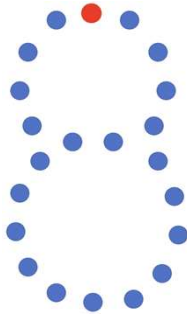


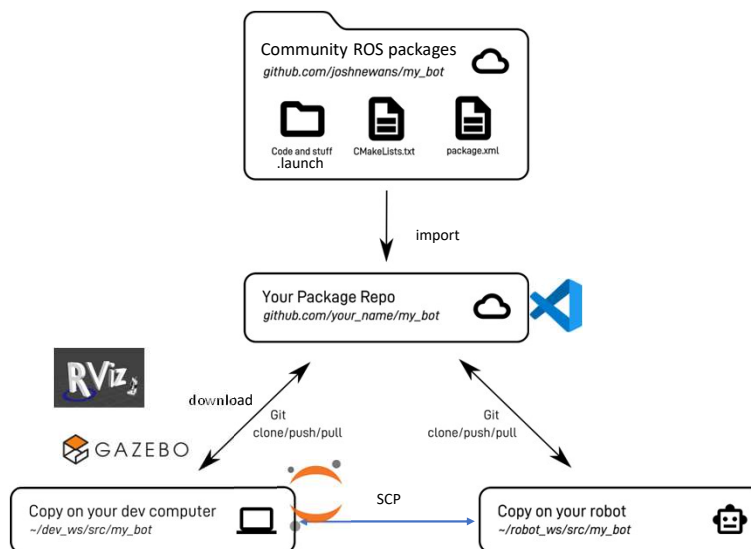


EIGHT

Robot Bringup

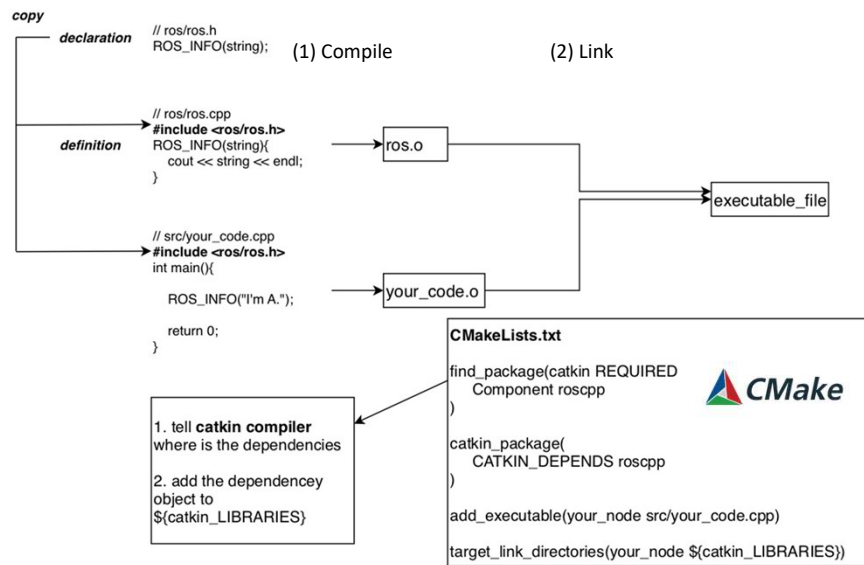


1



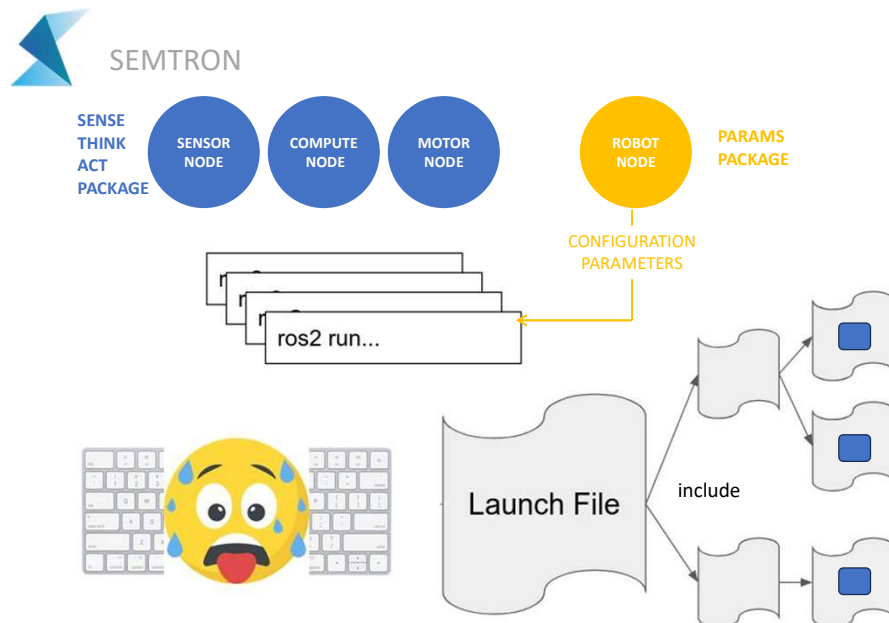
Robot bringup workflow

2



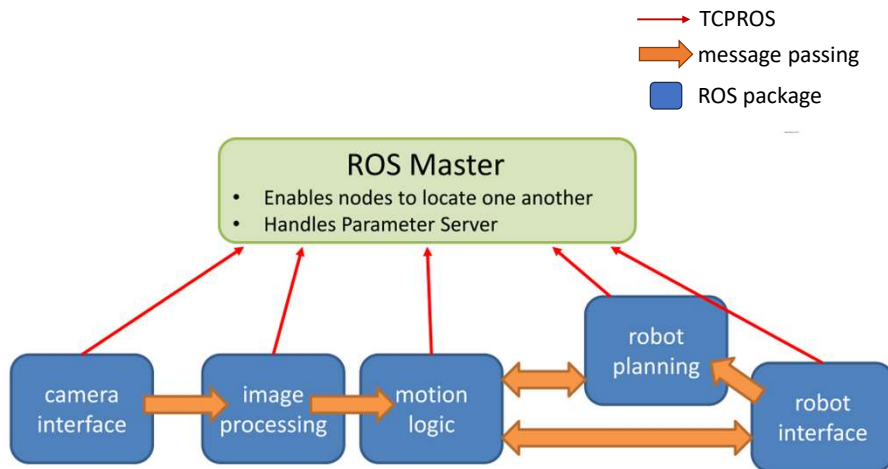
Robot bringup workflow

3



Robot bringup workflow

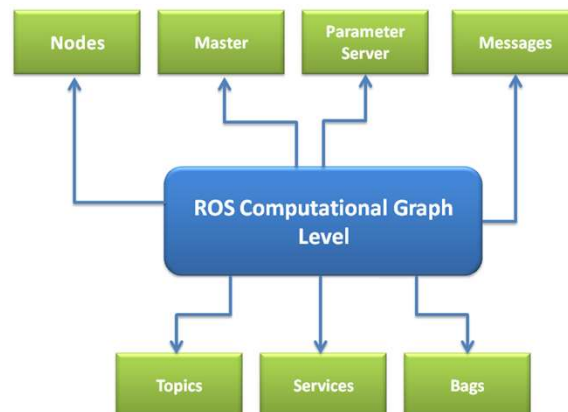
4



Robot bringup workflow

5

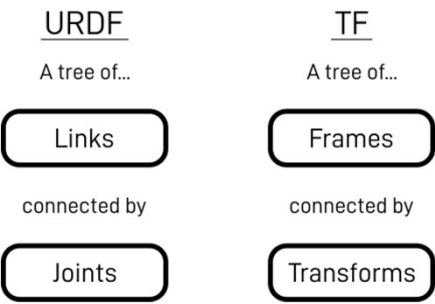
