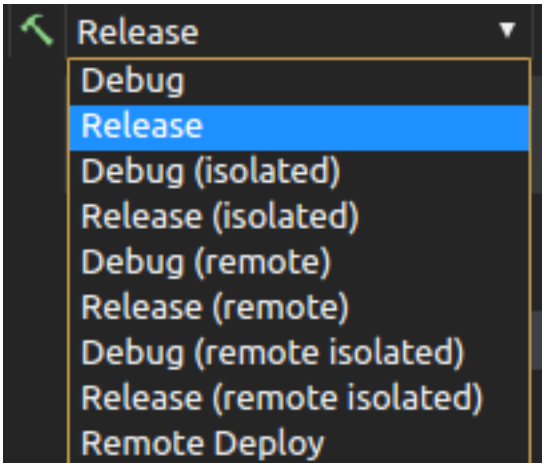

File
Edit
Selection
View
Go
Debug
ROS
Designer
Help
New File Ctrl+N
New Workspace...
New Window Ctrl+Shift+N
Open File...
Open Workspace... [Ctrl+K Ctrl+O]
Open Recent
Save Ctrl+S
Save As... Ctrl+Shift+S
Save All
Auto Save
Preferences
Revert File
Close Editor Ctrl+W
Close Workspace [Ctrl+K F]
Close Window Ctrl+W
Exit Ctrl+Q

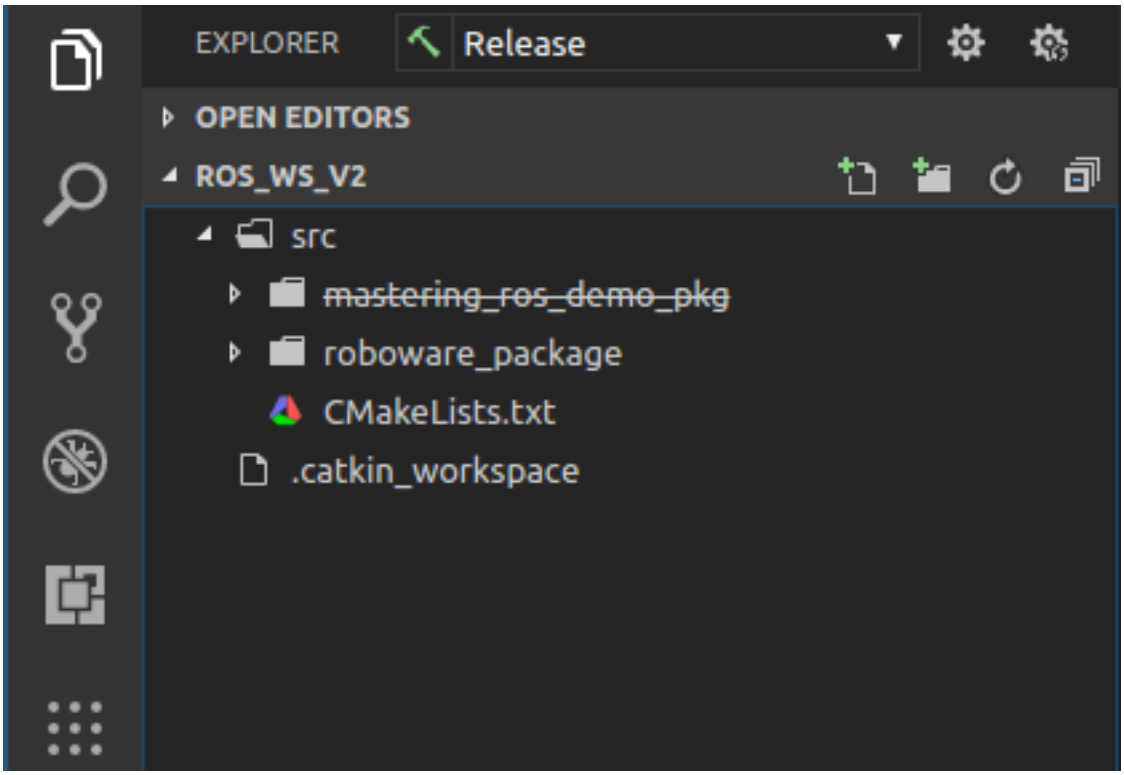

src
Add ROS Package
New File
New Folder
Open Containing Folder Alt+Ctrl+R
Open in Terminal Ctrl+Shift+C
Copy Ctrl+C
Paste Ctrl+V
Find in Folder
Copy Path Alt+Ctrl+C
Rename F2
Delete Del

