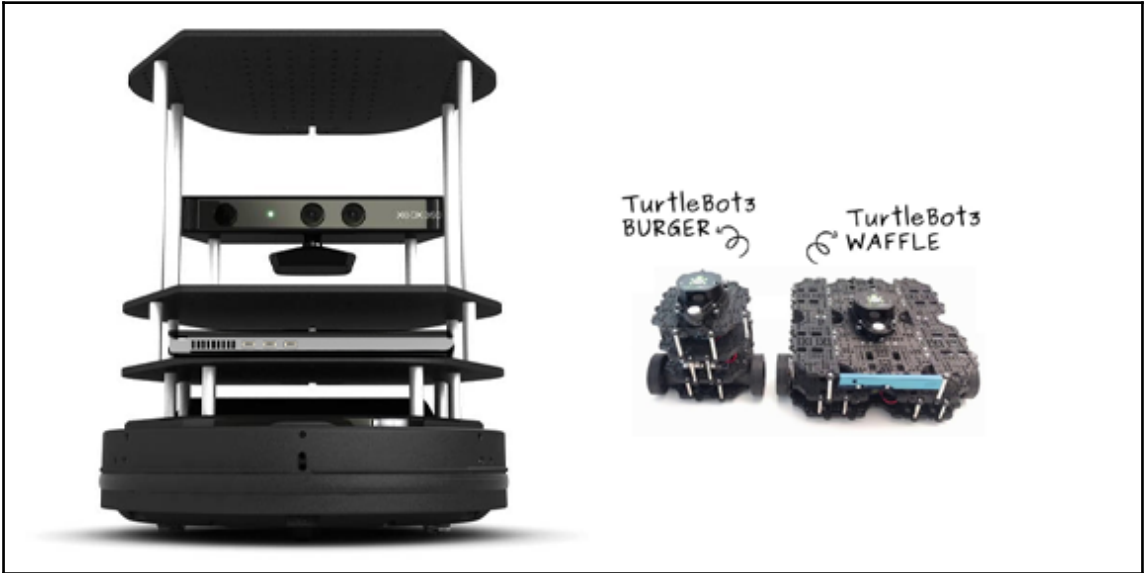
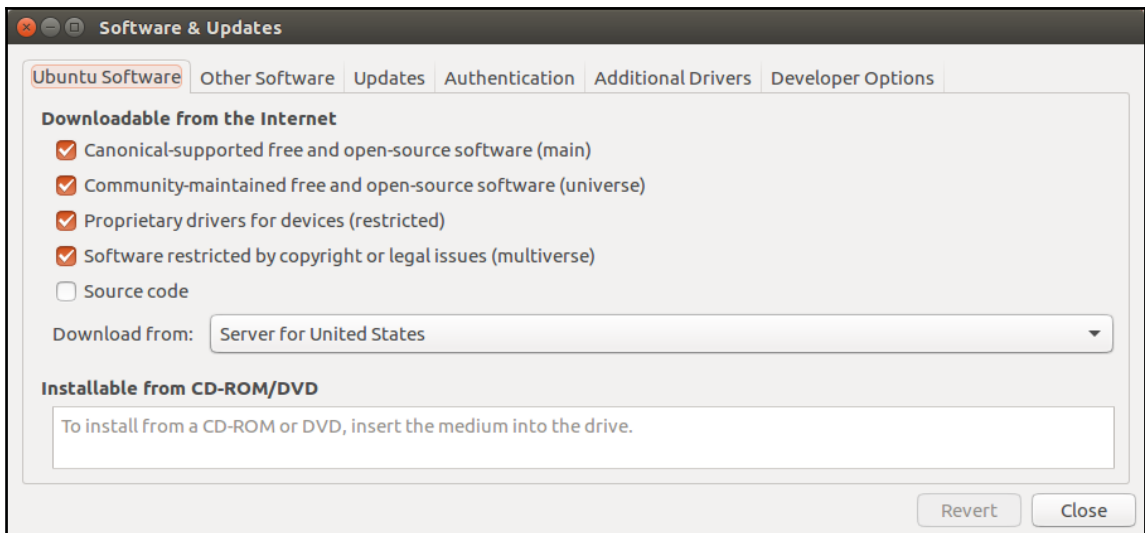
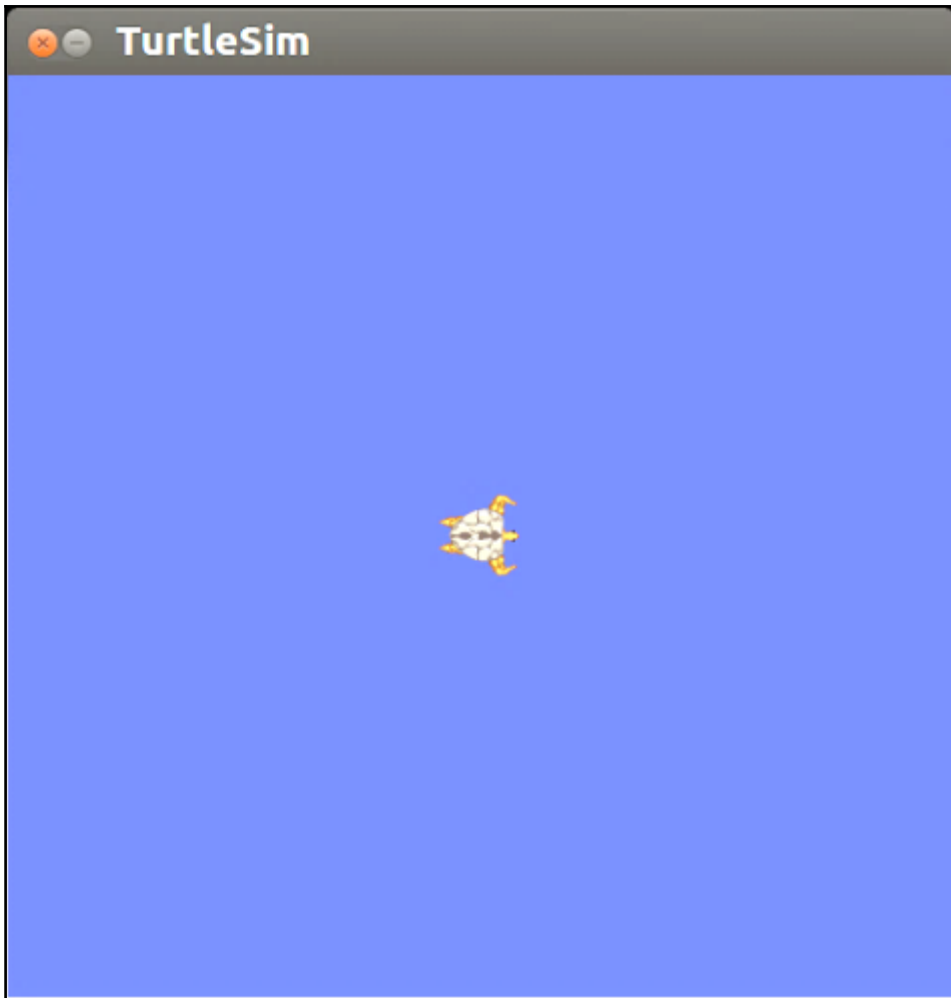


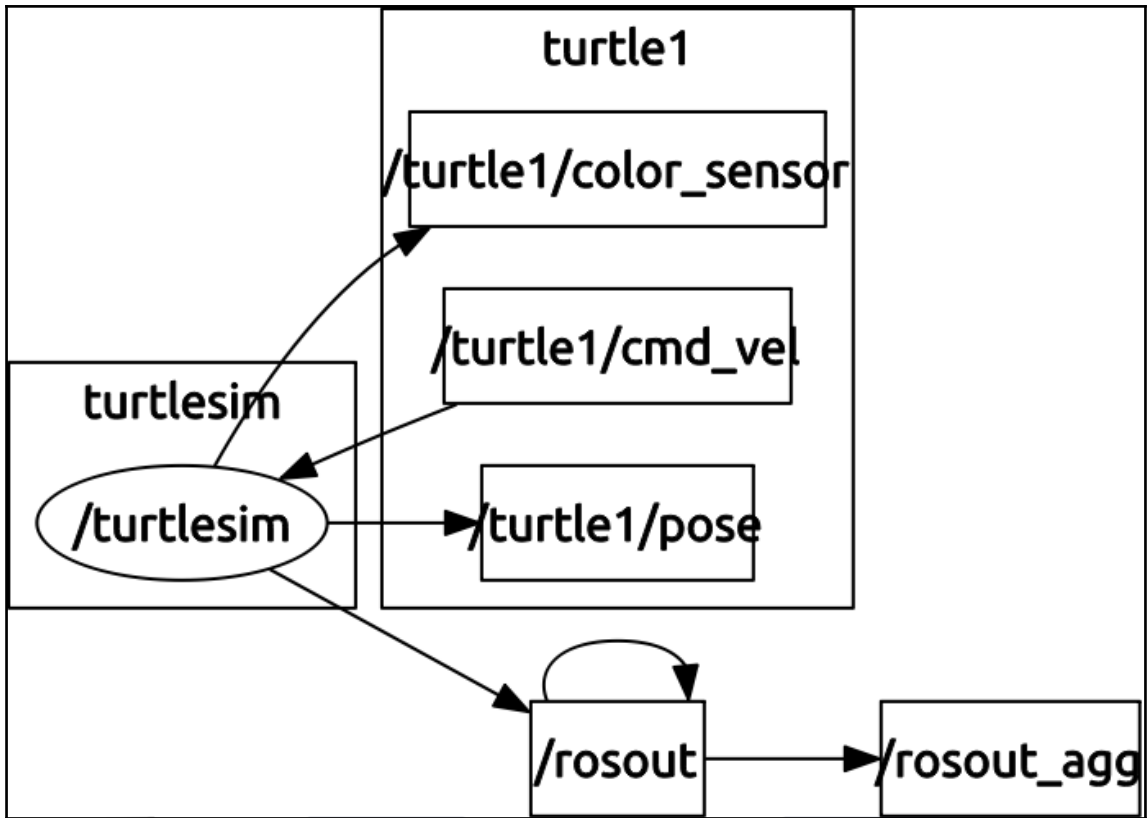
Chapter 1: Getting Started with ROS

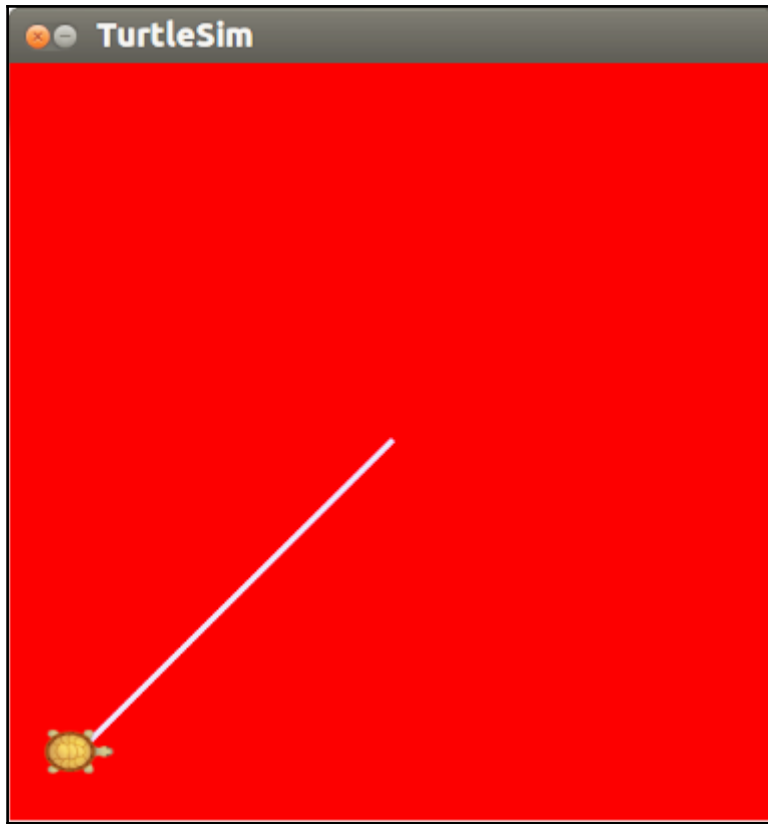




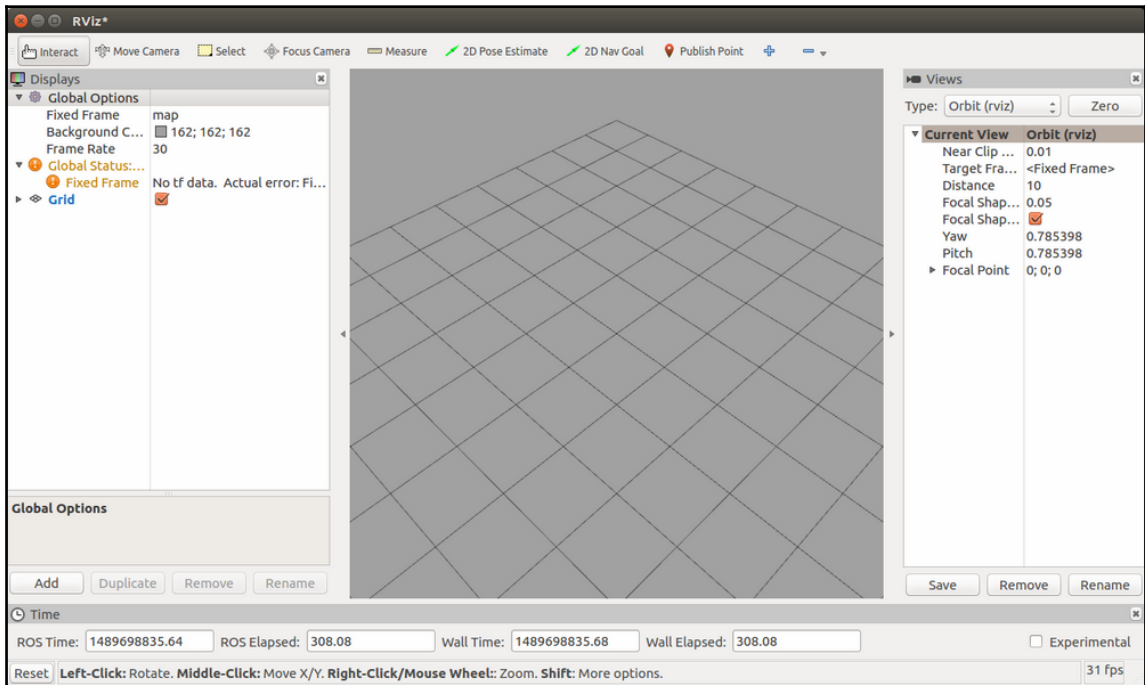


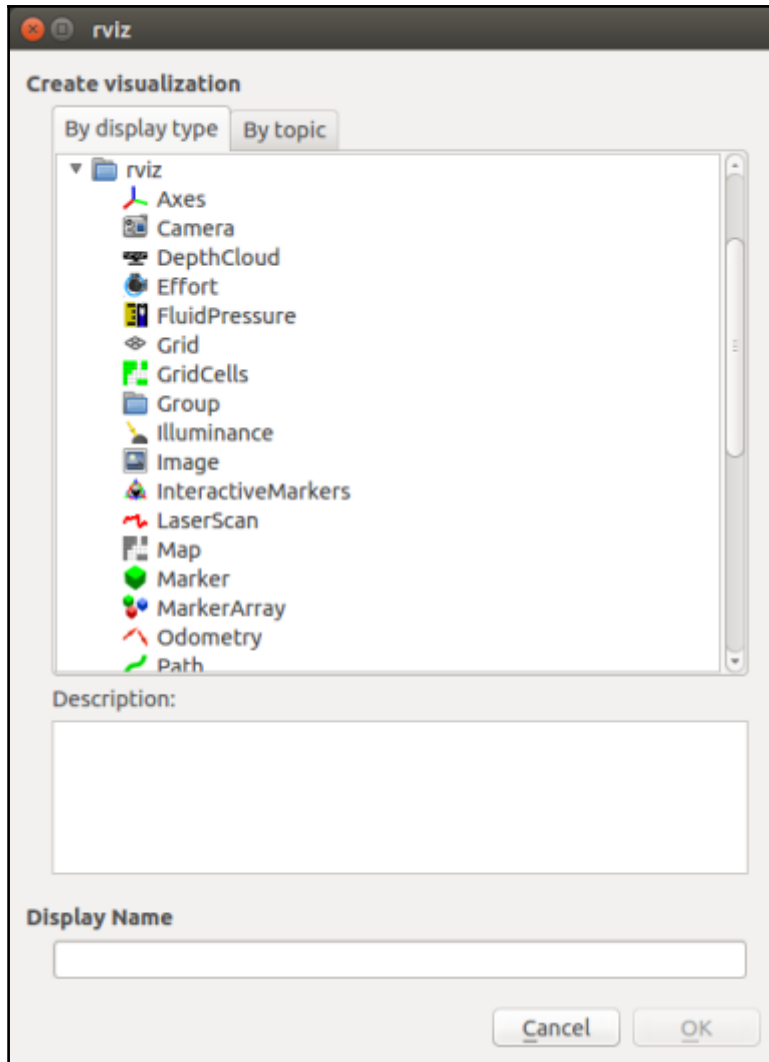


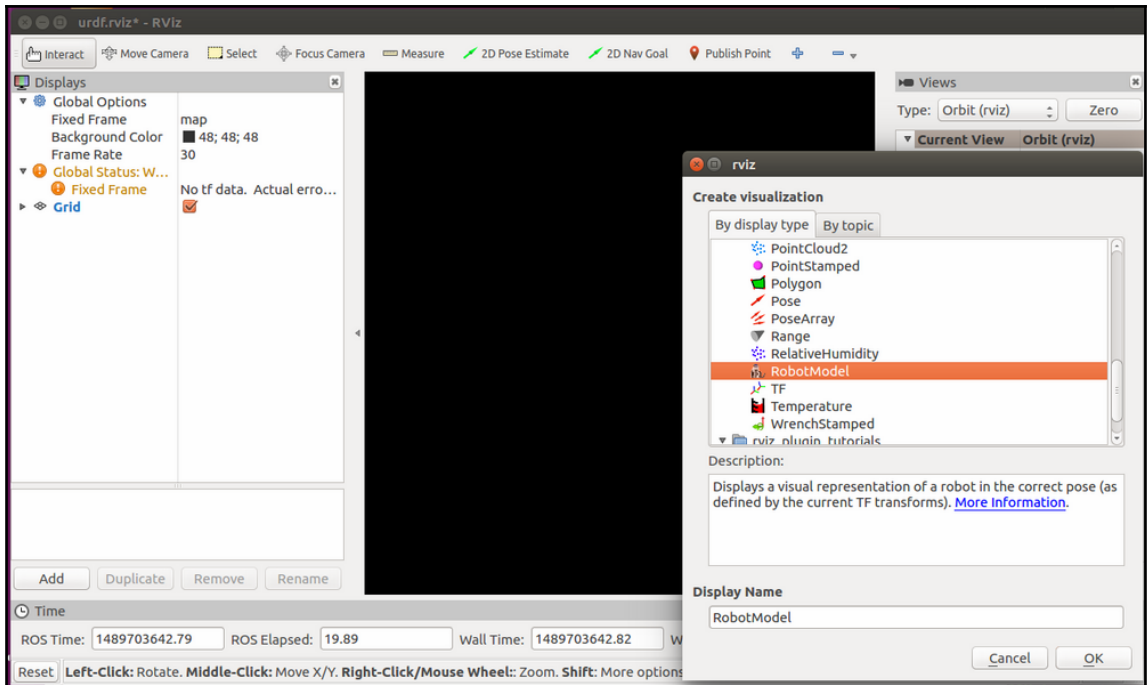


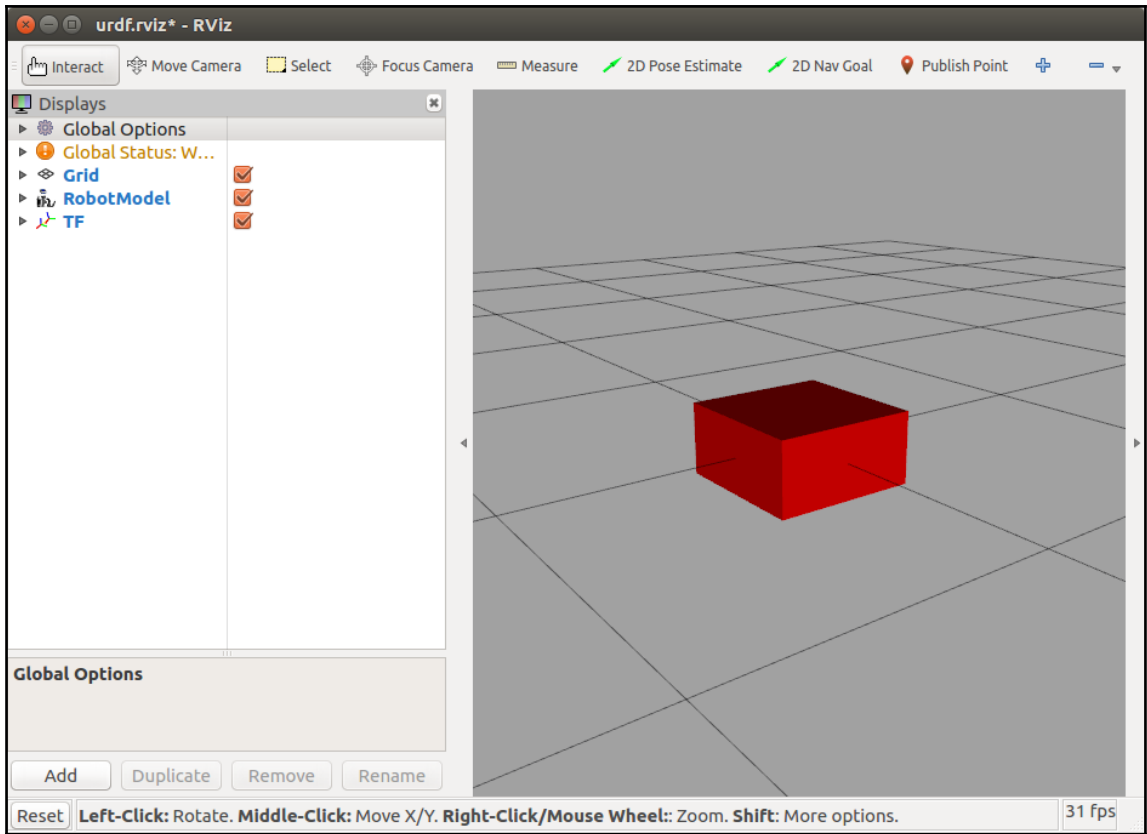


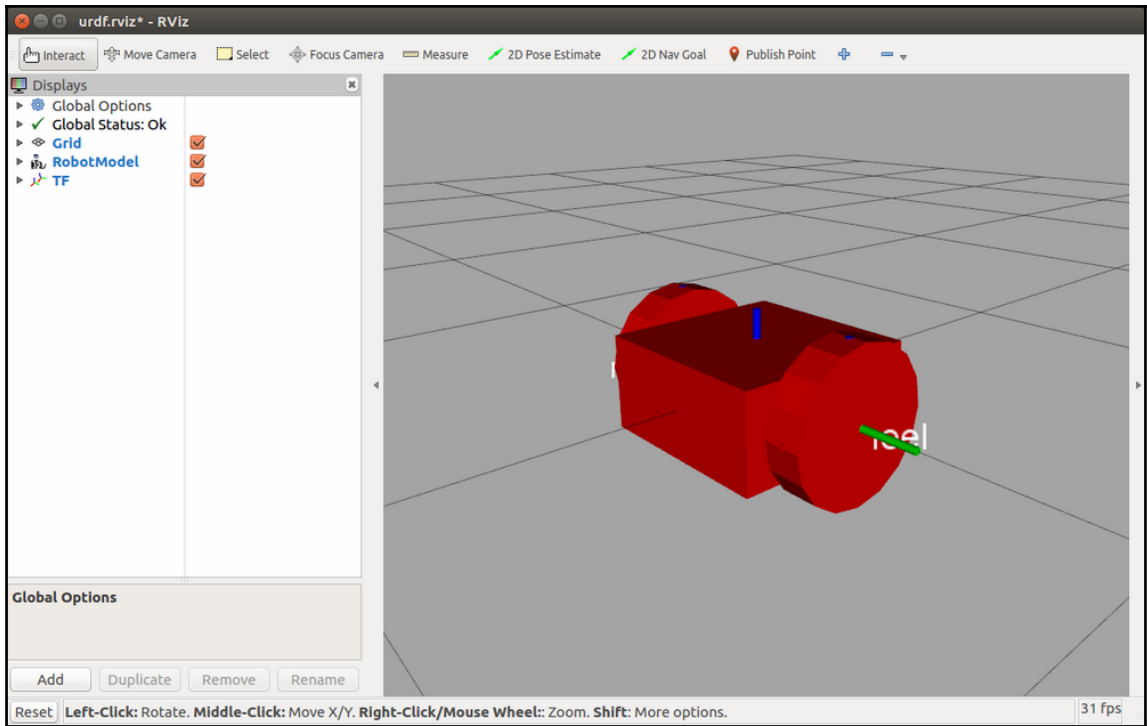
Chapter 2: Creating Your First Two-Wheeled ROS Robot (in Simulation)

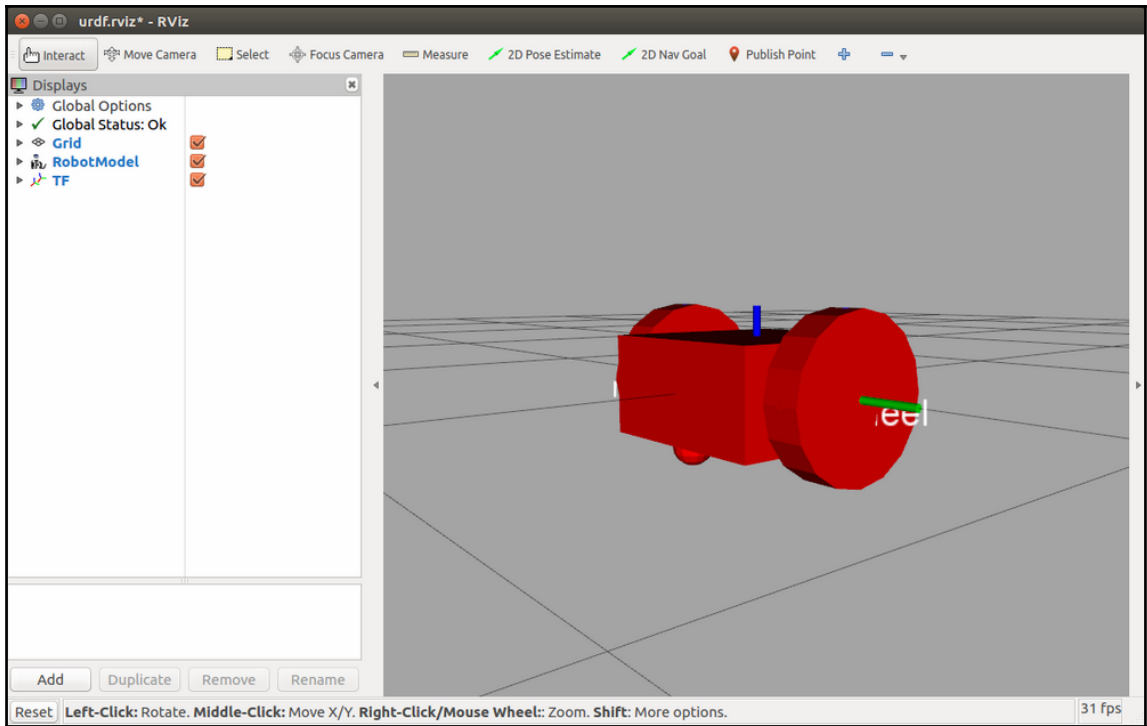


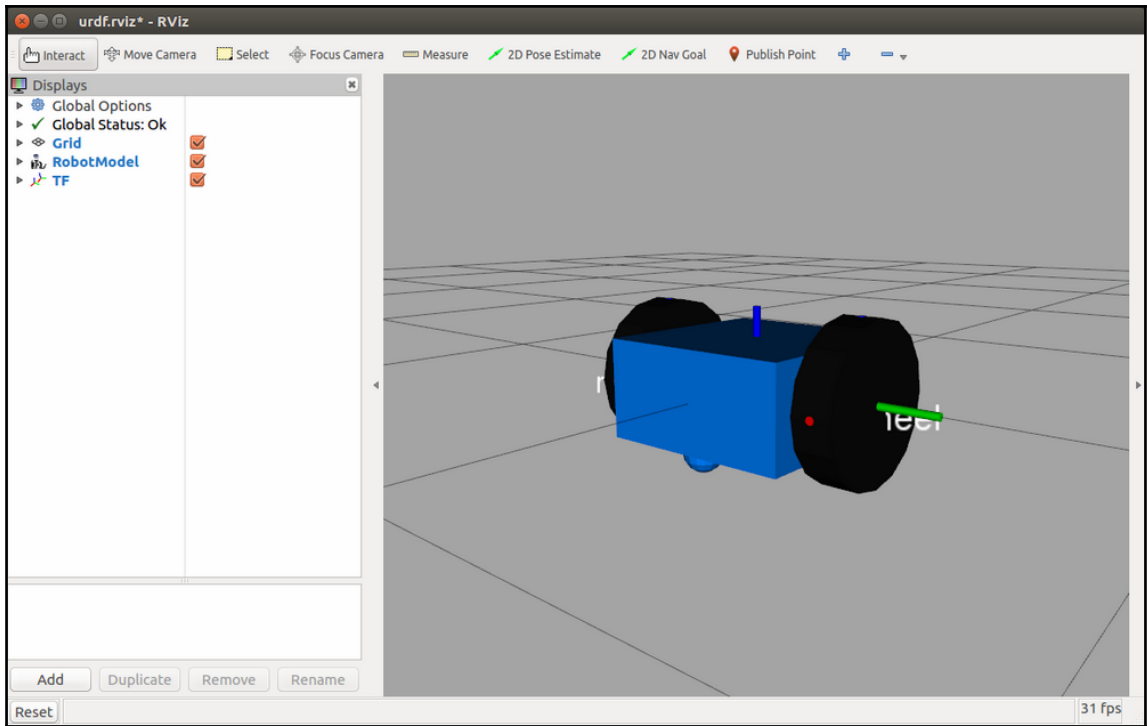


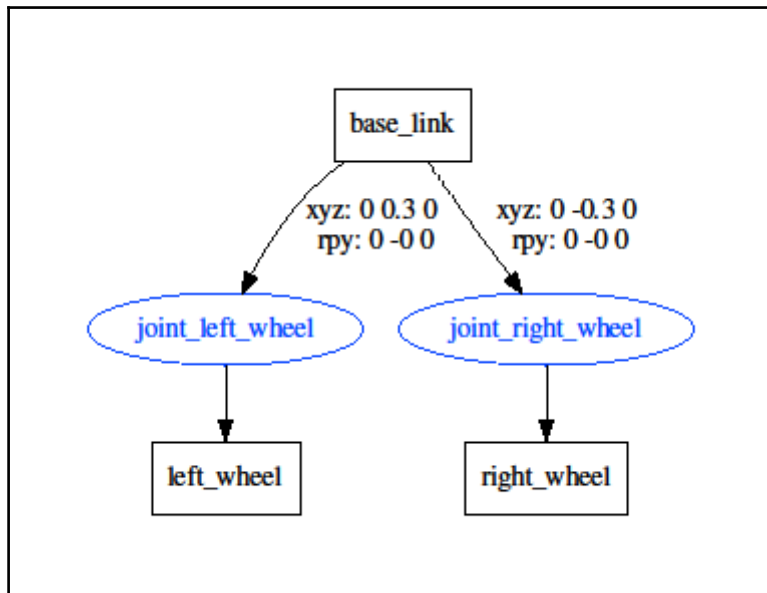
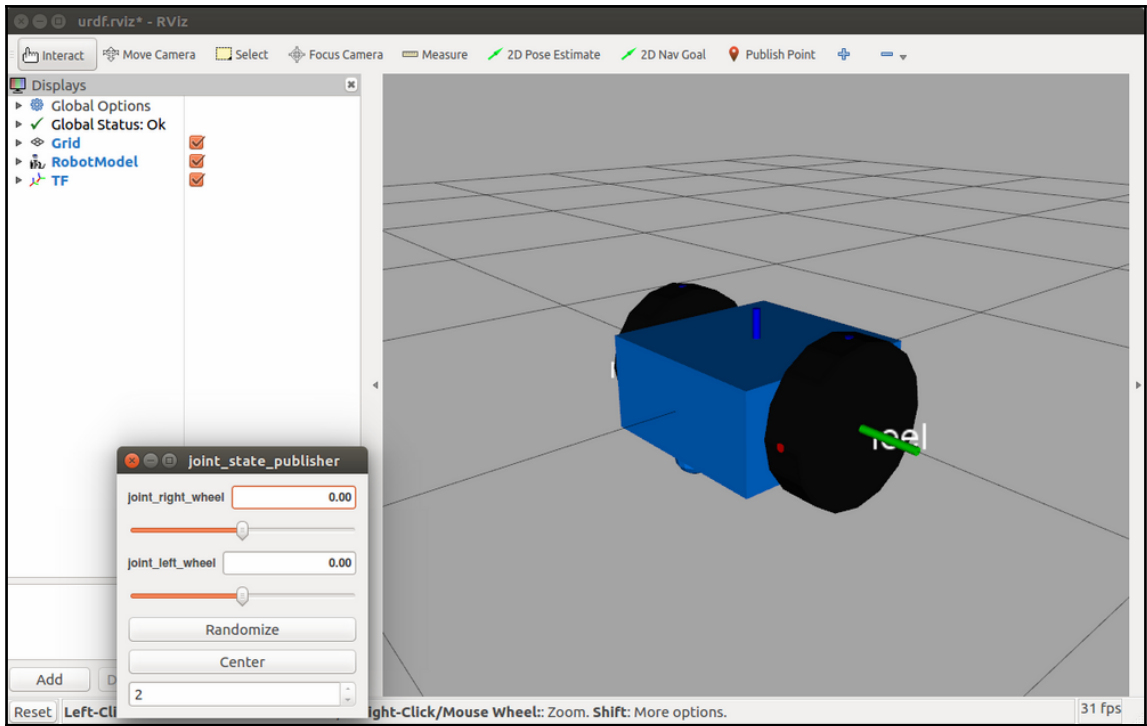


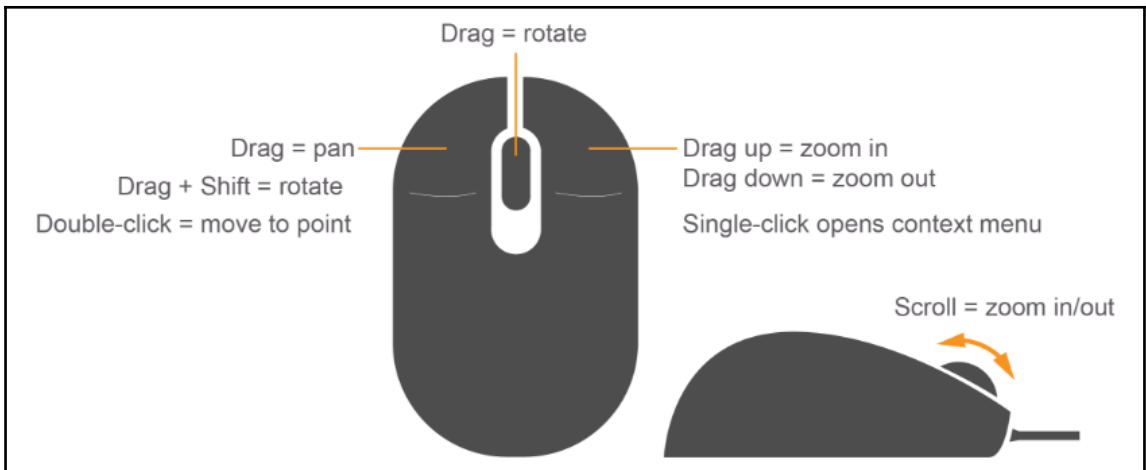
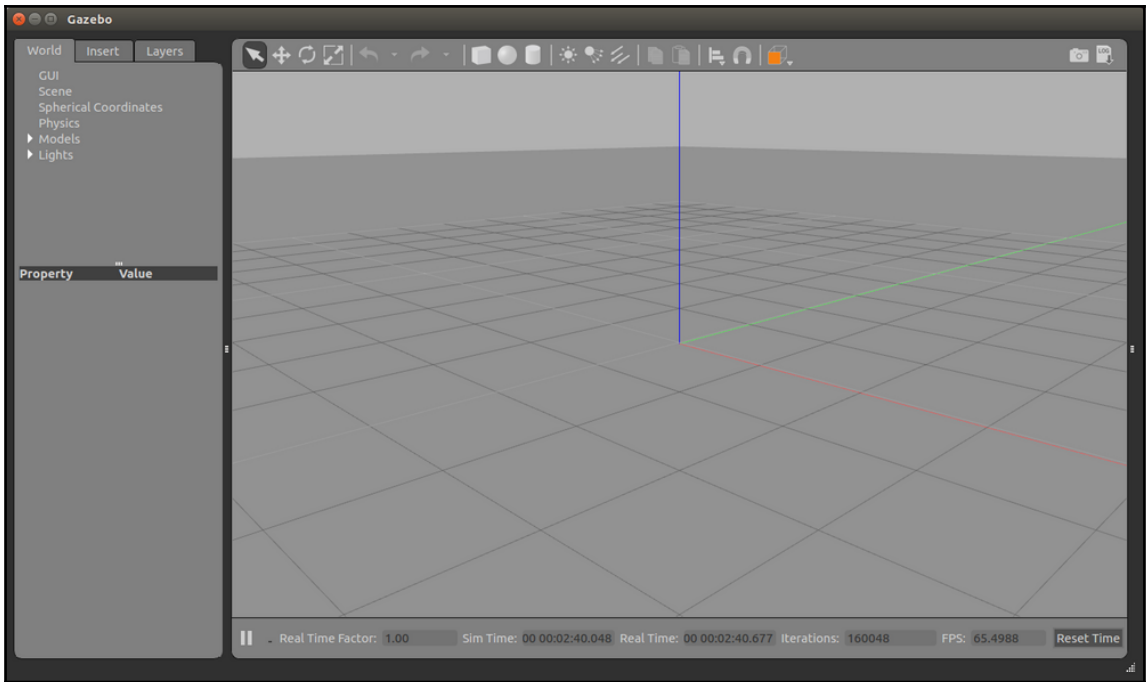


