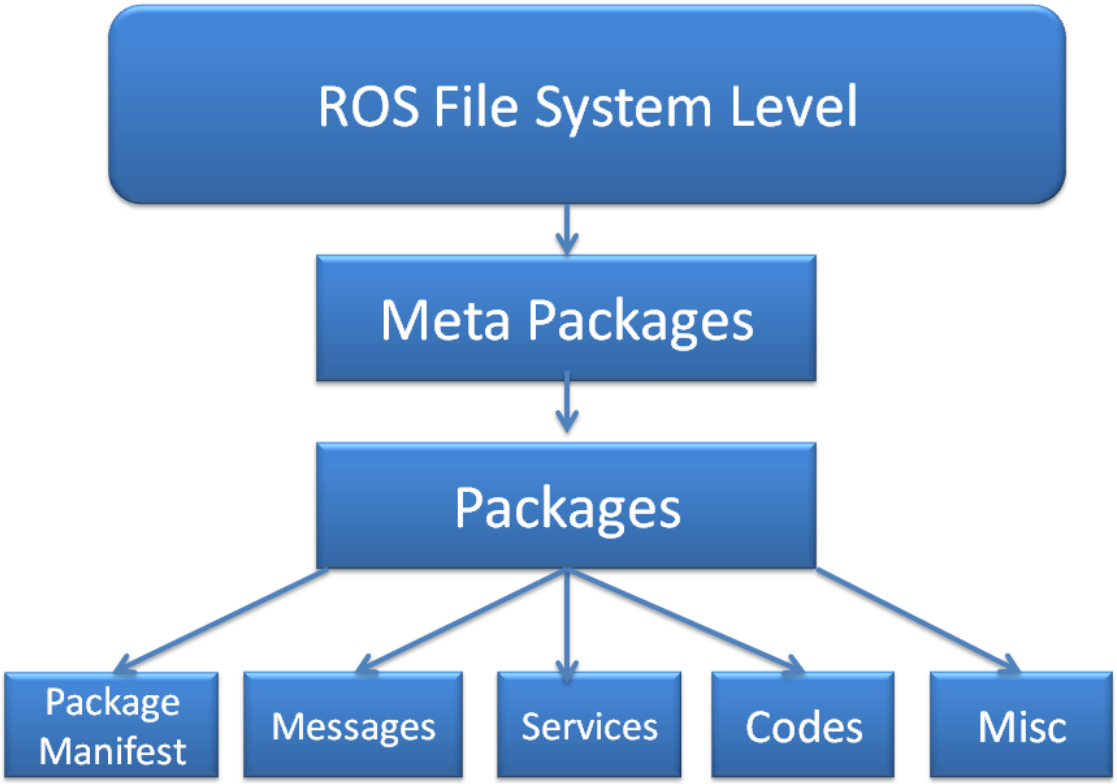
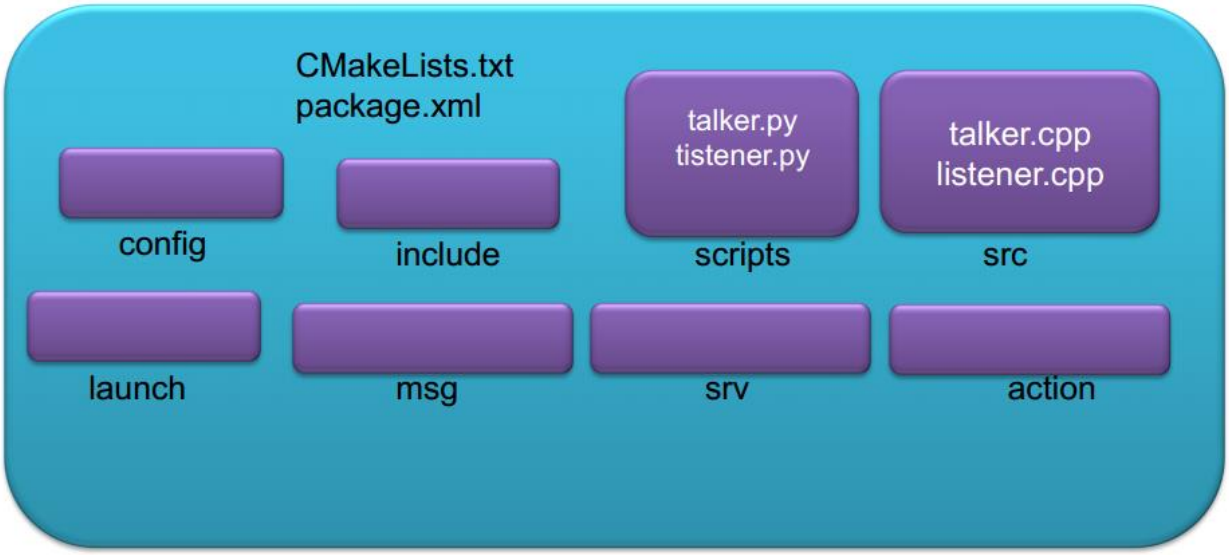
CHAPTER 1

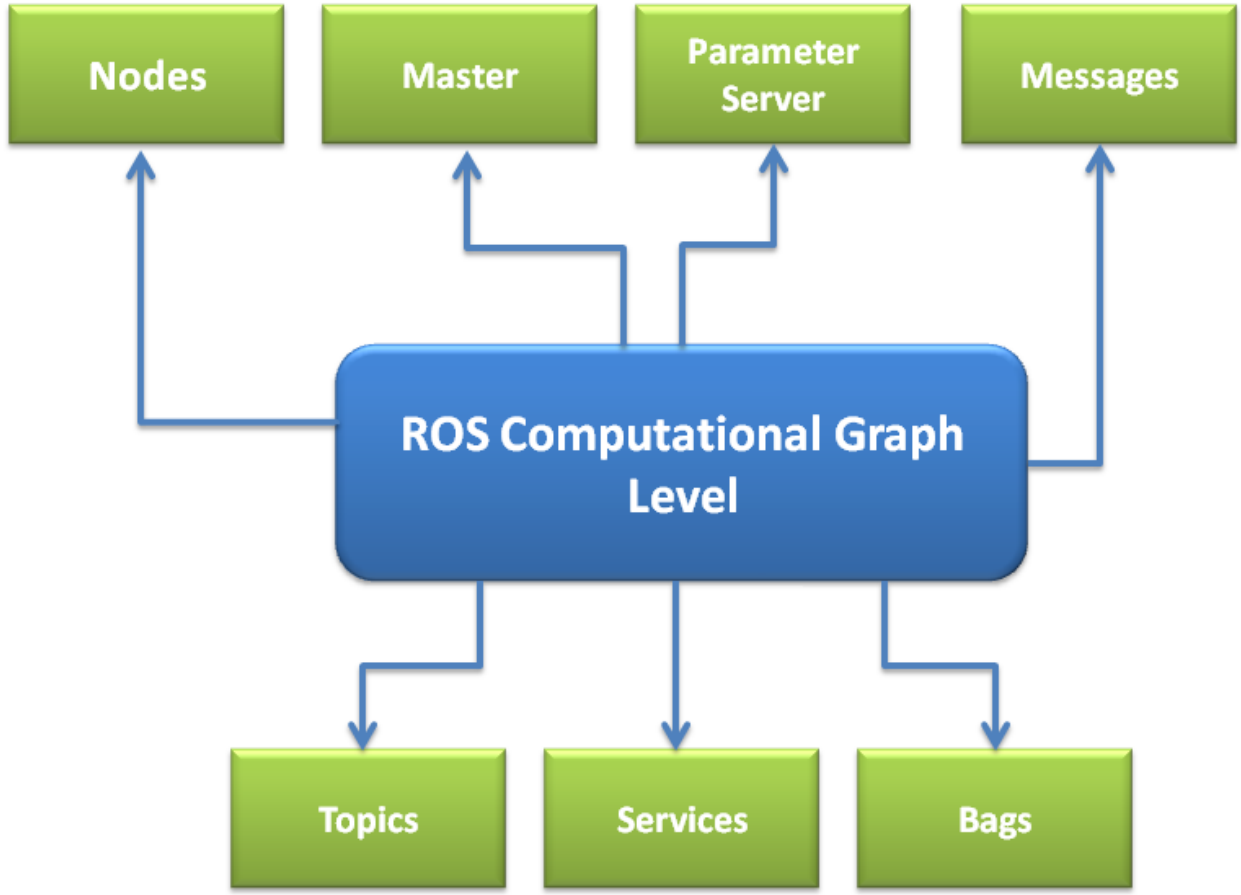

ROS File System Level
Meta Packages
Packages
Package Manifest
Messages
Services
Codes
Misc

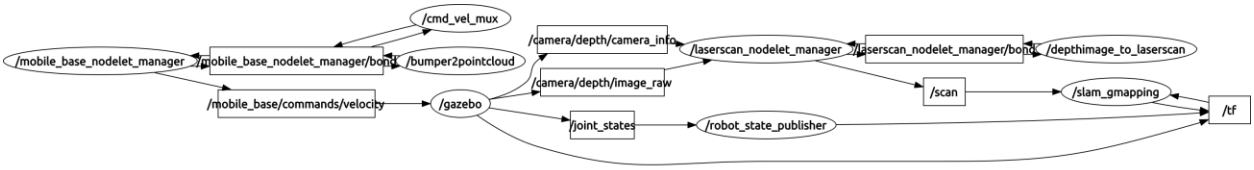
```
mastering_ros_demo_pkg/
|-- action
|   `-- Demo_action.action
|-- CMakeLists.txt
|-- include
|-- msg
|   `-- demo_msg.msg
|-- package.xml
|-- src
|   |-- demo_action_client.cpp
|   |-- demo_action_server.cpp
|   |-- demo_msg_publisher.cpp
|   |-- demo_msg_subscriber.cpp
|   |-- demo_service_client.cpp
|   |-- demo_service_server.cpp
|   |-- demo_topic_publisher.cpp
|   `-- demo_topic_subscriber.cpp
`-- srv
    `-- demo_srv.srv
```

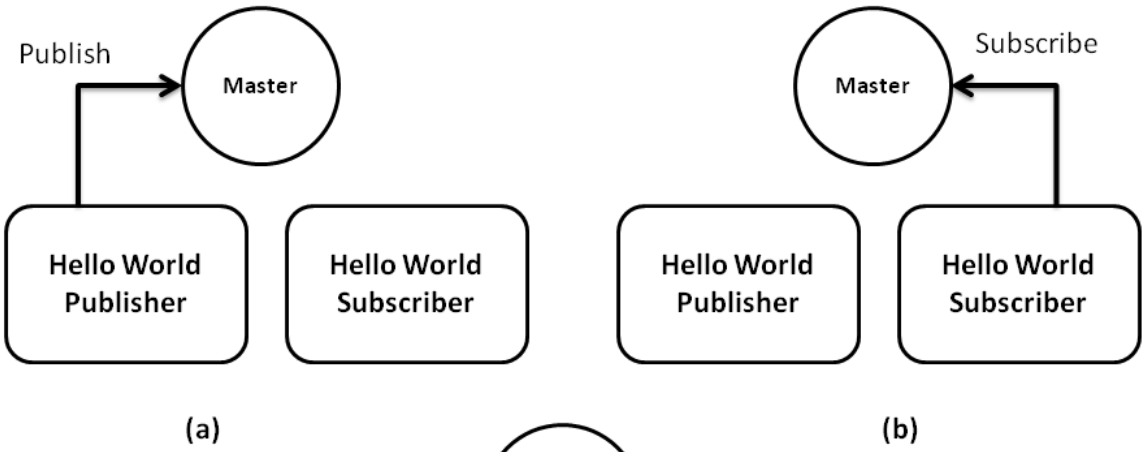


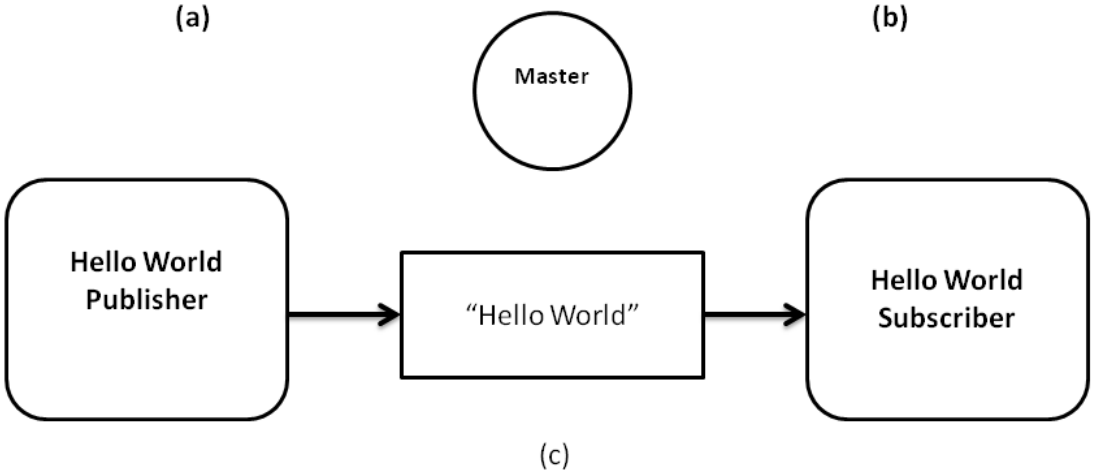
```xml
<?xml version="1.0"?>
<package>
  <name>hello_world</name>
  <version>0.0.0</version>
  <description>The hello_world package</description>

  <maintainer email="qboticslabs@gmail.com">Lentin Joseph</maintainer>
  <license>BSD</license>
  <url type="website">http://wiki.ros.org/hello_world</url>
 <author email="qboticslabs@gmail.com">Lentin Joseph</author>

  <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
<package>
    <name>navigation</name>
    <version>1.12.2</version>
    ........
    <buildtool_depend>catkin</buildtool_depend>
    ........
    <run_depend>amcl</run_depend>
    <run_depend>carrot_planner</run_depend>
    ........
    <export>
        <metapackage/>
    </export>
</package>
```


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


/cmd_vel_mux
/mobile_base_nodelet_manager
/mobile_base_nodelet_manager/bond
/bumper2pointcloud
/camera/depth/camera_info
/laserscan_nodelet_manager
/laserscan_nodelet_manager/bond
/depthimage_to_laserscan
/camera/depth/image_raw
/mobile_base/commands/velocity
/gazebo
/scan
/slam_gmapping
/joint_states
/robot_state_publisher
/tf






```
robot@robot-VirtualBox:~$ roscore
... logging to /home/robot/.ros/log/a3a8e160-e1ae-11e4-b7be-0800273c354c/roslaunch-robot-Virtu
alBox-2138.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.

started roslaunch server http://robot-VirtualBox:42377/
ros_comm version 1.11.10


SUMMARY
========

PARAMETERS
 * /rosdistro: indigo
 * /rosversion: 1.11.10

NODES

auto-starting new master
process[master]: started with pid [2183]
ROS_MASTER_URI=http://robot-VirtualBox:11311/

setting /run_id to a3a8e160-e1ae-11e4-b7be-0800273c354c
process[rosout-1]: started with pid [2196]
started core service [/rosout]
```

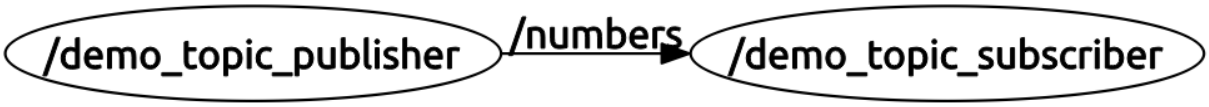
1 2 3 4 5

```
Created file mastering_ros_demo_pkg/package.xml
Created file mastering_ros_demo_pkg/CMakeLists.txt
Created folder mastering_ros_demo_pkg/include/mastering_ros_demo_pkg
Created folder mastering_ros_demo_pkg/src
Successfully created files in /home/lentin/catkin_ws/src/mastering_ros_demo_pkg.
 Please adjust the values in package.xml.
```

roscore http://robot-VirtualBox:11311/ × robot@robot-VirtualBox: ~ ×

```
robot@robot-VirtualBox:~$ rosrun mastering_ros_demo_pkg demo_topic_publi
sher
[ INFO] [1429195851.035054959]: 0
[ INFO] [1429195851.135337732]: 1
[ INFO] [1429195851.235186036]: 2
[ INFO] [1429195851.335841095]: 3
[ INFO] [1429195851.435267700]: 4
[ INFO] [1429195851.535966447]: 5
[ INFO] [1429195851.635125303]: 6
[ INFO] [1429195851.810513189]: 7
[ INFO] [1429195851.835139308]: 8
[ INFO] [1429195851.935245007]: 9
[ INFO] [1429195852.035188269]: 10
[ INFO] [1429195852.135188558]: 11
[ INFO] [1429195852.235172453]: 12
[ INFO] [1429195852.336646534]: 13
[ INFO] [1429195852.435268877]: 14
[ INFO] [1429195852.535263274]: 15
[ INFO] [1429195852.636214524]: 16
[ INFO] [1429195852.735282604]: 17
[ INFO] [1429195852.836172657]: 18
```

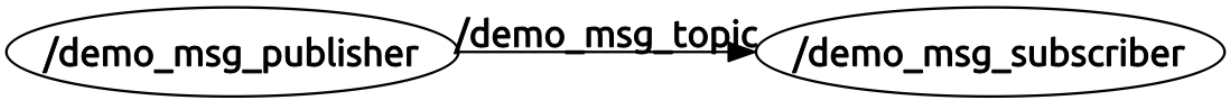
```
robot@robot-VirtualBox:~$ rosrun mastering_ros_demo_pkg demo_topic_subscr
iber
[ INFO] [1429195851.337429267]: Recieved  [3]
[ INFO] [1429195851.435783179]: Recieved  [4]
[ INFO] [1429195851.536240701]: Recieved  [5]
[ INFO] [1429195851.635804053]: Recieved  [6]
[ INFO] [1429195851.816521012]: Recieved  [7]
[ INFO] [1429195851.835736951]: Recieved  [8]
[ INFO] [1429195851.939650759]: Recieved  [9]
[ INFO] [1429195852.035614896]: Recieved  [10]
[ INFO] [1429195852.135903902]: Recieved  [11]
[ INFO] [1429195852.235513913]: Recieved  [12]
[ INFO] [1429195852.337660217]: Recieved  [13]
[ INFO] [1429195852.435941239]: Recieved  [14]
[ INFO] [1429195852.535806815]: Recieved  [15]
[ INFO] [1429195852.636739531]: Recieved  [16]
[ INFO] [1429195852.735823562]: Recieved  [17]
[ INFO] [1429195852.837438784]: Recieved  [18]
[ INFO] [1429195852.935985331]: Recieved  [19]
[ INFO] [1429195853.035816398]: Recieved  [20]
[ INFO] [1429195853.135980807]: Recieved  [21]
[ INFO] [1429195853.236516729]: Recieved  [22]
```

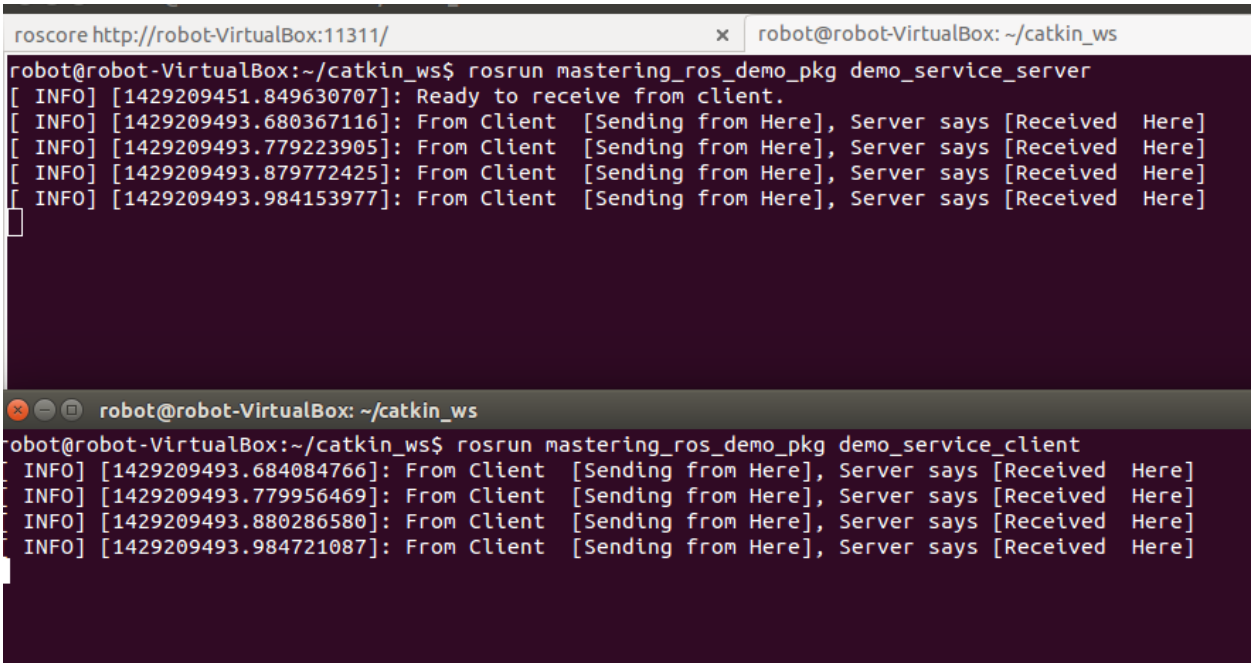


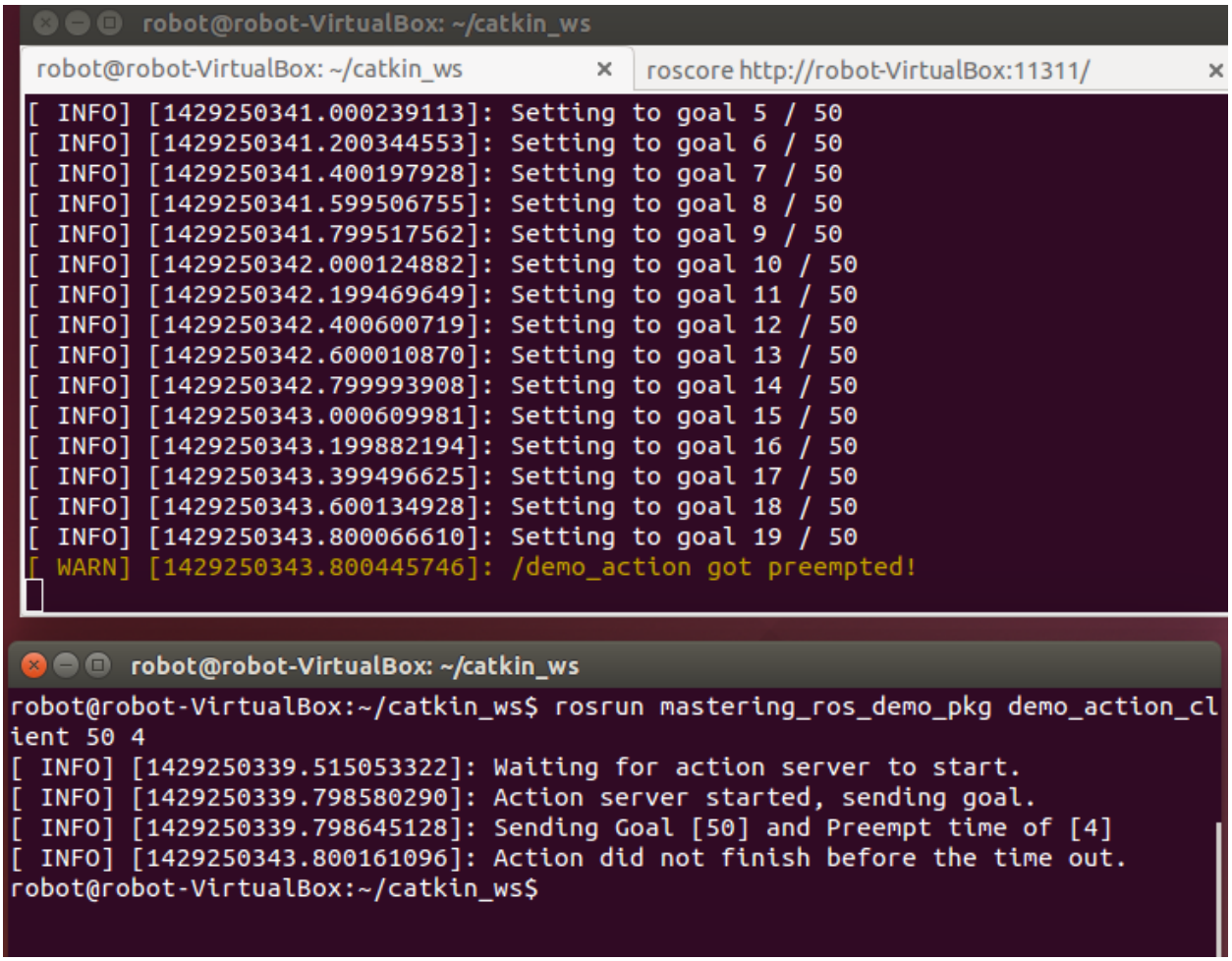
roscore http://robot-VirtualBox:11311/ × robot@robot-VirtualBox: ~/catkin_ws ×

```
robot@robot-VirtualBox:~/catkin_ws$ rosrun mastering_ros_demo_pkg d
emo_msg_publisher
[ INFO] [1429204461.730582067]: 0
[ INFO] [1429204461.731106481]: hello world
[ INFO] [1429204461.830816909]: 1
[ INFO] [1429204461.831052059]: hello world
[ INFO] [1429204461.930733743]: 2
[ INFO] [1429204461.930944783]: hello world
[ INFO] [1429204462.031510394]: 3
[ INFO] [1429204462.031653080]: hello world
[ INFO] [1429204462.130676852]: 4
[ INFO] [1429204462.131034528]: hello world
[ INFO] [1429204462.230590924]: 5
```

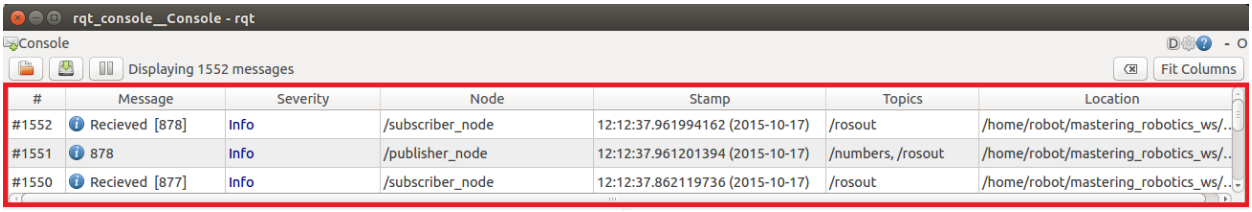
```
robot@robot-VirtualBox:~/catkin_ws$ rosrun mastering_ros_demo_pkg demo
_msg_subscriber
[ INFO] [1429204462.032108891]: Recieved  greeting [hello world ]
[ INFO] [1429204462.032258379]: Recieved  [3]
[ INFO] [1429204462.131825592]: Recieved  greeting [hello world ]
[ INFO] [1429204462.132171205]: Recieved  [4]
[ INFO] [1429204462.231192619]: Recieved  greeting [hello world ]
[ INFO] [1429204462.231297410]: Recieved  [5]
[ INFO] [1429204462.331417235]: Recieved  greeting [hello world ]
[ INFO] [1429204462.331505873]: Recieved  [6]
[ INFO] [1429204462.431412198]: Recieved  greeting [hello world ]
[ INFO] [1429204462.431507060]: Recieved  [7]
[ INFO] [1429204462.532275257]: Recieved  greeting [hello world ]
[ INFO] [1429204462.532470603]: Recieved  [8]
```




roscore http://robot-VirtualBox:11311/
robot@robot-VirtualBox: ~/catkin_ws
robot@robot-VirtualBox:~/catkin_ws$ rosrun mastering_ros_demo_pkg demo_service_server
[INFO] [1429209451.849630707]: Ready to receive from client.
[INFO] [1429209493.680367116]: From Client [Sending from Here], Server says [Received Here]
[INFO] [1429209493.779223905]: From Client [Sending from Here], Server says [Received Here]
[INFO] [1429209493.879772425]: From Client [Sending from Here], Server says [Received Here]
[INFO] [1429209493.984153977]: From Client [Sending from Here], Server says [Received Here]
robot@robot-VirtualBox: ~/catkin_ws
obot@robot-VirtualBox:~/catkin_ws$ rosrun mastering_ros_demo_pkg demo_service_client
INFO] [1429209493.684084766]: From Client [Sending from Here], Server says [Received Here]
INFO] [1429209493.779956469]: From Client [Sending from Here], Server says [Received Here]
INFO] [1429209493.880286580]: From Client [Sending from Here], Server says [Received Here]
INFO] [1429209493.984721087]: From Client [Sending from Here], Server says [Received Here]


robot@robot-VirtualBox: ~/catkin_ws
robot@robot-VirtualBox: ~/catkin_ws
roscore http://robot-VirtualBox:11311/
[INFO] [1429250341.000239113]: Setting to goal 5 / 50
[INFO] [1429250341.200344553]: Setting to goal 6 / 50
[INFO] [1429250341.400197928]: Setting to goal 7 / 50
[INFO] [1429250341.599506755]: Setting to goal 8 / 50
[INFO] [1429250341.799517562]: Setting to goal 9 / 50
[INFO] [1429250342.000124882]: Setting to goal 10 / 50
[INFO] [1429250342.199469649]: Setting to goal 11 / 50
[INFO] [1429250342.400600719]: Setting to goal 12 / 50
[INFO] [1429250342.600010870]: Setting to goal 13 / 50
[INFO] [1429250342.799993908]: Setting to goal 14 / 50
[INFO] [1429250343.000609981]: Setting to goal 15 / 50
[INFO] [1429250343.199882194]: Setting to goal 16 / 50
[INFO] [1429250343.399496625]: Setting to goal 17 / 50
[INFO] [1429250343.600134928]: Setting to goal 18 / 50
[INFO] [1429250343.800066610]: Setting to goal 19 / 50
[WARN] [1429250343.800445746]: /demo_action got preempted!
robot@robot-VirtualBox: ~/catkin_ws
robot@robot-VirtualBox:~/catkin_ws$ rosrun mastering_ros_demo_pkg demo_action_cl
ient 50 4
[INFO] [1429250339.515053322]: Waiting for action server to start.
[INFO] [1429250339.798580290]: Action server started, sending goal.
[INFO] [1429250339.798645128]: Sending Goal [50] and Preempt time of [4]
[INFO] [1429250343.800161096]: Action did not finish before the time out.
robot@robot-VirtualBox:~/catkin_ws$

```
started roslaunch server http://robot-VirtualBox:56174/

SUMMARY
========

PARAMETERS
 * /rosdistro: indigo
 * /rosversion: 1.11.10

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 [2713]
ROS_MASTER_URI=http://localhost:11311

setting /run_id to 3f5f5bca-7499-11e5-8e21-0800273c354c
```




```
lentin@lentin-Aspire-4755: /media/lentin/Work/Mastering_Robotics_using_ROS/Chapter-1-Introduction to ROS
New ROS Distro index url: 'https://raw.githubusercontent.com/ros/rosdistro/18cdf
ea398602b3af16d71d02aedab0628b8c7a0/index.yaml'
Specified repository 'mastering_ros_demo_pkg' is not in the distribution file lo
cated at 'https://raw.githubusercontent.com/ros/rosdistro/18cdfea398602b3af16d71
d02aedab0628b8c7a0/indigo/distribution.yaml'
Could not determine release repository url for repository 'mastering_ros_demo_pk
g' of distro 'indigo'
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...
No reasonable default release repository url could be determined from previous r
eleases.
Release repository url [press enter to abort]: https://github.com/qboticslabs/de
mo_pkg-release.git
```

```
Create a new track called 'indigo' now [Y/n]? Y
Creating track 'indigo'...
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/qboticslabs/mastering_ros_demo_pkg.git
```

```
==> Pulling latest rosdistro branch
remote: Counting objects: 68220, done.
remote: Compressing objects: 100% (51/51), done.
remote: Total 68220 (delta 28), reused 0 (delta 0), pack-reused 68169
Receiving objects: 100% (68220/68220), 20.31 MiB | 94.00 KiB/s, done.
Resolving deltas: 100% (42818/42818), done.
From https://github.com/ros/rosdistro
 * branch            master     -> FETCH_HEAD
==> git reset --hard 18cdfea398602b3af16d71d02aedab0628b8c7a0
HEAD is now at 18cdfea Merge pull request #9661 from mikepurvis/bloom-roboteq-1
==> Writing new distribution file: indigo/distribution.yaml
==> git add indigo/distribution.yaml
==> git commit -m "mastering_ros_demo_pkg: 0.0.2-0 in 'indigo/distribution.yaml' [bloom]"
[bloom-mastering_ros_demo_pkg-0 9f5f7bf] mastering_ros_demo_pkg: 0.0.2-0 in 'indigo/distribution.yaml' [bloom]
 1 file changed, 6 insertions(+)
==> Pushing changes to fork
Counting objects: 7, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (4/4), done.
Writing objects: 100% (4/4), 487 bytes | 0 bytes/s, done.
Total 4 (delta 3), reused 0 (delta 0)
To https://5b3a85ef89117532b0b62deba8d5dd14d3070d63:x-oauth-basic@github.com/qboticslabs/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/9662
lentin@lentin-Aspire-4755:/media/lentin/Work/Mastering_Robotics_using_ROS/Chapter-1-Introduction to ROS Package managem
ent/codes/mastering_ros_demo_pkg$
```

6 ■■■■■ indigo/distribution.yaml View

```
@@ -4651,6 +4651,12 @@ repositories:
4651 4651        url: https://github.com/swri-robotics/marti_messages.git
4652 4652        version: indigo-devel
4653 4653      status: developed
     4654 +  mastering_ros_demo_pkg:
     4655 +    release:
     4656 +      tags:
     4657 +        release: release/indigo/{package}/{version}
     4658 +      url: https://github.com/qboticslabs/demo_pkg-release.git
     4659 +      version: 0.0.2-0
4654 4660    mav_comm:
4655 4661      doc:
4656 4662        type: git
```

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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:

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ROS/Installation
ROS/Tutorials
RecentChanges
Documentation

Page
Edit (Text)
Edit (GUI)
Info
Subscribe
Remove Link
Attachments
More Actions:

User
qboticslabs
Settings
Logout

qboticslabs

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

Clear message

Mastering Robotics using ROS

Package Summary

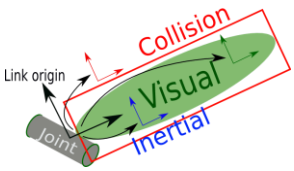
A demo package which has example codes demonstrating topic, service, custom messages and actionlib

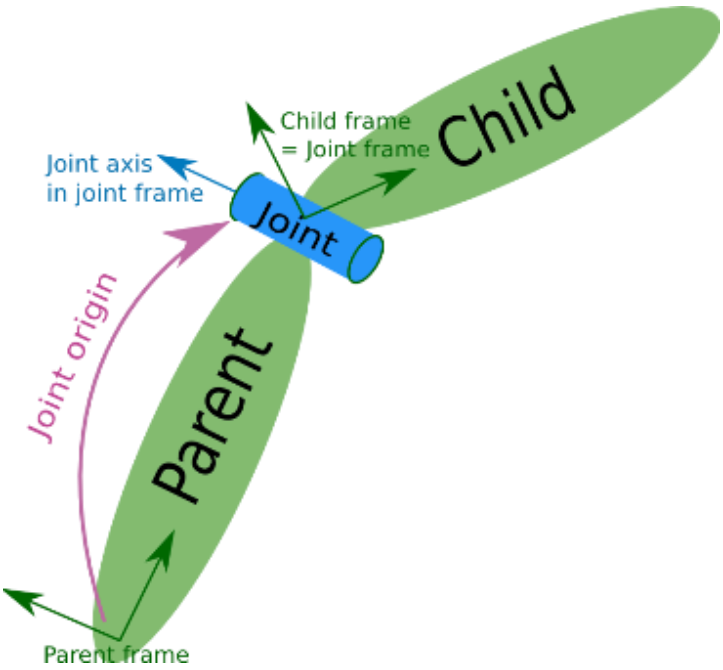
- Maintainer: Lentin Joseph <qboticslabsAT gmail DOT com>
- Author : Lentin Joseph < qboticslabs AT gmail DOT com>
- License : BSD
- Source : git https://github.com/qboticslabs/mastering_ros_demo_pkg.git

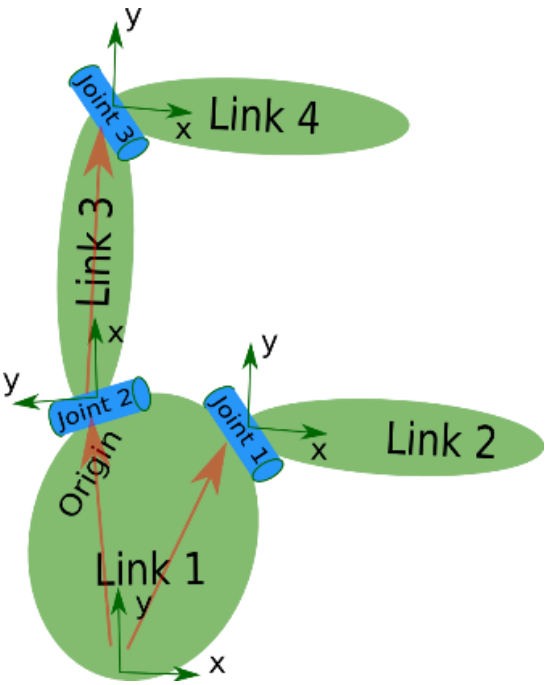
1. Installation

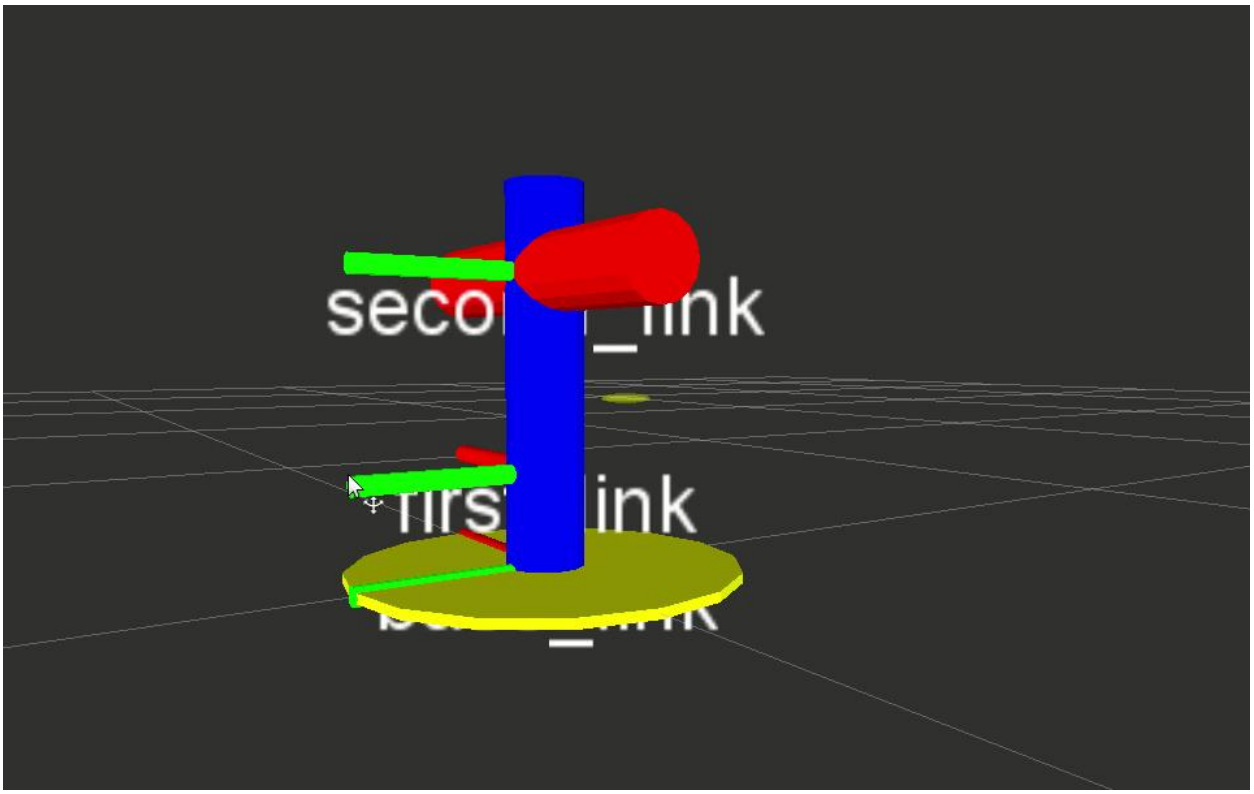
You can use git clone to install package.

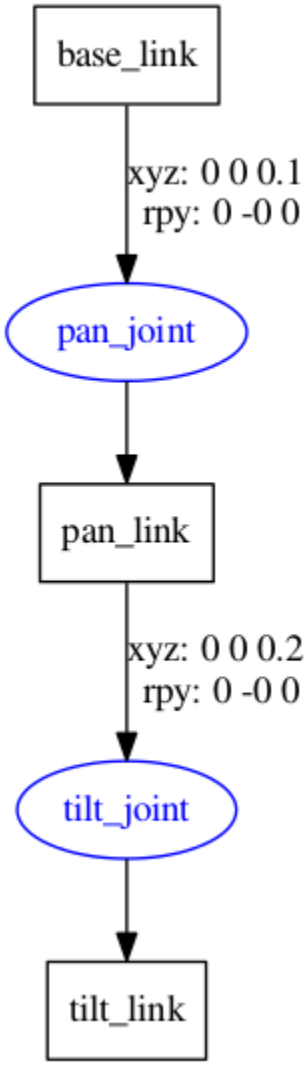
CHAPTER 2

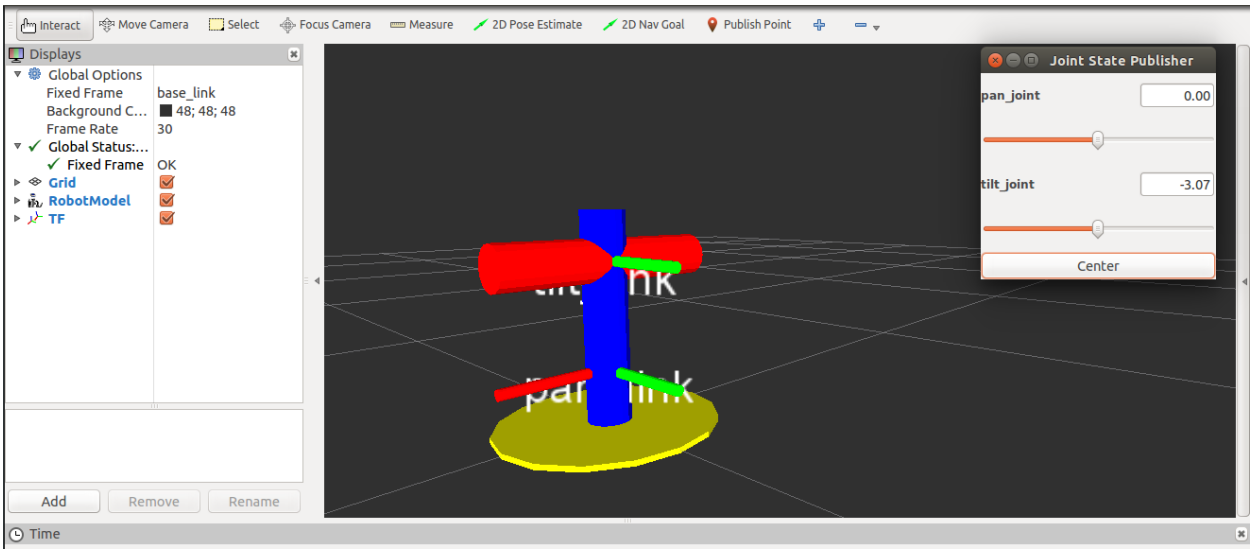


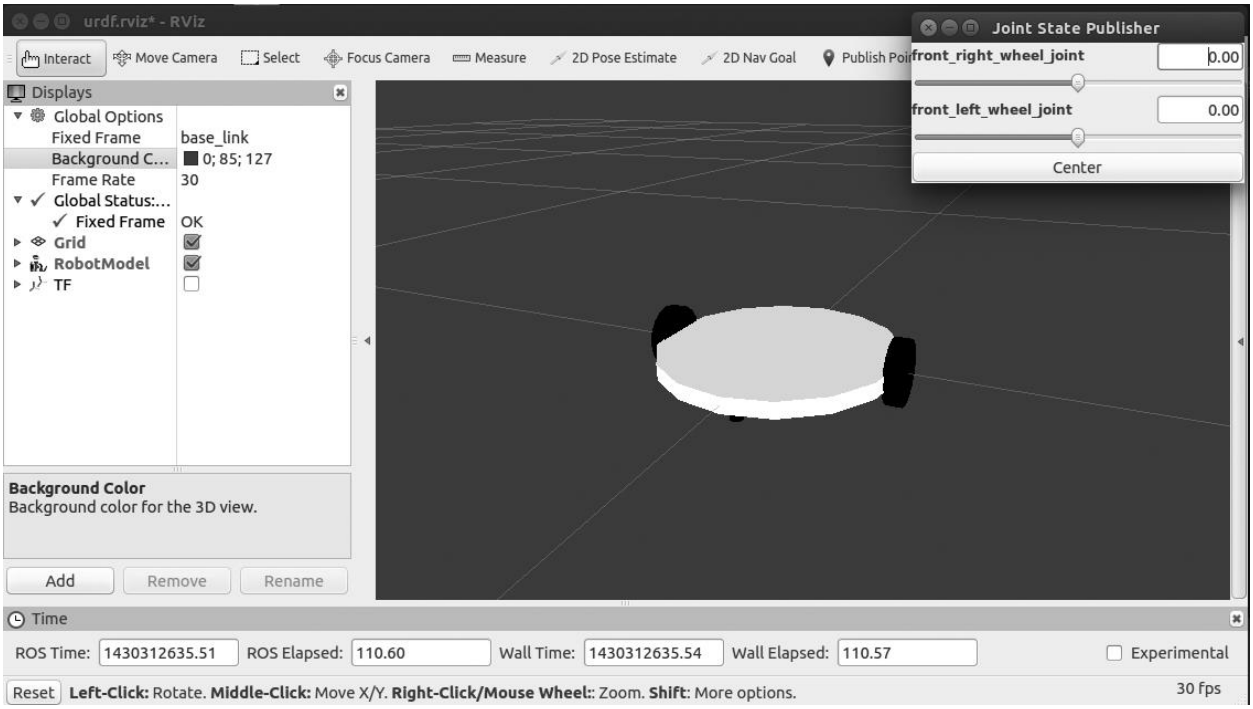


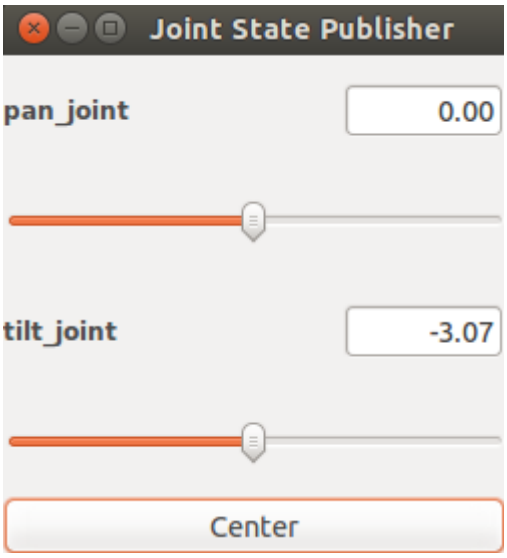

y
Joint 3
x
Link 4
Link 3
x
y
Joint 2
Joint 1
y
x
Link 2
Origin
Link 1
y
x

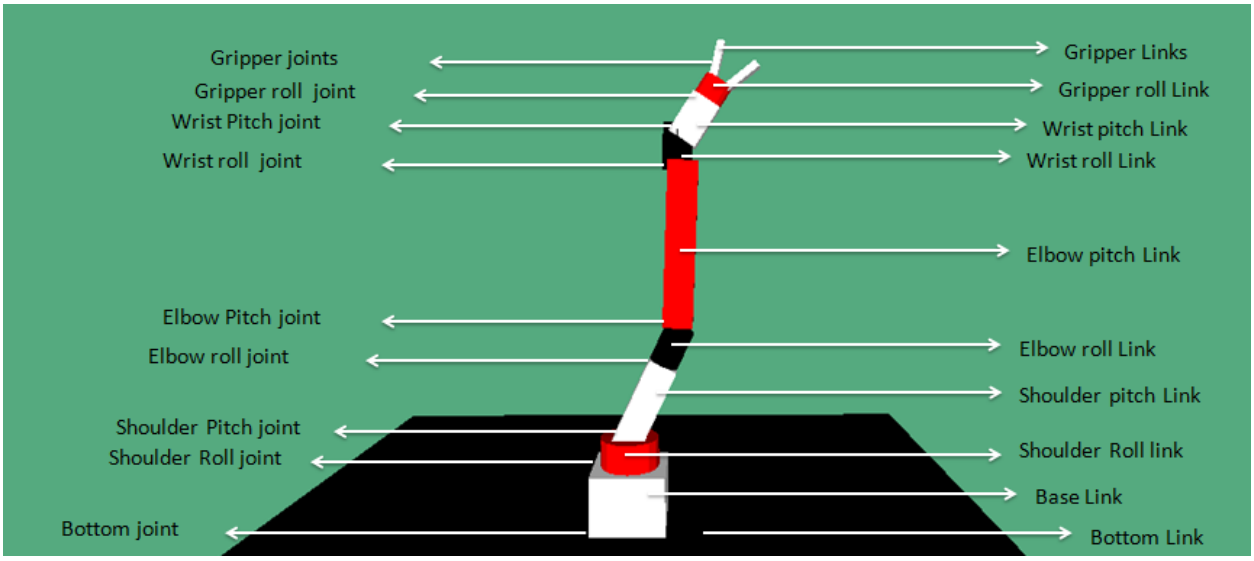


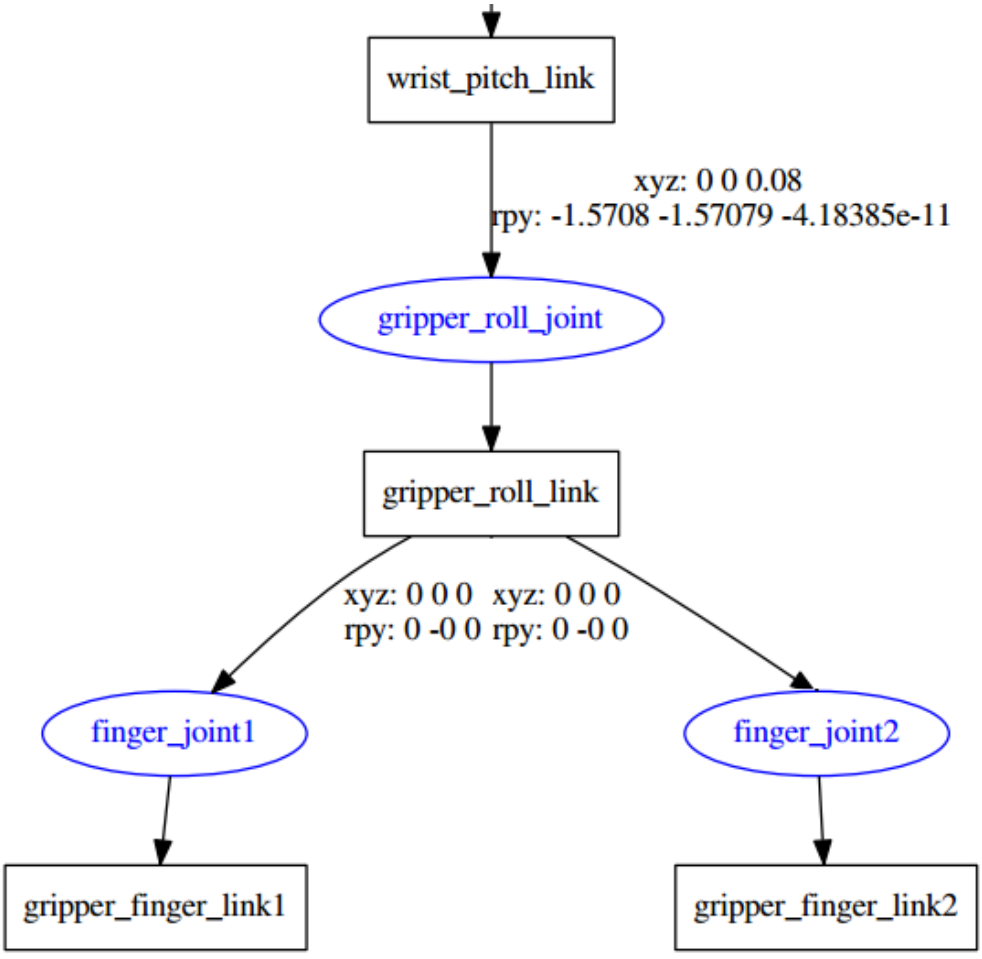

base_link
xyz: 0 0 0.1
rpy: 0 -0 0
pan_joint
pan_link
xyz: 0 0 0.2
rpy: 0 -0 0
tilt_joint
tilt_link

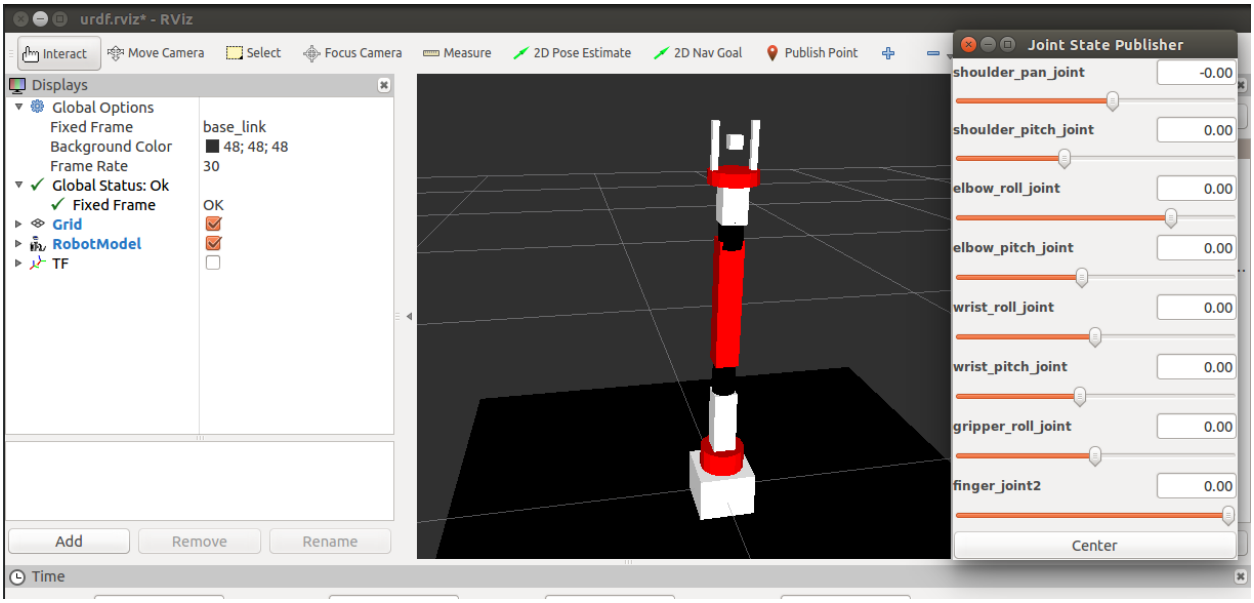

Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame
base_link
Background C...
48; 48; 48
Frame Rate
30
Global Status:...
Fixed Frame
OK
Grid
RobotModel
TF
Add
Remove
Rename
Time
Joint State Publisher
pan_joint
0.00
tilt_joint
-3.07
Center

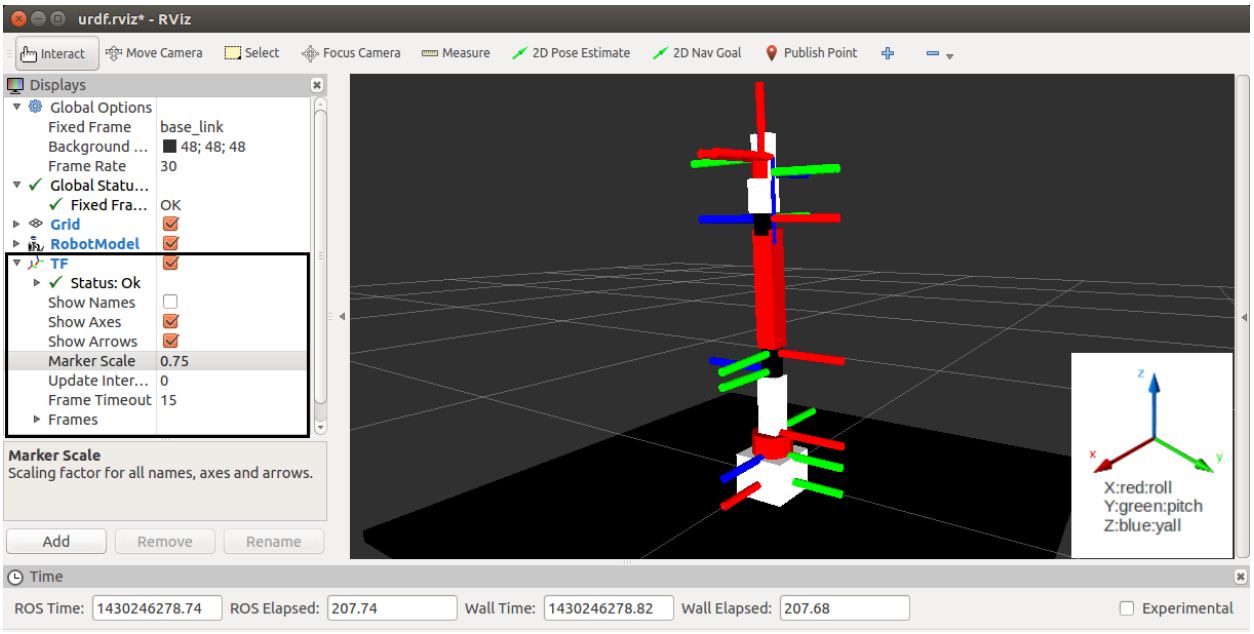

urdf.rviz* - RViz
Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Displays
Global Options
Fixed Frame
base_link
Background C...
0; 85; 127
Frame Rate
30
Global Status:...
Fixed Frame
OK
Grid
RobotModel
TF
Background Color
Background color for the 3D view.
Add
Remove
Rename
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