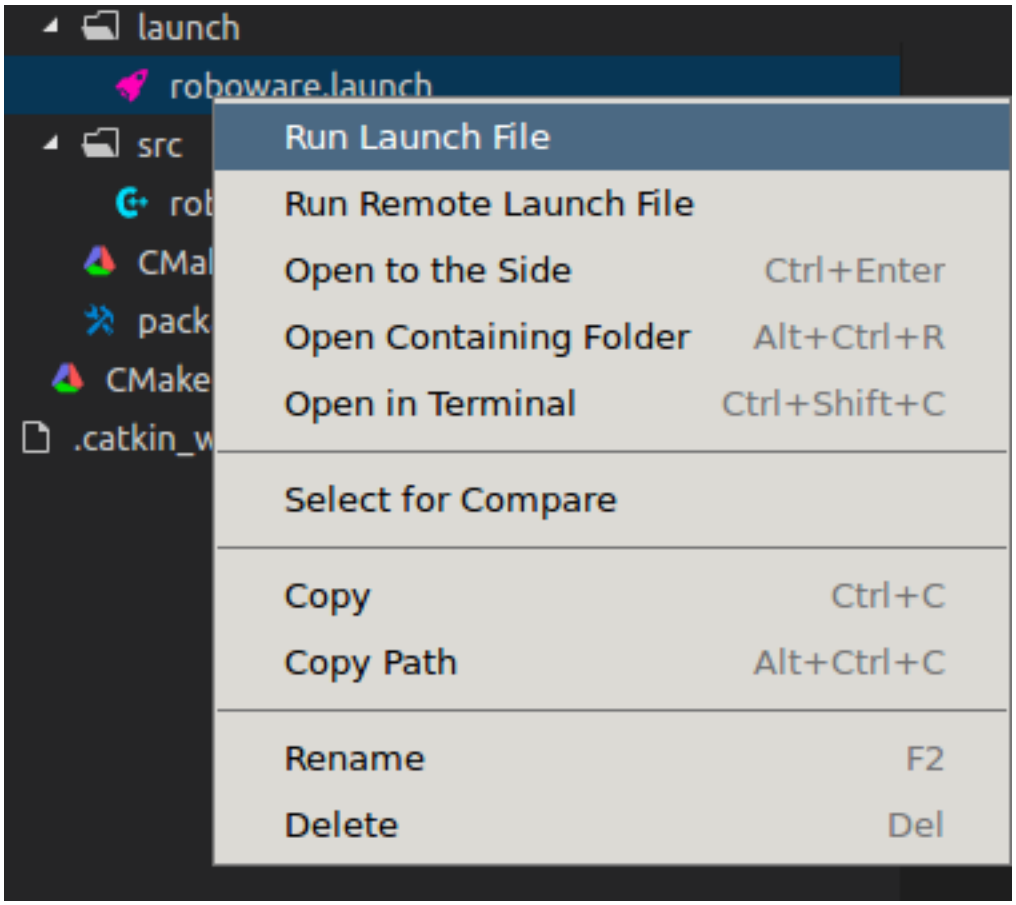

roboware_package
Activate ROS Package
Activate All ROS Package
Add Include Folder
Add Src Folder
Add Msg Folder
Add Srv Folder
Add Action Folder
Add Launch Folder
Add Cfg Folder