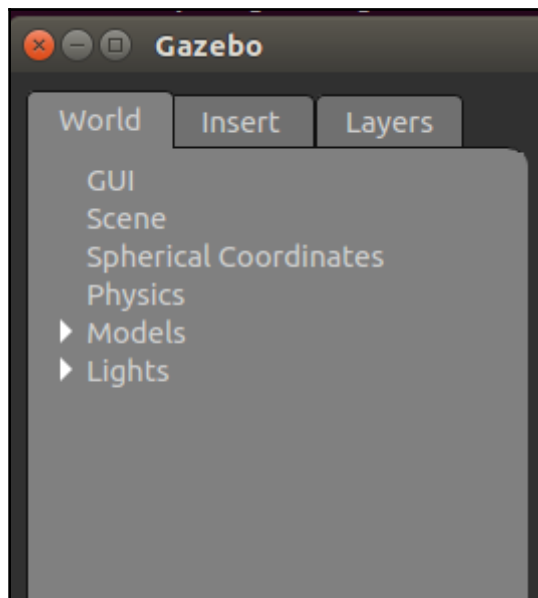
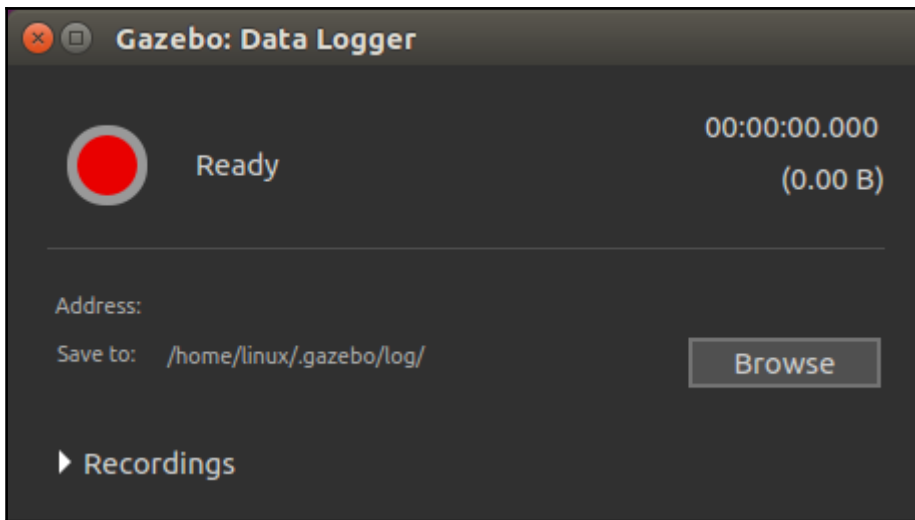


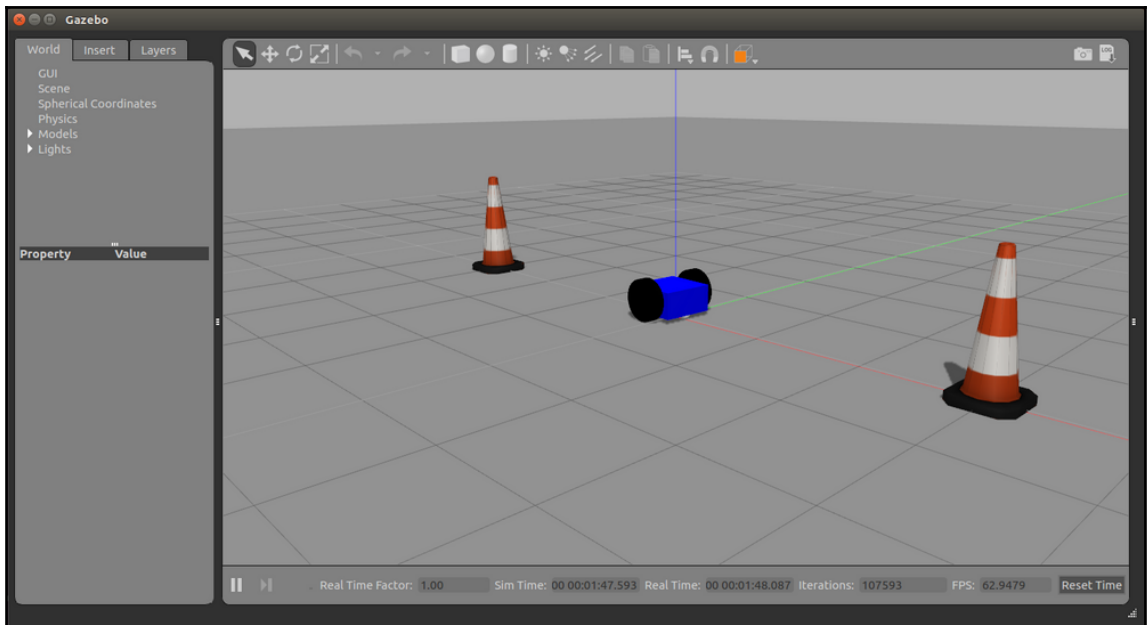
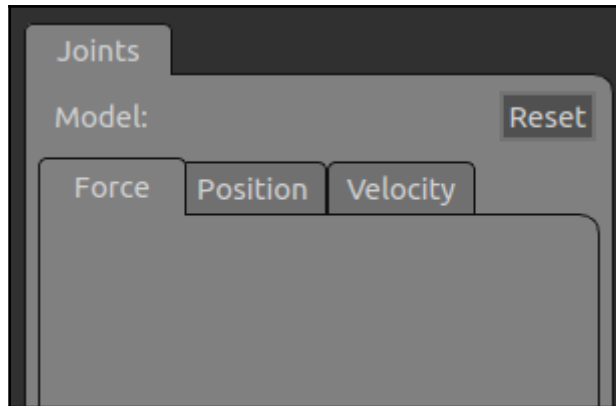


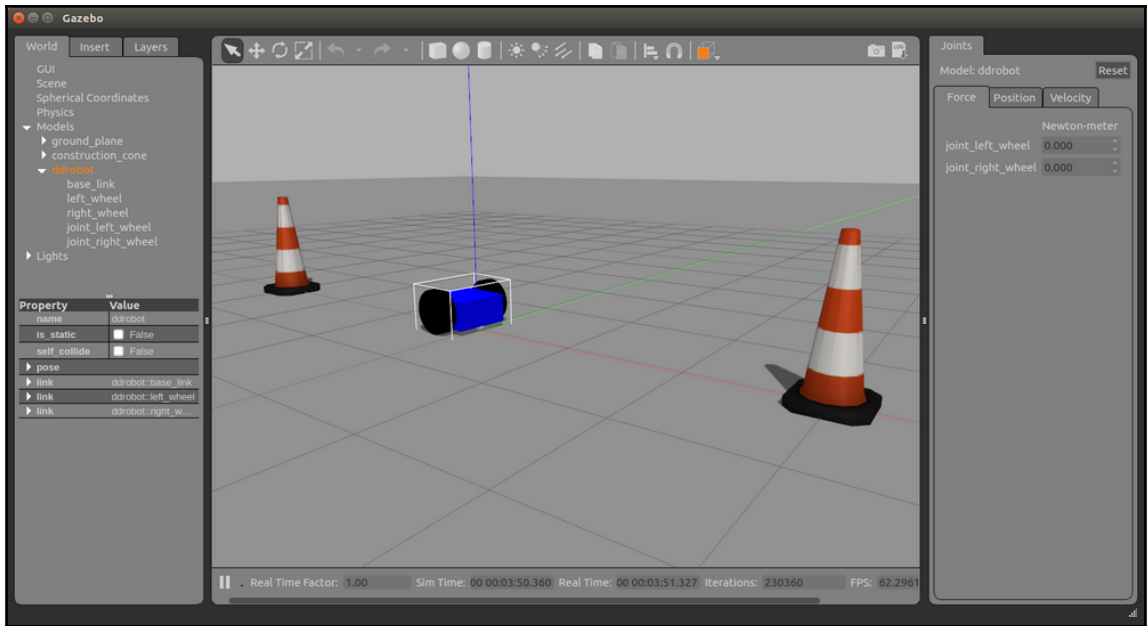






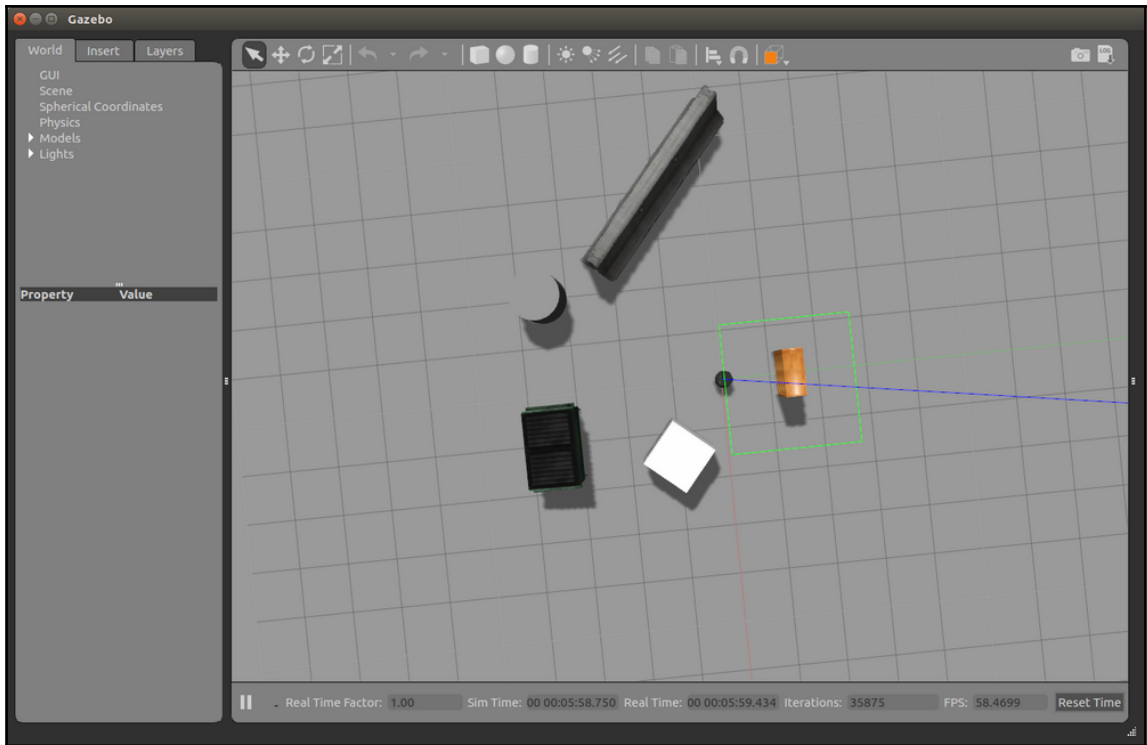


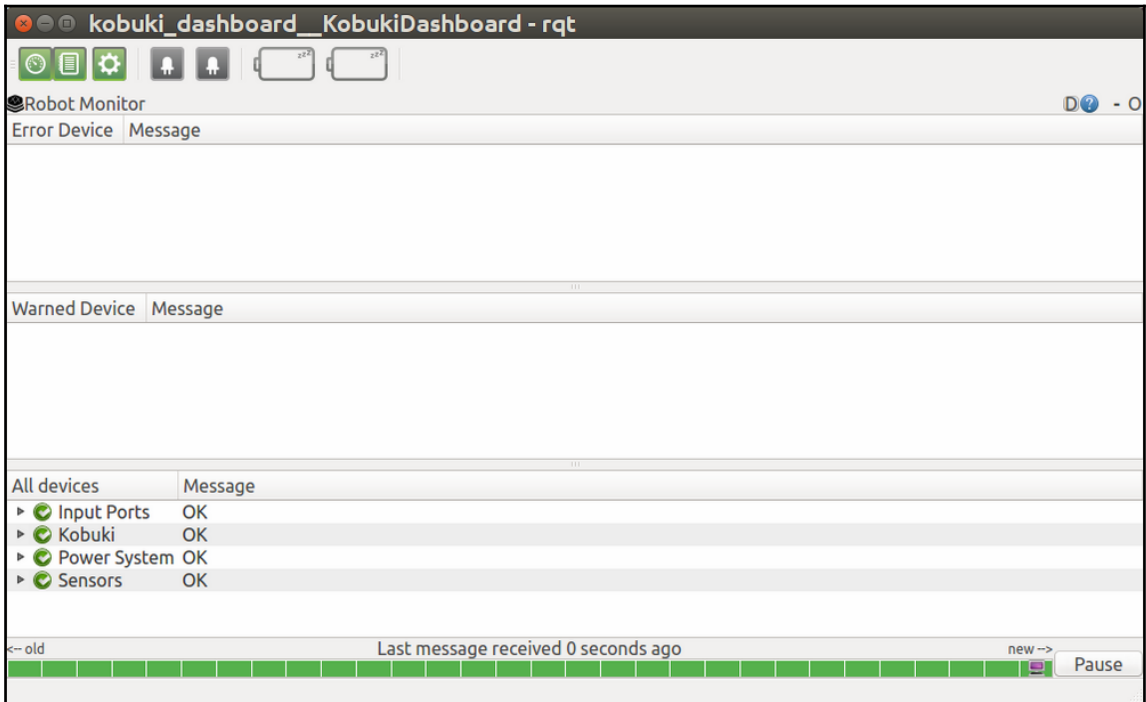
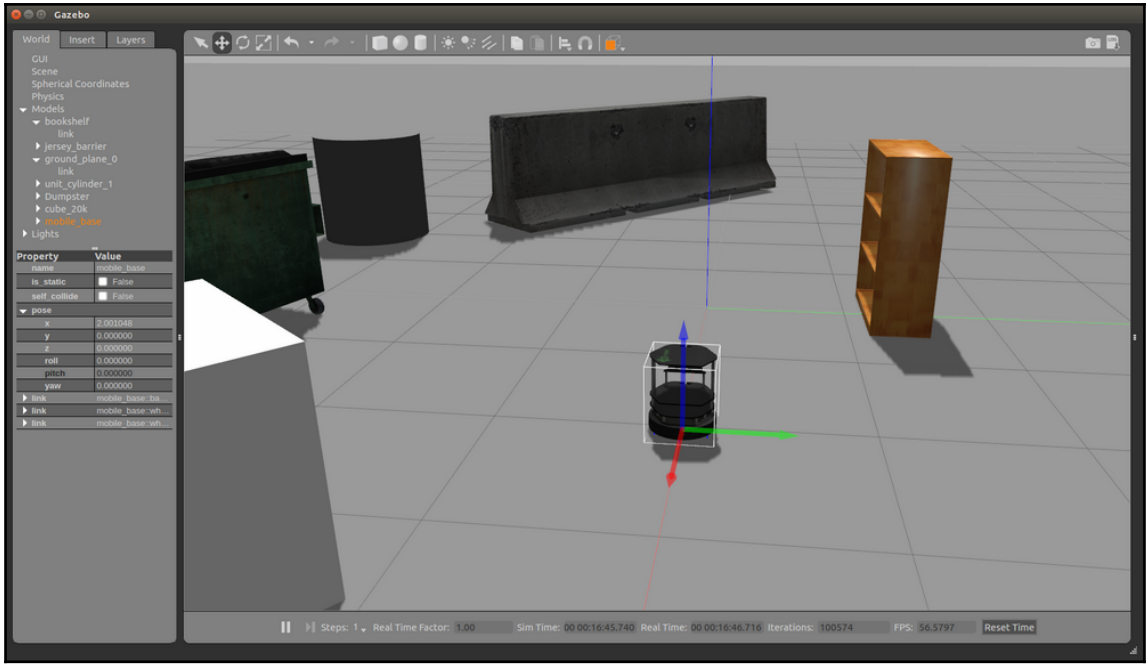


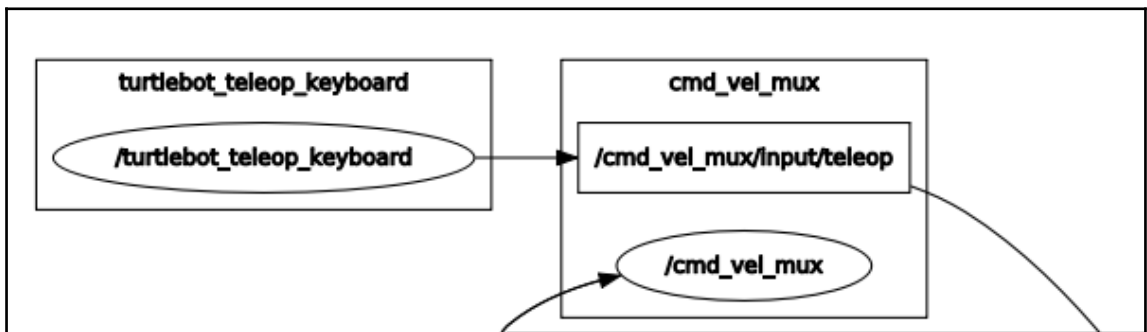
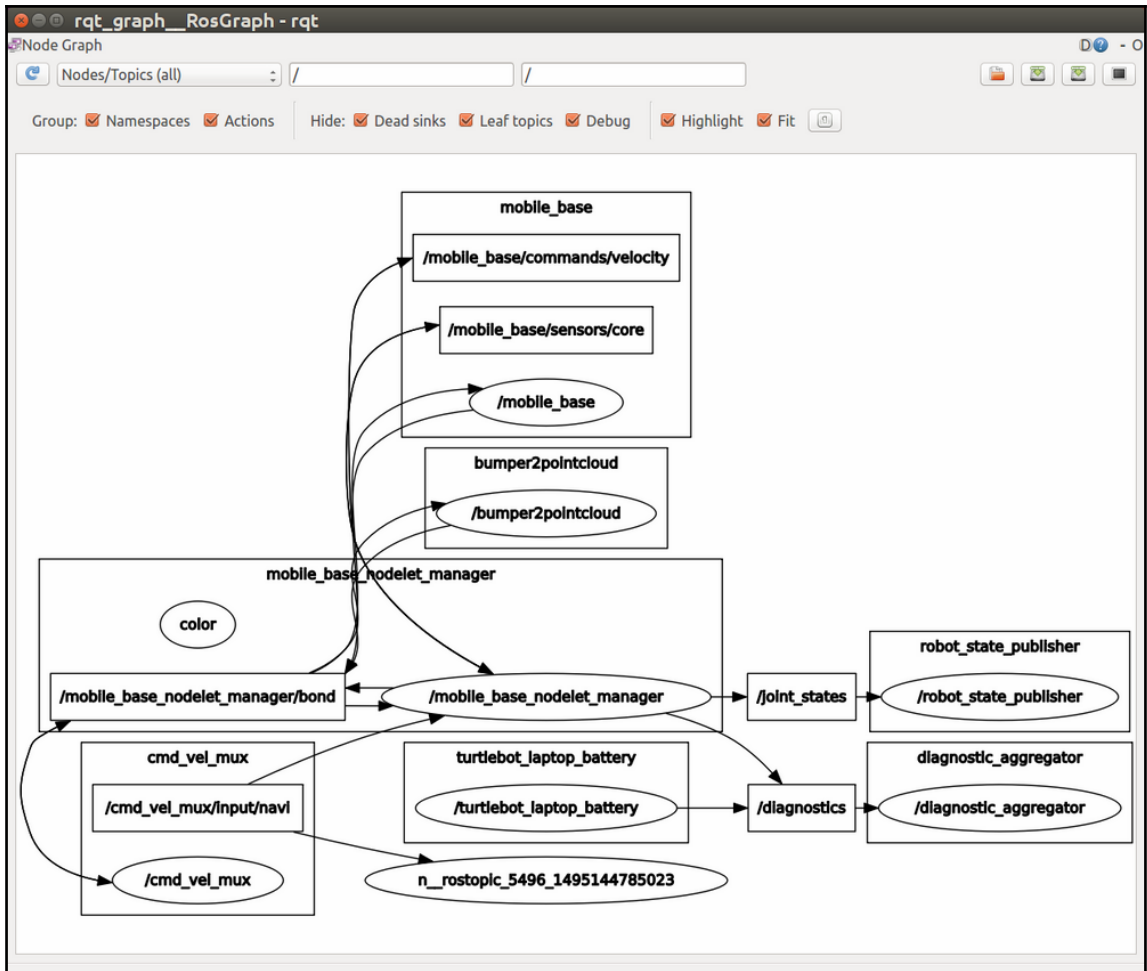


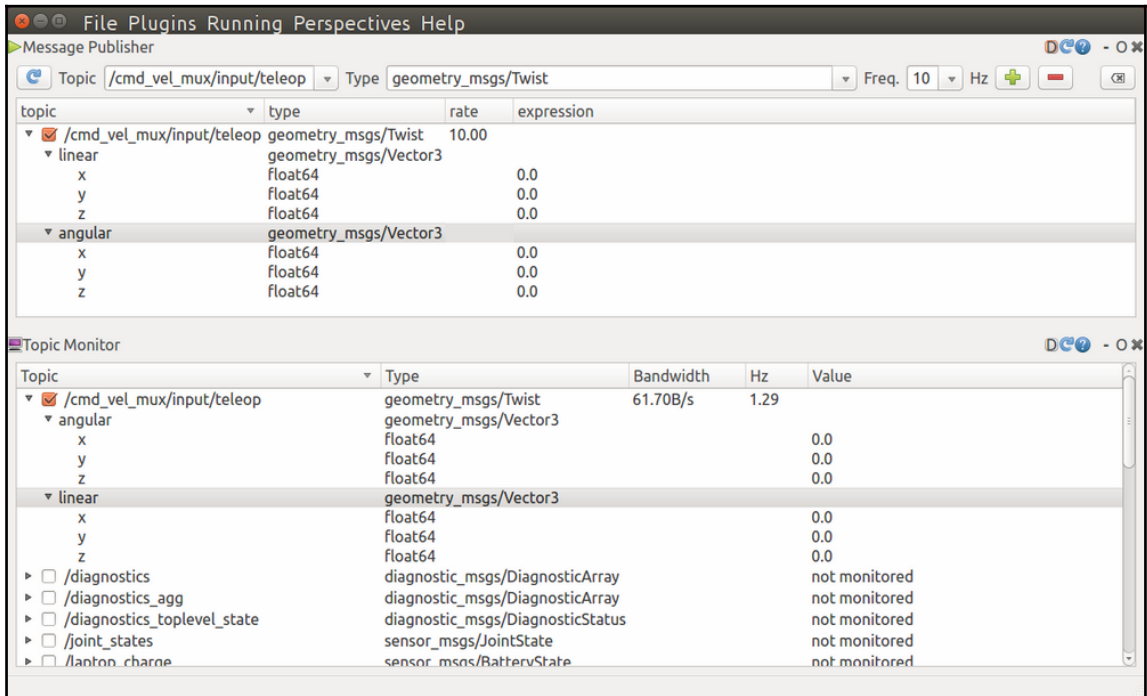
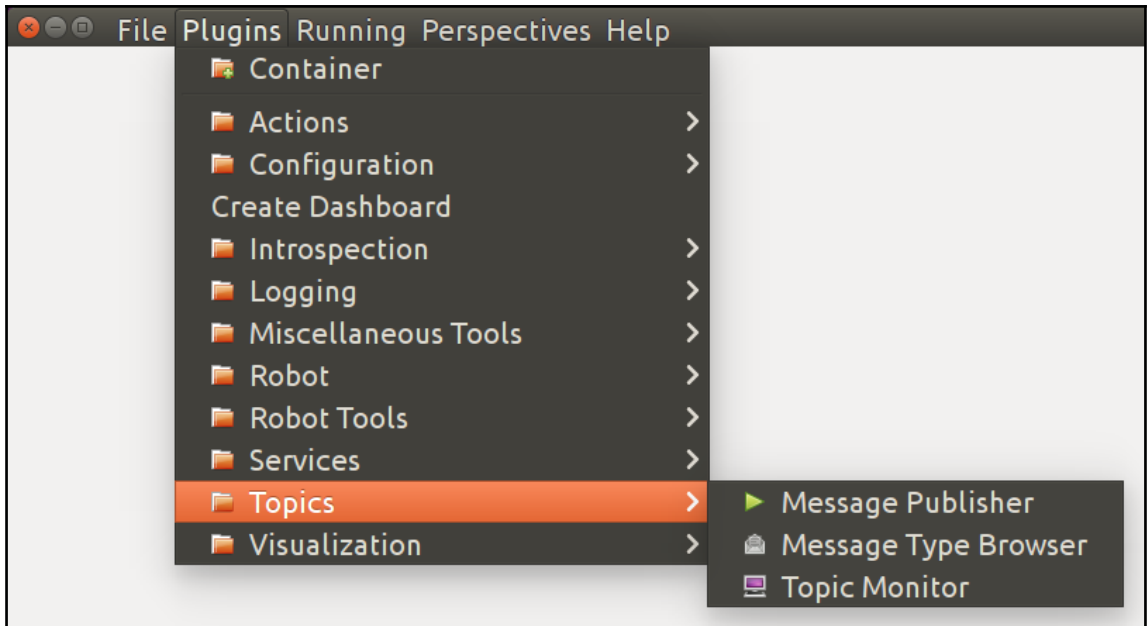
Chapter 3: Driving Around with TurtleBot