ROS launch creates a network where all ROS processes are connected. ROS Computational Graph shows the peer-to-peer network of the processes that are processing data together.



rqt_graph

6

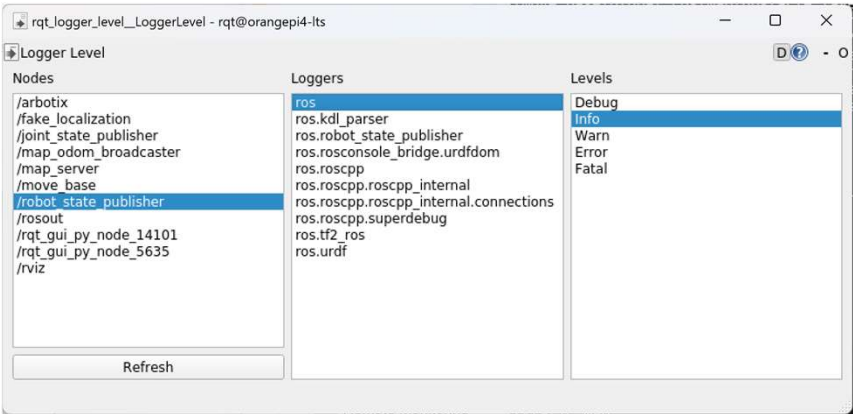
ROS node robot_state_publisher which take in a URDF file and automatically broadcast all the transforms from it to /tf and form the overall coordinate transformations