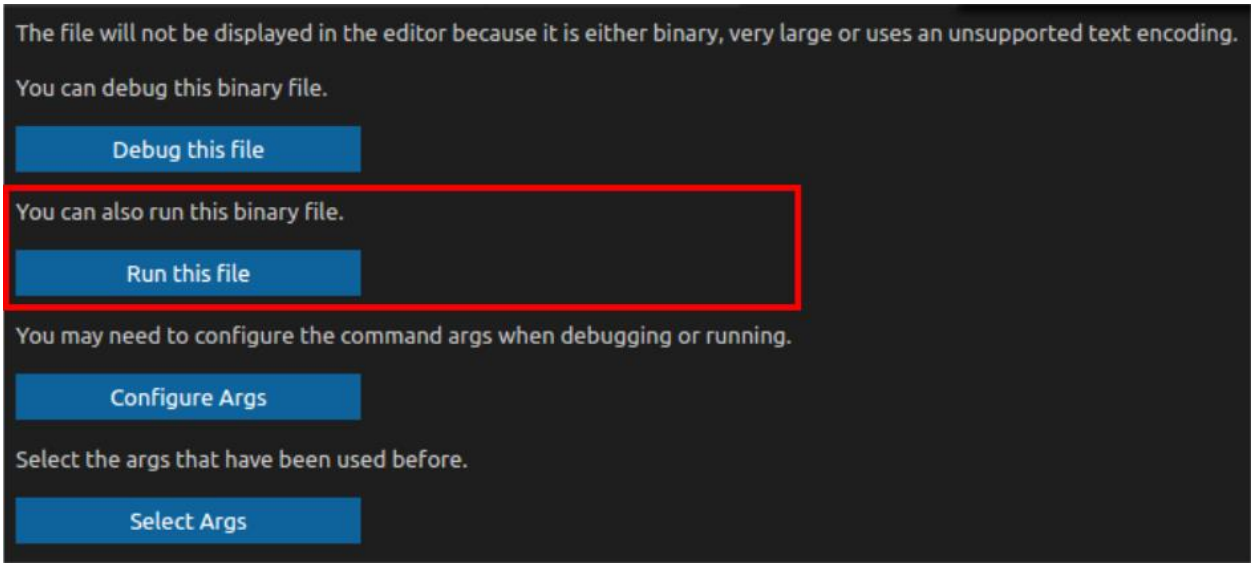

Select Library Or Executable
Add to new Library
Add to new Executable

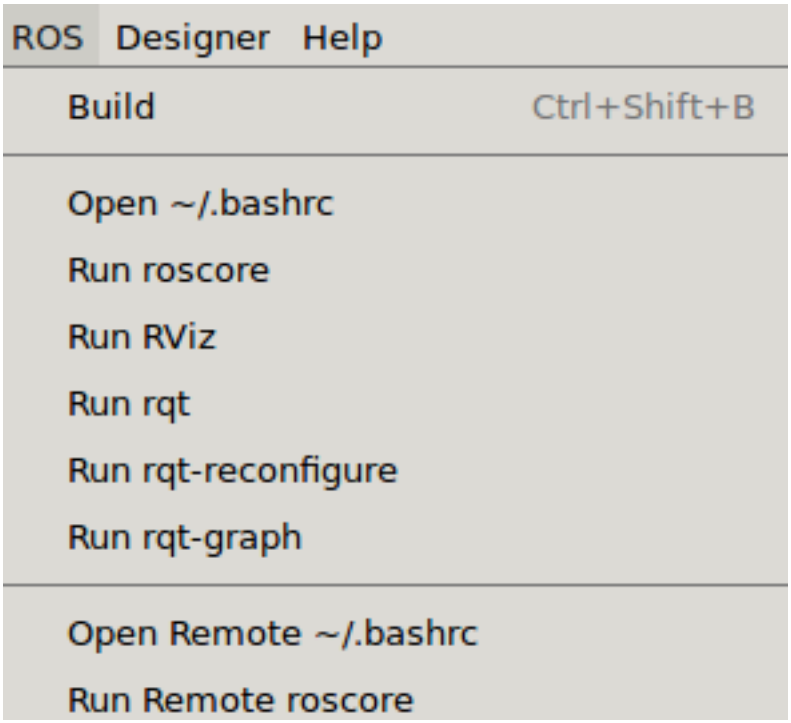
roscpp std_msgs
Edit catkin ROS Package Dependencies list, Separated by space. (Press 'Enter' to confirm or 'Es...