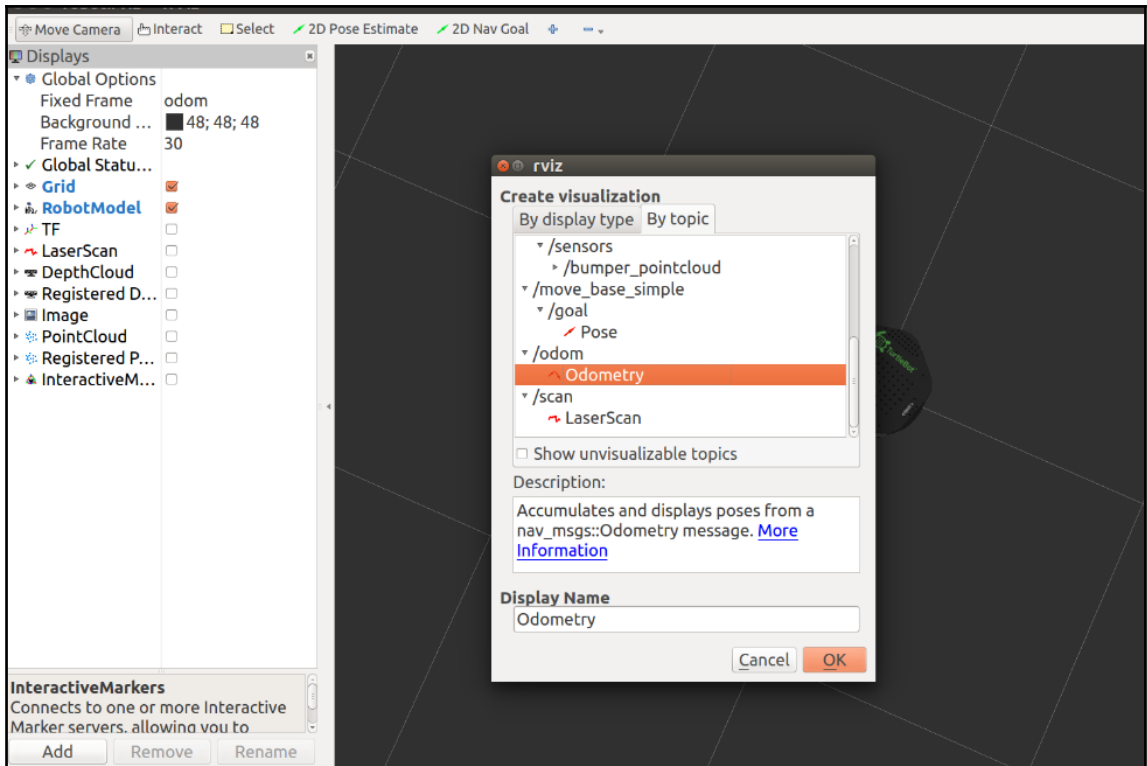


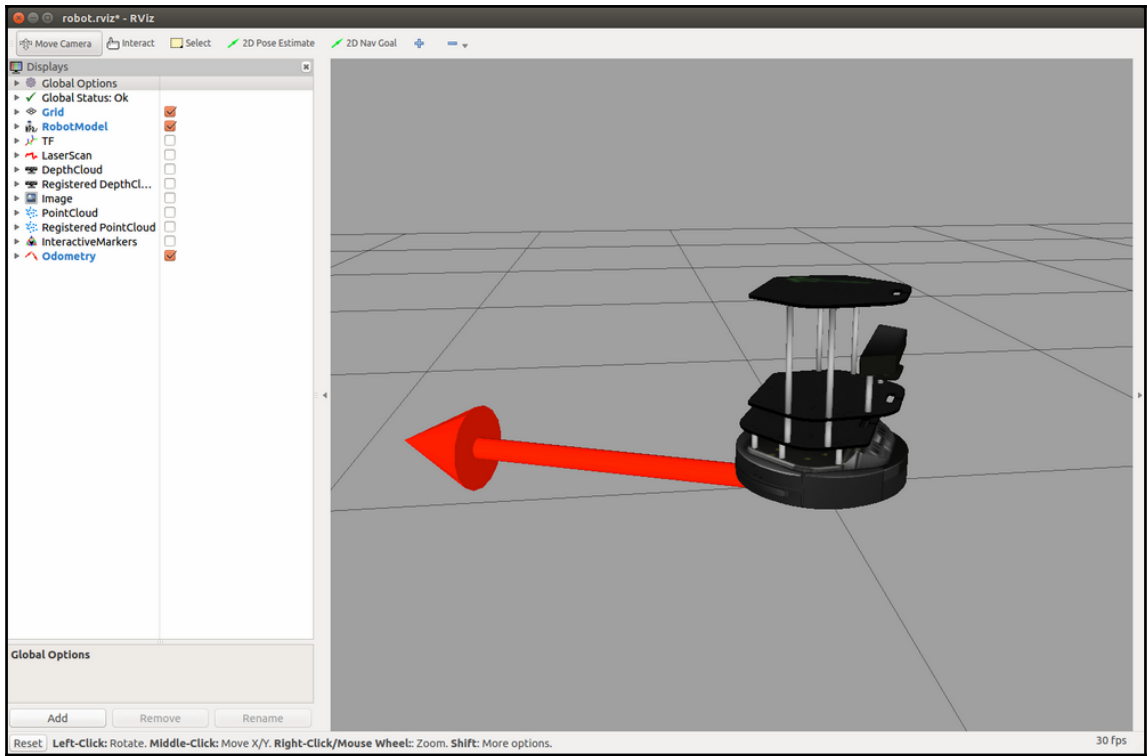


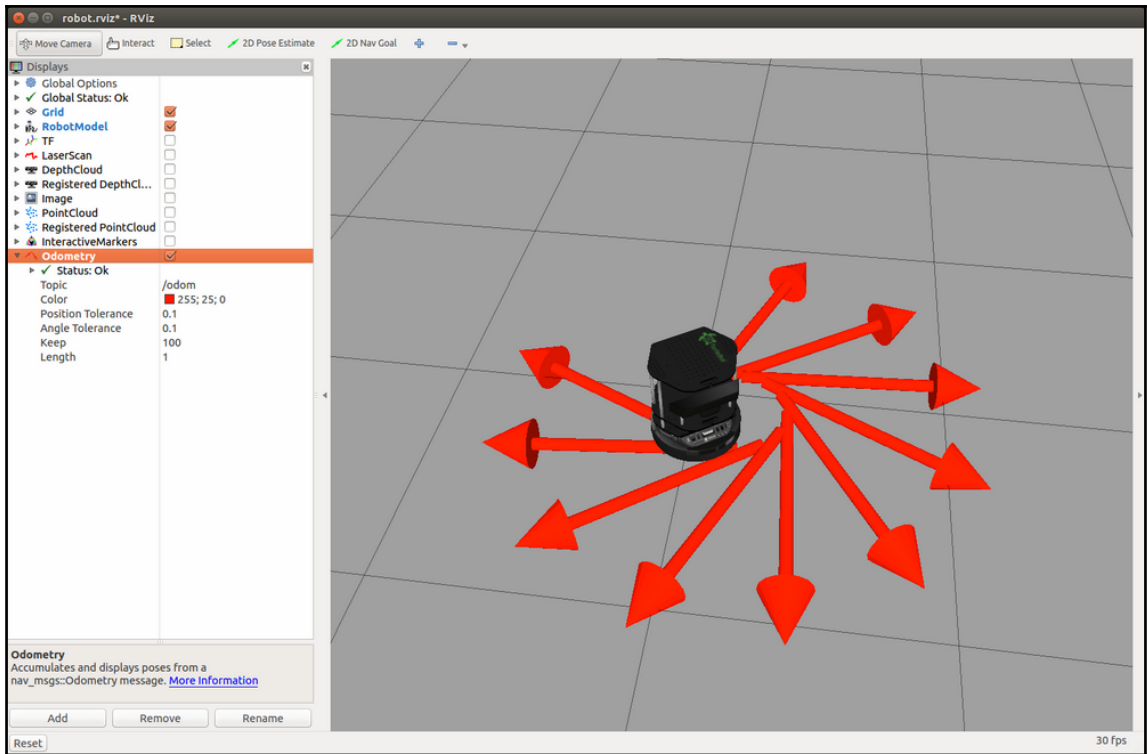


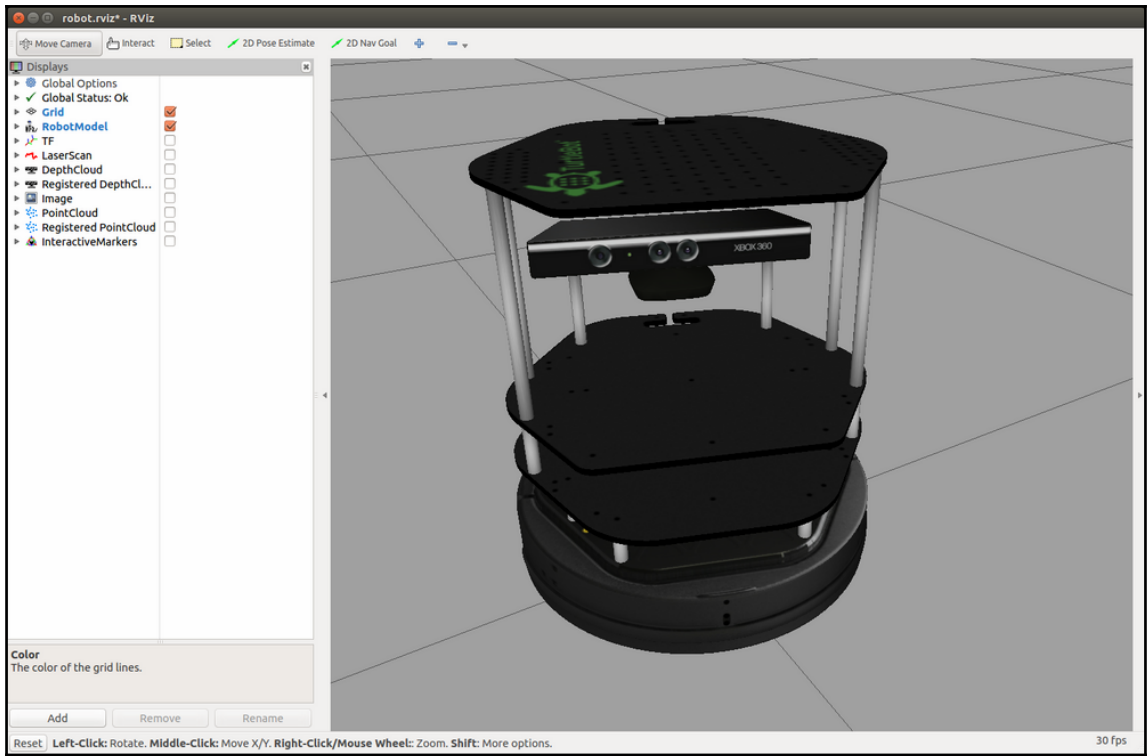


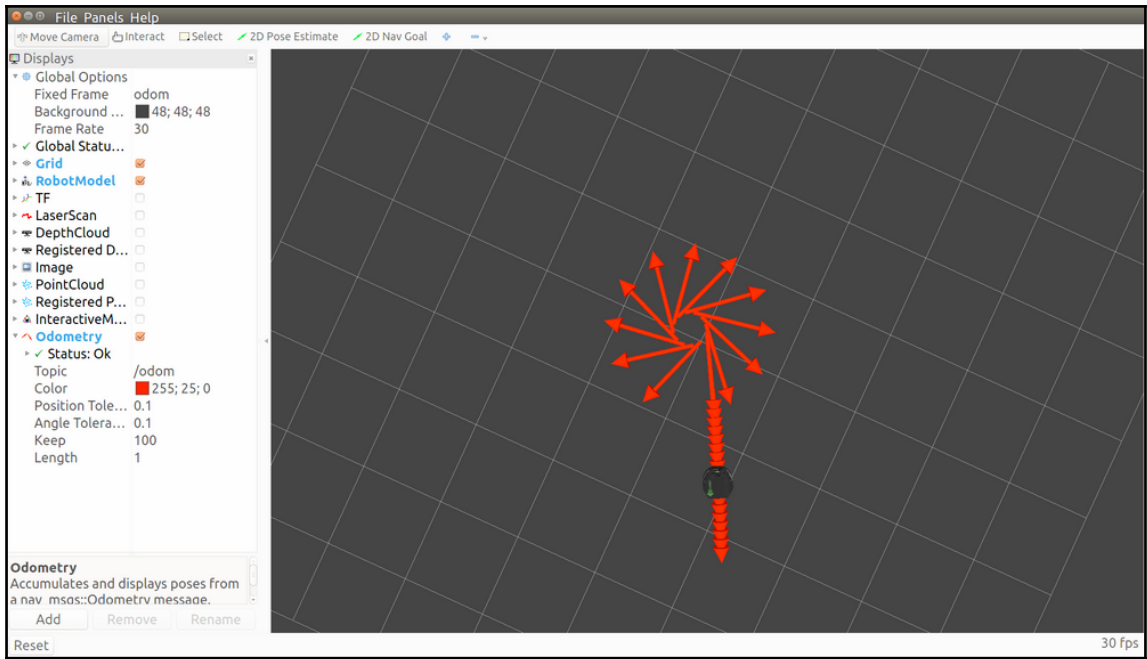


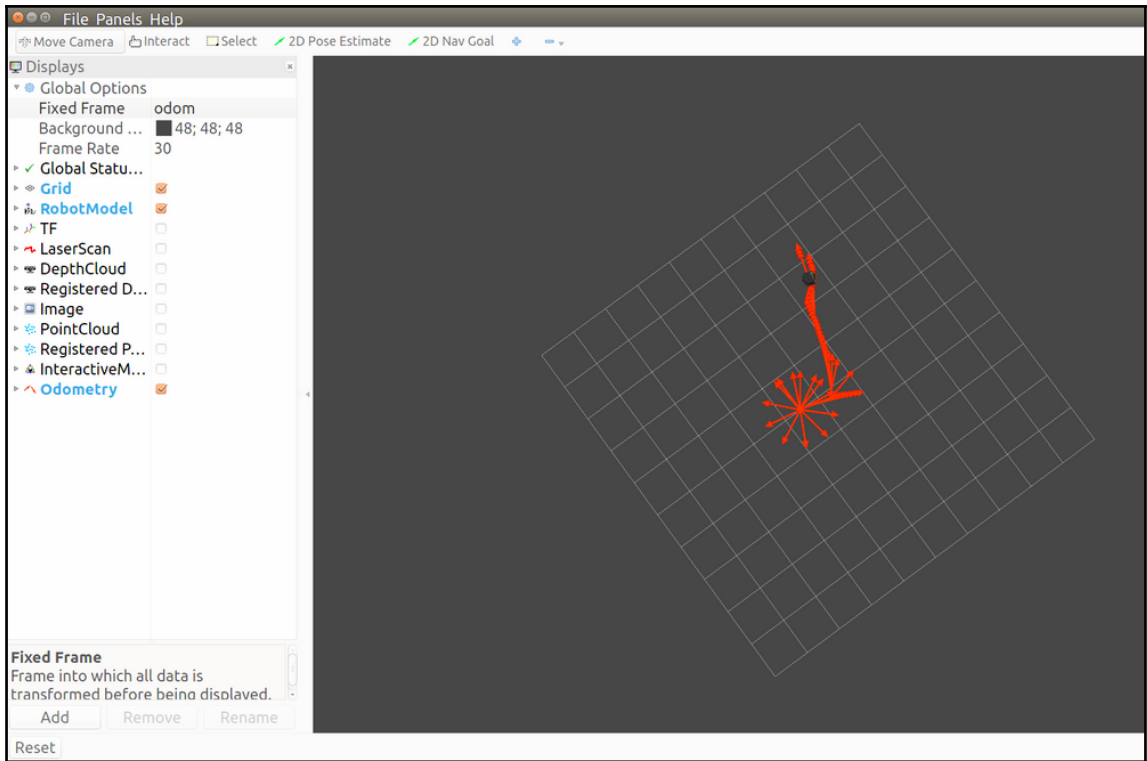


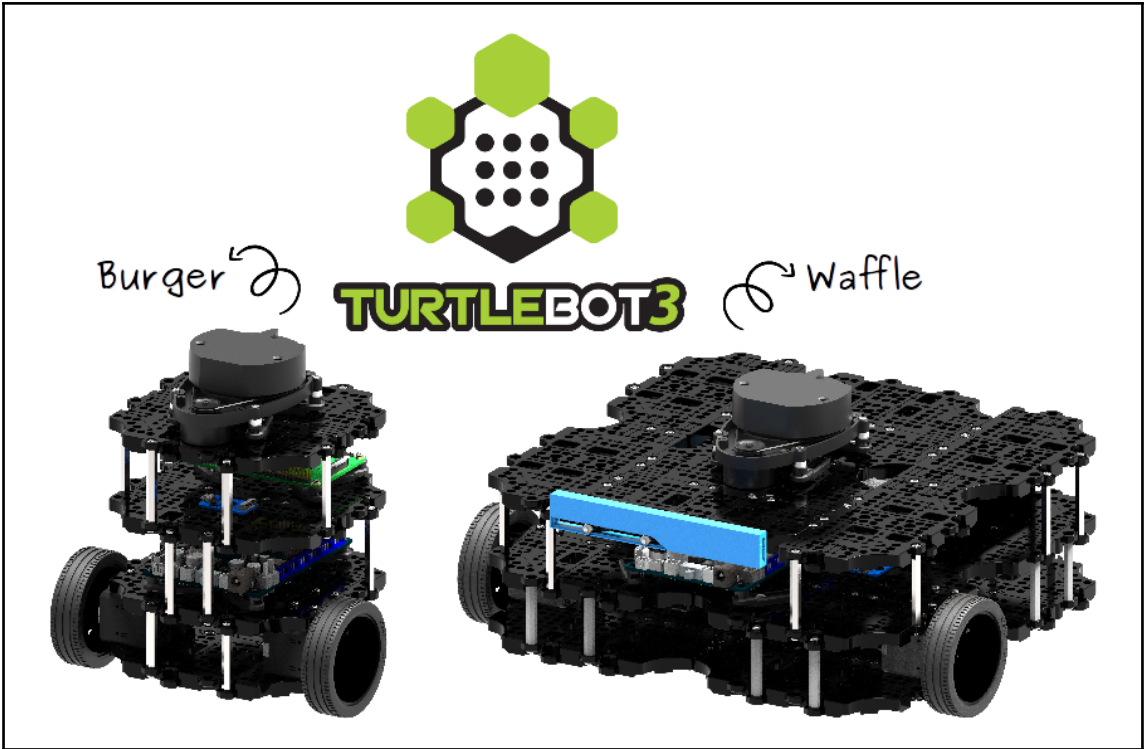


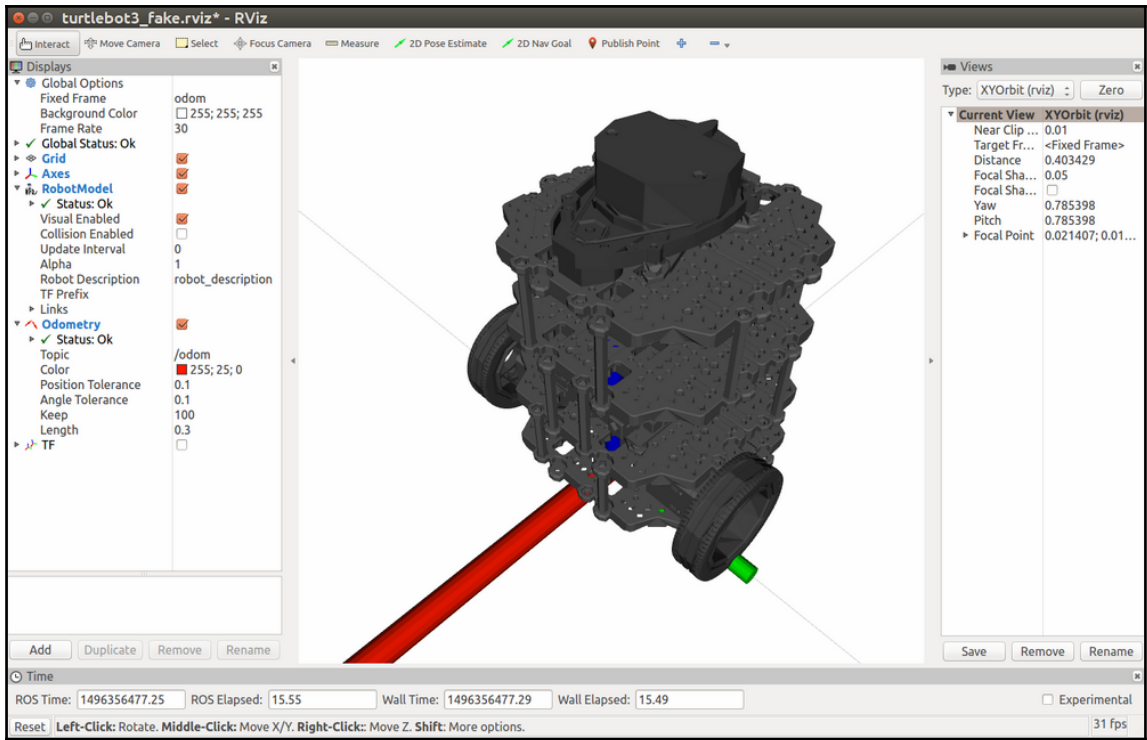


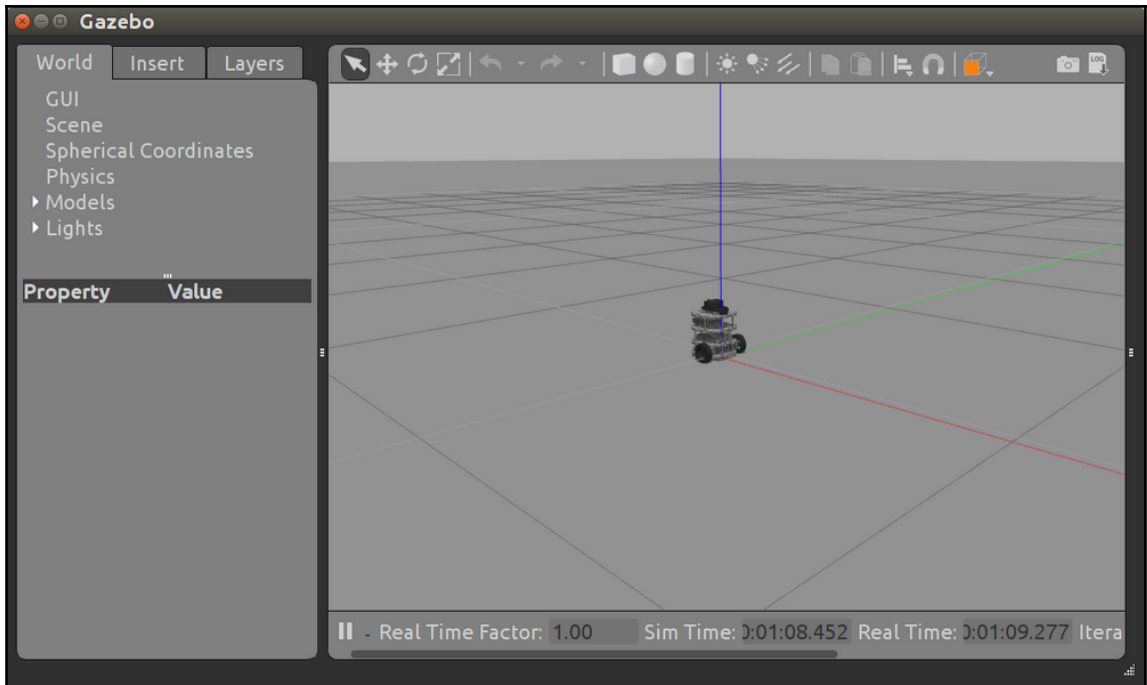


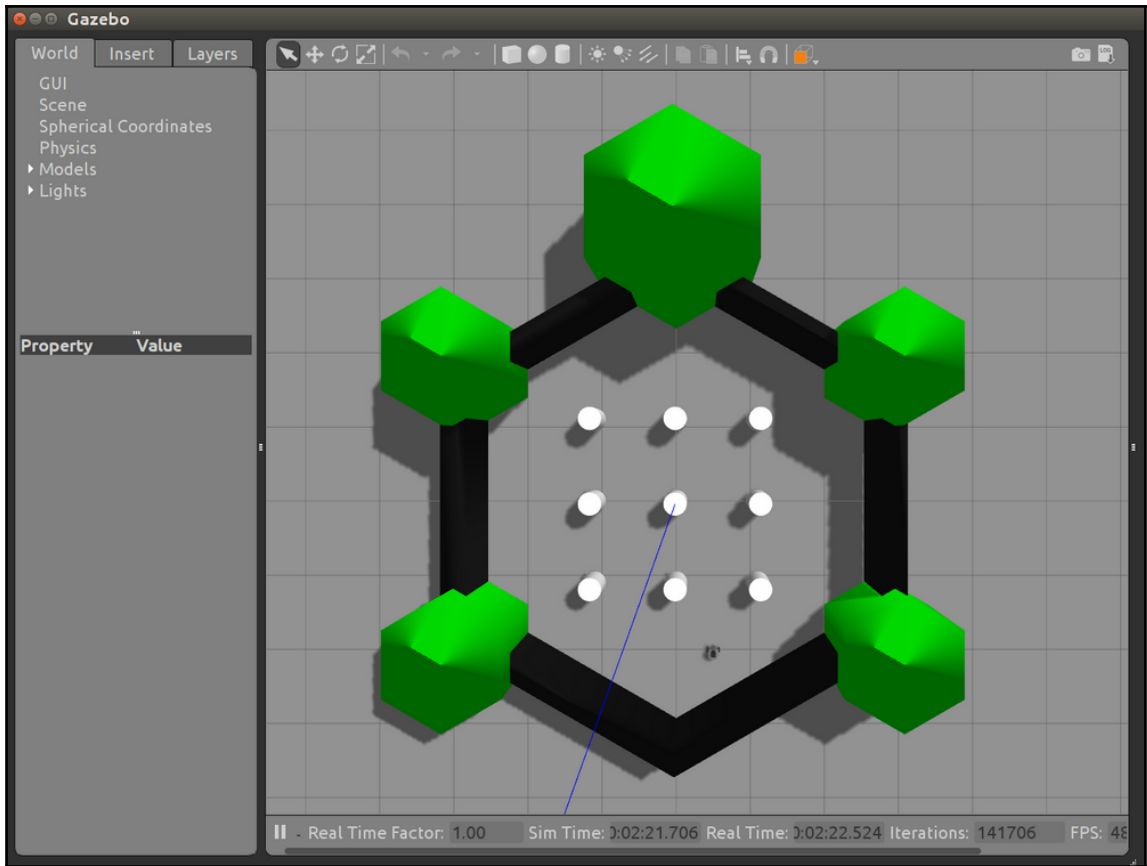


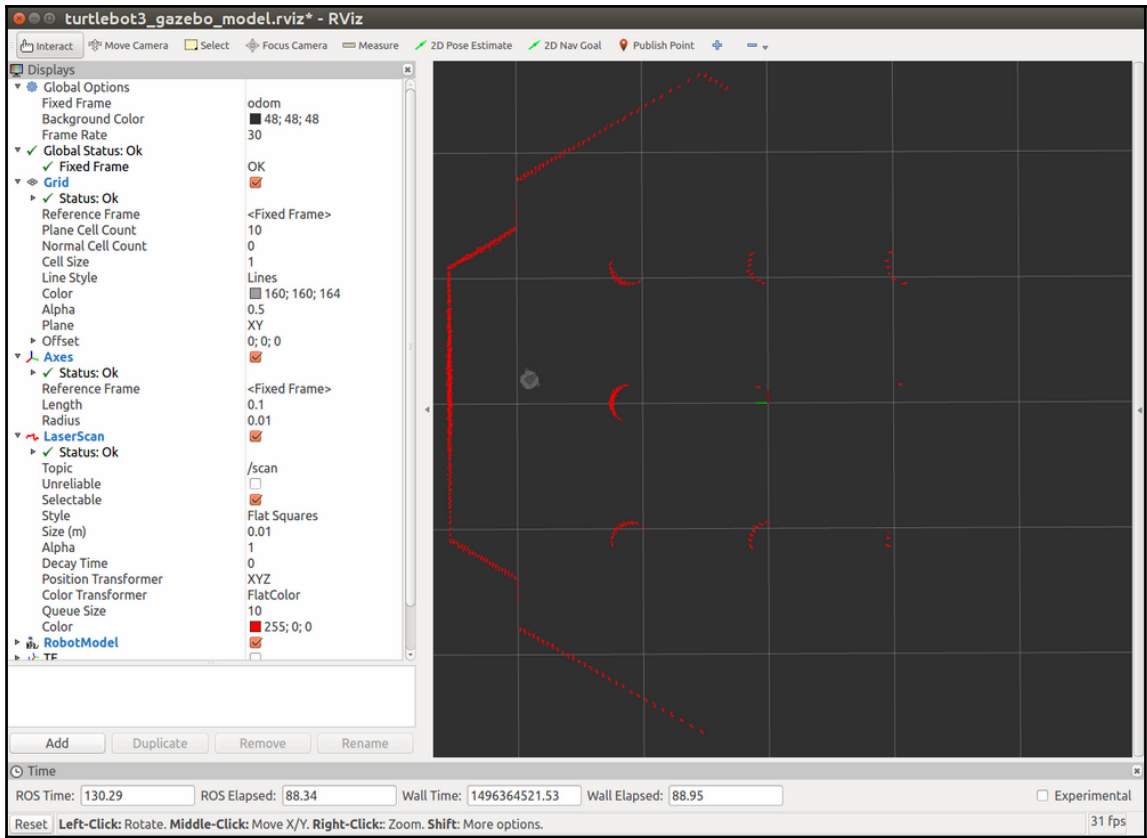












7.9 GB Drive — /dev/sdb

1.0 TB Hard Disk
HGST HTS721010A9E630

7.9 GB Drive
Generic-SD/MMC

Model Generic-SD/MMC (1.00)
Size 7.9 GB (7,948,206,080 bytes)
Partitioning Master Boot Record
Serial Number 20090815198100000
Job Restoring Disk Image: 1.7%
84.9 MB of 5.0 GB – 11 minutes remaining (7.2 MB/sec)

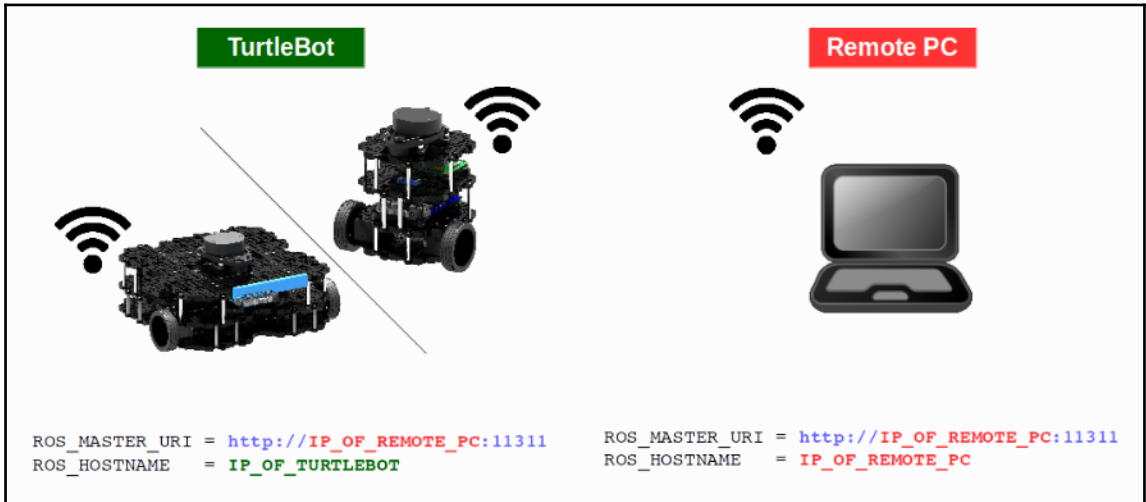
Volumes

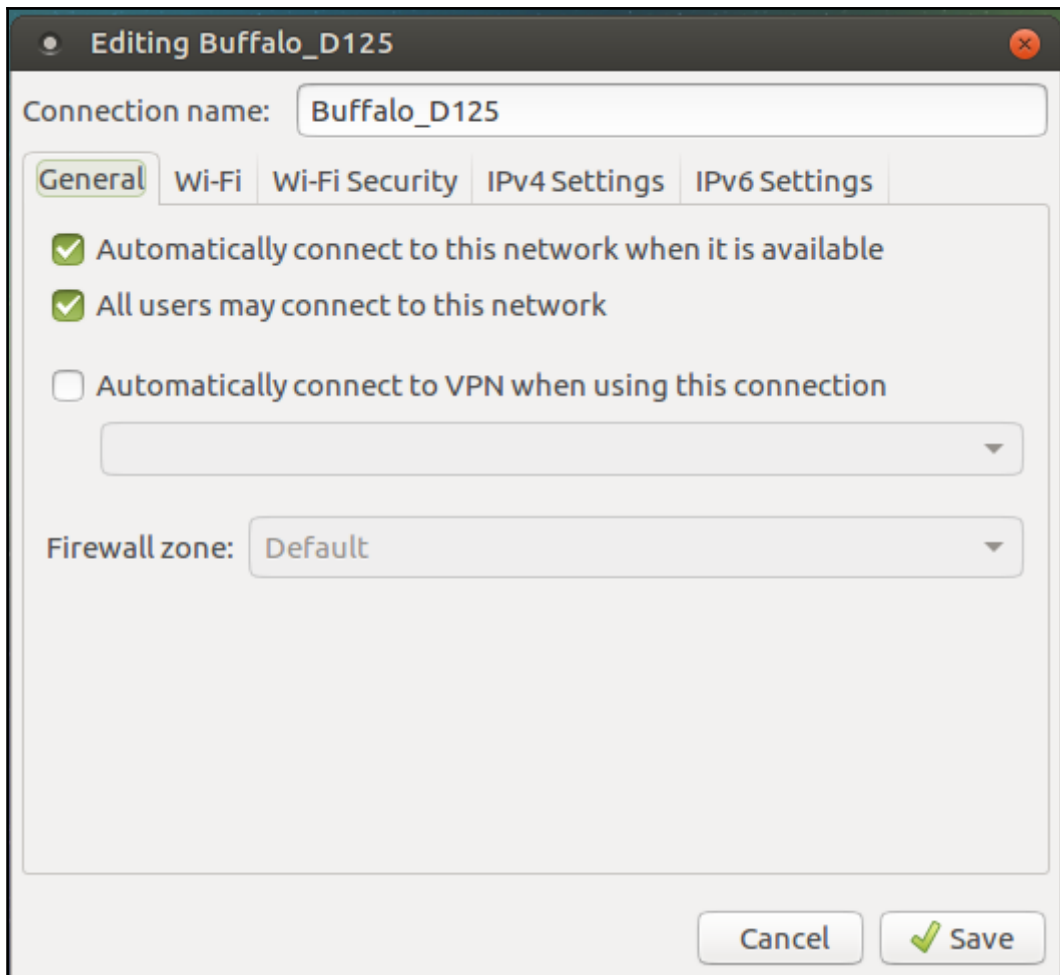
Free Space
4.2 MB

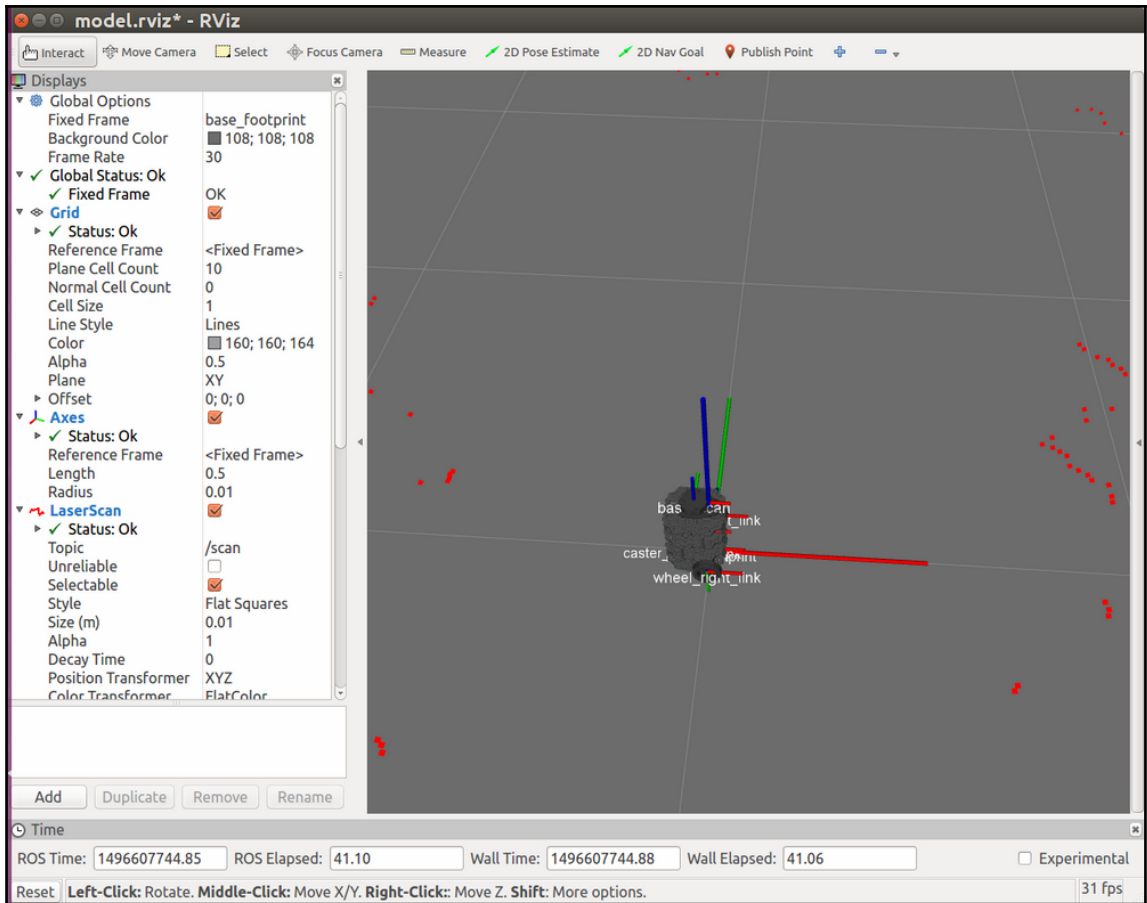
Filesystem
Partition 1
7.9 GB FAT

+ ⚙

Size 4.2 MB (4,194,304 bytes)
Device /dev/sdb
Contents Unallocated Space







Chapter 4: Navigating the World with TurtleBot



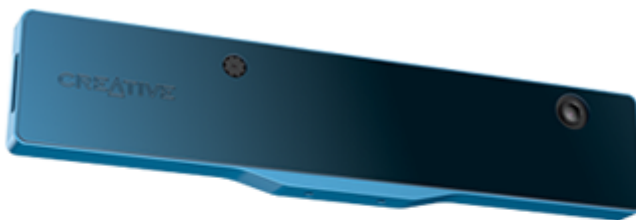




R200



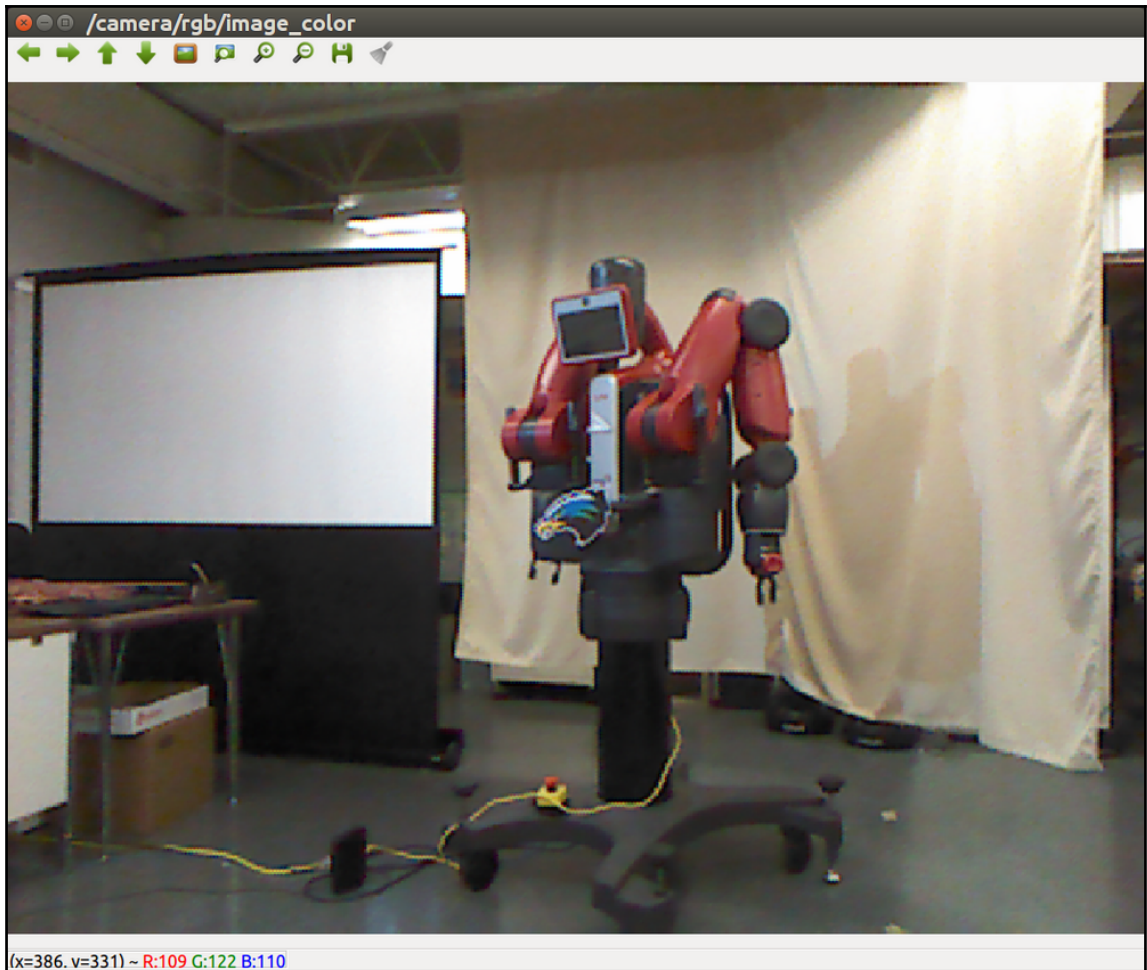
SR300

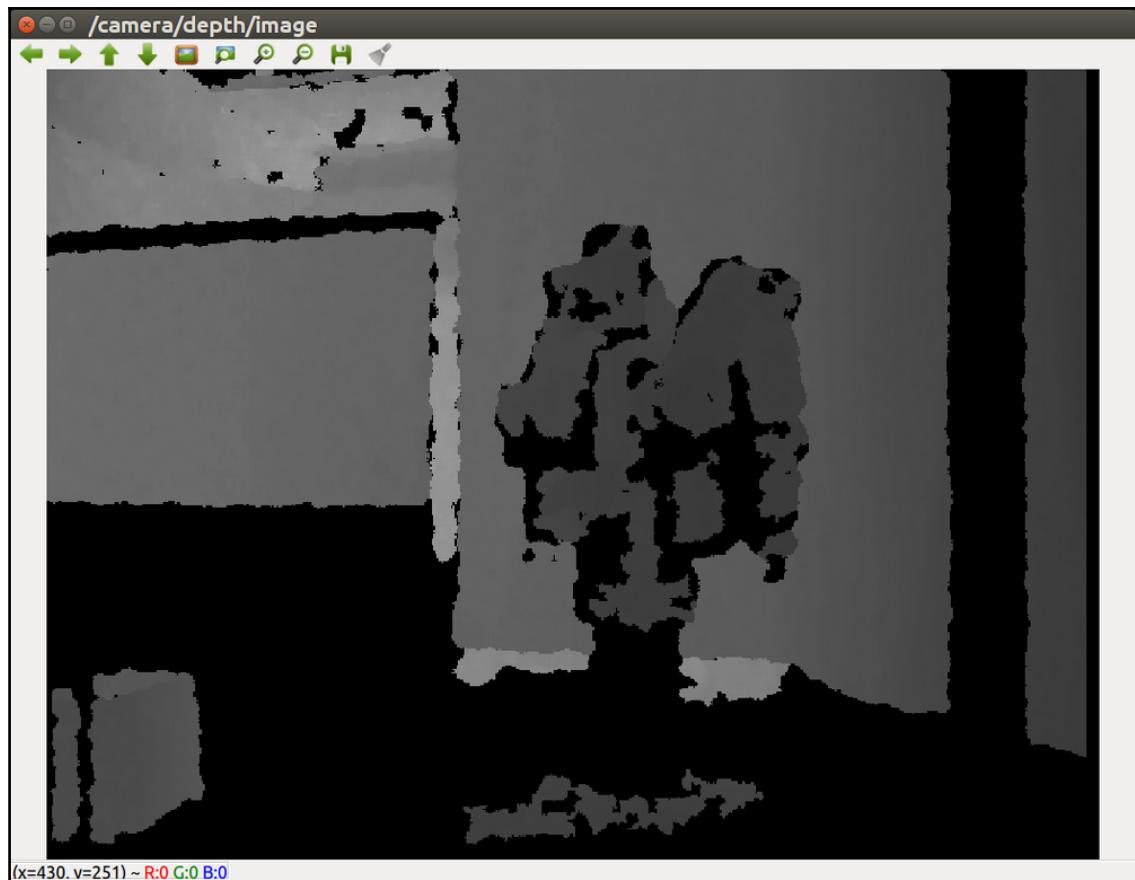


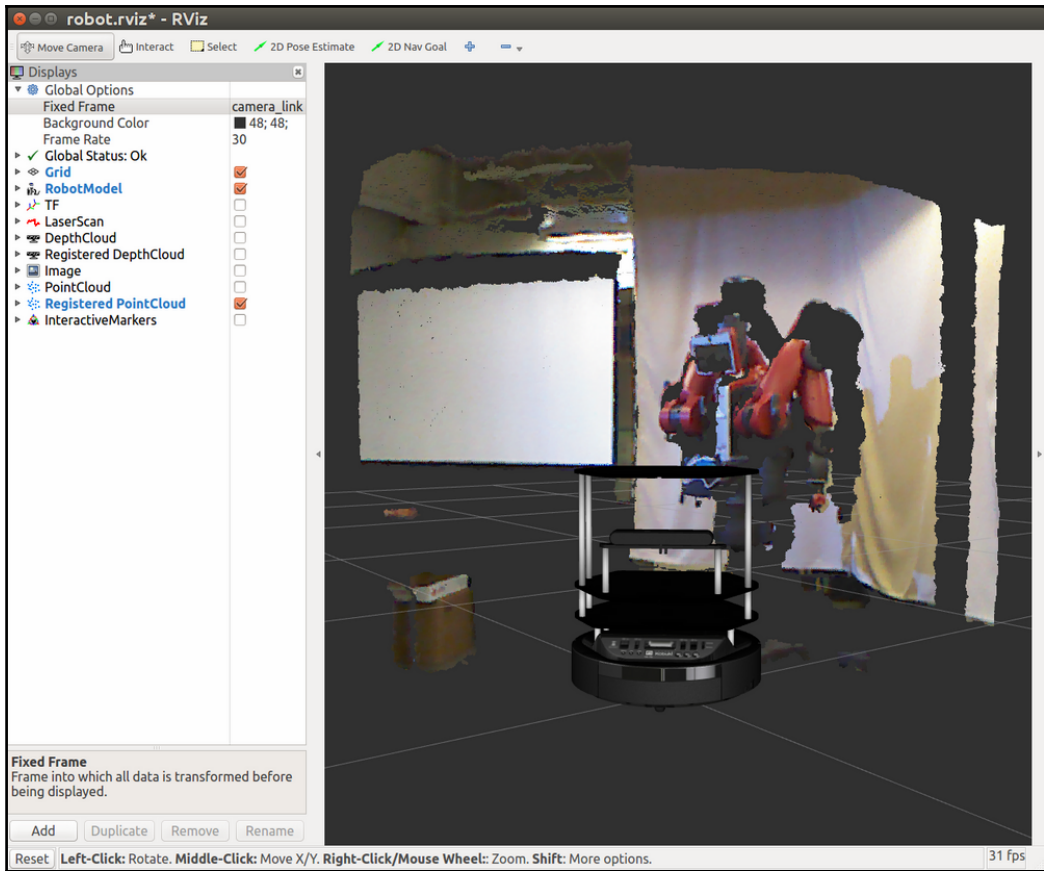
ZR300

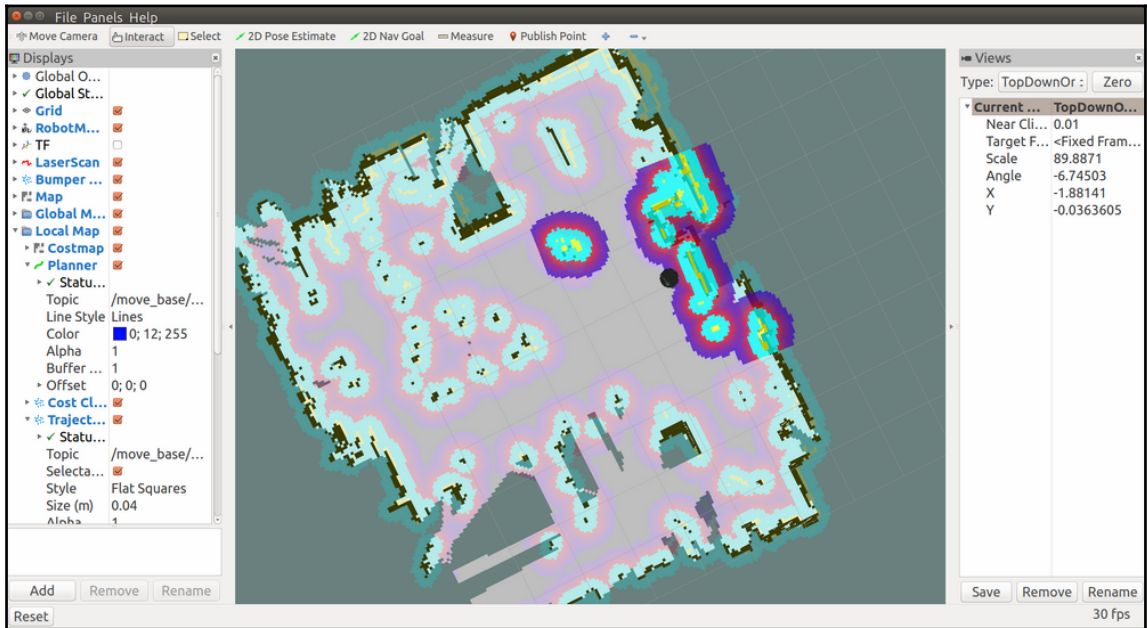
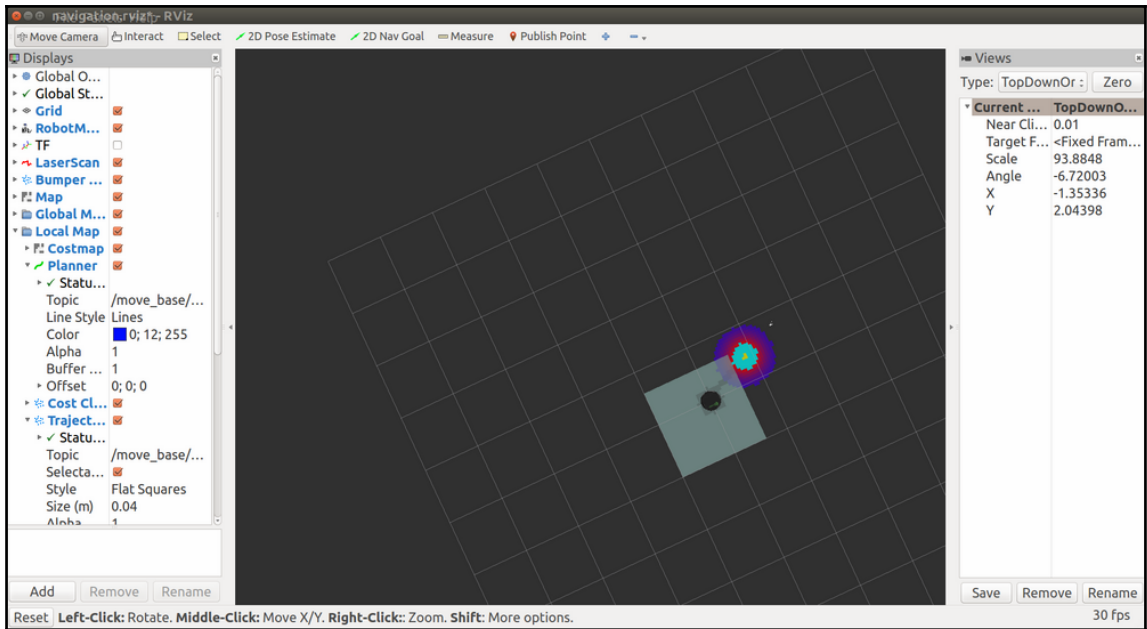