rqt_tf_tree

7

ROS provides tools for debugging which allows packages to send messages to /rosout and make them available on every node. The tools give access to these debugging messages and provide additional features such as filtering by level and by node.



rqt_logger_level

8

Console

Displaying 15 messages

#	Message	Severity	Node	Stamp	Topics	Location
#15	Going to: p5	Info	/random_n...	18:58:47.9...	/cmd_vel, /...	random_na...
#14	Running time: 1.8 min Distance: 9.2 m	Info	/random_n...	18:58:45.9...	/cmd_vel, /...	random_na...
#13	Success so far: 2/2 = 100%	Info	/random_n...	18:58:45.9...	/cmd_vel, /...	random_na...
#12	State:3	Info	/random_n...	18:58:45.8...	/cmd_vel, /...	random_na...
#11	Goal succeeded!	Info	/random_n...	18:58:45.8...	/cmd_vel, /...	random_na...
#10	Going to: p3	Info	/random_n...	18:58:22.5...	/cmd_vel, /...	random_na...
#9	Running time: 1.4 min Distance: 4.7 m	Info	/random_n...	18:58:20.5...	/cmd_vel, /...	random_na...
#8	Success so far: 1/1 = 100%	Info	/random_n...	18:58:20.5...	/cmd_vel, /...	random_na...
#7	State:3	Info	/random_n...	18:58:20.5...	/cmd_vel, /...	random_na...
#6	Goal succeeded!	Info	/random_n...	18:58:20.5...	/cmd_vel, /...	random_na...
#5	Going to: p6	Info	/random_n...	18:56:56.5...	/cmd_vel, /...	random_na...
#4	Updating current pose.	Info	/random_n...	18:56:56.5...	/cmd_vel, /...	random_na...
#3	Starting navigation test	Info	/random_n...	18:56:56.5...	/cmd_vel, /...	random_na...
#2	Connected to move base server	Info	/random_n...	18:56:56.5...	/cmd_vel, /...	random_na...
#1	Waiting for move_base action server...	Info	/random_n...	18:56:56.2...	/cmd_vel, /...	random_na...

rqt_console

9

File Edit Options

RealSenseCameraNode (18)

control_input_manager (3)

node_container (10)

novatel_gps (18658)

openrover_diagnostics_node (2)

phidgets_spatial (105)

velodyne_convert_node (1)

velodyne_driver_node (6)

velodyne_laserscan_node (2)

xbox_mapper_node (1)

Clear All

Clear Messages

Severity

☒ Debug

☒ Info

☒ Warn

☒ Error

☒ Fatal

☒ Follow Newest Messages

[I 0:00:22:202] Velodyne VLP-16 rotating at 600.000000 RPM

[I 0:00:22:202] publishing 76 packets per scan

[I 0:00:22:202] Cut at specific angle feature activated. Cutting velodyne points always at 6.283185 rad.

[I 0:00:22:202] expected frequency: 9.921 (Hz)

[I 0:00:22:202] Only accepting packets from IP address: 192.168.2.201

[I 0:00:22:202] Opening UDP socket: port 2368

[I 0:00:22:205] Load Library: /opt/swri_rover/dashing/velodyne_pointcloud/lib/libconvert.so

[I 0:00:22:207] Found class: rclcpp_components::NodeFactoryTemplate<velodyne_pointcloud::Convert>

[I 0:00:22:207] Instantiate class: rclcpp_components::NodeFactoryTemplate<velodyne_pointcloud::Convert>

[I 0:00:22:213] correction angles: /opt/swri_rover/dashing/swri_rover/share/swri_rover/params/VLP16db.yaml

[I 0:00:22:220] Load Library: /opt/swri_rover/dashing/phidgets_spatial/lib/libphidgets_spatial.so

[I 0:00:22:224] Found class: rclcpp_components::NodeFactoryTemplate<phidgets::SpatialRos1>

[I 0:00:22:224] Instantiate class: rclcpp_components::NodeFactoryTemplate<phidgets::SpatialRos1>

[I 0:00:22:375] Device Name: Intel RealSense D435

[I 0:00:22:375] Device Serial No: 825312071369

[I 0:00:22:375] Device FW version: 05.09.02.00

[I 0:00:22:375] Device Product ID: 0807

[I 0:00:22:375] Sync Mode: On

[I 0:00:22:375] Device Sensors:

[I 0:00:22:375] Stereo Module was found.