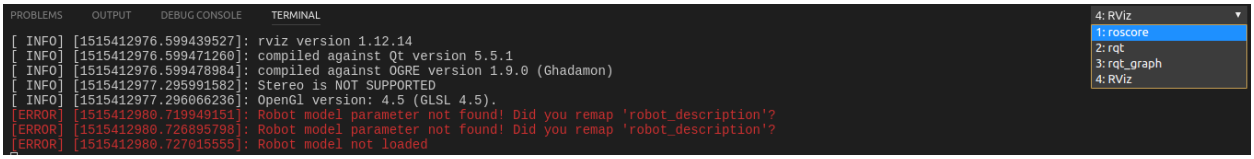

Release
Debug
Release
Debug (isolated)
Release (isolated)
Debug (remote)
Release (remote)
Debug (remote isolated)
Release (remote isolated)
Remote Deploy

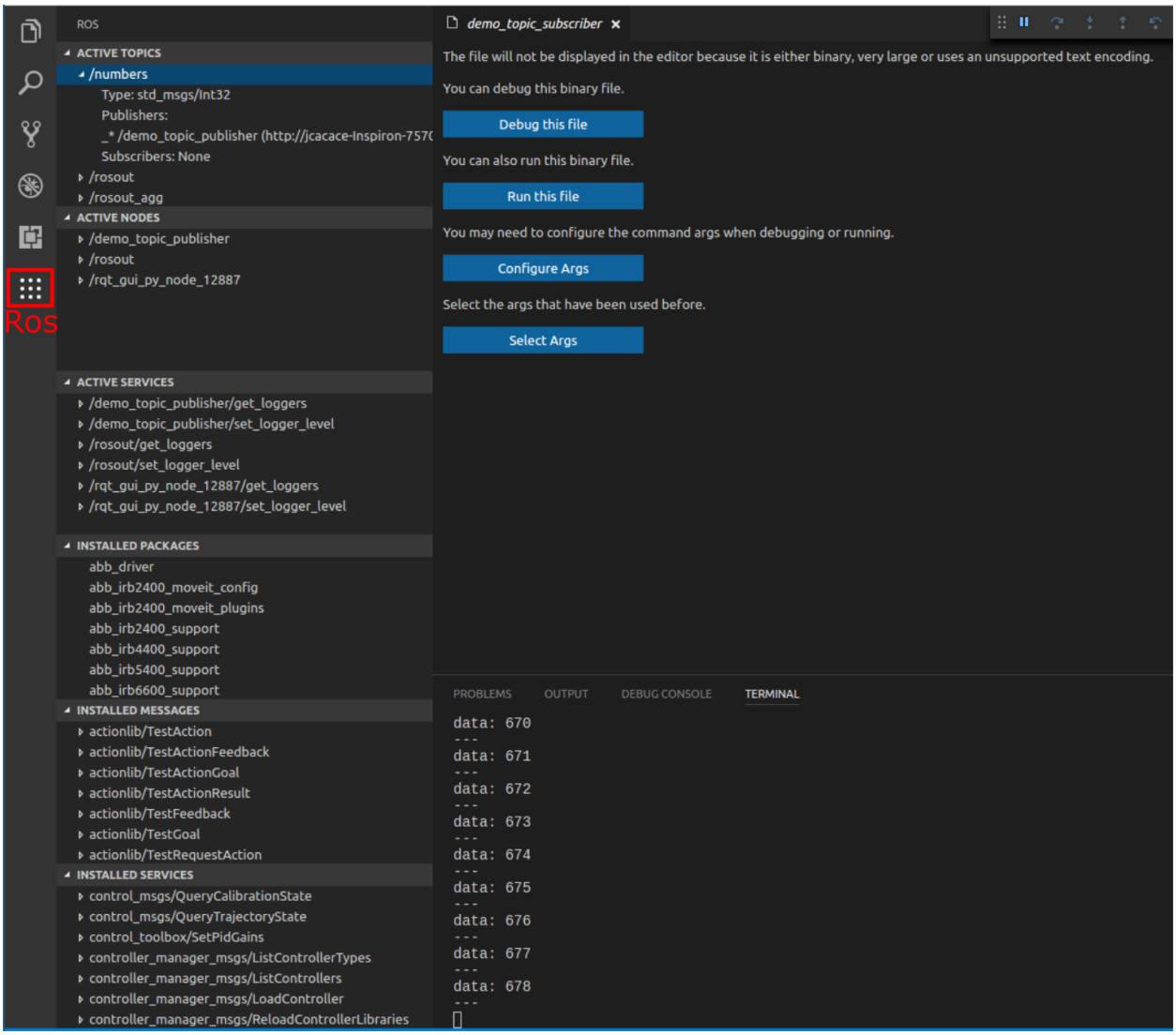

EXPLORER
Release
OPEN EDITORS
ROS_WS_V2
src
mastering_ros_demo_pkg
roboware_package
CMakeLists.txt
.catkin_workspace