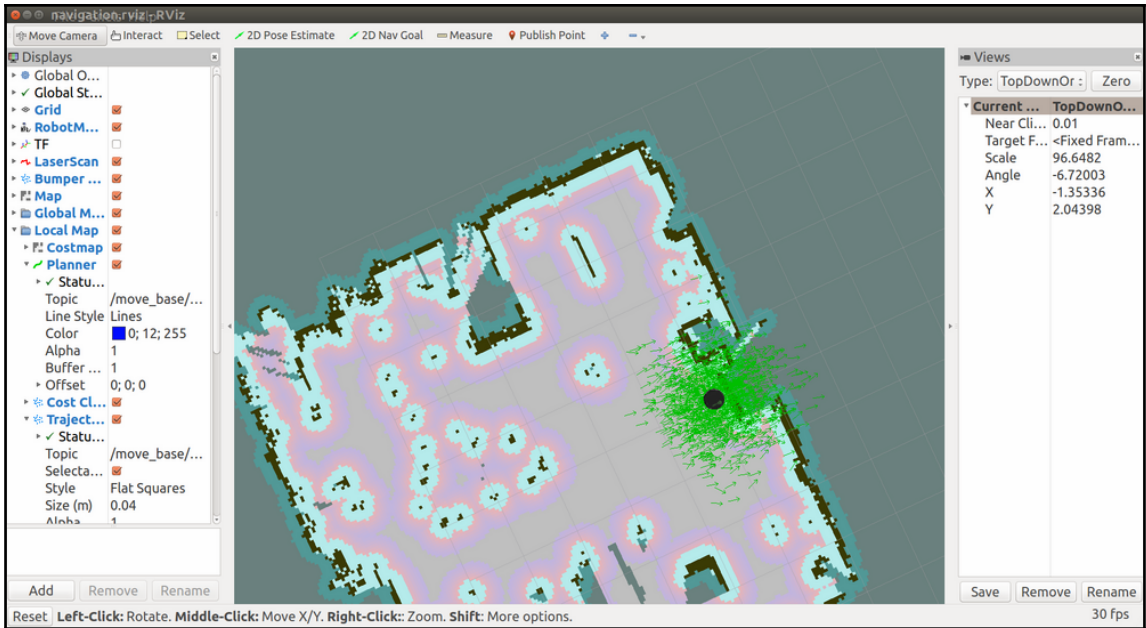
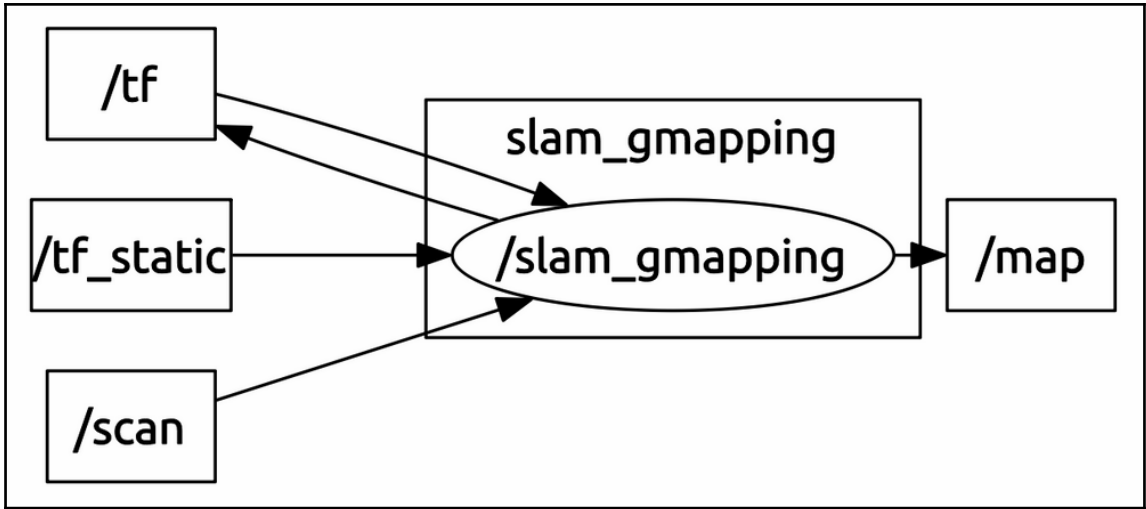
Euclid

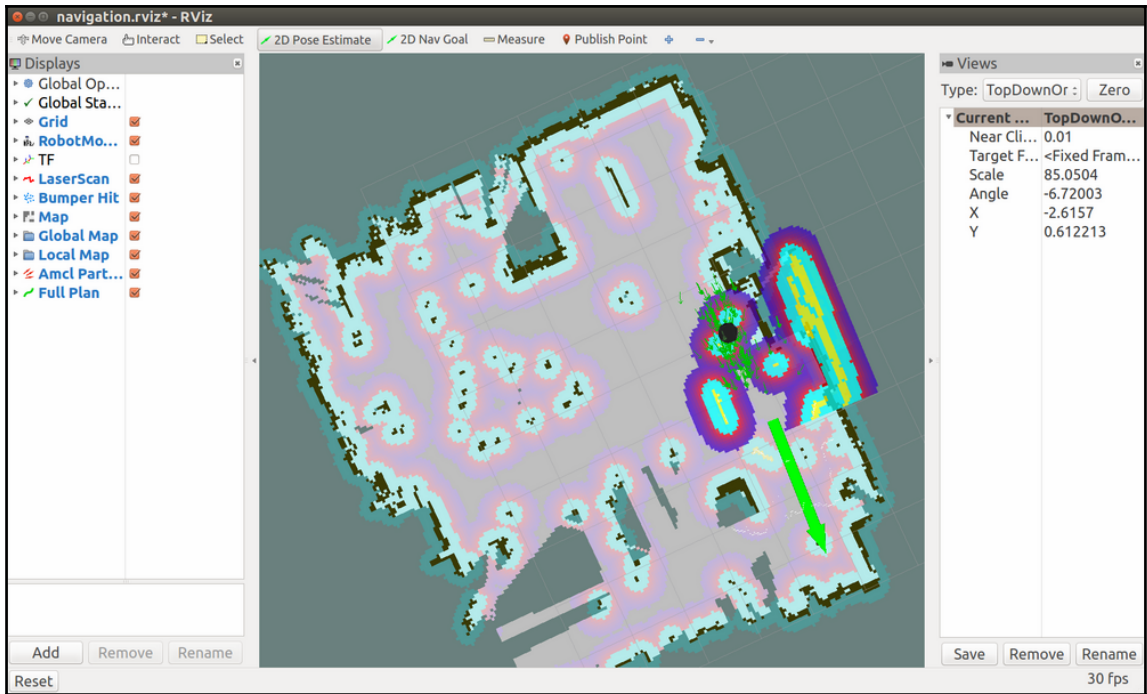


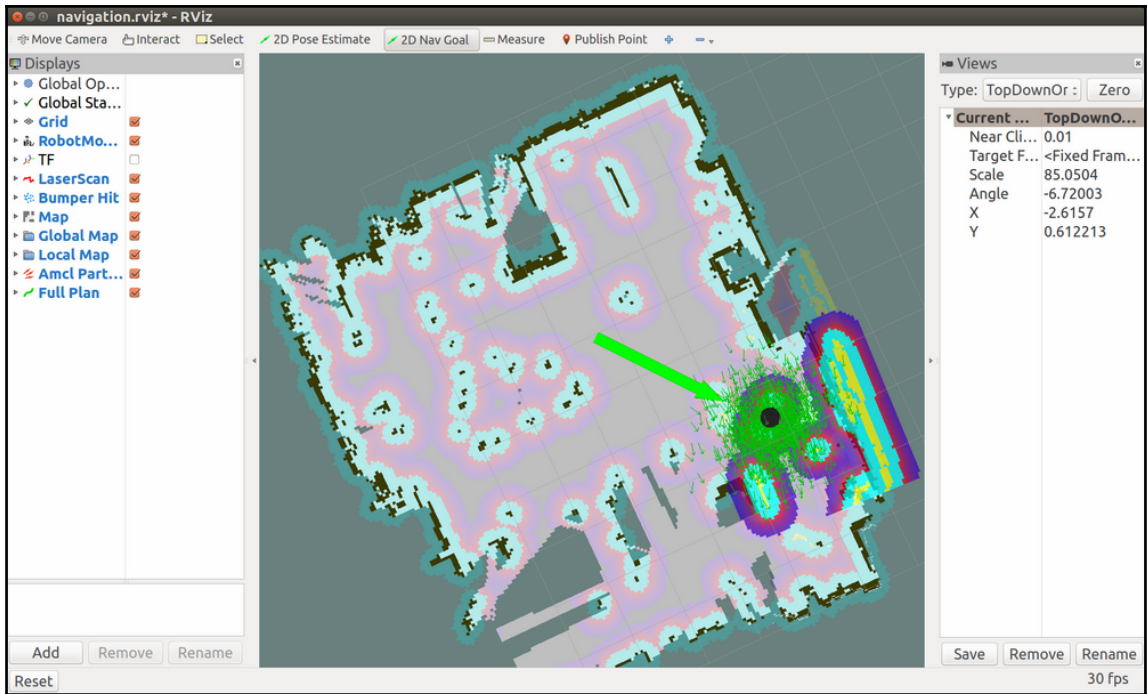


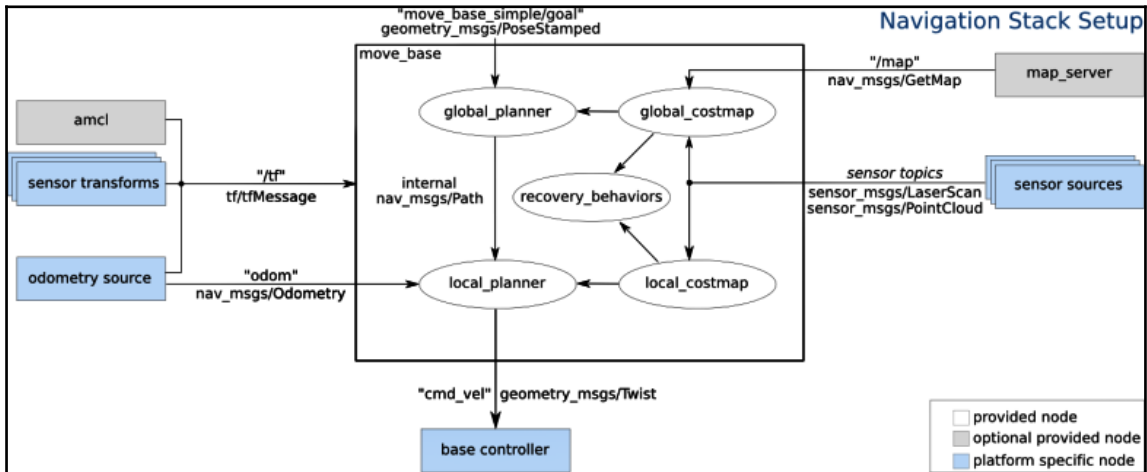
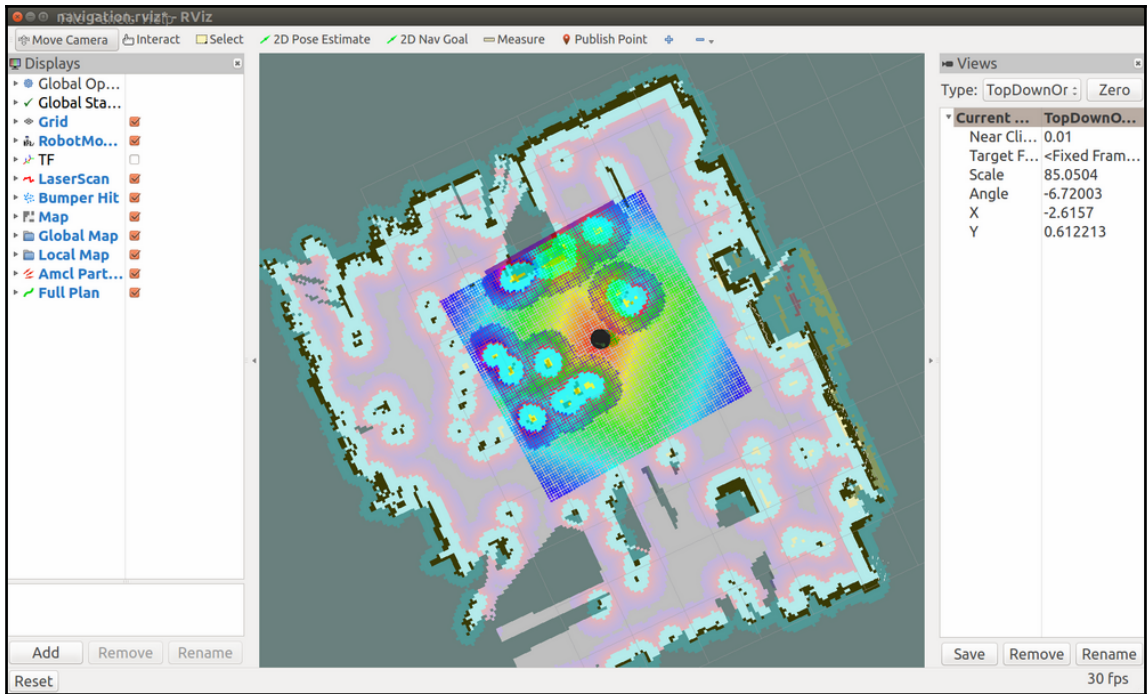


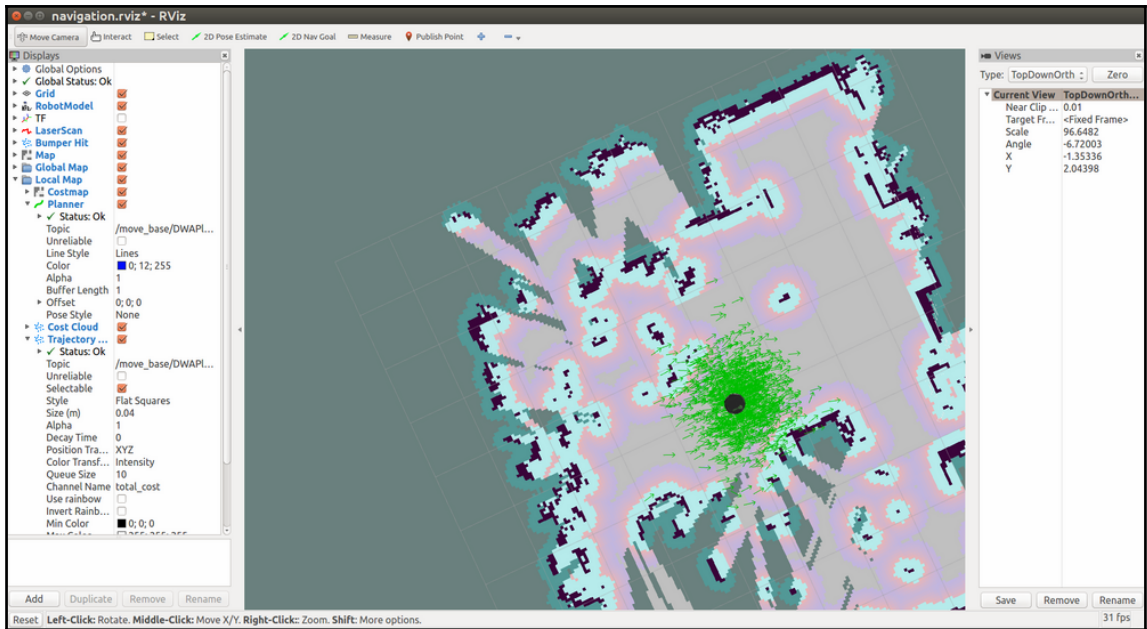


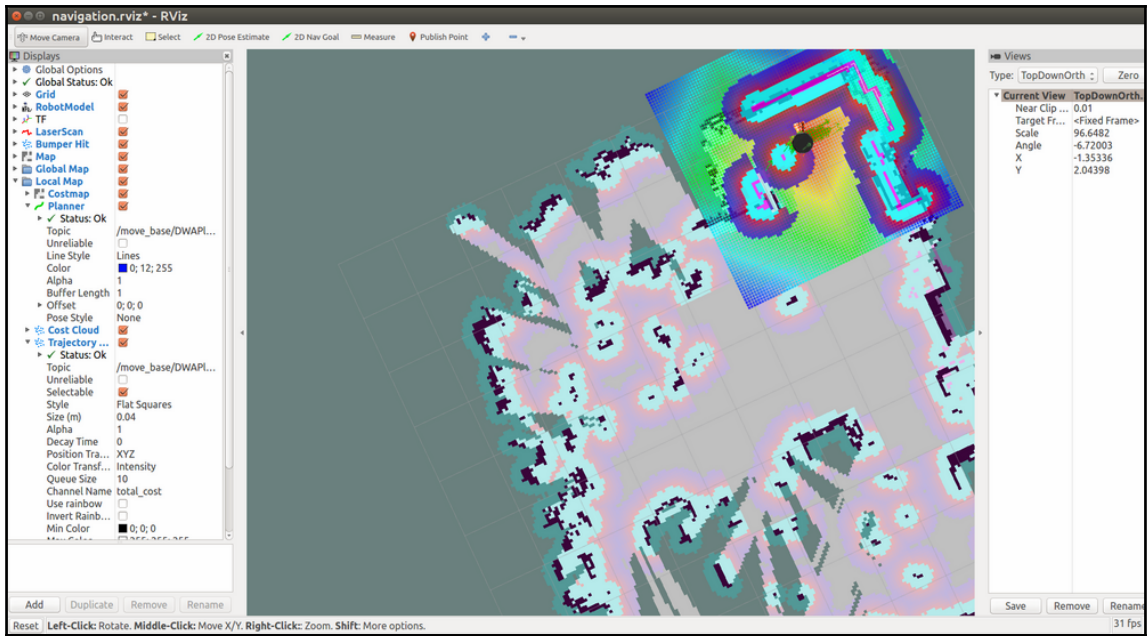


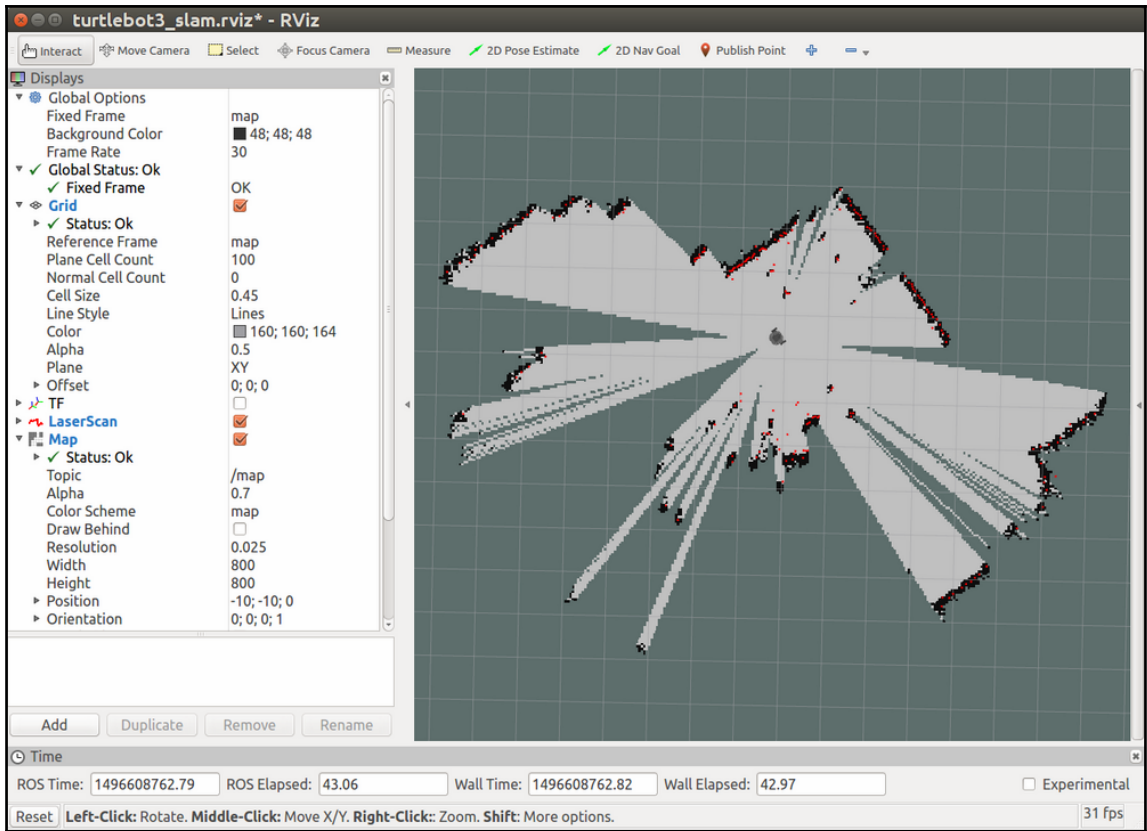


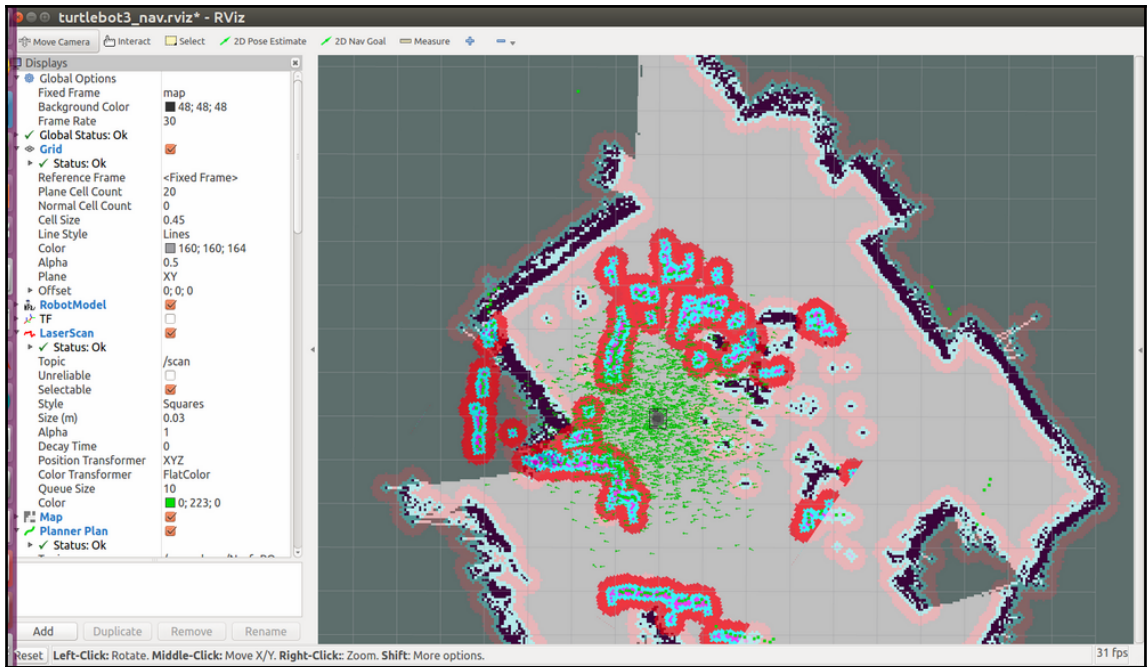


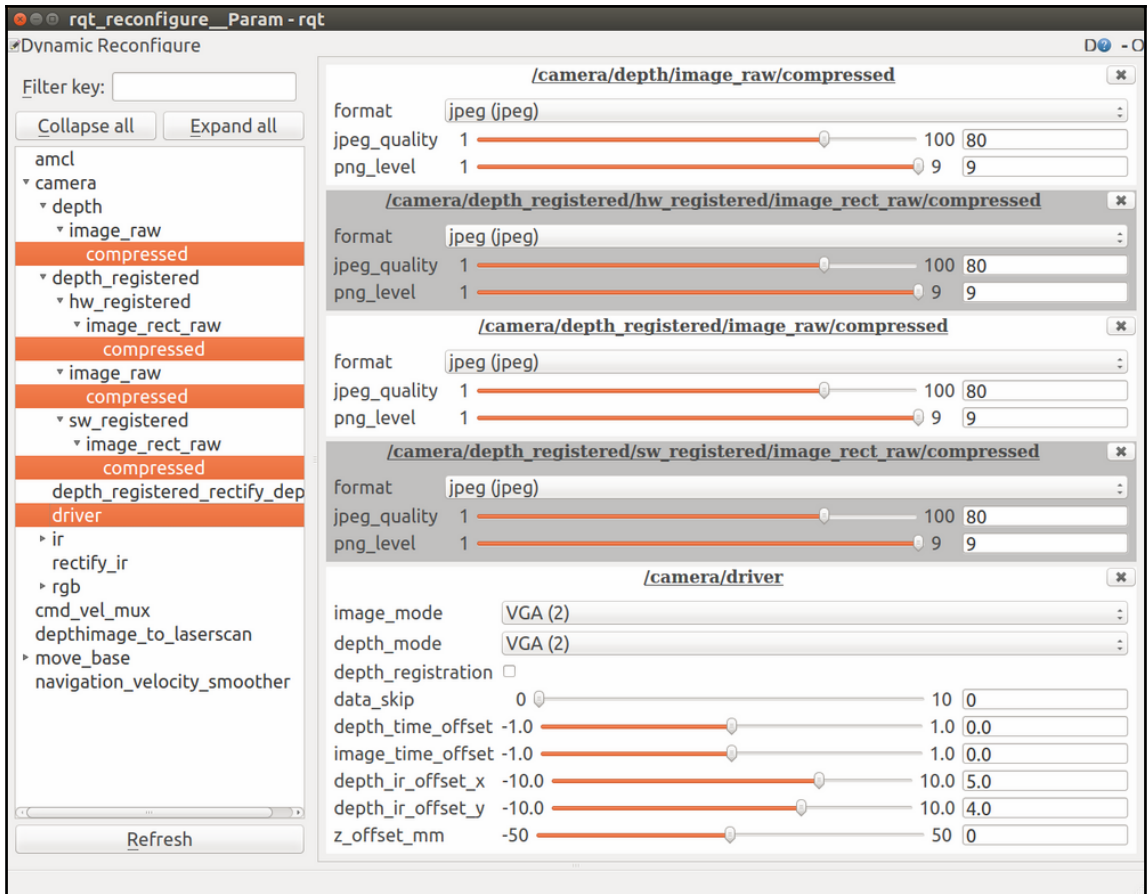


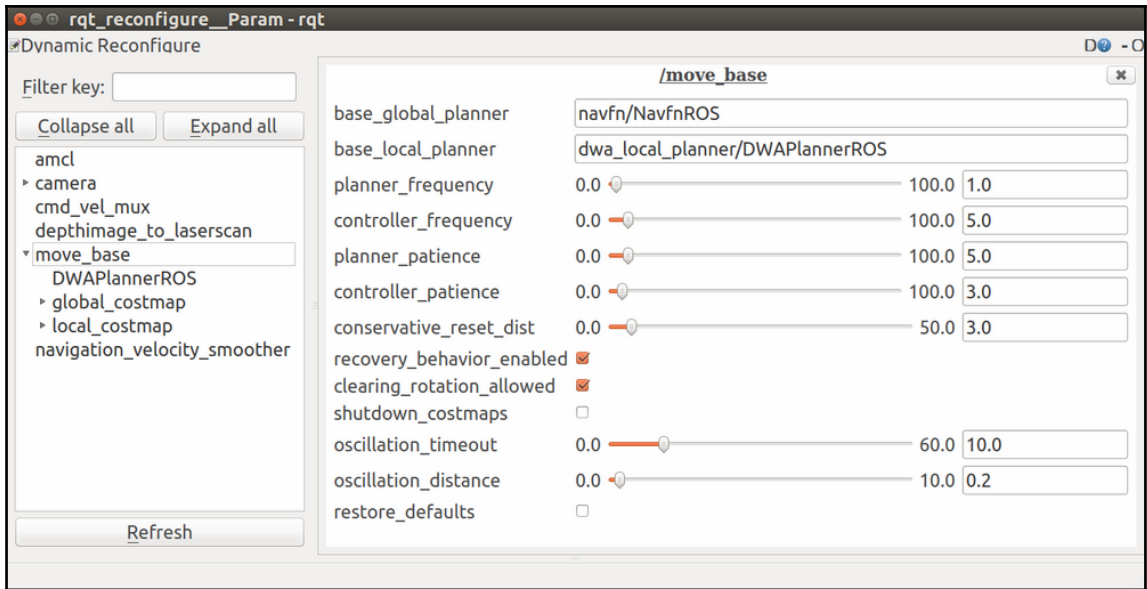




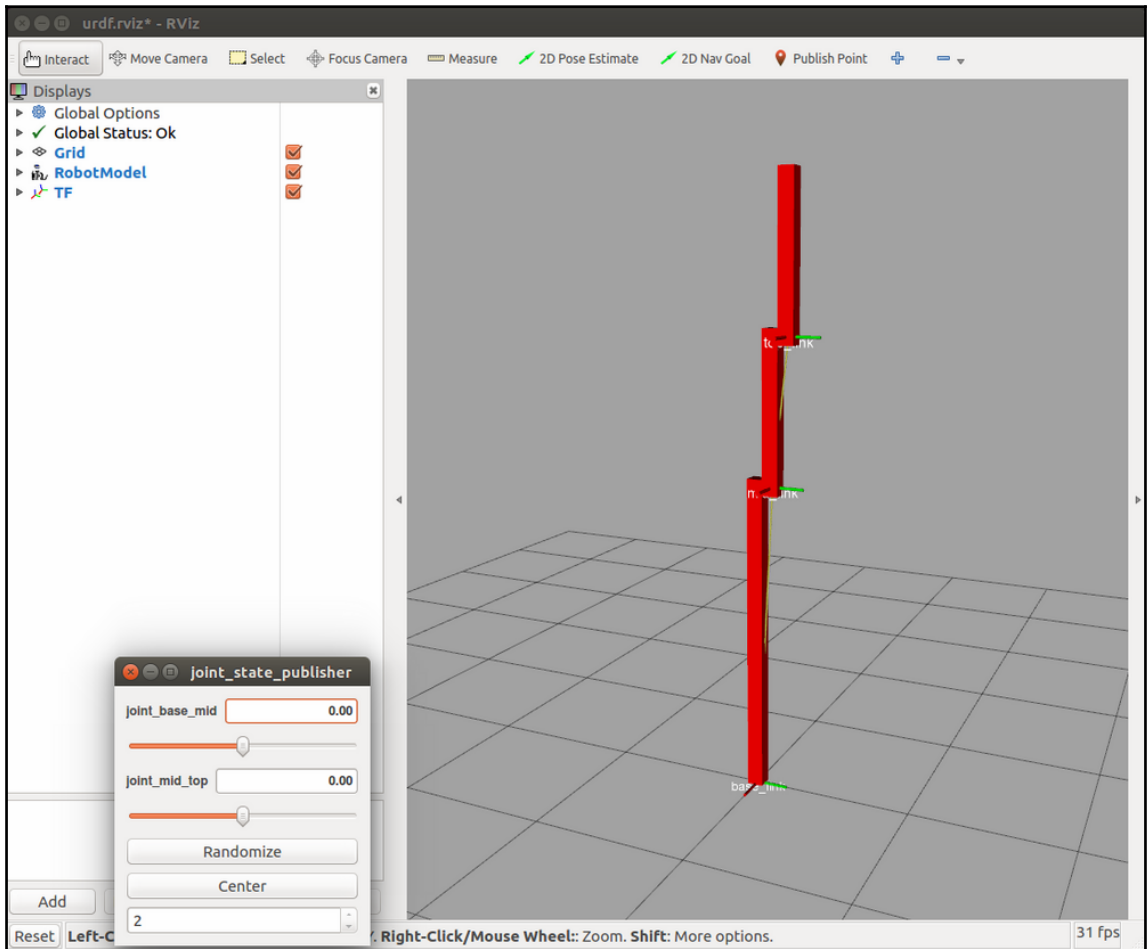


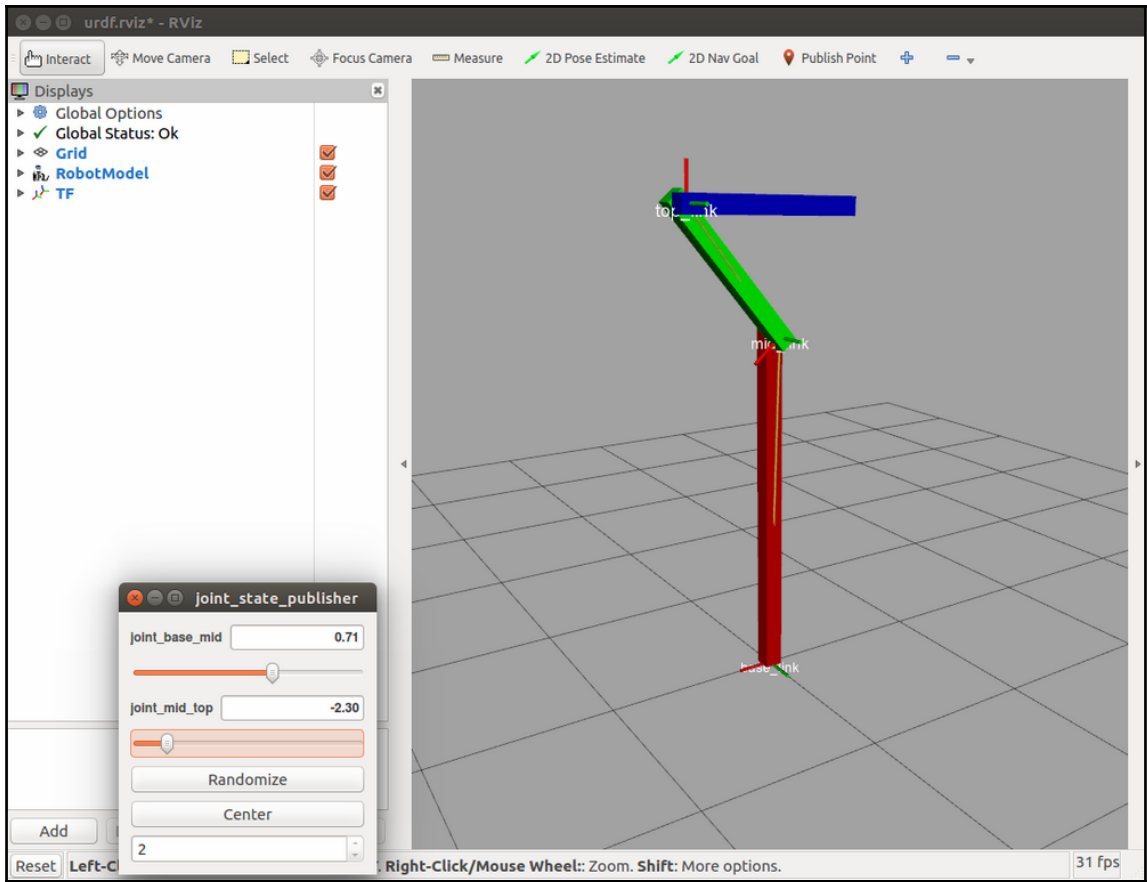


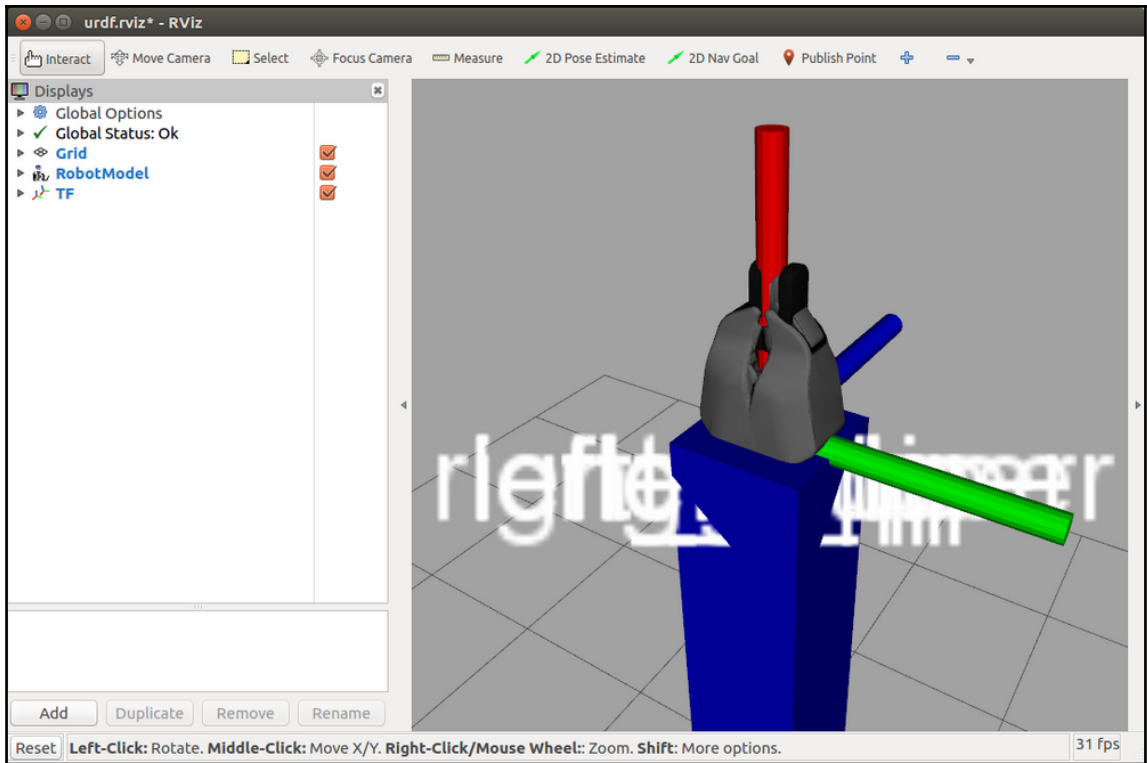


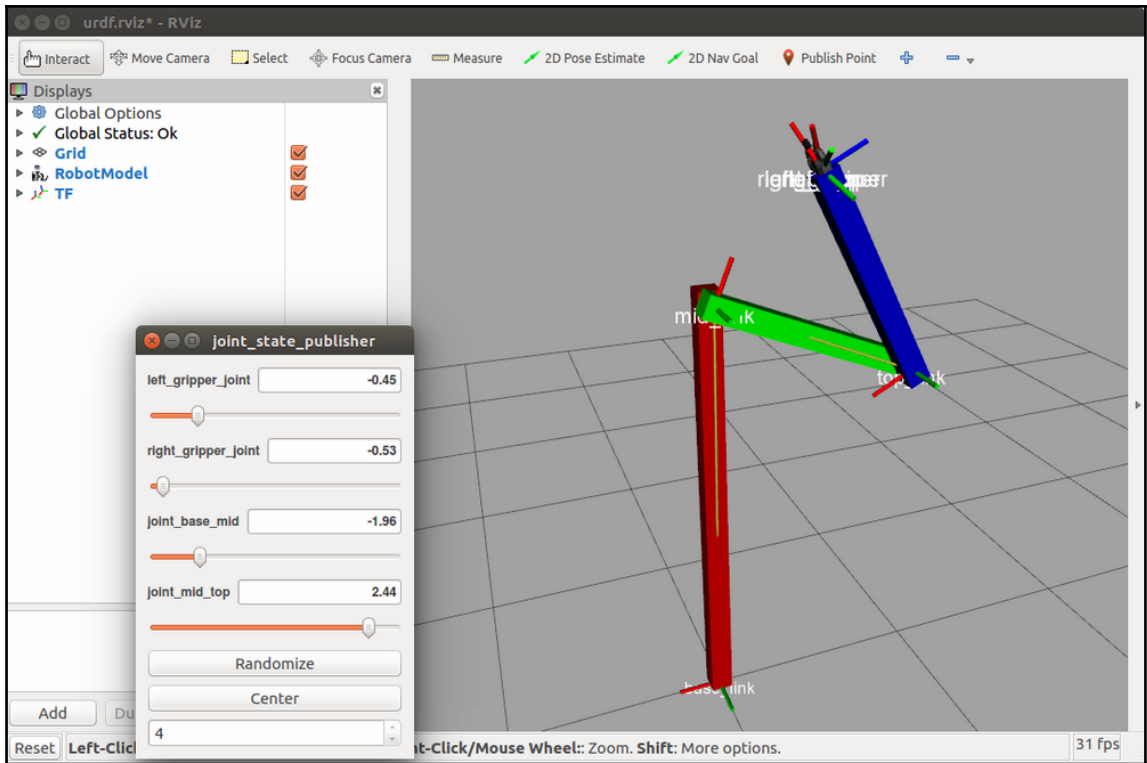


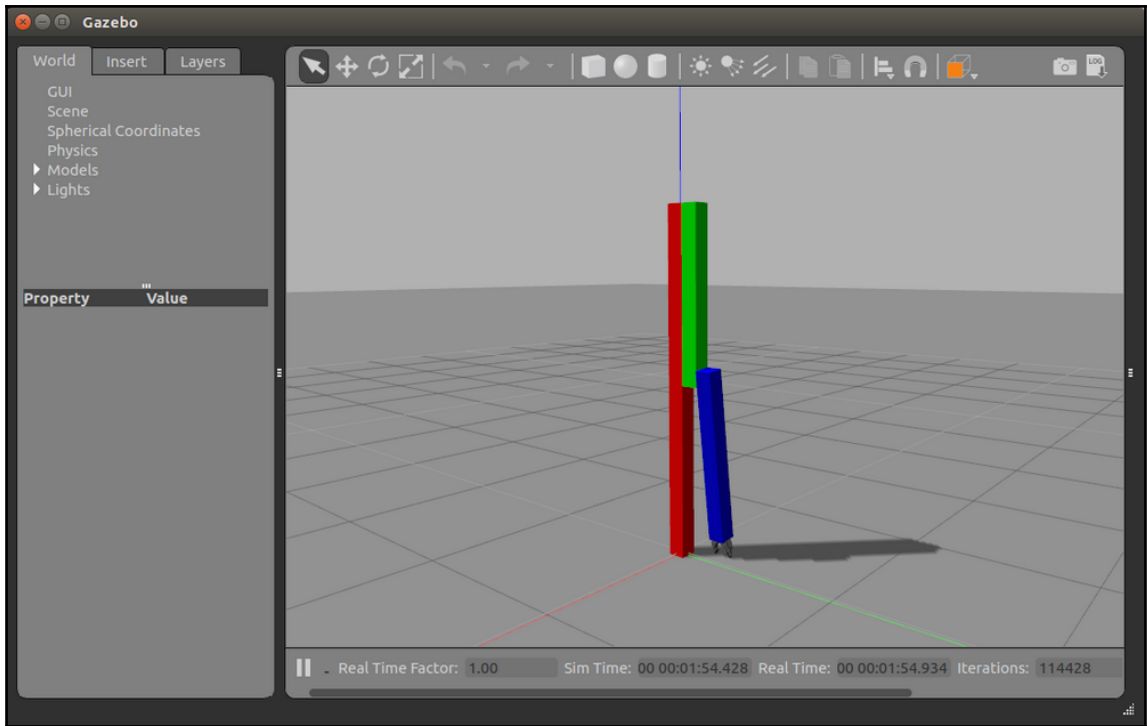
Chapter 5: Creating Your First Robot Arm (in Simulation)