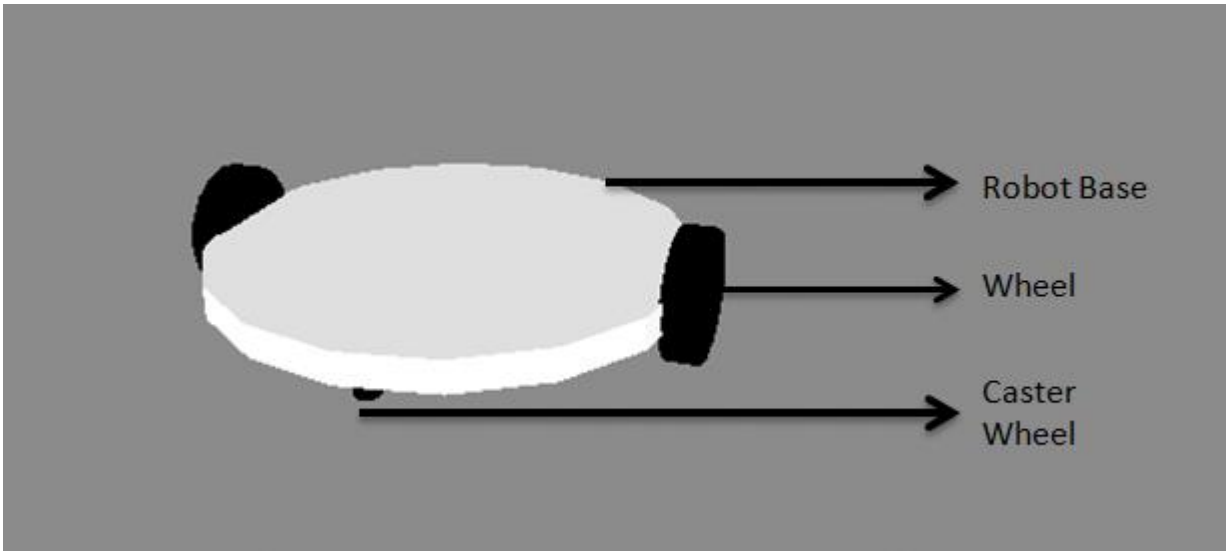

Joint State Publisher
pan_joint
0.00
tilt_joint
-3.07
Center

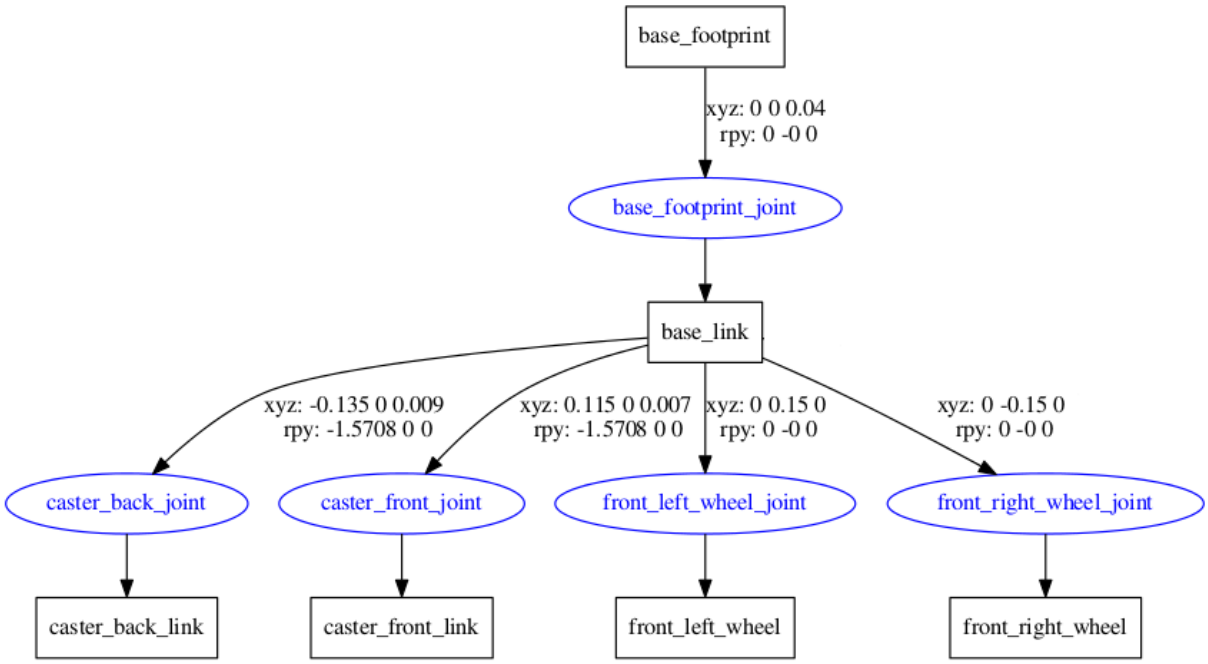

Gripper joints
Gripper roll joint
Wrist Pitch joint
Wrist roll joint
Elbow Pitch joint
Elbow roll joint
Shoulder Pitch joint
Shoulder Roll joint
Bottom joint
Gripper Links
Gripper roll Link
Wrist pitch Link
Wrist roll Link
Elbow pitch Link
Elbow roll Link
Shoulder pitch Link
Shoulder Roll link
Base Link
Bottom Link

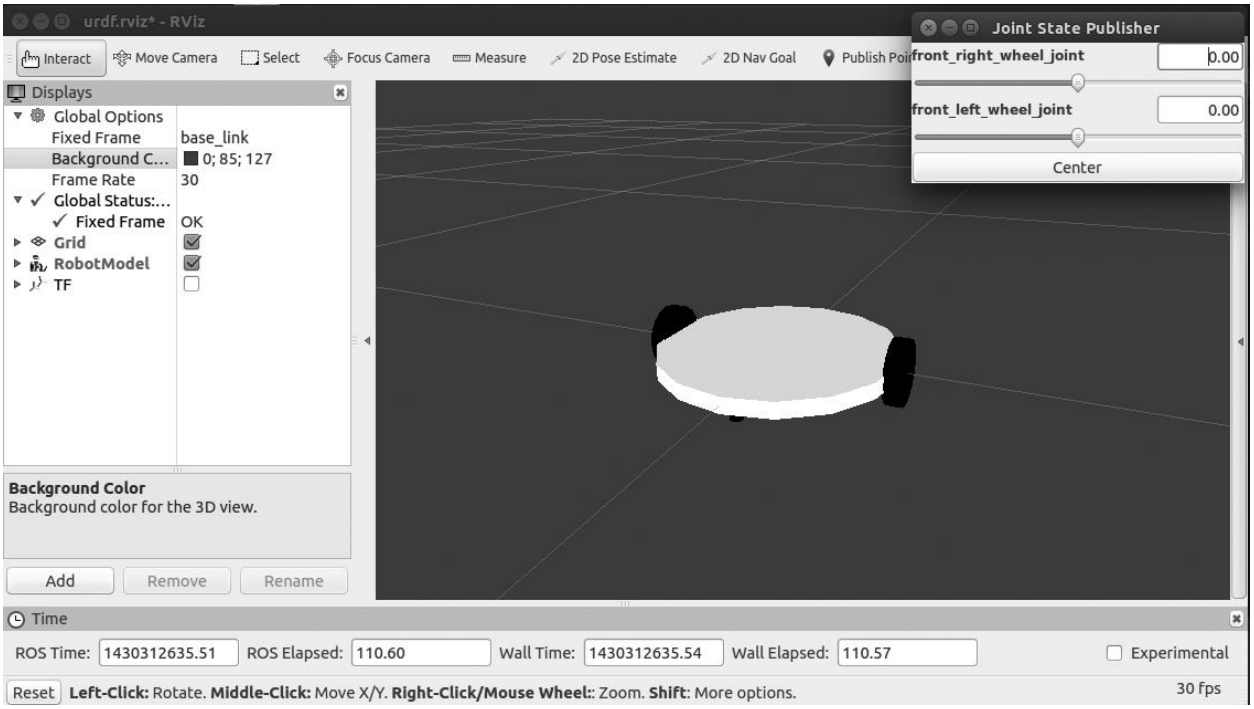

wrist_pitch_link
xyz: 0 0 0.08
rpy: -1.5708 -1.57079 -4.18385e-11
gripper_roll_joint
gripper_roll_link
xyz: 0 0 0
rpy: 0 -0 0
xyz: 0 0 0
rpy: 0 -0 0
finger_joint1
finger_joint2
gripper_finger_link1
gripper_finger_link2


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

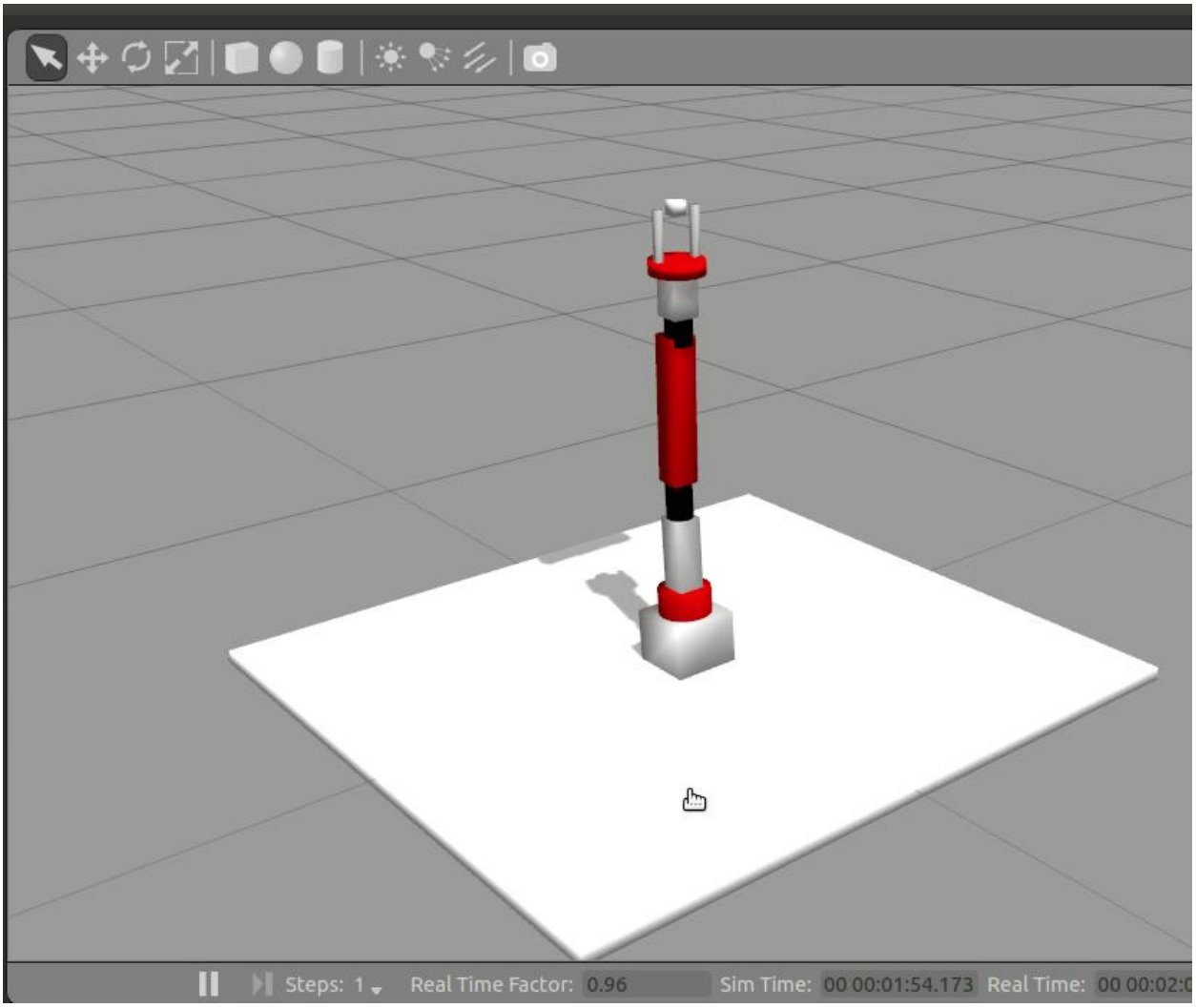

urdf.rviz* - RViz
Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame
base_link
Background ...
48; 48; 48
Frame Rate
30
Global Statu...
Fixed Fra...
OK
Grid
RobotModel
TF
Status: Ok
Show Names
Show Axes
Show Arrows
Marker Scale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

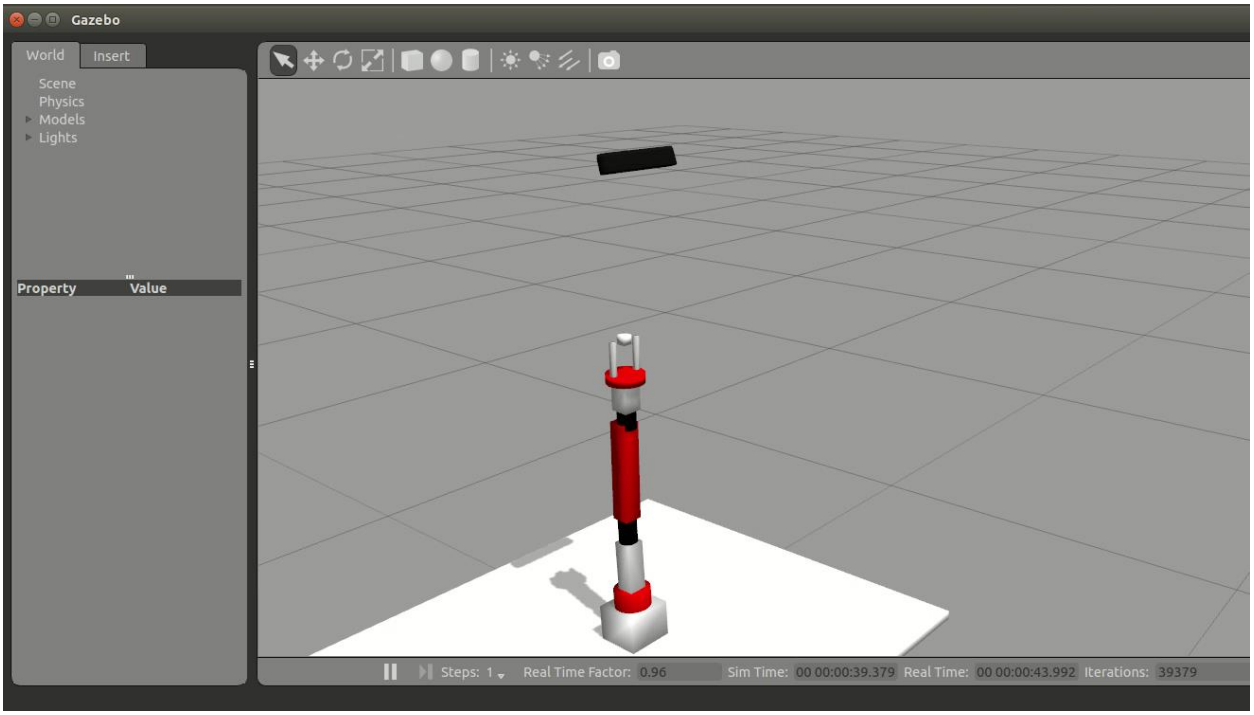

Robot Base
Wheel
Caster
Wheel


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

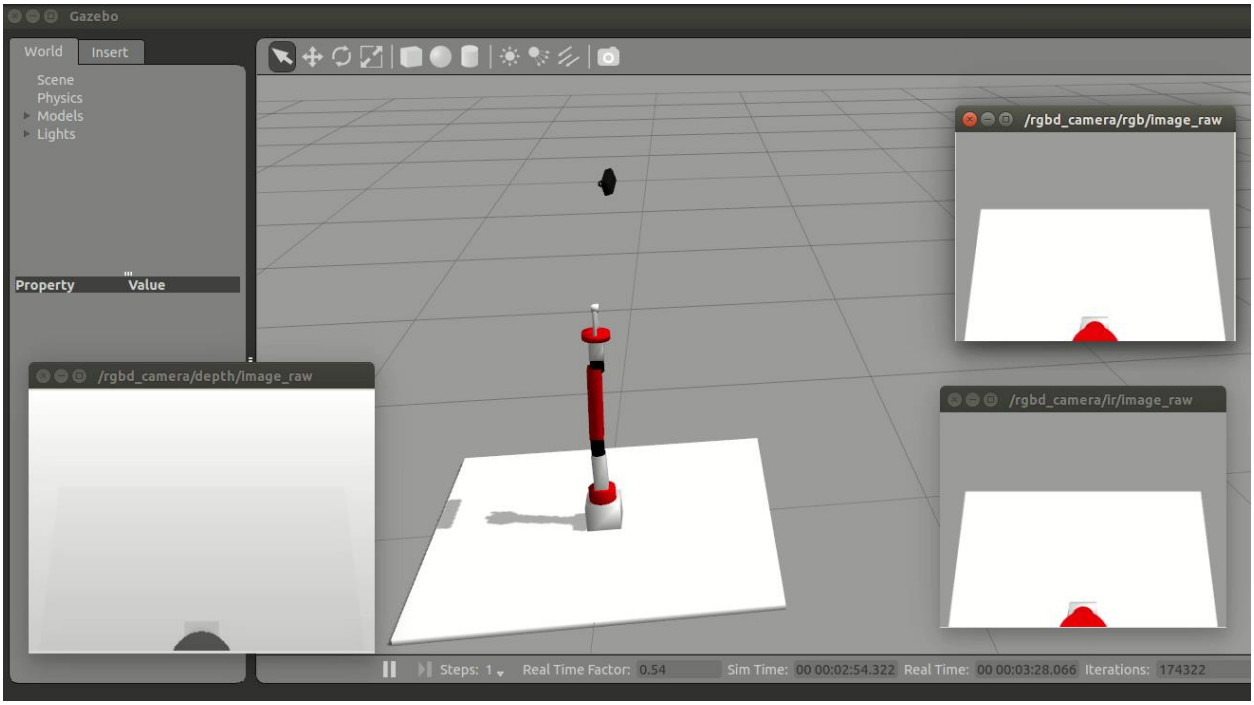

urdf.rviz* - RViz
Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Displays
Global Options
Fixed Frame
base_link
Background C...
0; 85; 127
Frame Rate
30
Global Status:...
Fixed Frame
OK
Grid
RobotModel
TF
Background Color
Background color for the 3D view.
Add
Remove
Rename
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

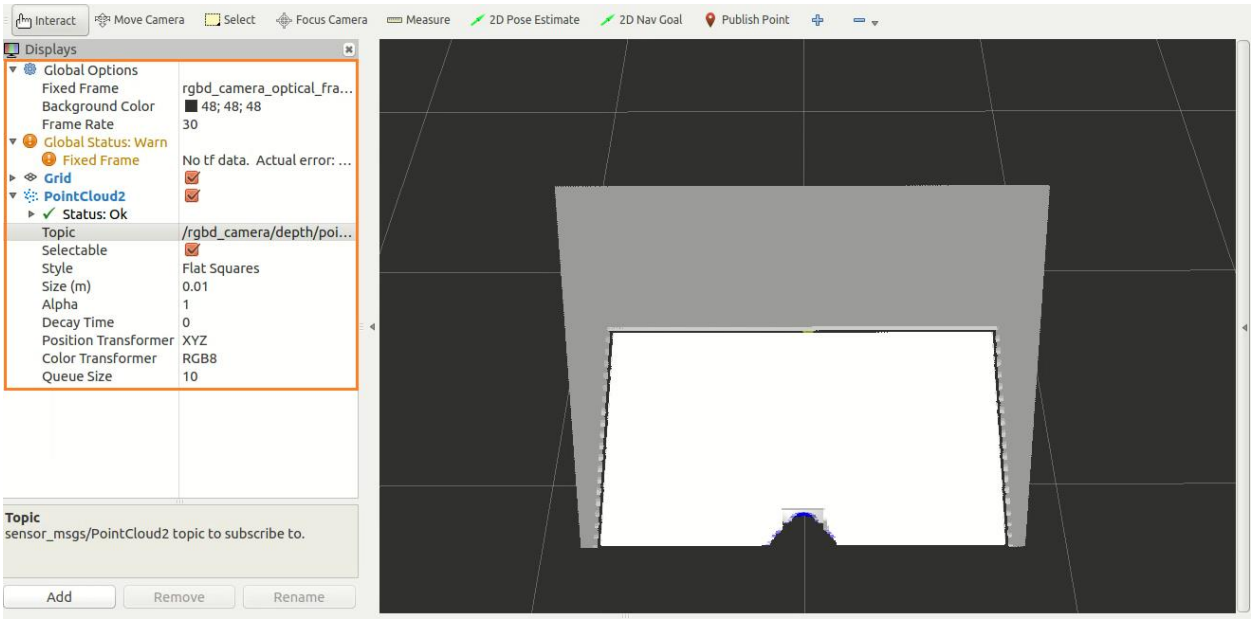
CHAPTER 3

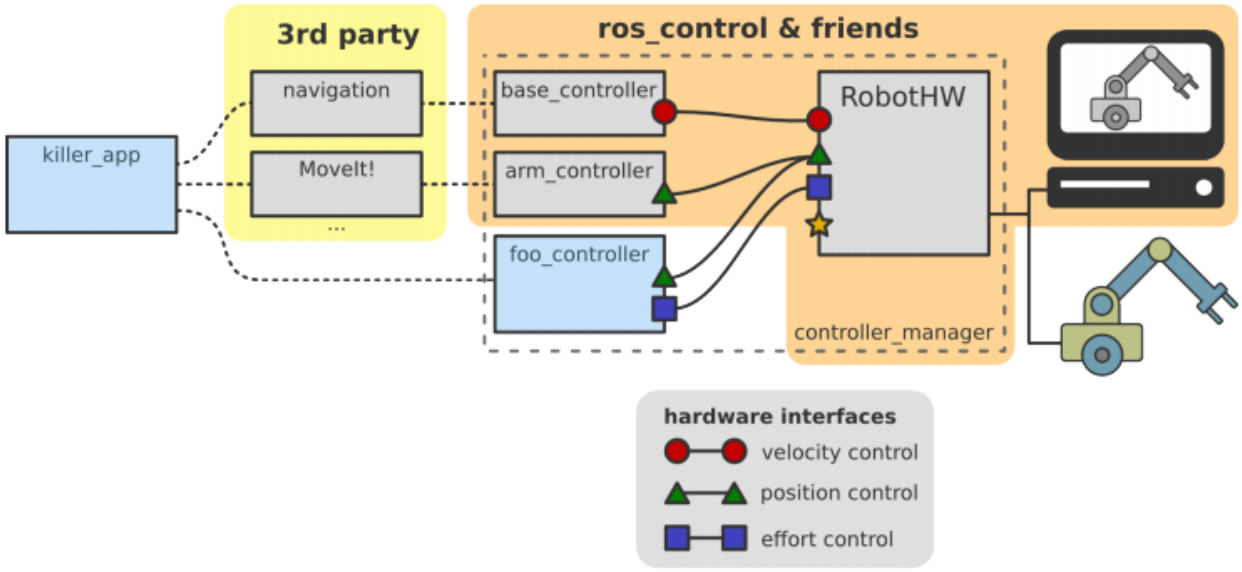

Steps: 1
Real Time Factor: 0.96
Sim Time: 00 00:01:54.173
Real Time: 00 00:02:0

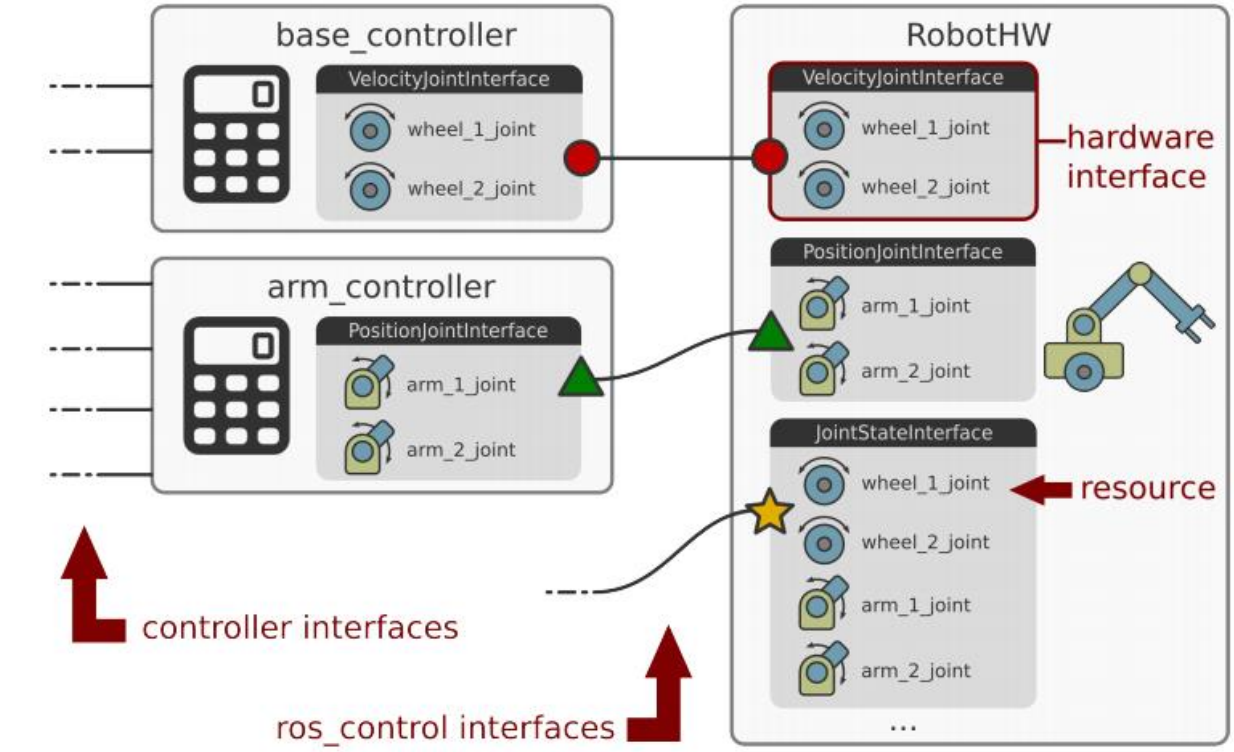



```
/rgbd_camera/depth/camera_info
/rgbd_camera/depth/image_raw
/rgbd_camera/depth/points
/rgbd_camera/ir/camera_info
/rgbd_camera/ir/image_raw
/rgbd_camera/ir/image_raw/compressed
/rgbd_camera/ir/image_raw/compressed/parameter_descriptions
/rgbd_camera/ir/image_raw/compressed/parameter_updates
/rgbd_camera/ir/image_raw/compressedDepth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


Gazebo
World
Insert
Scene
Physics
Models
Lights
Property
Value
/rgbd_camera/rgb/image_raw
/rgbd_camera/depth/image_raw
/rgbd_camera/ir/image_raw
Steps: 1
Real Time Factor: 0.54
Sim Time: 00 00:02:54.322
Real Time: 00 00:03:28.066
Iterations: 174322

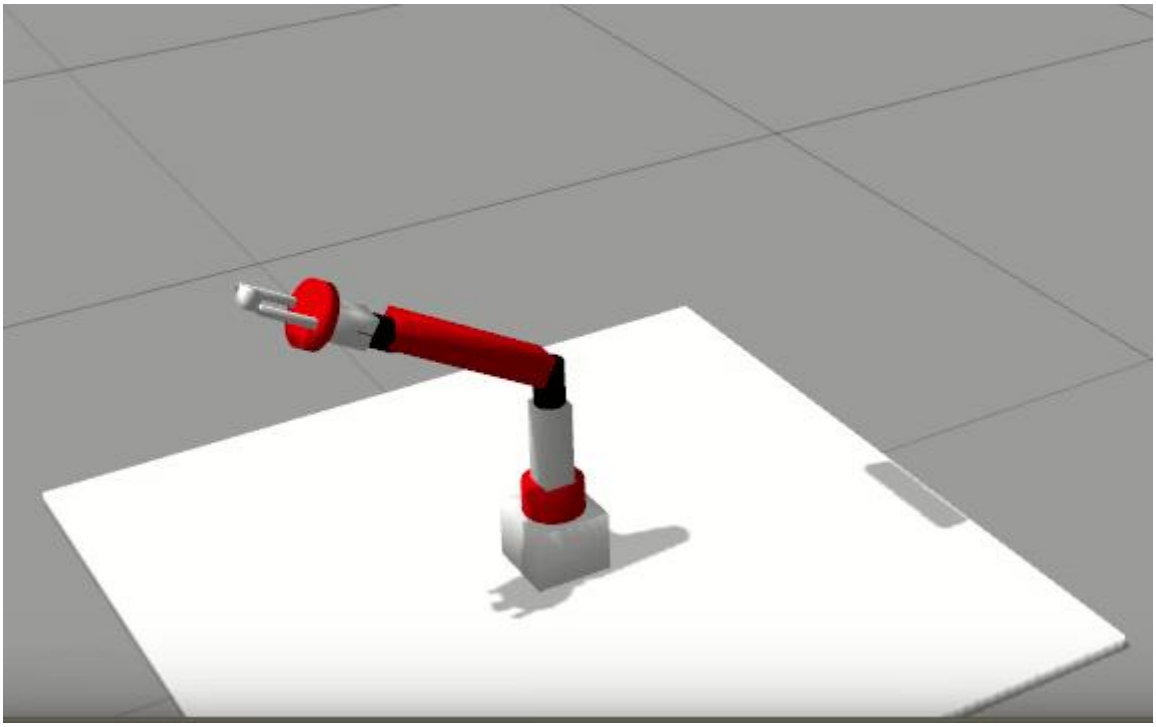

Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame
rgbd_camera_optical_fra...
Background Color
48; 48; 48
Frame Rate
30
Global Status: Warn
Fixed Frame
No tf data. Actual error: ...
Grid
PointCloud2
Status: Ok
Topic
/rgbd_camera/depth/poi...
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

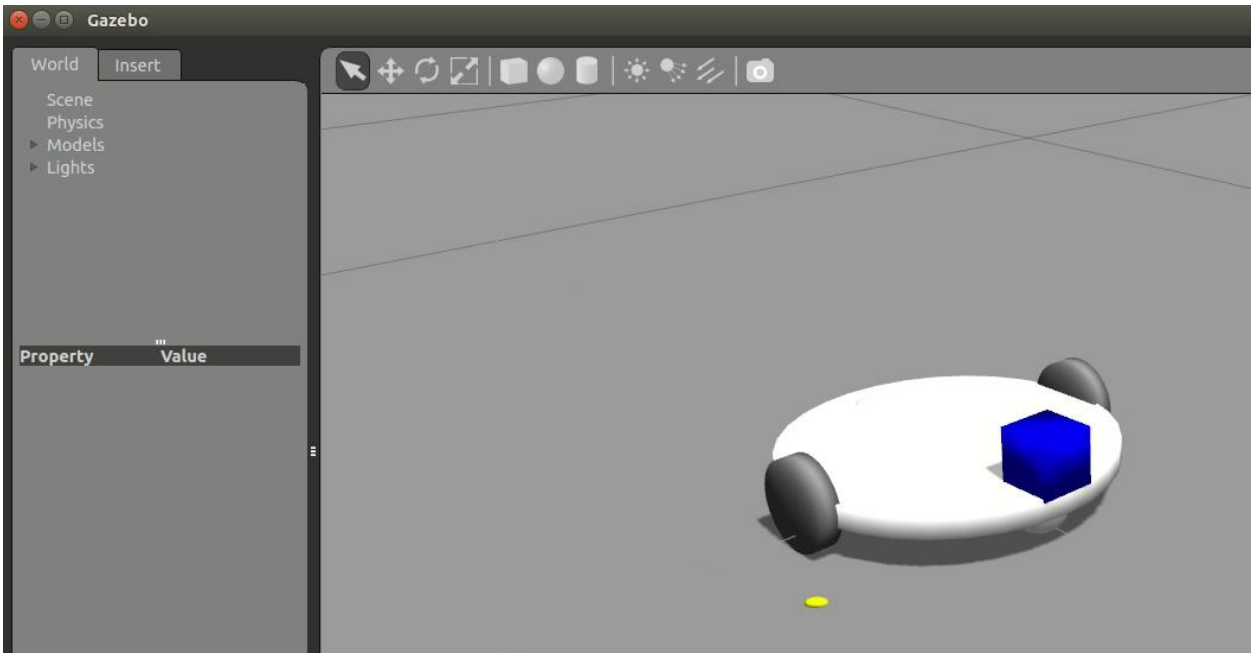

3rd party
navigation
MoveIt!
...
killer_app
ros_control & friends
base_controller
arm_controller
foo_controller
RobotHW
controller_manager
hardware interfaces
velocity control
position control
effort control

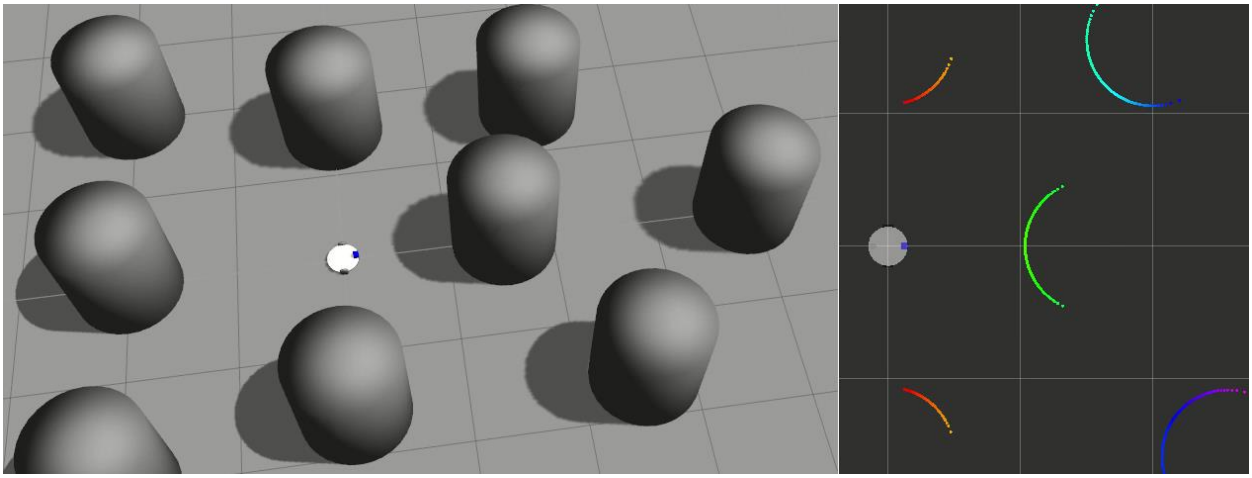

base_controller
VelocityJointInterface
wheel_1_joint
wheel_2_joint
arm_controller
PositionJointInterface
arm_1_joint
arm_2_joint
controller interfaces
ros_control interfaces
RobotHW
VelocityJointInterface
wheel_1_joint
wheel_2_joint
hardware interface
PositionJointInterface
arm_1_joint
arm_2_joint
JointStateInterface
wheel_1_joint
wheel_2_joint
arm_1_joint
arm_2_joint
resource
...

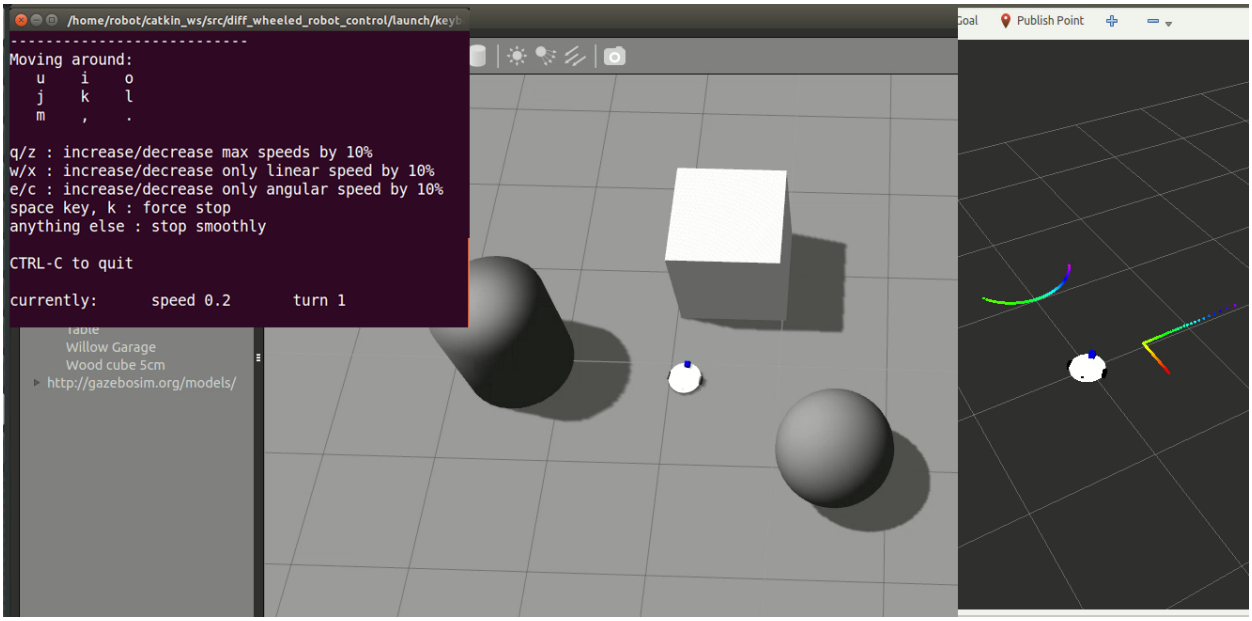
```
[INFO] [WallTime: 1445626906.221147] [0.223000] Loading controller: joint_state_
controller
[INFO] [WallTime: 1445626906.447525] [0.378000] Loading controller: joint1_posit
ion_controller
[INFO] [WallTime: 1445626906.886213] [0.762000] Loading controller: joint2_posit
ion_controller
[INFO] [WallTime: 1445626906.921447] [0.778000] Loading controller: joint3_posit
ion_controller
[INFO] [WallTime: 1445626906.956767] [0.804000] Loading controller: joint4_posit
ion_controller
[INFO] [WallTime: 1445626907.001207] [0.840000] Loading controller: joint5_posit
ion_controller
[INFO] [WallTime: 1445626907.029617] [0.869000] Loading controller: joint6_posit
ion_controller
[INFO] [WallTime: 1445626907.062851] [0.899000] Loading controller: joint7_posit
ion_controller
[INFO] [WallTime: 1445626907.089303] [0.925000] Controller Spawner: Loaded contr
ollers: joint_state_controller, joint1_position_controller, joint2_position_cont
roller, joint3_position_controller, joint4_position_controller, joint5_position_
controller, joint6_position_controller, joint7_position_controller
[INFO] [WallTime: 1445626907.095819] [0.932000] Started controllers: joint_state
_controller, joint1_position_controller, joint2_position_controller, joint3_posi
```