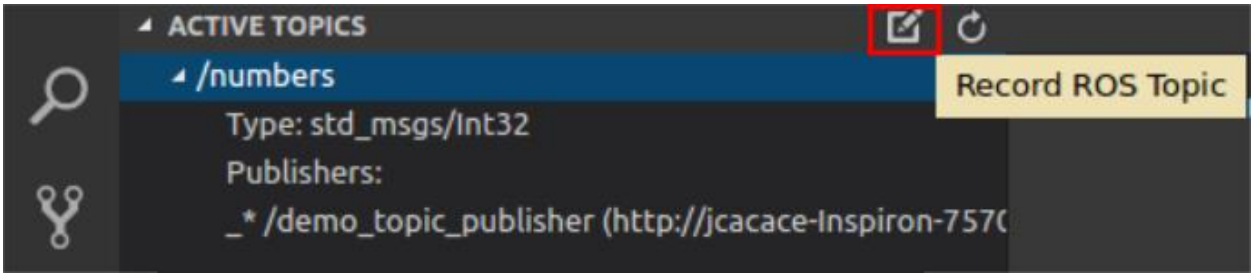

launch
roboware.launch
src
CMake
.catkin_w
Run Launch File
Run Remote Launch File
Open to the Side Ctrl+Enter
Open Containing Folder Alt+Ctrl+R
Open in Terminal Ctrl+Shift+C
Select for Compare
Copy Ctrl+C
Copy Path Alt+Ctrl+C
Rename F2
Delete Del

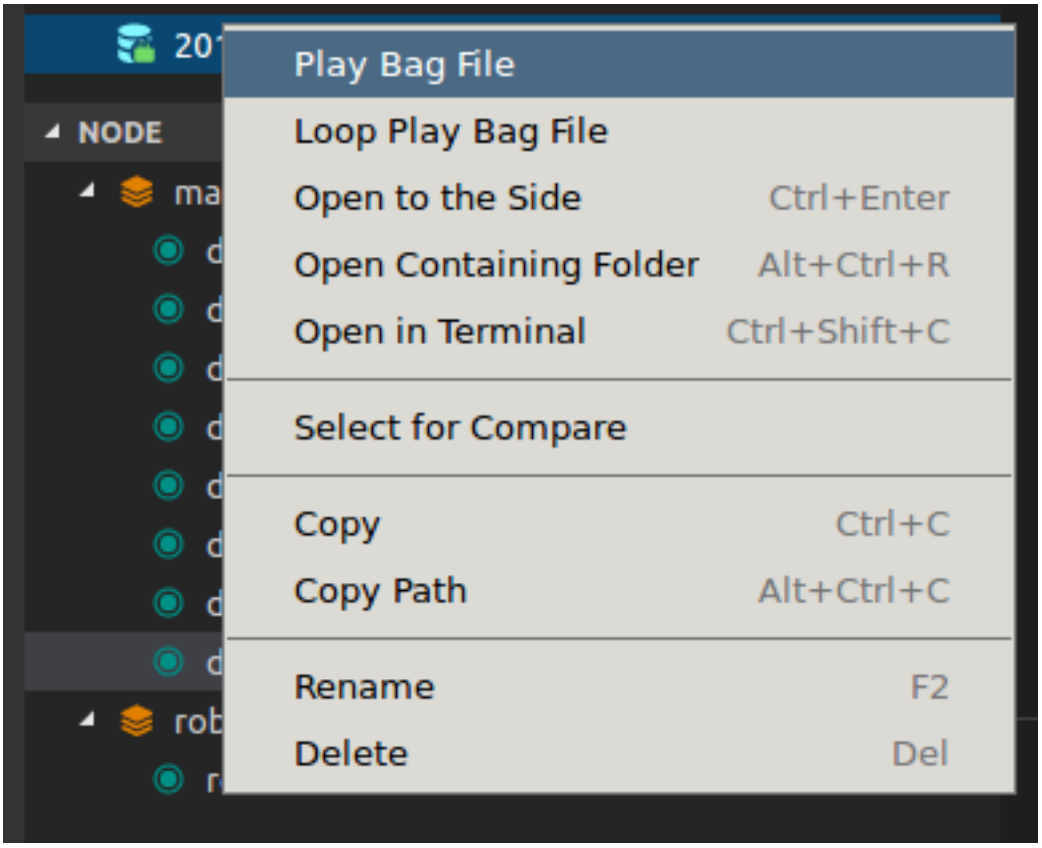

The file will not be displayed in the editor because it is either binary, very large or uses an unsupported text encoding.
You can debug this binary file.
Debug this file
You can also run this binary file.
Run this file
You may need to configure the command args when debugging or running.
Configure Args
Select the args that have been used before.
Select Args