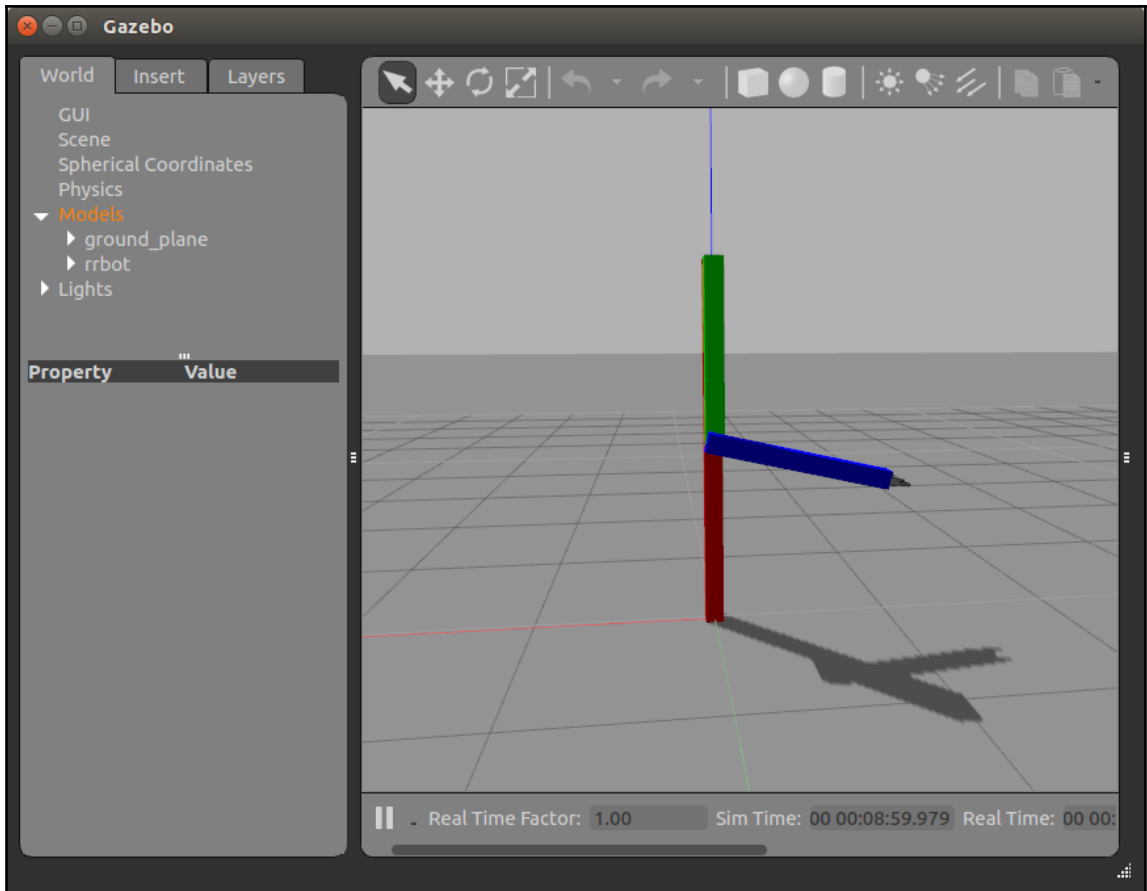


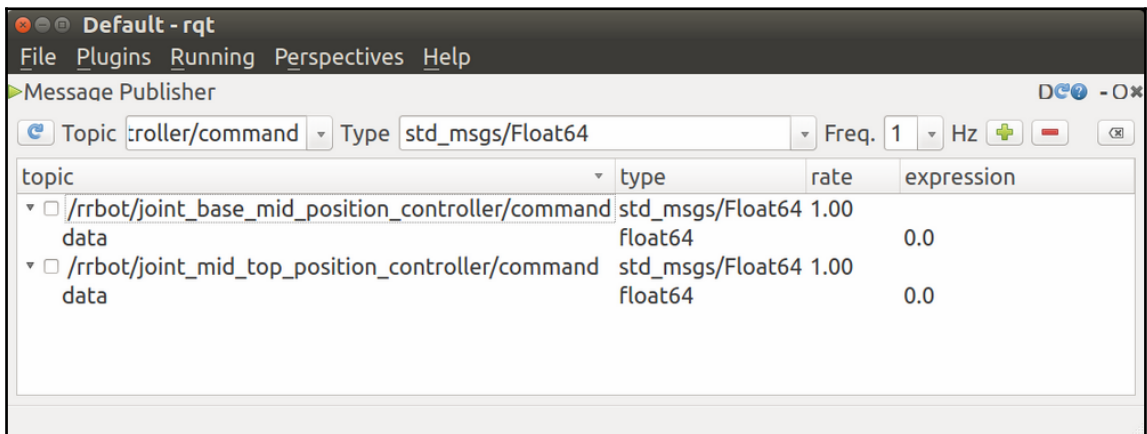
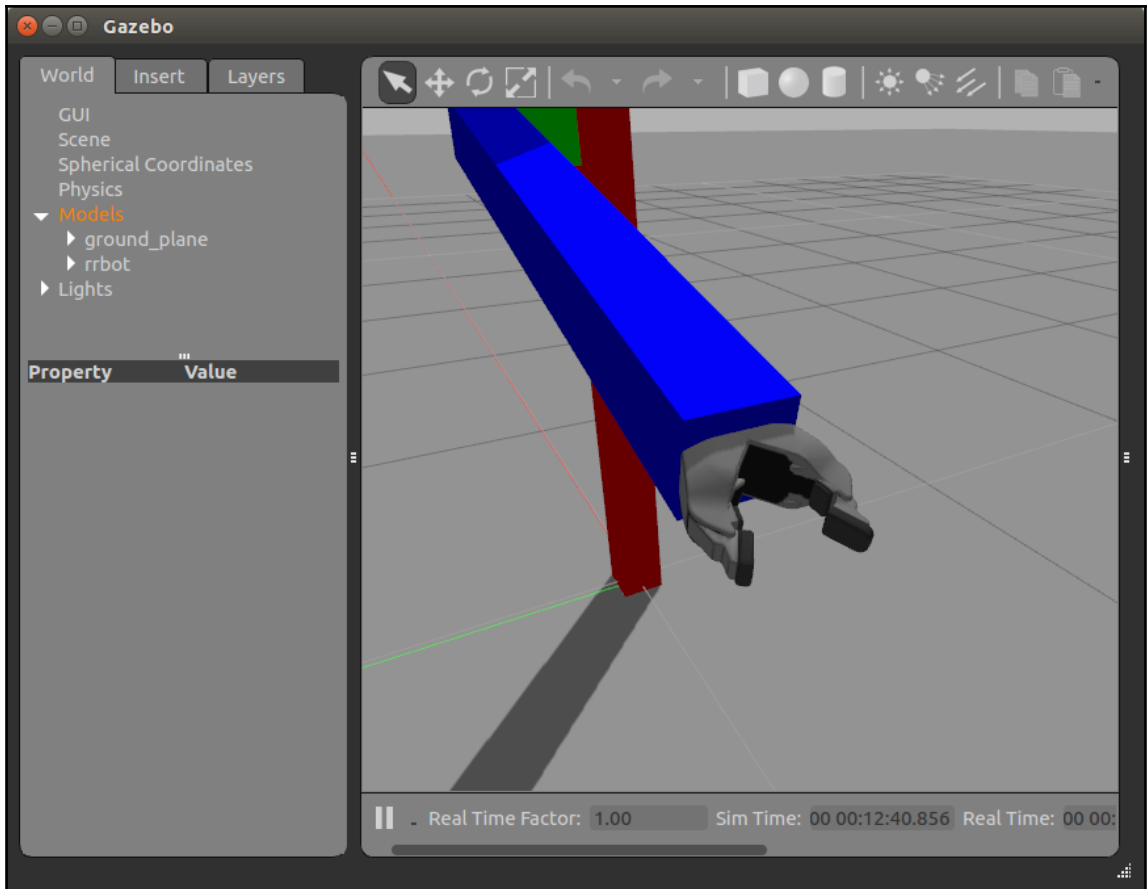


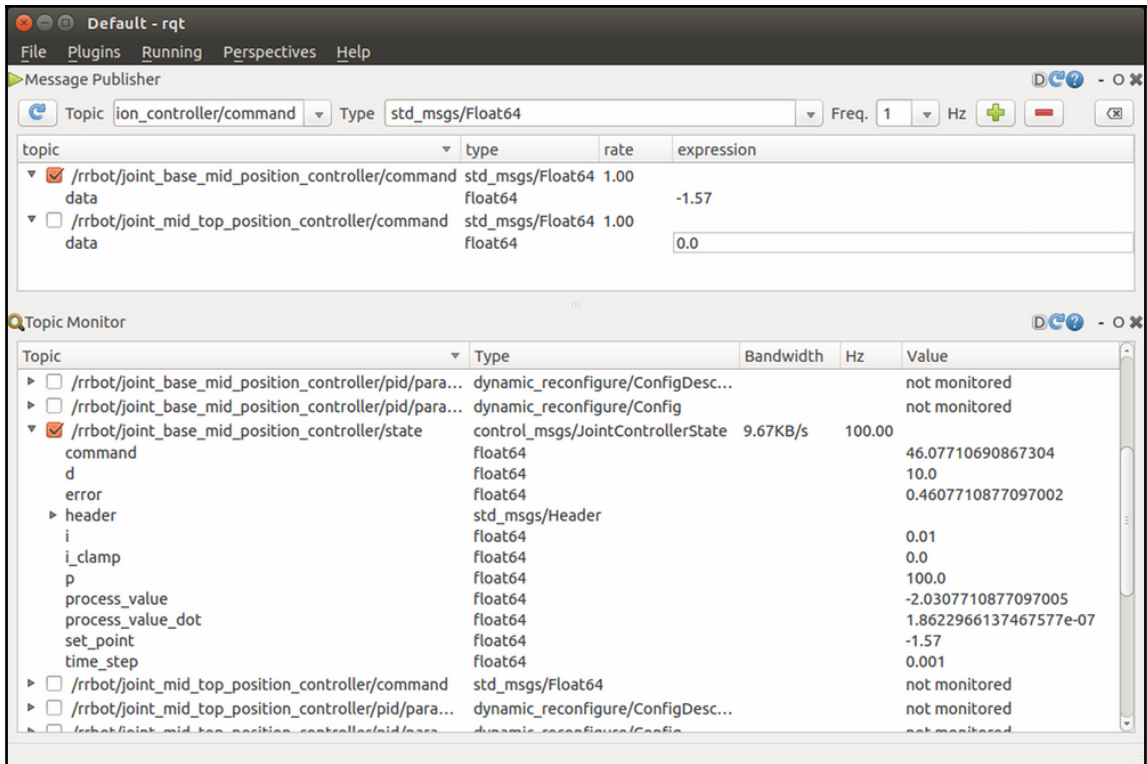












The image displays a ROS2 graphical user interface with two main windows and a 3D visualization.

Message Publisher Window:

- Topic: `/rbot/position_controller/command` Type: `std_msgs/Float64` Freq: 1 Hz
- Message 1: `data: -1.57`
- Message 2: `data: 0.0`

Topic Monitor Window:

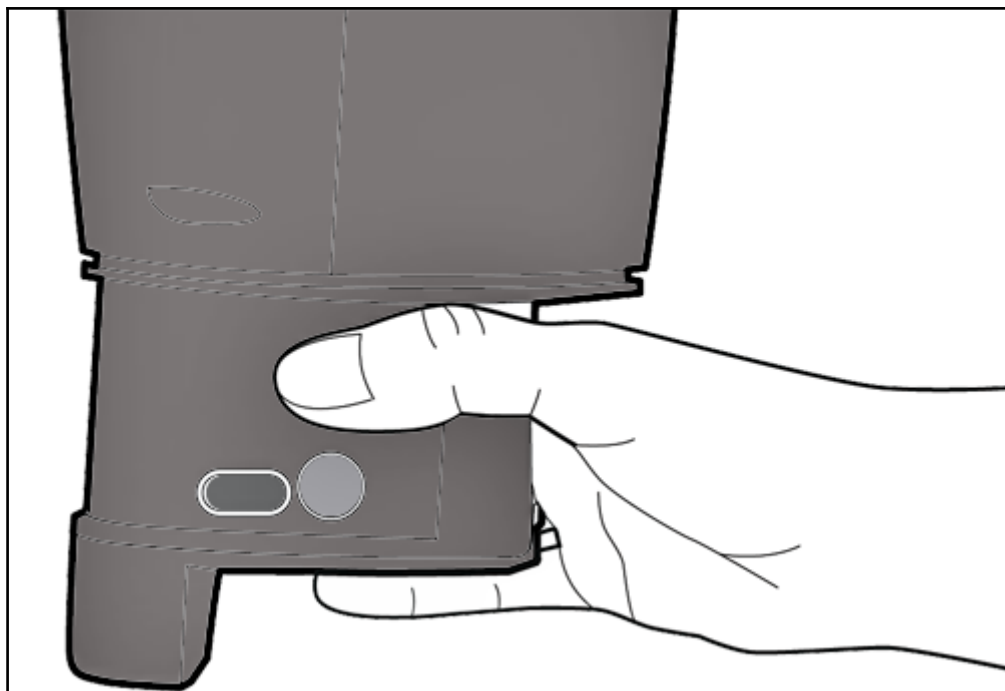
Topic	Type	Bandwidth	Hz	Value
<code>/rbot/joint_states</code>	<code>sensor_msgs/JointState</code>			not monitored
<code>/rbot/joint_mid_top_position_controller/state</code>	<code>control_msgs/JointControllerState</code>	9.87KB/s	99.70	0.001
<code>time_step</code>	<code>float64</code>			0.119589093458...
<code>set_point</code>	<code>float64</code>			-3.80594482461...
<code>process_value_dot</code>	<code>float64</code>			-0.07700140442...
<code>process_value</code>	<code>float64</code>			100.0
<code>p</code>	<code>float64</code>			0.0
<code>i_clamp</code>	<code>float64</code>			0.0
<code>i</code>	<code>float64</code>			0.01
<code>header</code>	<code>std_msgs/Header</code>			0.196590497881...
<code>error</code>	<code>float64</code>			10.0
<code>d</code>	<code>float64</code>			19.65905016878...
<code>command</code>	<code>float64</code>			False
<code>antwindup</code>	<code>bool</code>			False
<code>/rbot/joint_mid_top_position_controller/pid/parameter_updates</code>	<code>dynamic_reconfigure/Config</code>			not monitored
<code>/rbot/joint_mid_top_position_controller/pid/parameter_descriptions</code>	<code>dynamic_reconfigure/ConfigDescription</code>			not monitored
<code>/rbot/joint_mid_top_position_controller/command</code>	<code>std_msgs/Float64</code>			not monitored
<code>/rbot/joint_base_mid_position_controller/state</code>	<code>control_msgs/JointControllerState</code>	9.64KB/s	99.70	0.001
<code>time_step</code>	<code>float64</code>			0.001
<code>set_point</code>	<code>float64</code>			-1.57
<code>process_value_dot</code>	<code>float64</code>			-1.65943680848...
<code>process_value</code>	<code>float64</code>			-2.04169364345...
<code>p</code>	<code>float64</code>			100.0
<code>i_clamp</code>	<code>float64</code>			0.0
<code>i</code>	<code>float64</code>			0.0
<code>header</code>	<code>std_msgs/Header</code>			0.01
<code>error</code>	<code>float64</code>			0.471693643458...
<code>d</code>	<code>float64</code>			10.0
<code>command</code>	<code>float64</code>			47.16936600529...
<code>antwindup</code>	<code>bool</code>			False
<code>/rbot/joint_base_mid_position_controller/pid/parameter_updates</code>	<code>dynamic_reconfigure/Config</code>			not monitored
<code>/rbot/joint_base_mid_position_controller/pid/parameter_descriptions</code>	<code>dynamic_reconfigure/ConfigDescription</code>			not monitored
<code>/rbot/joint_base_mid_position_controller/command</code>	<code>std_msgs/Float64</code>			not monitored

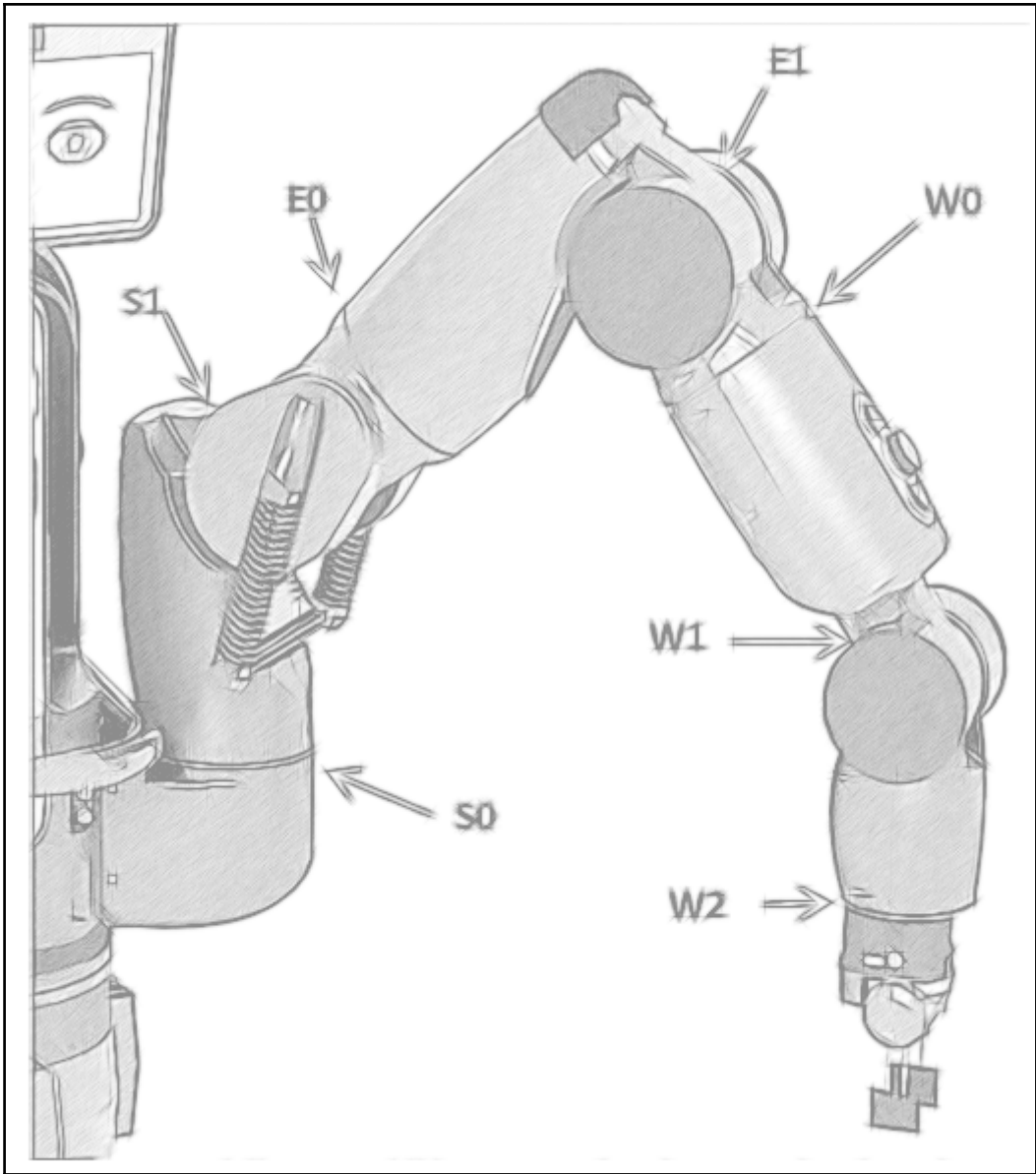
3D Visualization: A 3D model of a robot arm is shown. The base is red, the middle joint is green, and the end effector is blue. The robot is positioned on a grey grid floor.

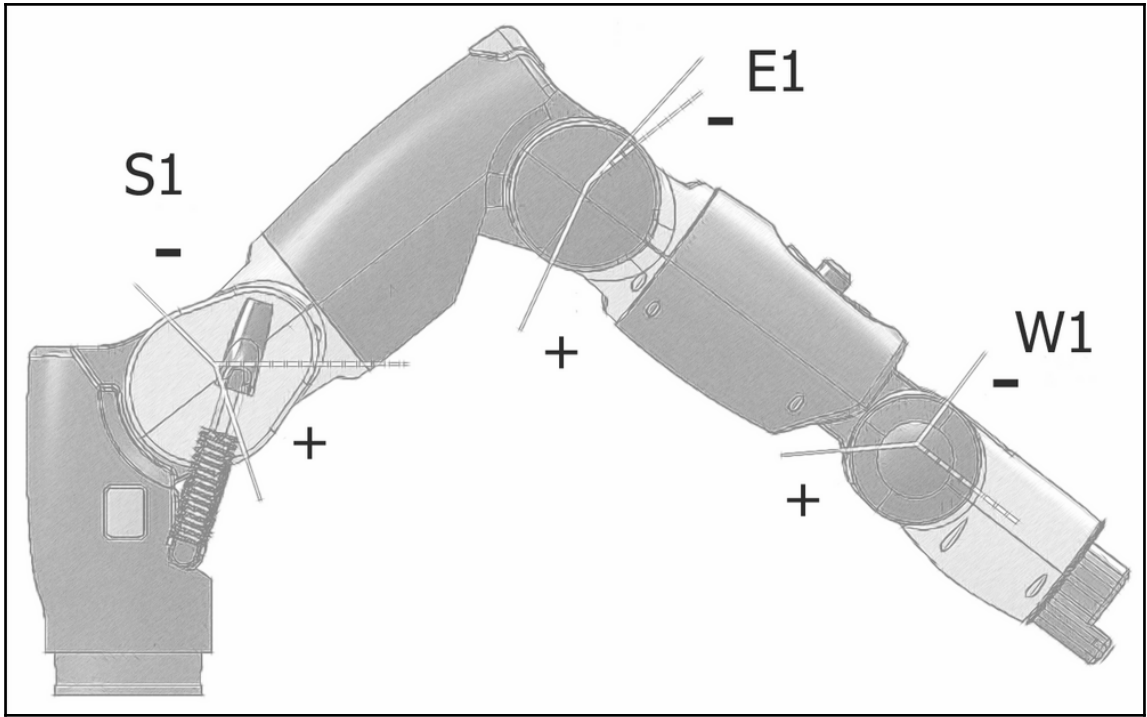
Status Bar: Real Time Factor: 1.00 Sim Time: 00:06:11:06.121 Real Time: 00:00:11:06.172 Rerol...

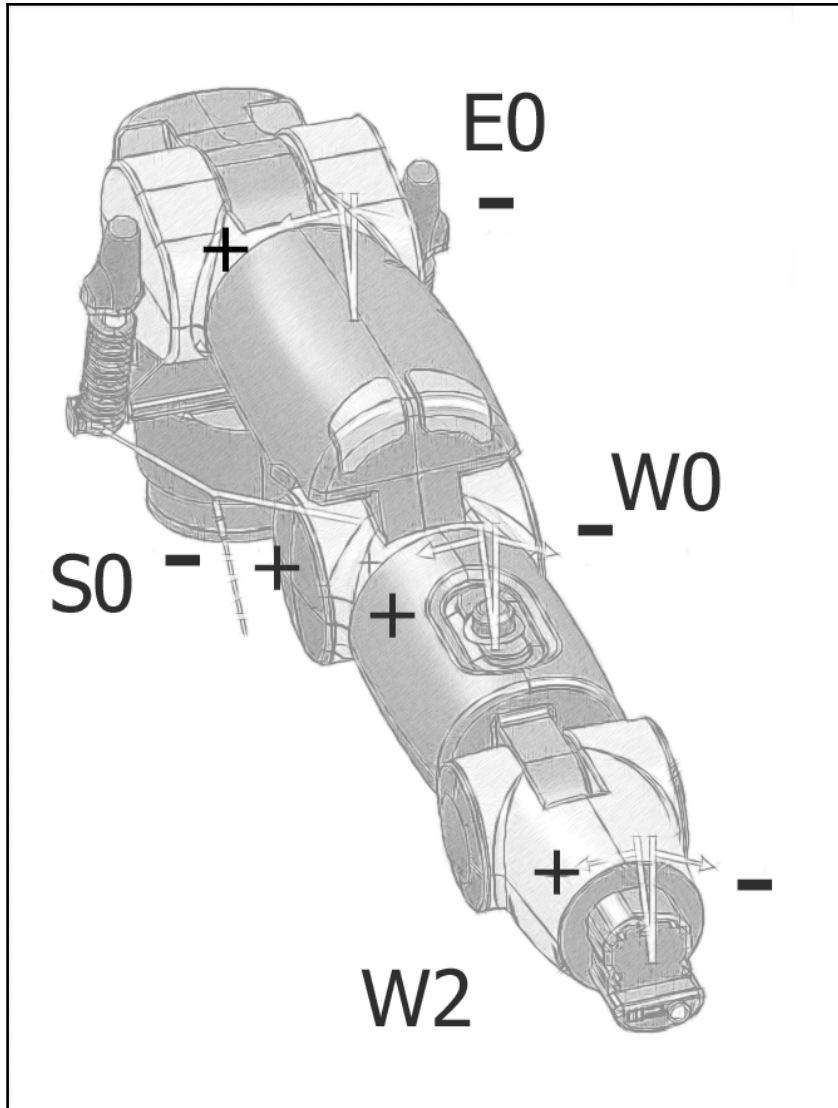
Chapter 6: Wobbling Robot Arms Using Joint Control