```
/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
/seven_dof_arm/joint_states
/tf
```

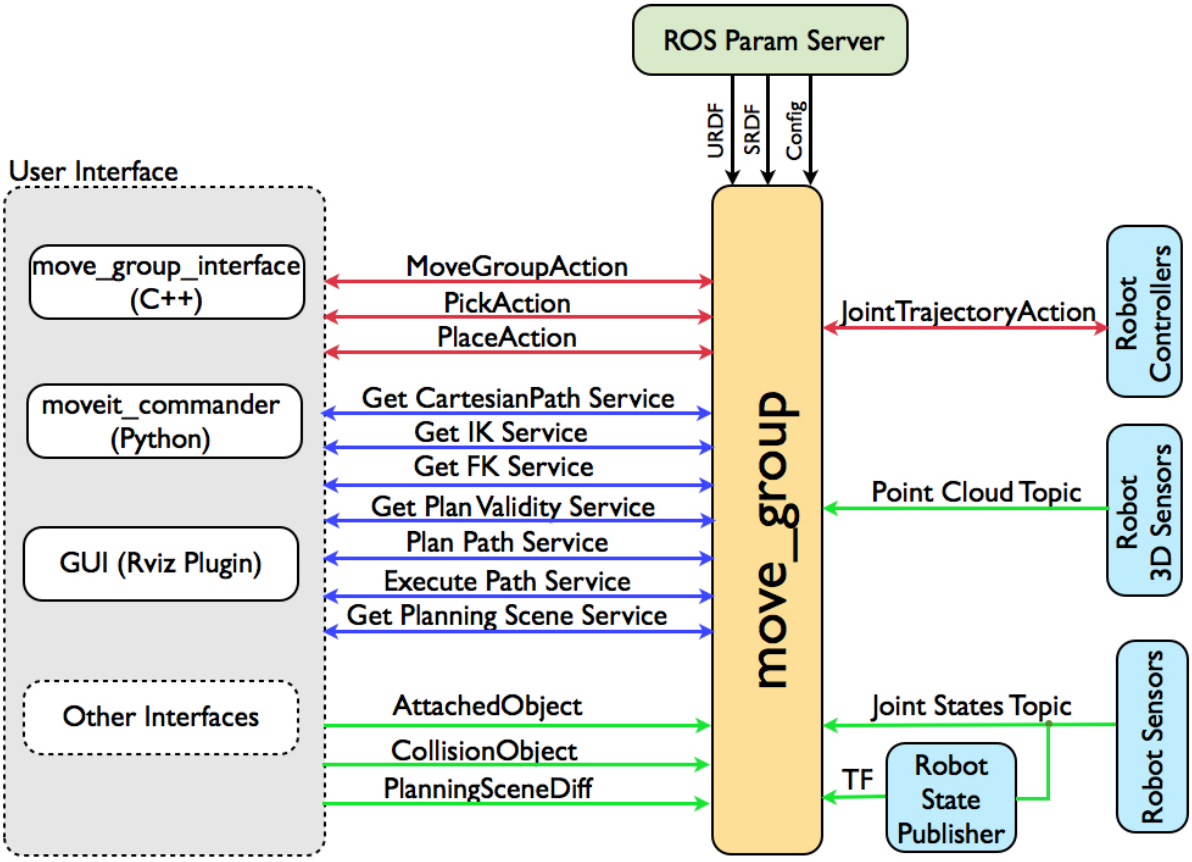


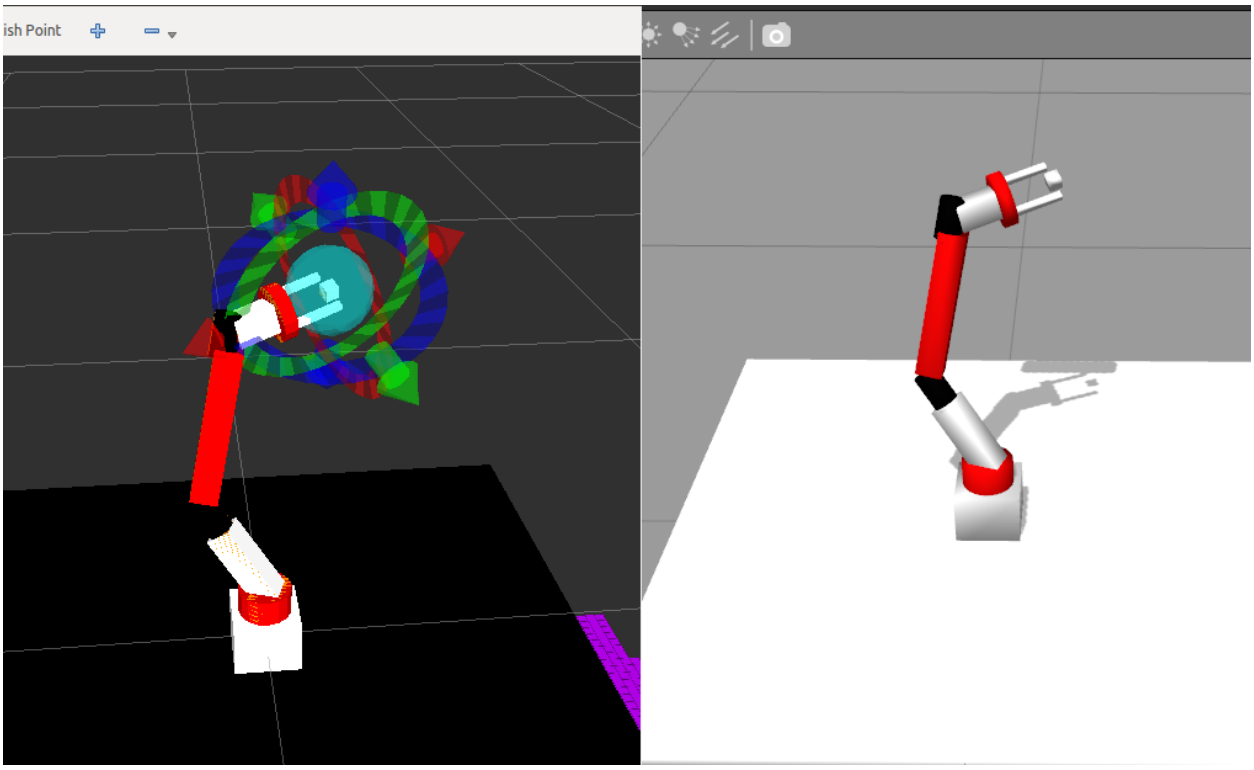

Gazebo
World
Insert
Scene
Physics
Models
Lights
Property
Value

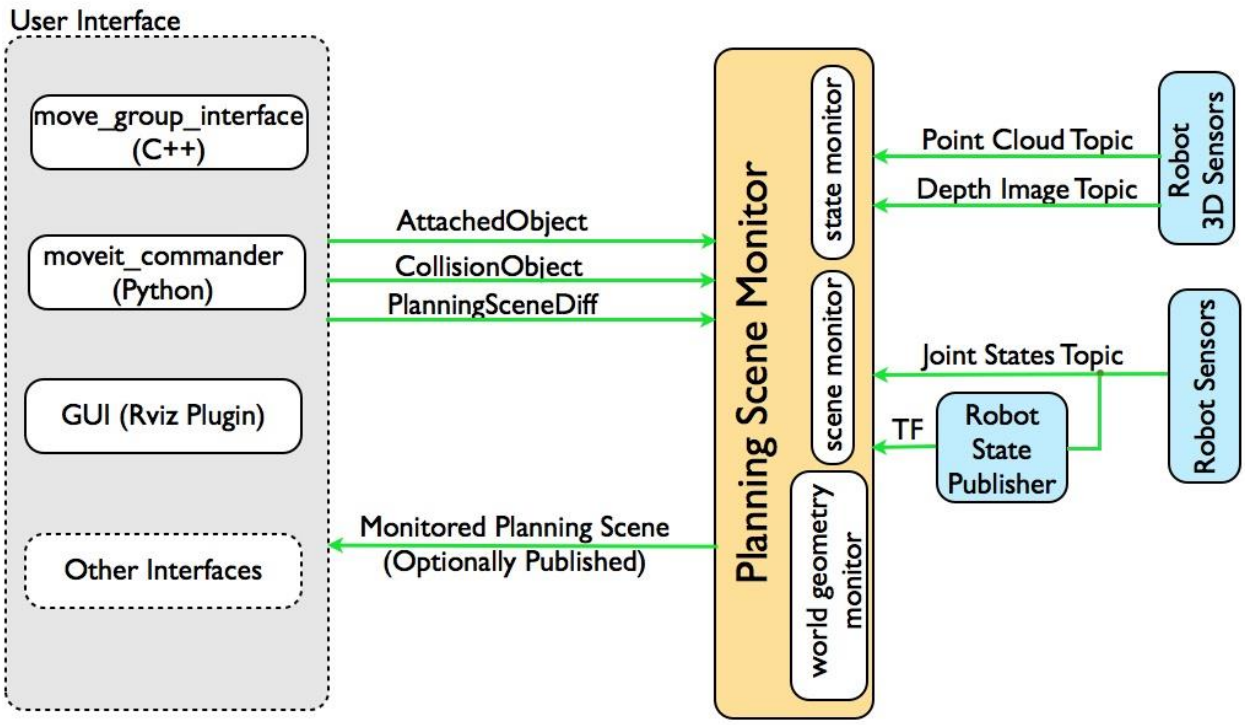


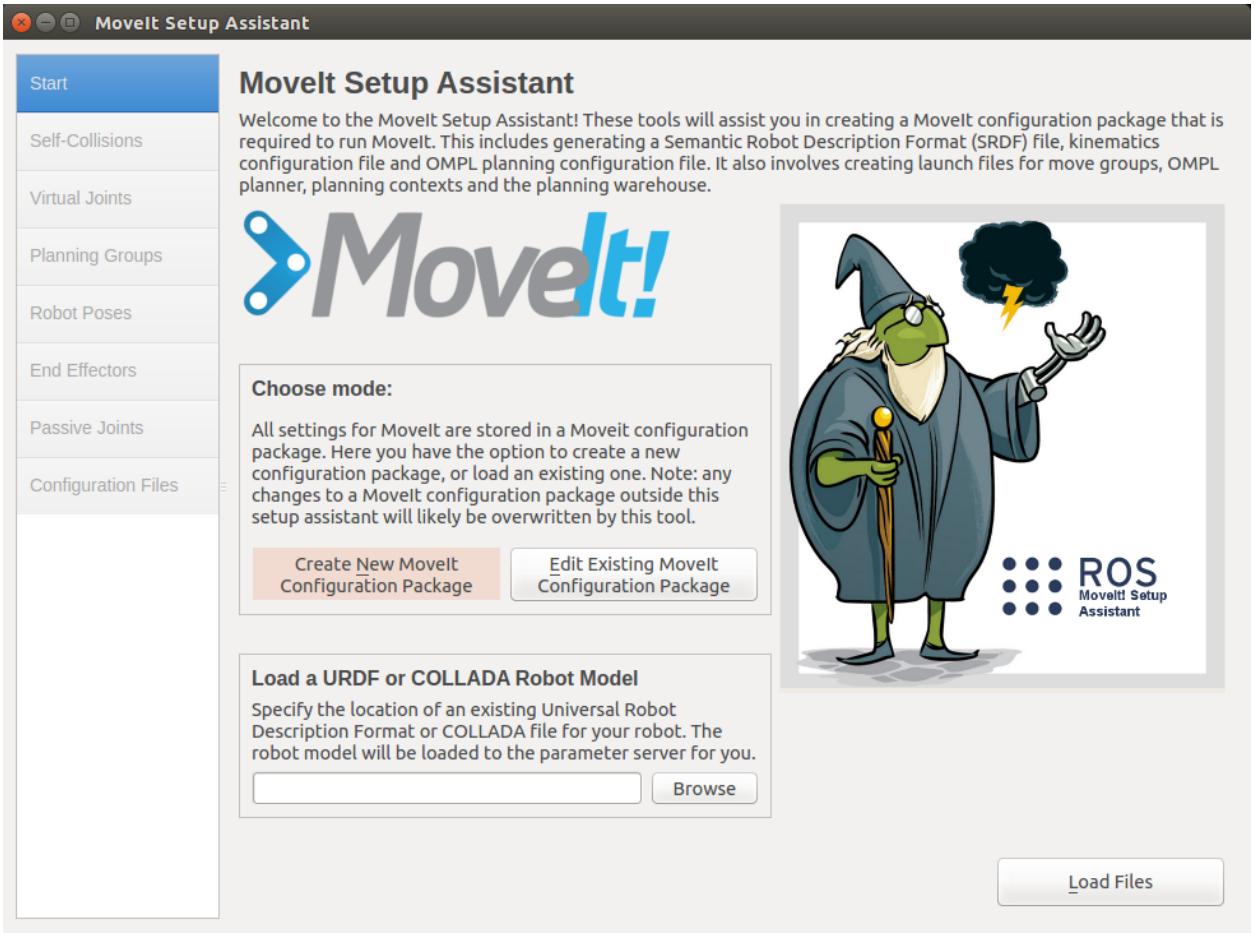

/home/robot/catkin_ws/src/diff_wheeled_robot_control/launch/keyb
Moving around:
u i o
j k l
m , .
q/z : increase/decrease max speeds by 10%
w/x : increase/decrease only linear speed by 10%
e/c : increase/decrease only angular speed by 10%
space key, k : force stop
anything else : stop smoothly
CTRL-C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

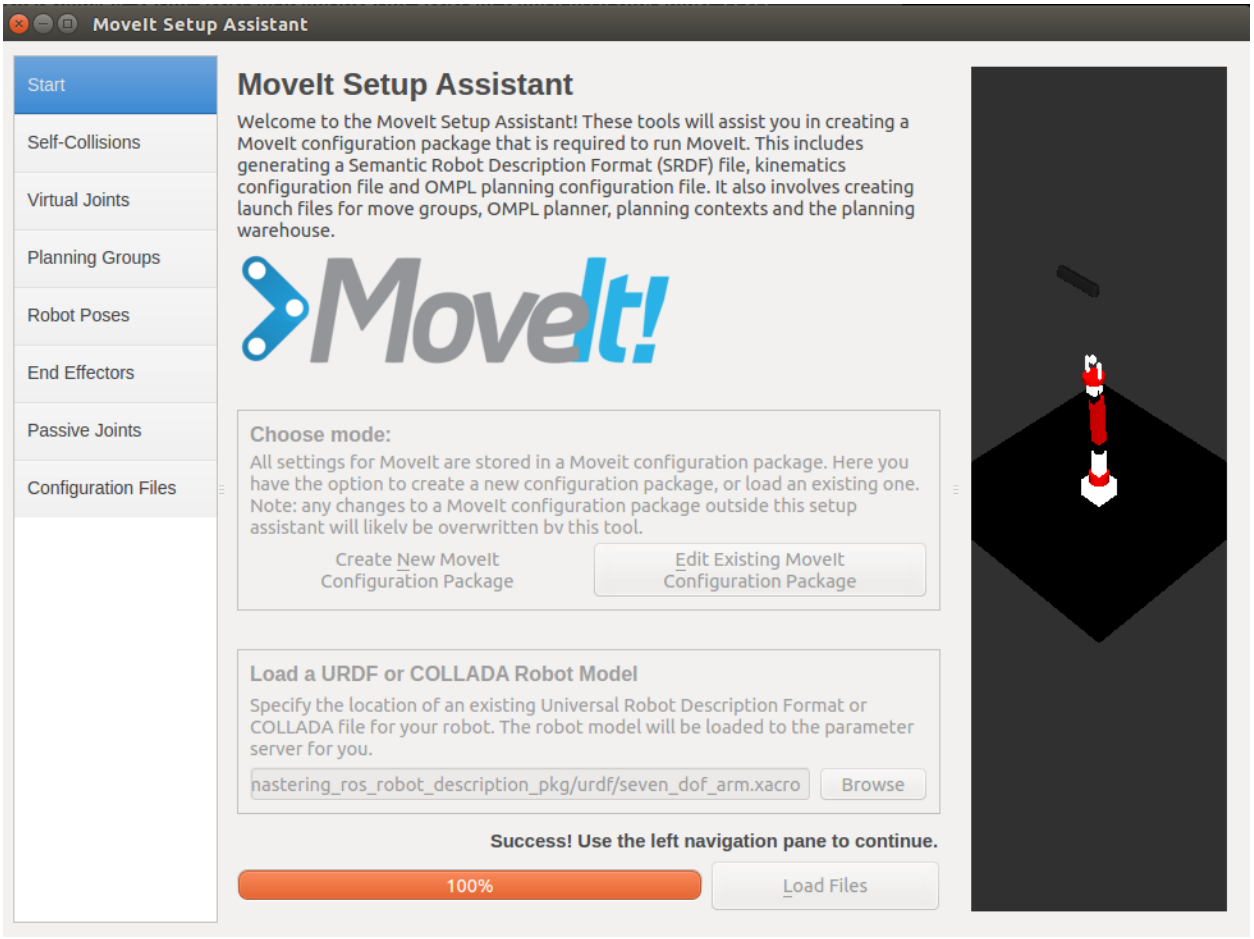
CHAPTER 4


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




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


MoveIt Setup Assistant
Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
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
ROS
MoveIt! Setup Assistant
Load a URDF or COLLADA Robot Model
Specify the location of an existing Universal Robot Description Format or COLLADA file for your robot. The robot model will be loaded to the parameter server for you.
Browse
Load Files


MoveIt Setup Assistant
Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
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
Load a URDF or COLLADA Robot Model
Specify the location of an existing Universal Robot Description Format or COLLADA file for your robot. The robot model will be loaded to the parameter server for you.
nastering_ros_robot_description_pkg/urdf/seven_dof_arm.xacro
Browse
Success! Use the left navigation pane to continue.
100%
Load Files

MoveIt Setup Assistant

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

Optimize Self-Collision Checking

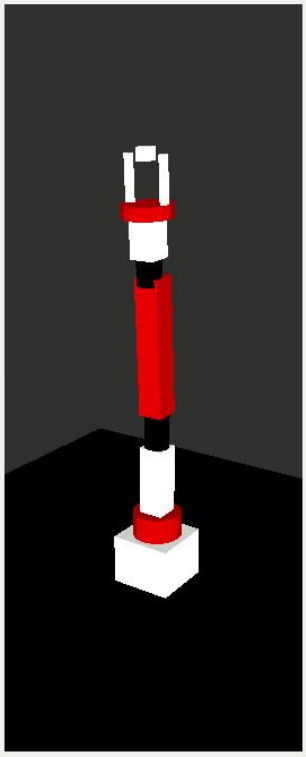
The Default Self-Collision Matrix Generator will search for pairs of links on the robot that can safely be disabled from collision checking, decreasing motion planning processing time. These pairs of links are disabled when they are always in collision, never in collision, in collision in the robot's 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

Regenerate Default Collision Matrix

	Link A	Link B	Disabled	Reason To Disable
1	base_link	bottom_link	☑	Adjacent Links
2	base_link	elbow_roll_link	☑	Never in Collision
3	base_link	grasping_frame	☑	Never in Collision
4	base_link	gripper_finger_link1	☑	Never in Collision
5	base_link	gripper_finger_link2	☑	Never in Collision
6	base_link	gripper_roll_link	☑	Never in Collision
7	base_link	shoulder_pan_link	☑	Adjacent Links
8	base_link	wrist_pitch_link	☑	Never in Collision
9	base_link	wrist_roll_link	☑	Never in Collision
10	bottom_link	elbow_roll_link	☑	Never in Collision

☐ Show Non-Disabled Link Pairs Min. collisions for "always"-colliding pairs: 95%



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

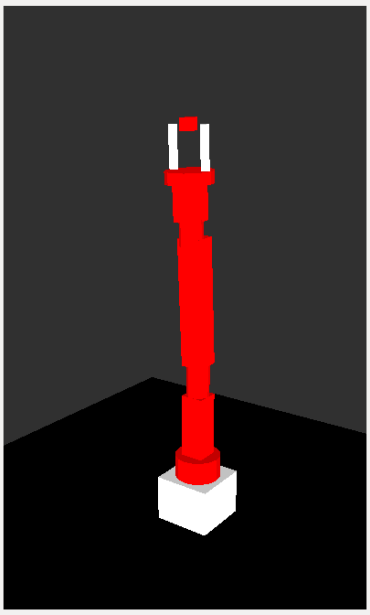
Planning Groups

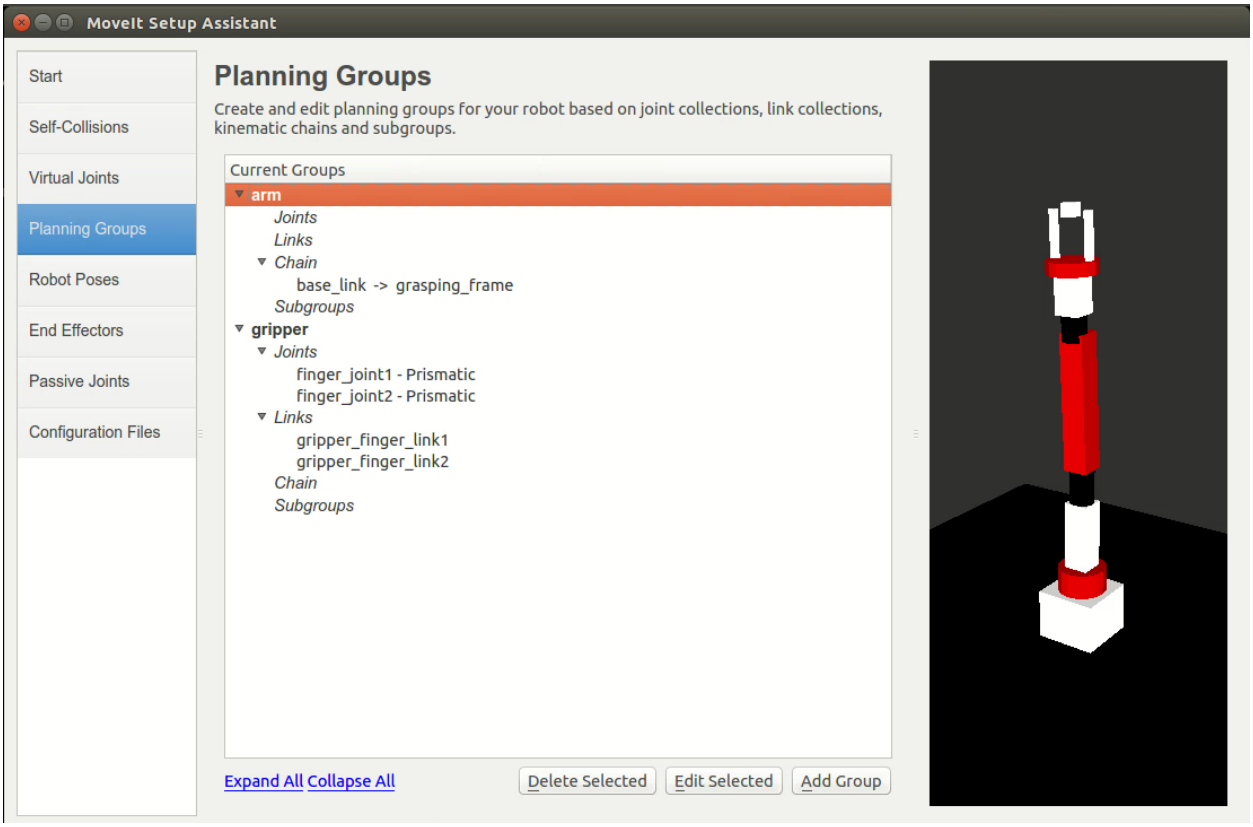
Create and edit planning groups for your robot based on joint collections, link collections, kinematic chains and subgroups.

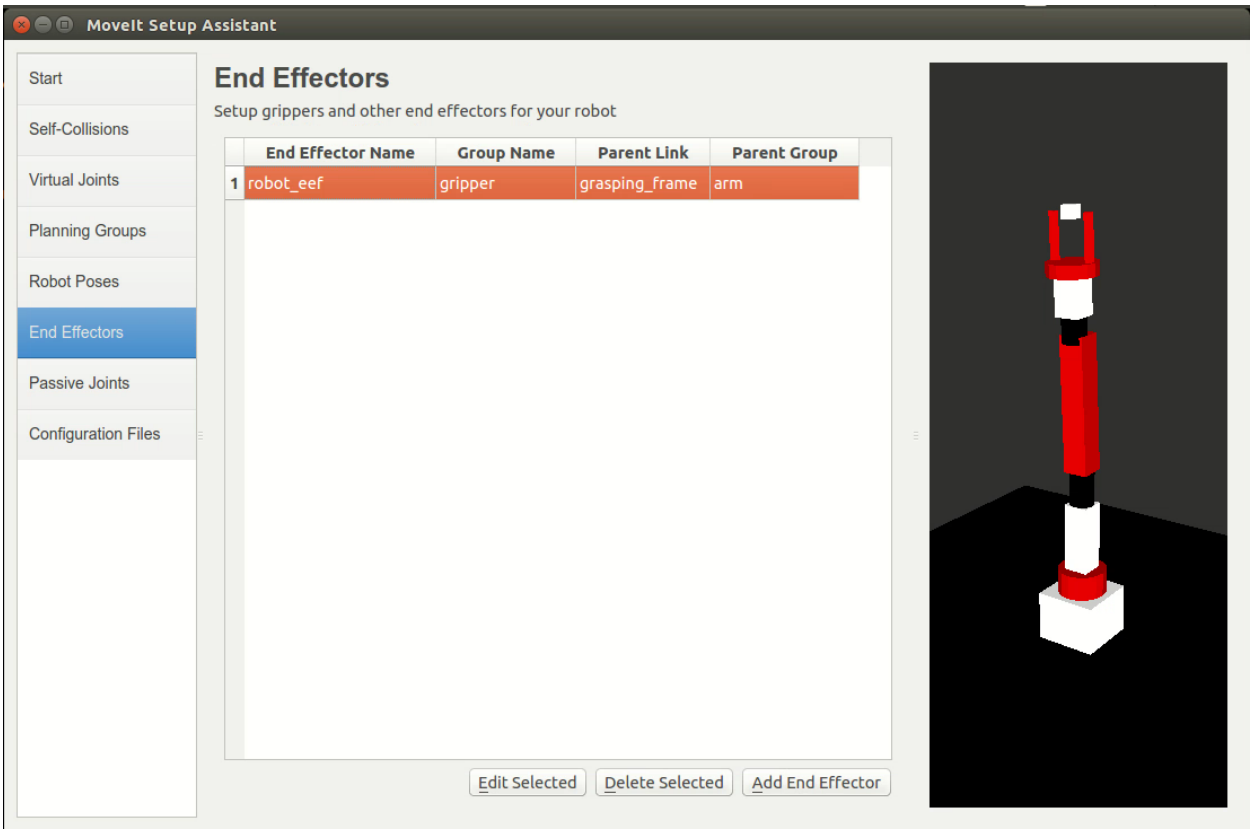
Edit Planning Group 'arm'

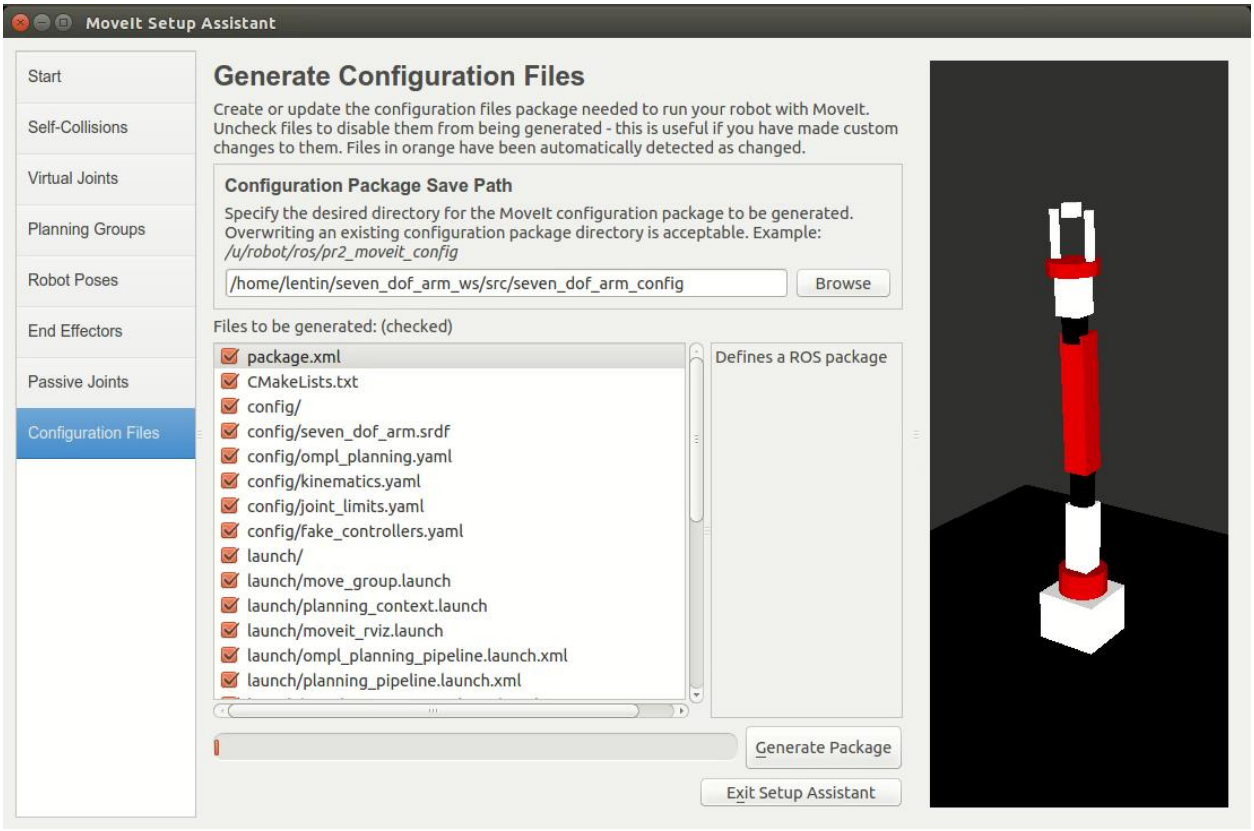
Group Name:	arm
Kinematic Solver:	kdl_kinematics_plugin/KDLKinematicsPlugin
Kin. Search Resolution:	0.005
Kin. Search Timeout (sec):	0.05
Kin. Solver Attempts:	3

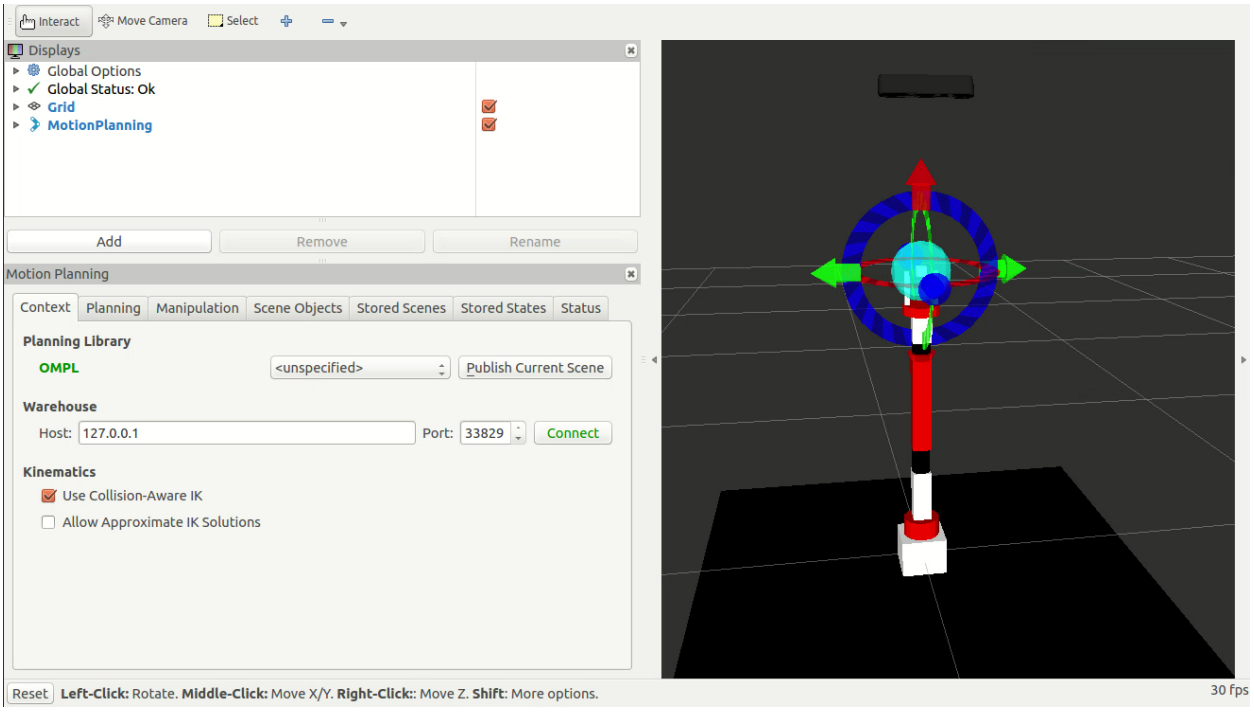
Delete Group Save Cancel

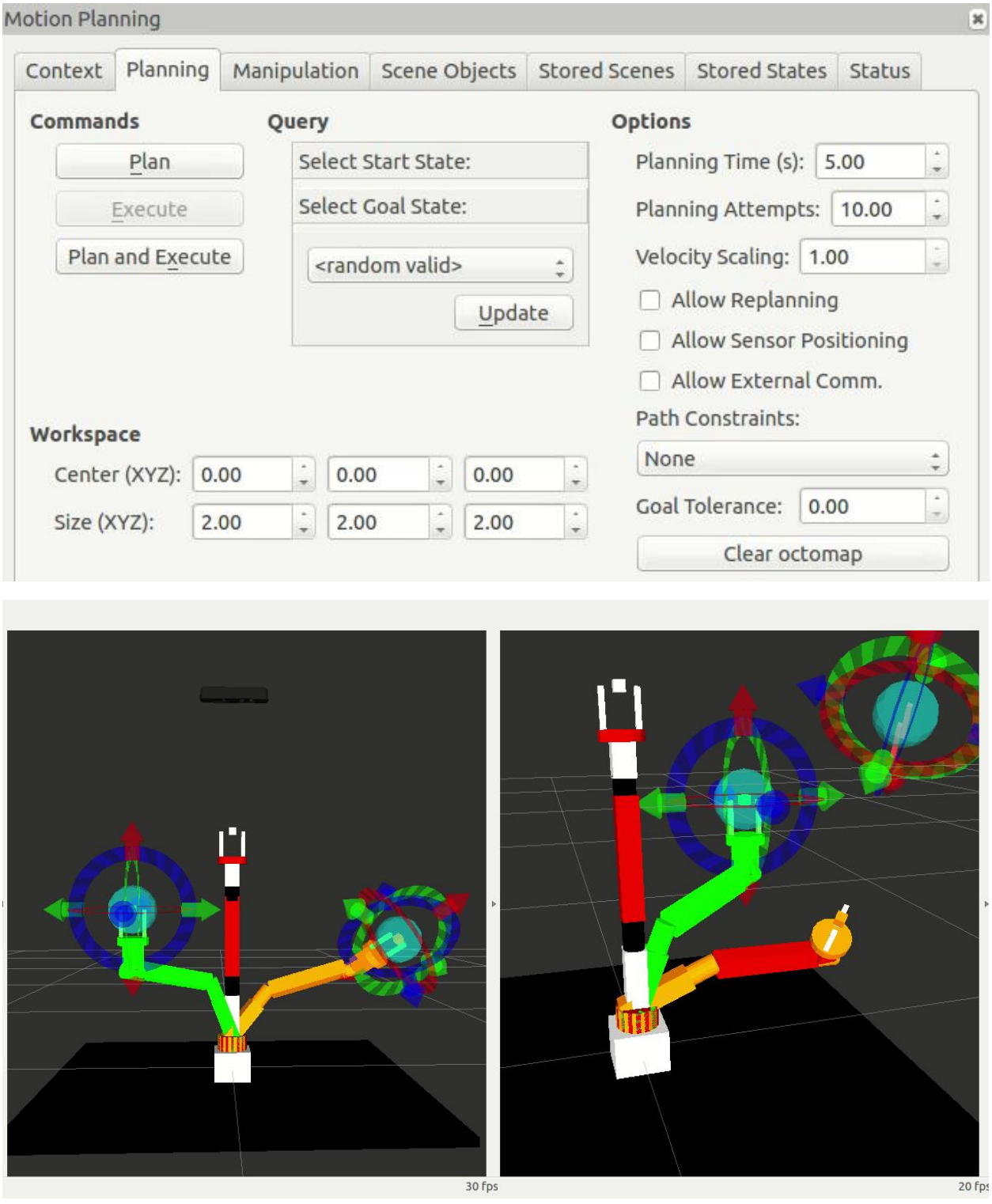


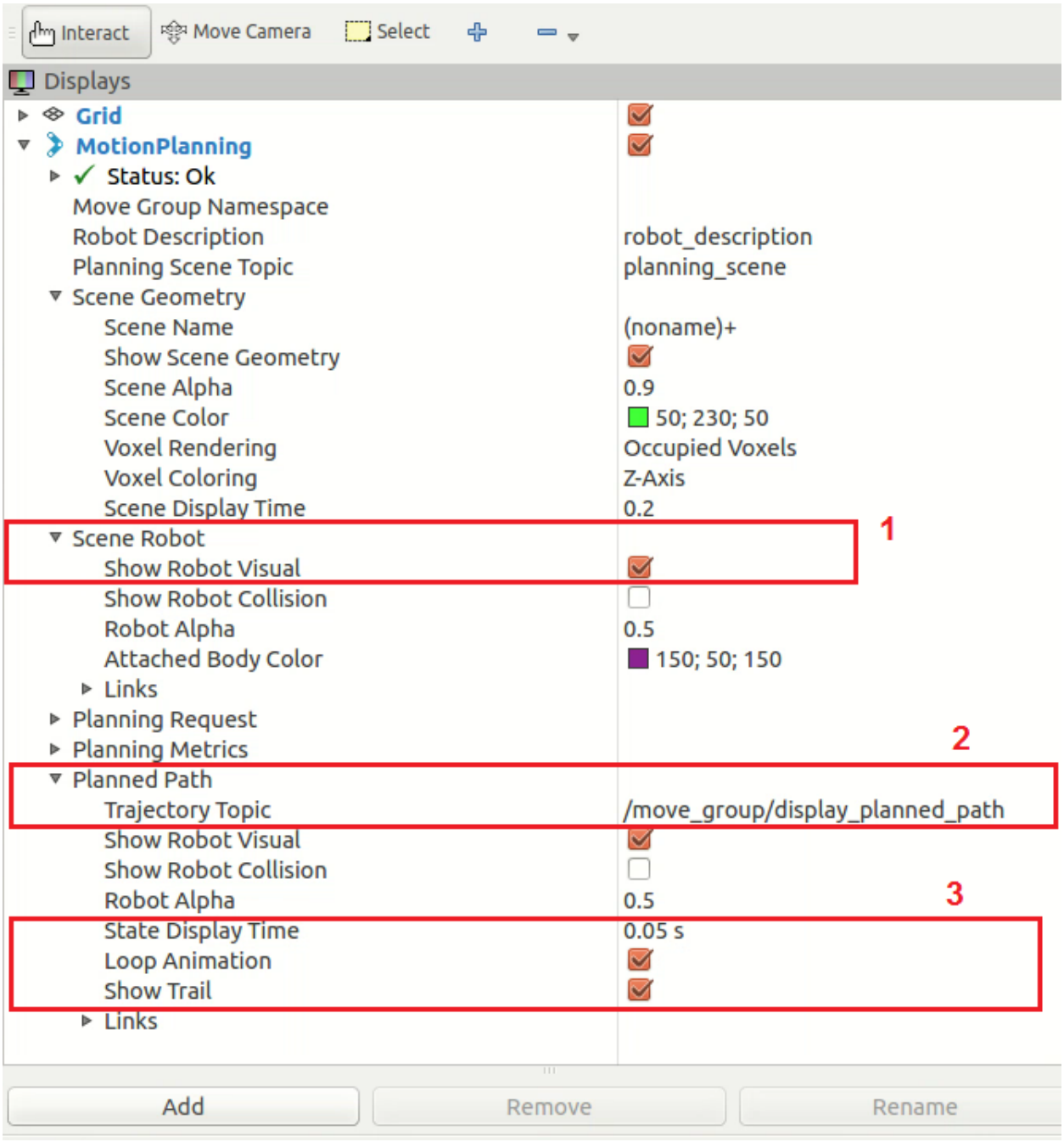

MoveIt Setup Assistant
Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
Configuration Files
Planning Groups
Create and edit planning groups for your robot based on joint collections, link collections, kinematic chains and subgroups.
Current Groups
arm
Joints
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


MoveIt Setup Assistant
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
Group Name
Parent Link
Parent Group
1
robot_eef
gripper
grasping_frame
arm
Edit Selected
Delete Selected
Add End Effector

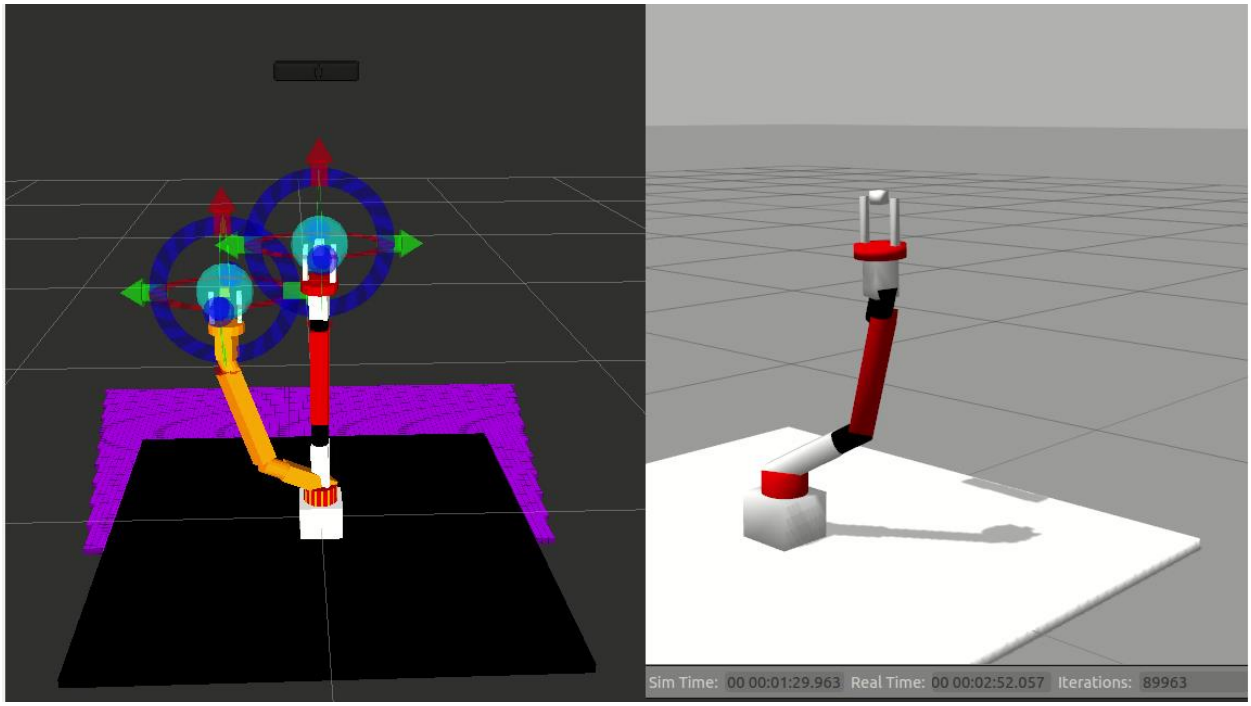

MoveIt Setup Assistant
Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
Configuration Files
Generate Configuration Files
Create or update the configuration files package needed to run your robot with MoveIt.
Uncheck files to disable them from being generated - 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
/home/lentin/seven_dof_arm_ws/src/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
launch/planning_pipeline.launch.xml
Defines a ROS package
Generate Package
Exit Setup Assistant


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
Planning Library
OMPL
<unspecified>
Publish Current Scene
Warehouse
Host: 127.0.0.1
Port: 33829
Connect
Kinematics
Use Collision-Aware IK
Allow Approximate IK Solutions
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click:: Move Z. Shift: More options.
30 fps


Motion Planning
Context
Planning
Manipulation
Scene Objects
Stored Scenes
Stored States
Status
Commands
Plan
Execute
Plan and Execute
Query
Select Start State:
Select Goal State:
<random valid>
Update
Options
Planning Time (s): 5.00
Planning Attempts: 10.00
Velocity 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
Show Robot Visual
Show Robot Collision
Robot Alpha
0.5
Attached Body Color
150; 50; 150
Links
Planning Request
Planning Metrics
Planned Path
Trajectory Topic
/move_group/display_planned_path
Show Robot Visual
Show Robot Collision
Robot Alpha
0.5
State Display Time
0.05 s
Loop Animation
Show Trail
Links
Add
Remove
Rename
1
2
3

▼ 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



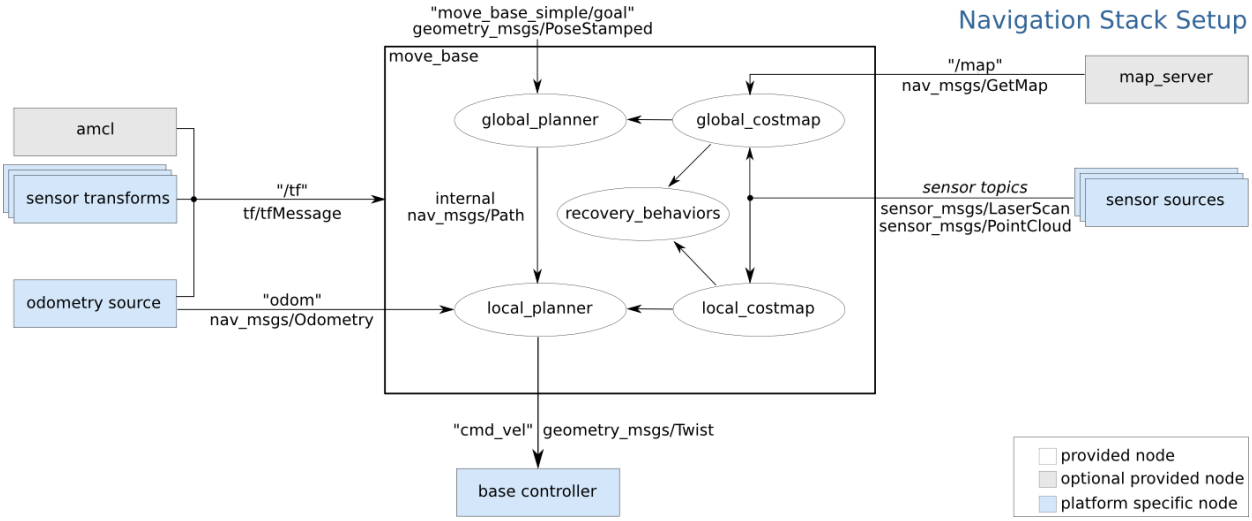
```
/seven_dof_arm/gripper_controller/command
/seven_dof_arm/gripper_controller/follow_joint_trajectory/cancel
/seven_dof_arm/gripper_controller/follow_joint_trajectory/feedback
/seven_dof_arm/gripper_controller/follow_joint_trajectory/goal
/seven_dof_arm/gripper_controller/follow_joint_trajectory/result
/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
```

```
[ INFO] [1436443220.700537882, 16.009000000]: Using planning request adapter 'Fi
x Start State Bounds'
[ INFO] [1436443220.704012811, 16.009000000]: Using planning request adapter 'Fi
x Start State In Collision'
[ INFO] [1436443220.705014564, 16.009000000]: Using planning request adapter 'Fi
x Start State Path Constraints'
[ INFO] [1436443221.637662714, 16.250000000]: MoveitSimpleControllerManager: Add
ed FollowJointTrajectory controller for seven_dof_arm/seven_dof_arm_joint_contro
ller
[ INFO] [1436443221.637879744, 16.250000000]: Returned 1 controllers in list
[ INFO] [1436443221.735805220, 16.265000000]: Trajectory execution is managing c
ontrollers
Loading 'move_group/MoveGroupCartesianPathService'...
Loading 'move_group/MoveGroupExecuteService'...
Loading 'move_group/MoveGroupKinematicsService'...
Loading 'move_group/MoveGroupMoveAction'...
Loading 'move_group/MoveGroupPickPlaceAction'...
Loading 'move_group/MoveGroupPlanService'...
Loading 'move_group/MoveGroupQueryPlannersService'...
Loading 'move_group/MoveGroupStateValidationService'...
Loading 'move_group/MoveGroupGetPlanningSceneService'...
Loading 'move_group/ClearOctomapService'...
[ INFO] [1436443223.371378749, 16.710000000]:
```

1

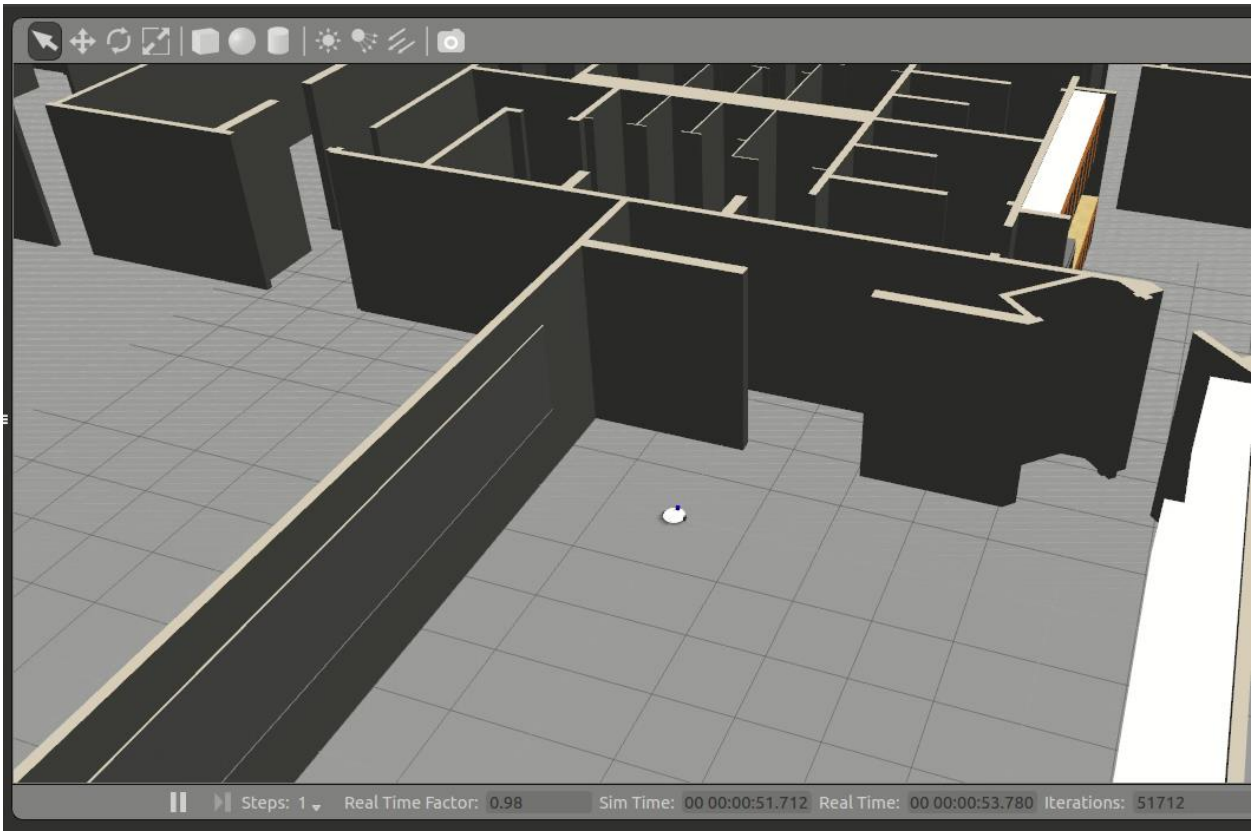
```
[ INFO] [1445951681.529080293, 32.872000000]: LBKPIECE1: Created 148 (28 start +
 120 goal) states in 132 cells (27 start (27 on boundary) + 105 goal (105 on bou
ndary))
[ INFO] [1445951681.686798180, 32.934000000]: LBKPIECE1: Created 173 (77 start +
 96 goal) states in 156 cells (75 start (75 on boundary) + 81 goal (81 on bounda
ry))
[ INFO] [1445951683.584298242, 34.156000000]: ParallelPlan::solve(): Solution fo
und by one or more threads in 2.387348 seconds
```

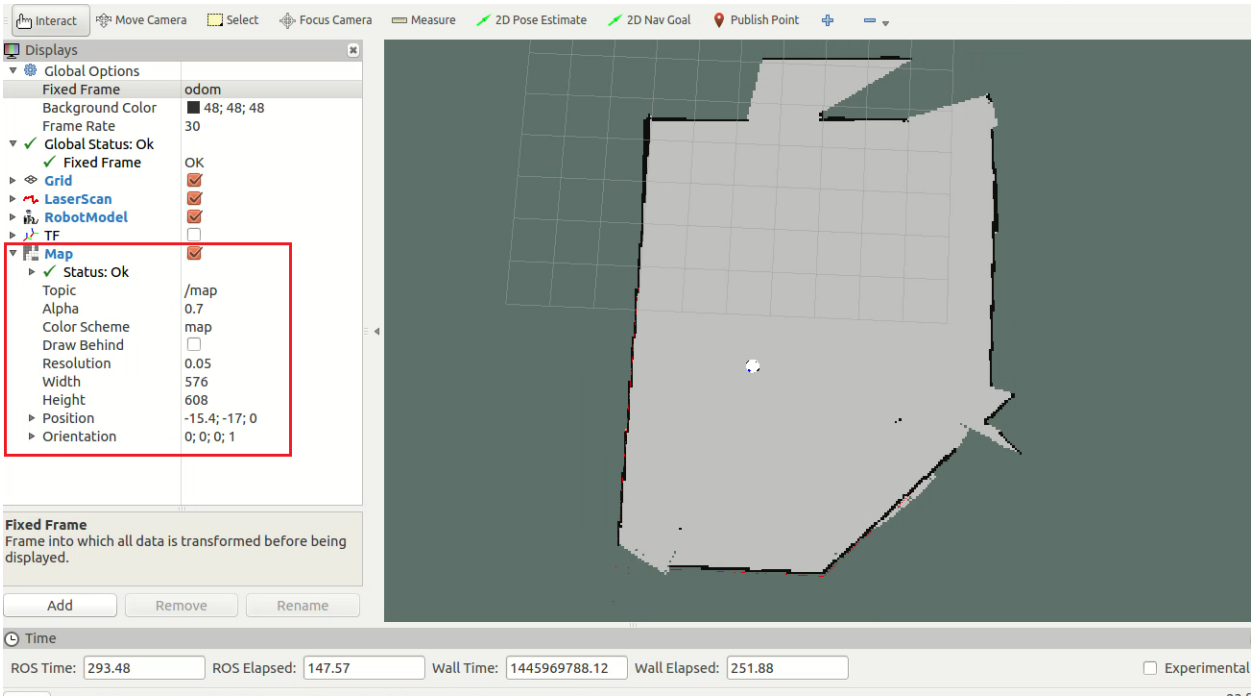
2



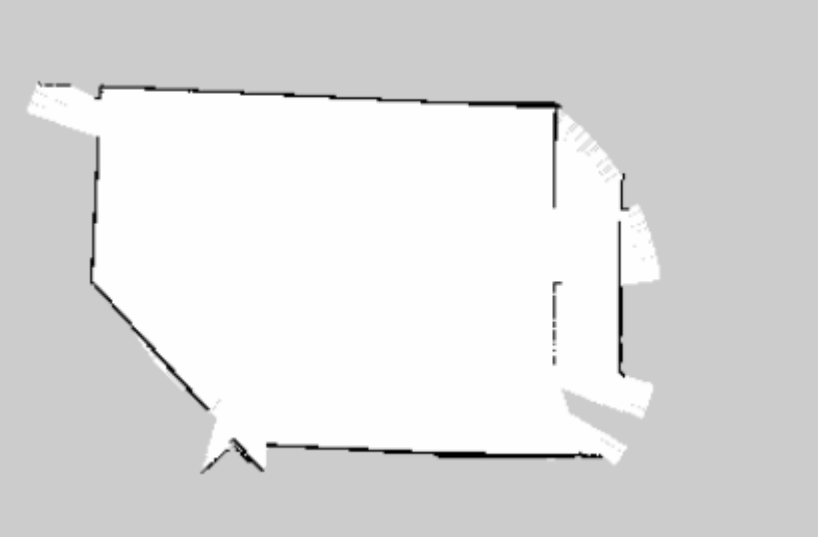
/home/lentin/catkin_ws/src/diff_wheeled_robot_ga... × /home/lentin/catkin_ws/src/diff_wheeled_robot_ga... ×

```
Registering First Scan
[ INFO] [1434905082.320452084, 196.009000000]: Loading from pre-hydro parameter
style
[ INFO] [1434905082.427309211, 196.103000000]: Using plugin "static_layer"
[ INFO] [1434905082.684322538, 196.353000000]: Requesting the map...
[ INFO] [1434905082.899954733, 196.561000000]: Resizing costmap to 288 X 480 at
0.050000 m/pix
[ INFO] [1434905083.004806029, 196.661000000]: Received a 288 X 480 map at 0.050
000 m/pix
[ INFO] [1434905083.022758957, 196.676000000]: Using plugin "obstacle_layer"
[ INFO] [1434905083.027259022, 196.681000000]:     Subscribed to Topics: scan bu
mp
[ INFO] [1434905083.200293308, 196.818000000]: Using plugin "inflation_layer"
[ INFO] [1434905083.615702678, 197.171000000]: Loading from pre-hydro parameter
style
[ INFO] [1434905083.722852138, 197.268000000]: Using plugin "obstacle_layer"
[ INFO] [1434905083.874587753, 197.395000000]:     Subscribed to Topics: scan bu
mp
[ INFO] [1434905084.036080619, 197.548000000]: Using plugin "inflation_layer"
[ INFO] [1434905084.338867420, 197.821000000]: Created local_planner dwa_local_p
lanner/DWAPlannerROS
[ INFO] [1434905084.348234556, 197.830000000]: Sim period is set to 0.01
[ INFO] [1434905086.197851157, 199.469000000]: odom received!
```

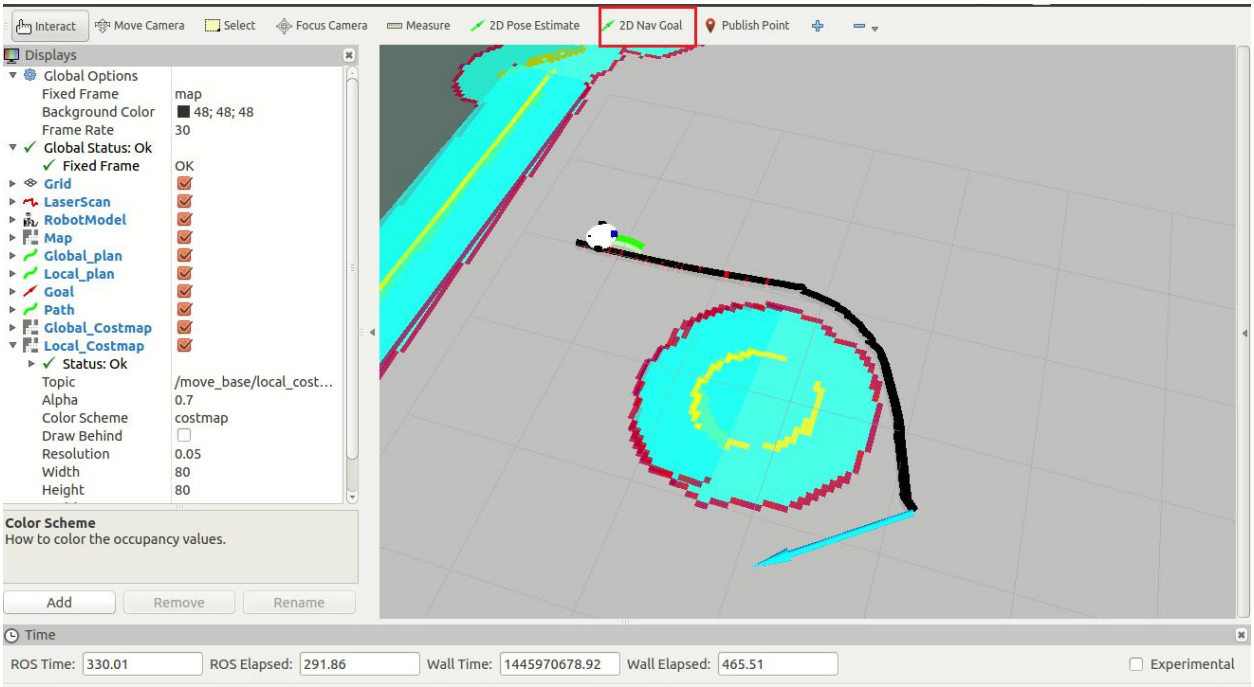

Steps: 1
Real Time Factor: 0.98
Sim Time: 00 00:00:51.712
Real Time: 00 00:00:53.780
Iterations: 51712

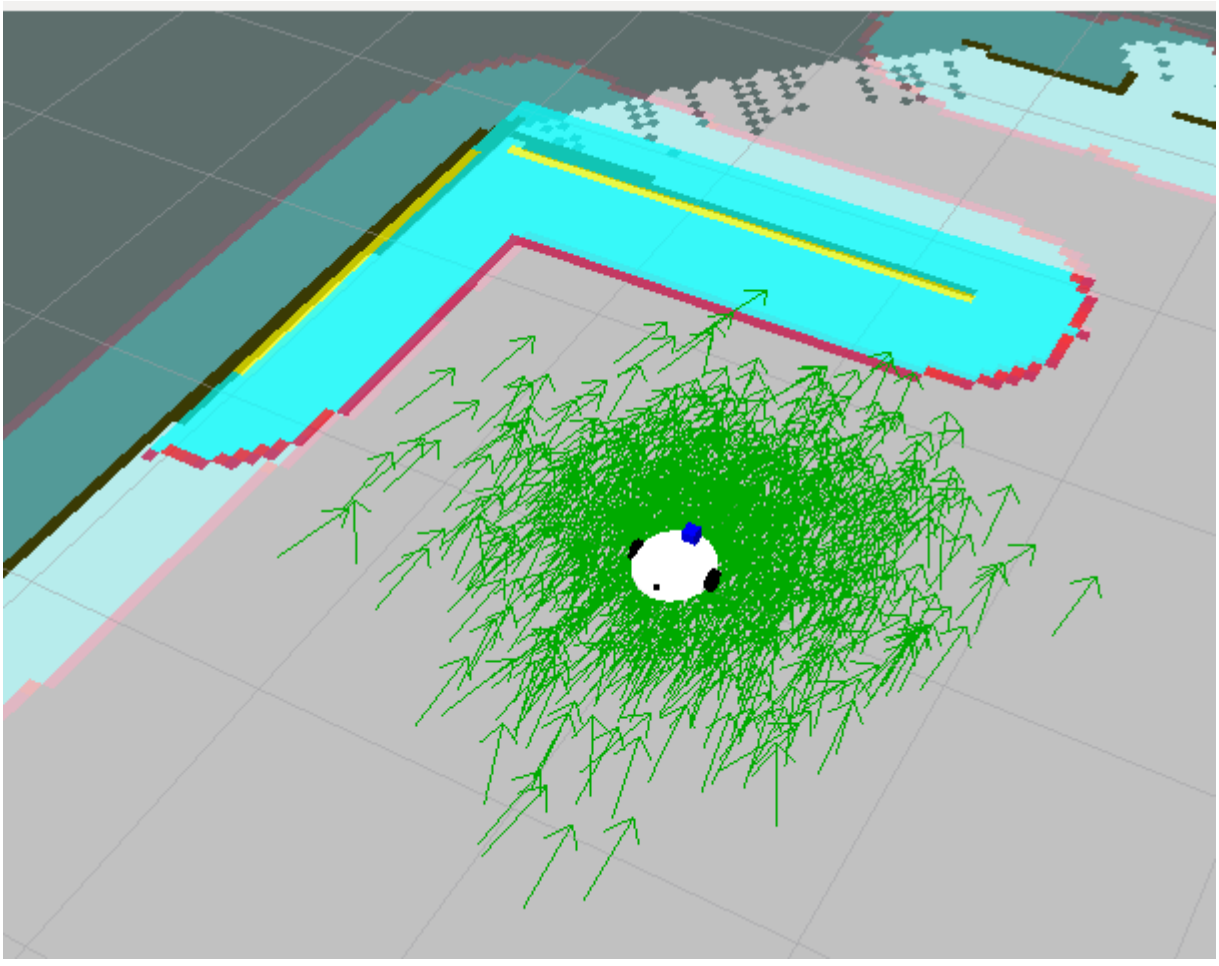

Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame odom
Background Color 48; 48; 48
Frame Rate 30
Global Status: Ok
Fixed Frame OK
Grid
LaserScan
RobotModel
TF
Map
Status: Ok
Topic /map
Alpha 0.7
Color Scheme map
Draw Behind
Resolution 0.05
Width 576
Height 608
Position -15.4; -17; 0
Orientation 0; 0; 0; 1
Fixed Frame
Frame into which all data is transformed before being displayed.
Add
Remove
Rename
Time
ROS Time: 293.48
ROS Elapsed: 147.57
Wall Time: 1445969788.12
Wall Elapsed: 251.88
Experimental

```
lentin@lentin-Aspire-4755:~$ rosrun map_server map_saver -f test1
[ INFO] [1434905213.468430940]: Waiting for the map
[ INFO] [1434905213.732655598]: Received a 288 X 480 map @ 0.050 m/pix
[ INFO] [1434905213.732744137]: Writing map occupancy data to test1.pgm
[ INFO] [1434905213.770990814, 314.112000000]: Writing map occupancy data to test1.yaml
[ INFO] [1434905213.771252850, 314.112000000]: Done
```

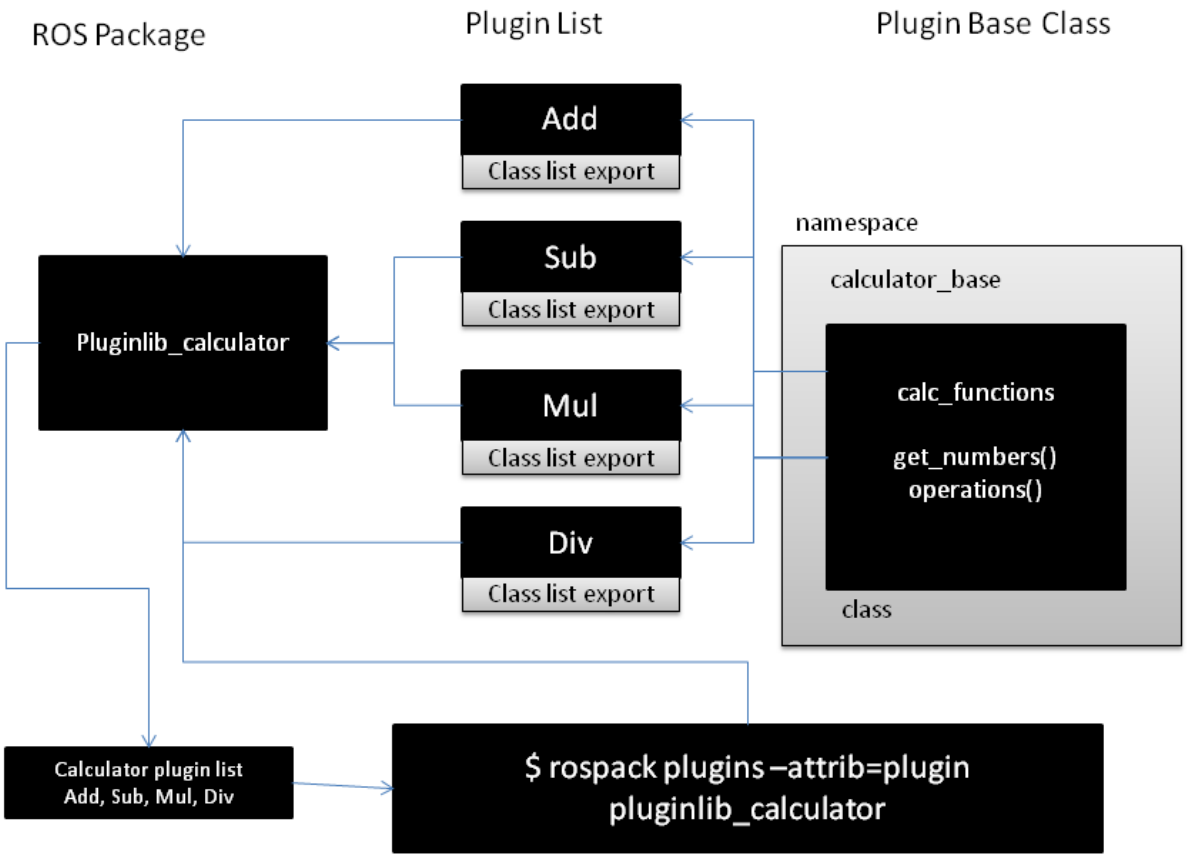


```
process[move_base-3]: started with pid [4261]
[ INFO] [1434975637.651690715, 136.327000000]: Loading from pre-hydro parameter
style
[ INFO] [1434975637.740981653, 136.406000000]: Using plugin "static_layer"
[ INFO] [1434975637.995048691, 136.630000000]: Requesting the map...
[ INFO] [1434975638.214156305, 136.838000000]: Resizing costmap to 512 X 480 at
0.050000 m/pix
[ INFO] [1434975638.320528075, 136.939000000]: Received a 512 X 480 map at 0.050
000 m/pix
[ INFO] [1434975638.332999377, 136.949000000]: Using plugin "obstacle_layer"
[ INFO] [1434975638.337888544, 136.954000000]:     Subscribed to Topics: scan bu
mp
[ INFO] [1434975638.462606794, 137.056000000]: Using plugin "inflation_layer"
[ INFO] [1434975638.917363023, 137.461000000]: Loading from pre-hydro parameter
style
[ INFO] [1434975638.994989529, 137.528000000]: Using plugin "obstacle_layer"
[ INFO] [1434975639.168703217, 137.687000000]:     Subscribed to Topics: scan bu
mp
[ INFO] [1434975639.287793203, 137.780000000]: Using plugin "inflation_layer"
[ INFO] [1434975639.624191618, 138.085000000]: Created local_planner dwa_local_p
lanner/DWAPlannerROS
[ INFO] [1434975639.631848598, 138.090000000]: Sim period is set to 0.20
[ INFO] [1434975641.461737700, 139.747000000]: odom received!
```


Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame map
Background Color 48; 48; 48
Frame Rate 30
Global Status: Ok
Fixed Frame OK
Grid
LaserScan
RobotModel
Map
Global_plan
Local_plan
Goal
Path
Global_Costmap
Local_Costmap
Status: Ok
Topic /move_base/local_cost…
Alpha 0.7
Color Scheme costmap
Draw Behind
Resolution 0.05
Width 80
Height 80
Color Scheme
How to color the occupancy values.
Add
Remove
Rename
Time
ROS Time: 330.01
ROS Elapsed: 291.86
Wall Time: 1445970678.92
Wall Elapsed: 465.51
Experimental



CHAPTER 5




```
robot@robot-VirtualBox: ~/catkin_ws/src
robot@robot-VirtualBox:~/catkin_ws/src$ rospack plugins --attrib=plugin pluginlib_calculator
pluginlib_calculator /home/robot/catkin_ws/install/share/pluginlib_calculator/calculator_plugins.xml
robot@robot-VirtualBox:~/catkin_ws/src$
```

```
robot@robot-VirtualBox: ~
robot@robot-VirtualBox: ~                    roscore http://robot-VirtualBox:11311/
robot@robot-VirtualBox:~$ rosrun pluginlib_calculator calculator_loader
[ INFO] [1437397692.187448980]: Triangle area: 20.00
[ INFO] [1437397692.187686870]: Substracted result: 0.00
[ INFO] [1437397692.187823622]: Multiplied result: 100.00
[ INFO] [1437397692.187969548]: Division result: 1.00
robot@robot-VirtualBox:~$
```

```
robot@robot-VirtualBox:~$ rosrun nodelet nodelet manager __name:=nodelet_manager
[ INFO] [1437416267.697084914]: Initializing nodelet with 2 worker threads.
```

```
robot@robot-VirtualBox: ~
roscore htt... × | robot@rob... × | robot@rob... × | robot@rob... × | robot@rob... × | robot@rob... × | robot@rob... ×
robot@robot-VirtualBox:~$ rosrun nodelet nodelet load nodelet_hello_world/Hello nodele
t_manager __name:=nodelet1
[ INFO] [1437418742.996229783]: Loading nodelet /nodelet1 of type nodelet_hello_world/
Hello to manager nodelet_manager with the following remappings:
```

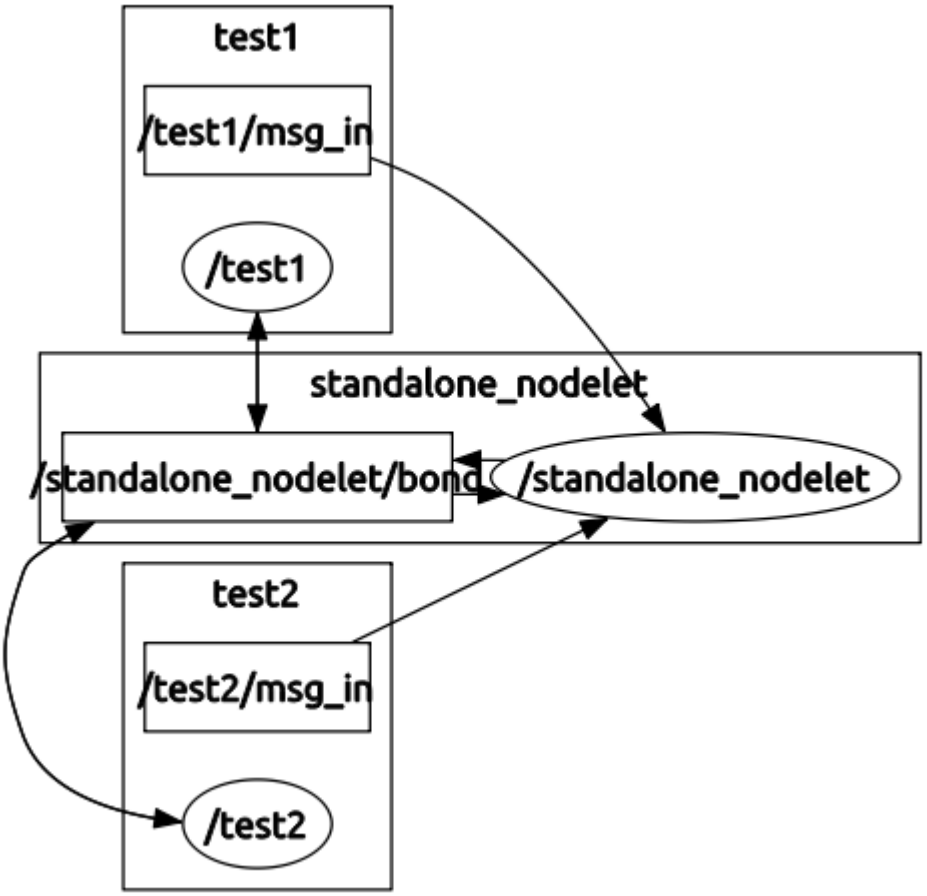
```
robot@robot-VirtualBox:~$ rostopic list
/nodelet1/msg_in
/nodelet1/msg_out
/nodelet_manager/bond
/rosout
/rosout_agg
robot@robot-VirtualBox:~$ rosnode list
/nodelet1
/nodelet_manager
/rosout
robot@robot-VirtualBox:~$
```

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

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

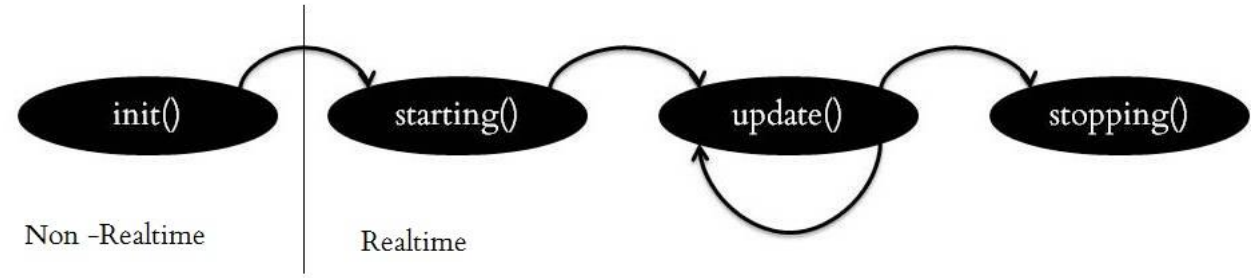
```
setting /run_id to 502aac5e-2f14-11e5-9a2e-0800273c354c
process[rosout-1]: started with pid [5210]
started core service [/rosout]
process[standalone_nodelet-2]: started with pid [5227]
[ INFO] [1437420001.238956883]: Initializing nodelet with 2 worker threads.
process[test1-3]: started with pid [5245]
[ INFO] [1437420001.402022087]: Loading nodelet /test1 of type nodelet_hello_world/Hello to manager standalo
ne_nodelet with the following remappings:
process[test2-4]: started with pid [5284]
[ INFO] [1437420001.704979871]: Loading nodelet /test2 of type nodelet_hello_world/Hello to manager standalo
ne_nodelet with the following remappings:
```

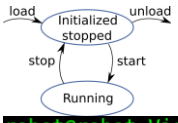
```
robot@robot-VirtualBox:~$ rostopic list
/rosout
/rosout_agg
/standalone_nodelet/bond
/test1/msg_in
/test1/msg_out
/test2/msg_in
/test2/msg_out
robot@robot-VirtualBox:~$ rosnode list
/rosout
/standalone_nodelet
/test1
/test2
robot@robot-VirtualBox:~$
```



```
robot@robot-VirtualBox:~/gazebo_plugin_tutorial$ gzserver hello.world --verbose
Gazebo multi-robot simulator, version 2.2.3
Copyright (C) 2012-2014 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!
```

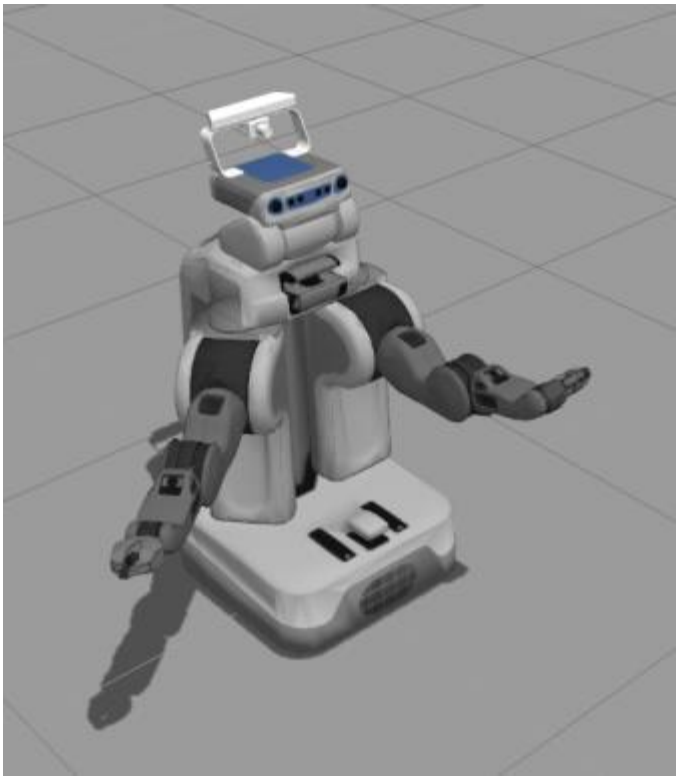
CHAPTER 6

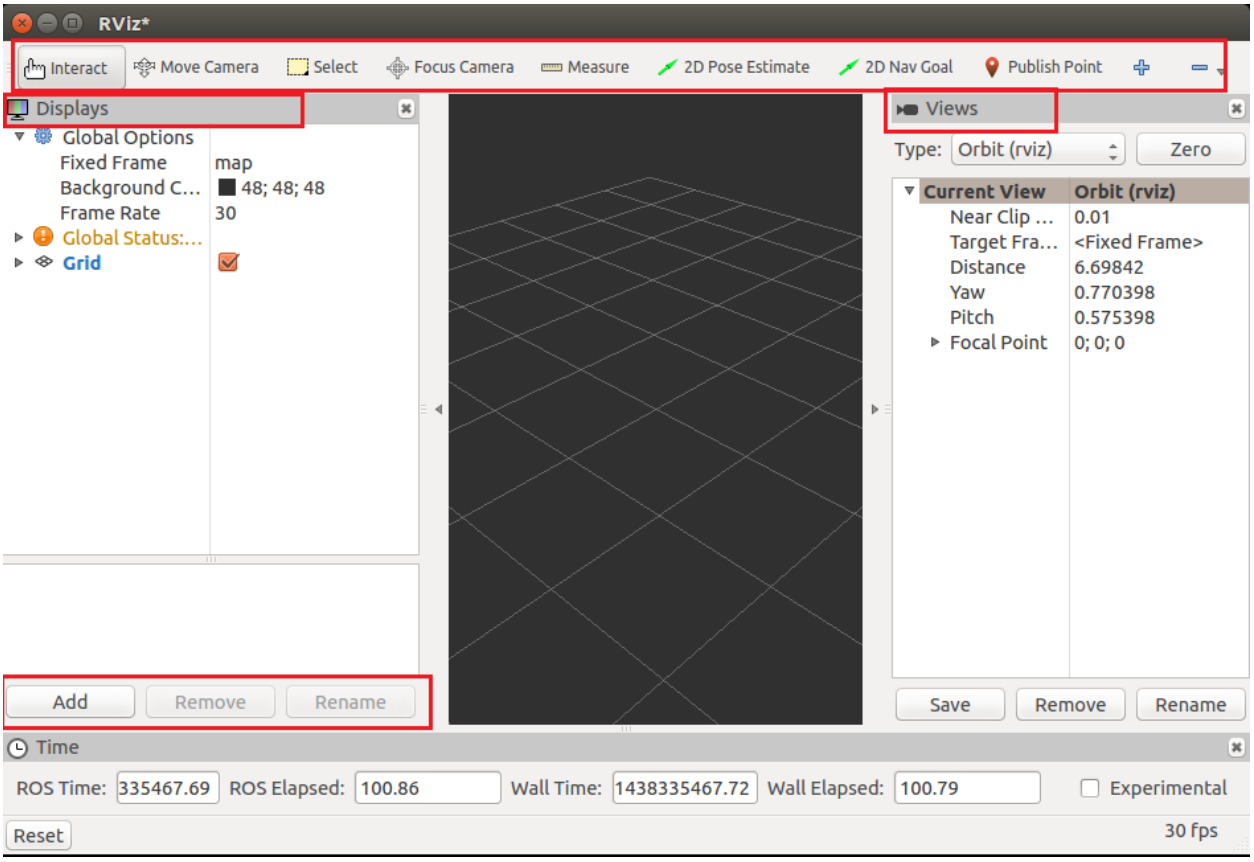


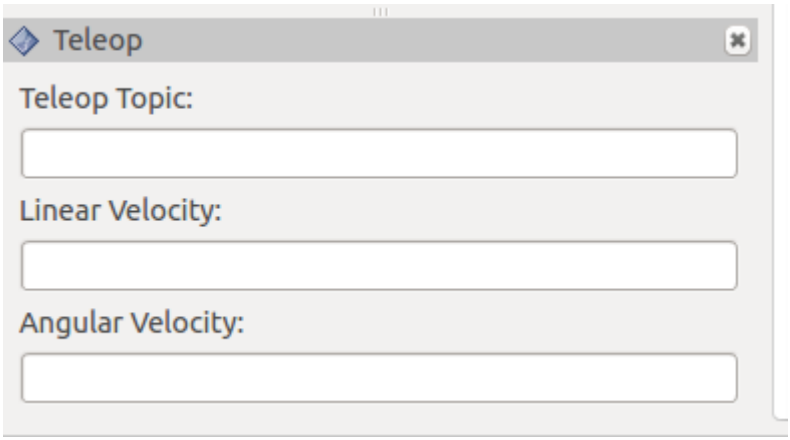


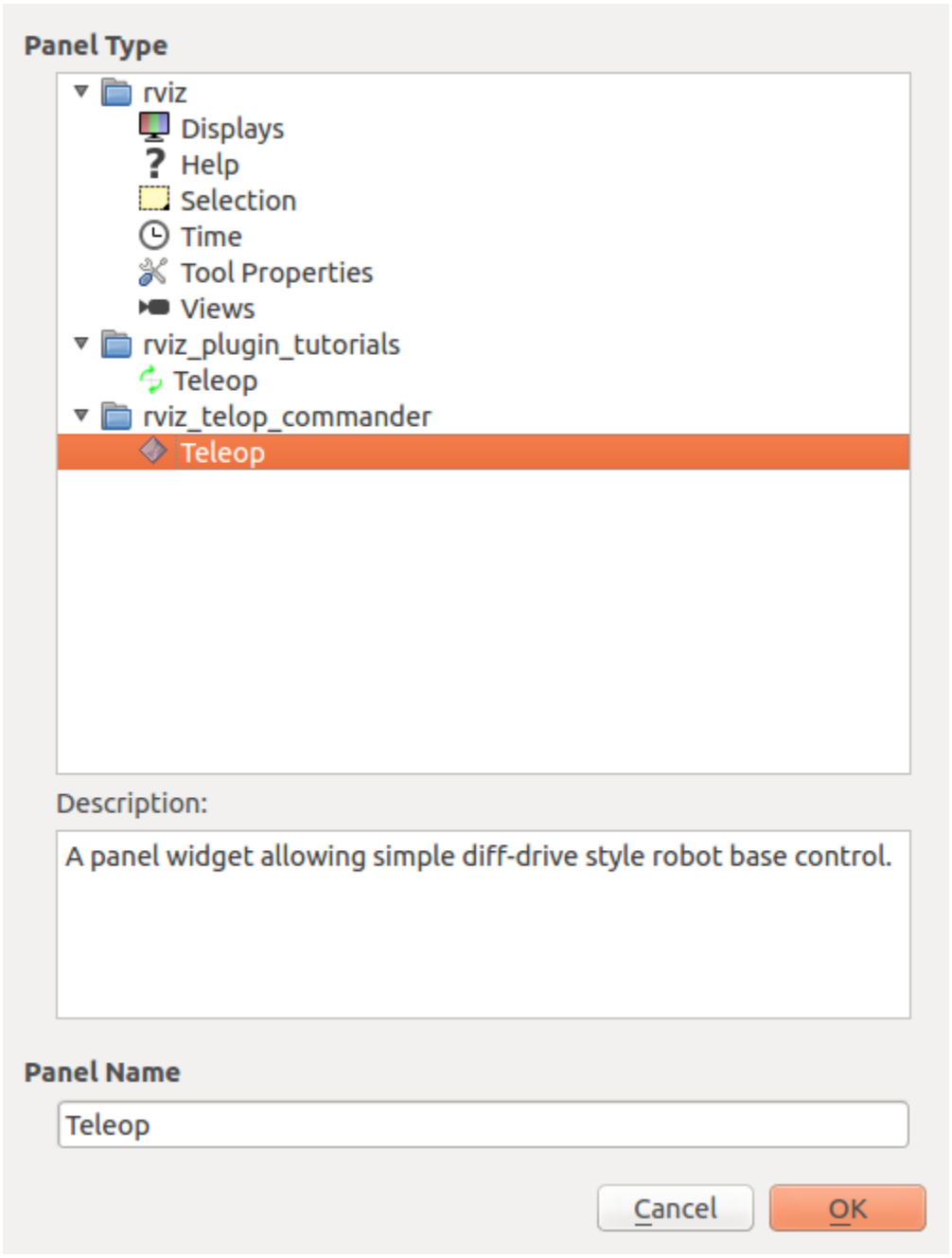