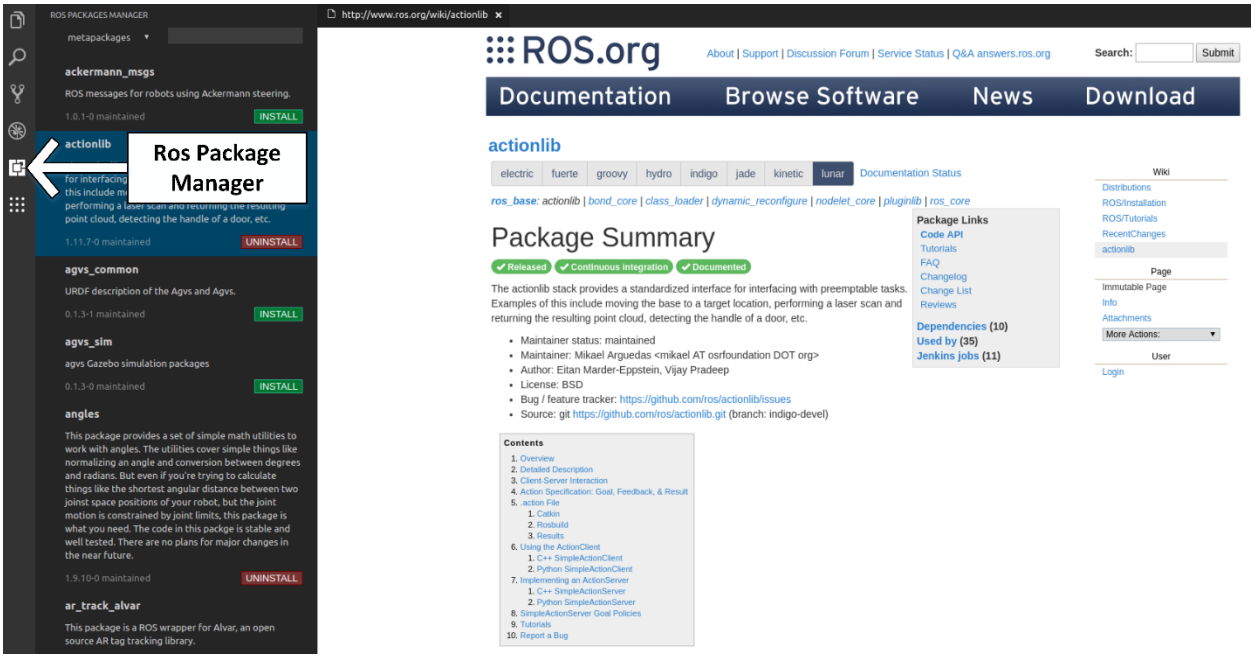

ROS
Designer
Help
Build
Ctrl+Shift+B
Open ~/.bashrc
Run roscore
Run RViz
Run rqt
Run rqt-reconfigure
Run rqt-graph
Open Remote ~/.bashrc
Run Remote roscore


PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
[INFO] [1515412976.599439527]: rviz version 1.12.14
[INFO] [1515412976.599471260]: compiled against Qt version 5.5.1
[INFO] [1515412976.599478984]: compiled against OGRE version 1.9.0 (Ghadamon)
[INFO] [1515412977.295991582]: Stereo is NOT SUPPORTED
[INFO] [1515412977.296066236]: OpenGl version: 4.5 (GLSL 4.5).
[ERROR] [1515412980.719949151]: Robot model parameter not found! Did you remap 'robot_description'?
[ERROR] [1515412980.726895798]: Robot model parameter not found! Did you remap 'robot_description'?
[ERROR] [1515412980.727015555]: Robot model not loaded
4: RViz
1: roscore
2: rqt
3: rqt_graph
4: RViz