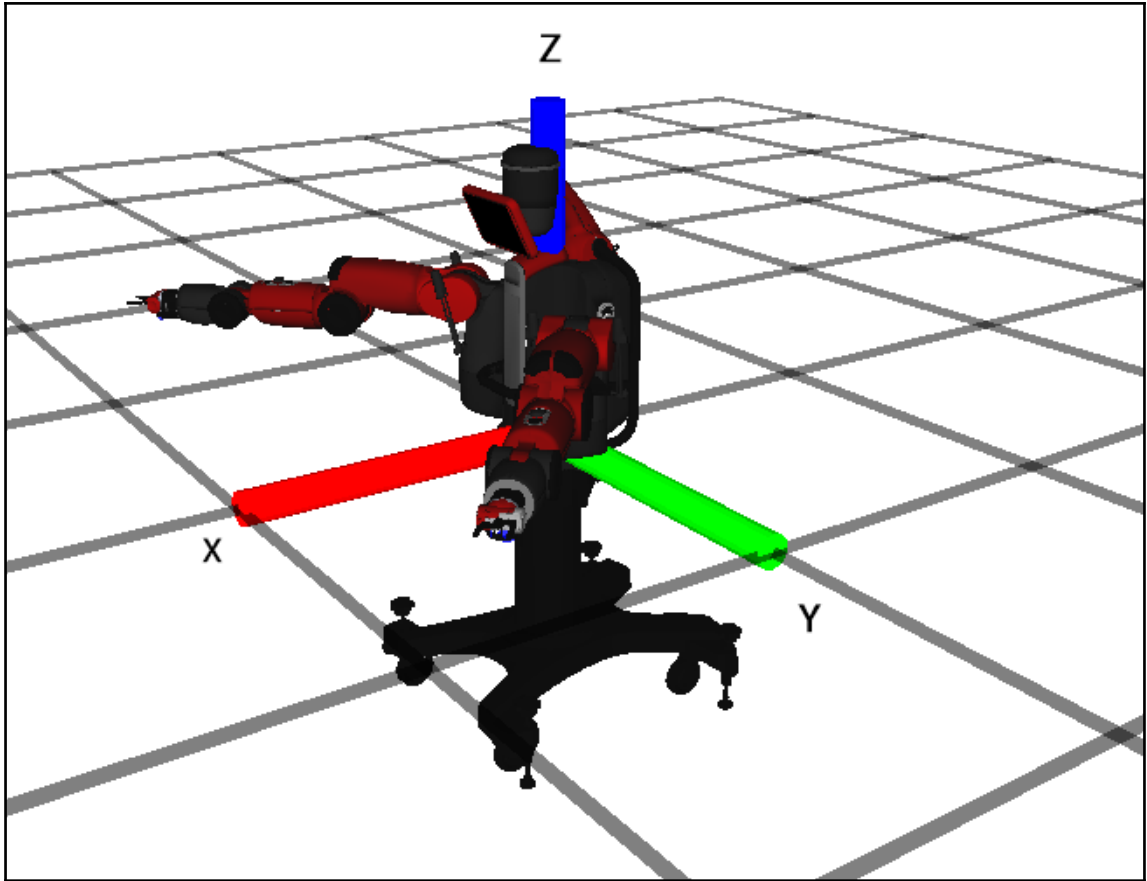


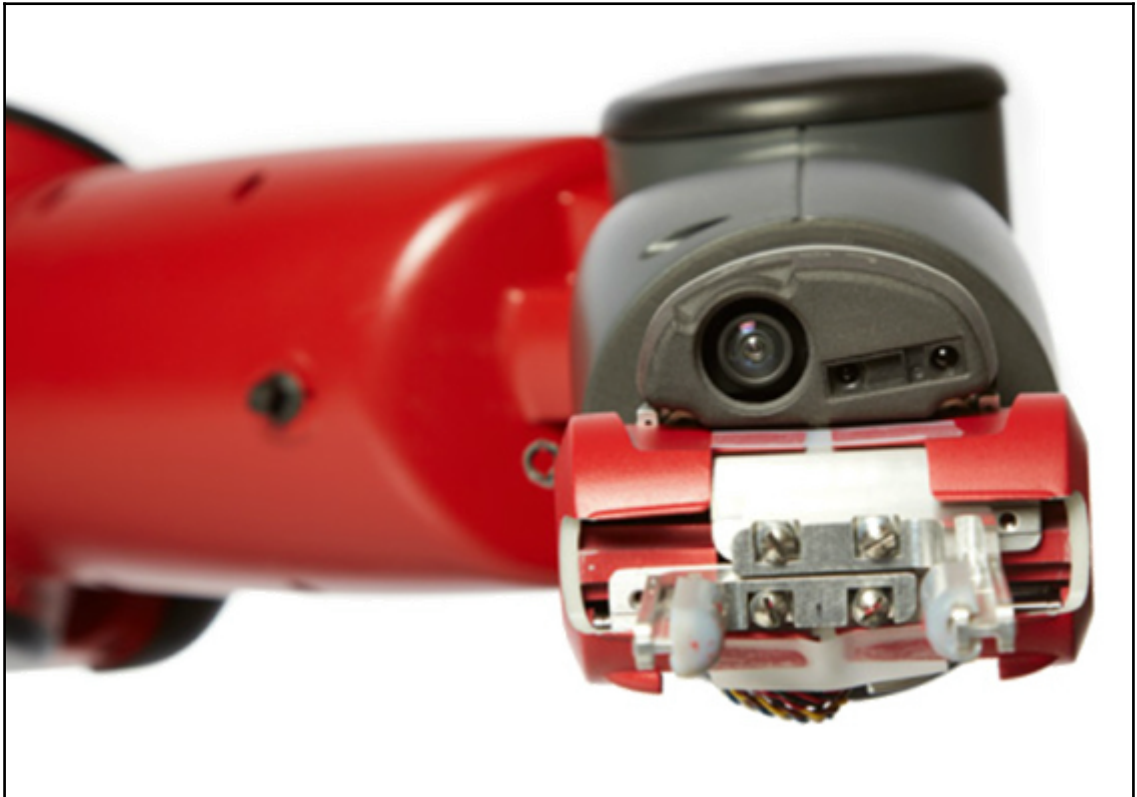


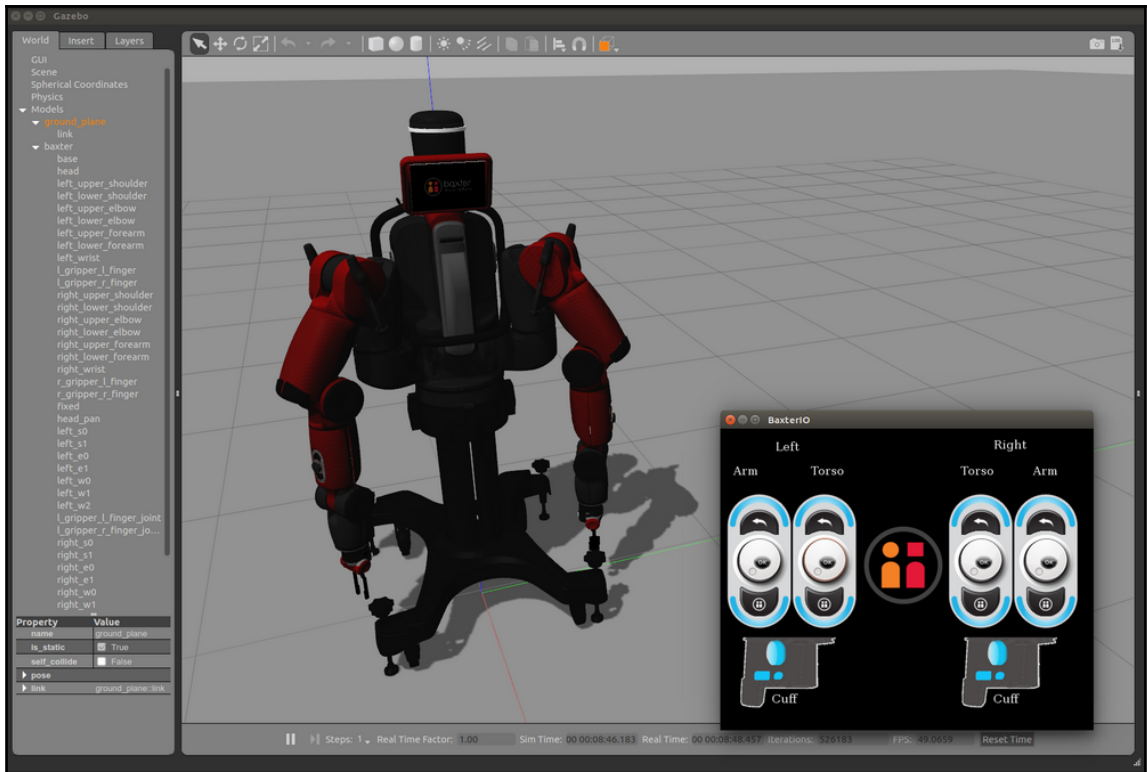


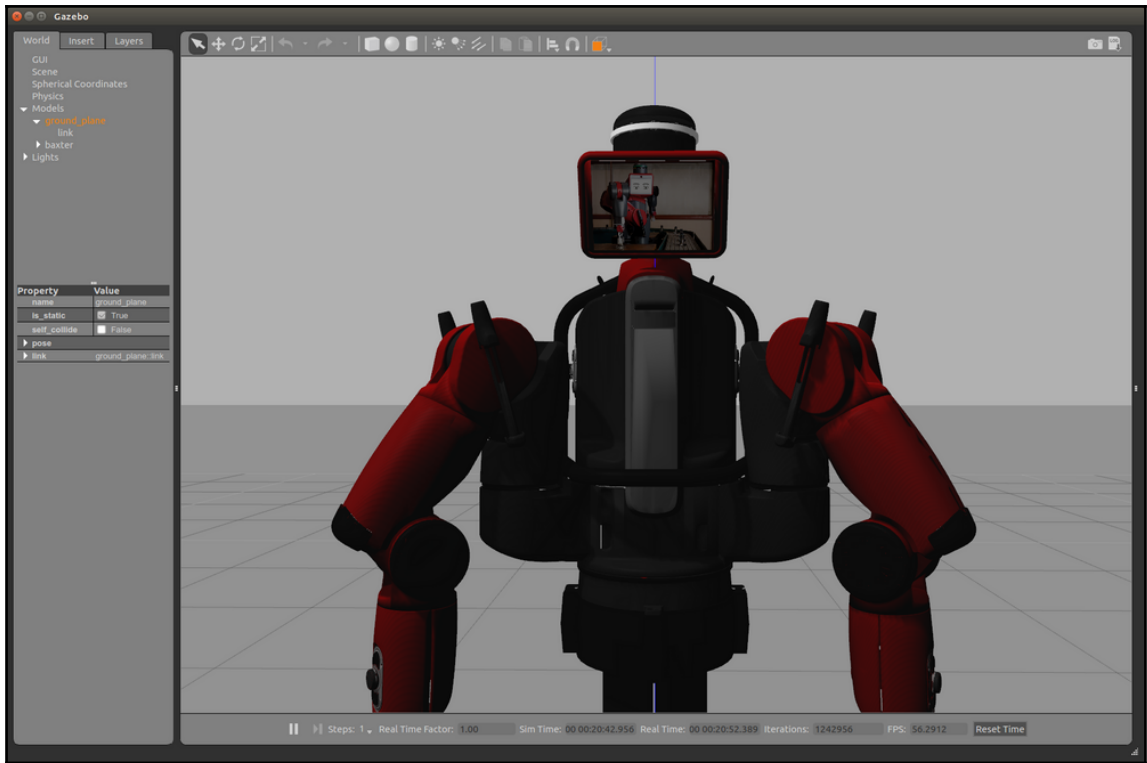


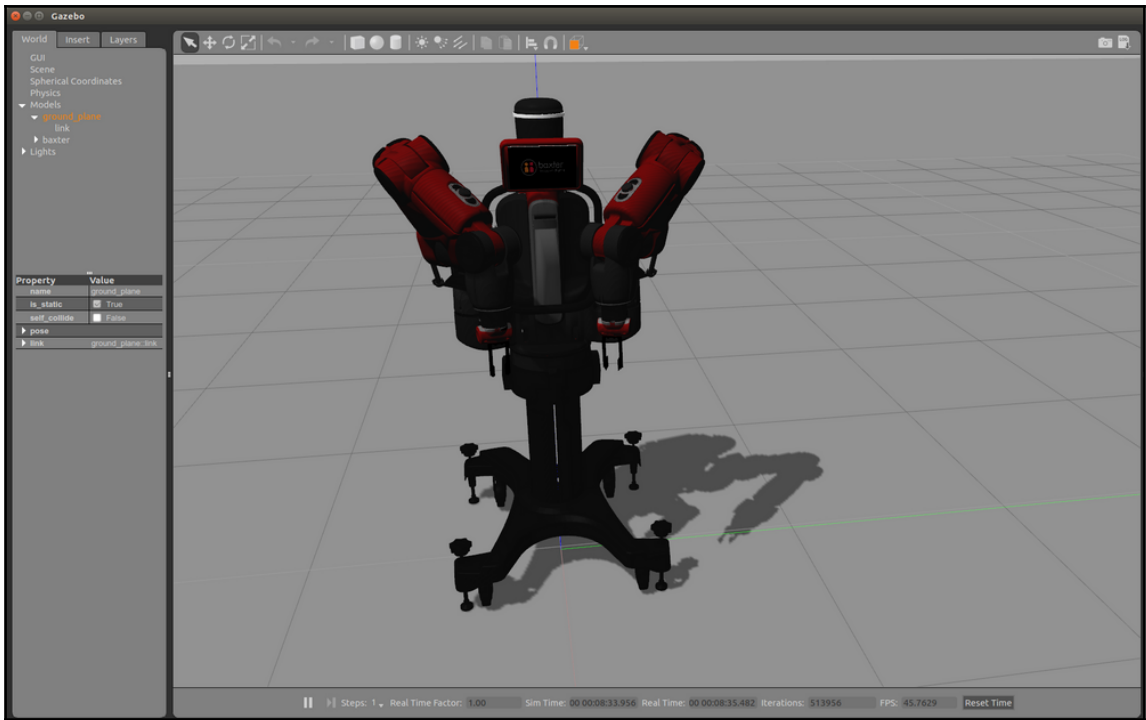


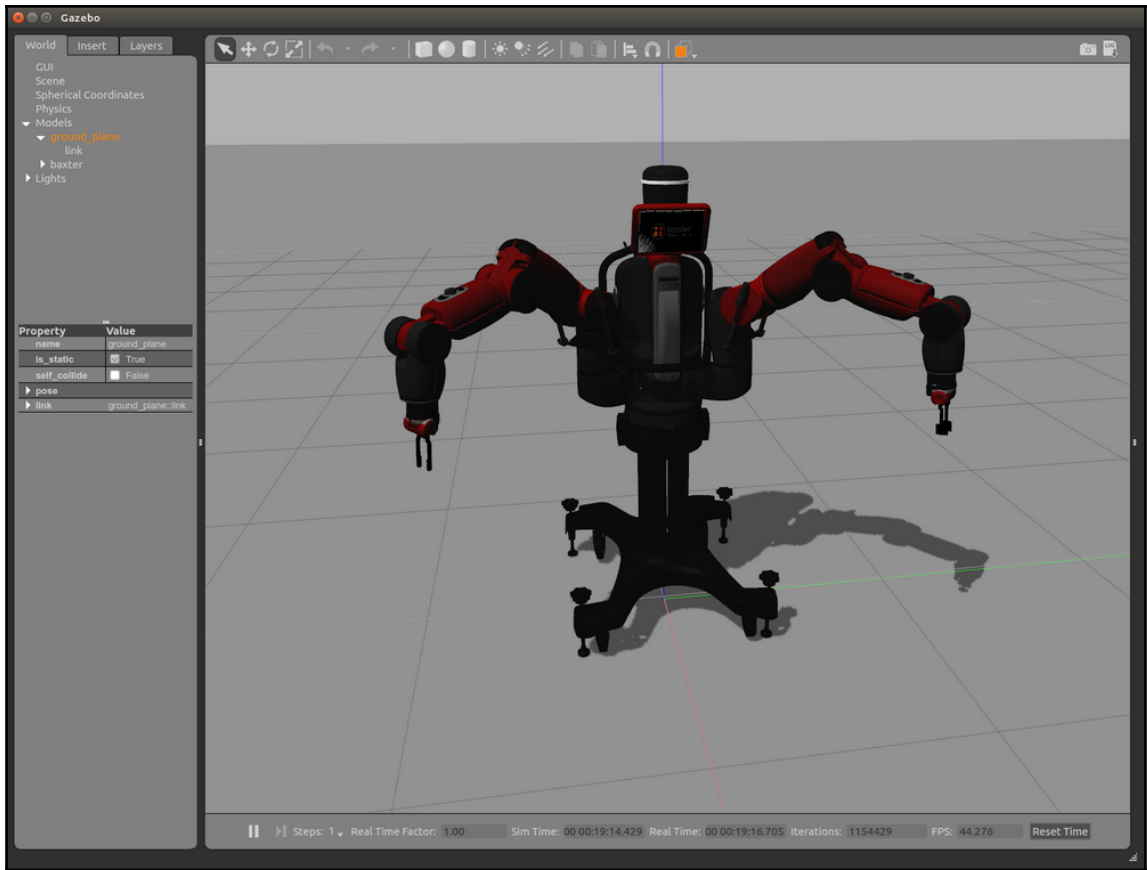


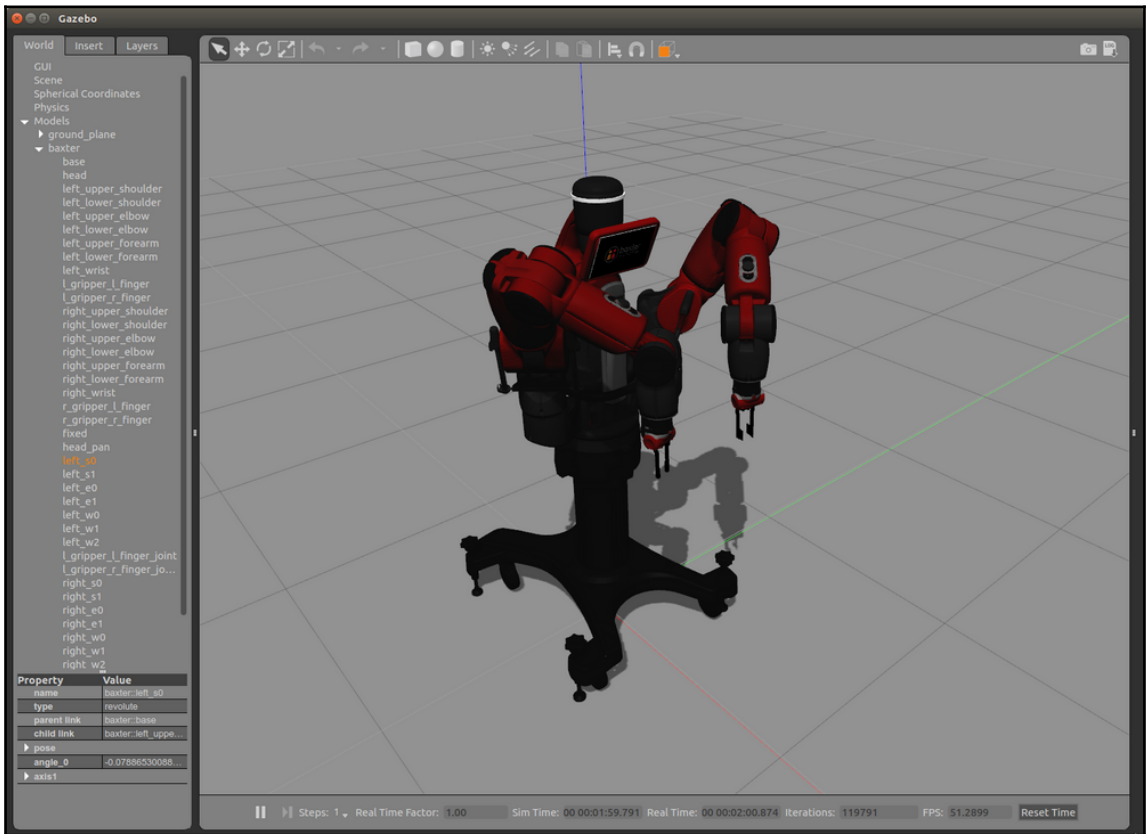
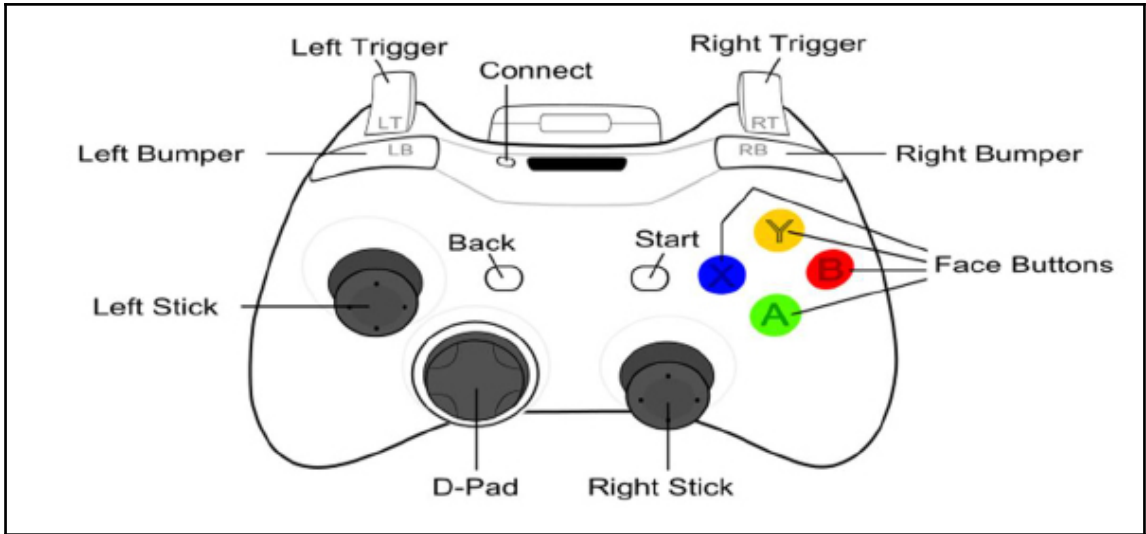










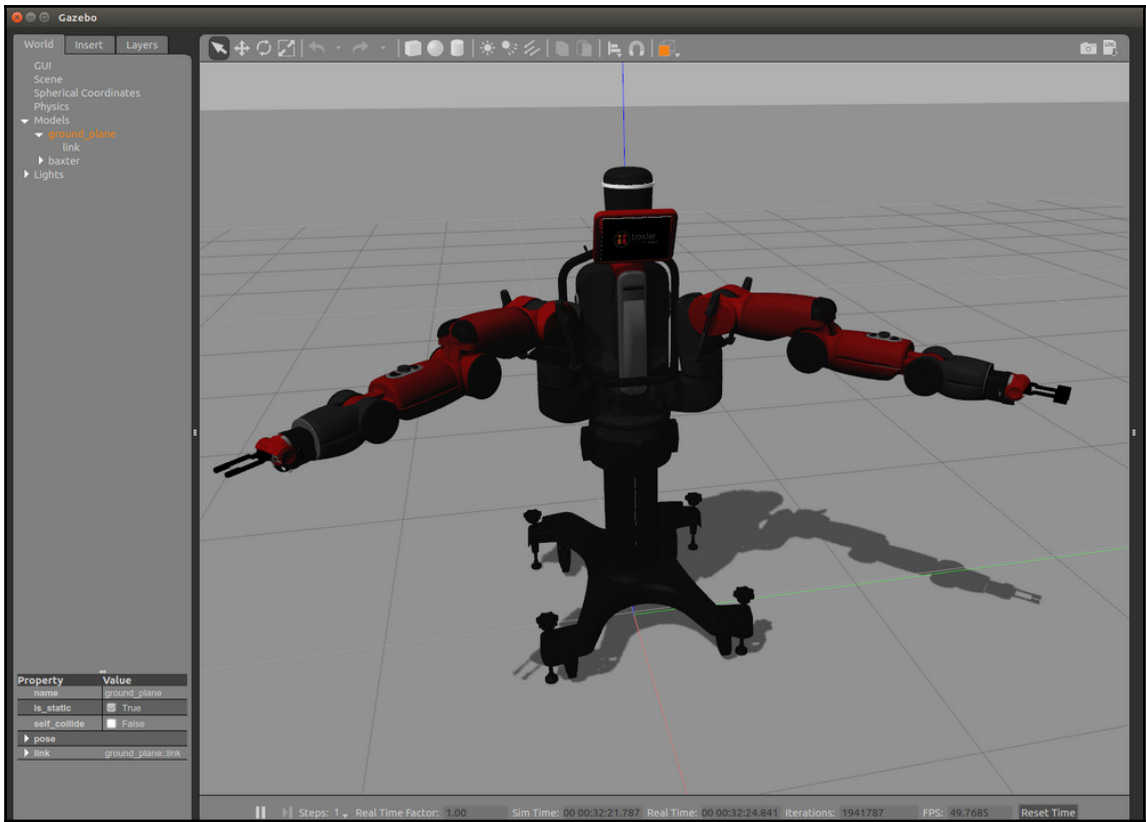


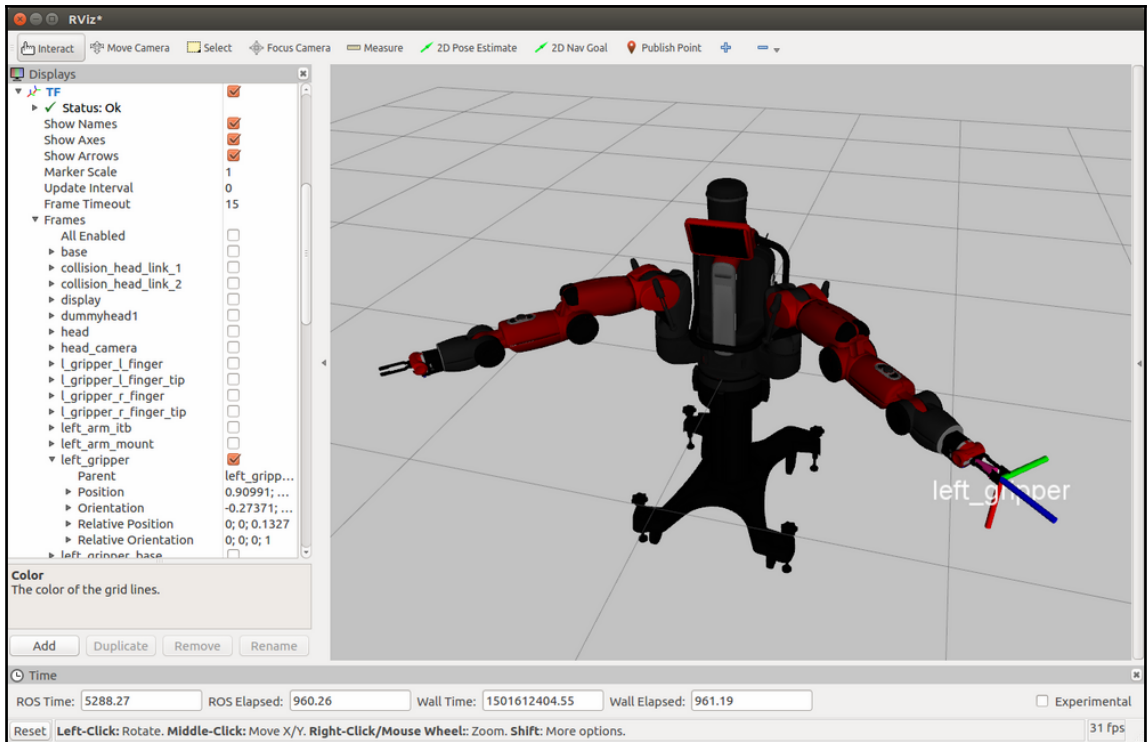
Default - rqt

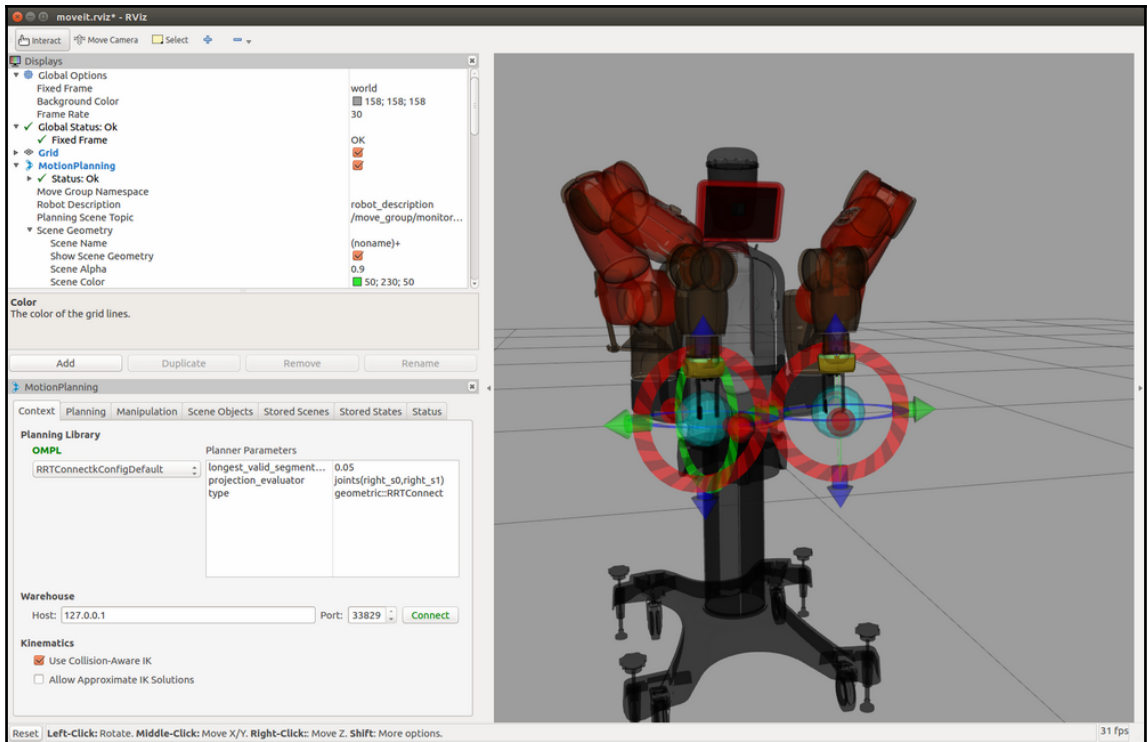
File Plugins Running Perspectives Help

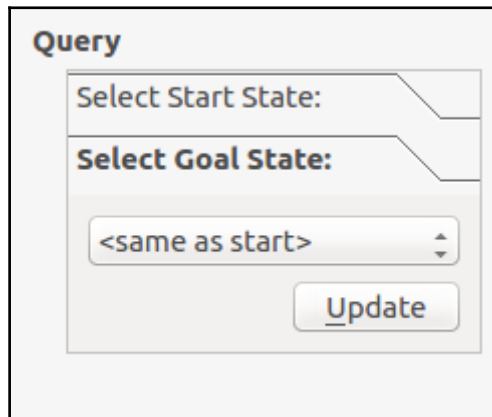
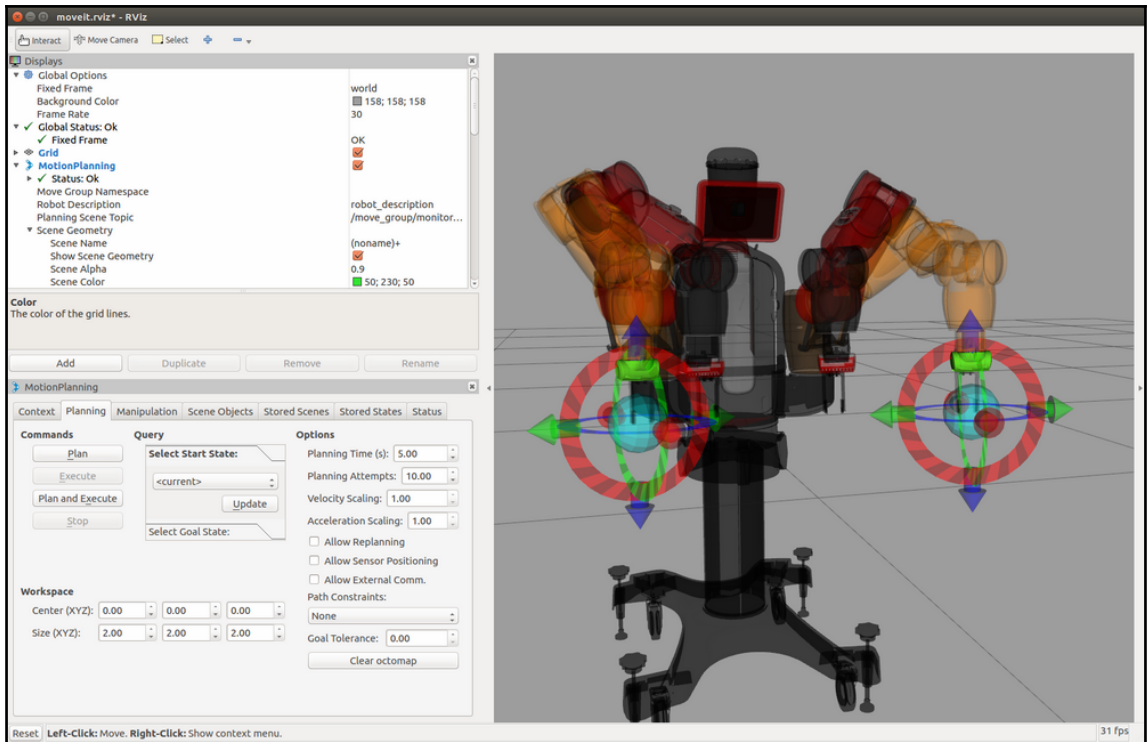
Topic Monitor

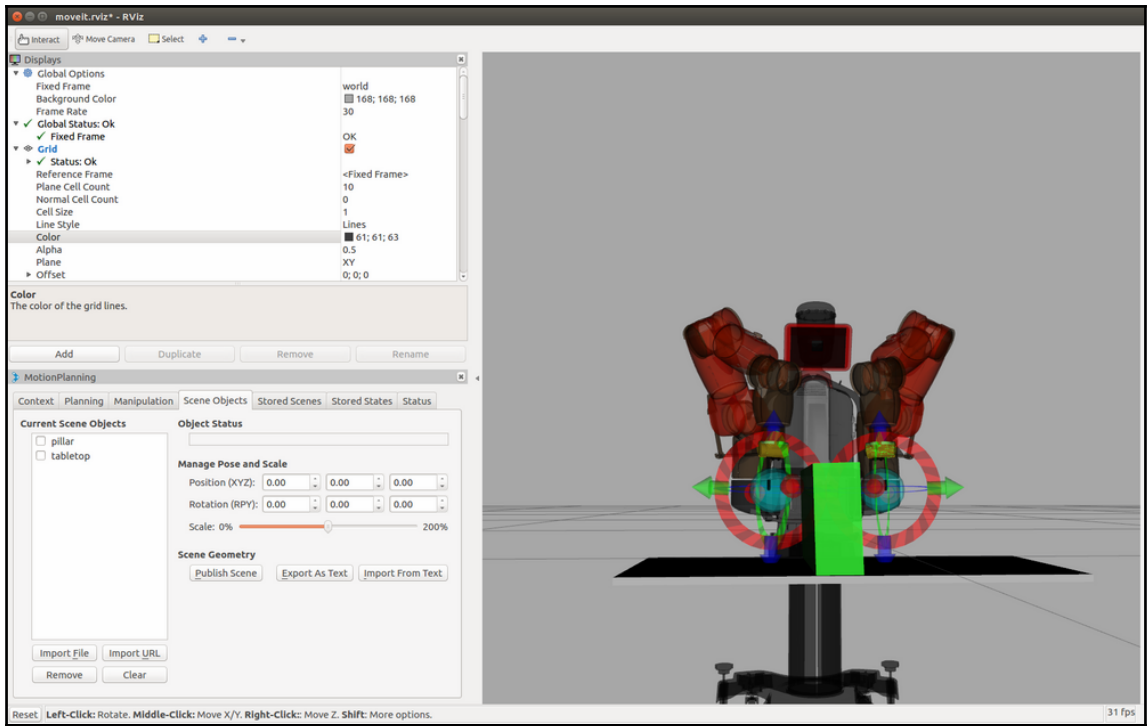
Topic	Type	Bandwidth	Hz	Value
<input type="checkbox"/> /robot/left_joint_velocity_controller/joints/left_w2...	control_msgs/JointControllerState			not monitored
<input checked="" type="checkbox"/> /robot/limb/left/endpoint_state	baxter_core_msgs/EndpointState	8.46KB/s	49.77	
▶ header	std_msgs/Header			
▼ pose	geometry_msgs/Pose			
▼ orientation	geometry_msgs/Quaternion			
w	float64			0.022281433295881014
x	float64			0.1311685567478608
y	float64			0.9910403505177976
z	float64			0.01172054164811699
▼ position	geometry_msgs/Point			
x	float64			0.5823263388282515
y	float64			0.1910176575824131
z	float64			0.11112816196017064
▶ twist	geometry_msgs/Twist			
▶ wrench	geometry_msgs/Wrench			
<input type="checkbox"/> /robot/limb/left/gravity_compensation_torques	baxter_core_msgs/SEAJointState			not monitored
<input checked="" type="checkbox"/> /robot/limb/right/endpoint_state	baxter_core_msgs/EndpointState	8.46KB/s	49.77	
▶ header	std_msgs/Header			
▼ pose	geometry_msgs/Pose			
▼ orientation	geometry_msgs/Quaternion			
w	float64			0.022297400703710755
x	float64			-0.1312326671662762
y	float64			0.9910312425550769
z	float64			-0.011742626197909735
▼ position	geometry_msgs/Point			
x	float64			0.5822958000748767
y	float64			-0.19098681299201517
z	float64			0.11113570617297241
▶ twist	geometry_msgs/Twist			
▶ wrench	geometry_msgs/Wrench			
<input type="checkbox"/> /robot/limb/right/gravity_compensation_torques	baxter_core_msgs/SEAJointState			not monitored

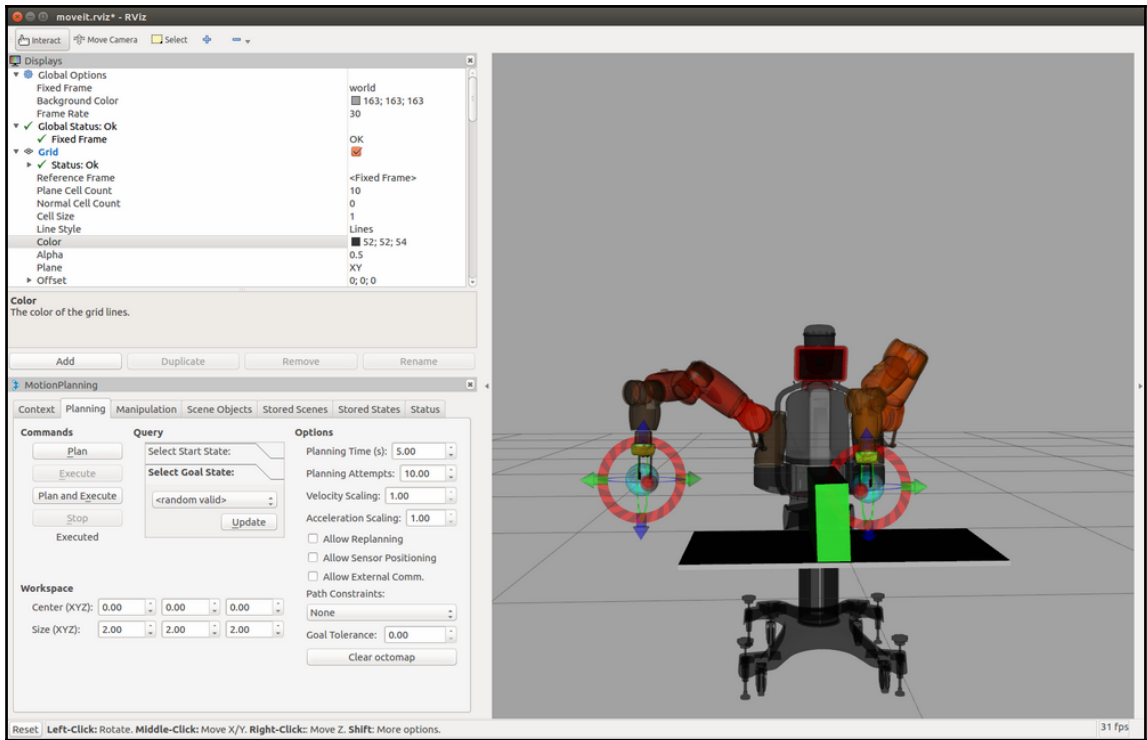


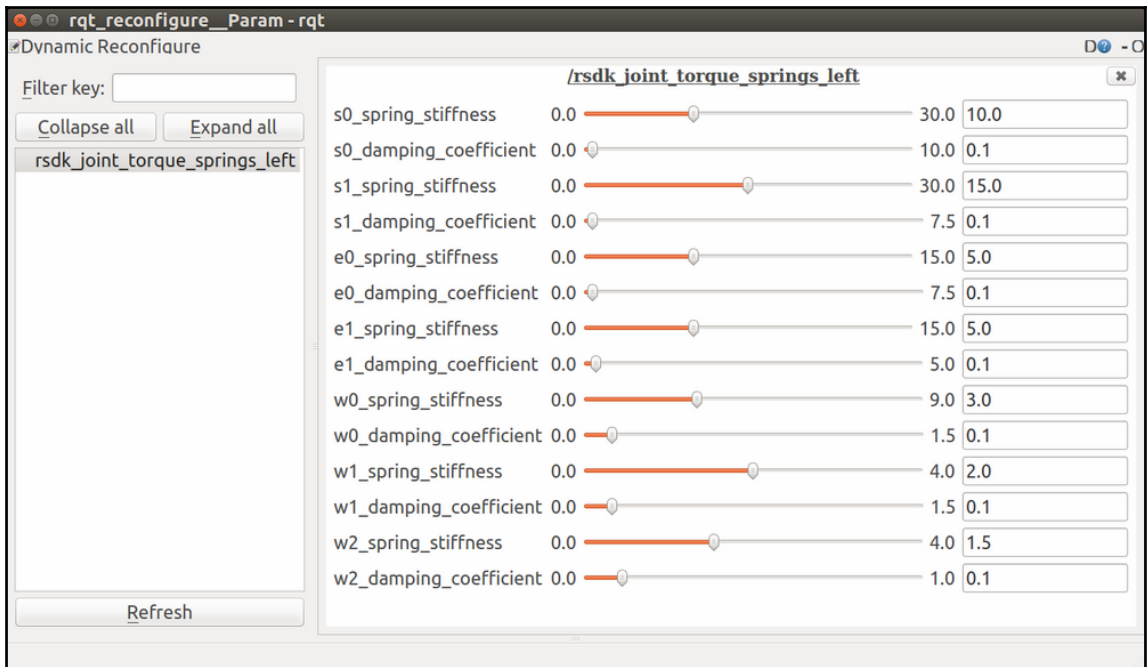
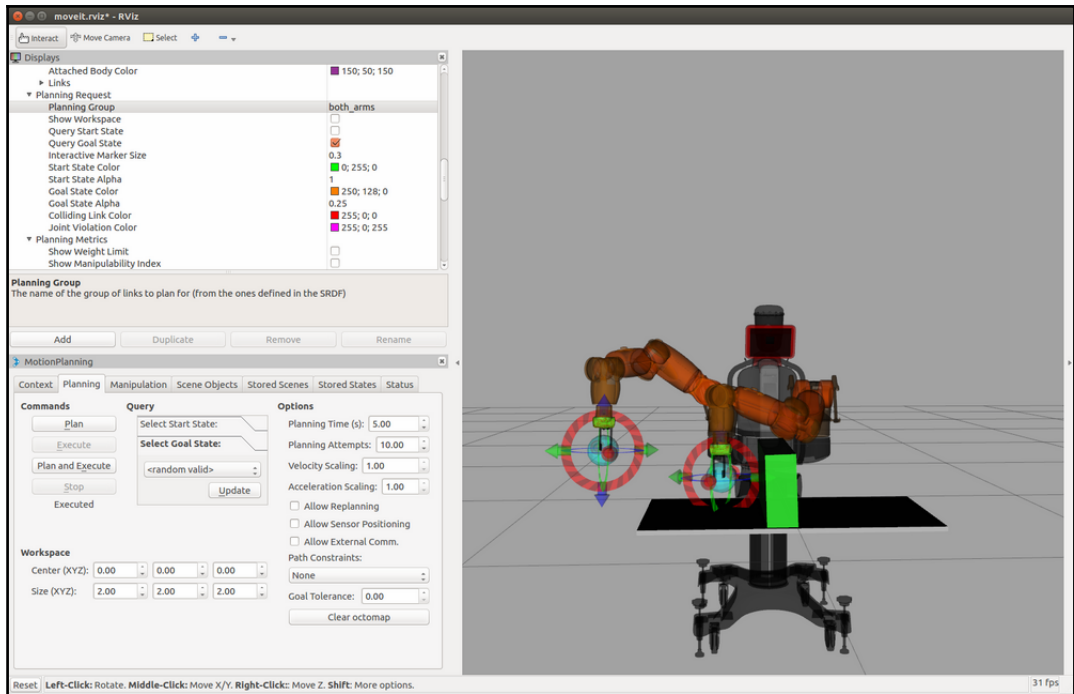




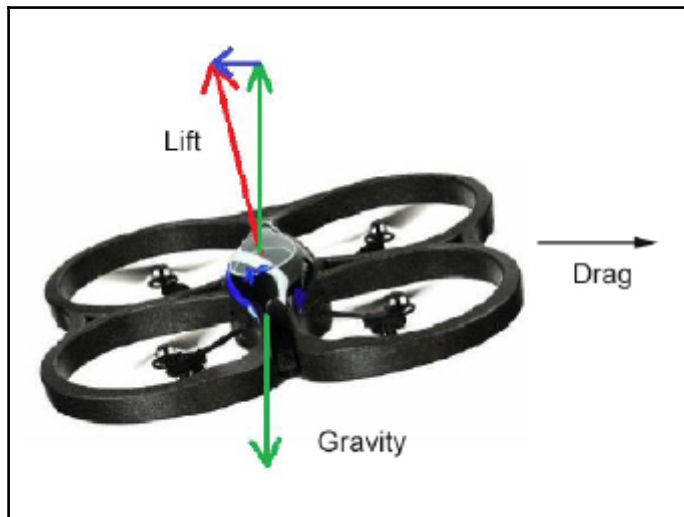
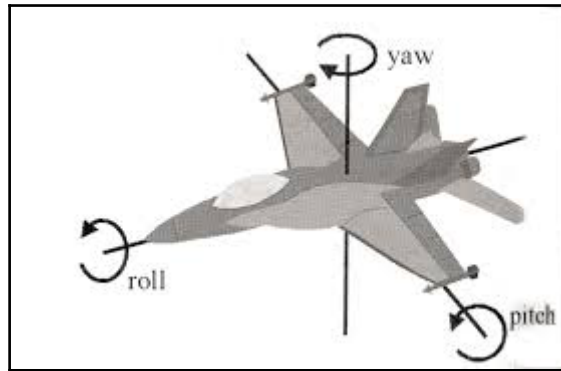
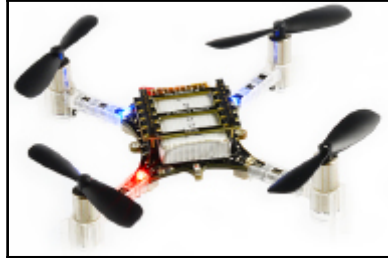