```
robot@robot-VirtualBox:~/catkin_ws$ rospack plugins --attrib=plugin pr2_controller_interface
pr2_controller_manager /opt/ros/indigo/share/pr2_controller_manager/test/controller_plugin.xml
pr2_calibration_controllers /opt/ros/indigo/share/pr2_calibration_controllers/controller_plugins.xml
pr2_mechanism_controllers /opt/ros/indigo/share/pr2_mechanism_controllers/controller_plugins.xml
ethercat_trigger_controllers /opt/ros/indigo/share/ethercat_trigger_controllers/controller_plugins.xml
robot_mechanism_controllers /opt/ros/indigo/share/robot_mechanism_controllers/controller_plugins.xml
sample_controller /home/robot/catkin_ws/src/sample_controller/controller_plugins.xml
my_controller_pkg /home/robot/catkin_ws/src/my_controller_pkg/controller_plugins.xml
```

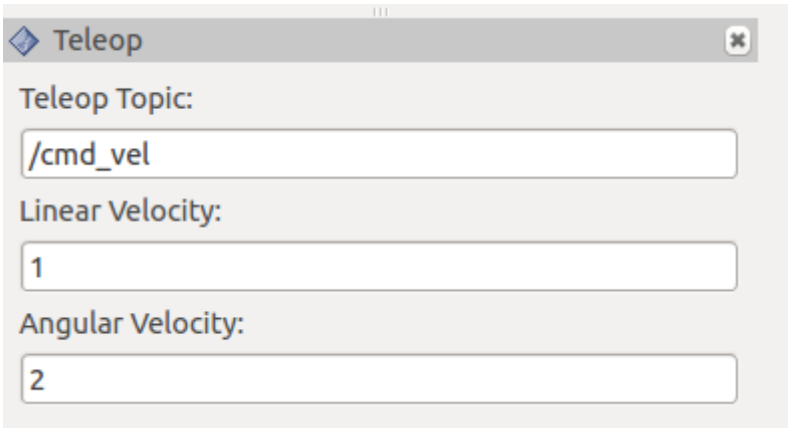
```
lentin@lentin-Aspire-4755:~$ rosrun pr2_controller_manager pr2_controller_manager
list
base_controller ( running )
base_odometry ( running )
head_traj_controller ( running )
l_arm_controller ( running )
l_gripper_controller ( running )
laser_tilt_controller ( running )
r_arm_controller ( running )
r_gripper_controller ( running )
torso_controller ( running )
lentin@lentin-Aspire-4755:~$
```




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

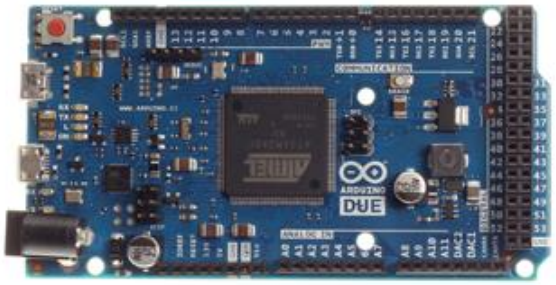



```
linear:
  x: 1.0
  y: 0.0
  z: 0.0
angular:
  x: 0.0
  y: 0.0
  z: 2.0
---
linear:
  x: 1.0
  y: 0.0
  z: 0.0
angular:
  x: 0.0
  y: 0.0
  z: 2.0
---
```

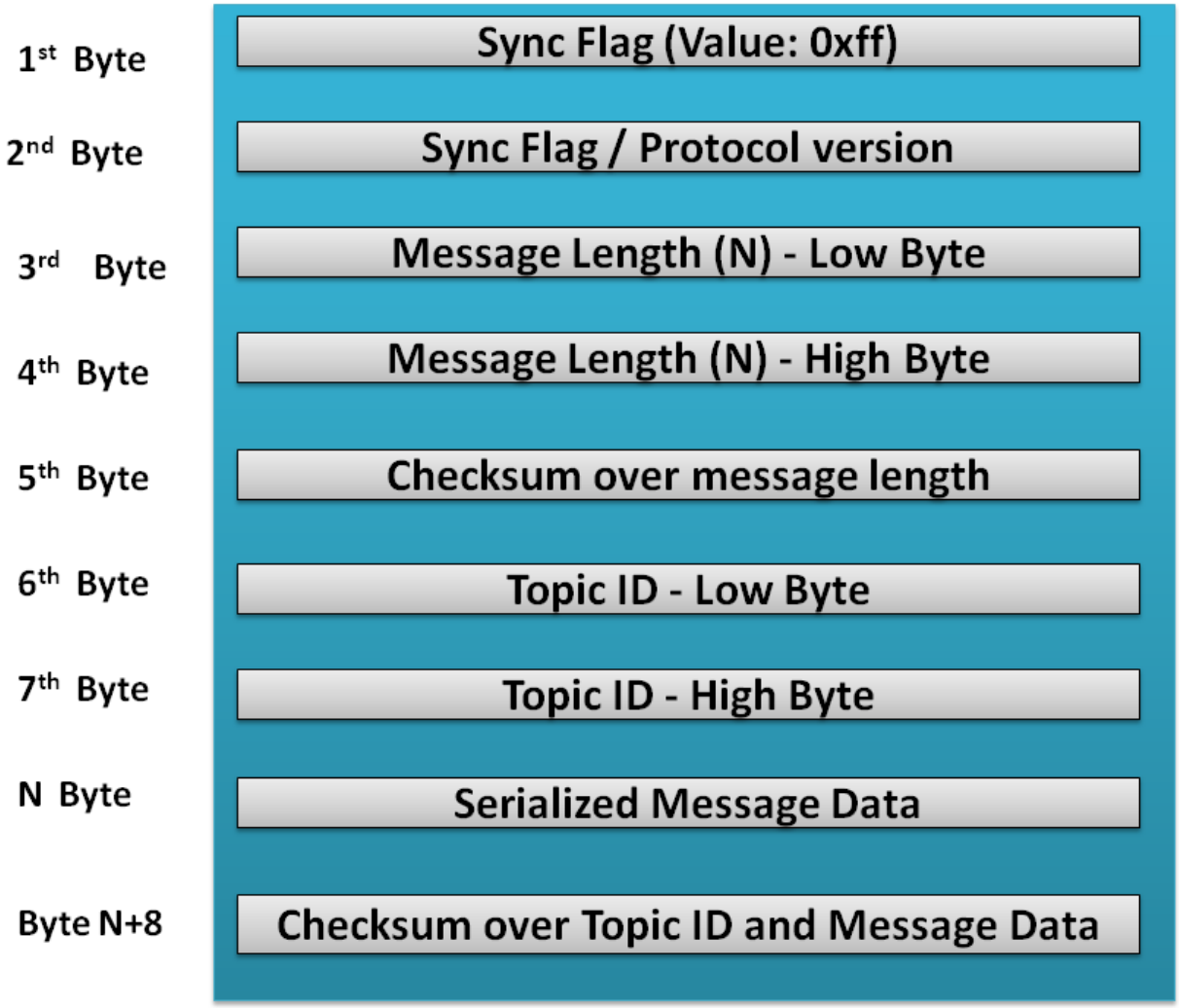
CHAPTER 7

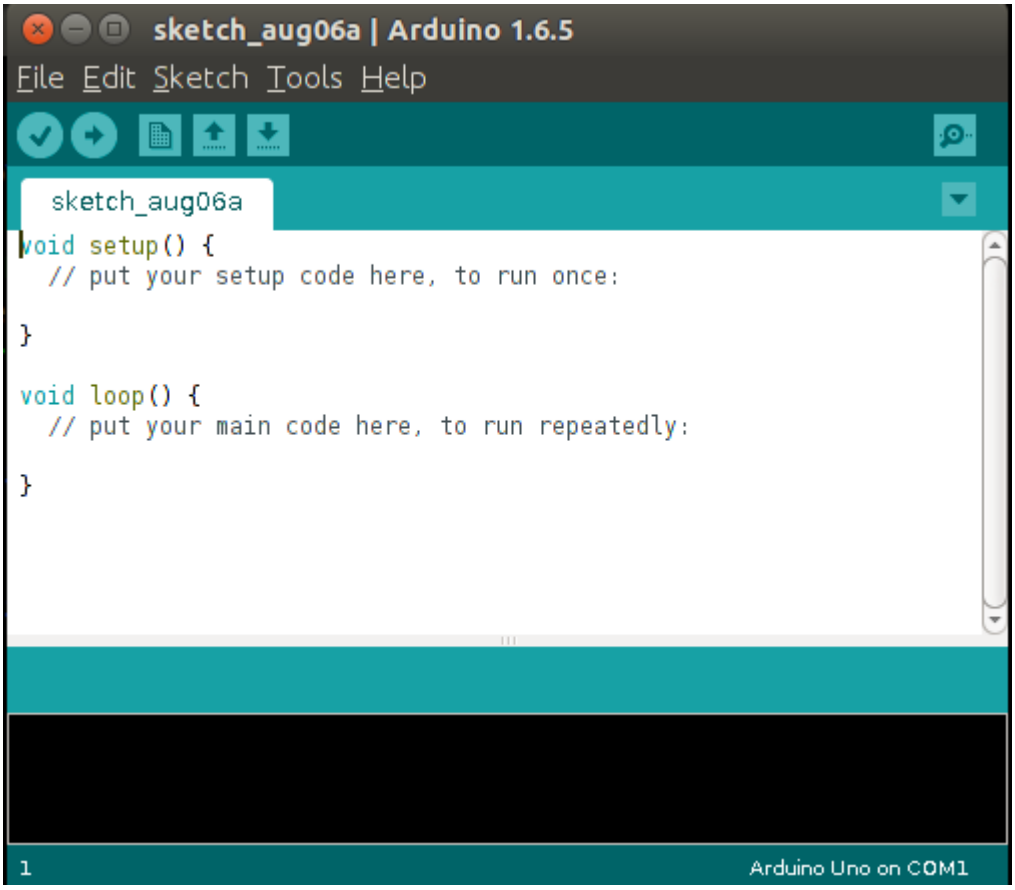
Beginner : Arduino UNO

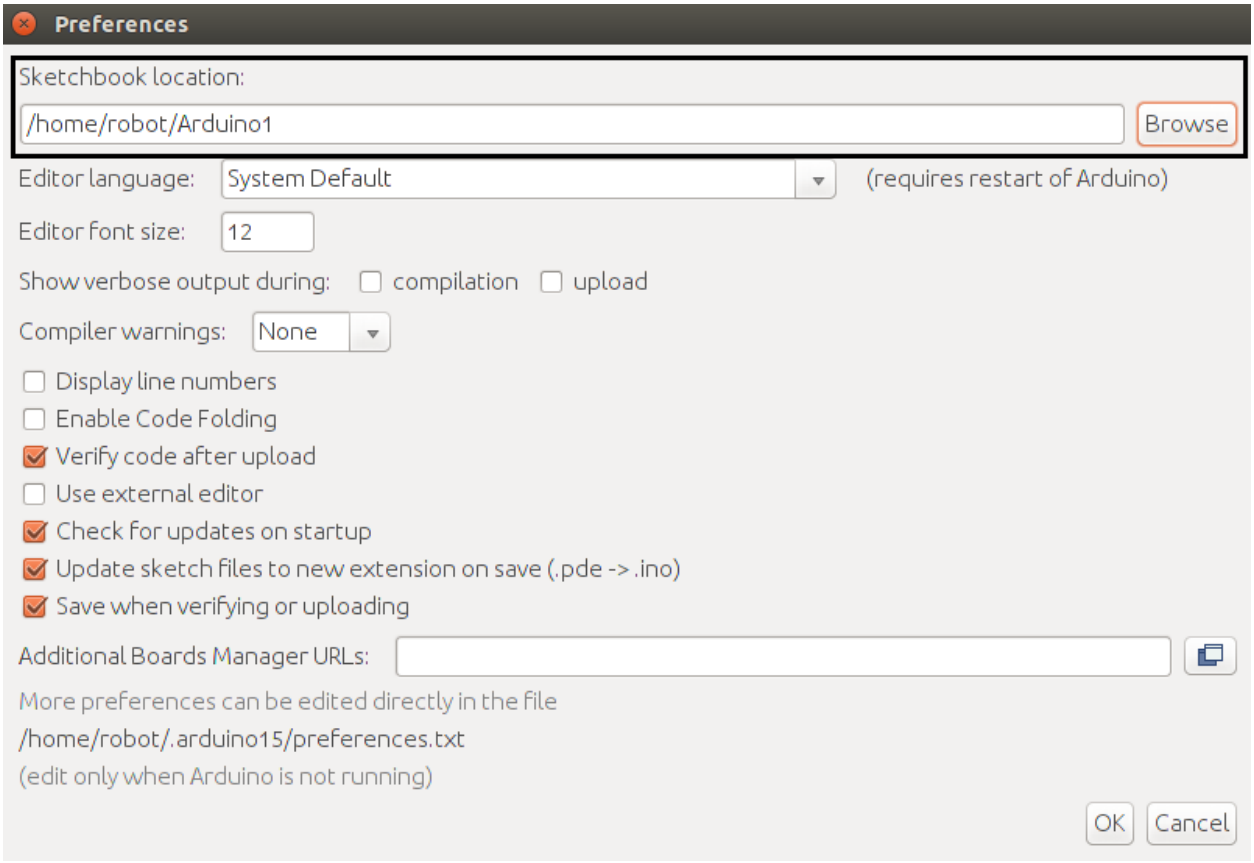
Intermediate : Arduino Mega

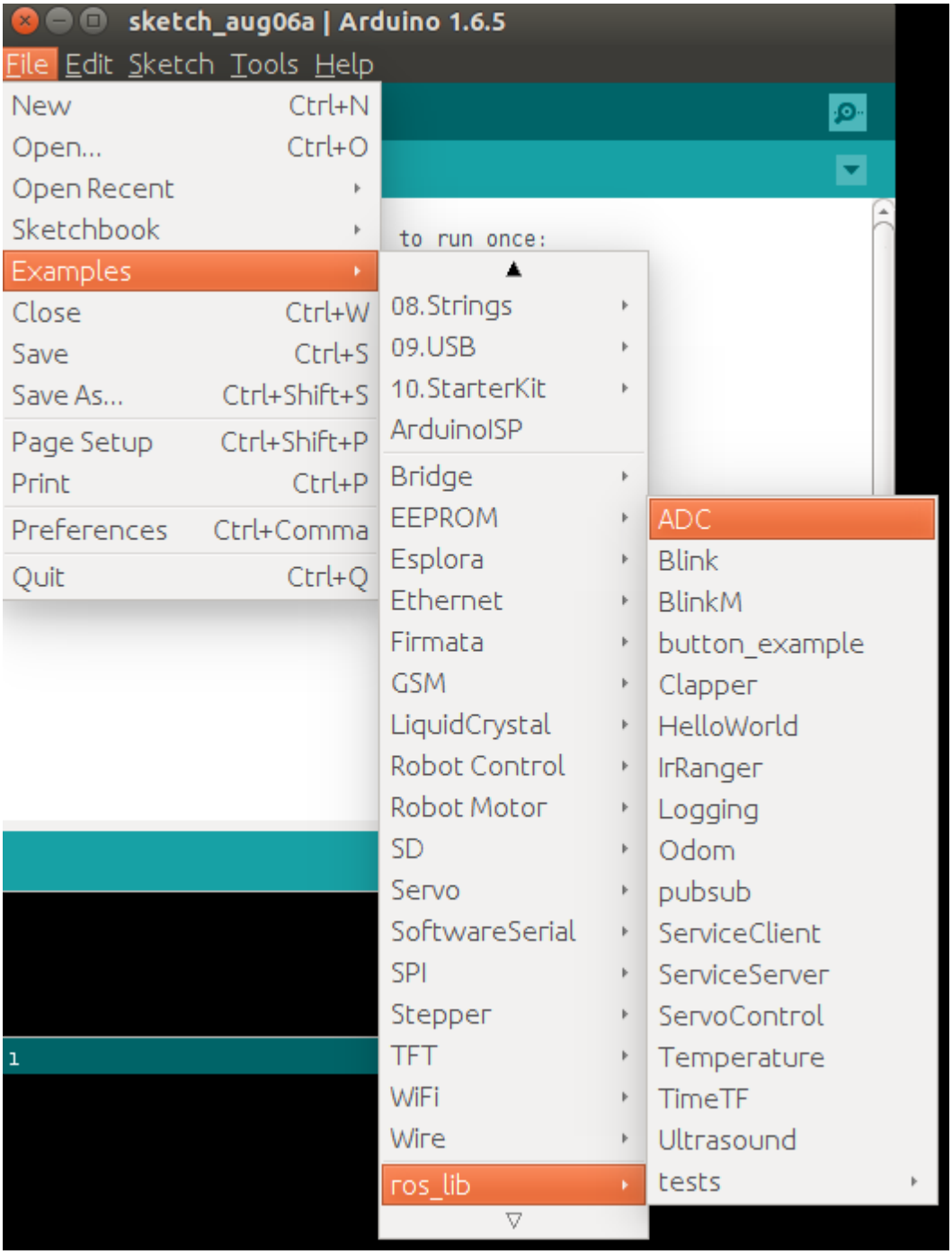


Advanced : Arduino Due


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

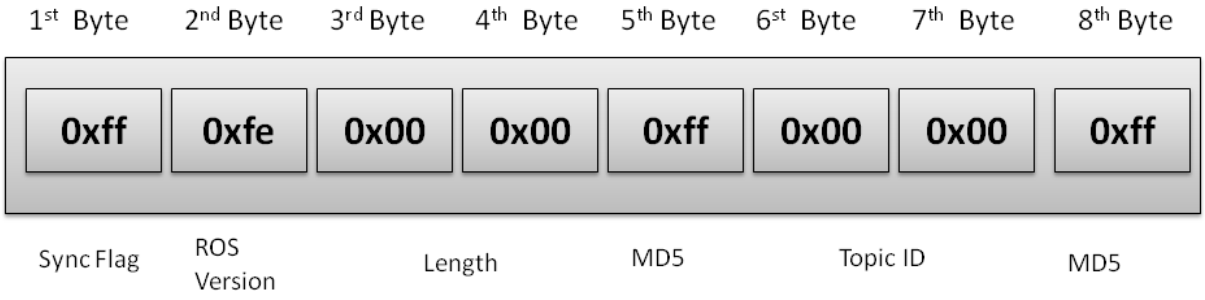

sketch_aug06a | Arduino 1.6.5
File Edit Sketch Tools Help
sketch_aug06a
void setup() {
// put your setup code here, to run once:
}
void loop() {
// put your main code here, to run repeatedly:
}
1
Arduino Uno on COM1


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

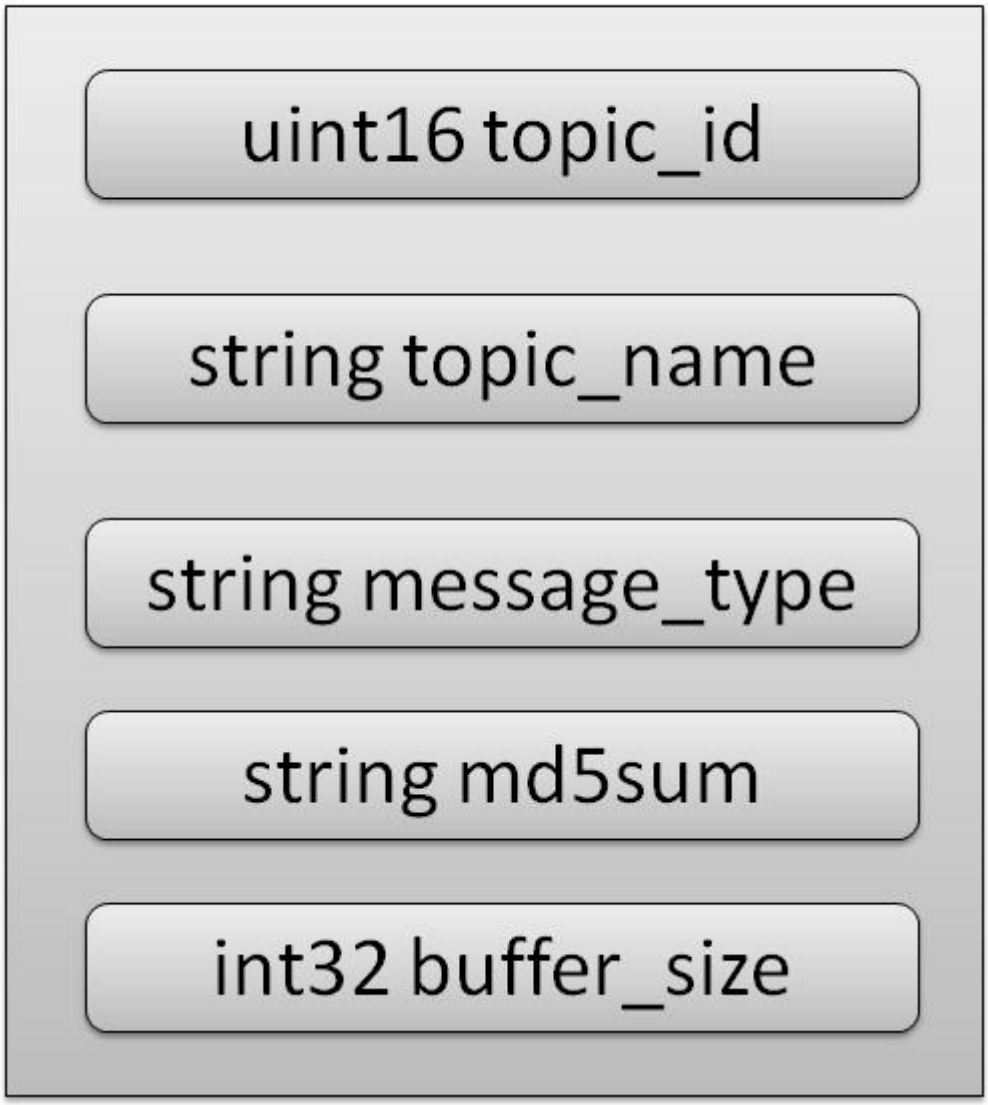



```
lentin@lentin-Aspire-4755:~/Desktop/arduino-1.6.5$ rosrun rosserial_python seria
l_node.py /dev/ttyACM0
[INFO] [WallTime: 1438880620.972231] ROS Serial Python Node
[INFO] [WallTime: 1438880620.982245] Connecting to /dev/ttyACM0 at 57600 baud
[INFO] [WallTime: 1438880623.117417] Note: publish buffer 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
]
```

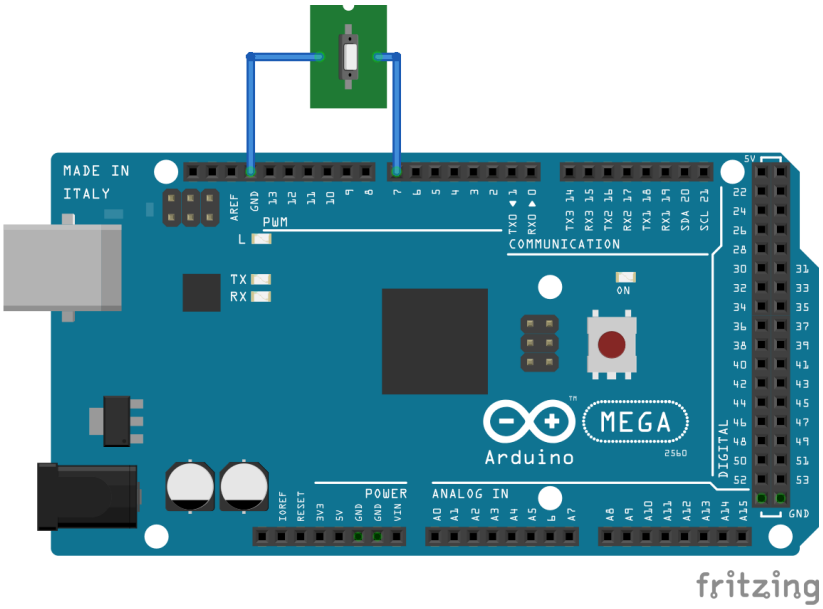
Query Packet



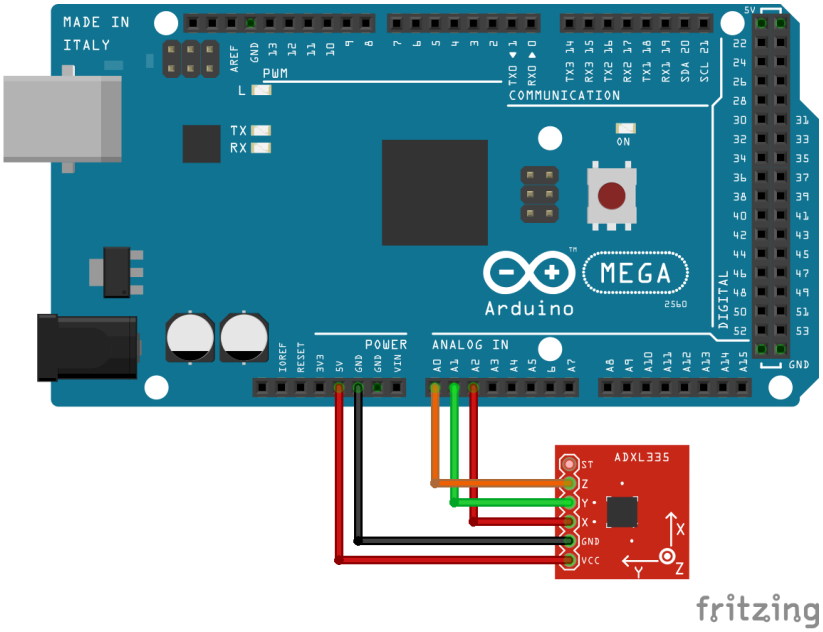
Response Packet

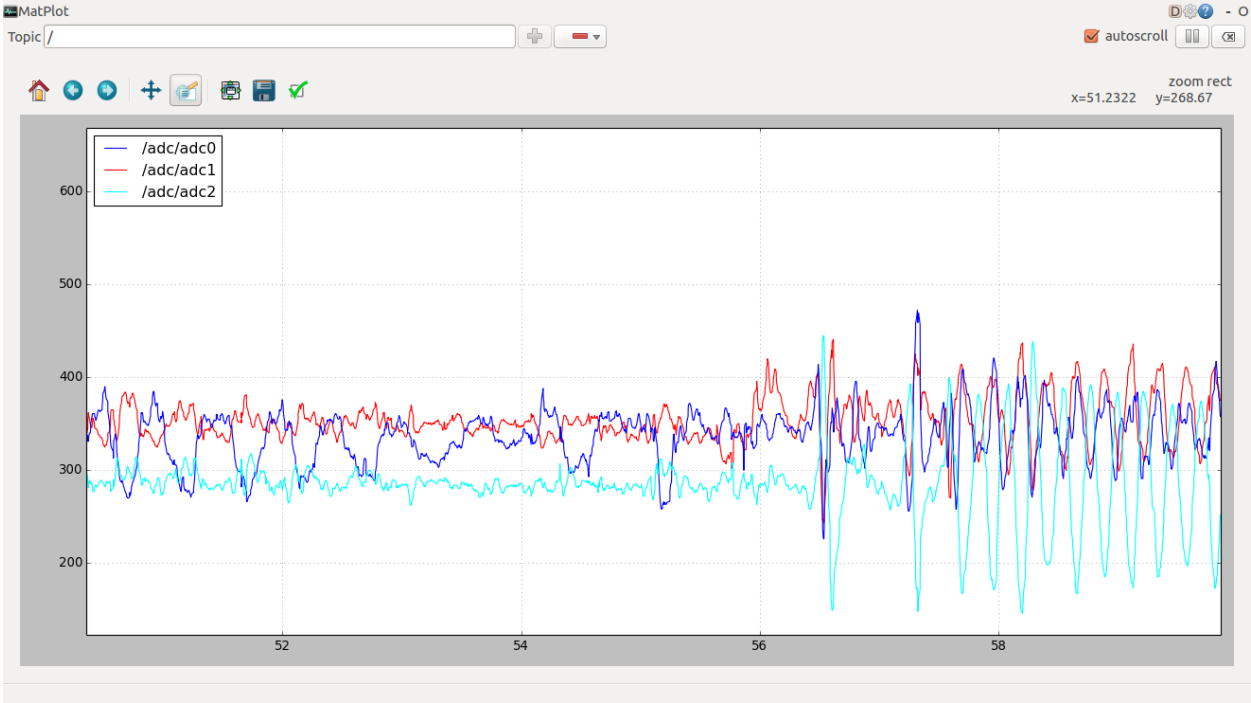


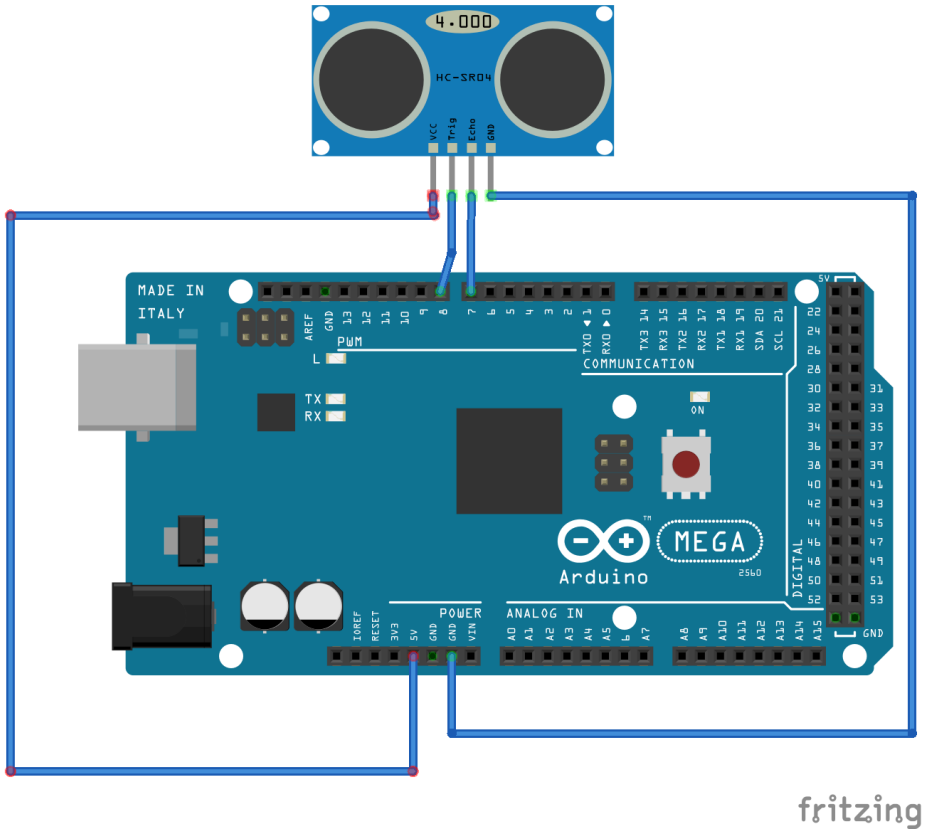
```
lentin@lentin-Aspire-4755:~$ rostopic echo /chatter
data: Hello World
---
data: Hello World
---
data: Hello World
---
data: Hello World
---
data: Hello World
---
data: Hello World
---
data: Hello World
---
data: Hello World
---
```

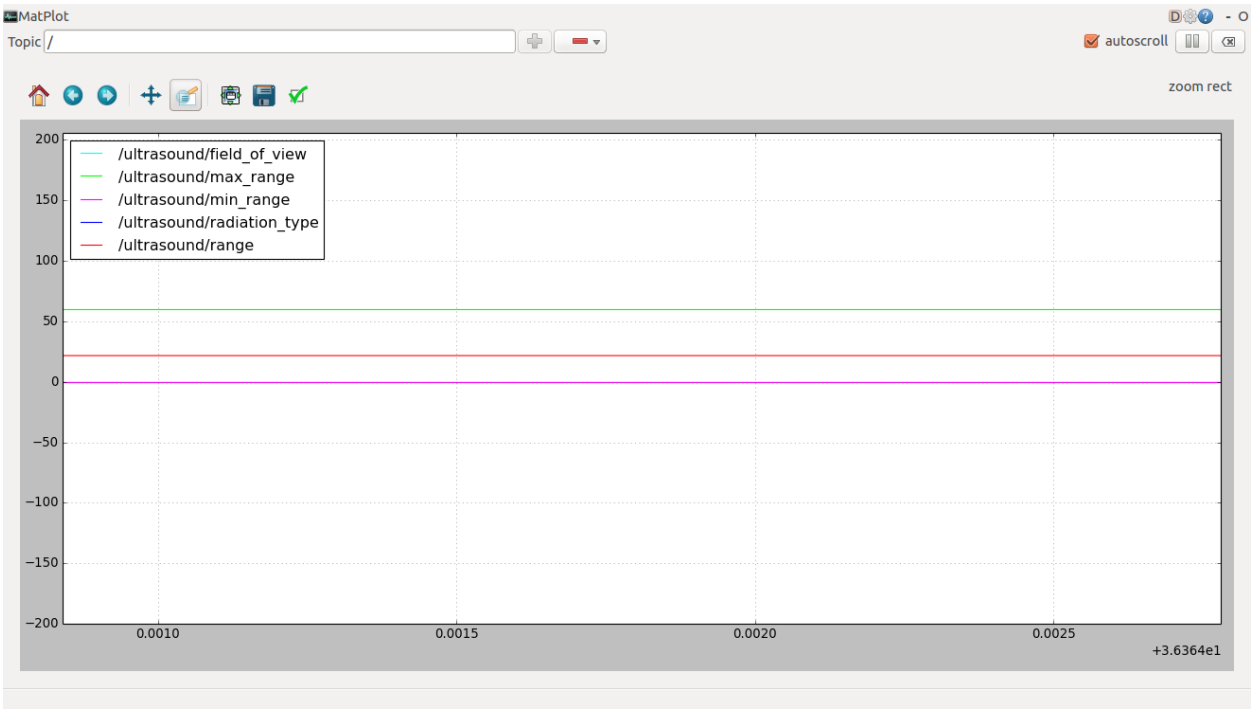


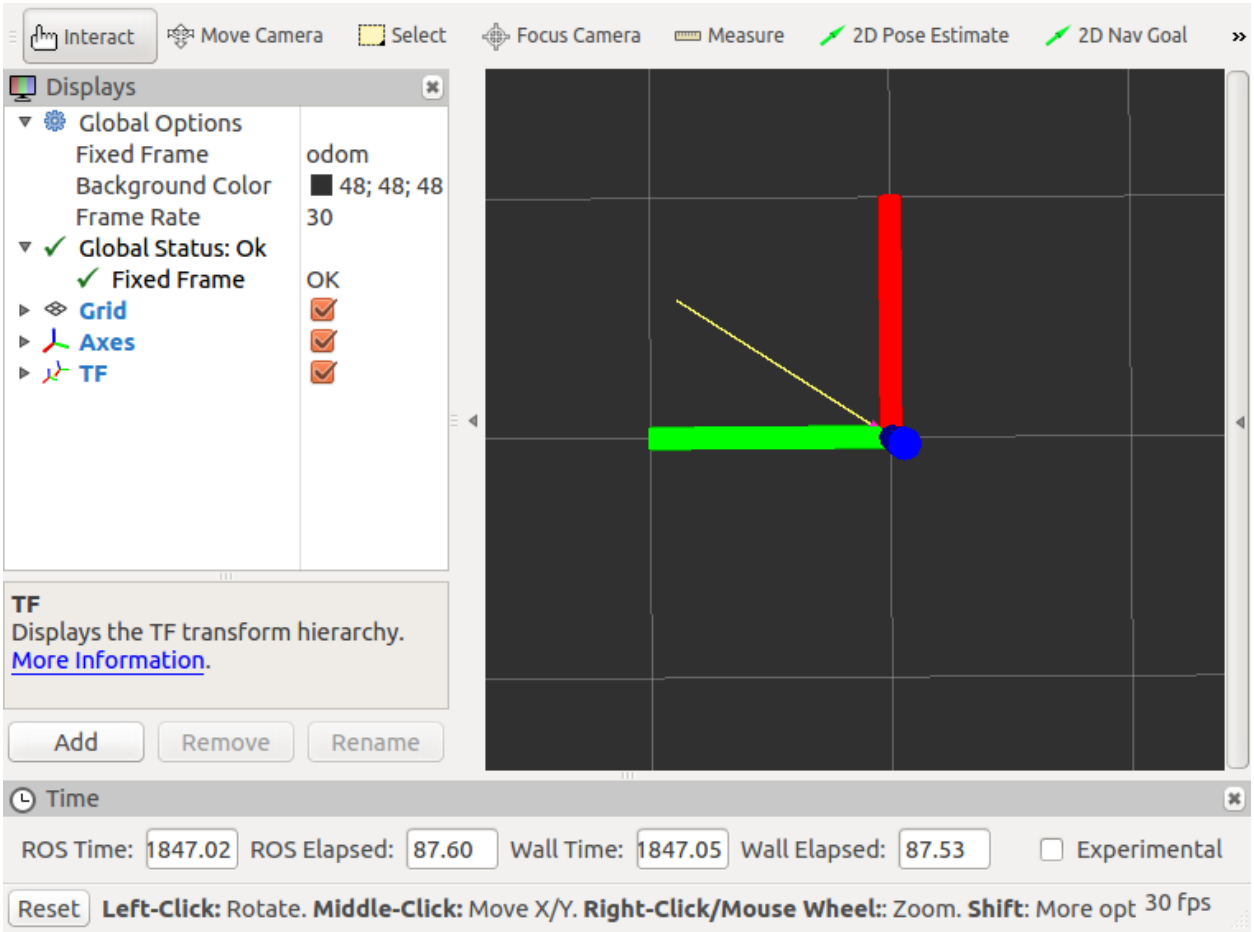
```
---
data: False
---
data: True
---
data: False
---
data: False
---
data: True
---
```

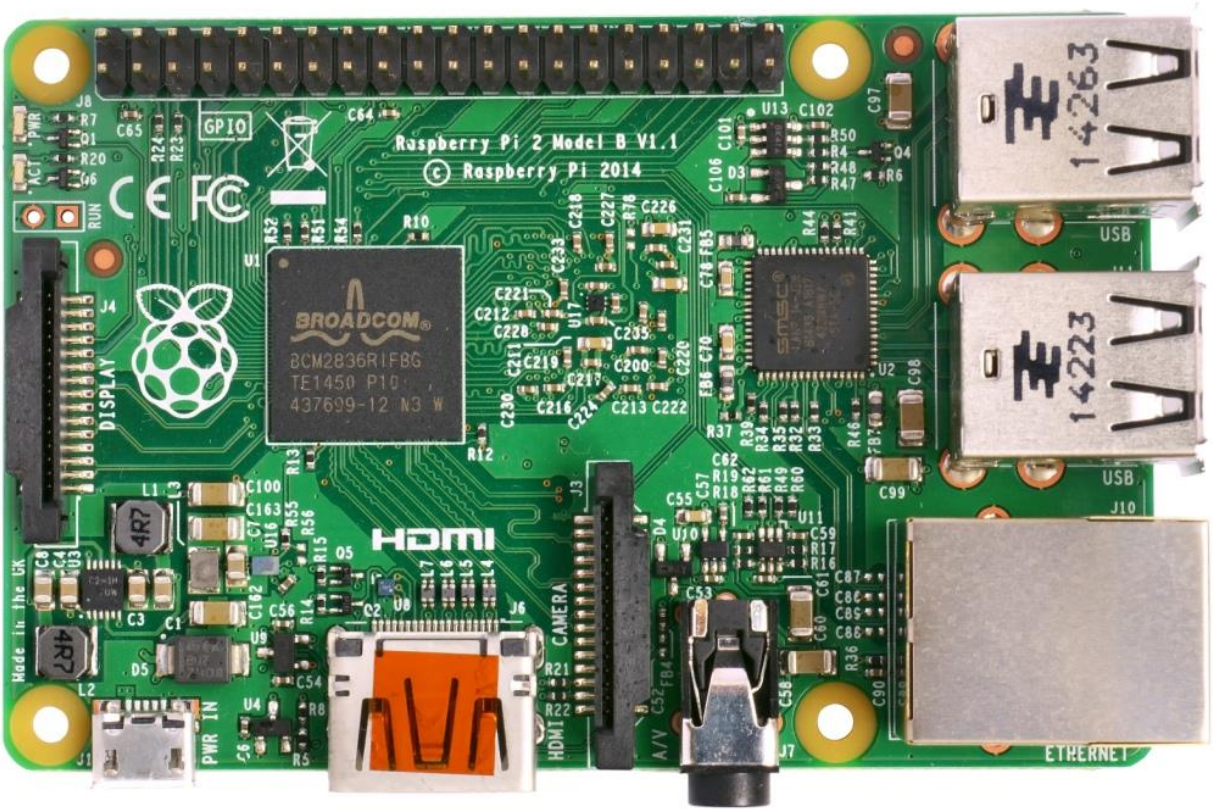


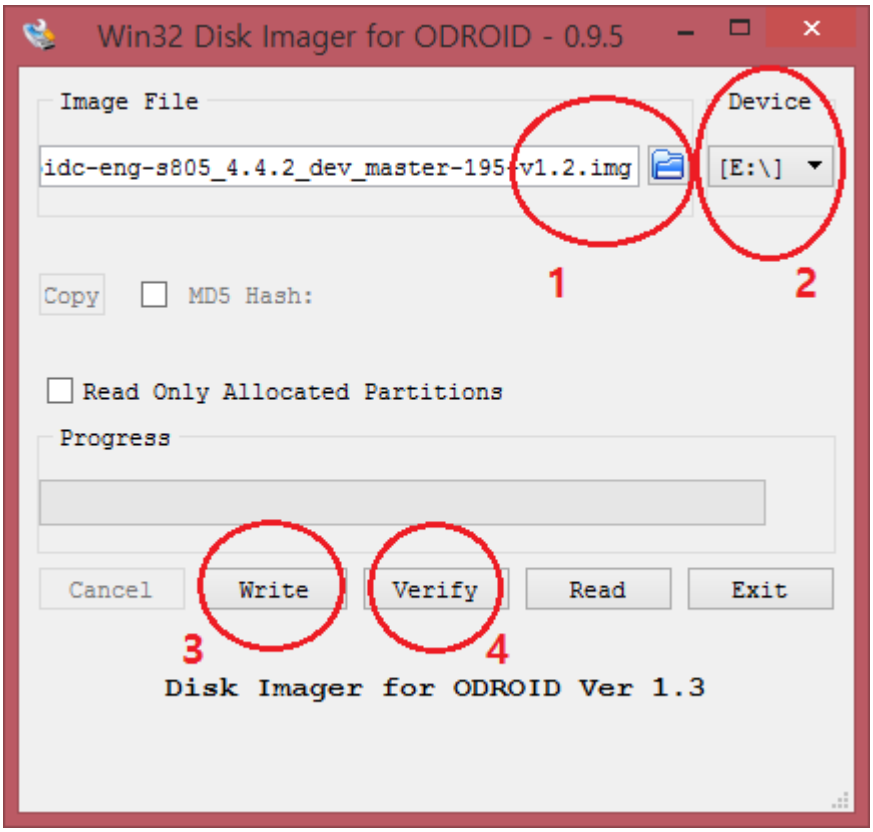

MatPlot
Topic /
autoscroll
zoom rect
x=51.2322 y=268.67
/adc/adc0
/adc/adc1
/adc/adc2
600
500
400
300
200
52
54
56
58

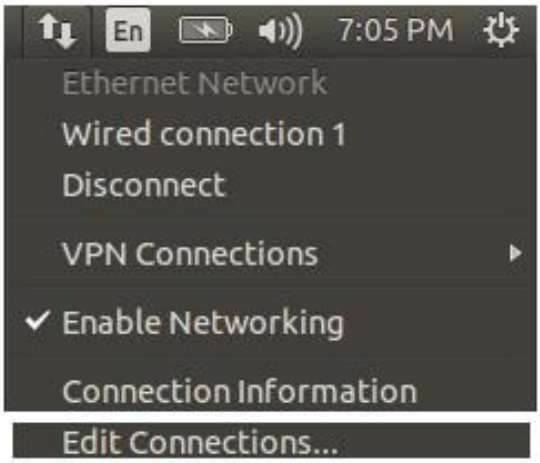

4.000
HC-SR04
Vcc
Trig
Echo
Gnd
MADE IN
ITALY
PWM
COMMUNICATION
TX
RX
ON
MEGA
Arduino
2560
POWER
ANALOG IN
DIGITAL
fritzing


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

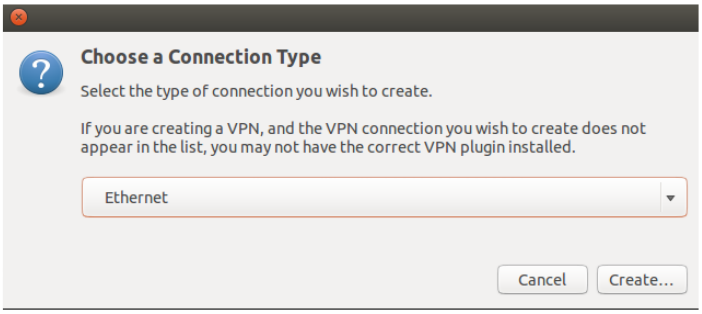

Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Displays
Global Options
Fixed Frame
odom
Background Color
48; 48; 48
Frame Rate
30
Global Status: Ok
Fixed Frame
OK
Grid
Axes
TF
TF
Displays the TF transform hierarchy.
More Information.
Add
Remove
Rename
Time
ROS Time:
1847.02
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

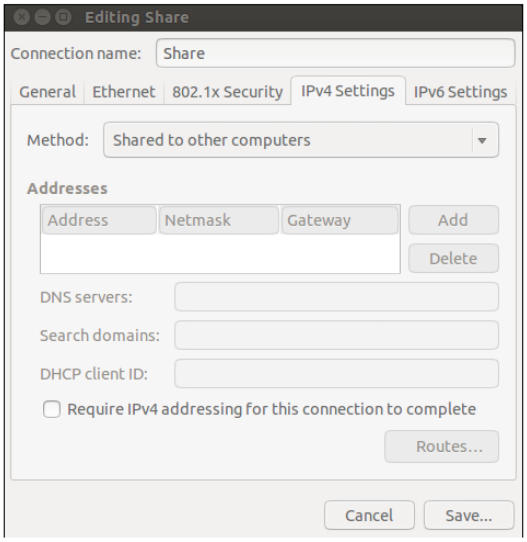

Raspberry Pi 2 Model B V1.1
© Raspberry Pi 2014
BROADCOM
BCM2836RIFBG
GPIO
DISPLAY
HDMI
CAMERA
USB
USB
ETHERNET
PWR IN
Made in the UK

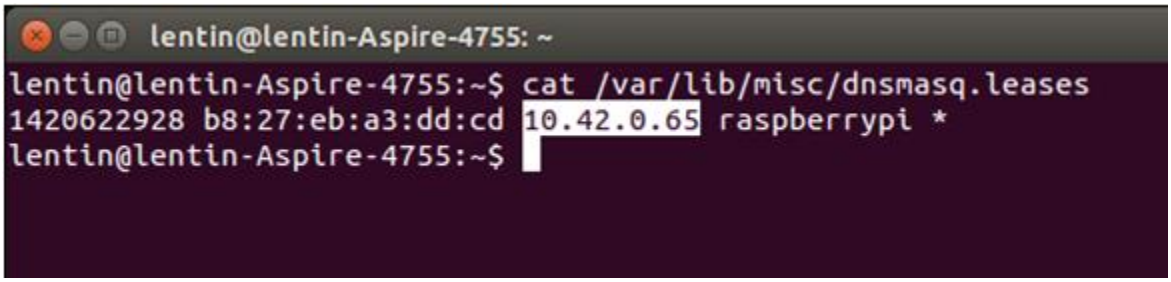

Win32 Disk Imager for ODROID - 0.9.5
Image File
idc-eng-s805_4.4.2_dev_master-195-v1.2.img
Device
[E:\]
1
2
Copy
MD5 Hash:
Read Only Allocated Partitions
Progress
Cancel
Write
Verify
Read
Exit
3
4
Disk Imager for ODROID Ver 1.3


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...


lentin@lentin-Aspire-4755: ~
lentin@lentin-Aspire-4755:~$ cat /var/lib/misc/dnsmasq.leases
1420622928 b8:27:eb:a3:dd:cd 10.42.0.65 raspberrypi *
lentin@lentin-Aspire-4755:~$

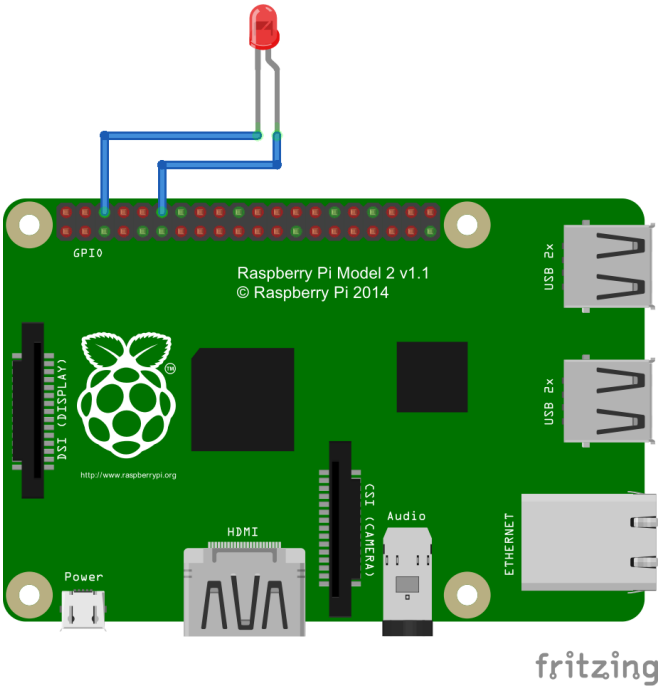
ODROID-C1 40pin Layout

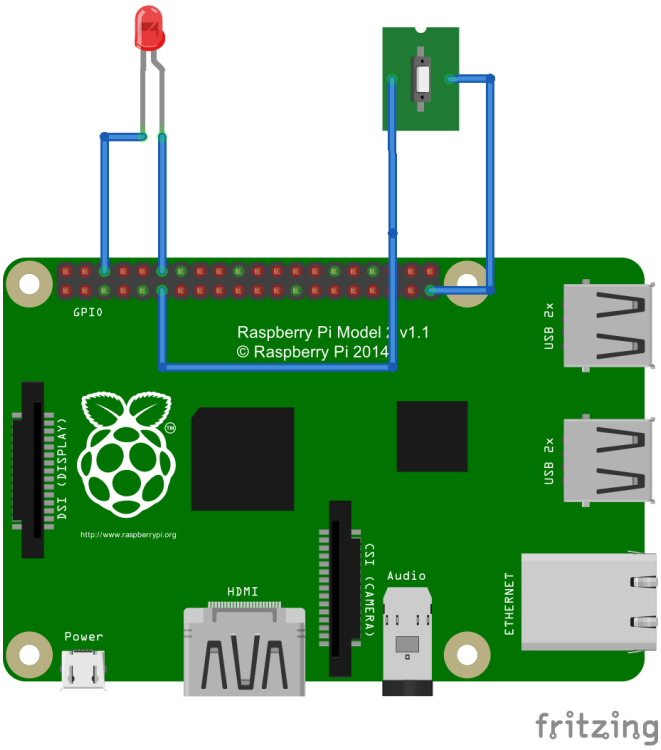
	Power Pin
	Special Function
	GPIO/Special Function

WiringPi GPIO#	Export GPIO#	ODROID-C PIN		Label	HEADER		Label	ODROID-C PIN		Export GPIO#	WiringPi GPIO#
				3V3	1	2	5V0				
			I2CA_SDA	SDA1	3	4	5V0				
			I2CA_SCL	SCL1	5	6	GND				
7	83		GPIOY.BIT3	#83	7	8	TXD1	TXD_B		113	
				GND	9	10	RXD1	RXD_B		114	
0	88		GPIOY.BIT8	#88	11	12	#87	GPIOY.BIT7		87	1
2	116		GPIOX.BIT19	#116	13	14	GND				
3	115		GPIOX.BIT18	#115	15	16	#104	GPIOX.BIT7		104	4
				3V3	17	18	#102	GPIOX.BIT5		102	5
12	107	MOSI	GPIOX.BIT10	MOSI	19	20	GND				
13	106	MISO	GPIOX.BIT9	MISO	21	22	#103	GPIOX.BIT6		103	6
14	105	SCLK	GPIOX.BIT8	SCLK	23	24	CE0	GPIOX.BIT20	CE0	117	10
				GND	25	26	#118	GPIOX.BIT21		118	11
			I2CB_SDA	SDA2	27	28	SCL2	I2CB_SCL			
21	101		GPIOX.BIT4	#101	29	30	GND				
22	100		GPIOX.BIT3	#100	31	32	#99	GPIOX.BIT2		99	26
23	108		GPIOX.BIT11	#108	33	34	GND				
24	97		GPIOX.BIT0	#97	35	36	#98	GPIOX.BIT1		98	27
			ADC.AIN1	AIN1	37	38	1V8	1V8			
				GND	39	40	AIN0	ADC.AIN0			

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

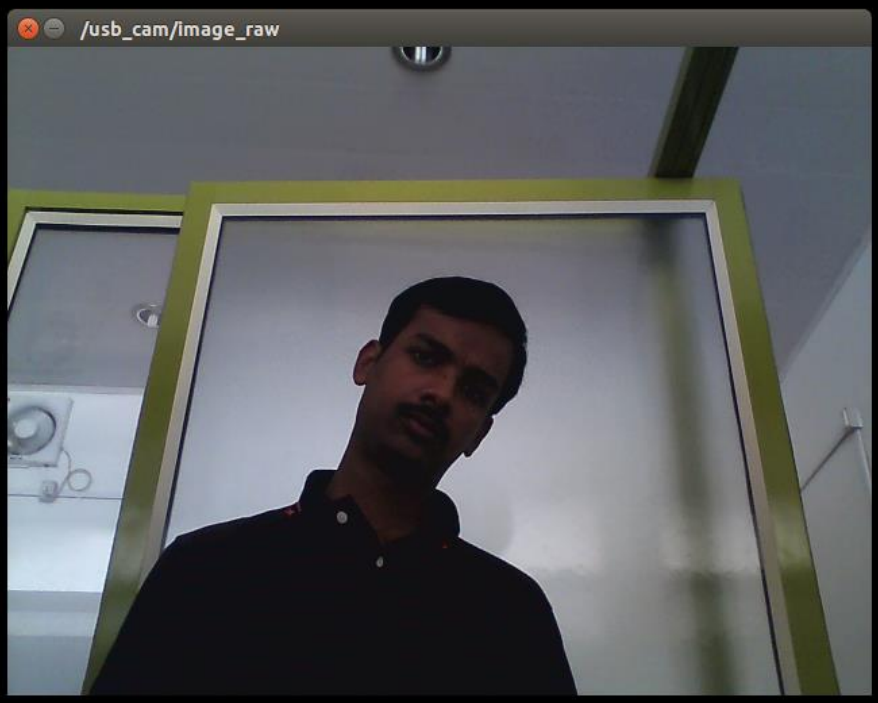



GPIO
Raspberry Pi Model B v1.1
© Raspberry Pi 2014
USB 2x
USB 2x
DSI (DISPLAY)
http://www.raspberrypi.org
CSI (CAMERA)
Audio
HDMI
ETHERNET
Power
fritzing


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

CHAPTER 8

```
setting /run_id to a2751c16-4719-11e5-87e2-9439e54d7dda
process[rosout-1]: started with pid [7193]
started core service [/rosout]
process[usb_cam-2]: started with pid [7210]
process[image_view-3]: started with pid [7238]
[ INFO] [1440061115.268901882]: Using transport "raw"
[ INFO] [1440061115.444921009]: using default calibration URL
[ INFO] [1440061115.445240220]: camera calibration URL: file:///home/lentin/.ros
/camera_info/head_camera.yaml
[ INFO] [1440061115.445450655]: Unable to open camera calibration file [/home/le
ntin/.ros/camera_info/head_camera.yaml]
[ WARN] [1440061115.445595230]: Camera calibration file /home/lentin/.ros/camera
_info/head_camera.yaml not found.
[ INFO] [1440061115.445742030]: Starting 'head_camera' (/dev/video0) at 640x480
via mmap (yuyv) at 30 FPS
[ WARN] [1440061115.531282236]: unknown control 'white_balance_temperature_auto'