ROS
ACTIVE TOPICS
/numbers
Type: std_msgs/Int32
Publishers:
_* /demo_topic_publisher (http://jcacace-Inspiron-757(
Subscribers: None
/rosout
/rosout_agg
ACTIVE NODES
/demo_topic_publisher
/rosout
/rqt_gui_py_node_12887
Ros
ACTIVE SERVICES
/demo_topic_publisher/get_loggers
/demo_topic_publisher/set_logger_level
/rosout/get_loggers
/rosout/set_logger_level
/rqt_gui_py_node_12887/get_loggers
/rqt_gui_py_node_12887/set_logger_level
INSTALLED PACKAGES
abb_driver
abb_irb2400_moveit_config
abb_irb2400_moveit_plugins
abb_irb2400_support
abb_irb4400_support
abb_irb5400_support
abb_irb6600_support
INSTALLED MESSAGES
actionlib/TestAction
actionlib/TestActionFeedback
actionlib/TestActionGoal
actionlib/TestActionResult
actionlib/TestFeedback
actionlib/TestGoal
actionlib/TestRequestAction
INSTALLED SERVICES
control_msgs/QueryCalibrationState
control_msgs/QueryTrajectoryState
control_toolbox/SetPidGains
controller_manager_msgs/ListControllerTypes
controller_manager_msgs/ListControllers
controller_manager_msgs/LoadController
controller_manager_msgs/ReloadControllerLibraries
demo_topic_subscriber
The file will not be displayed in the editor because it is either binary, very large or uses an unsupported text encoding.
You can debug this binary file.
Debug this file
You can also run this binary file.
Run this file
You may need to configure the command args when debugging or running.
Configure Args
Select the args that have been used before.
Select Args
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
data: 670
---
data: 671
---
data: 672
---
data: 673
---
data: 674
---
data: 675
---
data: 676
---
data: 677
---
data: 678


ACTIVE TOPICS
/numbers
Type: std_msgs/Int32
Publishers:
_* /demo_topic_publisher (http://jcacace-Inspiron-757(
Record ROS Topic


NODE
Play Bag File
Loop Play Bag File
Open to the Side Ctrl+Enter
Open Containing Folder Alt+Ctrl+R
Open in Terminal Ctrl+Shift+C
Select for Compare
Copy Ctrl+C
Copy Path Alt+Ctrl+C
Rename F2
Delete Del