[I 0:00:22:375] RGB Camera was found.

[I 0:00:22:375] Fisheye sensor isn't supported by current device! -- Skipping...

[I 0:00:22:375] Gyro sensor isn't supported by current device! -- Skipping...

[I 0:00:22:375] Accel sensor isn't supported by current device! -- Skipping...

[I 0:00:22:375] setupPublishers...

[I 0:00:22:385] setupStreams...

[I 0:00:22:386] depth stream is enabled - width: 640, height: 480, fps: 30

[I 0:00:22:386] infra2 stream is enabled - width: 640, height: 480, fps: 30

[I 0:00:22:386] color stream is enabled - width: 640, height: 480, fps: 30

[I 0:00:22:463] XBOX CONFIG: wireless & xboxdrv

[I 0:00:24:266] Latched ring count of 16

[I 0:00:24:266] PointCloud2 fields in unexpected order. Using slower generic method.

[I 0:00:24:270] Load Library: /opt/swri_rover/dashing/novatel_gps_driver/lib/libnovatel_gps_driver_nodes.so

[I 0:00:24:399] RealSense Node Is Up!

Include

Exclude GPRMC:GPGLGA

Search

Next

Previous

swri_console

10

There are four potential places a log message may end up depending on the verbosity level

Output	Log Level				
	Debug	Info	Warn	Error	Fatal
stdout		X			
stderr			X	X	X
log file	X	X	X	X	X
/rosout	o	X	X	X	X

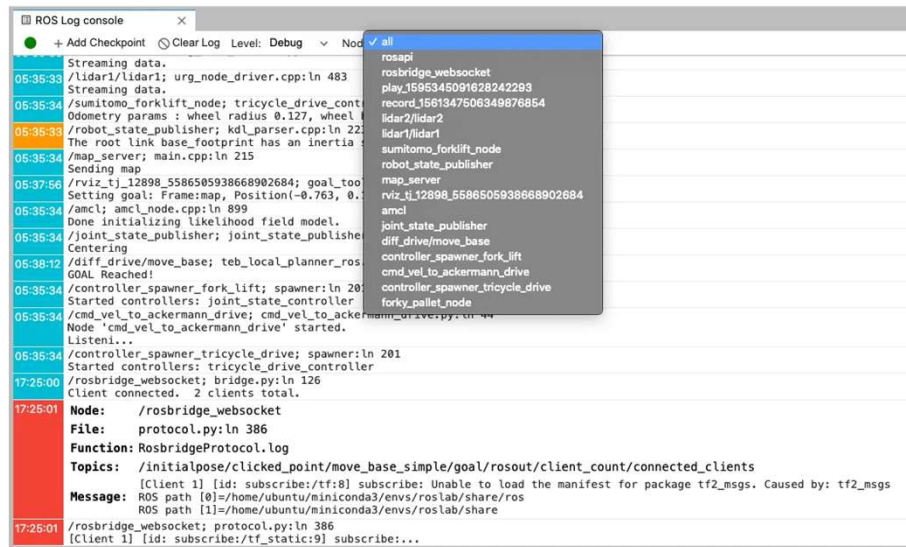
loginfo will be sent to screen if the value of the [roslaunch/XML/node](#) output parameter 'screen' is set. The default is 'log', the stdout/stderr output will be sent to a log file in \$ROS_HOME/log, and stderr will continue to be sent to the screen.