[ WARN] [1440061115.538576973]: unknown control 'focus_auto'
```



/home/lentin/catkin_ws/src/usb_cam/launch/usb_cam-te... × | lentin@lentin-Aspire-4755: ~/catkin_ws

```
lentin@lentin-Aspire-4755:~/catkin_ws$ rostopic list
/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
lentin@lentin-Aspire-4755:~/catkin_ws$
```

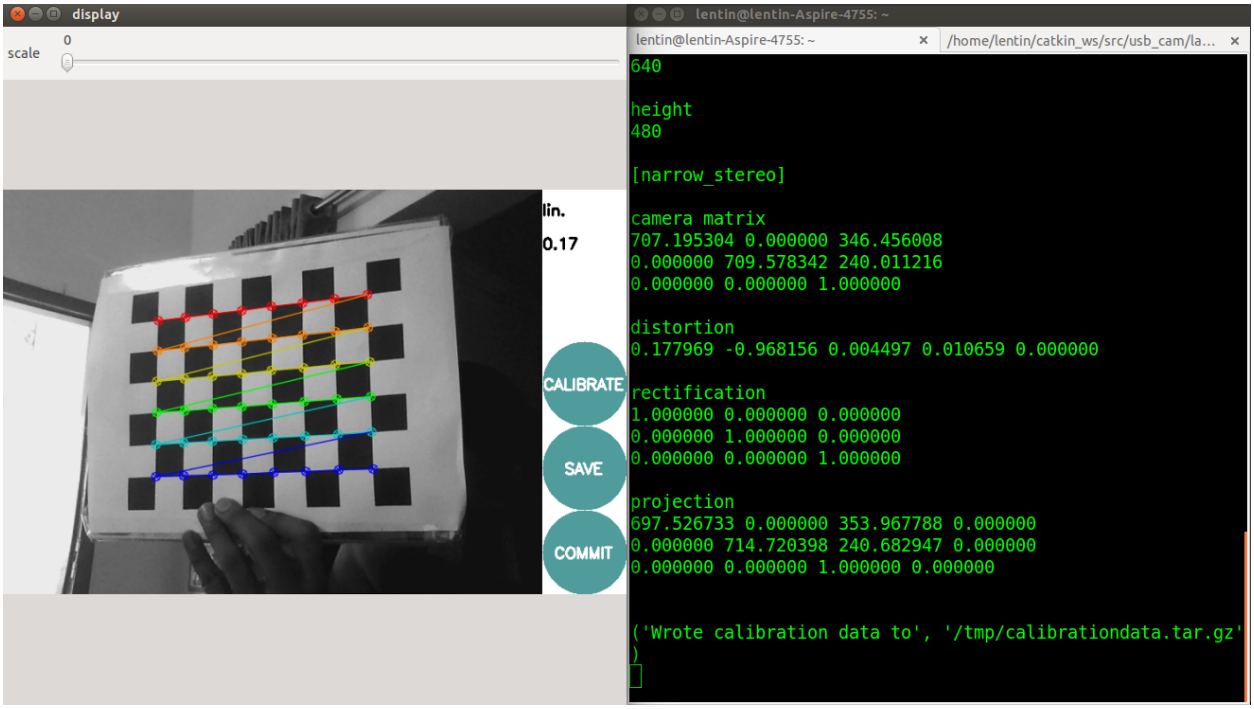
display

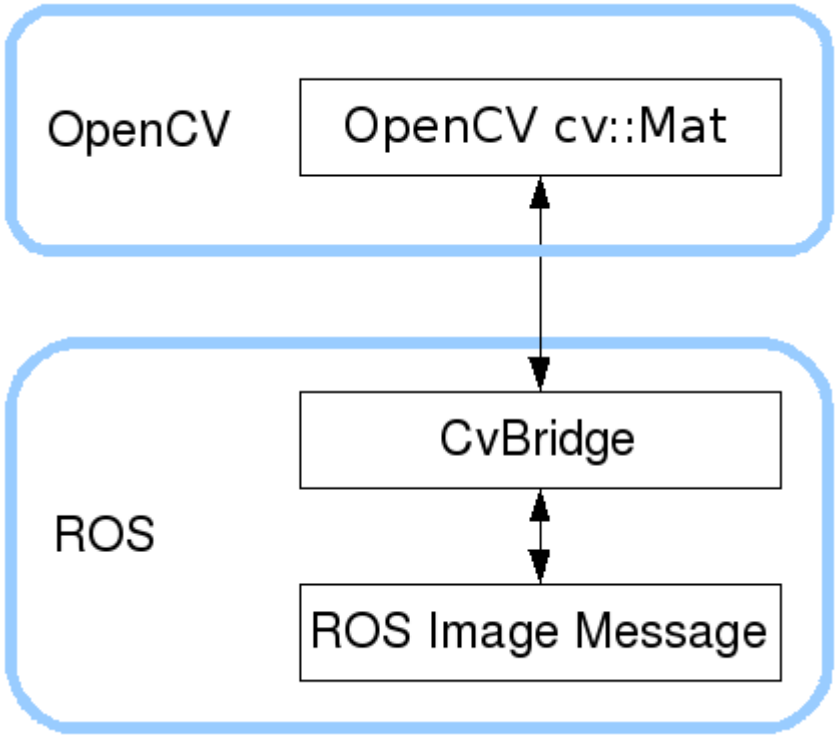
scale 0

lentin@lentin-Aspire-4755: ~

lentin@lentin-Aspire-4755: ~ × | /home/lentin/catkin_ws/src/usb_cam/la... ×

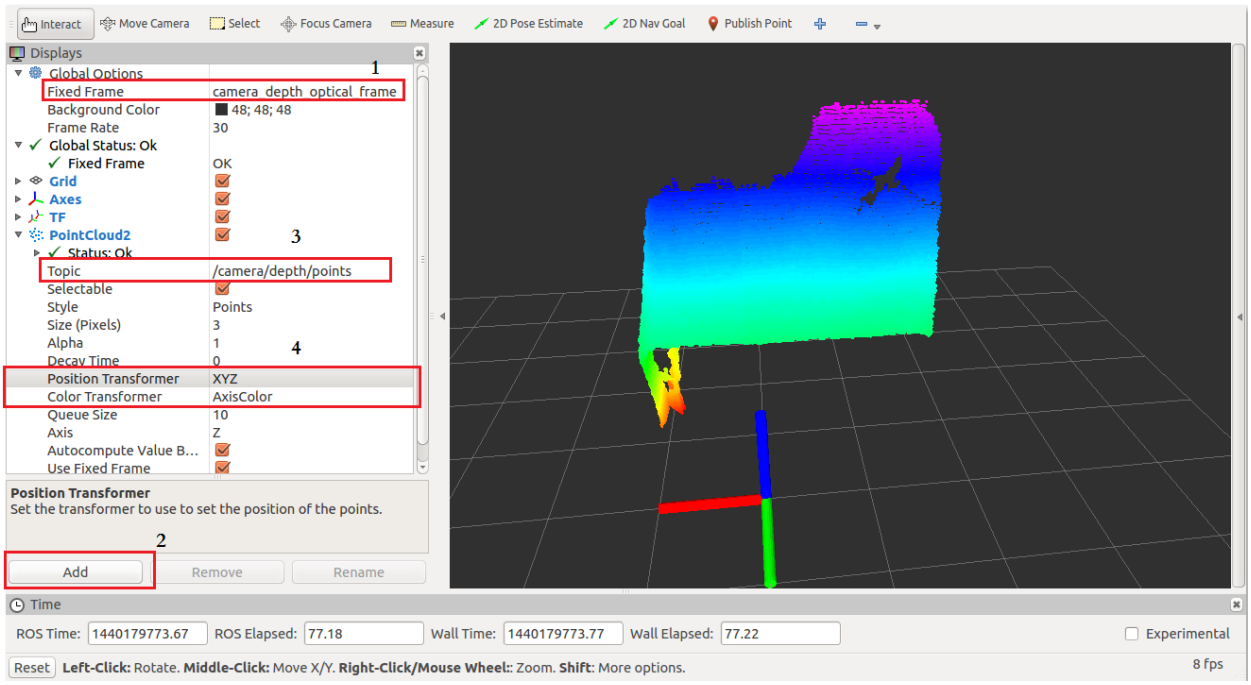
```
lentin@lentin-Aspire-4755:~$ $ rosrun camera_calibration ca
ize 8x6 --square 0.108 image:=/camera/image_raw camera:=/ca
$: command not found
lentin@lentin-Aspire-4755:~$ $ rosrun camera_calibration ca
ize 8x6 --square 0.108 image:=/usb_cam/image_raw camera:=/u
$: command not found
lentin@lentin-Aspire-4755:~$ rosrun camera_calibration came
e 8x6 --square 0.108 image:=/usb_cam/image_raw camera:=/usb
('Waiting for service', '/usb_cam/set_camera_info', '...')
OK
*** Added sample 1, p_x = 0.353, p_y = 0.473, p_size = 0.33
*** Added sample 2, p_x = 0.457, p_y = 0.498, p_size = 0.32
*** Added sample 3, p_x = 0.289, p_y = 0.442, p_size = 0.34
*** Added sample 4, p_x = 0.536, p_y = 0.523, p_size = 0.47
*** Added sample 5, p_x = 0.421, p_y = 0.704, p_size = 0.34
*** Added sample 6, p_x = 0.526, p_y = 0.815, p_size = 0.36
*** Added sample 7, p_x = 0.380, p_y = 0.551, p_size = 0.33
*** Added sample 8, p_x = 0.400, p_y = 0.411, p_size = 0.34
*** Added sample 9, p_x = 0.389, p_y = 0.535, p_size = 0.31
4, skew = 0.386
*** Added sample 10, p_x = 0.371, p_y = 0.497, p_size = 0.2
90, skew = 0.542
*** Added sample 11, p_x = 0.404, p_y = 0.480, p_size = 0.2
51, skew = 0.720
*** Added sample 12, p_x = 0.415, p_y = 0.474, p_size = 0.3
53, skew = 0.626
```

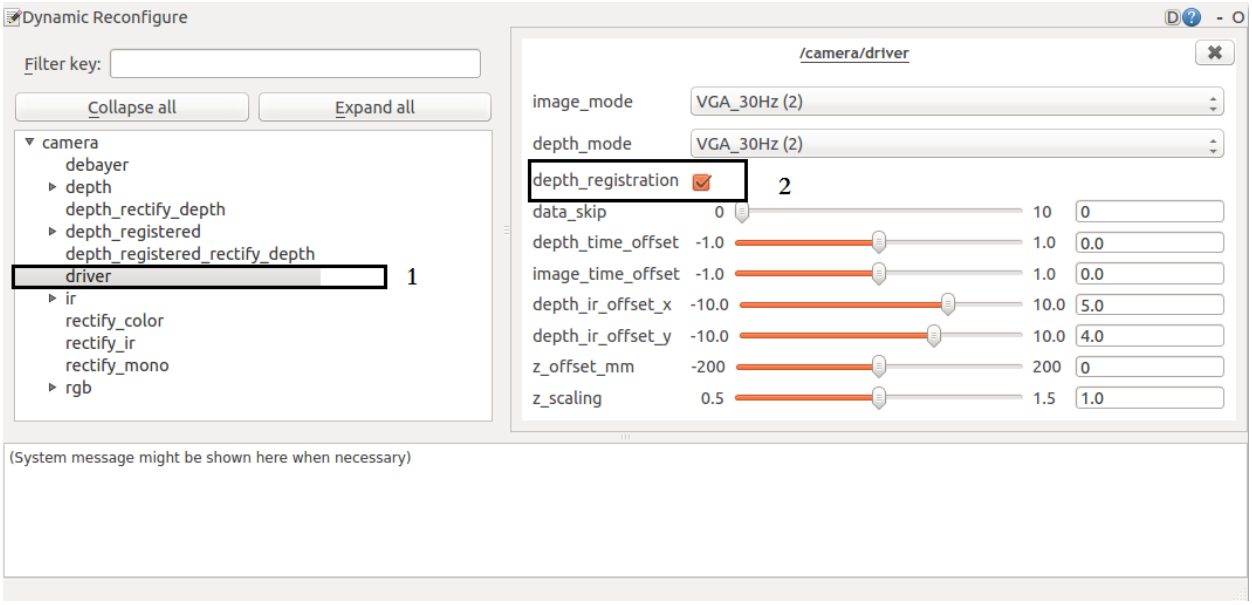

display
scale
0
lin.
0.17
CALIBRATE
SAVE
COMMIT
lentin@lentin-Aspire-4755: ~
lentin@lentin-Aspire-4755: ~
/home/lentin/catkin_ws/src/usb_cam/la...
640
height
480
[narrow_stereo]
camera matrix
707.195304 0.000000 346.456008
0.000000 709.578342 240.011216
0.000000 0.000000 1.000000
distortion
0.177969 -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'
)

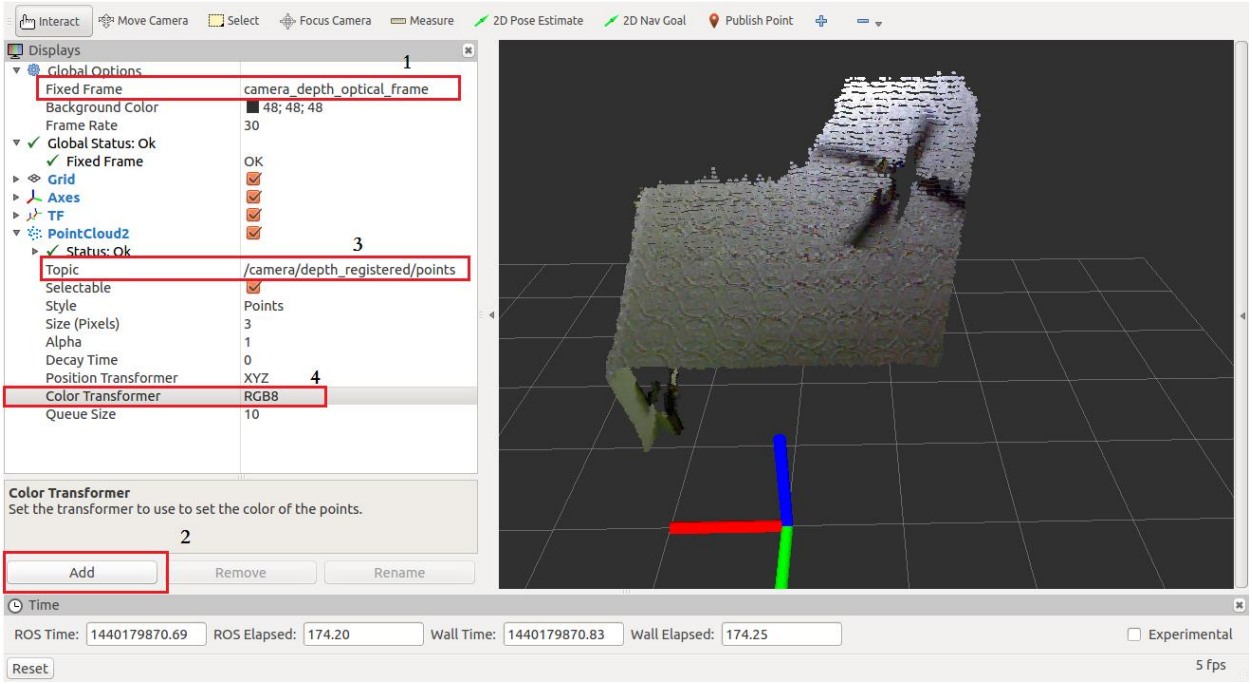

OpenCV
OpenCV cv::Mat
CvBridge
ROS
ROS Image Message


Raw Image window
Edge Detection

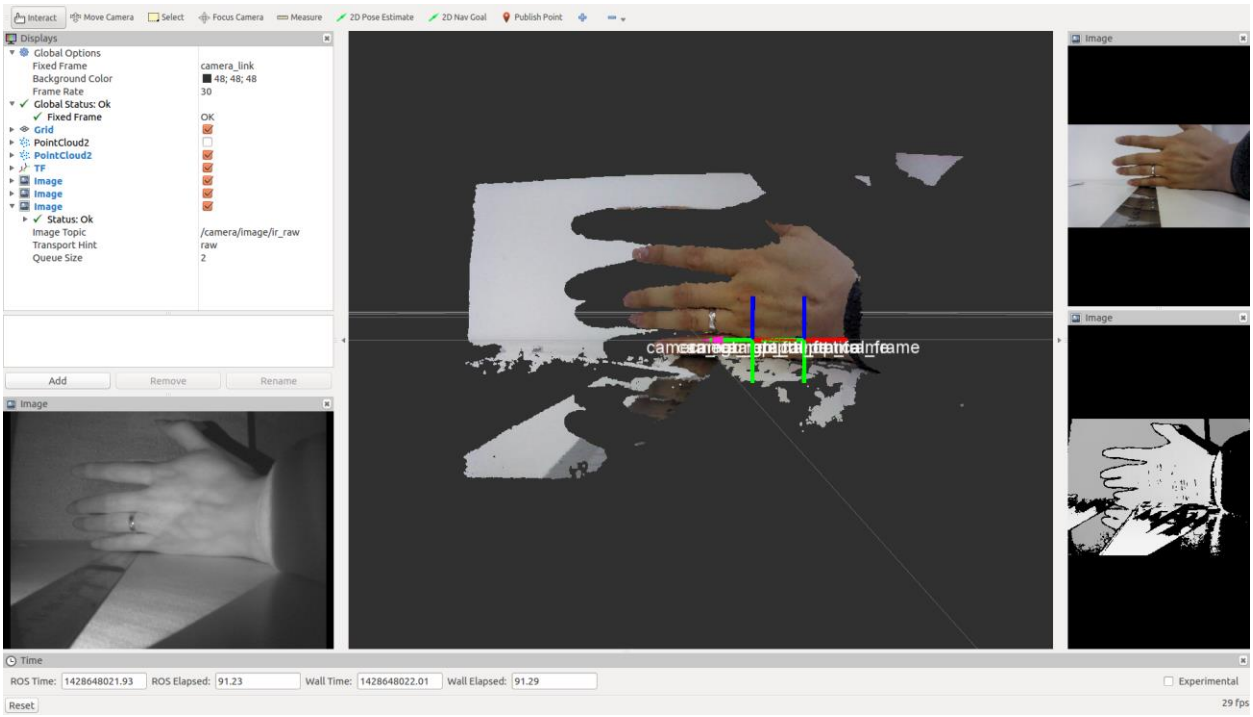

XBOX 360
KINECT
ASUS

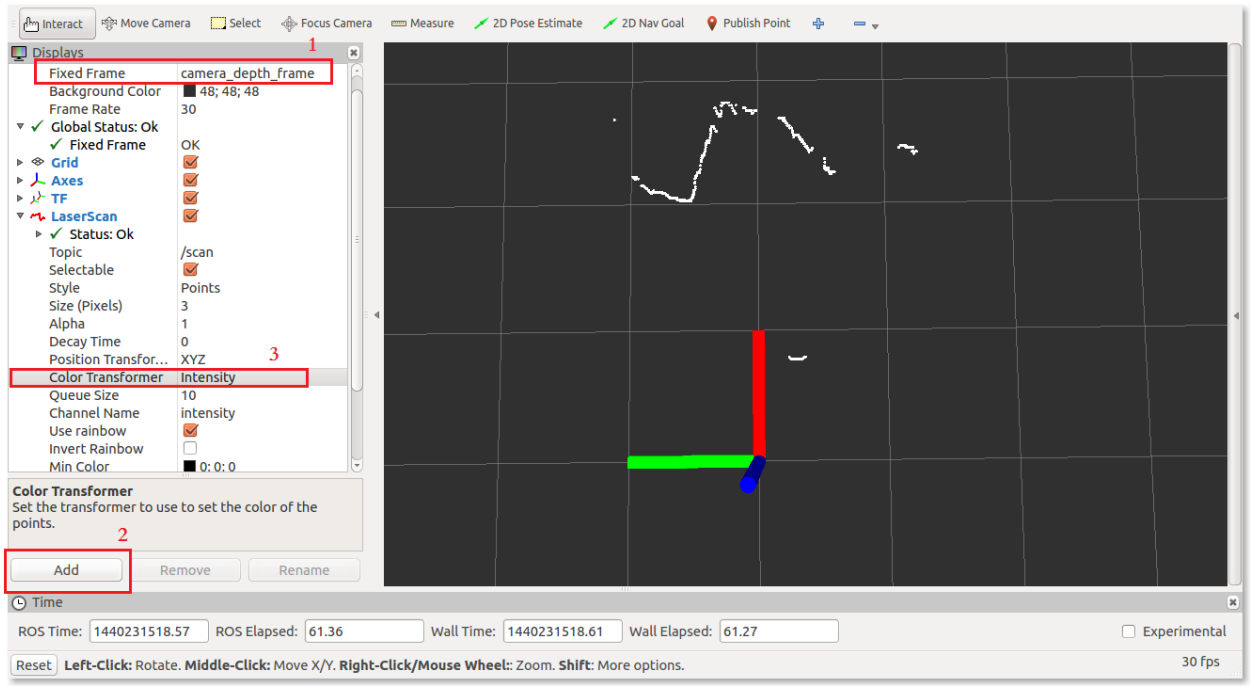

Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame
camera_depth_optical_frame
Background Color
48; 48; 48
Frame Rate
30
Global Status: Ok
Fixed Frame
OK
Grid
Axes
TF
PointCloud2
Status: Ok
Topic
/camera/depth/points
Selectable
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)

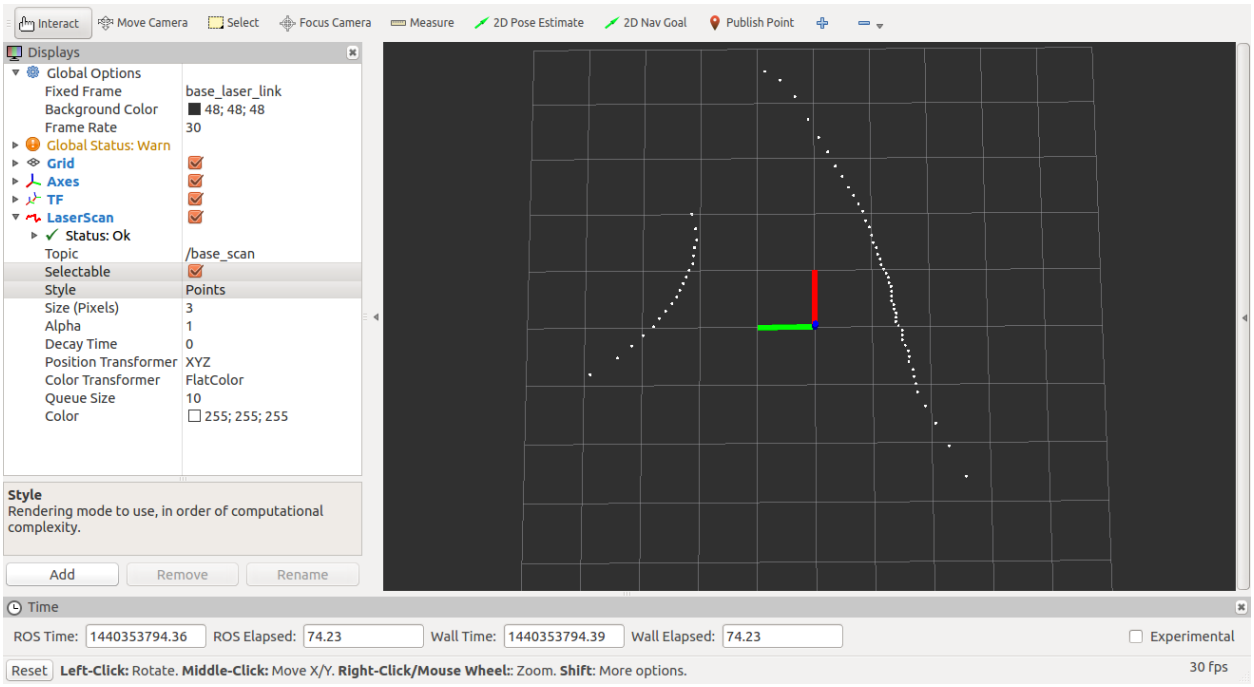

Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame
camera_depth_optical_frame
Background Color
48; 48; 48
Frame Rate
30
Global Status: Ok
Fixed Frame
OK
Grid
Axes
TF
PointCloud2
Status: Ok
Topic
/camera/depth_registered/points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

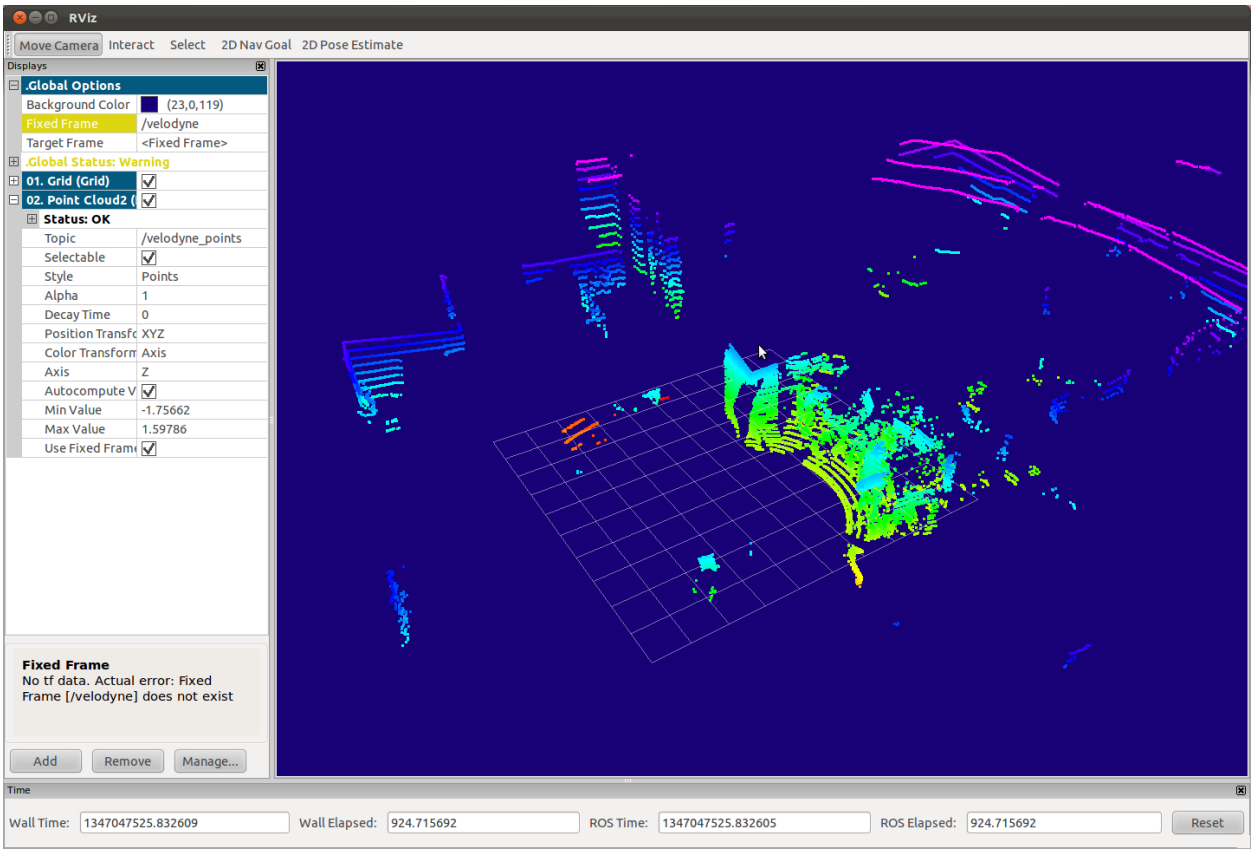

CREATIVE


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

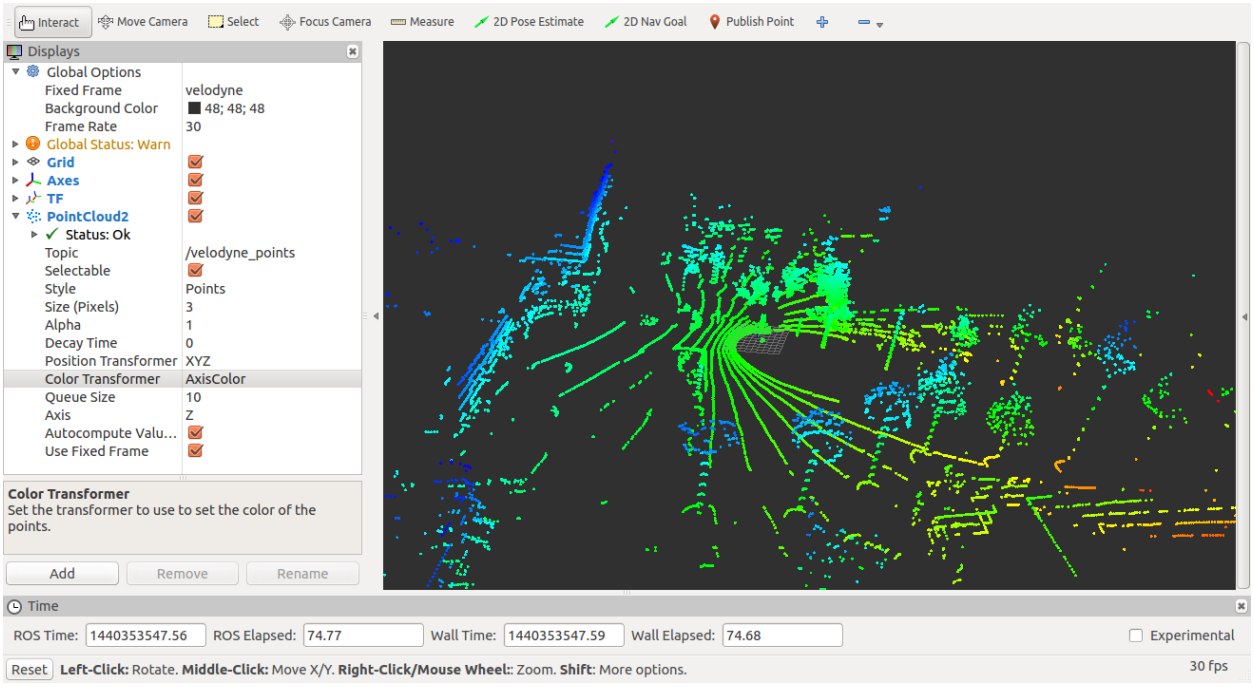

Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
1
Fixed Frame
camera_depth_frame
Background Color
48; 48; 48
Frame Rate
30
Global Status: Ok
Fixed Frame
OK
Grid
Axes
TF
LaserScan
Status: Ok
Topic
/scan
Selectable
Style
Points
Size (Pixels)
3
Alpha
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

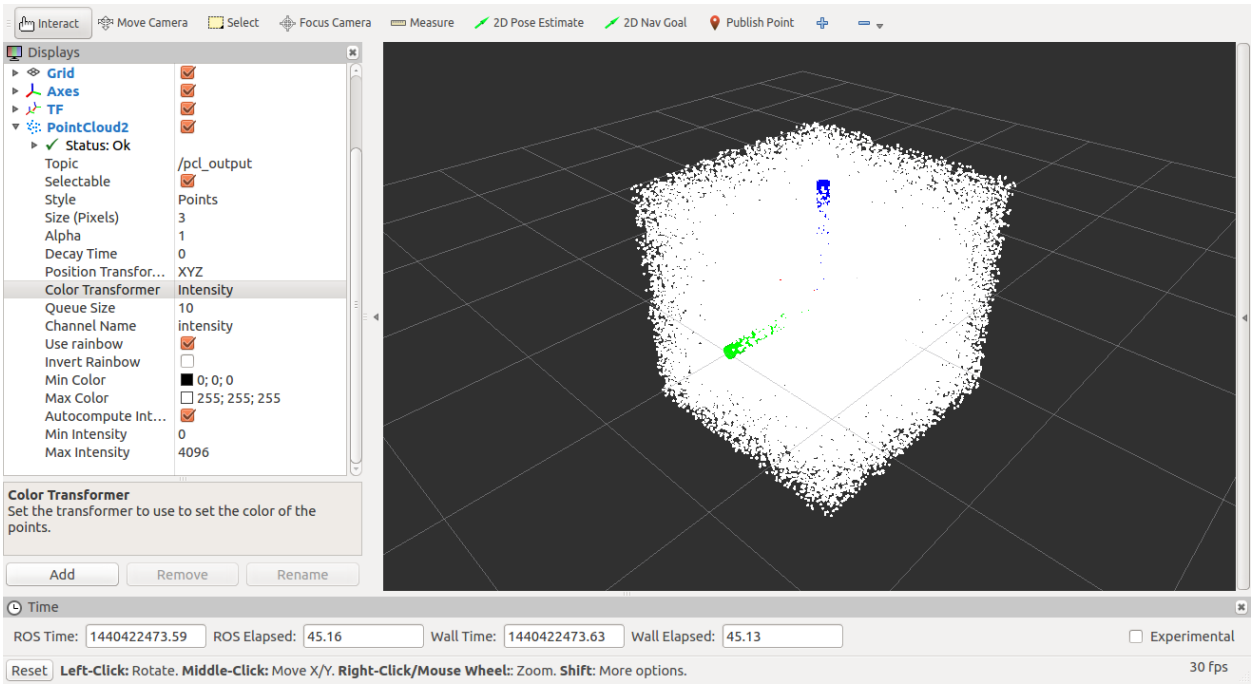

HOKUYO

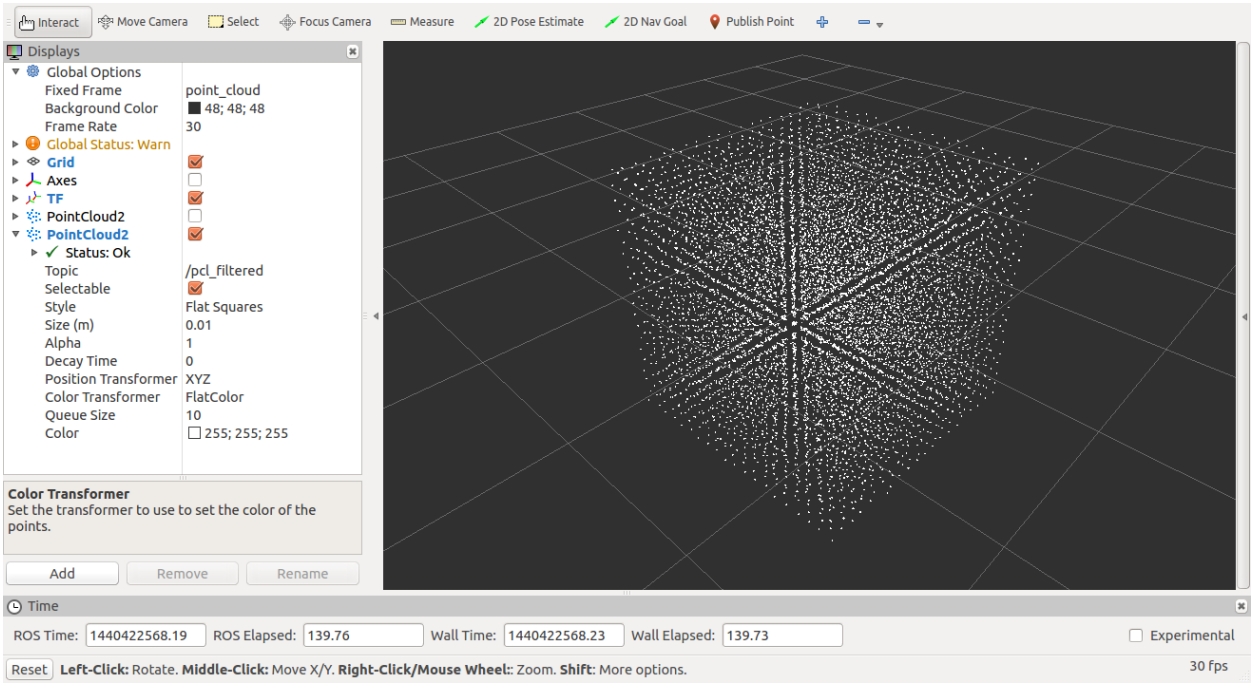

Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame base_laser_link
Background Color 48; 48; 48
Frame Rate 30
Global Status: Warn
Grid
Axes
TF
LaserScan
Status: Ok
Topic /base_scan
Selectable
Style Points
Size (Pixels) 3
Alpha 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


RViz
Move Camera
Interact
Select
2D Nav Goal
2D Pose Estimate
Displays
.Global Options
Background Color (23,0,119)
Fixed Frame /velodyne
Target Frame <Fixed Frame>
.Global Status: Warning
01. Grid (Grid)
02. Point Cloud2
Status: OK
Topic /velodyne_points
Selectable
Style Points
Alpha 1
Decay Time 0
Position Transfc XYZ
Color Transform Axis
Axis Z
Autocompute V
Min Value -1.75662
Max Value 1.59786
Use Fixed Fram
Fixed Frame
No tf data. Actual error: Fixed Frame [/velodyne] does not exist
Add
Remove
Manage...
Time
Wall Time: 1347047525.832609
Wall Elapsed: 924.715692
ROS Time: 1347047525.832605
ROS Elapsed: 924.715692
Reset


Velodyne
Velodyne
Velodyne

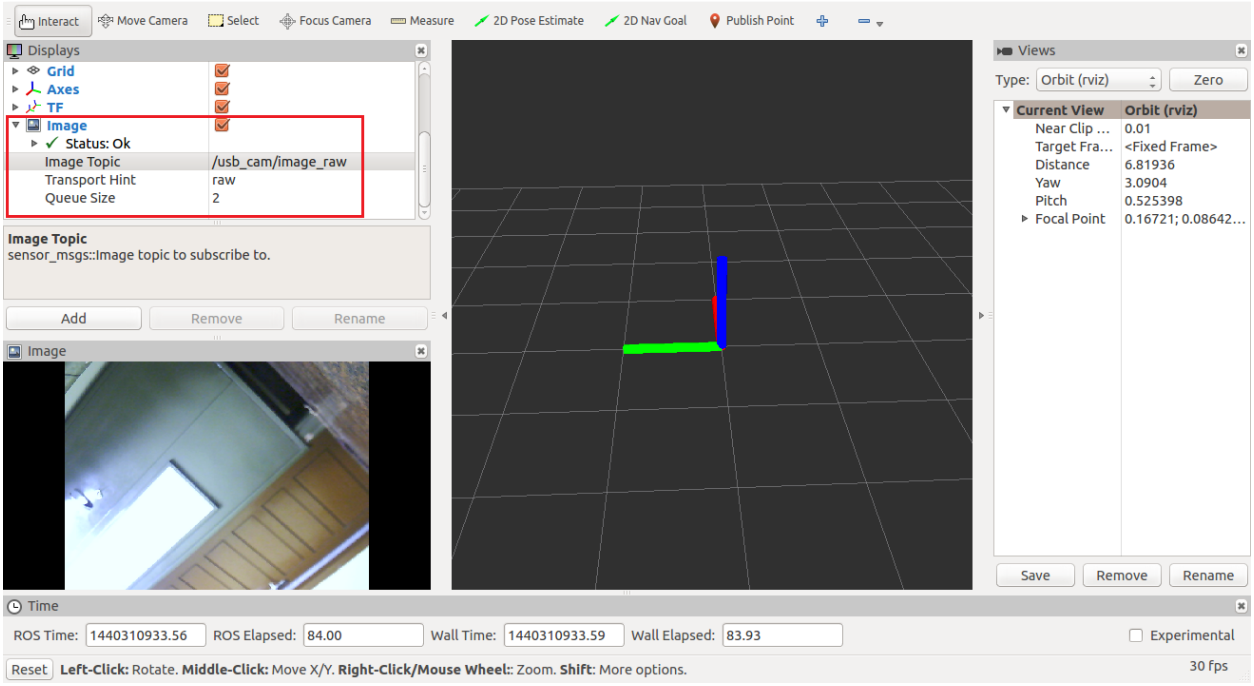

Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame velodyne
Background Color 48; 48; 48
Frame Rate 30
Global Status: Warn
Grid
Axes
TF
PointCloud2
Status: Ok
Topic /velodyne_points
Selectable
Style Points
Size (Pixels) 3
Alpha 1
Decay Time 0
Position Transformer XYZ
Color Transformer AxisColor
Queue Size 10
Axis Z
Autocompute Valu…
Use Fixed Frame
Color Transformer
Set the transformer to use to set the color of the points.
Add
Remove
Rename
Time
ROS Time: 1440353547.56
ROS Elapsed: 74.77
Wall Time: 1440353547.59
Wall Elapsed: 74.68
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


Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame point_cloud
Background Color 48; 48; 48
Frame Rate 30
Global Status: Warn
Grid
Axes
TF
PointCloud2
PointCloud2
Status: Ok
Topic /pcl_filtered
Selectable
Style Flat Squares
Size (m) 0.01
Alpha 1
Decay Time 0
Position Transformer XYZ
Color Transformer FlatColor
Queue Size 10
Color 255; 255; 255
Color Transformer
Set the transformer to use to set the color of the points.
Add
Remove
Rename
Time
ROS Time: 1440422568.19
ROS Elapsed: 139.76
Wall Time: 1440422568.23
Wall Elapsed: 139.73
Experimental
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click/Mouse Wheel:: Zoom. Shift: More options.
30 fps

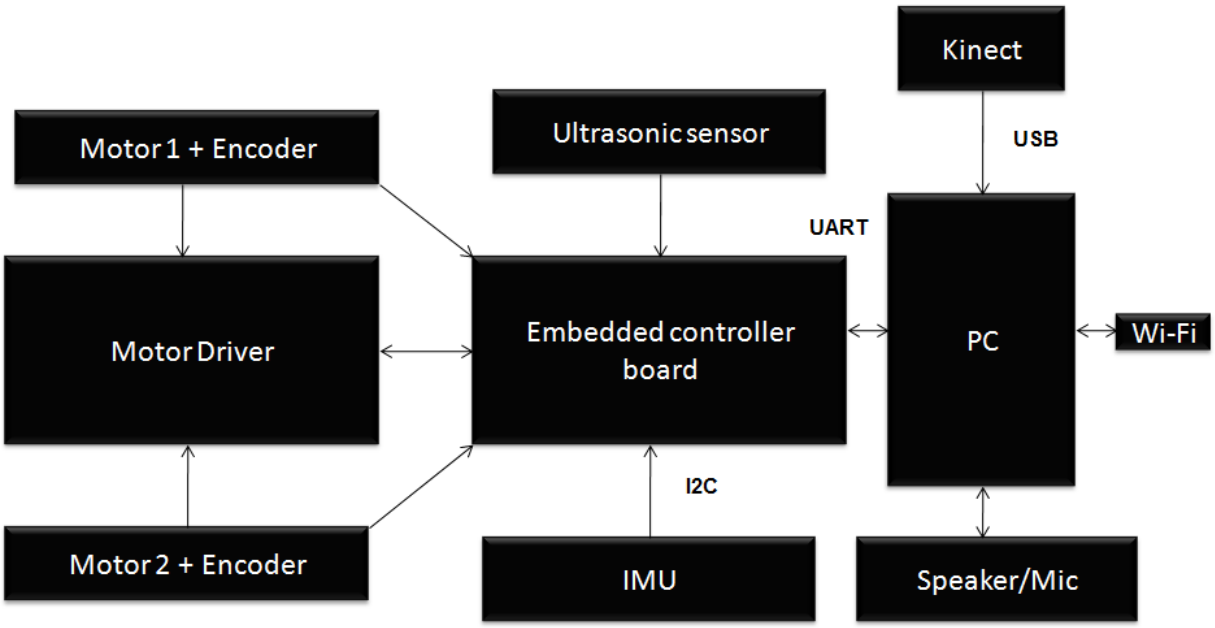
```
NODES
  /
    usb_cam (usb_cam/usb_cam_node)

auto-starting new master
process[master]: started with pid [3175]
ROS_MASTER_URI=http://10.42.0.94:11311

setting /run_id to 05c2ebd0-495f-11e5-9af9-001e06c210fb
process[rosout-1]: started with pid [3188]
started core service [/rosout]
process[usb_cam-2]: started with pid [3205]
[ INFO] [1440310820.477715000]: using default calibration URL
[ INFO] [1440310820.478223000]: camera calibration URL: file:///home/odroid/.ros/camera_info/head_camera.yaml
[ INFO] [1440310820.478641000]: Unable to open camera calibration file [/home/odroid/.ros/camera_info/head_camera.yaml]
[ WARN] [1440310820.478818000]: Camera calibration file /home/odroid/.ros/camera_info/head_camera.yaml not found.
[ INFO] [1440310820.479016000]: Starting 'head_camera' (/dev/video0) at 640x480 via mmap (yuyv) at 30 FPS
[ WARN] [1440310820.607612000]: unknown control 'focus_auto'
```

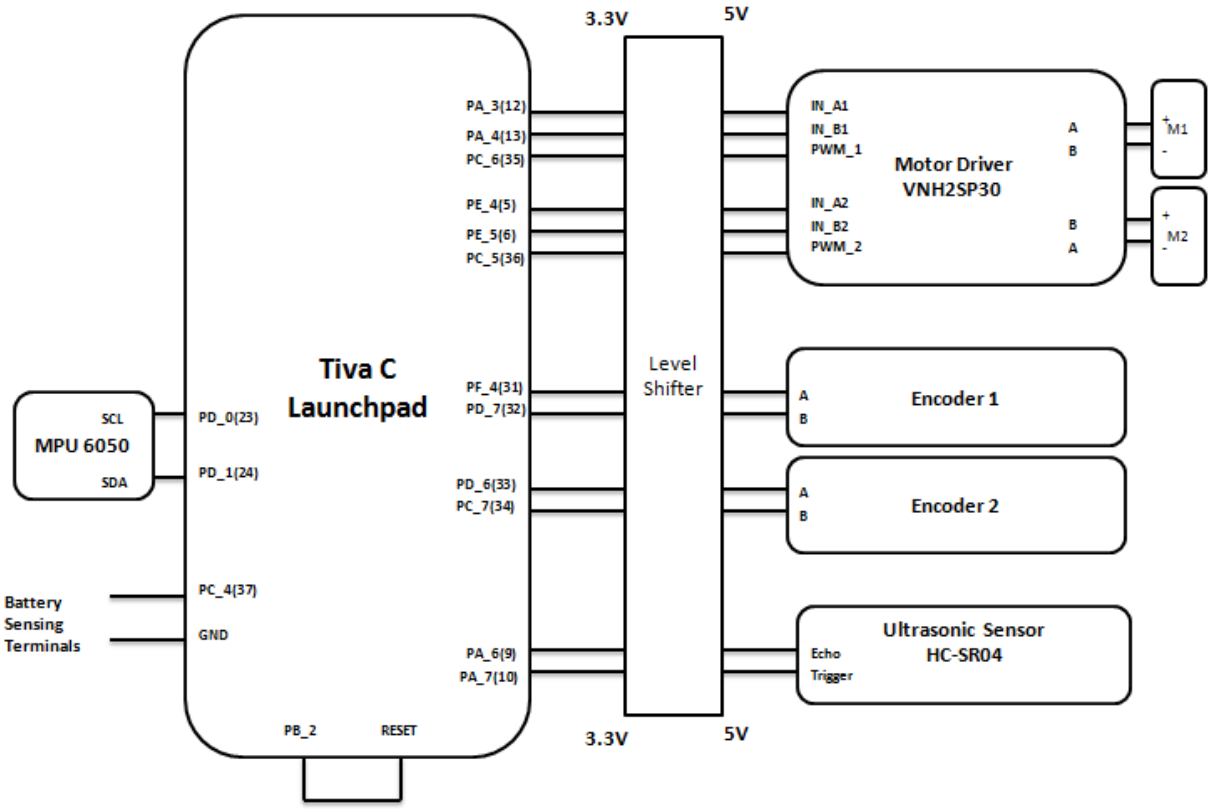
```
lentin@lentin-Aspire-4755:~$ rostopic list
/clicked_point
/initialpose
/move_base_simple/goal
/rosout
/rosout_agg
/tf
/tf_static
/usb_cam/camera_info
/usb_cam/image_raw
/usb_cam/image_raw/compressed
/usb_cam/image_raw/compressed/parameter_descriptions
/usb_cam/image_raw/compressed/parameter_updates
/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
lentin@lentin-Aspire-4755:~$
```


Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Grid
Axes
TF
Image
Status: Ok
Image Topic
/usb_cam/image_raw
Transport Hint
raw
Queue Size
2
Image Topic
sensor_msgs::Image topic to subscribe to.
Add
Remove
Rename
Image
Views
Type:
Orbit (rviz)
Zero
Current View
Orbit (rviz)
Near Clip ...
0.01
Target Fra...
<Fixed Frame>
Distance
6.81936
Yaw
3.0904
Pitch
0.525398
Focal Point
0.16721; 0.08642...
Save
Remove
Rename
Time
ROS Time:
1440310933.56
ROS Elapsed:
84.00
Wall Time:
1440310933.59
Wall Elapsed:
83.93
Experimental
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click/Mouse Wheel:: Zoom. Shift: More options.
30 fps

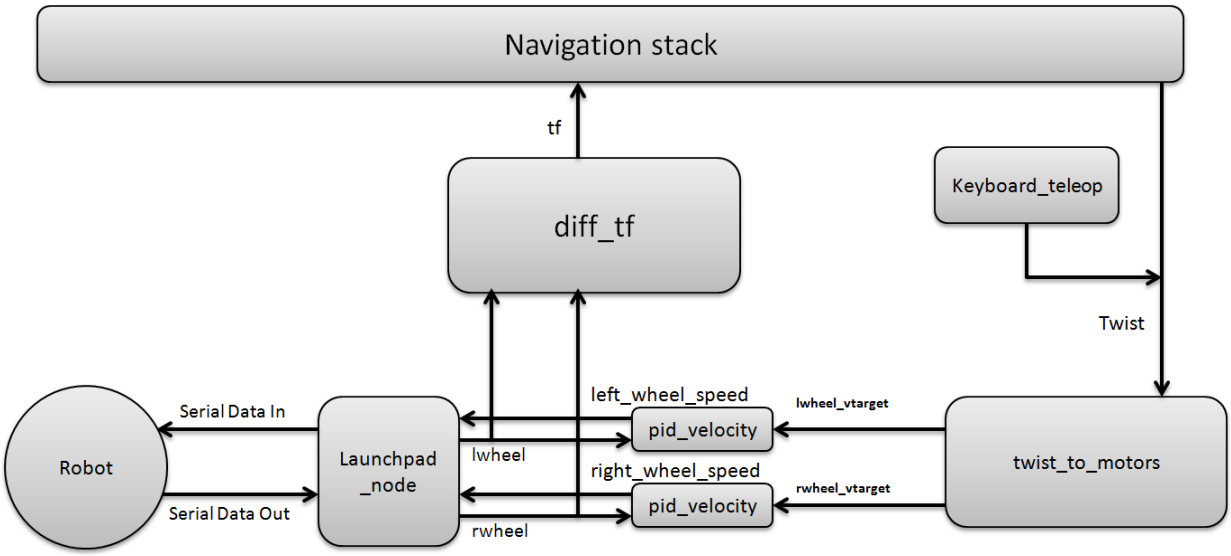
CHAPTER 9


XBOX 360
KINECT

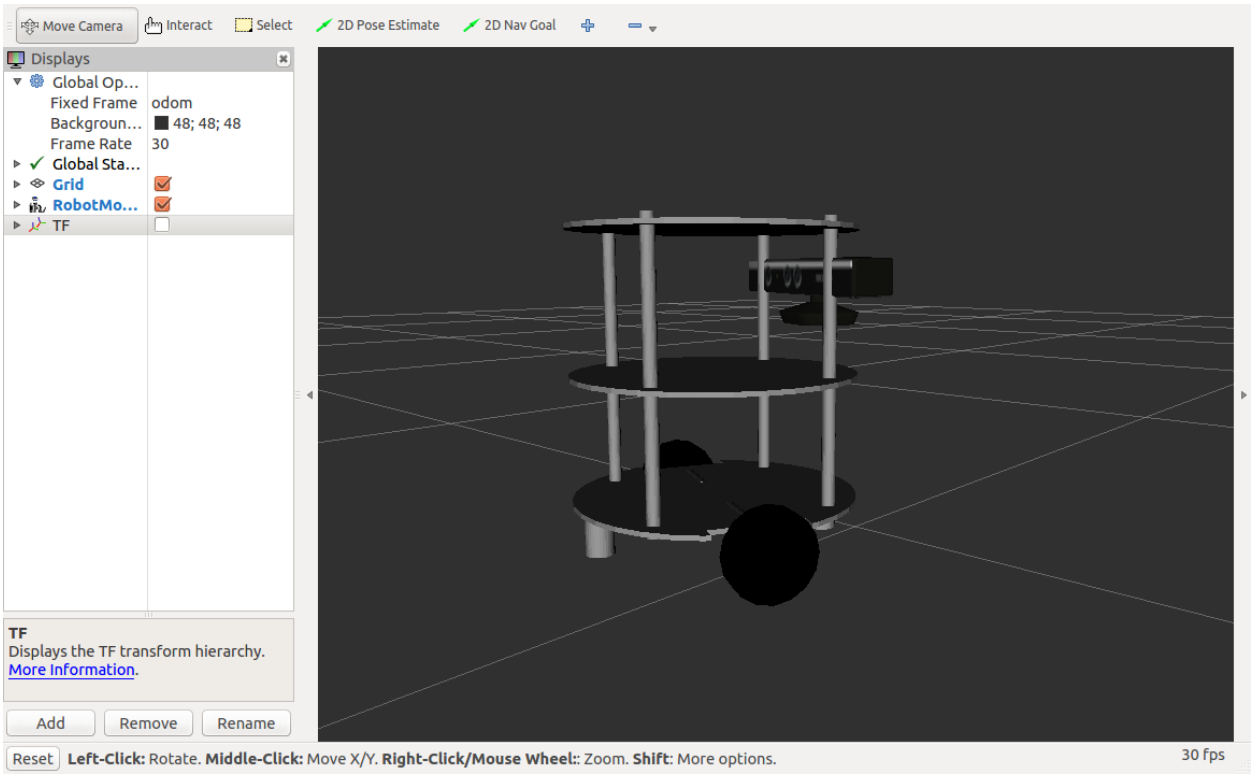

Kinect
USB
Motor 1 + Encoder
Ultrasonic sensor
UART
Motor Driver
Embedded controller board
PC
Wi-Fi
I2C
Motor 2 + Encoder
IMU
Speaker/Mic

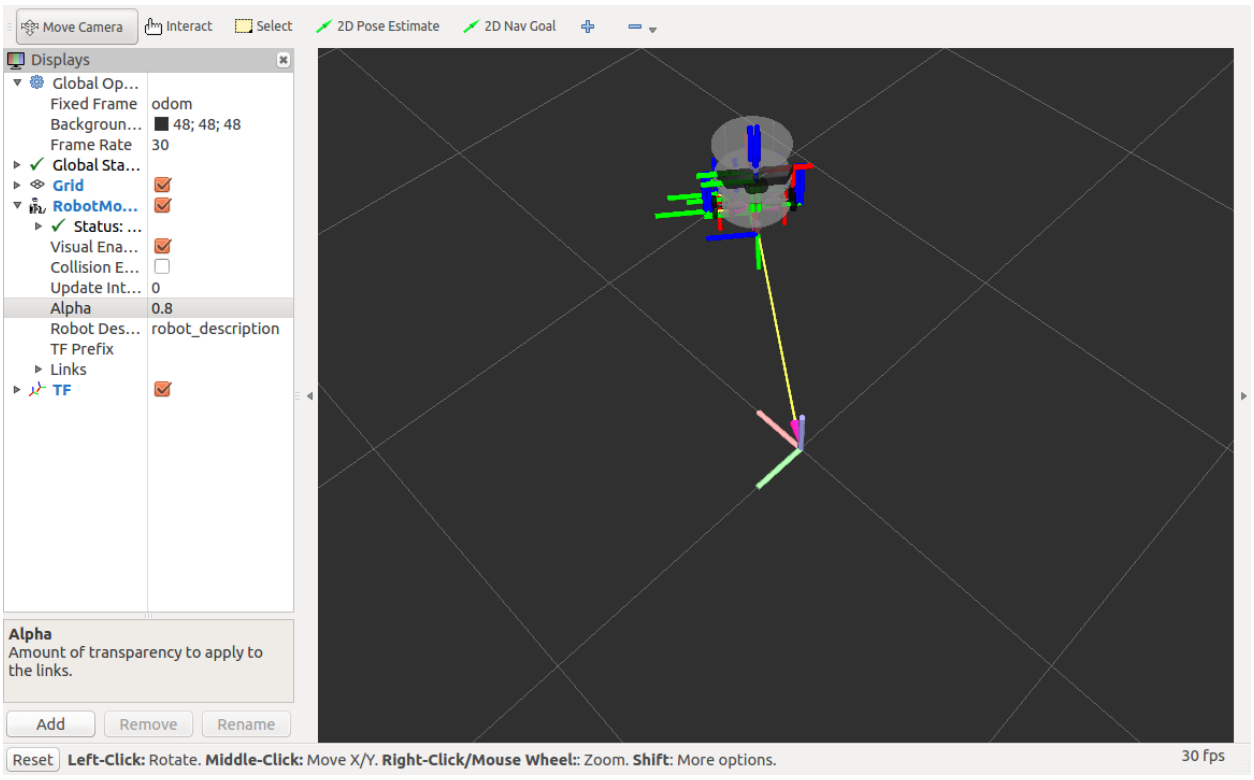

3.3V
5V
PA_3(12)
PA_4(13)
PC_6(35)
PE_4(5)
PE_5(6)
PC_5(36)
IN_A1
IN_B1
PWM_1
IN_A2
IN_B2
PWM_2
Motor Driver
VNH2SP30
A
B
B
A
M1
M2
Tiva C
Launchpad
Level
Shifter
PF_4(31)
PD_7(32)
PD_6(33)
PC_7(34)
Encoder 1
Encoder 2
SCL
MPU 6050
SDA
PD_0(23)
PD_1(24)
PC_4(37)
GND
Battery
Sensing
Terminals
PA_6(9)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

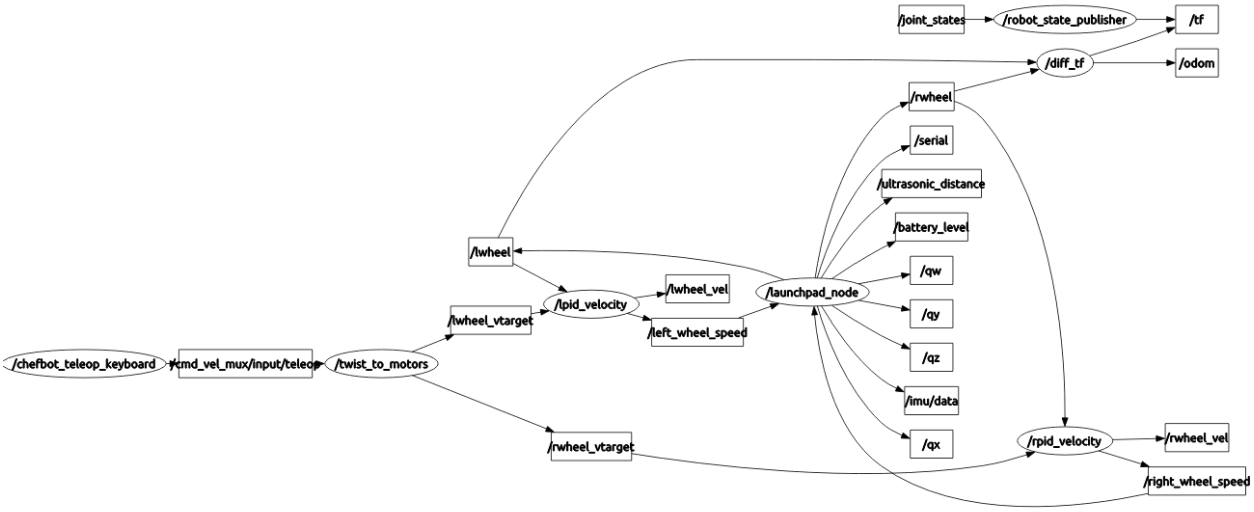
```
b       0.00
t       66458239        0.05
e       0       0
u       10
s       0.00    0.00
i       -0.68   -0.47   -0.40   0.40
b       0.00
t       66511681        0.05
e       0       0
u       10
s       0.00    0.00
i       -0.68   -0.47   -0.40   0.40
b       0.00
t       66566051        0.05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