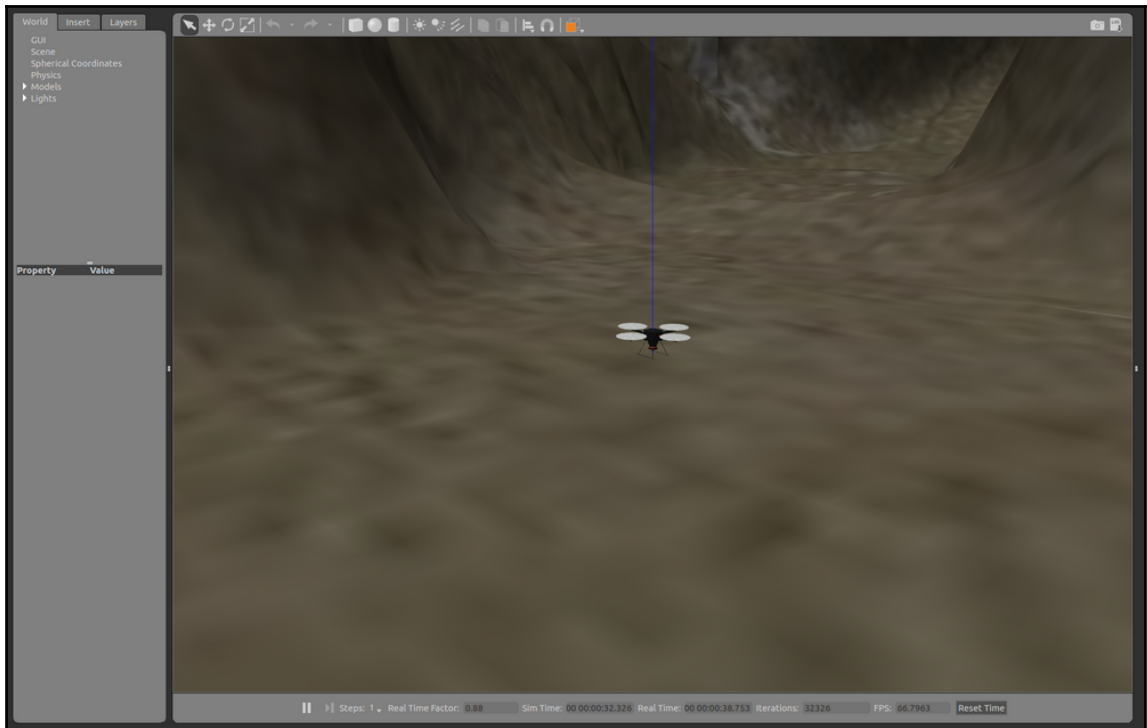


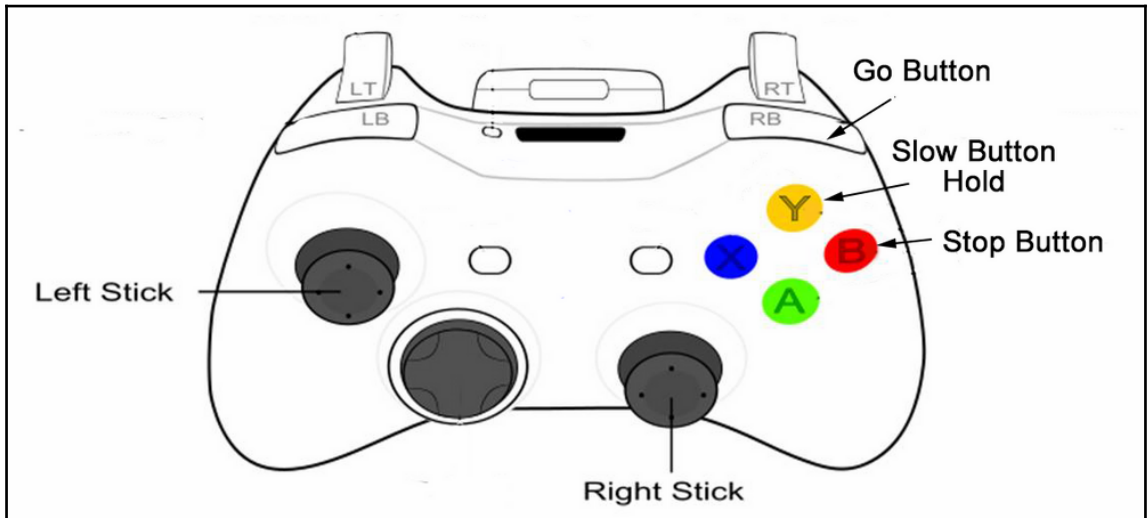
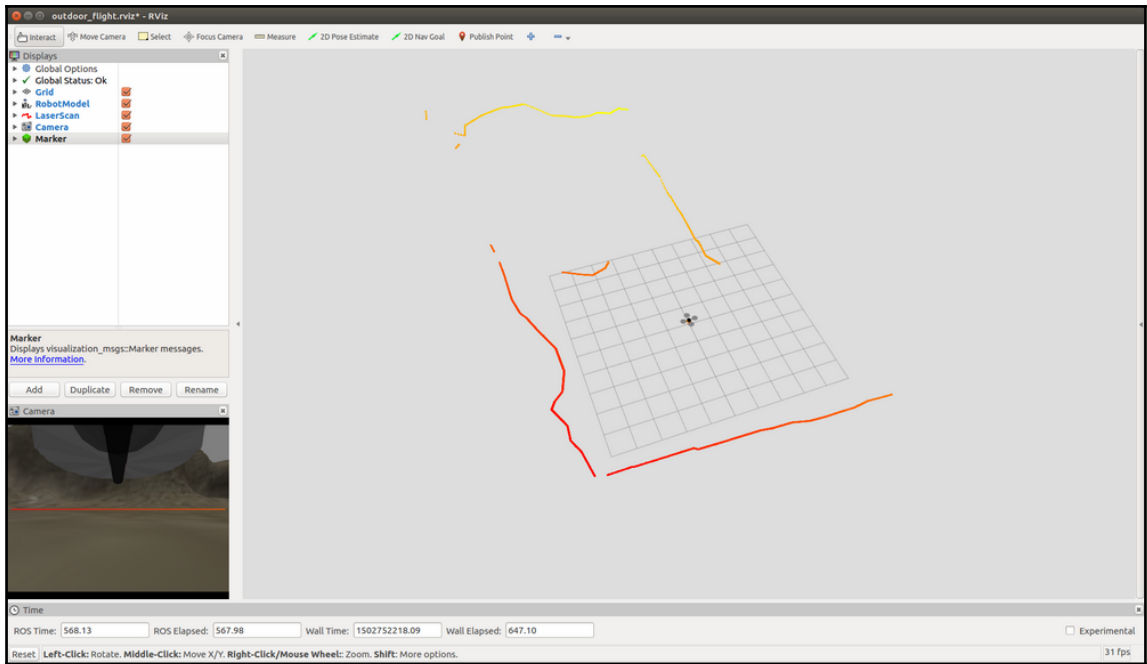


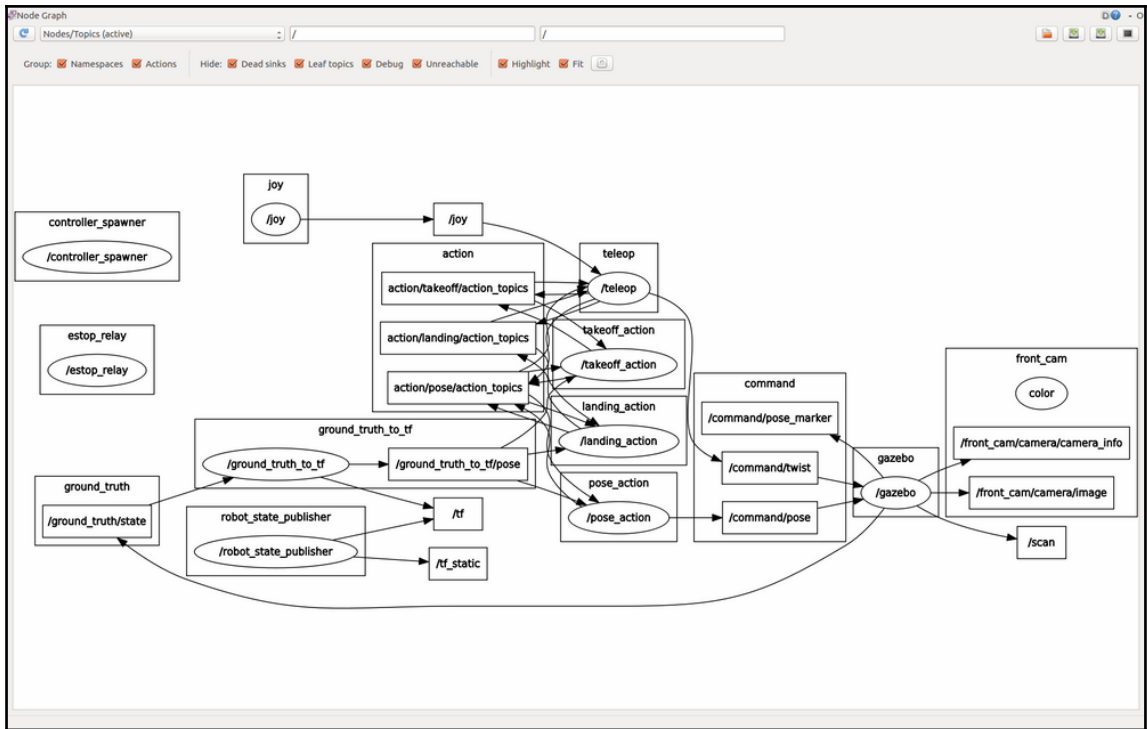


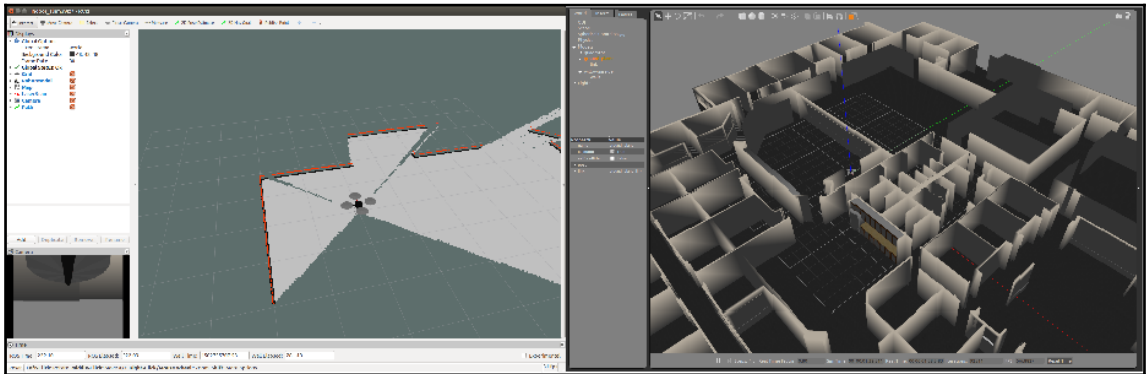
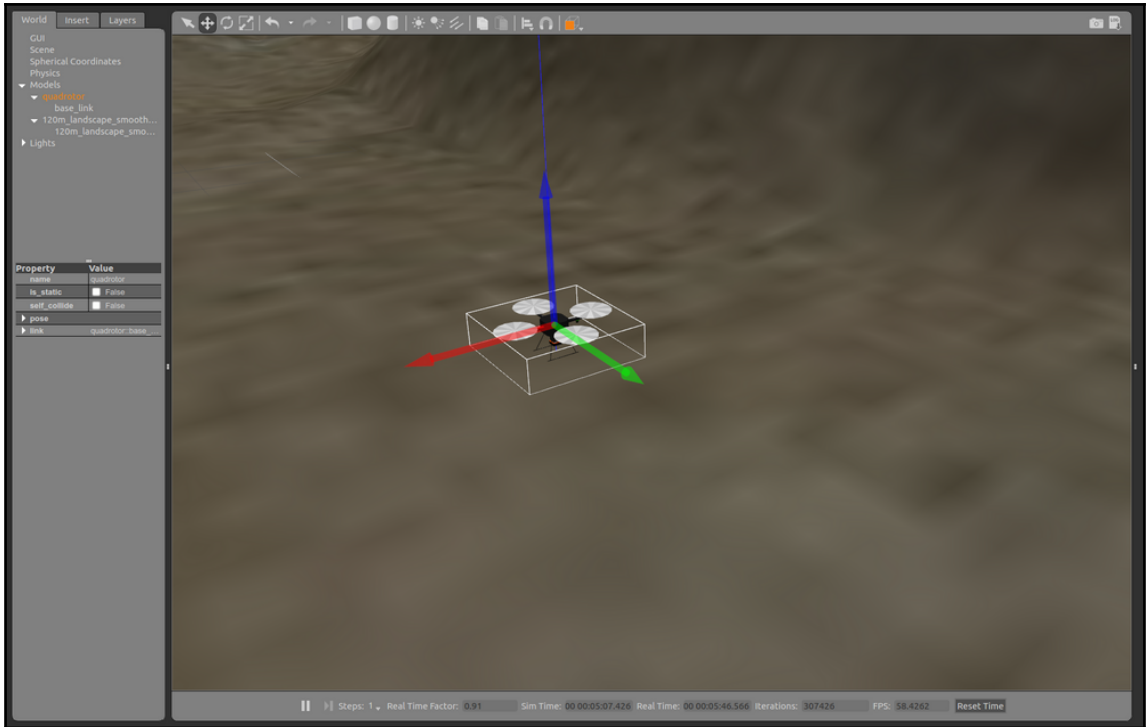
Chapter 7: Making a Robot Fly

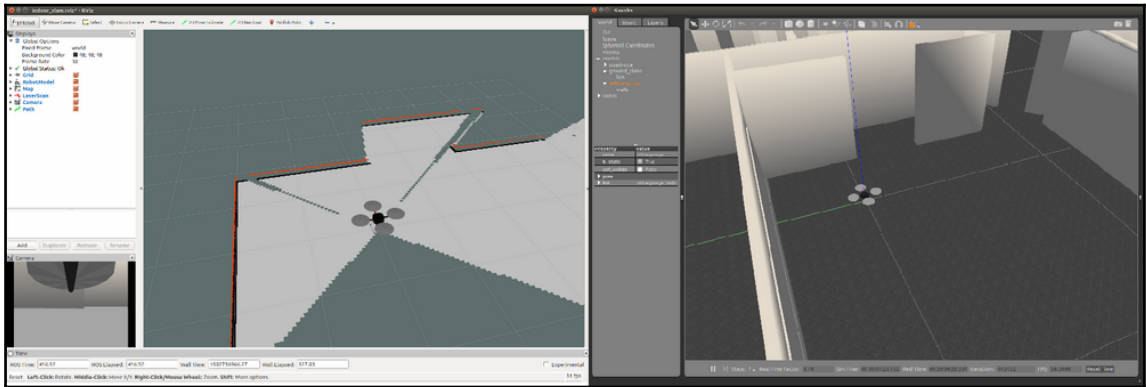
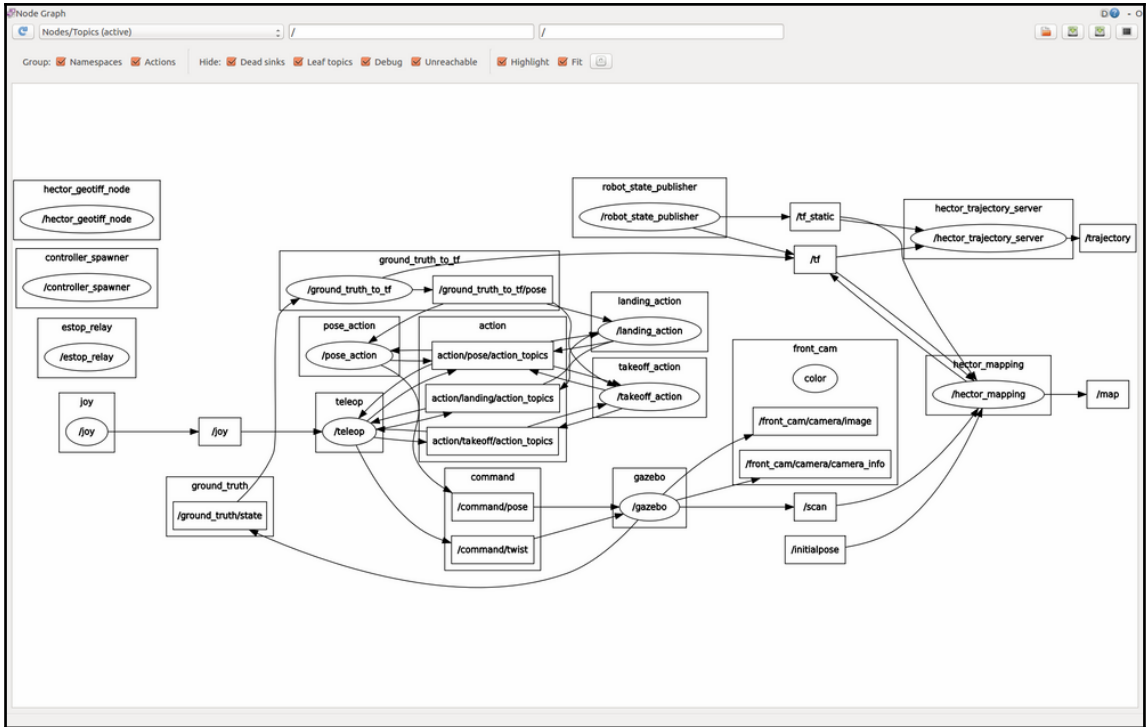




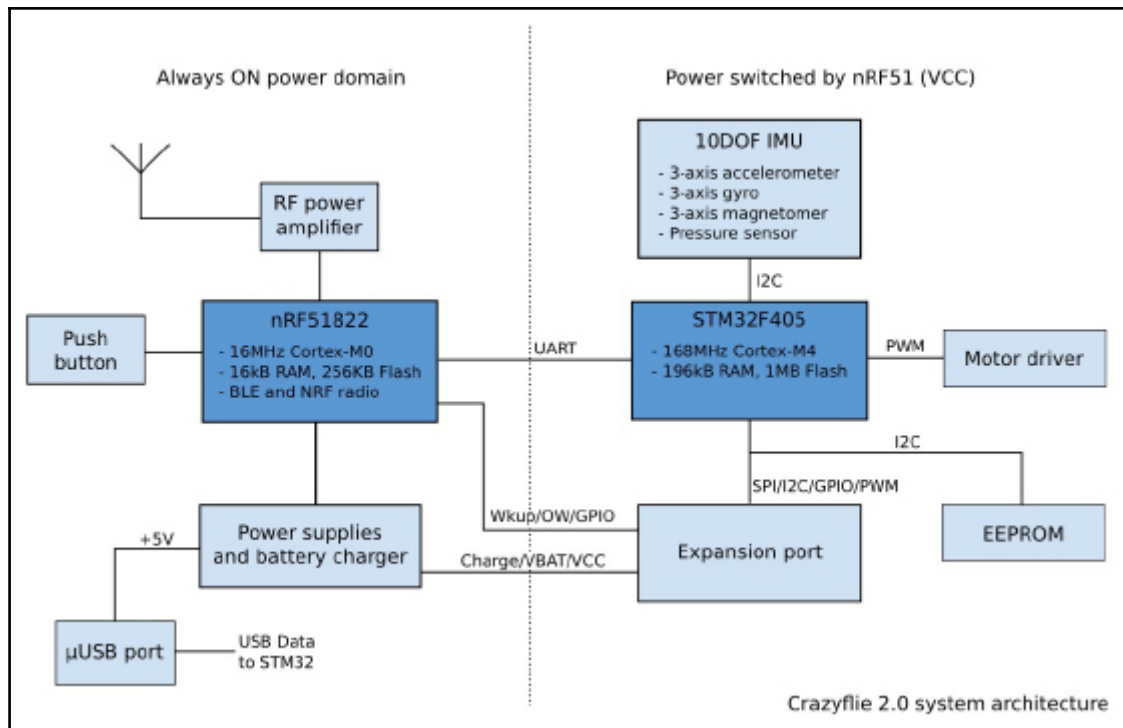


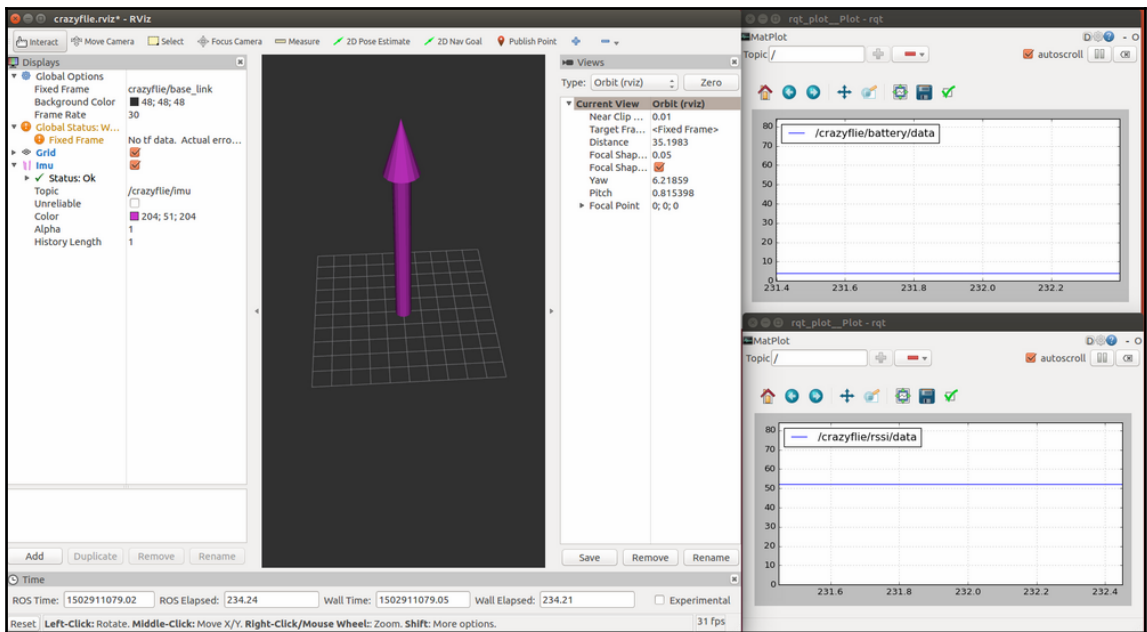
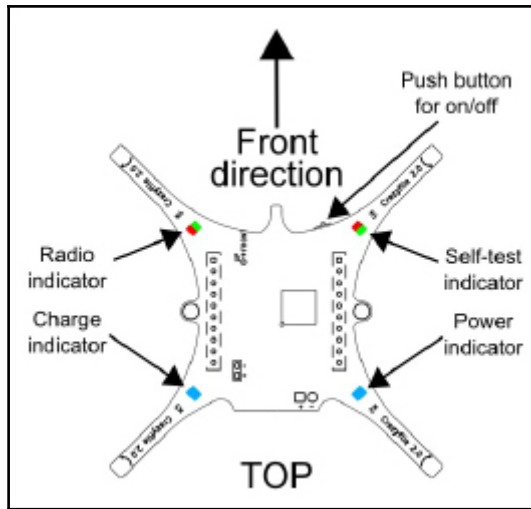


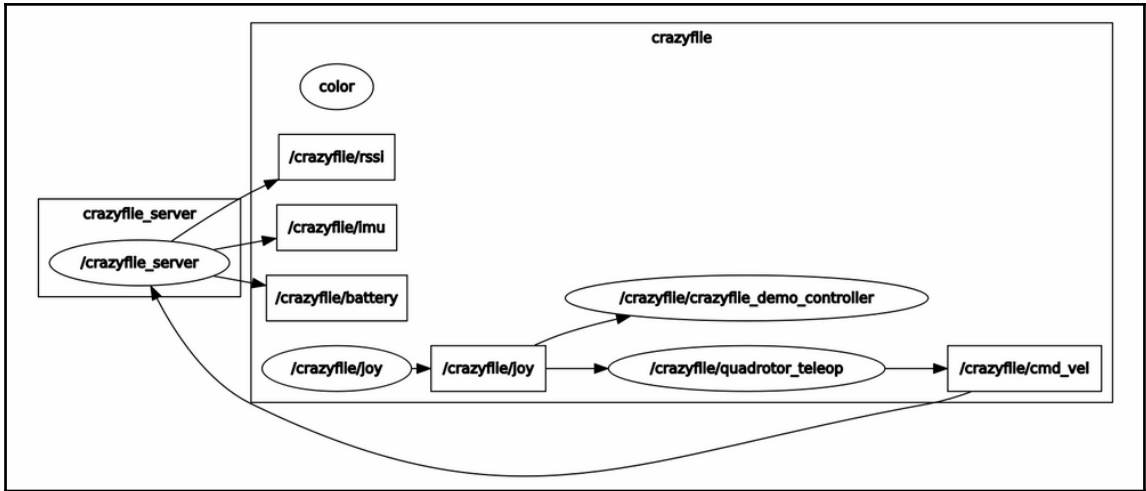




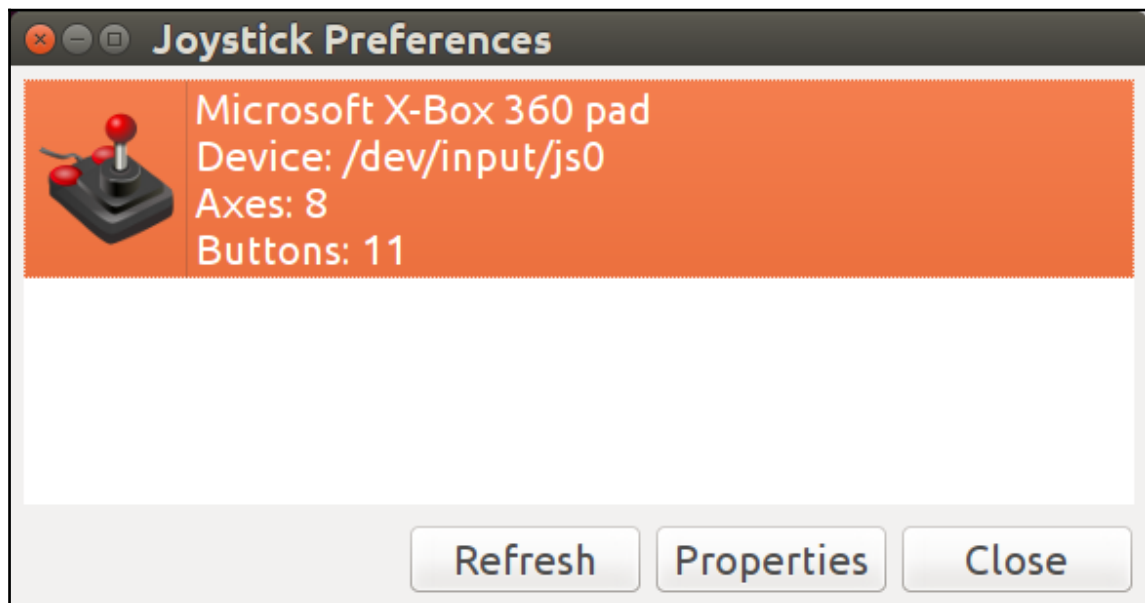
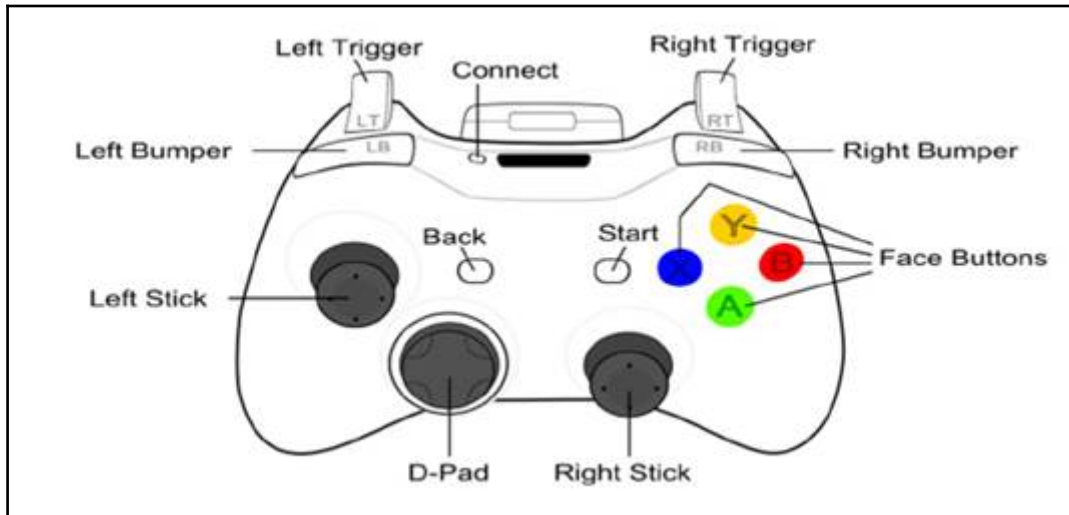


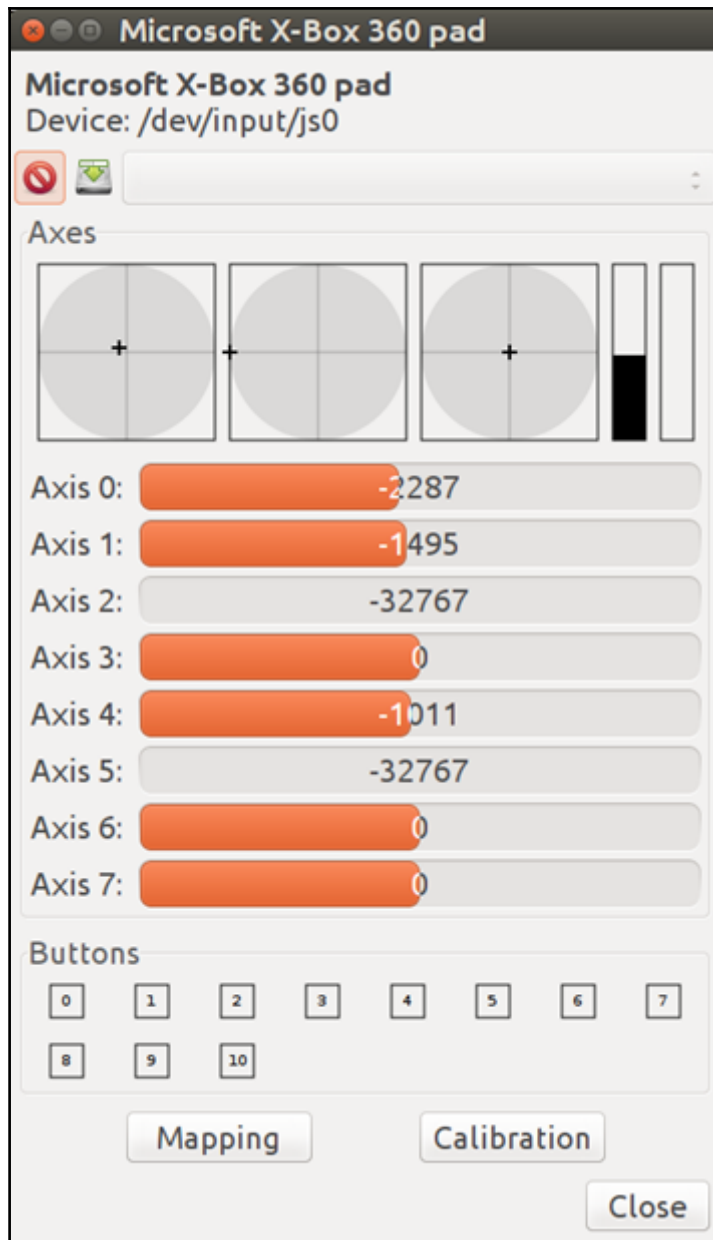


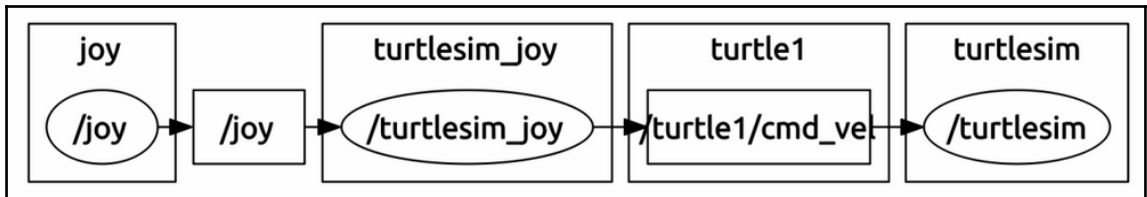
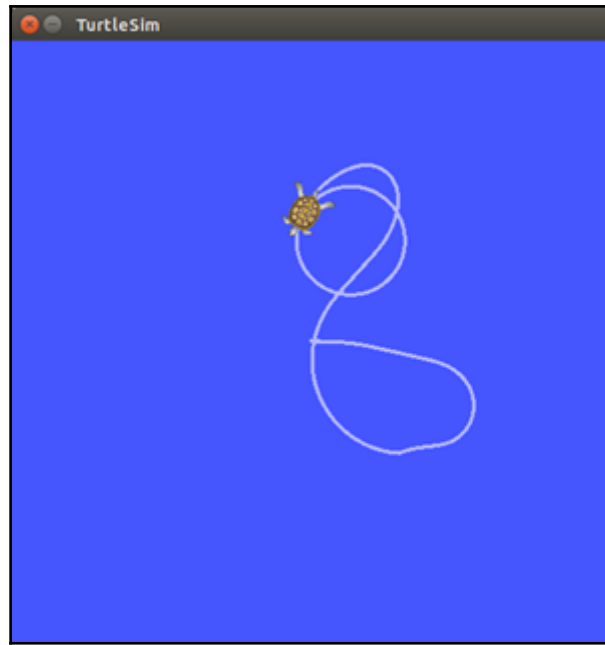


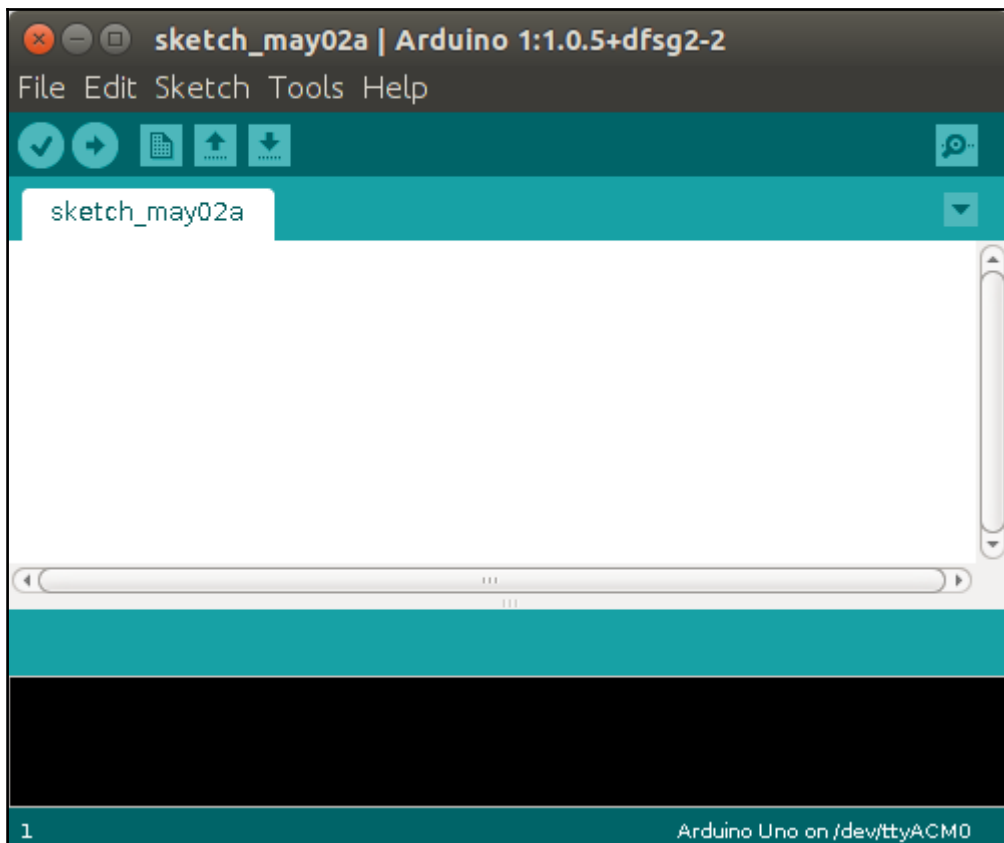
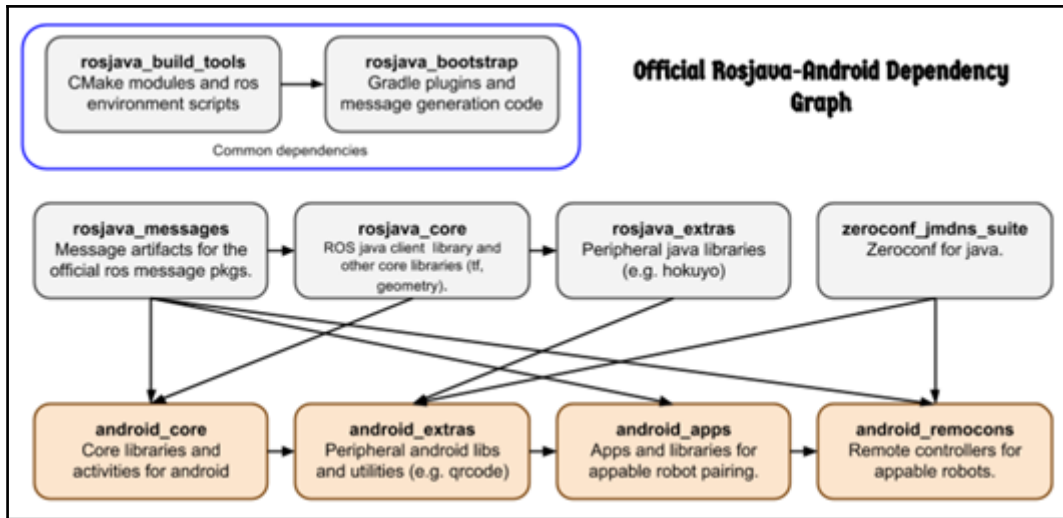


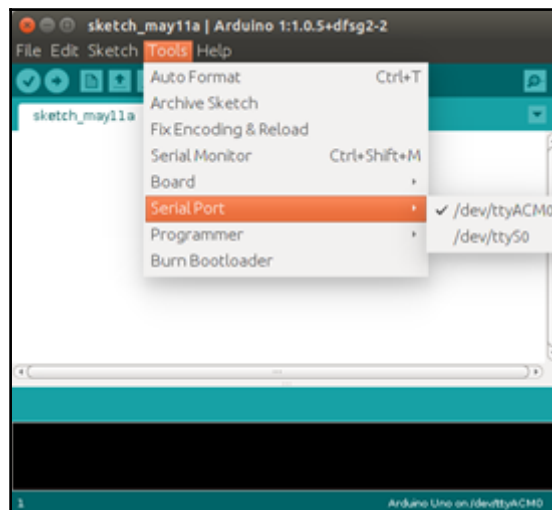
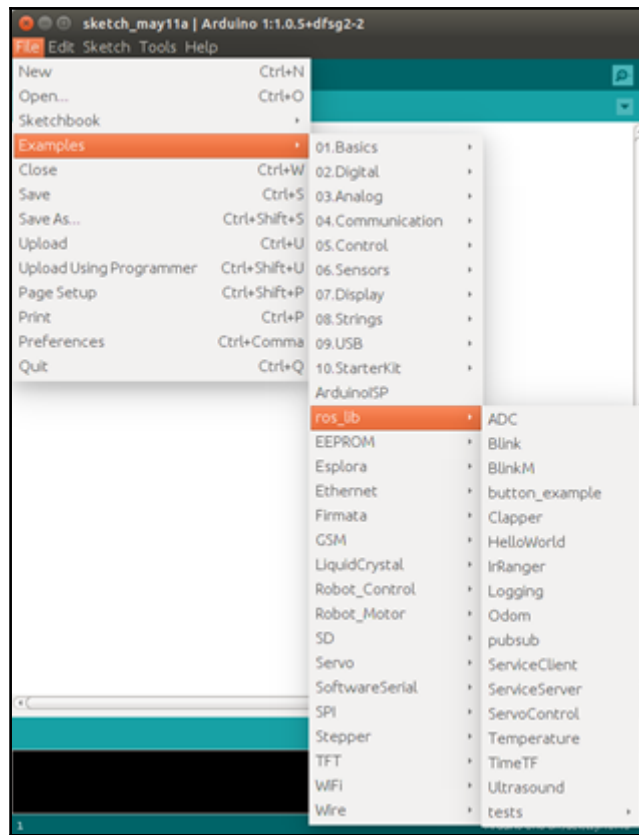
Chapter 8: Controlling Your Robots with External Devices