ROS PACKAGES MANAGER
metapackages
ackermann_msgs
ROS messages for robots using Ackermann steering.
1.0.1-0 maintained
INSTALL
actionlib
Ros Package Manager
1.11.7-0 maintained
UNINSTALL
agvs_common
URDF description of the Agvs and Agvs.
0.1.3-1 maintained
INSTALL
agvs_sim
agvs Gazebo simulation packages
0.1.3-0 maintained
INSTALL
angles
This package provides a set of simple math utilities to work with angles. The utilities cover simple things like normalizing an angle and conversion between degrees and radians. But even if you're trying to calculate things like the shortest angular distance between two joinst space positions of your robot, but the joint motion is constrained by joint limits, this package is what you need. The code in this packge is stable and well tested. There are no plans for major changes in the near future.
1.9.10-0 maintained
UNINSTALL
ar_track_alvar
This package is a ROS wrapper for Alvar, an open source AR tag tracking library.
http://www.ros.org/wiki/actionlib
ROS.org
About | Support | Discussion Forum | Service Status | Q&A answers.ros.org
Search:
Submit
Documentation
Browse Software
News
Download
actionlib
electric fuerte groovy hydro indigo jade kinetic lunar Documentation Status
ros_base: actionlib | bond_core | class_loader | dynamic_reconfigure | nodelet_core | pluginlib | ros_core
Package Summary
Released
Continuous integration
Documented
The actionlib stack provides a standardized interface for interfacing with preemptable tasks. Examples of this include moving the base to a target location, performing a laser scan and returning the resulting point cloud, detecting the handle of a door, etc.
Maintainer status: maintained
Maintainer: Mikael Arguedas <mikael AT osrfoundation DOT org>
Author: Eitan Marder-Eppstein, Vijay Pradeep
License: BSD
Bug / feature tracker: https://github.com/ros/actionlib/issues
Source: git https://github.com/ros/actionlib.git (branch: indigo-devel)
Contents
Overview
Detailed Description
Client-Server Interaction
Action Specification: Goal, Feedback, & Result
.action File
Catkin
Rosbuild
Results
Using the ActionClient
C++ SimpleActionClient
Python SimpleActionClient
Implementing an ActionServer
C++ SimpleActionServer
Python SimpleActionServer
SimpleActionServer Goal Policies
Tutorials
Report a Bug
Package Links
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FAQ
Changelog
Change List
Reviews
Dependencies (10)
Used by (35)
Jenkins jobs (11)
Wiki
Distributions
ROS/Installation
ROS/Tutorials
RecentChanges
actionlib
Page
Immutable Page
Info
Attachments
More Actions:
User
Login

```
Loaded plugin tf.tfwtf
================================================================================
Static checks summary:

Found 1 warning(s).
Warnings are things that may be just fine, but are sometimes at fault

WARNING ROS_HOSTNAME may be incorrect: ROS_HOSTNAME [192.168.2.23] resolves to [192.168.2.23], which does
not appear to be a local IP address ['127.0.0.1', '192.168.1.7'].

================================================================================

ROS Master does not appear to be running.
Online graph checks will not be run.
ROS_MASTER_URI is [http://192.168.2.2:11311]
```

```
jcacace@jcacace-Inspiron-7570:~$ rosrun roscpp_tutorials talker
[ERROR] [1515175271.173829991]: [registerPublisher] Failed to contact ma
ster at [localhost:11311].  Retrying...
```

```
jcacace@jcacace-Inspiron-7570:~$ rostopic pub /chatter std_msgs/Int32 "data: 1"
publishing and latching message. Press ctrl-C to terminate
[WARN] [1515176143.614150]: Could not process inbound connection: topic types do not
match: [std_msgs/String] vs. [std_msgs/Int32]{'topic': '/chatter', 'tcp_nodelay': '0'
, 'md5sum': '992ce8a1687cec8c8bd883ec73ca41d1', 'type': 'std_msgs/String', 'callerid'
: '/listener'}
```

```
jcacace@jcacace-Inspiron-7570:~$ rosrun roscpp_tutorials taker
[rosrun] Couldn't find executable named taker below /opt/ros/kinetic/sha
re/roscpp_tutorials
```

```
jcacace@jcacace-Inspiron-7570:~$ roscore
^C... logging to /home/jcacace/.ros/log/5a62571a-f2d2-11e7-9514-9cda3ea0
e939/roslaunch-jcacace-Inspiron-7570-6141.log
Checking log directory for disk usage. This may take awhile.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.
```

```
Base path: /home/jcacace/ros_ws
Source space: /home/jcacace/ros_ws/src
Build space: /home/jcacace/ros_ws/build
Devel space: /home/jcacace/ros_ws/devel
Install space: /home/jcacace/ros_ws/install
####
#### Running command: "make cmake_check_build_system" in "/home/jcacace/ros_ws/build"
####
####
#### Running command: "make -j8 -l8" in "/home/jcacace/ros_ws/build"
####
[ 50%] Linking CXX executable /home/jcacace/ros_ws/devel/lib/linking_error_test/linking_error
CMakeFiles/linking_error.dir/src/linking_error.cpp.o: In function `main':
/home/jcacace/ros_ws/src/linking_error_test/src/linking_error.cpp:7: undefined reference to `ros::init(int&, char**, std::__cxx
11::basic_string<char, std::char_traits<char>, std::allocator<char> > const&, unsigned int)'
collect2: error: ld returned 1 exit status
linking_error_test/CMakeFiles/linking_error.dir/build.make:104: recipe for target '/home/jcacace/ros_ws/devel/lib/linking_error
_test/linking_error' failed
make[2]: *** [/home/jcacace/ros_ws/devel/lib/linking_error_test/linking_error] Error 1
CMakeFiles/Makefile2:493: recipe for target 'linking_error_test/CMakeFiles/linking_error.dir/all' failed
make[1]: *** [linking_error_test/CMakeFiles/linking_error.dir/all] Error 2
Makefile:138: recipe for target 'all' failed
make: *** [all] Error 2
Invoking "make -j8 -l8" failed
```

```
cmake_minimum_required(VERSION 2.8.3)
project(linking_error_test)

find_package(catkin REQUIRED COMPONENTS
  #roscpp
  std_msgs
)
```