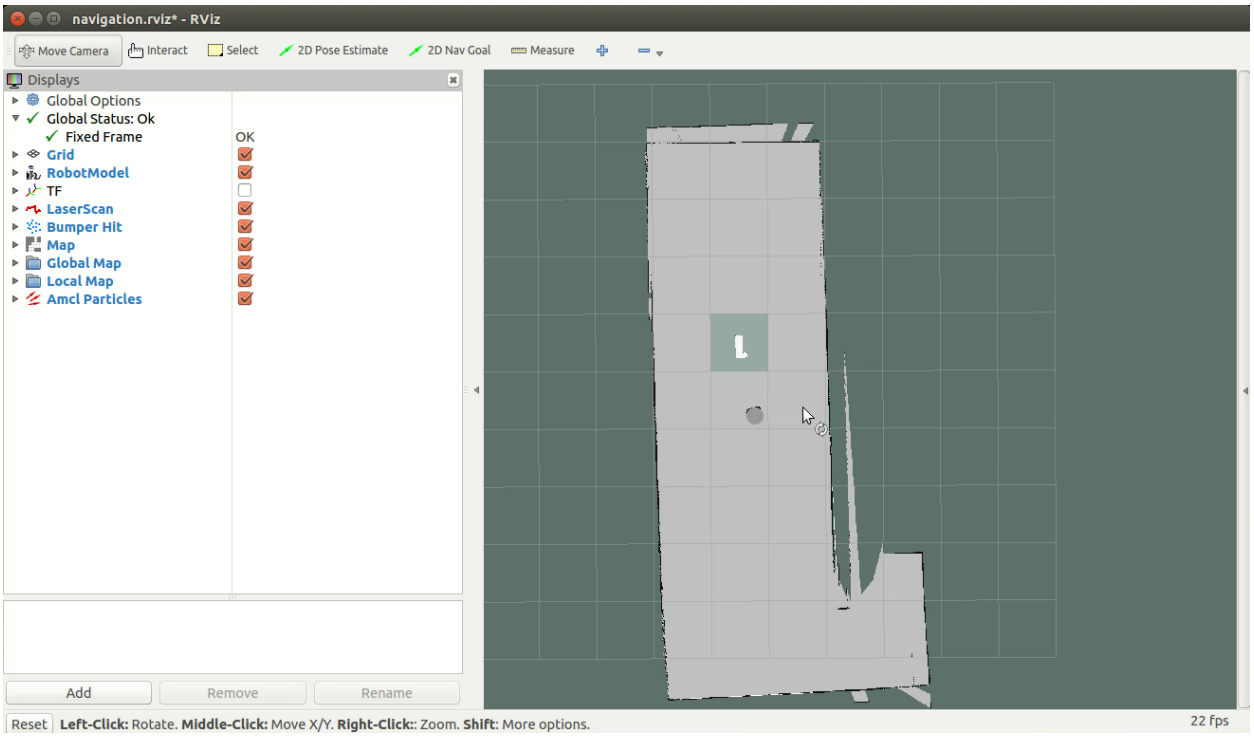


```
lentin@lentin-Aspire-4755:~$ rostopic list
/battery_level
/cmd_vel_mux/input/teleop
/imu/data
/joint_states
/left_wheel_speed
/lwheel
/lwheel_vel
/lwheel_vtarget
/odom
/qw
/qx
/qy
/qz
/right_wheel_speed
/rosout
/rosout_agg
/rwheel
/rwheel_vel
/rwheel_vtarget
/serial
/tf
/ultrasonic_distance
```

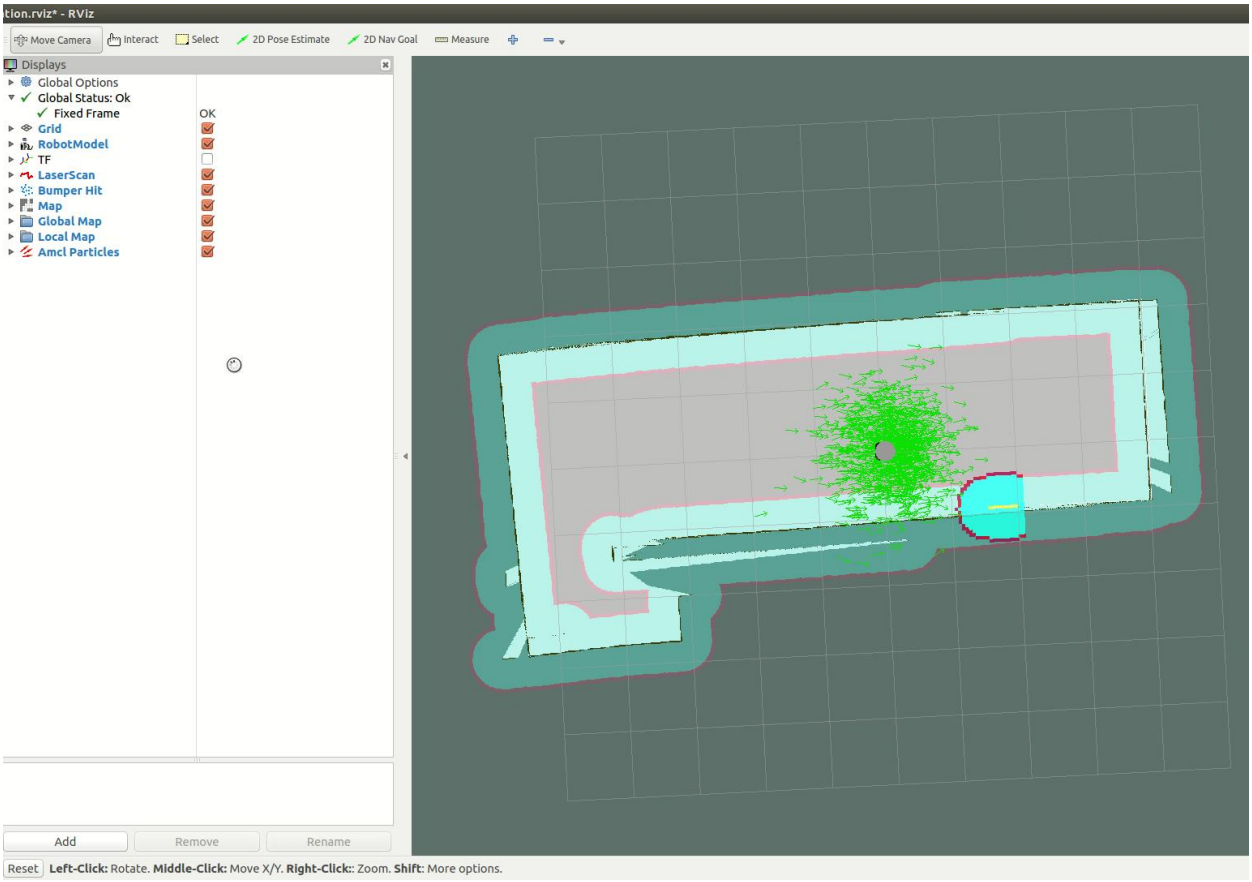

Move Camera
Interact
Select
2D Pose Estimate
2D Nav Goal
Displays
Global Op...
Fixed Frame
odom
Backgroun...
48; 48; 48
Frame Rate
30
Global Sta...
Grid
RobotMo...
TF
TF
Displays the TF transform hierarchy.
More Information.
Add
Remove
Rename
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click/Mouse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

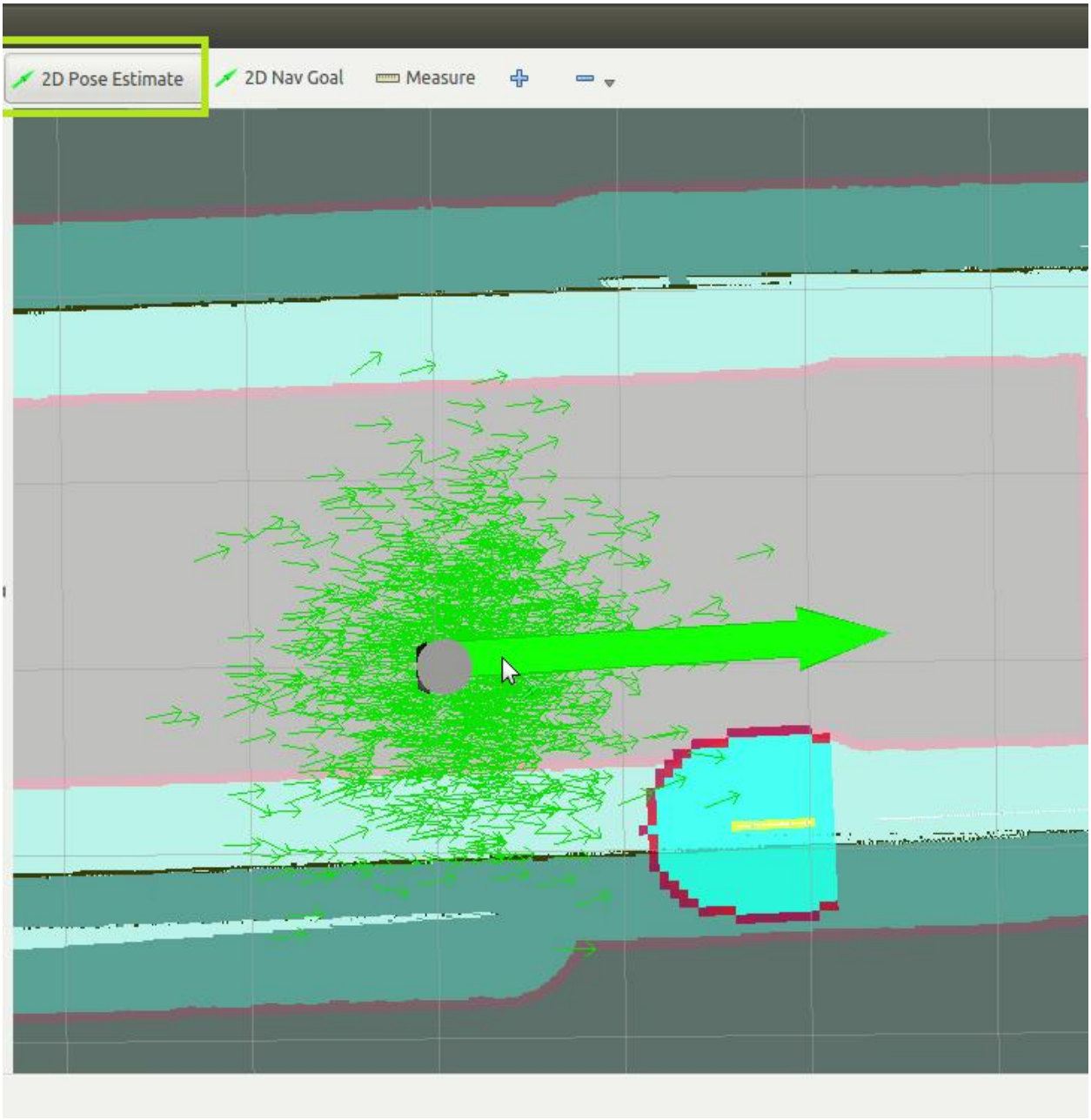

Move Camera
Interact
Select
2D Pose Estimate
2D Nav Goal
Displays
Global Op...
Fixed Frame
odom
Backgroun...
48; 48; 48
Frame Rate
30
Global Sta...
Grid
RobotMo...
Status: ...
Visual Ena...
Collision E...
Update Int...
0
Alpha
0.8
Robot Des...
robot_description
TF Prefix
Links
TF
Alpha
Amount of transparency 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

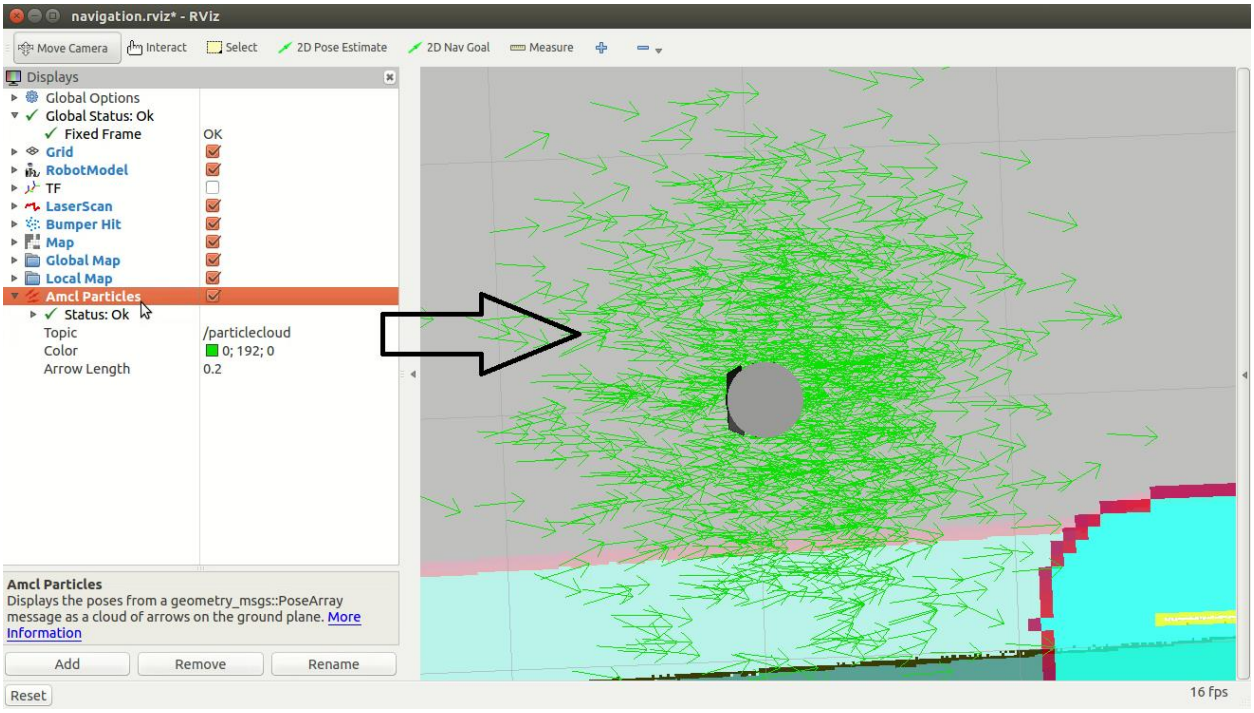


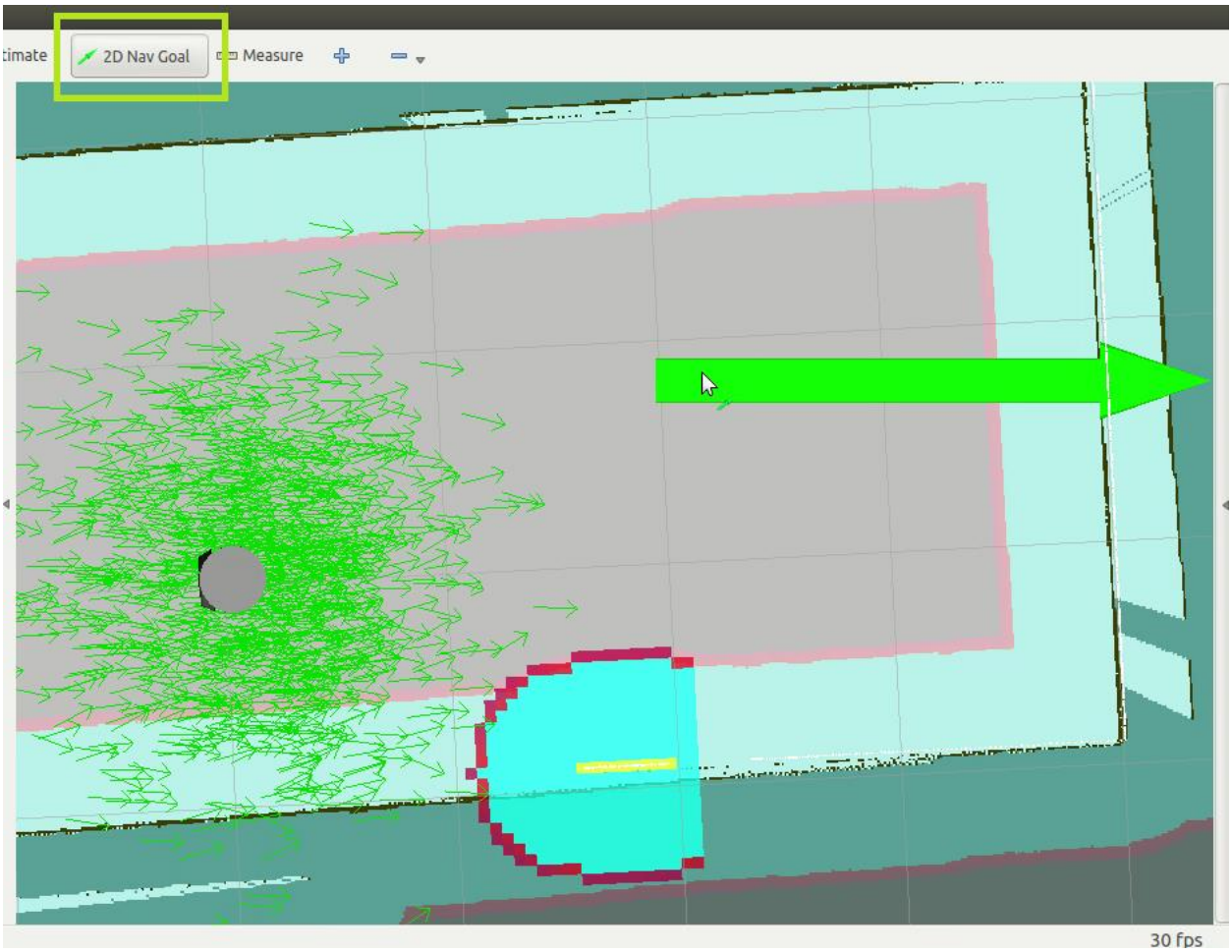


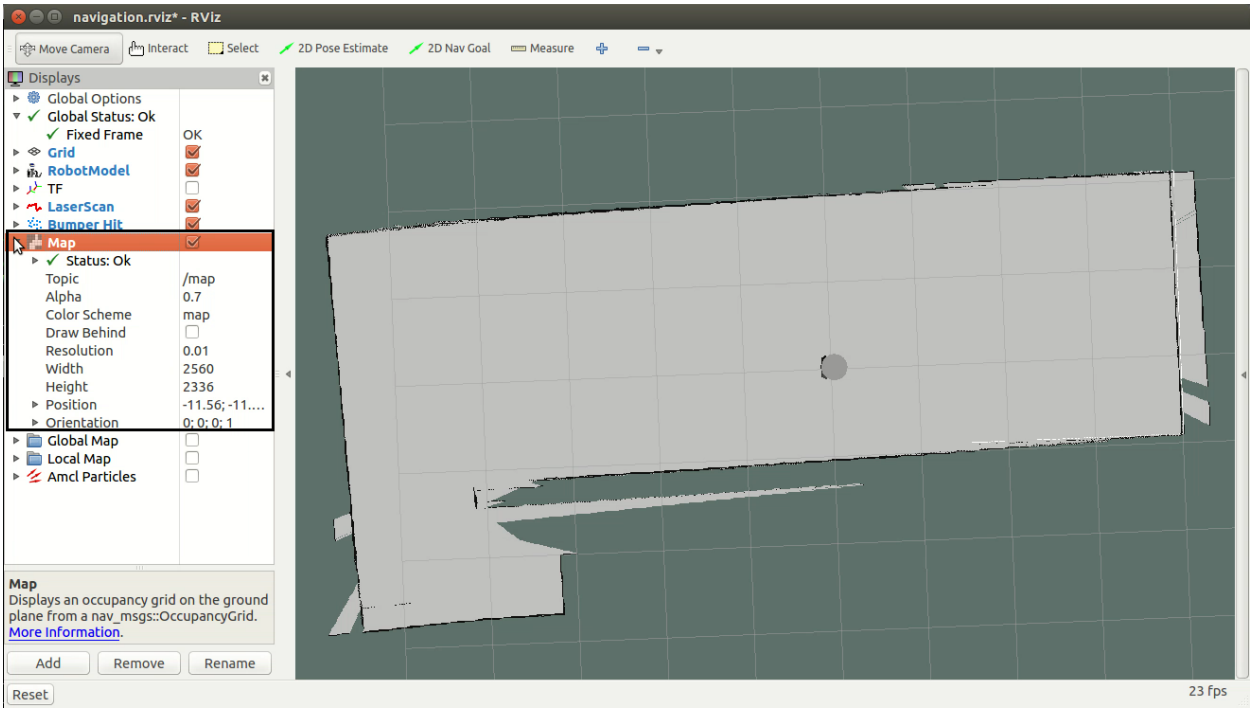

```
lentin@lentin-Aspire-4755:~$ rosrun map_server map_saver -f room
[ INFO] [1441544530.992319268]: Waiting for the map
[ INFO] [1441544531.226293214]: Received a 2560 X 2336 map @ 0.010 m/pix
[ INFO] [1441544531.226483203]: Writing map occupancy data to room.pgm
[ INFO] [1441544531.497796388, 101.846000000]: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

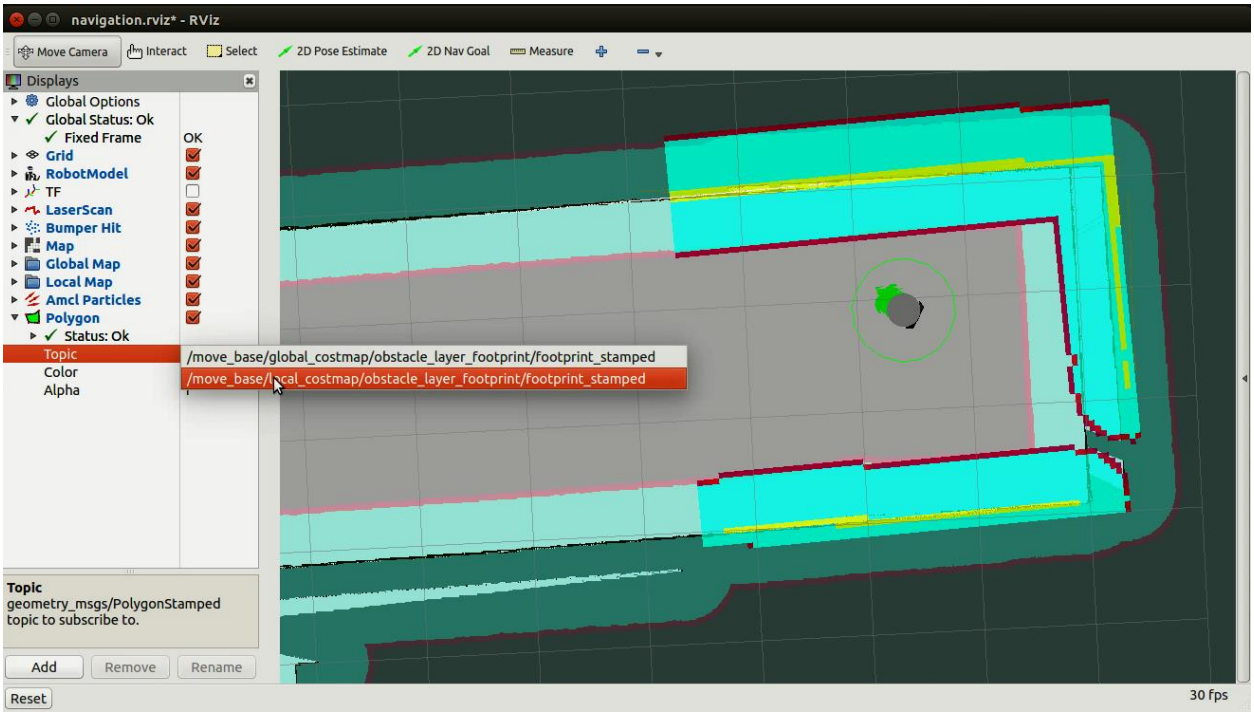

tion.rviz* - RViz
Move Camera
Interact
Select
2D Pose Estimate
2D Nav Goal
Measure
Displays
Global Options
Global Status: Ok
Fixed Frame
OK
Grid
RobotModel
TF
LaserScan
Bumper Hit
Map
Global Map
Local Map
Amcl Particles
Add
Remove
Rename
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click:: Zoom. Shift: More options.

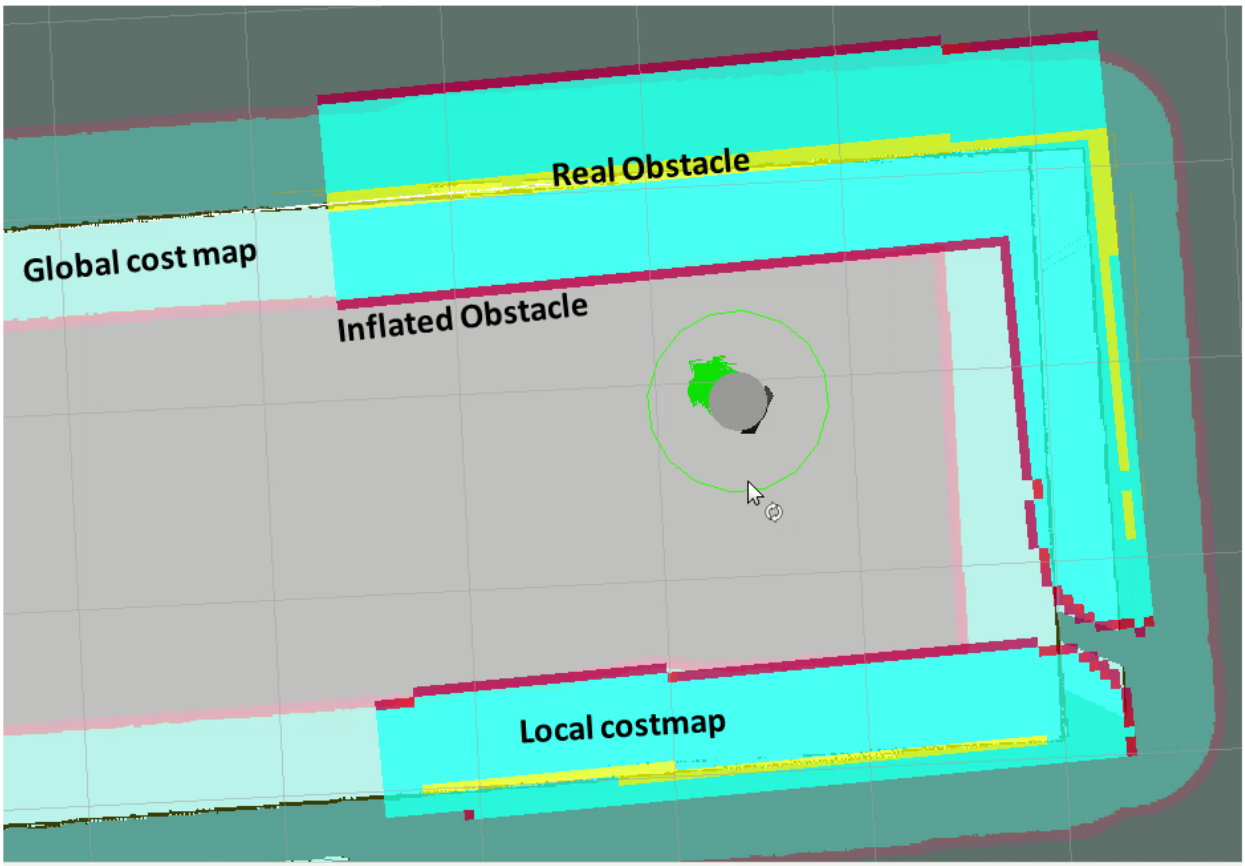

2D Pose Estimate
2D Nav Goal
Measure


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

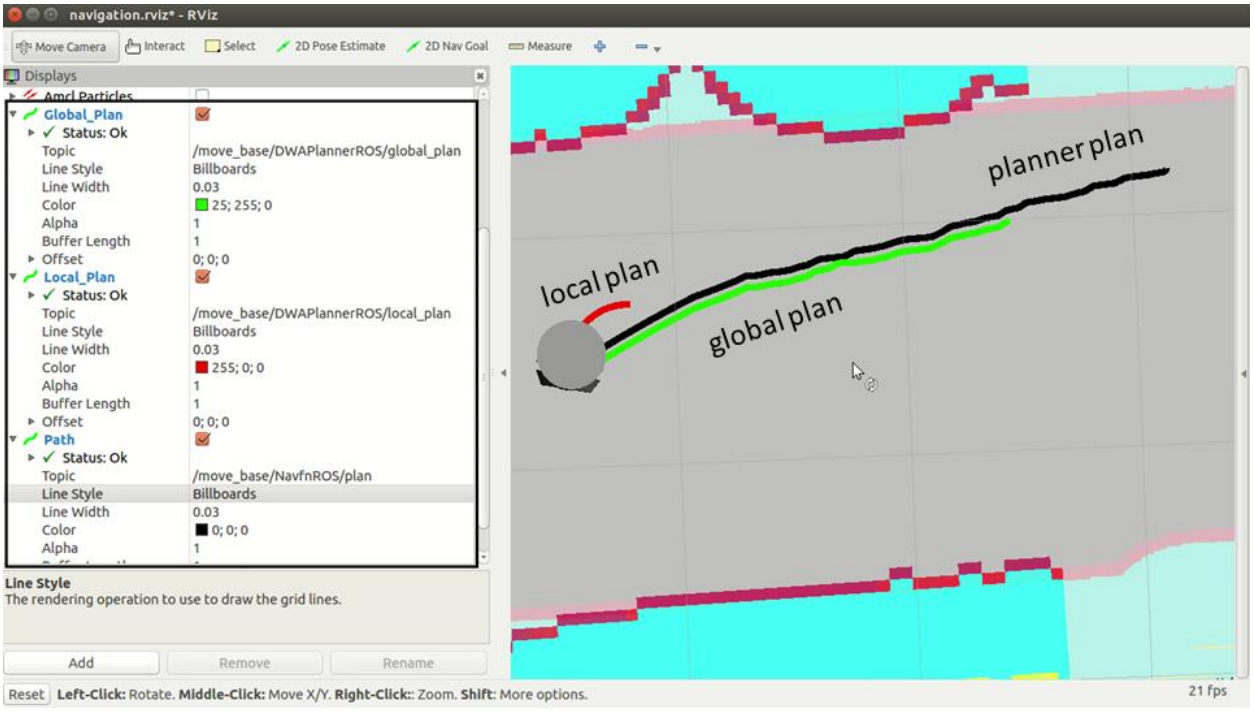

timate
2D Nav Goal
Measure
30 fps

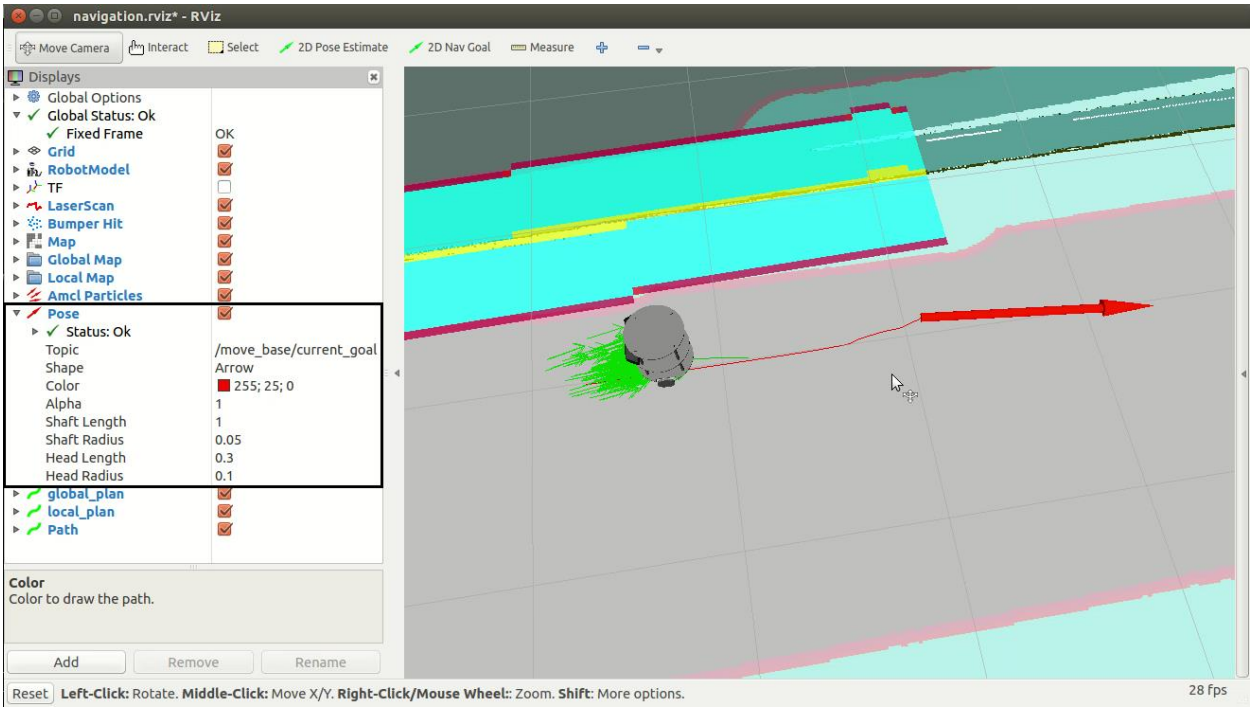

navigation.rviz* - RViz
Move Camera
Interact
Select
2D Pose Estimate
2D Nav Goal
Measure
Displays
Global Options
Global Status: Ok
Fixed Frame
OK
Grid
RobotModel
TF
LaserScan
Bumper Hit
Map
Status: Ok
Topic
/map
Alpha
0.7
Color Scheme
map
Draw Behind
Resolution
0.01
Width
2560
Height
2336
Position
-11.56; -11....
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

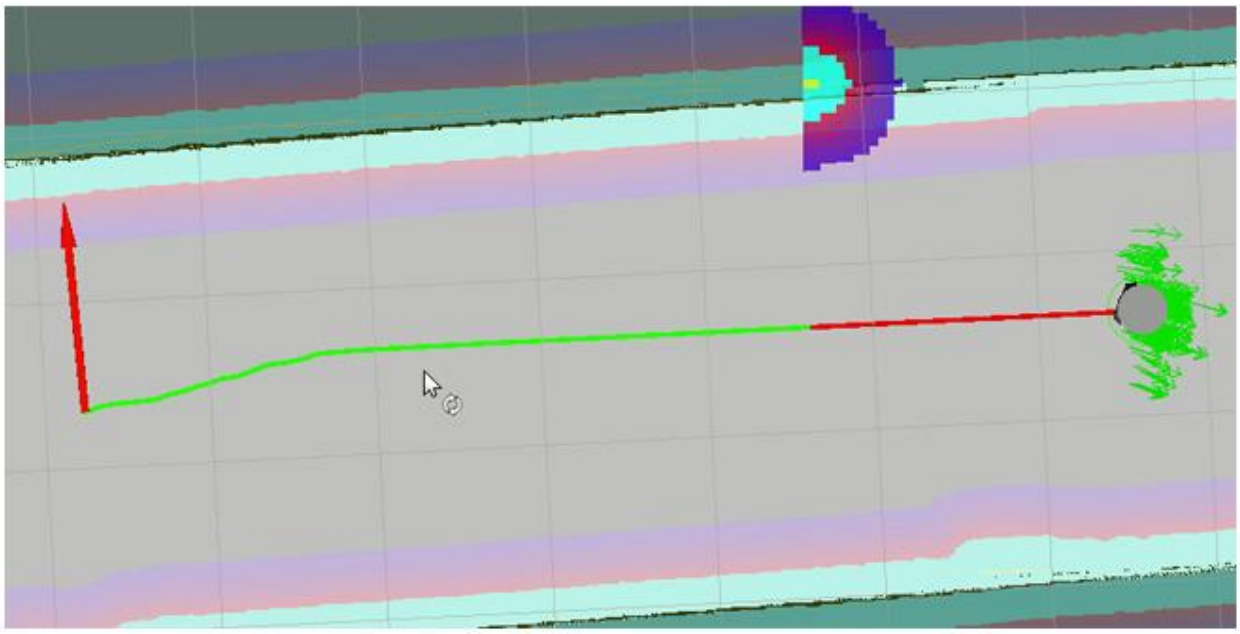

navigation.rviz* - RViz
Move Camera
Interact
Select
2D Pose Estimate
2D Nav Goal
Measure
Displays
Global Options
Global Status: Ok
Fixed Frame
OK
Grid
RobotModel
TF
LaserScan
Bumper Hit
Map
Global Map
Local Map
Amcl Particles
Polygon
Status: Ok
Topic
Color
Alpha
/move_base/global_costmap/obstacle_layer_footprint/footprint_stamped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



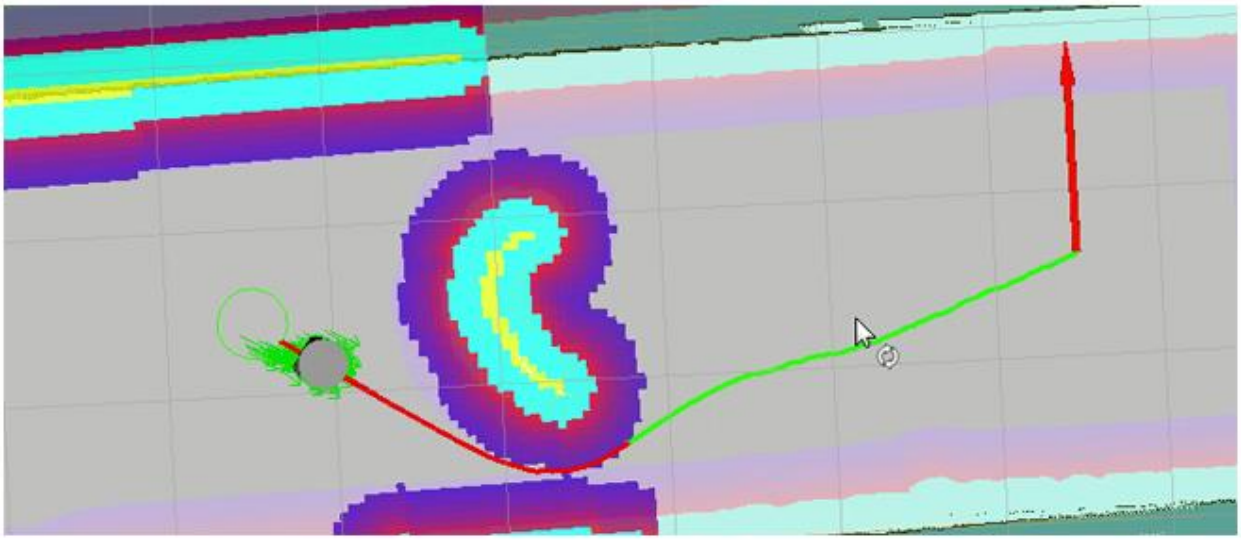
e X/Y. **Right-Click:**: Zoom. **Shift**: More options.



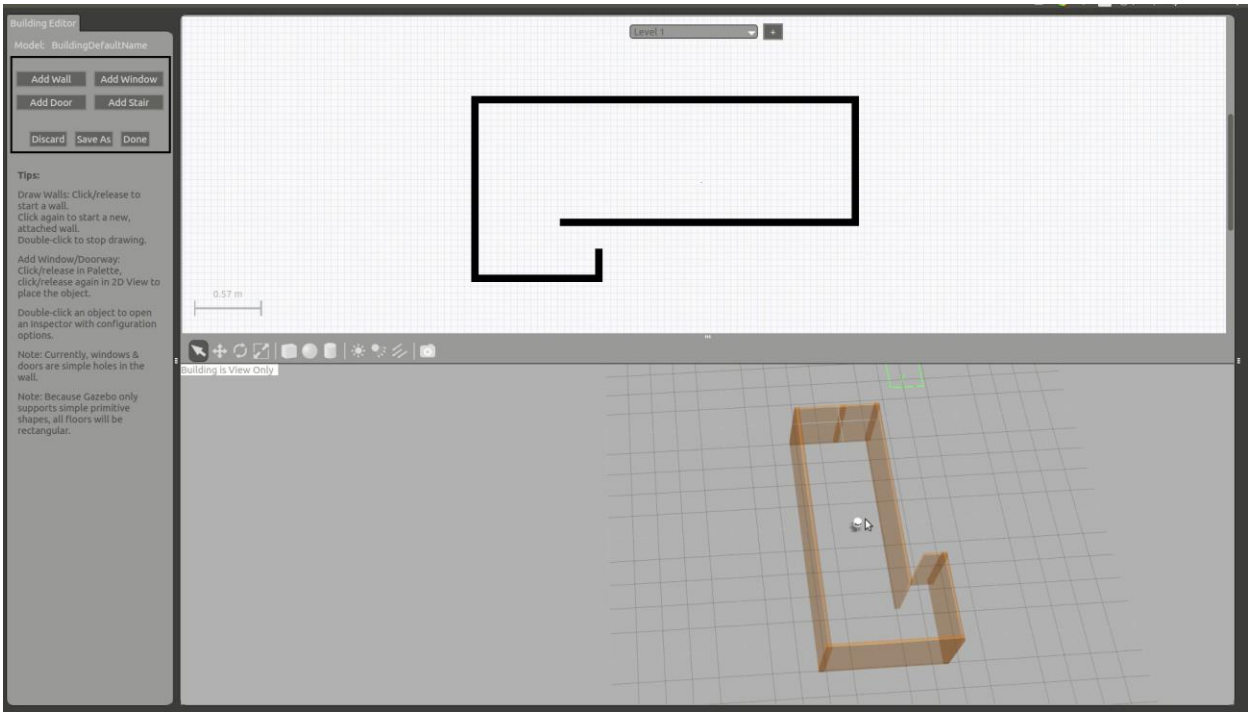

navigation.rviz* - RViz
Move Camera
Interact
Select
2D Pose Estimate
2D Nav Goal
Measure
Displays
Global Options
Global Status: Ok
Fixed Frame
OK
Grid
RobotModel
TF
LaserScan
Bumper Hit
Map
Global Map
Local Map
Amcl Particles
Pose
Status: Ok
Topic
/move_base/current_goal
Shape
Arrow
Color
255; 25; 0
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

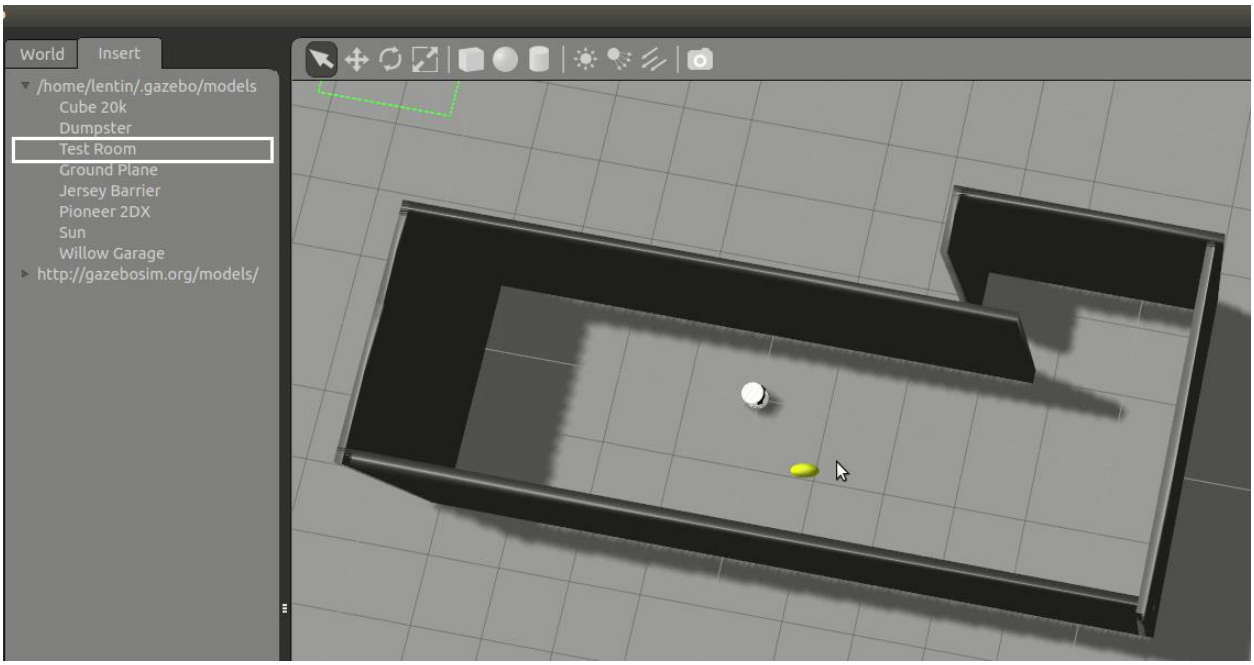


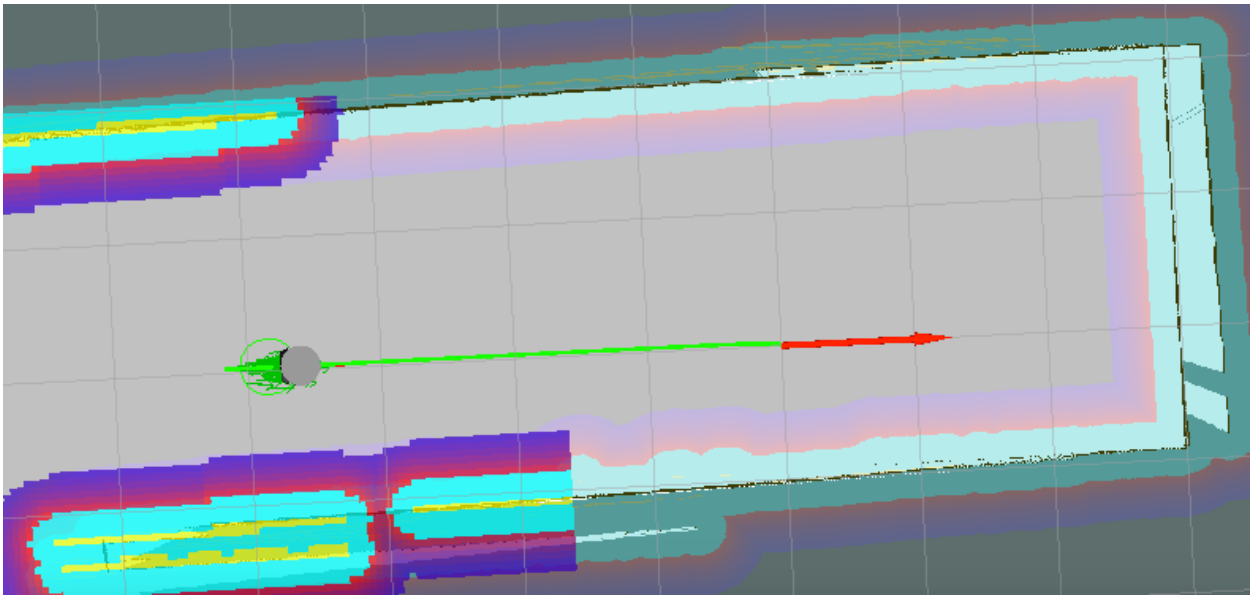
No obstacle



With obstacle

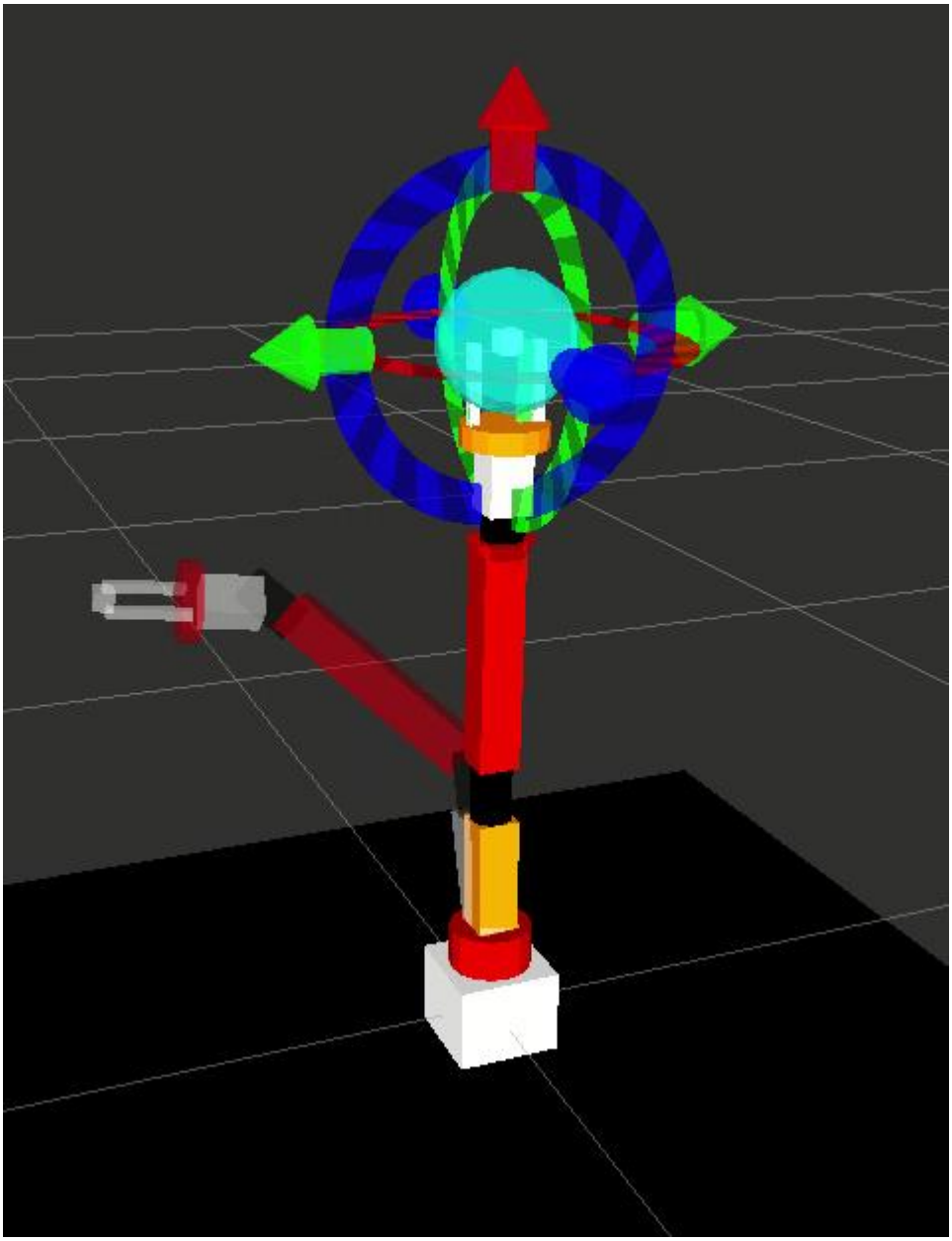

Building Editor
Model: BuildingDefaultName
Add Wall
Add Window
Add Door
Add Stair
Discard
Save As
Done
Tips:
Draw Walls: Click/release to start a wall.
Click again to start a new, attached wall.
Double-click to stop drawing.
Add Window/Doorway: Click/release in Palette, click/release again in 2D View 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

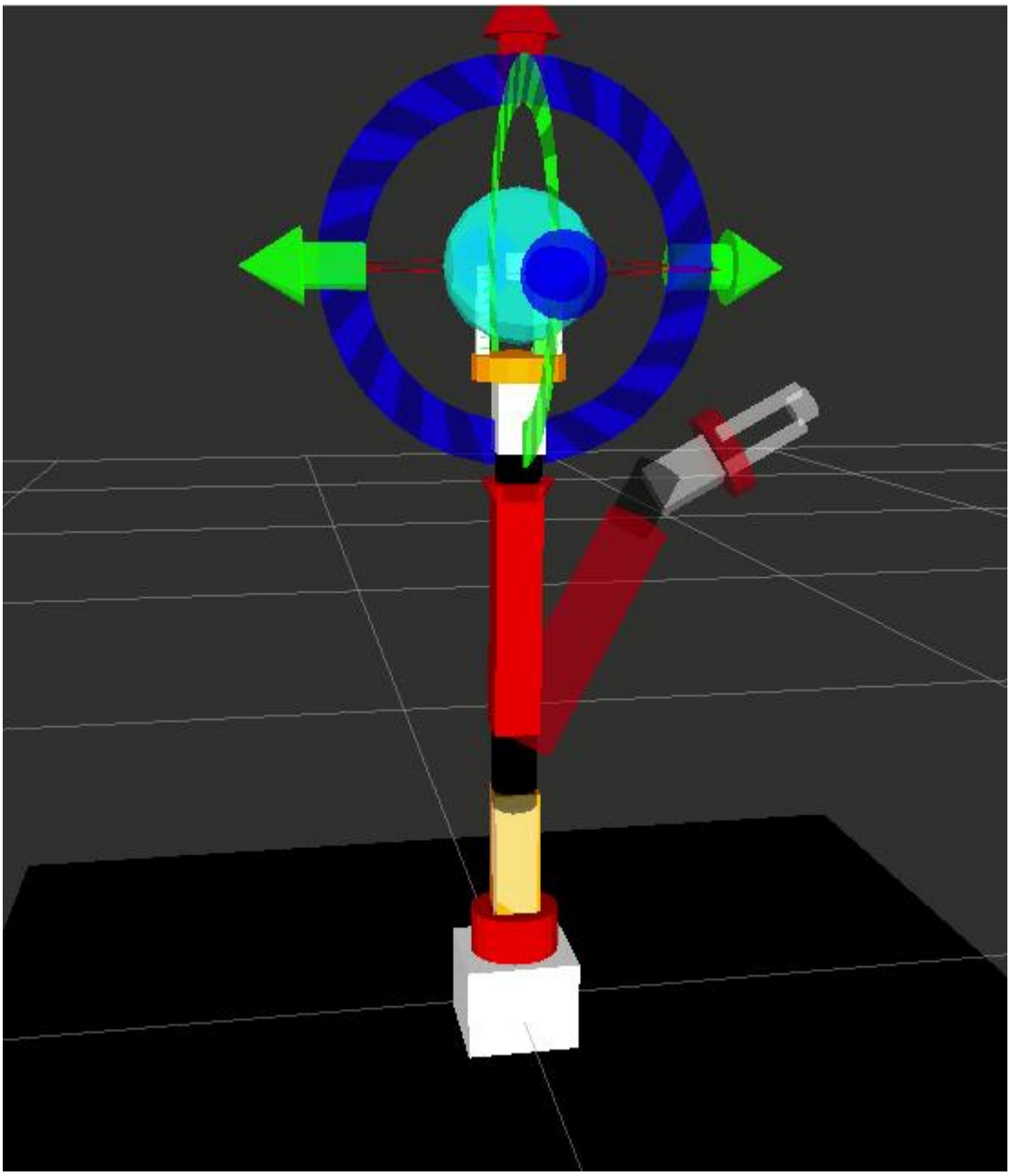

World
Insert
/home/lentin/.gazebo/models
Cube 20k
Dumpster
Test Room
Ground Plane
Jersey Barrier
Pioneer 2DX
Sun
Willow Garage
http://gazebosim.org/models/

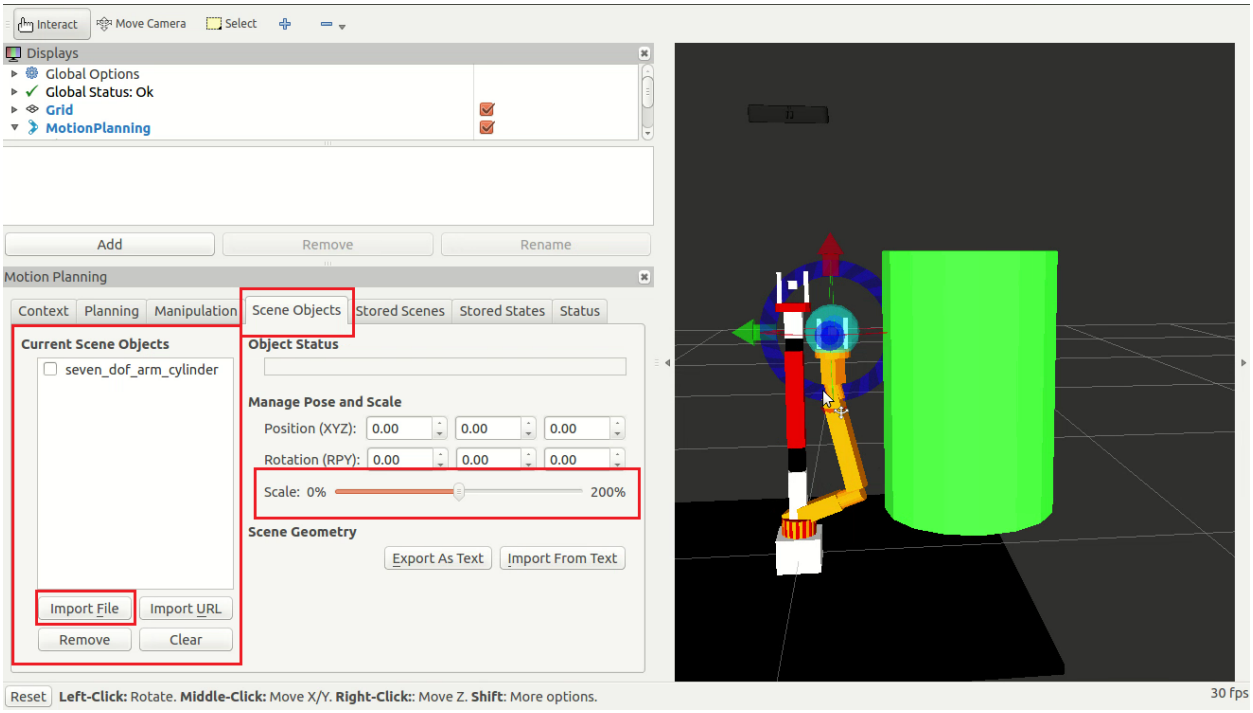


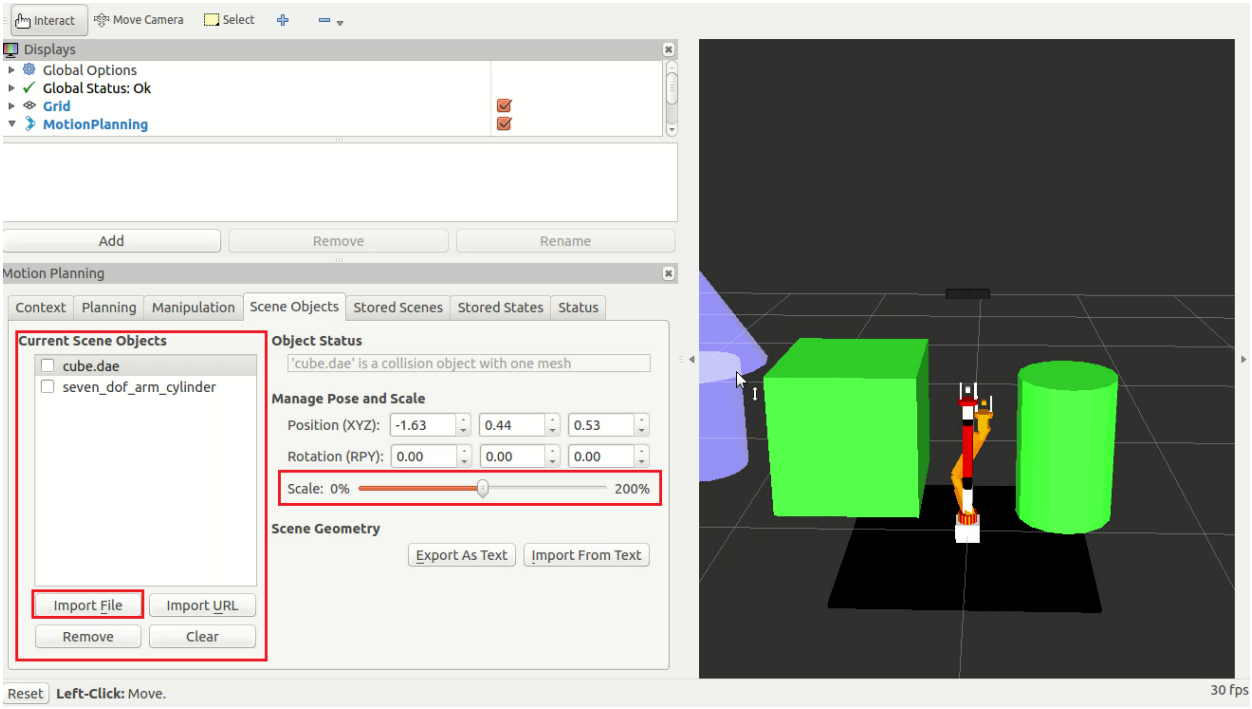
```
Clentin@lentin-Aspire-4755:~$ rosrun chefbot_bringup send_goal 1 0 1
 INFO] [1441650740.309473041, 210.432000000]: Waiting for the move_base
action server
 INFO] [1441650740.472899452, 210.471000000]: Sending move base goal
 INFO] [1441650767.998997498, 223.440000000]: Robot has arrived to the
oal position
```

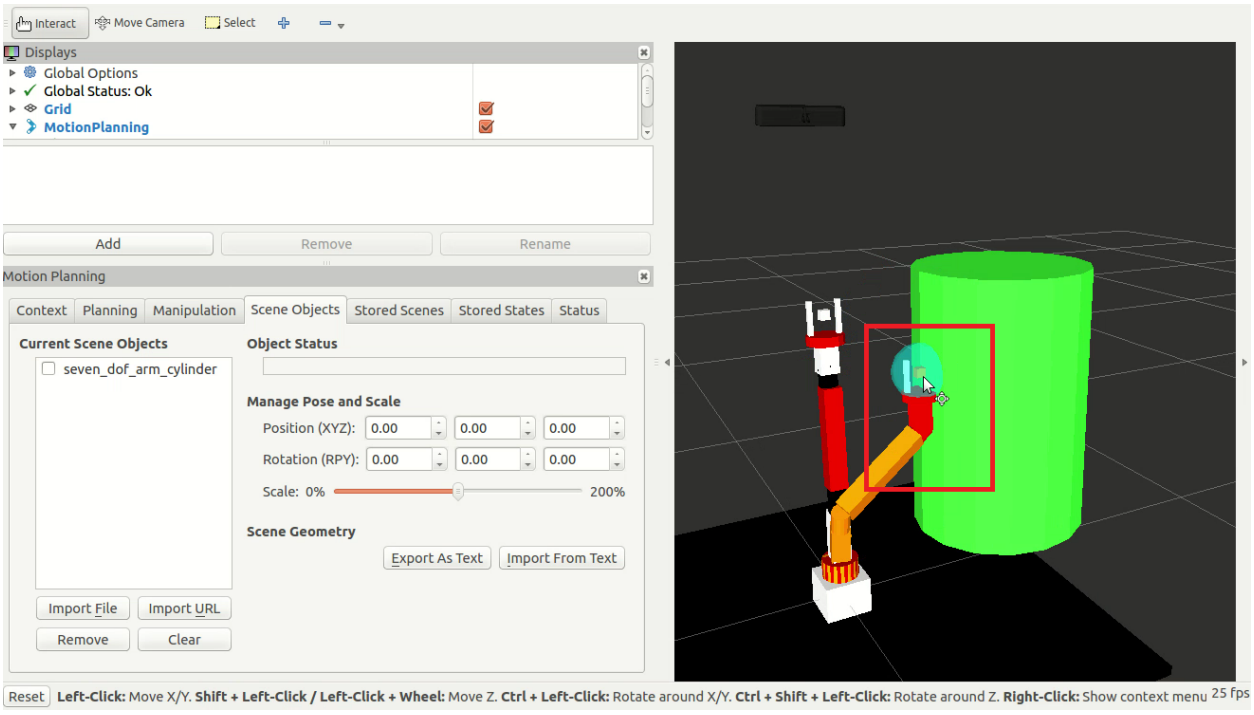
CHAPTER 10



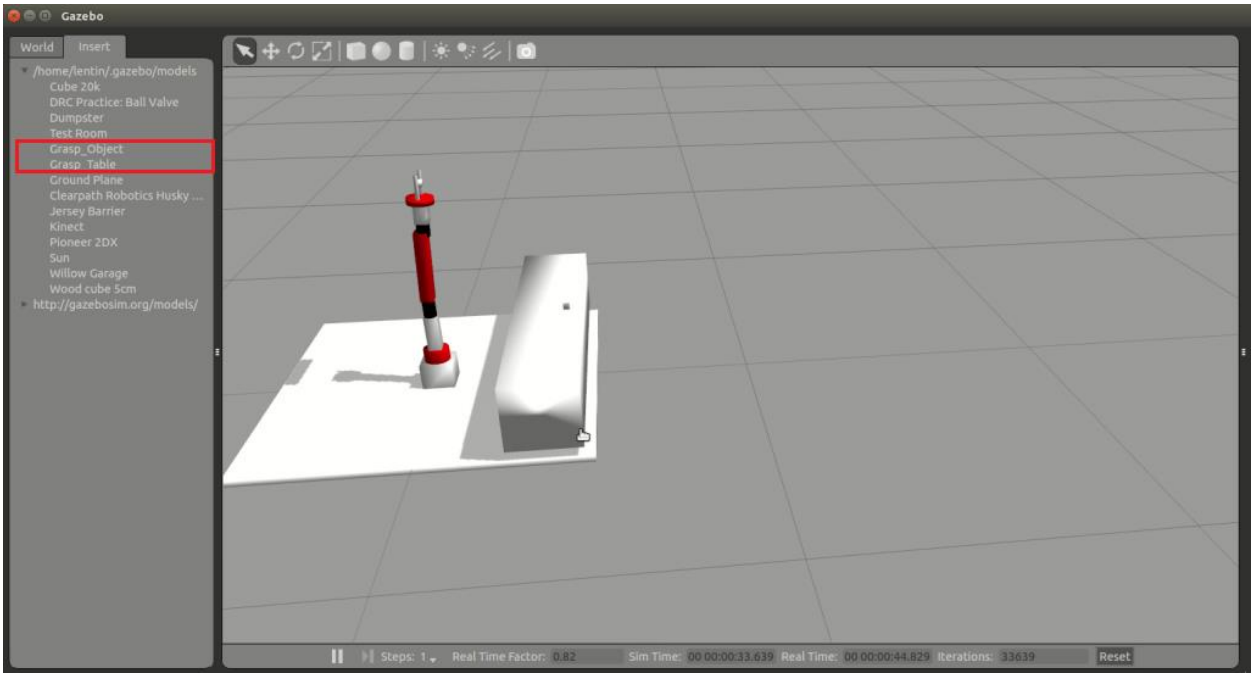



Interact
Move Camera
Select
Displays
Global Options
Global Status: Ok
Grid
MotionPlanning
Add
Remove
Rename
Motion Planning
Context
Planning
Manipulation
Scene Objects
Stored Scenes
Stored States
Status
Current Scene Objects
seven_dof_arm_cylinder
Object Status
Manage Pose and Scale
Position (XYZ): 0.00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

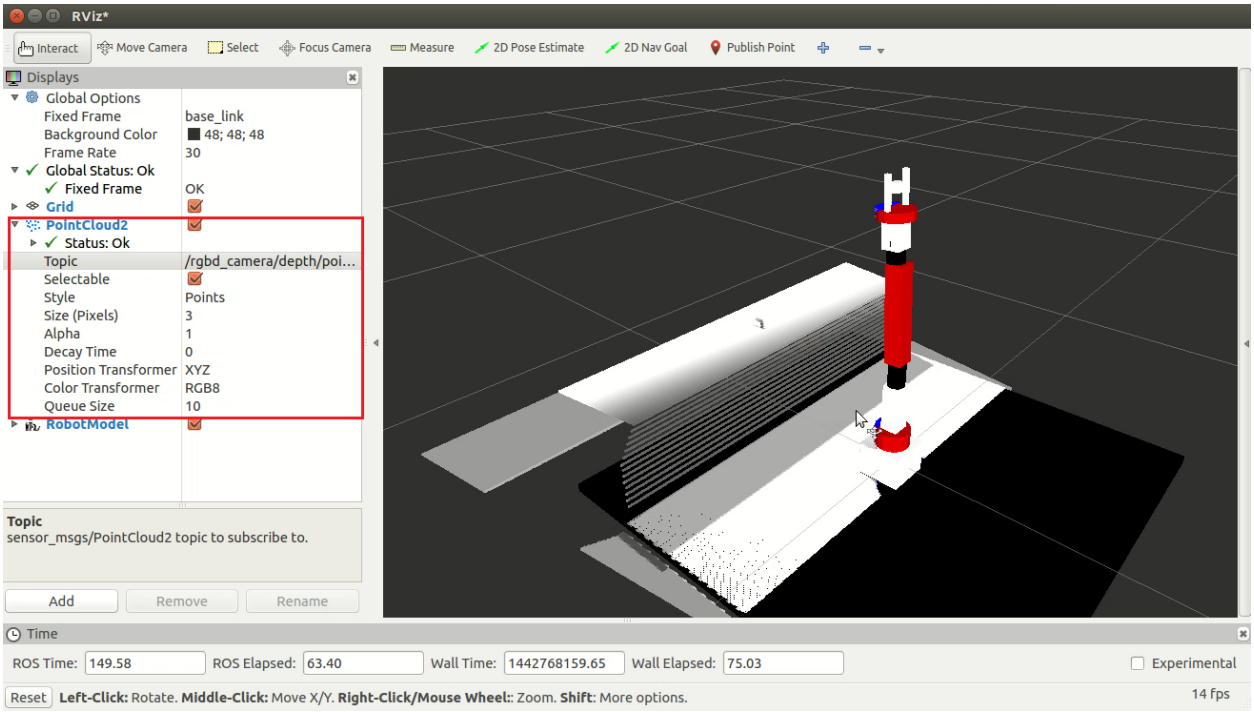

Interact
Move Camera
Select
Displays
Global Options
Global Status: Ok
Grid
MotionPlanning
Add
Remove
Rename
Motion Planning
Context
Planning
Manipulation
Scene Objects
Stored Scenes
Stored States
Status
Current Scene Objects
cube.dae
seven_dof_arm_cylinder
Object Status
'cube.dae' is a collision object with one mesh
Manage Pose and Scale
Position (XYZ): -1.63 0.44 0.53
Rotation (RPY): 0.00 0.00 0.00
Scale: 0% 200%
Scene Geometry
Export As Text
Import From Text
Import File
Import URL
Remove
Clear
Reset
Left-Click: Move.
30 fps

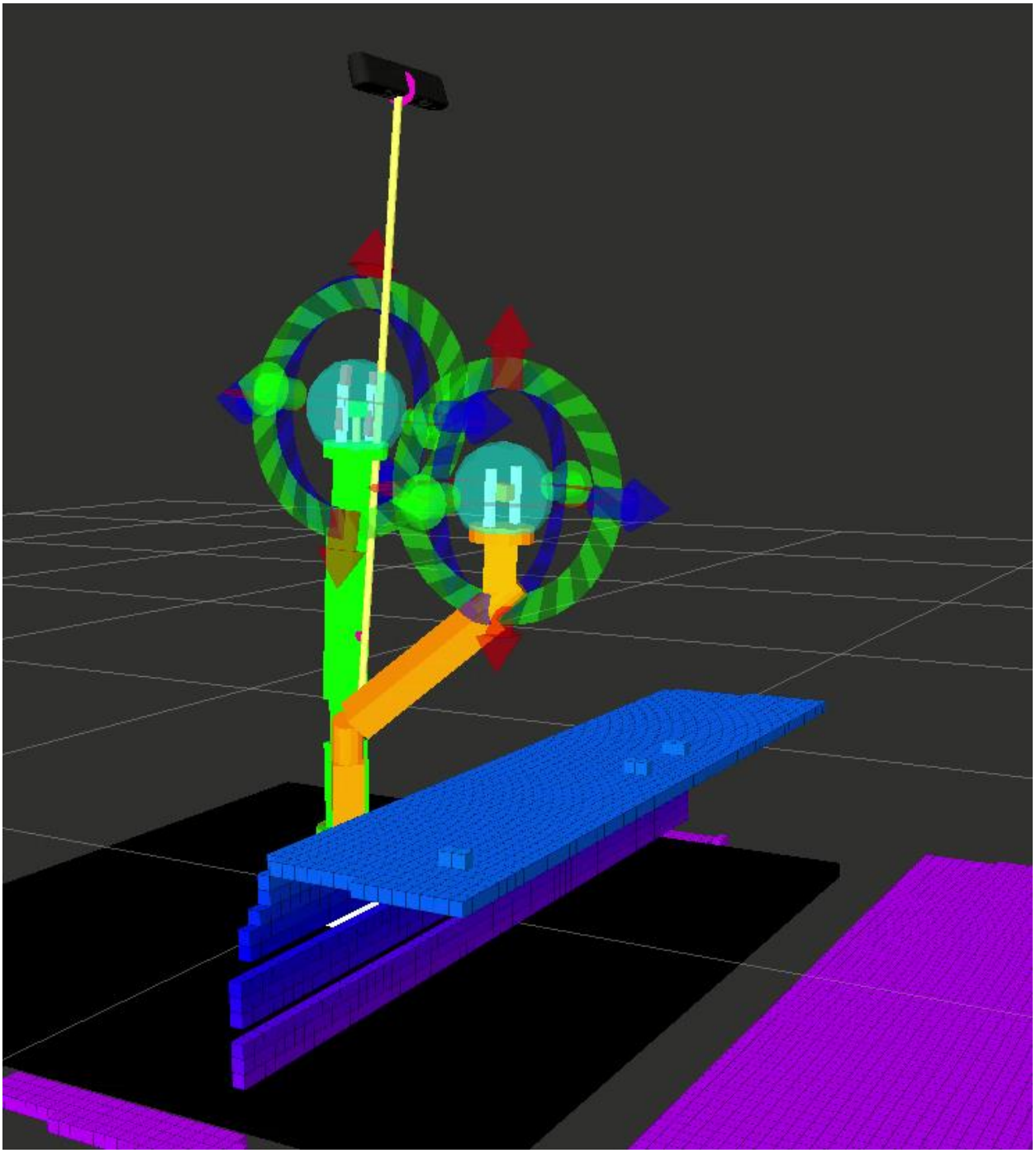