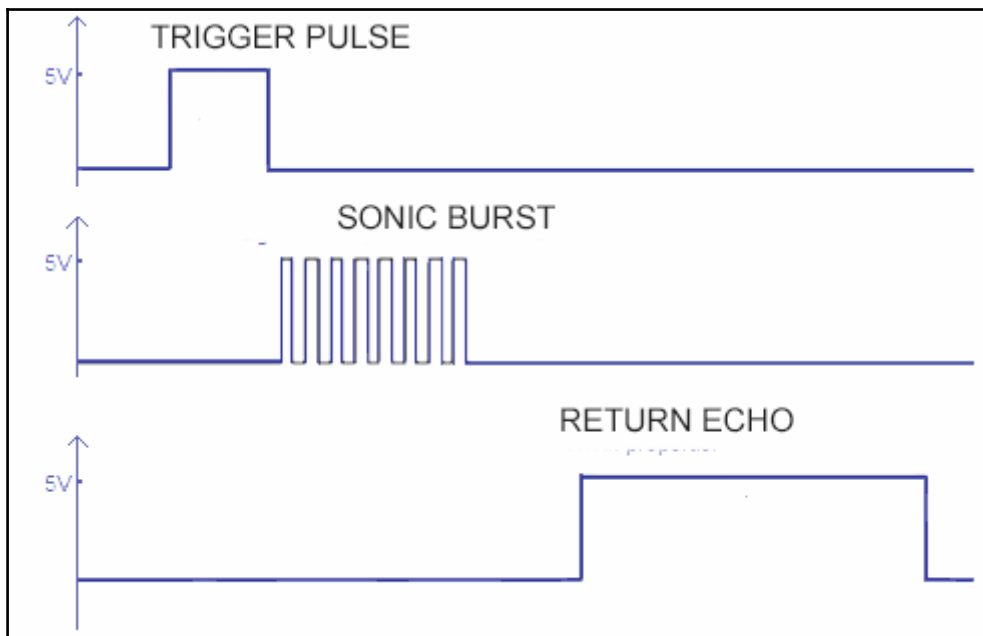













```
ultrasound_sr04 | Arduino 1:1.0.5+dfsg2-2
File Edit Sketch Tools Help

ultrasound_sr04

/*
 * rosserial Ultrasound Example for HC-SR04
 */

#include <ros.h>
#include <ros/time.h>
#include <sensor_msgs/Range.h>

const int echoPin = 5; //Echo pin
const int trigPin = 6; //Trigger pin

const int maxRange = 400.0; //Maximum range in centimeters
const int minRange = 0.0; //Minimum range

unsigned long range_timer; //Used to measure 50 ms interval

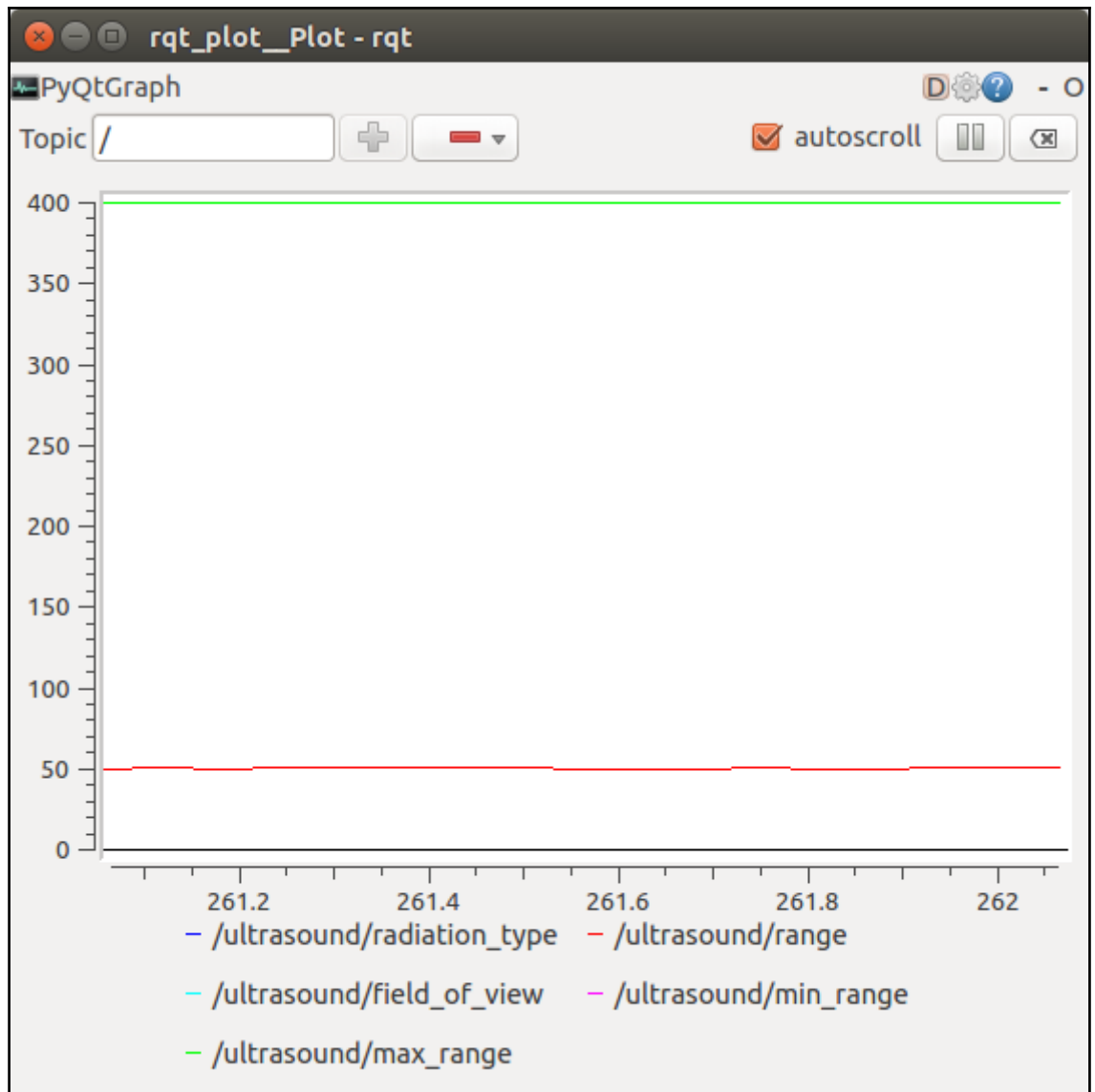
// instantiate node handle and publisher for
// a sensor_msgs/Range message (topic name is /ultrasound)
ros::NodeHandle nh;
sensor_msgs::Range range_msg;
ros::Publisher pub_range( "ultrasound", &range_msg);

/*
 * getRange() - This function reads the time duration of the echo
 *              and converts it to centimeters.
 */
```

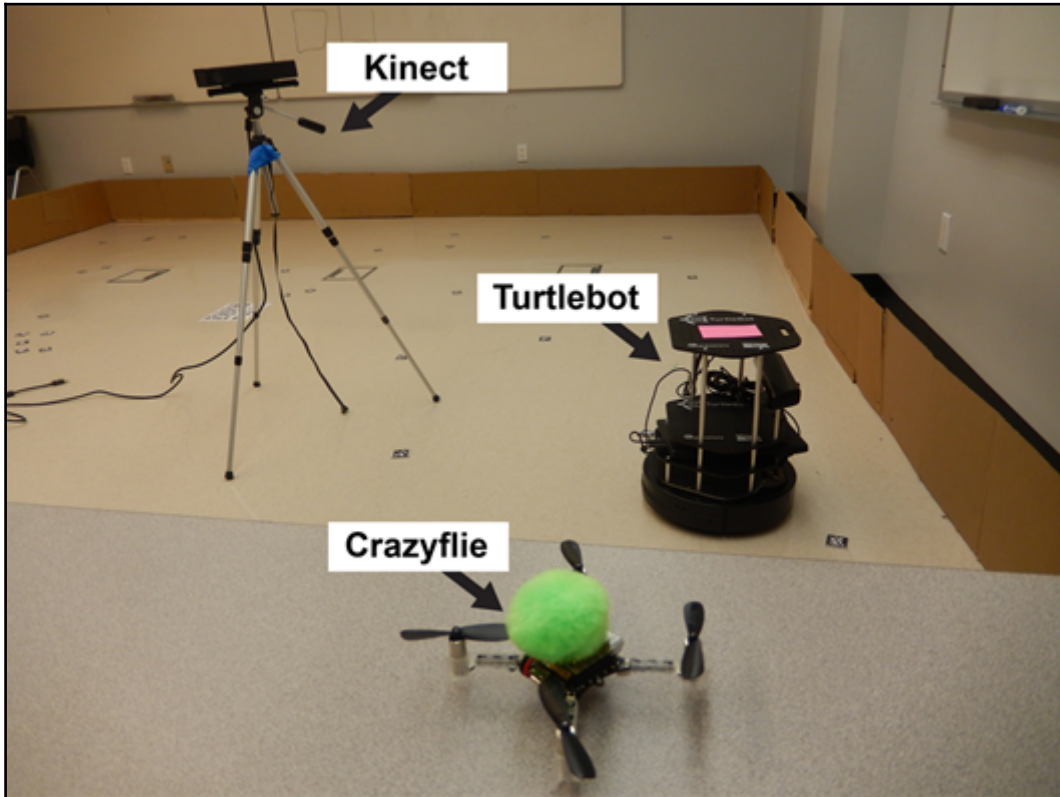
Done Saving.

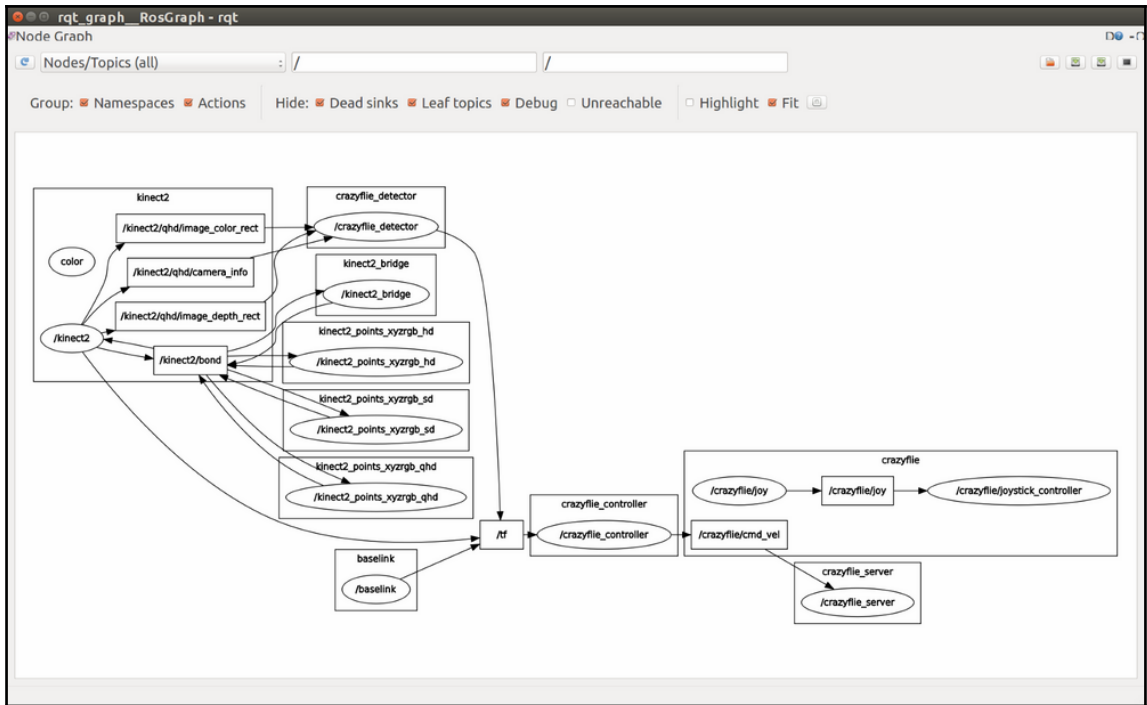
Binary sketch size: 10,874 bytes (of a 32,256 byte maximum)

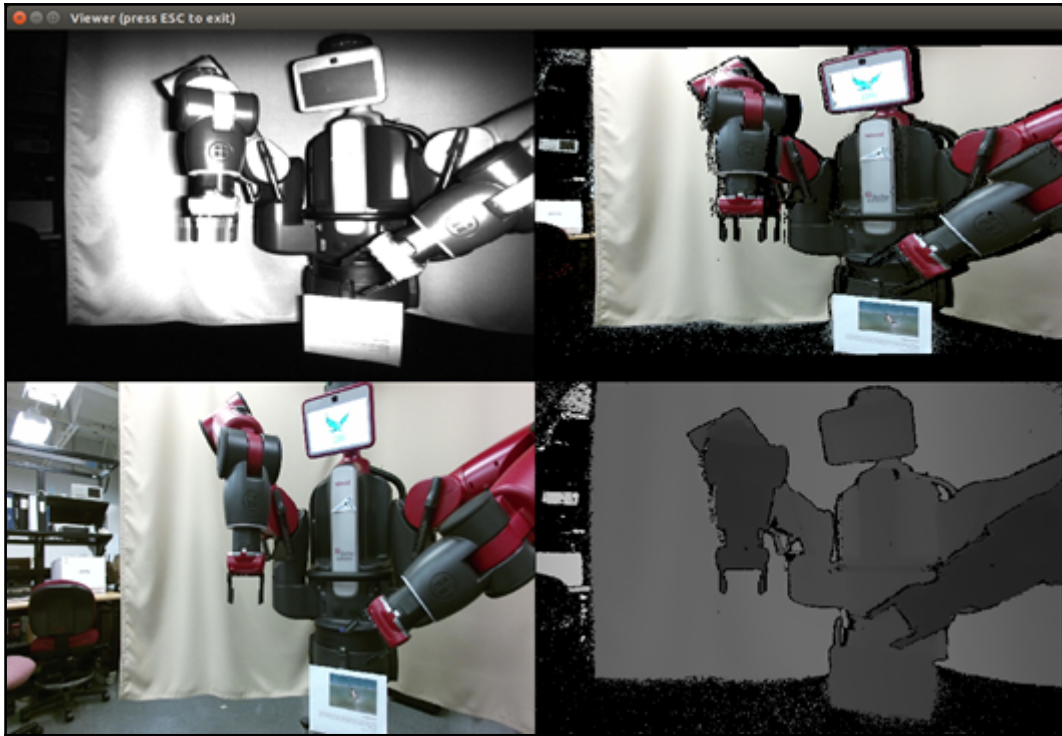
43 Arduino Uno on /dev/ttyACM0

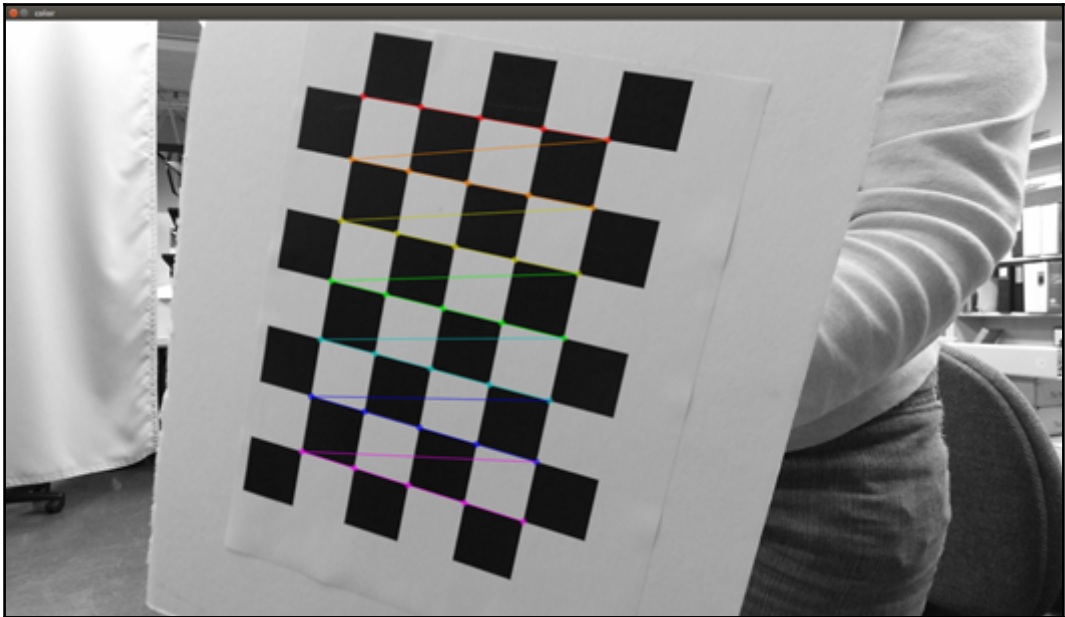
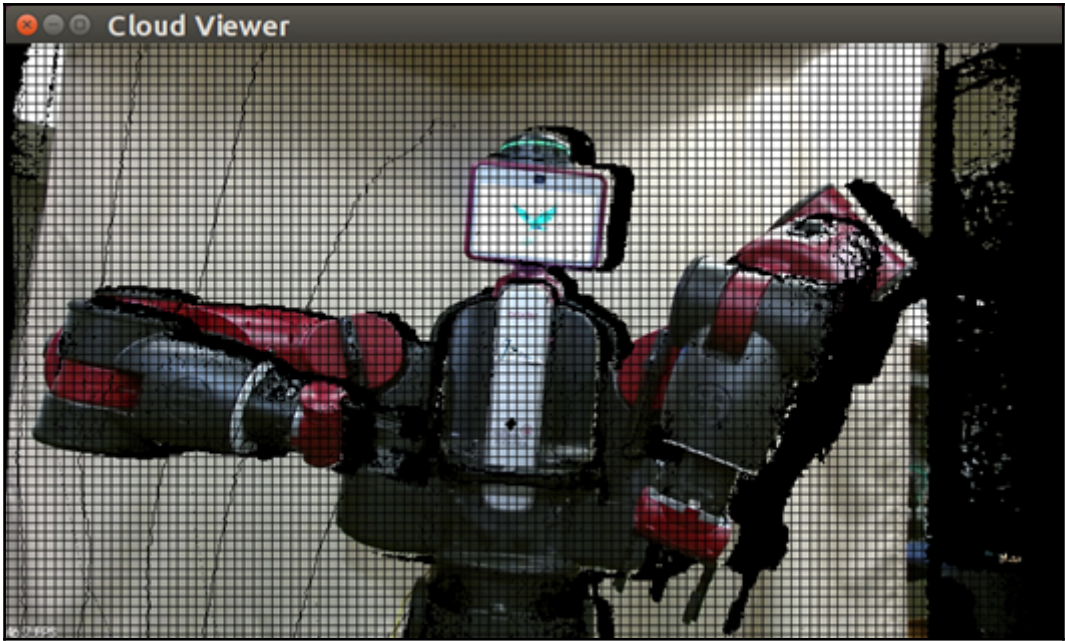


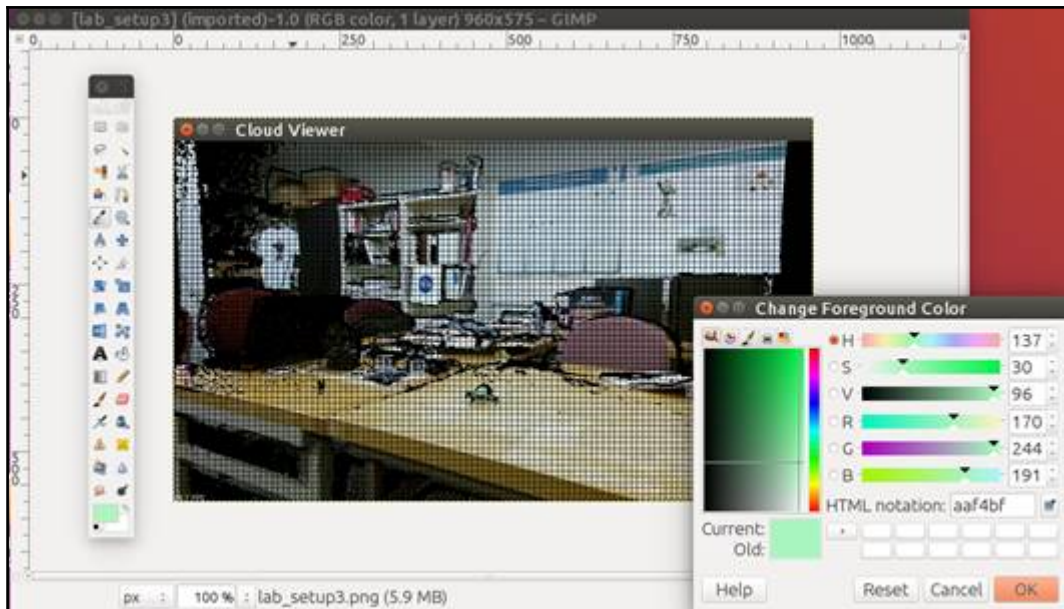
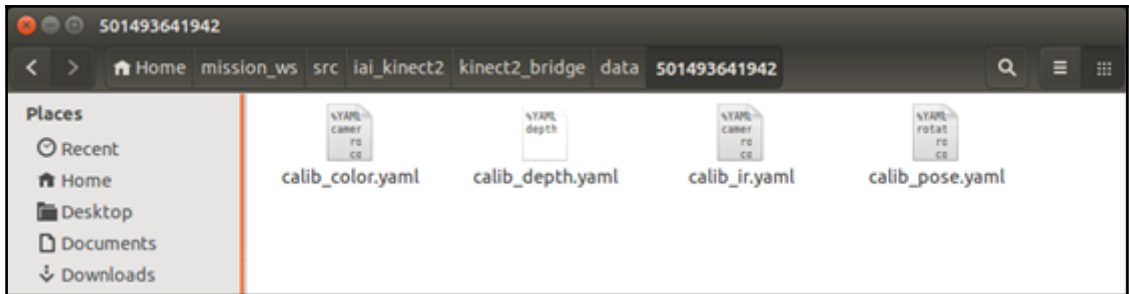
Chapter 9: Flying a Mission with Crazyflie

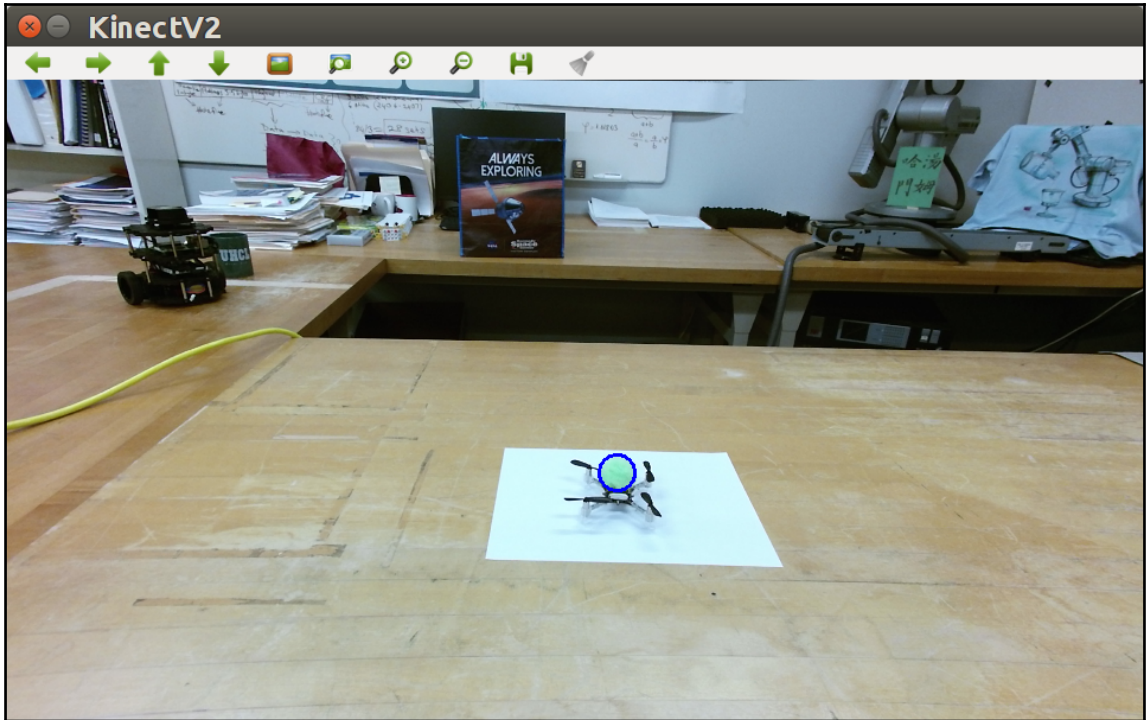
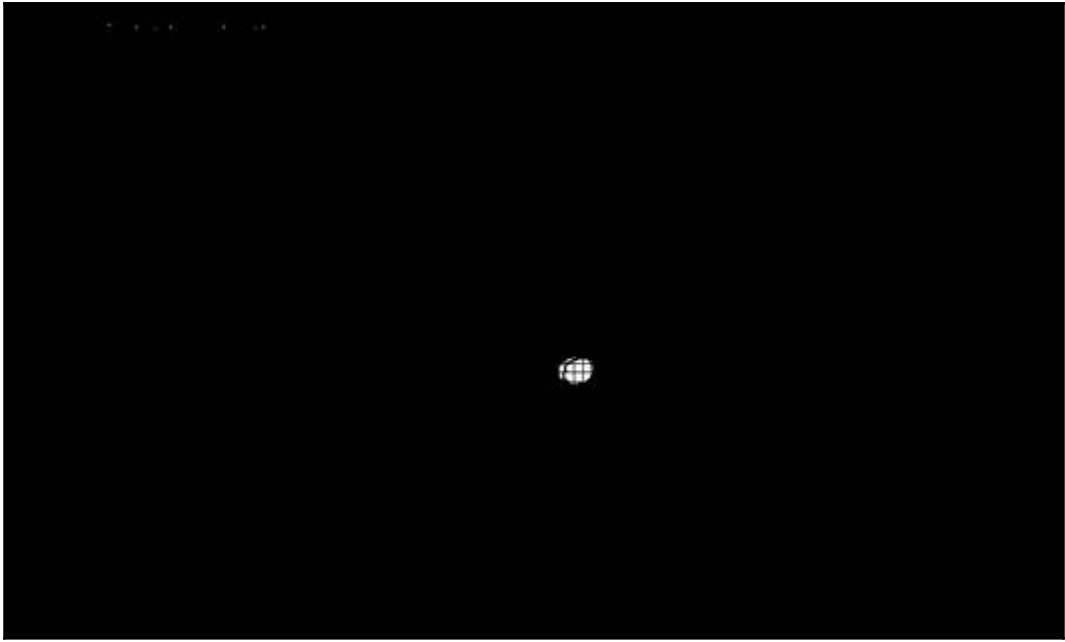


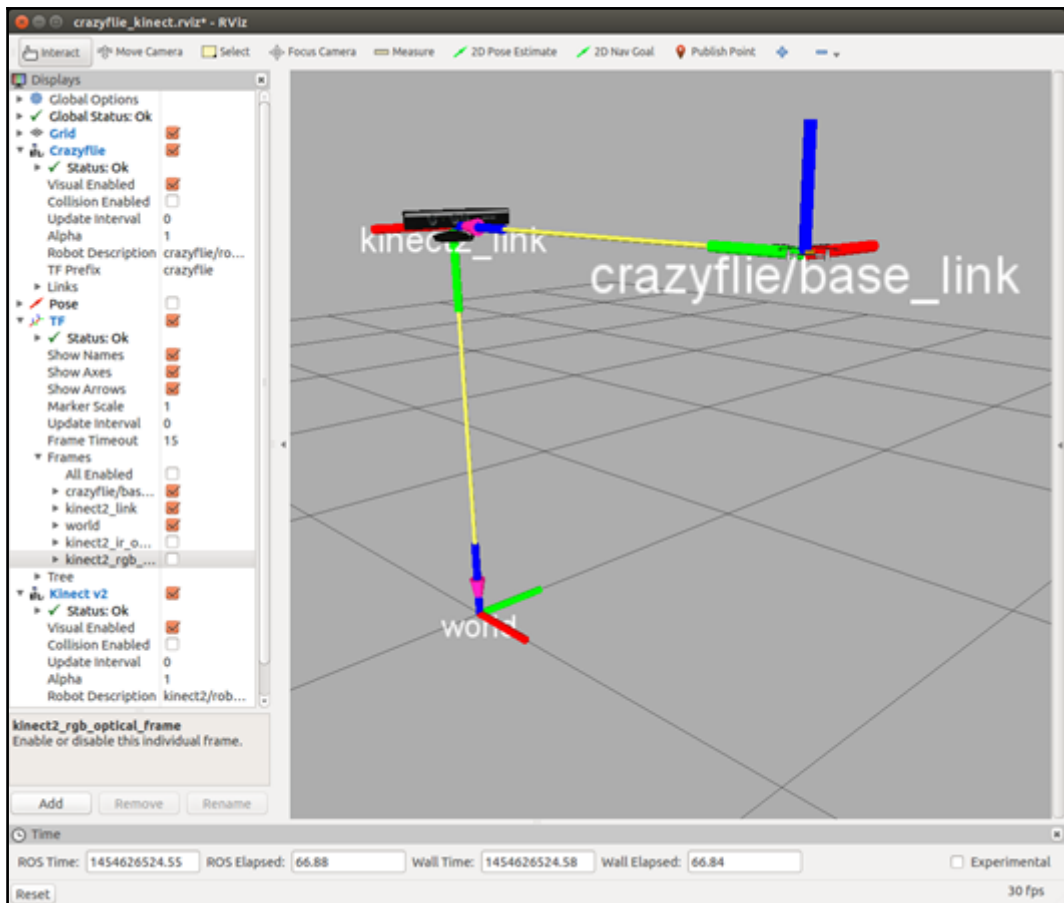


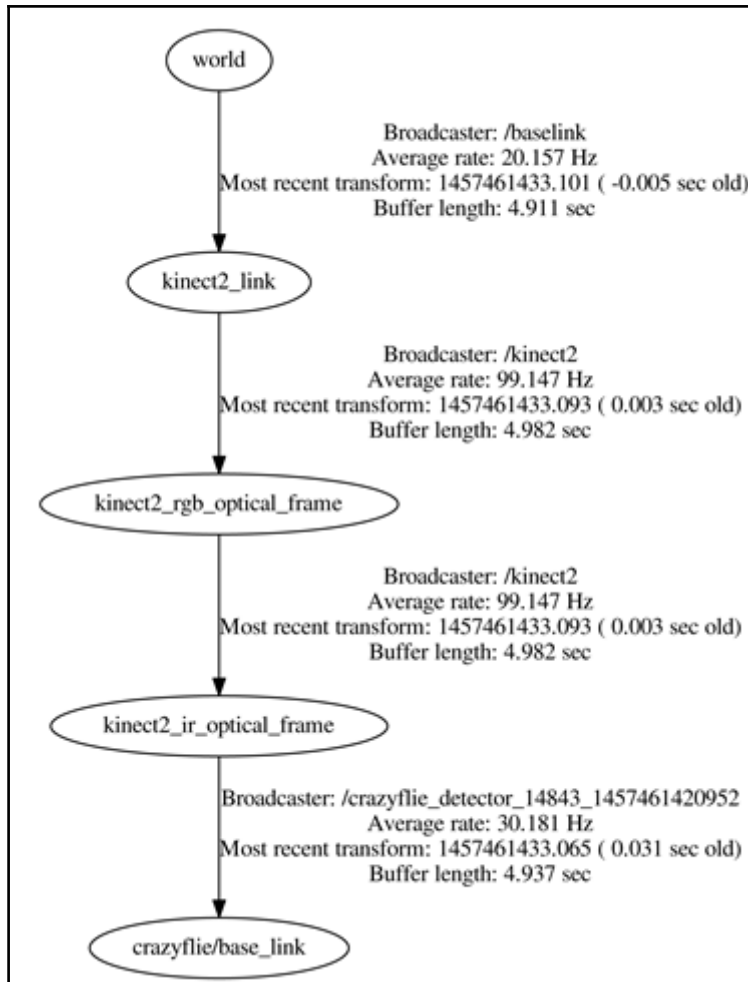








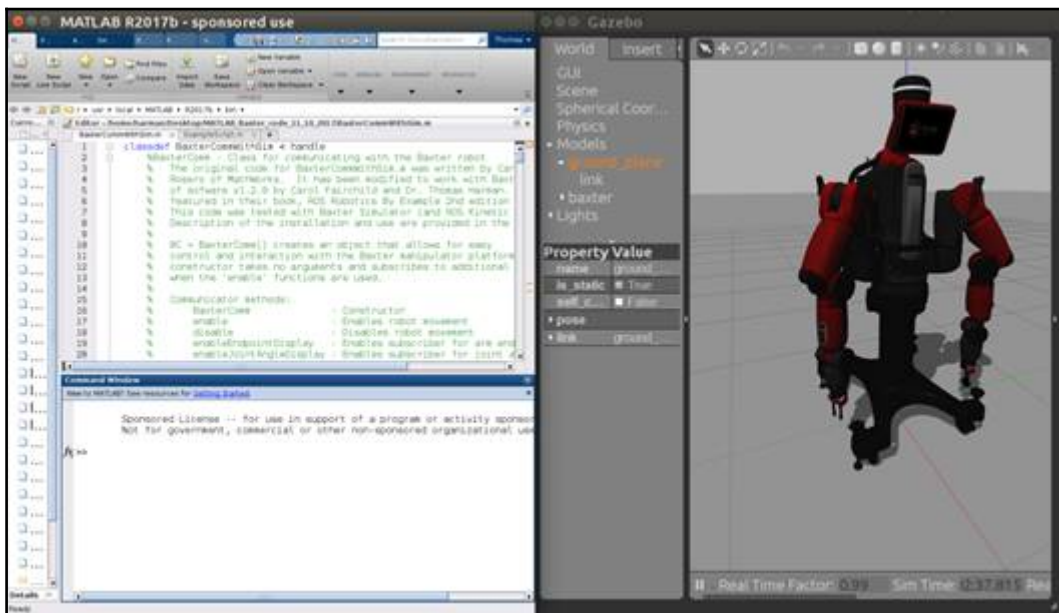


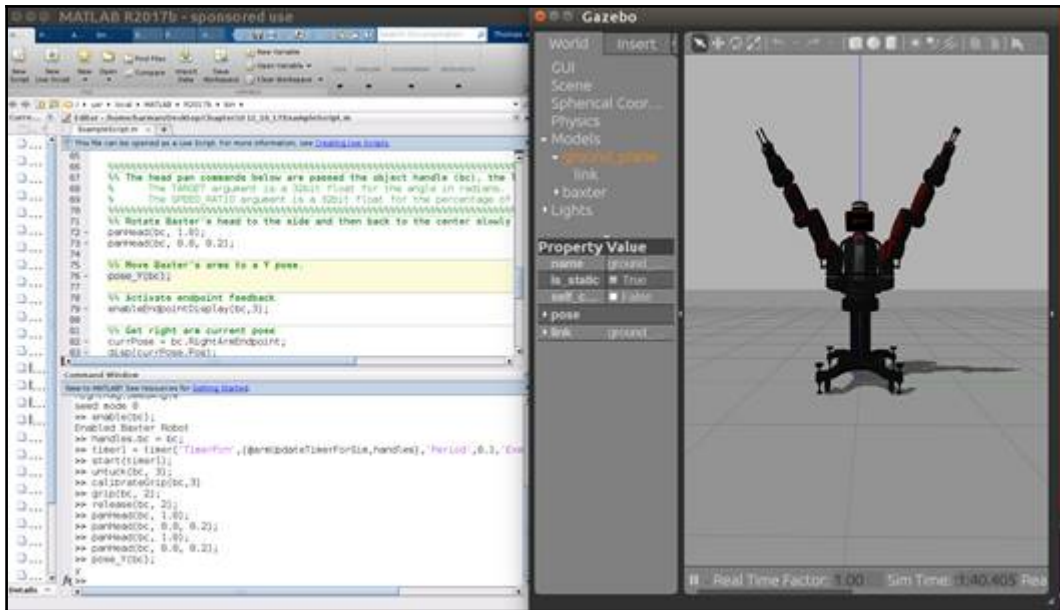




Chapter 10: Controlling Baxter with MATLAB®

```
MATLAB R2017b - sponsored use
HOME   PLOTS   APPS   SHORTCUTS   EDITOR   VIEW
New    Open    Save    Compare    Go To    Comment    Breakpoints
Print  Print  Print  Print  Print  Print  Print
FILE   EDIT   BREAKPOINTS
GazeboRobotAutonomyExample1.m  BaxterCommWithSim.m  ExampleScriptToStart_of.m  javaclasspath.txt
Editor - javaclasspath.txt
1 <before>
2 /opt/baxter_ws/src/baxter_common/matlab_gen/jar/baxter_common-1.2.0.jar
3 /opt/baxter_ws/src/baxter_common/matlab_gen/jar/baxter_core_msgs-1.2.0.jar
4 /opt/baxter_ws/src/baxter_common/matlab_gen/jar/baxter_description-1.2.0.jar
5 /opt/baxter_ws/src/baxter_common/matlab_gen/jar/baxter_maintenance_msgs-1.2.0.jar
6 /opt/baxter_ws/src/baxter_common/matlab_gen/jar/rethink_ee_description-1.2.0.jar
7
```





```
Command Window
New to MATLAB? See resources for Getting Started.
>> enableEndpointDisplay(bc,3);
>> disp(currPose.Pos);
ROS Point message with properties:

    MessageType: 'geometry_msgs/Point'
             X: 0.5901
             Y: -0.7851
             Z: 1.3047

Use showdetails to show the contents of the message

>> disp(currPose.Orientation);
ROS Quaternion message with properties:

    MessageType: 'geometry_msgs/Quaternion'
             X: 0.1078
             Y: 0.2602
             Z: -0.3672
             W: 0.8865

Use showdetails to show the contents of the message

fx >>
```