```
[ INFO] [1442483406.124802329]: 1. Self collision Test: not in self collision
[ INFO] [1442483406.125105624]: 2. Self collision Test(Change the state): in
[ INFO] [1442483406.125339959]: 3. Self collision Test(In a group): not in
[ INFO] [1442483406.125421092]: 4. Collision points valid
[ INFO] [1442483406.125672041]: 5. Self collision Test: not in self collision
[ INFO] [1442483406.125928019]: 6. Self collision Test after modified ACM: not in self collision
[ INFO] [1442483406.126233457]: 6. Full collision Test: not in collision
```

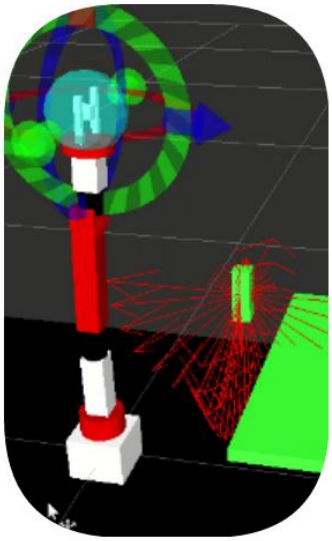


```
/rgbd_camera/depth/camera_info
/rgbd_camera/depth/image_raw
/rgbd_camera/depth/points
/rgbd_camera/ir/camera_info
/rgbd_camera/ir/image_raw
/rgbd_camera/ir/image_raw/compressed
/rgbd_camera/ir/image_raw/compressed/parameter_descriptions
/rgbd_camera/ir/image_raw/compressed/parameter_updates
/rgbd_camera/ir/image_raw/theora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

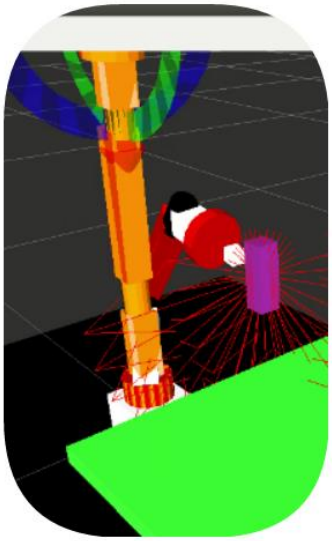




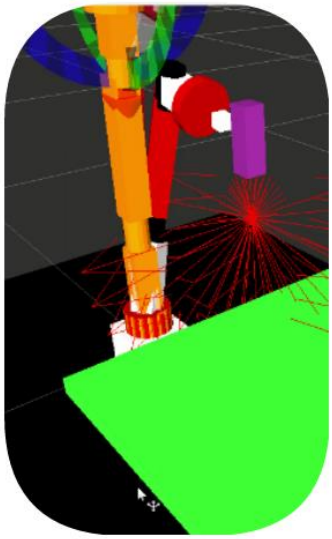
```
0.0]
 * /moveit_simple_grasps_server/gripper/pregrasp_time_from_start
: 4.0
 * /moveit_simple_grasps_server/group: arm
 * /rosdistro: indigo
 * /rosversion: 1.11.13

NODES
  /
    moveit_simple_grasps_server (moveit_simple_grasps/moveit_sim
ple_grasps_server)

ROS_MASTER_URI=http://localhost:11311

core service [/rosout] found
process[moveit_simple_grasps_server-1]: started with pid [30638]
```



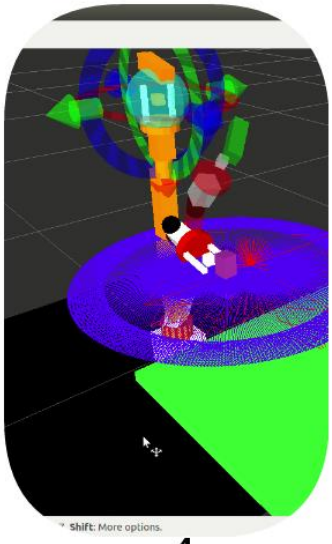
1



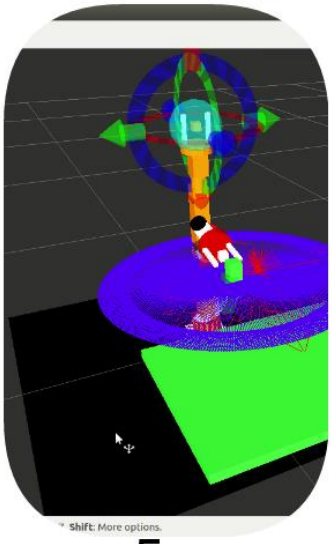
2



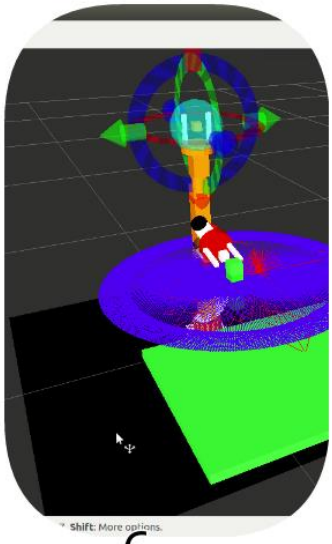
3



4



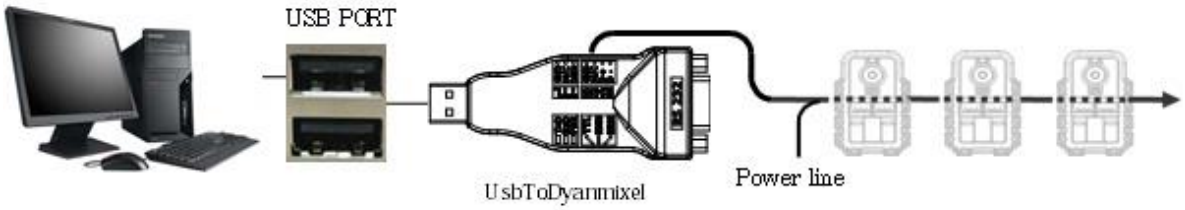
5

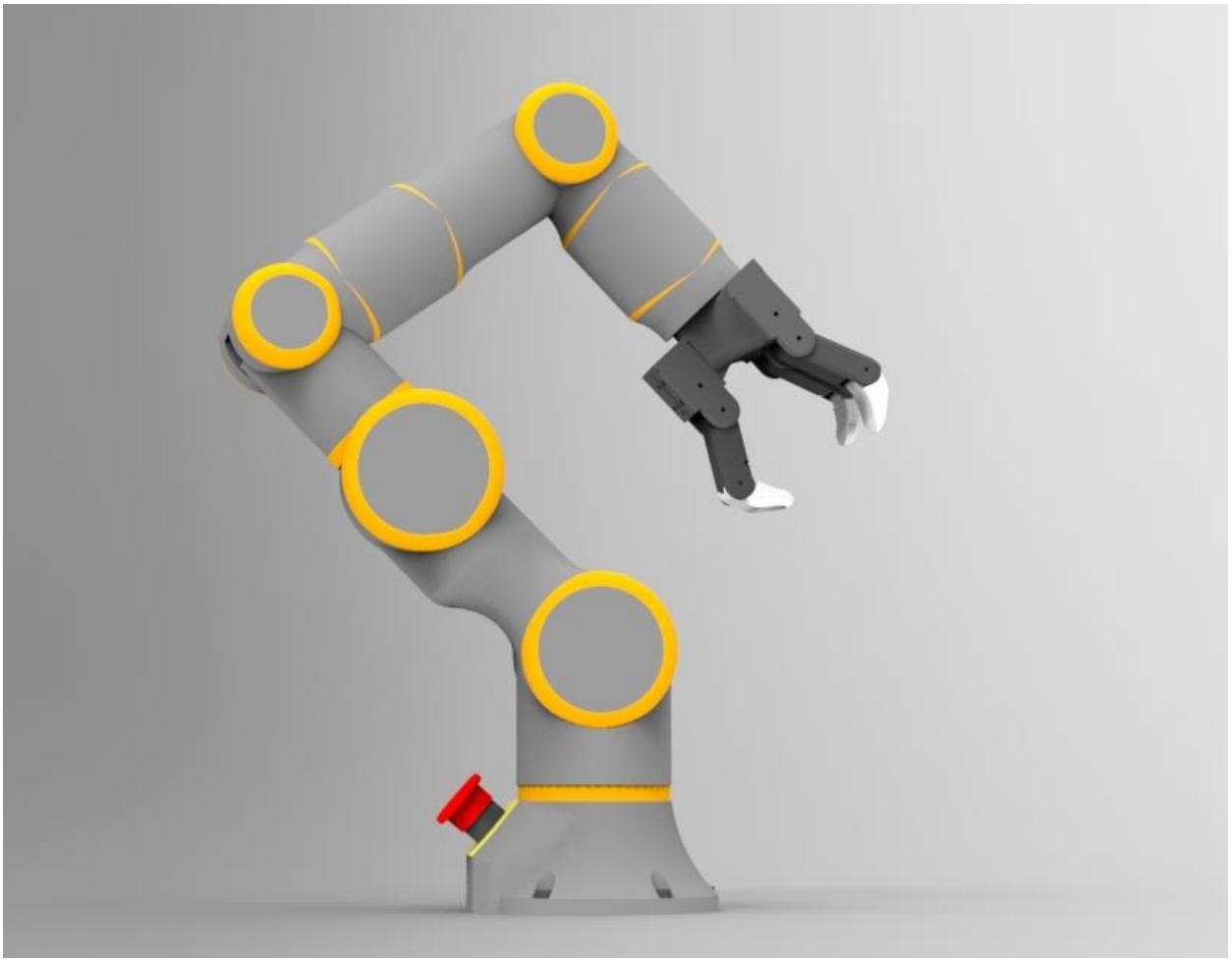


6

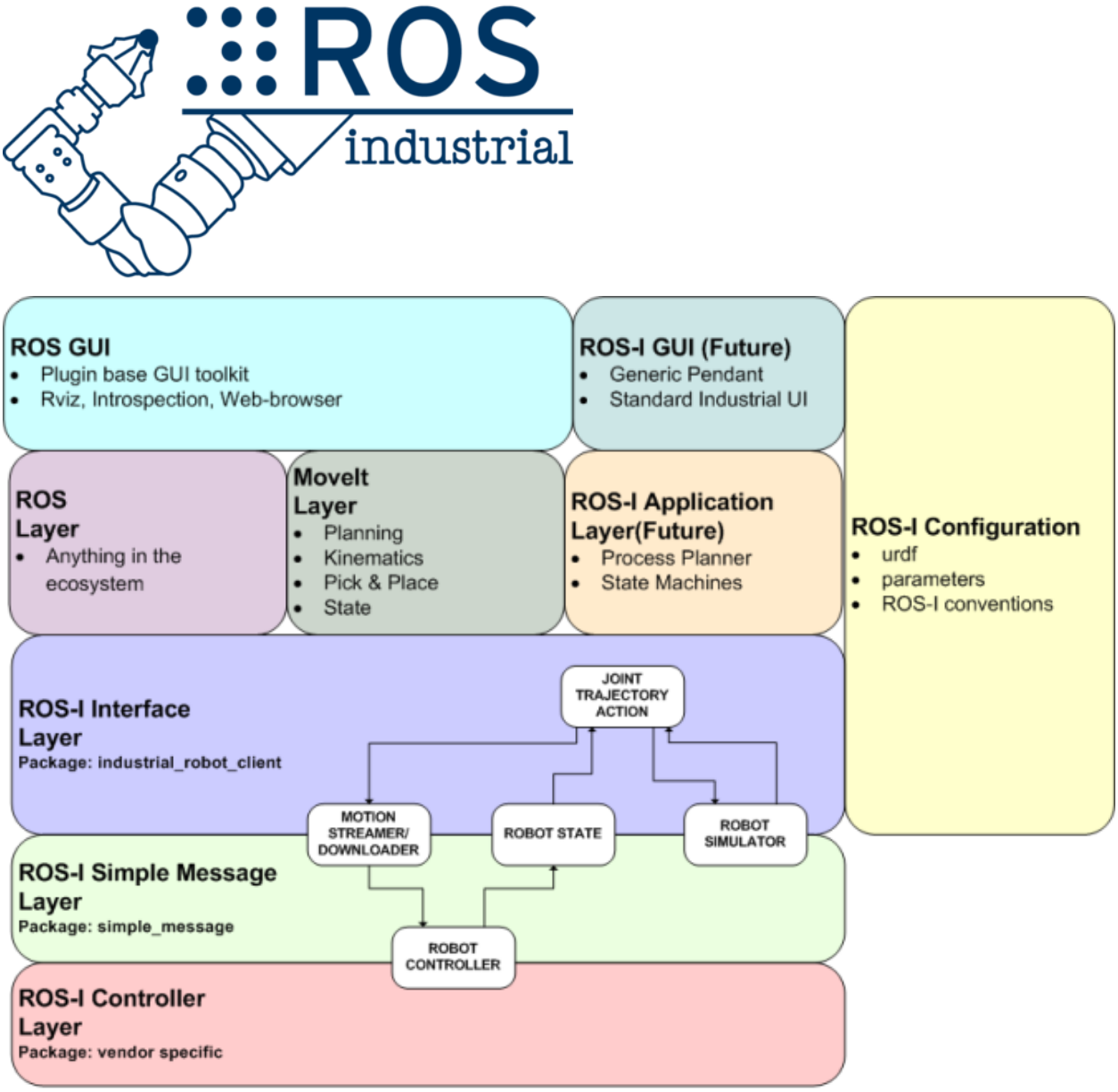
Dynamixel Servo

USB To Dynamixel

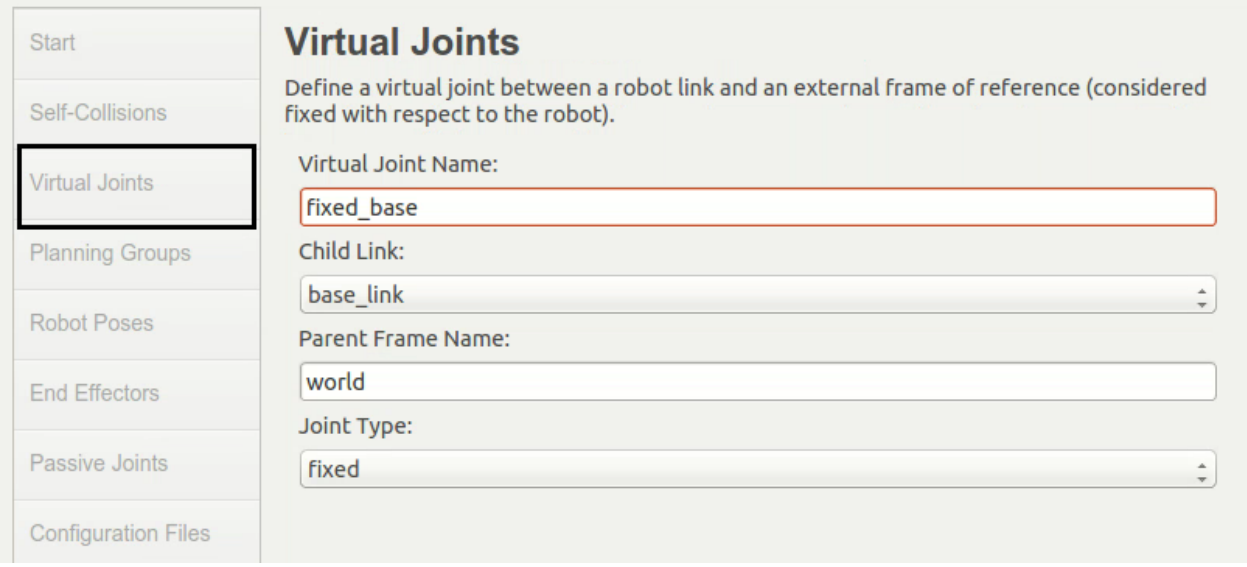


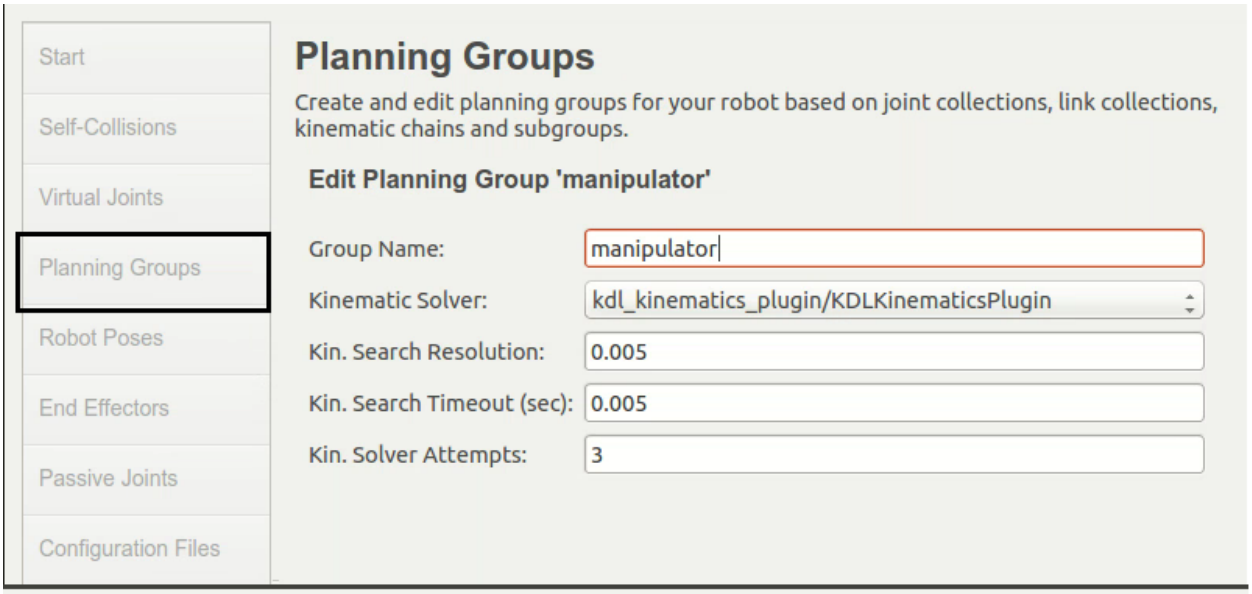


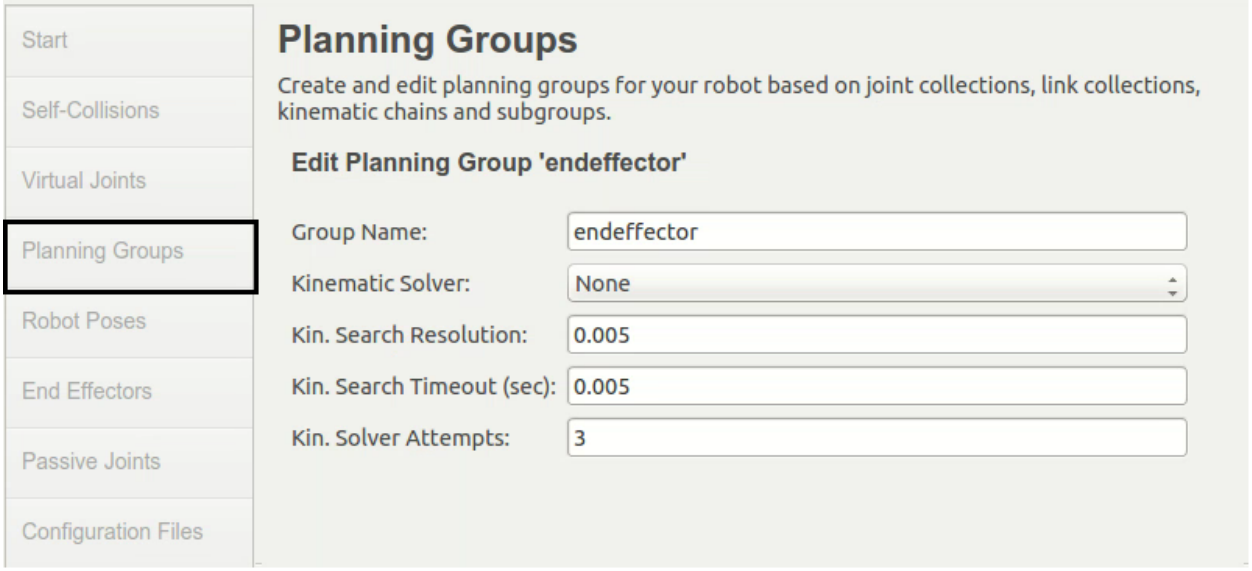
CHAPTER 11

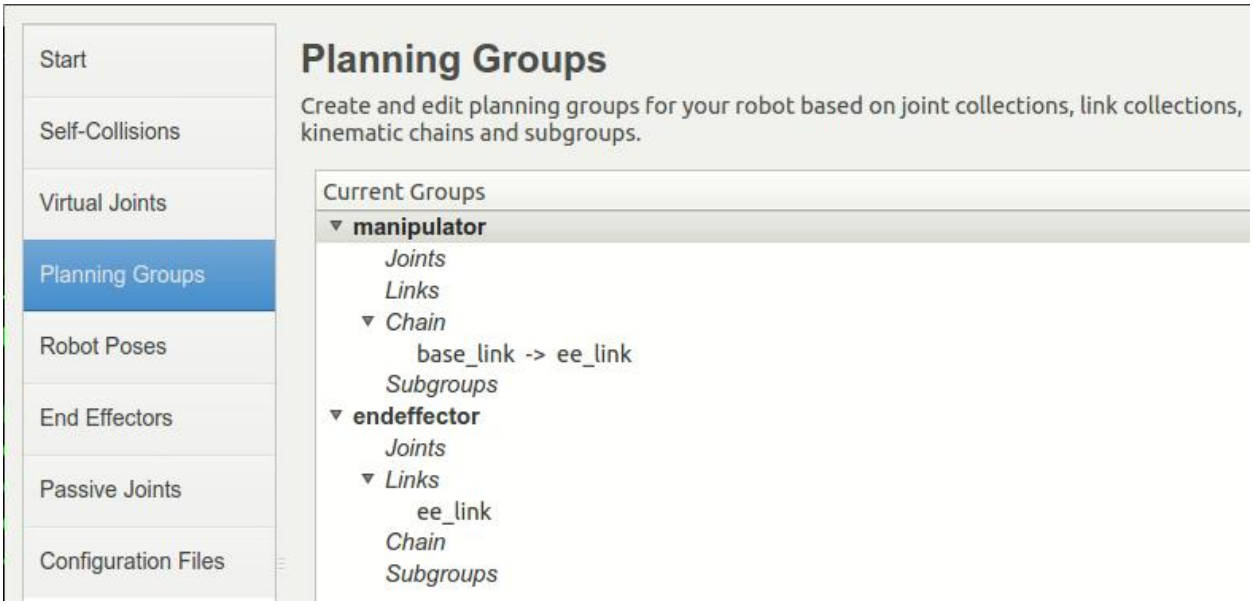


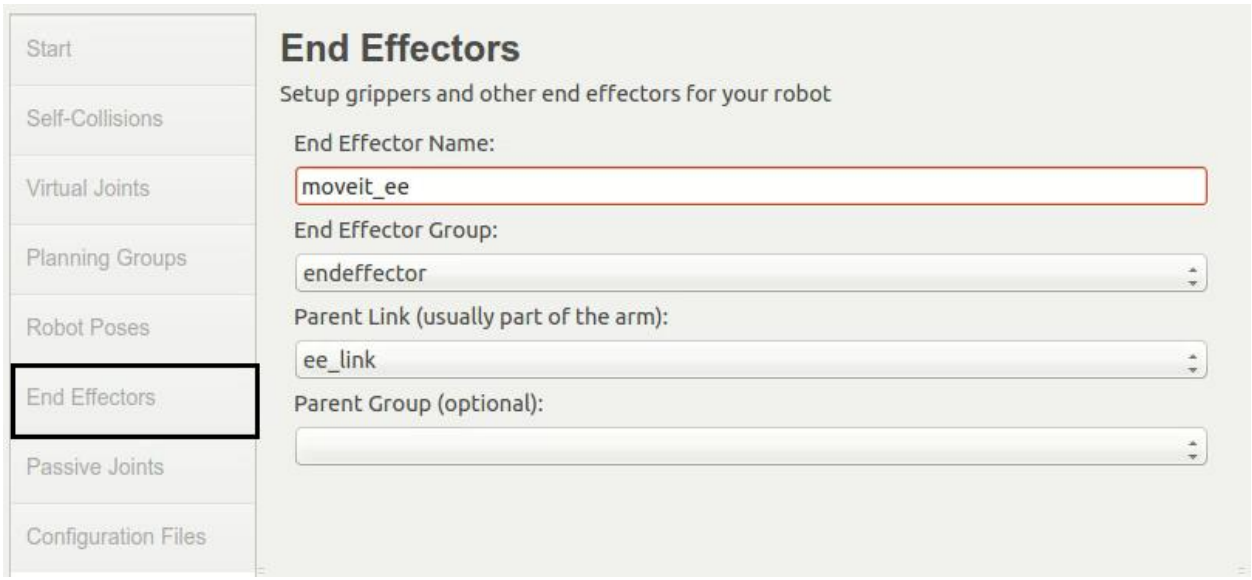
ROS-Industrial High Level Architecture - Rev 0.02.vsd

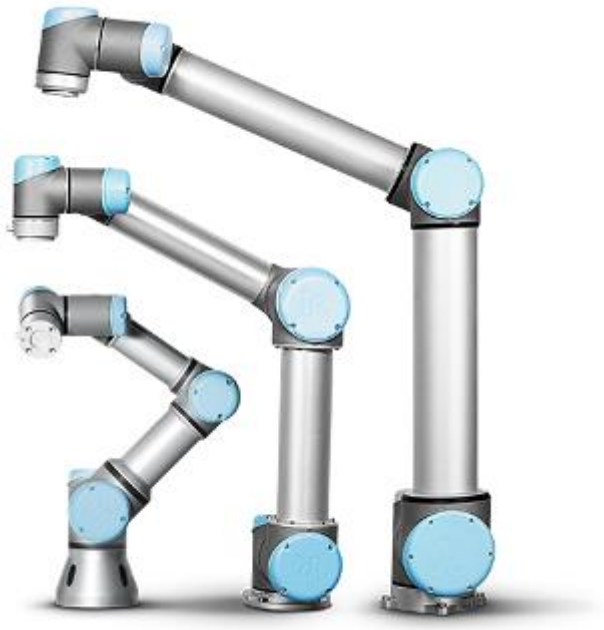

Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
Configuration Files
Virtual Joints
Define a virtual joint between a robot link and an external frame of reference (considered fixed with respect to the robot).
Virtual Joint Name:
fixed_base
Child Link:
base_link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

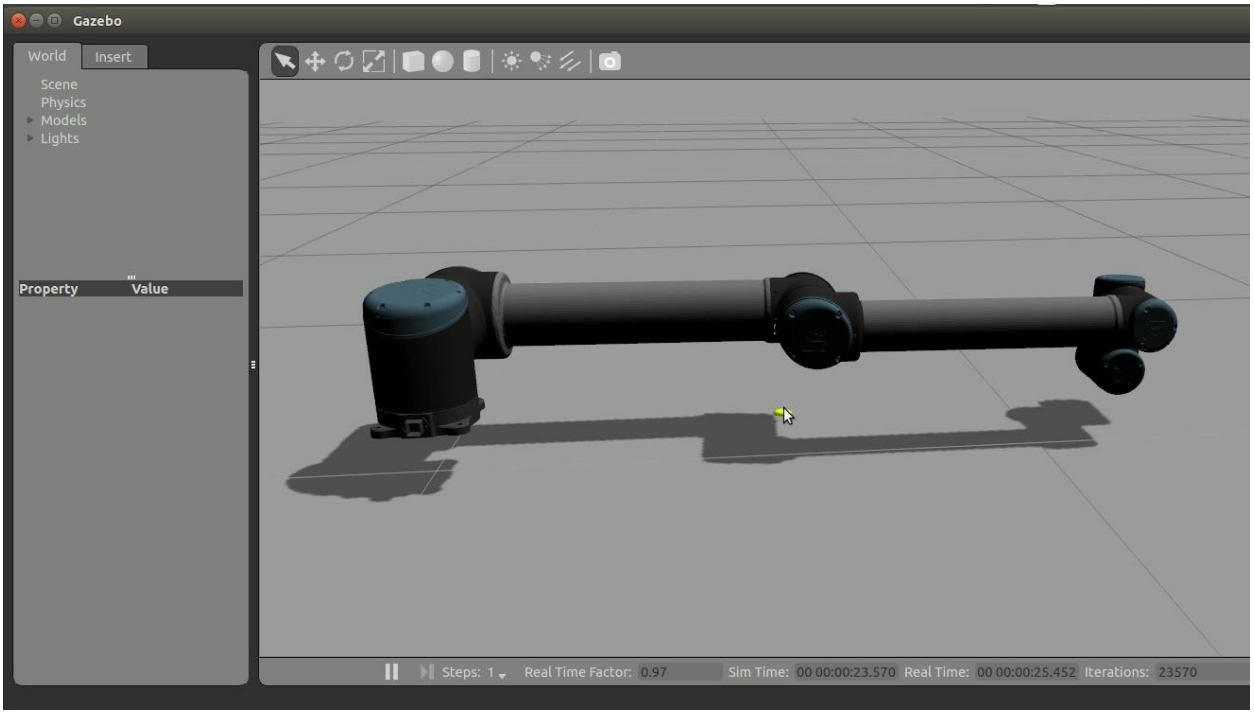

Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
Configuration Files
Planning Groups
Create and edit planning groups for your robot based on joint collections, link collections, kinematic chains and subgroups.
Edit Planning Group 'manipulator'
Group Name: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

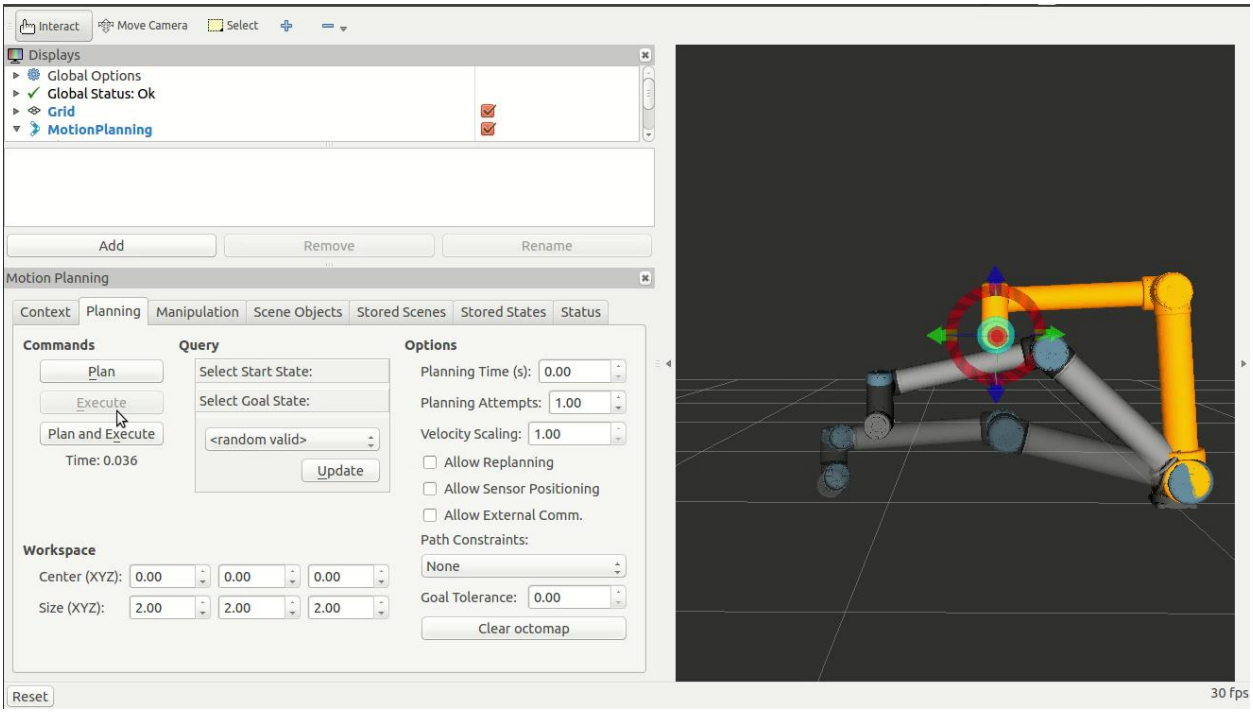

Start
Self-Collisions
Virtual Joints
Planning Groups
Robot Poses
End Effectors
Passive Joints
Configuration Files
Planning Groups
Create and edit planning groups for your robot based on joint collections, link collections, kinematic chains and subgroups.
Edit Planning Group 'endeffector'
Group Name:
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):




Gazebo
World
Insert
Scene
Physics
Models
Lights
Property
Value
Steps: 1
Real Time Factor: 0.97
Sim Time: 00 00:00:23.570
Real Time: 00 00:00:25.452
Iterations: 23570


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
Commands
Plan
Execute
Plan and Execute
Time: 0.036
Query
Select Start State:
Select Goal State:
<random valid>
Update
Options
Planning Time (s): 0.00
Planning Attempts: 1.00
Velocity 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
Reset
30 fps

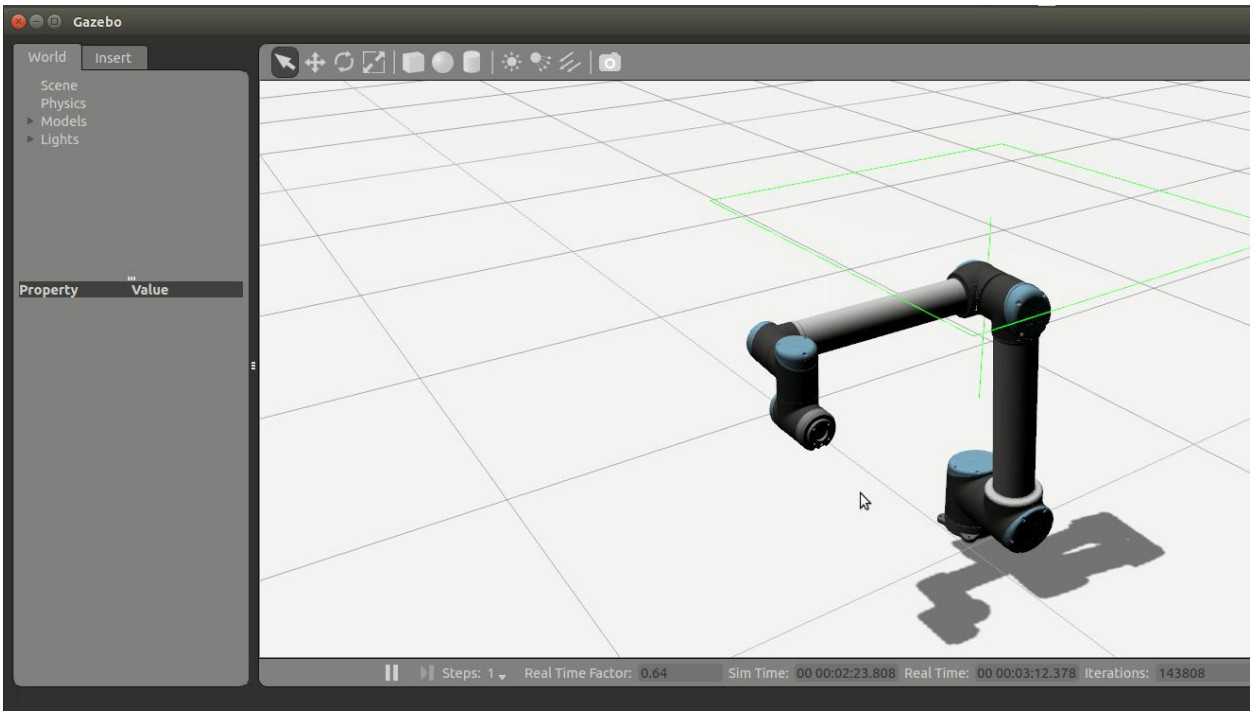
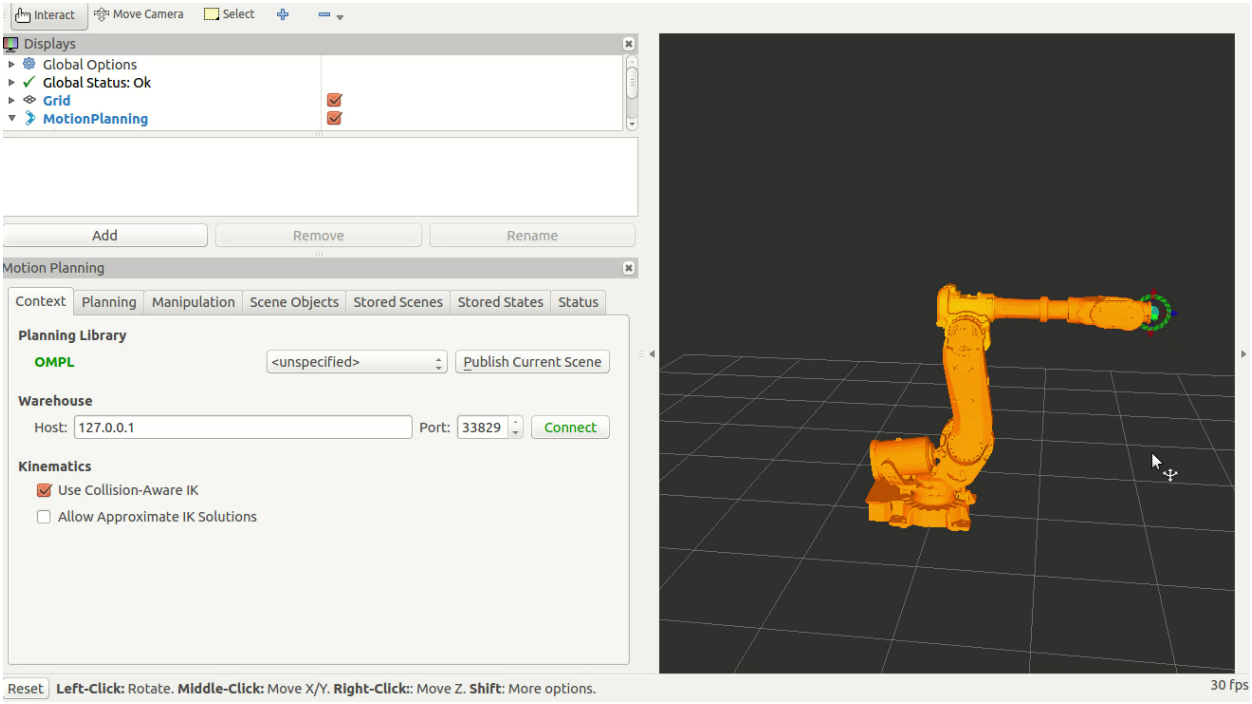
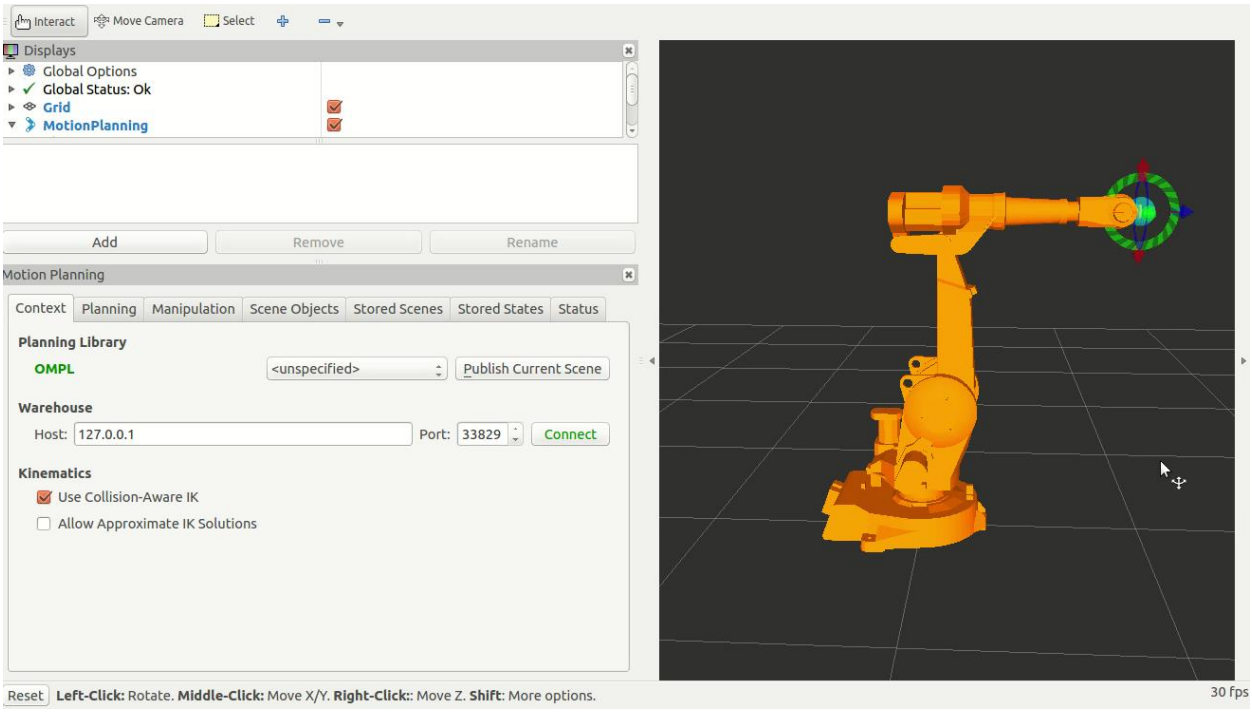
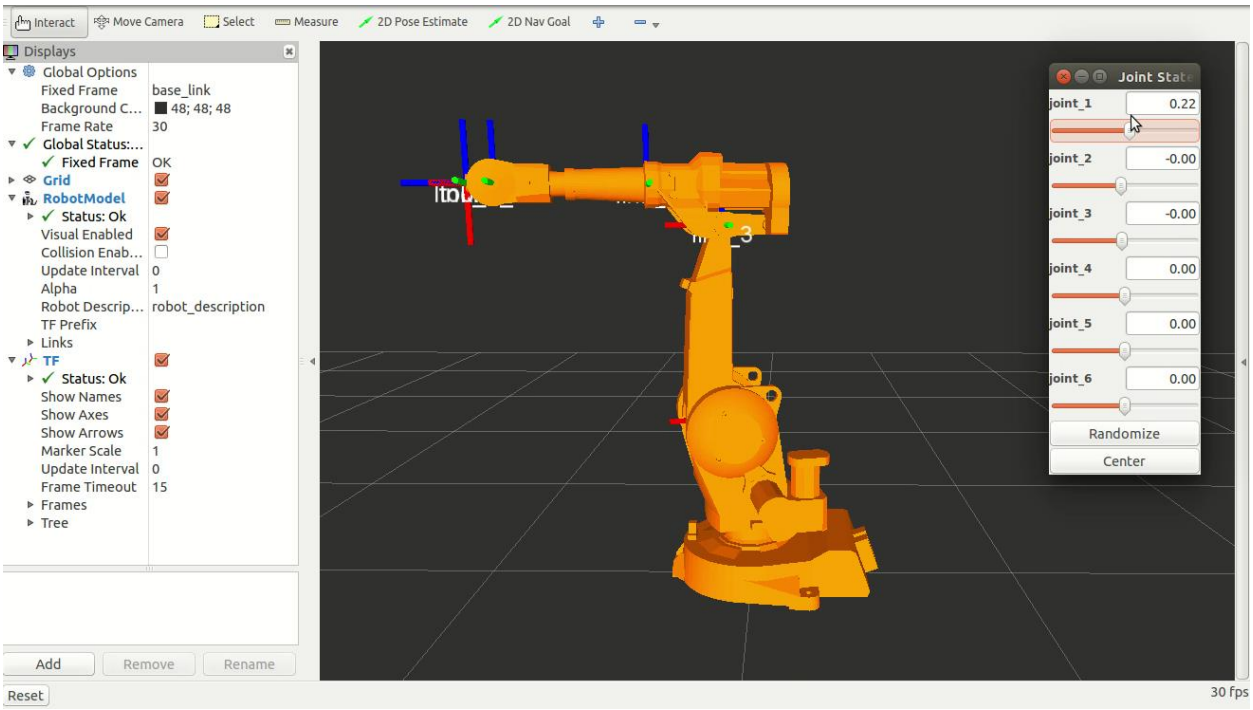

Gazebo
World
Insert
Scene
Physics
Models
Lights
Property
Value
Steps: 1
Real Time Factor: 0.64
Sim Time: 00 00:02:23.808
Real Time: 00 00:03:12.378
Iterations: 143808

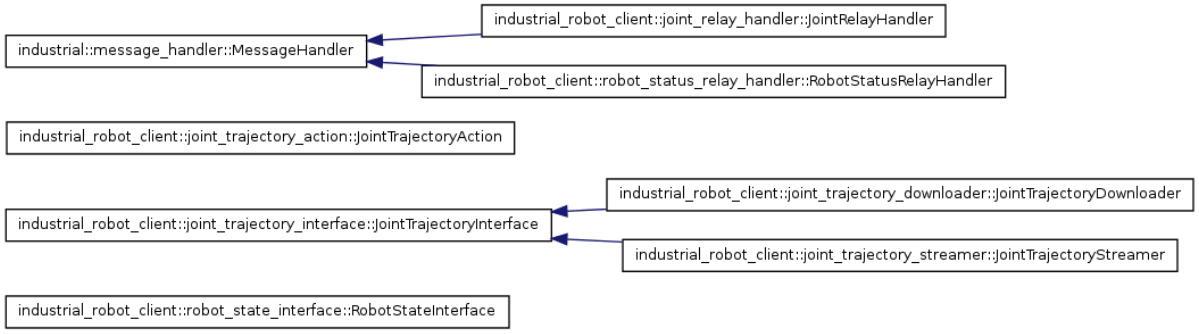
ABB IRB 2400

ABB IRB 6640




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
Planning Library
OMPL
<unspecified>
Publish Current Scene
Warehouse
Host: 127.0.0.1
Port: 33829
Connect
Kinematics
Use Collision-Aware IK
Allow Approximate IK Solutions
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click:: Move Z. Shift: More options.
30 fps


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
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
Add
Remove
Rename
Reset
30 fps

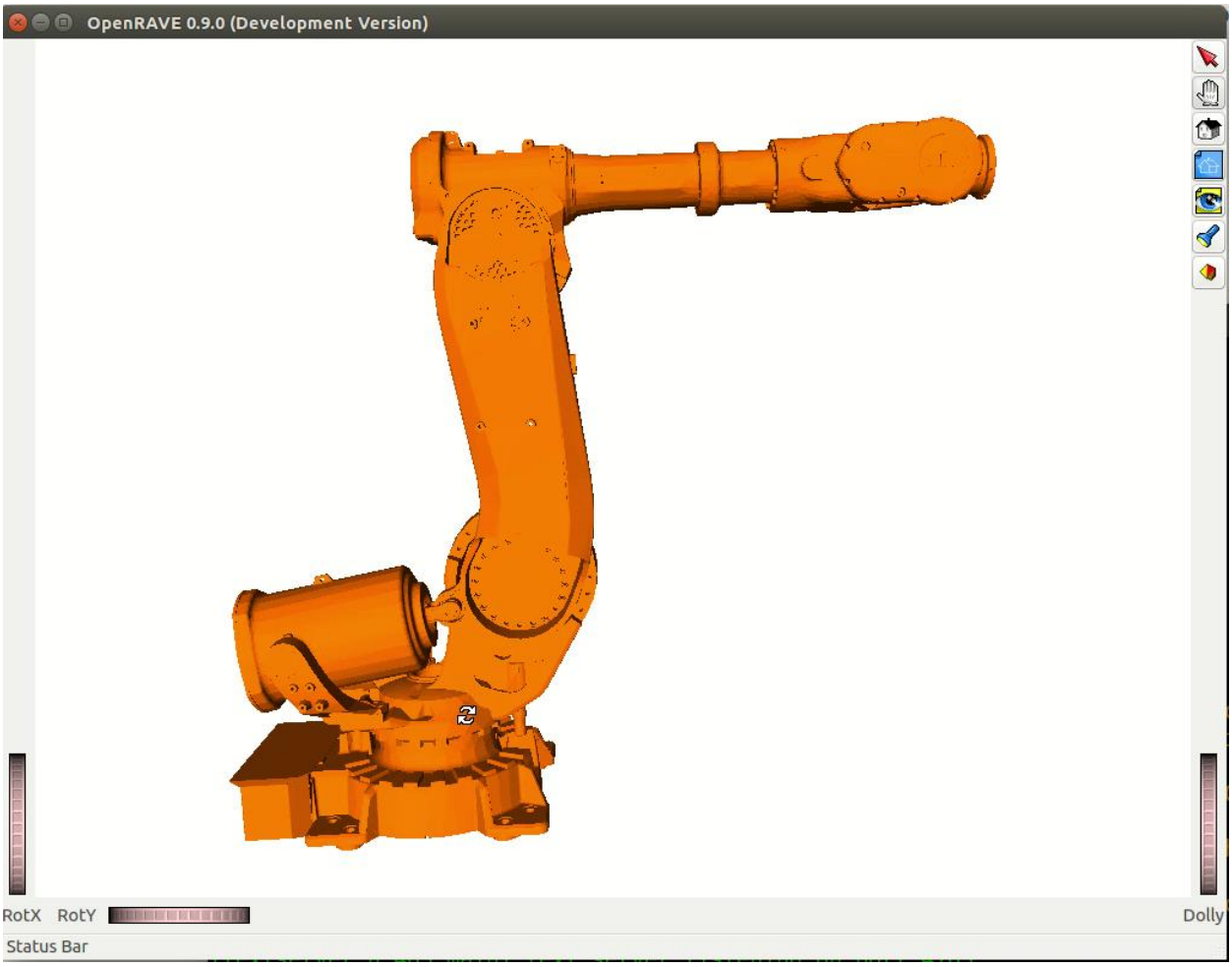


Where is the source code: /home/lentin/Desktop/openrave/openrave

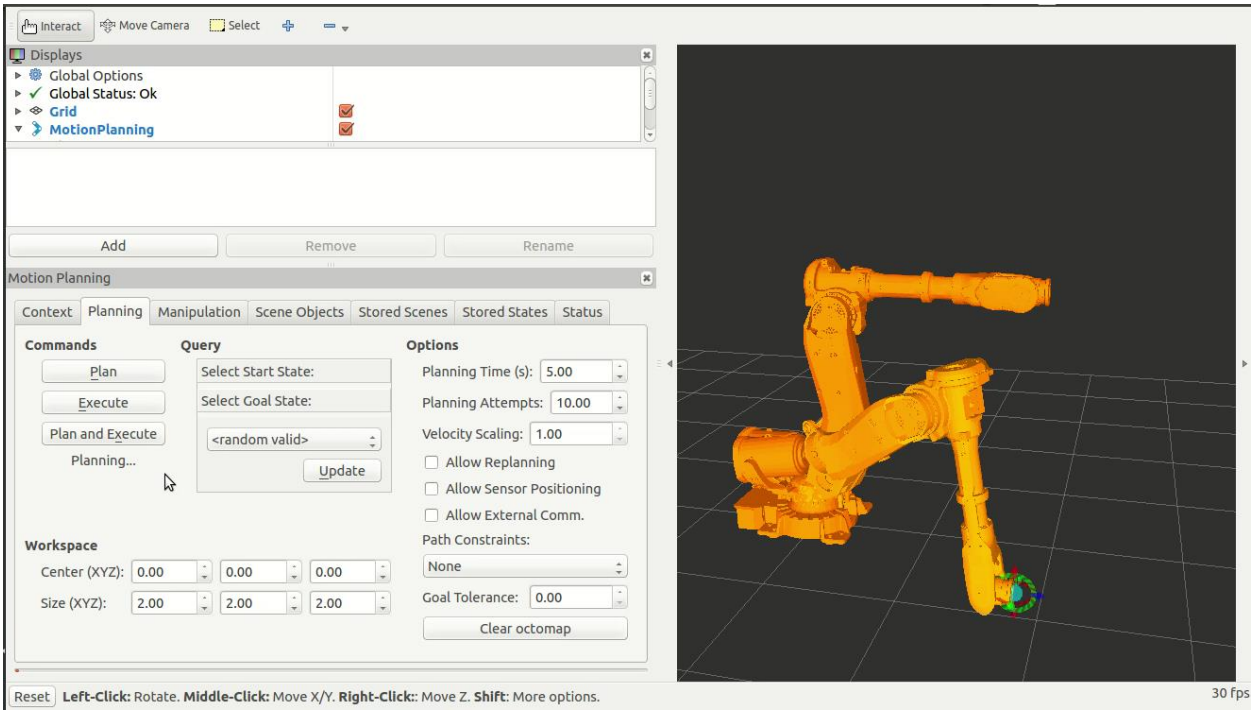
Where to build the binaries: /home/lentin/Desktop/openrave/openrave/build

Search:

Name	Value
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_FLANN	☐
OPT_IKFAST_FLOAT32	☑
OPT_MATLAB	☐
OPT_OCTAVE	☐
OPT_PLUGINS	☑
OPT_PYTHON	☑
OPT_STATIC	☐
OPT_VIDEORECORDING	☑




```
lentin@lentin-Aspire-4755:~/ros_industrial_ws/src/abb_irb6640_moveit_plugins/src$ rosrun moveit_ikfast create_ikfast_mo
veit_plugin.py abb_irb6640 manipulator abb_irb6640_moveit_plugins abb_irb6640_manipulator_ikfast_solver.cpp
Warning: The default search has changed from OPTIMIZE_FREE_JOINT to now OPTIMIZE_MAX_JOINT!

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 268435528

Created plugin file at '/home/lentin/ros_industrial_ws/src/abb_irb6640_moveit_plugins/src/abb_irb6640_manipulator_ikfas
t_moveit_plugin.cpp'

Created plugin definition at: '/home/lentin/ros_industrial_ws/src/abb_irb6640_moveit_plugins/abb_irb6640_manipulator_mo
veit_ikfast_plugin_description.xml'

Overwrote CMakeLists file at '/home/lentin/ros_industrial_ws/src/abb_irb6640_moveit_plugins/CMakeLists.txt'

Modified kinematics.yaml at /home/lentin/ros_industrial_ws/src/abb/abb_irb6640_moveit_config/config/kinematics.yaml

Created update plugin script at /home/lentin/ros_industrial_ws/src/abb_irb6640_moveit_plugins/update_ikfast_plugin.sh
lentin@lentin-Aspire-4755:~/ros_industrial_ws/src/abb_irb6640_moveit_plugins/src$
```


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
Commands
Plan
Execute
Plan and Execute
Planning...
Query
Select Start State:
Select Goal State:
<random valid>
Update
Options
Planning Time (s): 5.00
Planning Attempts: 10.00
Velocity 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
Reset
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click:: Move Z. Shift: More options.
30 fps

CHAPTER 12

...or download an Eclipse Package

Eclipse IDE for Java EE Developers

273 MB | 122,278 DOWNLOADS

Tools for Java developers creating Java EE and Web applications, including a Java IDE, tools for Java EE, JPA, JSF, Mylyn...

Linux
32 bit | 64 bit

Eclipse IDE for Java Developers

165 MB | 65,598 DOWNLOADS

The essential tools for any Java developer, including a Java IDE, a Git client, XML Editor, Mylyn, Maven integration and WindowBuilder...

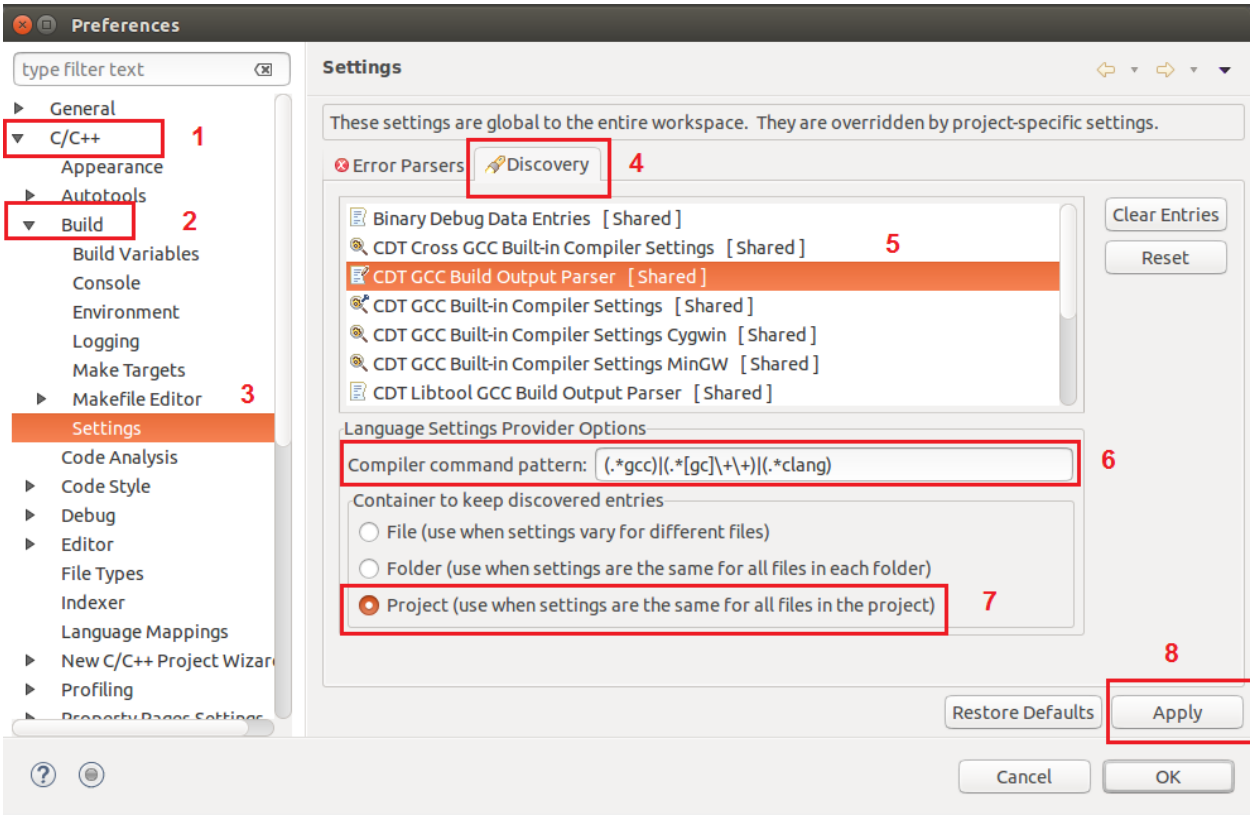
Linux
32 bit | 64 bit

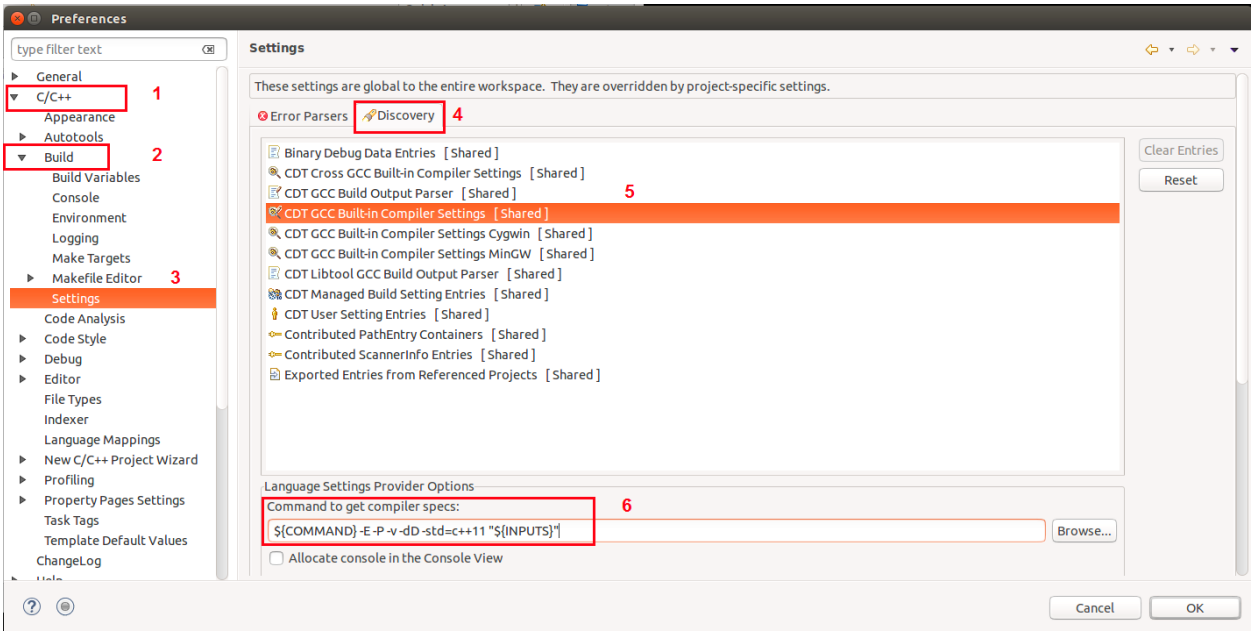
Eclipse IDE for C/C++ Developers

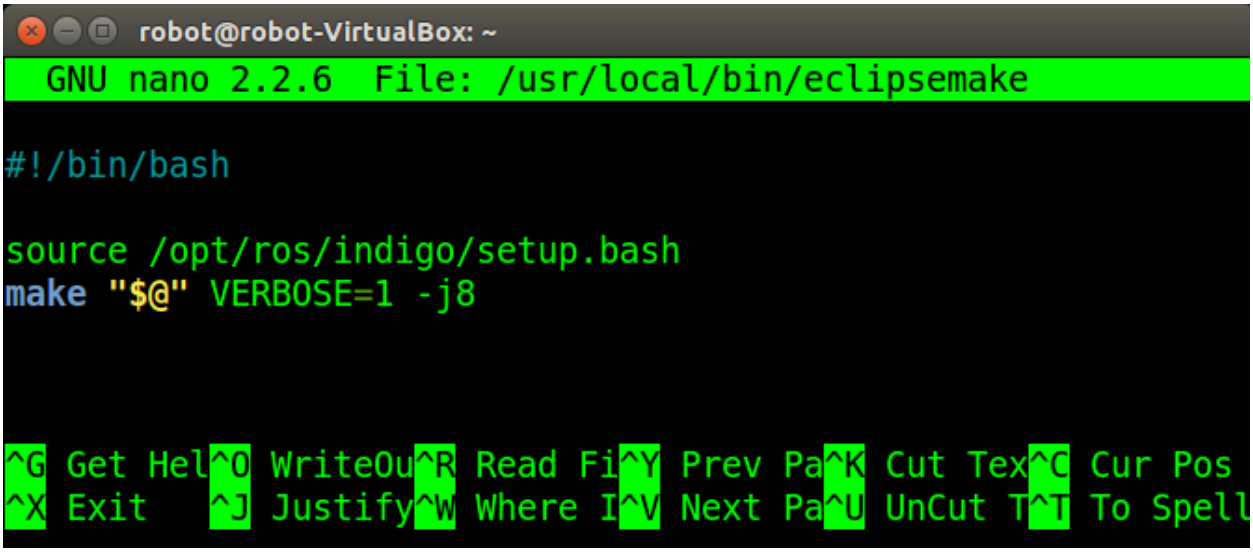
182 MB | 32,974 DOWNLOADS

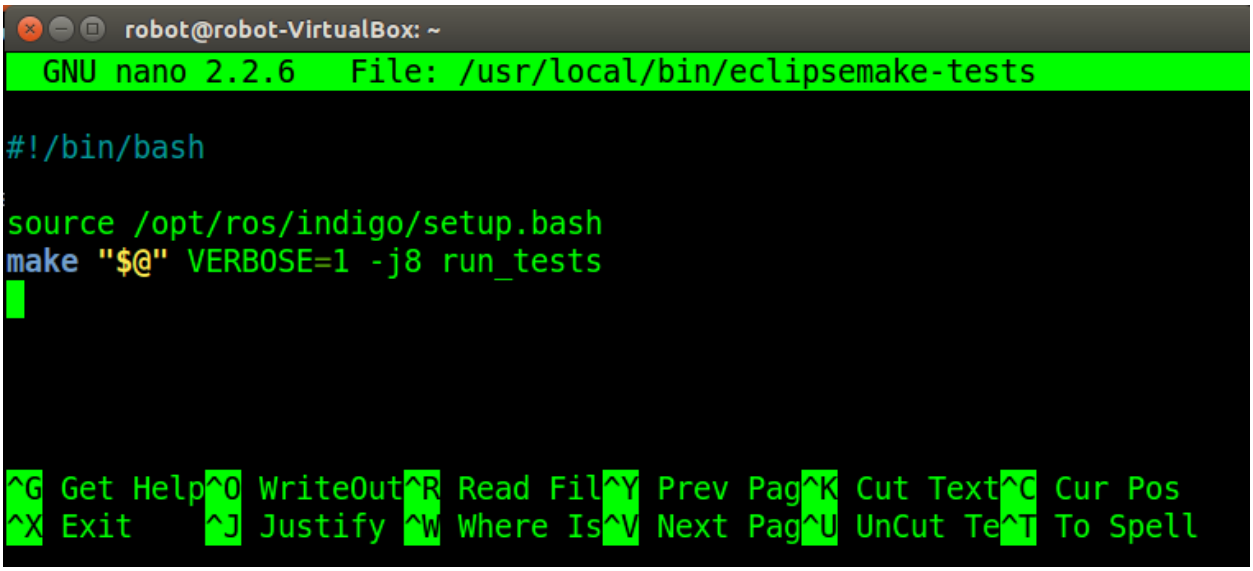
An IDE for C/C++ developers with Mylyn integration.

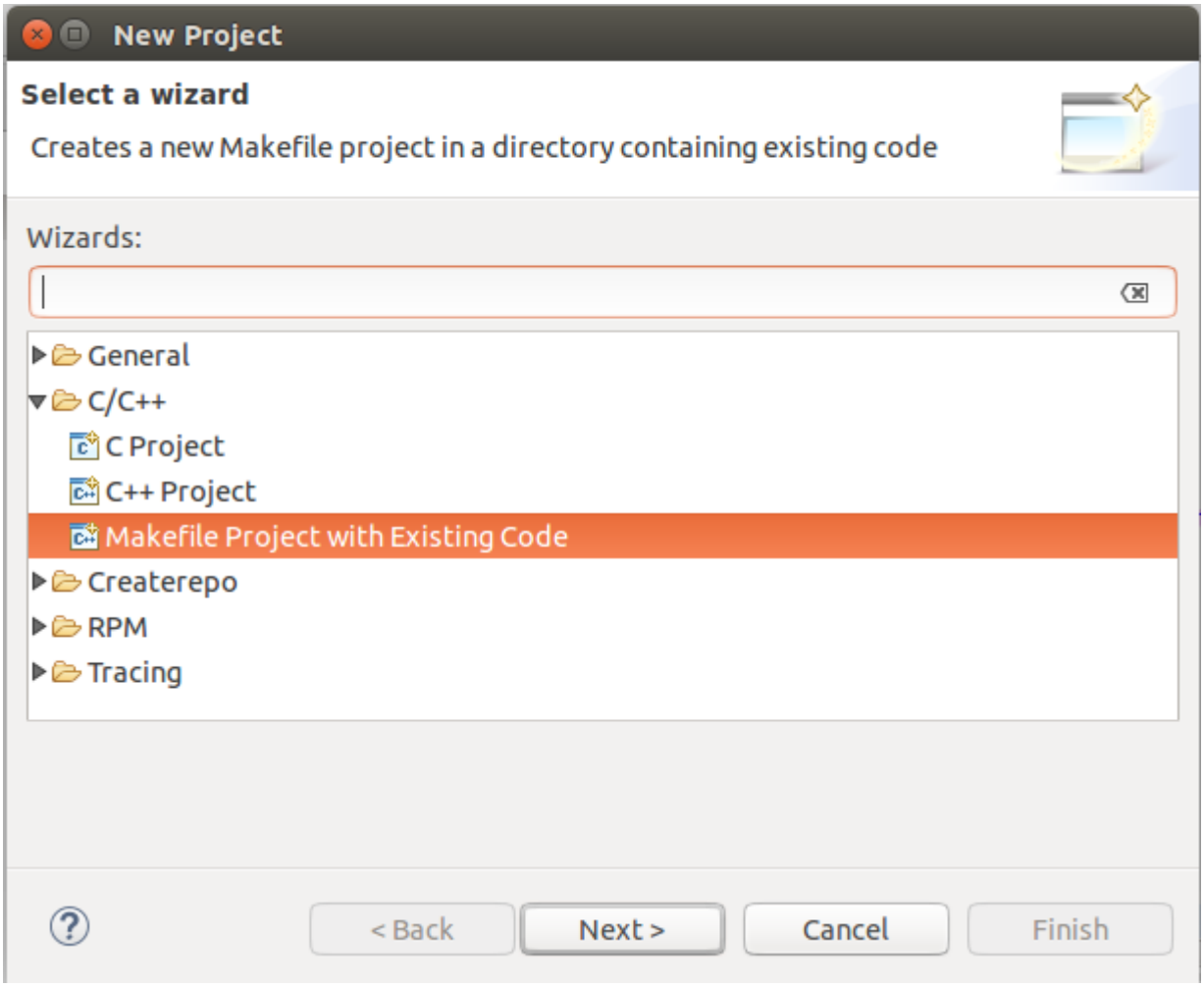
Linux
32 bit | 64 bit

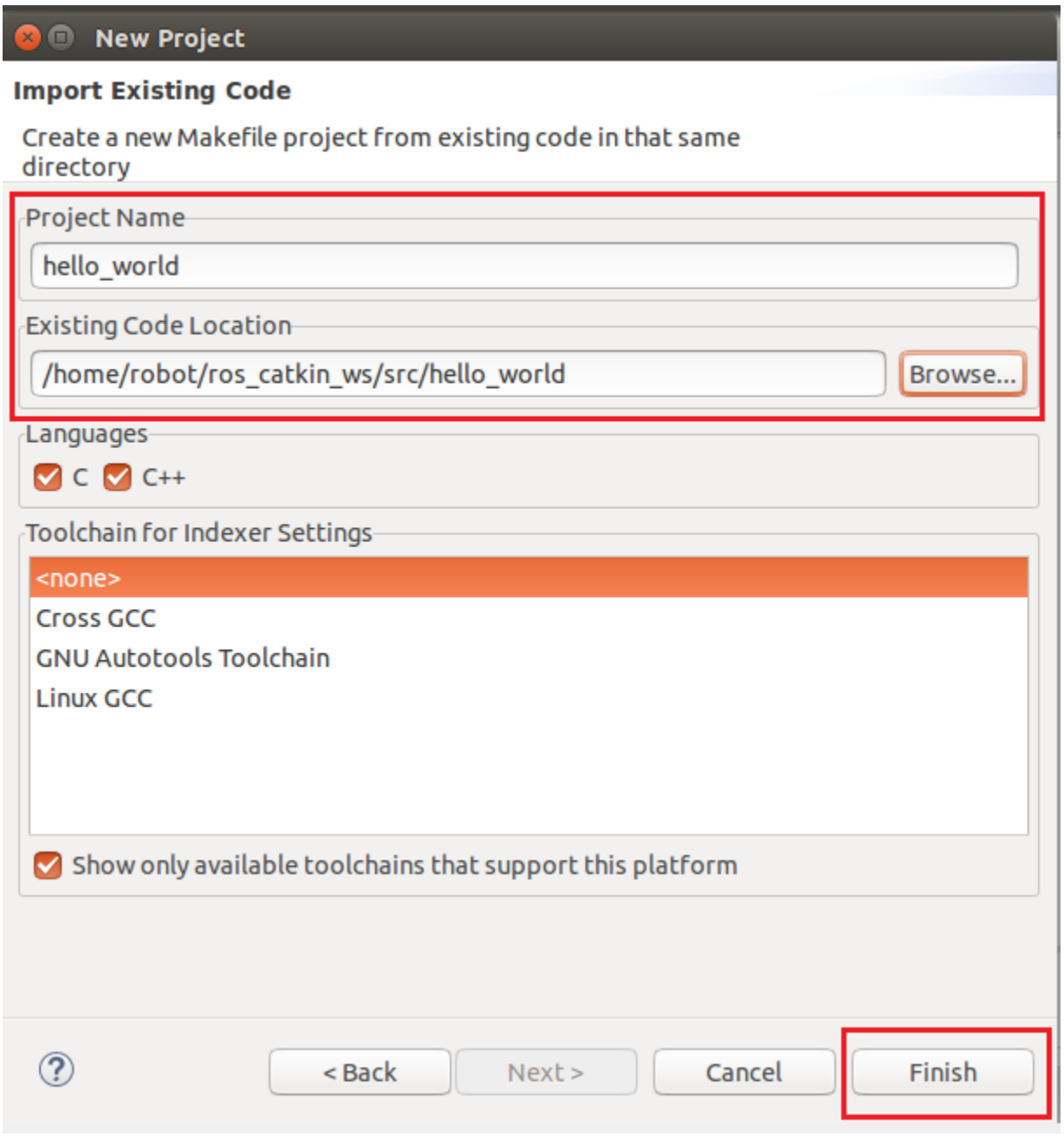

Preferences
type filter text
General
C/C++
1
Appearance
Autotools
Build
2
Build Variables
Console
Environment
Logging
Make Targets
Makefile Editor
3
Settings
Code Analysis
Code Style
Debug
Editor
File Types
Indexer
Language Mappings
New C/C++ Project Wizar
Profiling
Settings
These settings are global to the entire workspace. They are overridden by project-specific settings.
Error Parsers
Discovery
4
Binary Debug Data Entries [Shared]
CDT Cross GCC Built-in Compiler Settings [Shared]
5
CDT GCC Build Output Parser [Shared]
CDT GCC Built-in Compiler Settings [Shared]
CDT GCC Built-in Compiler Settings Cygwin [Shared]
CDT GCC Built-in Compiler Settings MinGW [Shared]
CDT Libtool GCC Build Output Parser [Shared]
Clear Entries
Reset
Language Settings Provider Options
Compiler command pattern: (.*gcc)|(.*[gc]\+\+)|(.*clang)
6
Container to keep discovered entries
File (use when settings vary for different files)
Folder (use when settings are the same for all files in each folder)
Project (use when settings are the same for all files in the project)
7
8
Restore Defaults
Apply
Cancel
OK

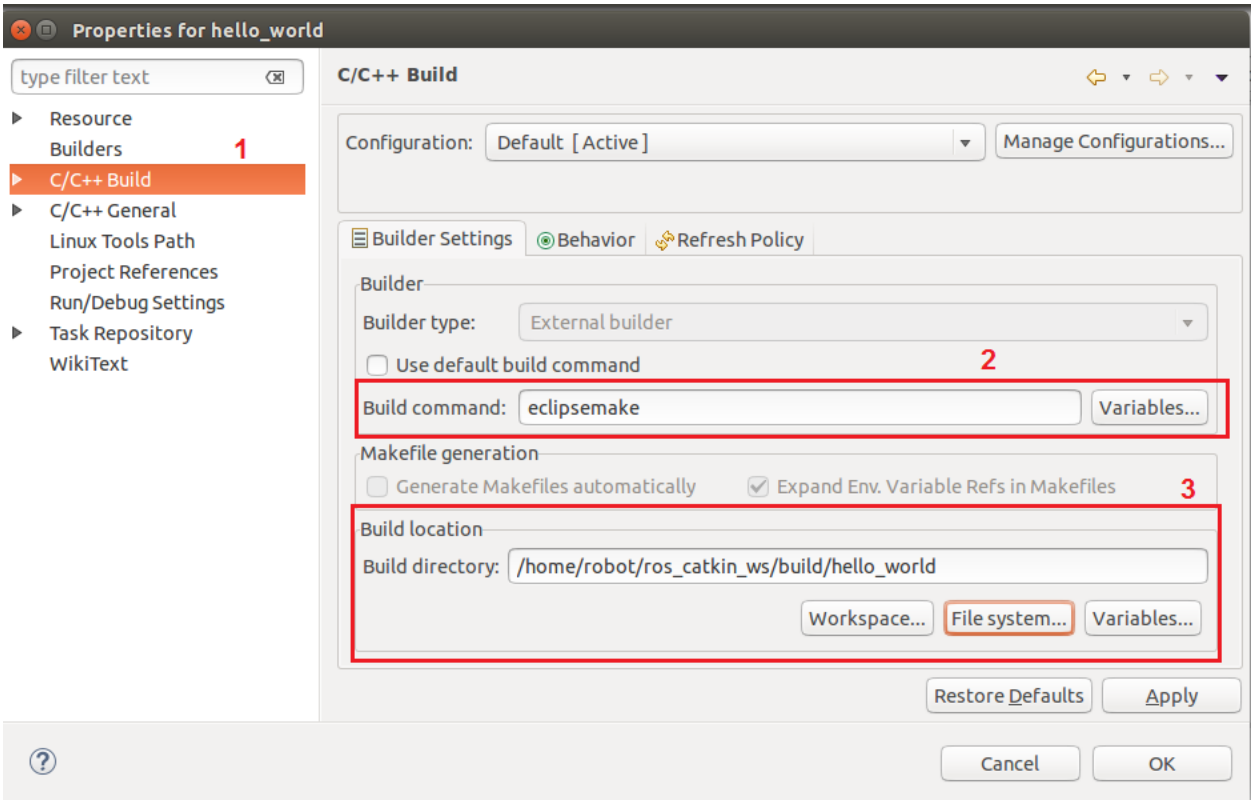

Preferences
type filter text
General
C/C++
1
Appearance
Autotools
Build
2
Build Variables
Console
Environment
Logging
Make Targets
Makefile Editor
3
Settings
Code Analysis
Code Style
Debug
Editor
File Types
Indexer
Language Mappings
New C/C++ Project Wizard
Profiling
Property Pages Settings
Task Tags
Template Default Values
ChangeLog
Settings
These settings are global to the entire workspace. They are overridden by project-specific settings.
Error Parsers
Discovery
4
Binary Debug Data Entries [Shared]
CDT Cross GCC Built-in Compiler Settings [Shared]
CDT GCC Build Output Parser [Shared]
5
CDT GCC Built-in Compiler Settings [Shared]
CDT GCC Built-in Compiler Settings Cygwin [Shared]
CDT GCC Built-in Compiler Settings MinGW [Shared]
CDT Libtool GCC Build Output Parser [Shared]
CDT Managed Build Setting Entries [Shared]
CDT User Setting Entries [Shared]
Contributed PathEntry Containers [Shared]
Contributed ScannerInfo Entries [Shared]
Exported Entries from Referenced Projects [Shared]
Clear Entries
Reset
Language Settings Provider Options
Command to get compiler specs:
6
${COMMAND} -E -P -v -dD -std=c++11 "${INPUTS}"
Browse...
Allocate console in the Console View
Cancel
OK

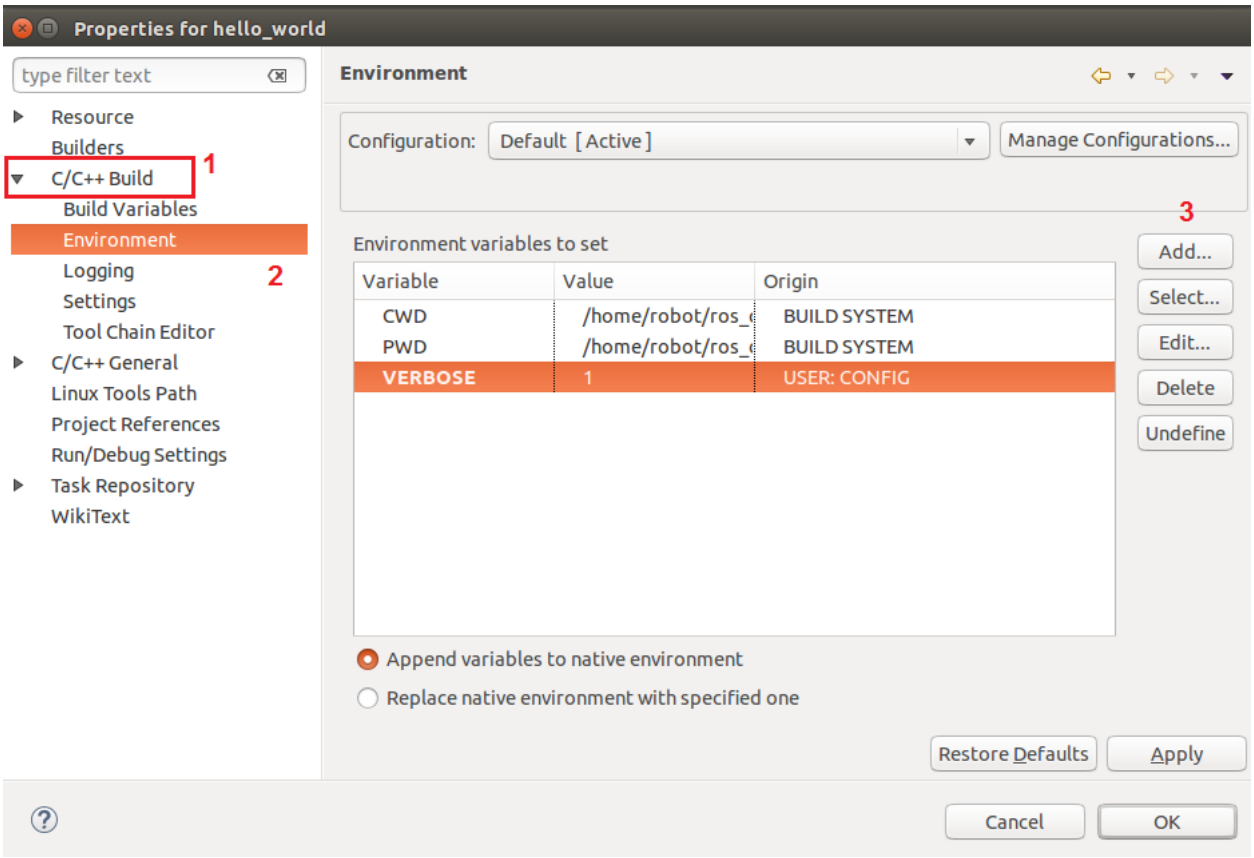

robot@robot-VirtualBox: ~
GNU nano 2.2.6 File: /usr/local/bin/eclipsemake
#!/bin/bash
source /opt/ros/indigo/setup.bash
make "$@" VERBOSE=1 -j8
^G Get Hel^O WriteOu^R Read Fi^Y Prev Pa^K Cut Tex^C Cur Pos
^X Exit ^J Justify^W Where I^V Next Pa^U UnCut T^T To Spell

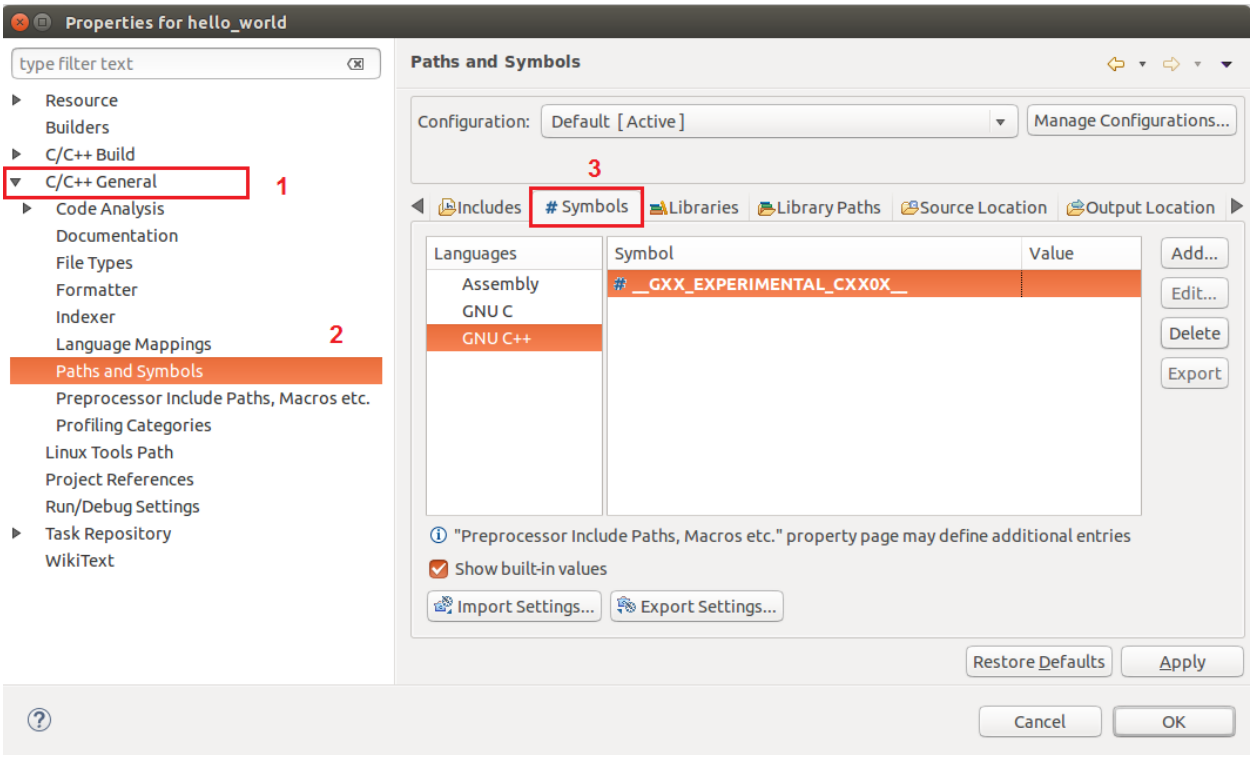

robot@robot-VirtualBox: ~
GNU nano 2.2.6 File: /usr/local/bin/eclipsemake-tests
#!/bin/bash
source /opt/ros/indigo/setup.bash
make "$@" VERBOSE=1 -j8 run_tests
^G Get Help^O WriteOut^R Read Fil^Y Prev Pag^K Cut Text^C Cur Pos
^X Exit ^J Justify ^W Where Is^V Next Pag^U UnCut Te^T To Spell

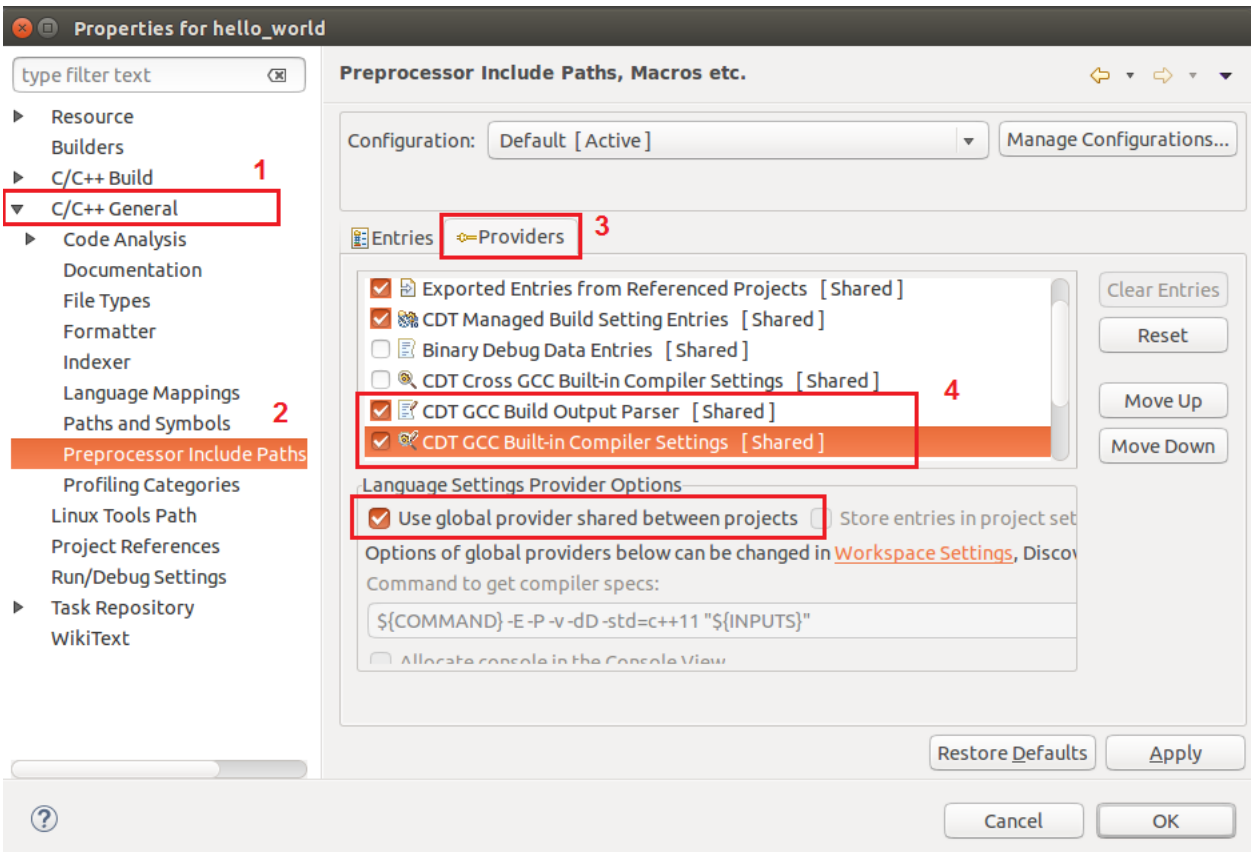

New Project
Select a wizard
Creates a new Makefile project in a directory containing existing code
Wizards:
General
C/C++
C Project
C++ Project
Makefile Project with Existing Code
Createrepo
RPM
Tracing
< Back
Next >
Cancel
Finish

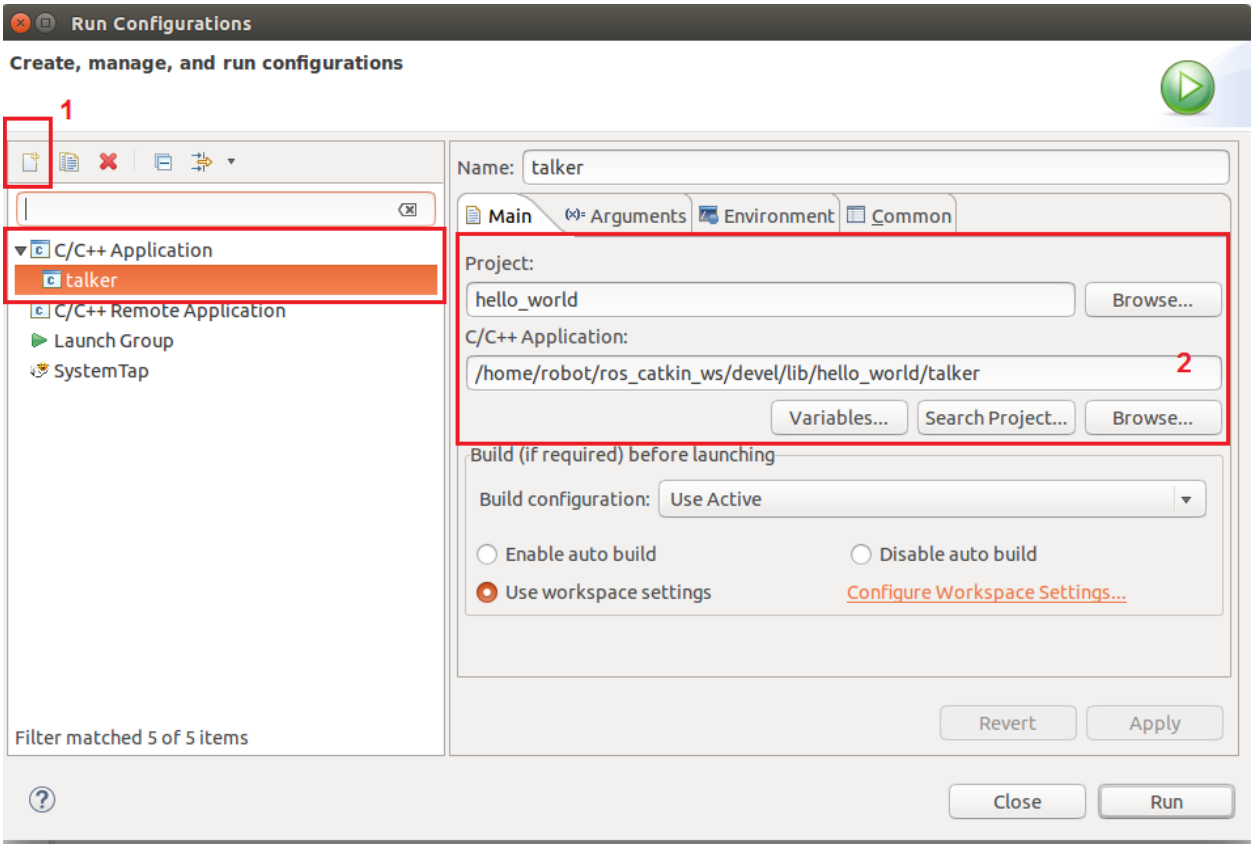

New Project
Import Existing Code
Create a new Makefile project from existing code in that same directory
Project Name
hello_world
Existing Code Location
/home/robot/ros_catkin_ws/src/hello_world
Browse...
Languages
C
C++
Toolchain for Indexer Settings
<none>
Cross GCC
GNU Autotools Toolchain
Linux GCC
Show only available toolchains that support this platform
< Back
Next >
Cancel
Finish

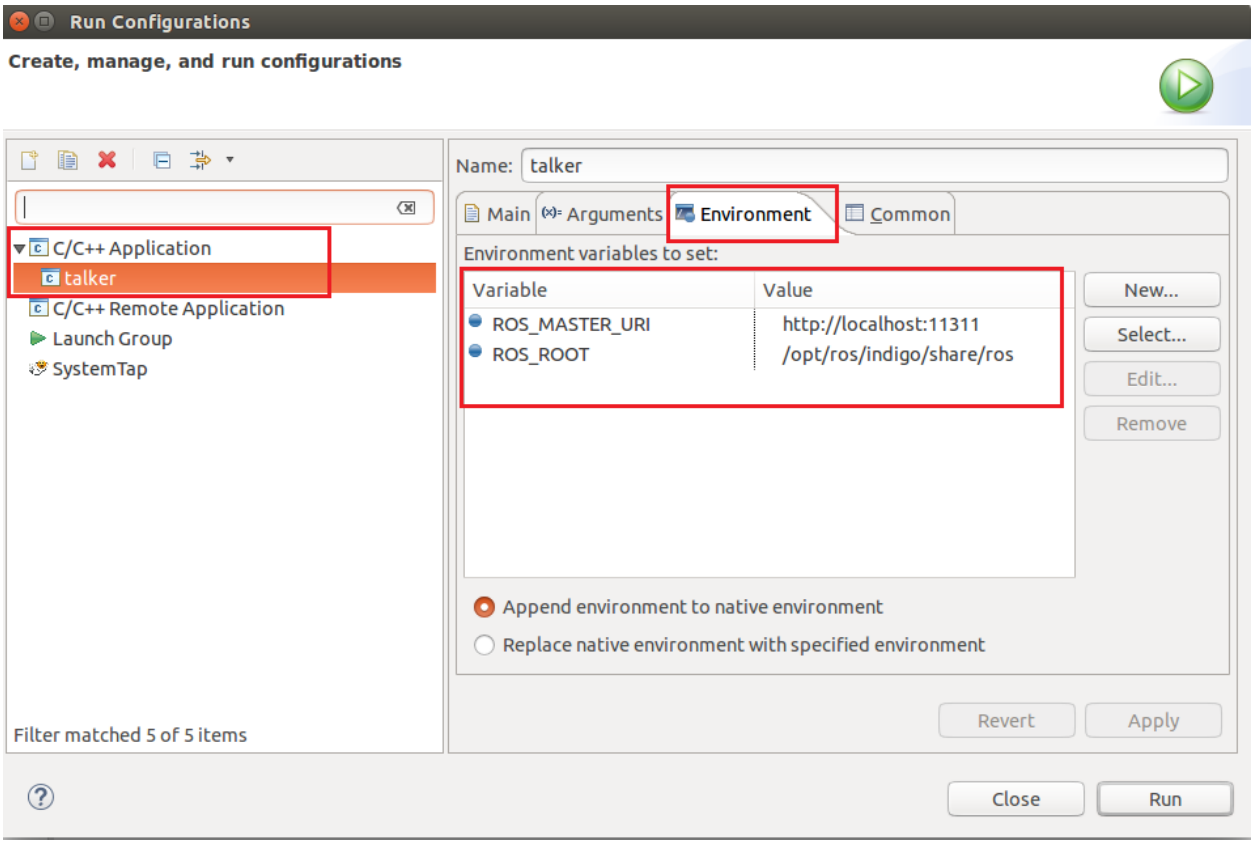

Properties for hello_world
type filter text
Resource
Builders
C/C++ Build
C/C++ General
Linux Tools Path
Project References
Run/Debug Settings
Task Repository
WikiText
1
C/C++ Build
Configuration: Default [Active]
Manage Configurations...
Builder Settings
Behavior
Refresh Policy
Builder
Builder type: External builder
Use default build command
2
Build command: eclipsemake
Variables...
Makefile generation
Generate Makefiles automatically
Expand Env. Variable Refs in Makefiles
3
Build location
Build directory: /home/robot/ros_catkin_ws/build/hello_world
Workspace...
File system...
Variables...
Restore Defaults
Apply
Cancel
OK

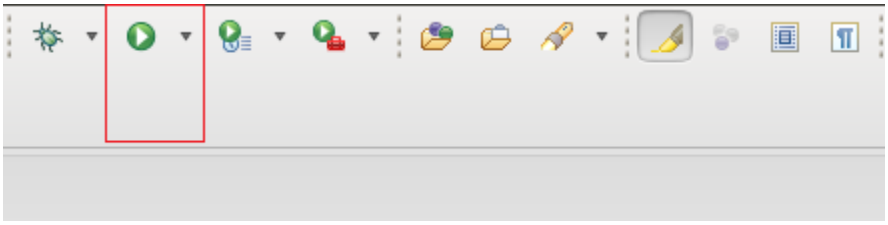

Properties for hello_world
type filter text
Resource
Builders
C/C++ Build
Build Variables
Environment
Logging
Settings
Tool Chain Editor
C/C++ General
Linux Tools Path
Project References
Run/Debug Settings
Task Repository
WikiText
1
2
Environment
Configuration: Default [Active]
Manage Configurations...
3
Environment variables to set
Variable
Value
Origin
CWD
/home/robot/ros_
BUILD SYSTEM
PWD
/home/robot/ros_
BUILD SYSTEM
VERBOSE
1
USER: CONFIG
Add...
Select...
Edit...
Delete
Undefine
Append variables to native environment
Replace native environment with specified one
Restore Defaults
Apply
Cancel
OK

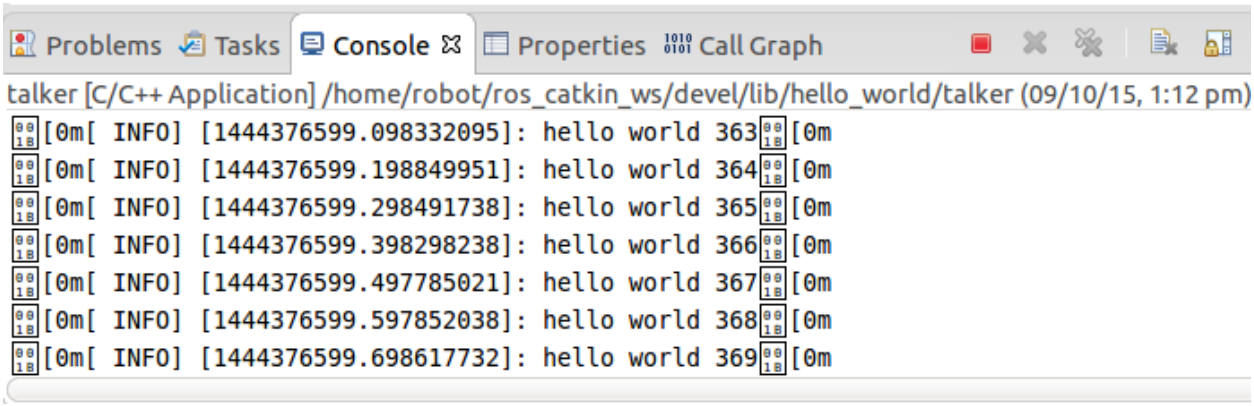

Properties for hello_world
type filter text
Resource
Builders
C/C++ Build
C/C++ General
Code Analysis
Documentation
File Types
Formatter
Indexer
Language Mappings
Paths and Symbols
Preprocessor Include Paths, Macros etc.
Profiling Categories
Linux Tools Path
Project References
Run/Debug Settings
Task Repository
WikiText
1
2
Paths and Symbols
Configuration: Default [Active]
Manage Configurations...
3
Includes
Symbols
Libraries
Library Paths
Source Location
Output Location
Languages
Assembly
GNU C
GNU C++
Symbol
Value
__GXX_EXPERIMENTAL_CXX0X__
Add...
Edit...
Delete
Export
"Preprocessor Include Paths, Macros etc." property page may define additional entries
Show built-in values
Import Settings...
Export Settings...
Restore Defaults
Apply
Cancel
OK


Properties for hello_world
type filter text
Resource
Builders
C/C++ Build
C/C++ General
Code Analysis
Documentation
File Types
Formatter
Indexer
Language Mappings
Paths and Symbols
Preprocessor Include Paths
Profiling Categories
Linux Tools Path
Project References
Run/Debug Settings
Task Repository
WikiText
1
2
Preprocessor Include Paths, Macros etc.
Configuration: Default [Active]
Manage Configurations...
Entries
Providers
3
Exported Entries from Referenced Projects [Shared]
CDT Managed Build Setting Entries [Shared]
Binary Debug Data Entries [Shared]
CDT Cross GCC Built-in Compiler Settings [Shared]
CDT GCC Build Output Parser [Shared]
CDT GCC Built-in Compiler Settings [Shared]
4
Clear Entries
Reset
Move Up
Move Down
Language Settings Provider Options
Use global provider shared between projects
Store entries in project set
Options of global providers below can be changed in Workspace Settings, Disco
Command to get compiler specs:
${COMMAND} -E -P -v -dD -std=c++11 "${INPUTS}"
Allocate console in the Console View
Restore Defaults
Apply
Cancel
OK


Run Configurations
Create, manage, and run configurations
1
C/C++ Application
talker
C/C++ Remote Application
Launch Group
SystemTap
Filter matched 5 of 5 items
Name: talker
Main
Arguments
Environment
Common
Project:
hello_world
Browse...
C/C++ Application:
/home/robot/ros_catkin_ws/devel/lib/hello_world/talker
2
Variables...
Search Project...
Browse...
Build (if required) before launching
Build configuration: Use Active
Enable auto build
Disable auto build
Use workspace settings
Configure Workspace Settings...
Revert
Apply
Close
Run


Run Configurations
Create, manage, and run configurations
C/C++ Application
talker
C/C++ Remote Application
Launch Group
SystemTap
Filter matched 5 of 5 items
Name: talker
Main
Arguments
Environment
Common
Environment variables to set:
Variable
Value
ROS_MASTER_URI
http://localhost:11311
ROS_ROOT
/opt/ros/indigo/share/ros
New...
Select...
Edit...
Remove
Append environment to native environment
Replace native environment with specified environment
Revert
Apply
Close
Run






```
Static checks summary:

Found 1 error(s).

ERROR Not all paths in PYTHONPATH [/home/robot/ros_industrial_ws/devel/lib/p
ython2.7/dist-packages:/home/robot/ros_catkin_ws/devel/lib/python2.7/dist-pa
ckages:/home/robot/cool_arm_ws/devel/lib/python2.7/dist-packages:/home/robot
/catkin_ws/devel/lib/python2.7/dist-packages:/opt/ros/indigo/lib/python2.7/d
ist-packages] point to a directory:
 * /home/robot/ros_catkin_ws/devel/lib/python2.7/dist-packages
```

```
robot@robot-VirtualBox: ~
robot@robot-VirtualBox:~$ rosrun roscpp_tutorials talker
[ERROR] [1444418189.264516006]: [registerPublisher] Failed to contact master at [localhost:11311].  Retry
ing...
```

```
robot@robot-VirtualBox:~$ rostopic pub /chatter std_msgs/Int32 1
publishing and latching message. Press ctrl-C to terminate
[WARN] [WallTime: 1444419579.855744] Could not process inbound connection: topic types do not match: [std
_msgs/String] vs. [std_msgs/Int32]{'topic': '/chatter', 'tcp_nodelay': '0', 'md5sum': '992ce8a1687cec8c8b
d883ec73ca41d1', 'type': 'std_msgs/String', 'callerid': '/listener'}
```

```
lentin@lentin-Aspire-4755:~/ros_catkin_ws$ rosrun hello_world talker
[rosrun] Couldn't find executable named talker below /home/lentin/ros_catkin_ws/src/hello_world
lentin@lentin-Aspire-4755:~/ros_catkin_ws$
```

```
cmake_minimum_required(VERSION 2.8.3)
project(hello_world)

find_package(catkin REQUIRED COMPONENTS
  roscpp
  rospy
  std_msgs
)
#catkin_package()

include_directories(
  ${catkin_INCLUDE_DIRS}
)
```

```
lentin@lentin-Aspire-4755:~$ roscore
^C... logging to /home/lentin/.ros/log/6d2860a2-6f48-11e5-b76e-9439e54d7dda/roslaunch-lentin-Aspire-47
55-5045.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.
```

```
export MY_IP=10.42.0.11
export ROS_IP=$MY_IP
export ROS_MASTER_URI="http://10.42.0.11:11311"
```

```
Linking CXX executable /home/lentin/ros_catkin_ws/devel/lib/hello_world/talker
Linking CXX executable /home/lentin/ros_catkin_ws/devel/lib/hello_world/listener
CMakeFiles/talker.dir/src/talker.cpp.o: In function `main':
talker.cpp:(.text+0x61): undefined reference to `ros::init(int&, char**, std::string
 const&, unsigned int)'
talker.cpp:(.text+0xbd): undefined reference to `ros::NodeHandle::NodeHandle(std::st
ring const&, std::map<std::string, std::string, std::less<std::string>, std::allocat
or<std::pair<std::string const, std::string> > > const&)'
talker.cpp:(.text+0x223): undefined reference to `ros::console::g_initialized'
talker.cpp:(.text+0x233): undefined reference to `ros::console::initialize()'
talker.cpp:(.text+0x288): undefined reference to `ros::console::initializeLogLocatio
n(ros::console::LogLocation*, std::string const&, ros::console::levels::Level)'
talker.cpp:(.text+0x2c9): undefined reference to `ros::console::setLogLocationLevel(
ros::console::LogLocation*, ros::console::levels::Level)'
talker.cpp:(.text+0x2d3): undefined reference to `ros::console::checkLogLocationEnab
```

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

include_directories(
  ${catkin_INCLUDE_DIRS}
)
```