ROS logging

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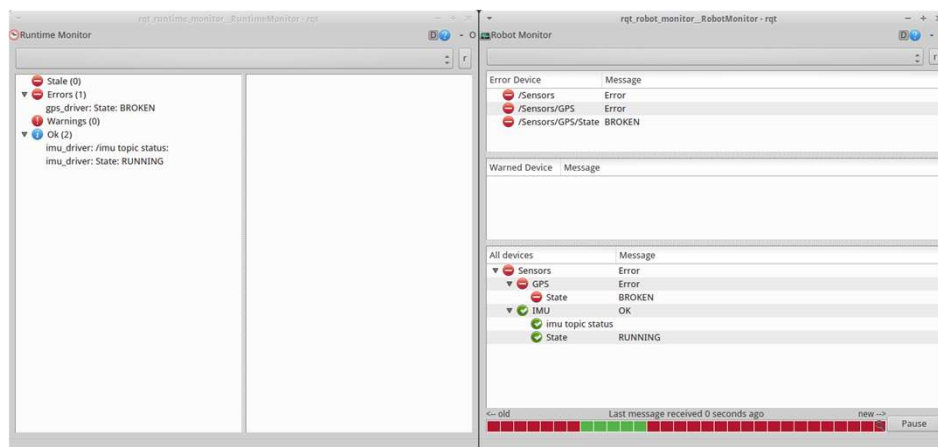
```
status: connected logs: 85830 ros time: 1607701305.31 system time: 1607701305.31
1275452574.2556 [INFO] Subscribing to /clock
1275452574.2556 [INFO] Subscribing to /wide_stereo/right/camera_info
0.0000 [INFO] Opening 2010-06-01-21-22-53.bag
1275452592.0657 [INFO] Loading display config from [/u/eoleynikova/.rviz/display_c
0.0000 [INFO] Opening 2010-06-01-21-22-53.bag
1275452592.0657 [INFO] Loading display config from [/u/eoleynikova/.rviz/display_c
1607656317.8831 [INFO] Subscribing to /rosout
1607656317.8861 [INFO] Subscribing to /rosout_agg
1607656317.8883 [INFO] Recording to '2020-12-10-21-11-57.bag'.
1607656317.8883 [INFO] Recording to '2020-12-10-21-11-57.bag'.
1275452574.2455 [INFO] Subscribing to /rosout
1275452574.2455 [INFO] Subscribing to /wide_stereo/left/image_rect
1275452574.2455 [INFO] Subscribing to /initialpose
1275452574.2455 [INFO] Subscribing to /rosout_agg
1275452574.2455 [INFO] Subscribing to /goal
1275452574.2556 [INFO] Subscribing to /narrow_stereo/right/camera_info
1275452574.2556 [INFO] Subscribing to /narrow_stereo/right/image_rect
1275452574.2556 [INFO] Subscribing to /wide_stereo/right/image_rect
1275452574.2556 [INFO] Subscribing to /clock
1275452574.2556 [INFO] Subscribing to /wide_stereo/right/camera_info
0.0000 [INFO] Opening 2010-06-01-21-22-53.bag
1275452592.0657 [INFO] Loading display config from [/u/eoleynikova/.rviz/display_c
debug info warn error fatal all nodes CTRL+h: view help
```

12



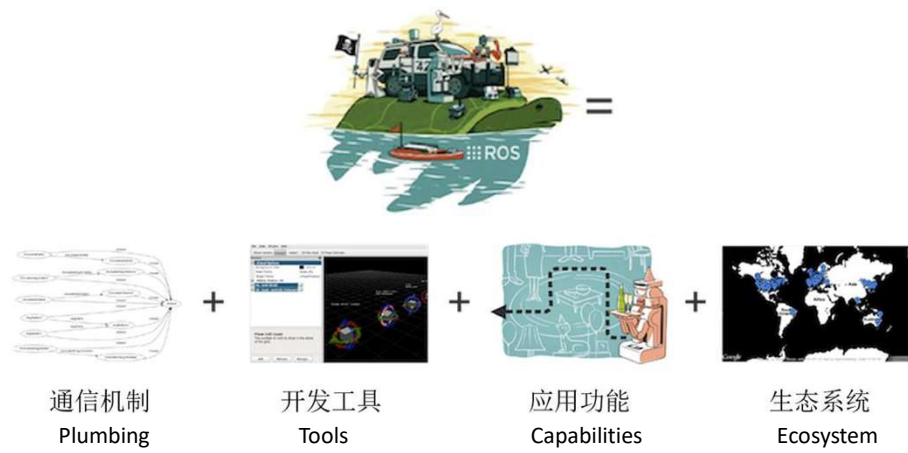
13

The diagnostics stack contains tools for collecting, publishing, analyzing and viewing diagnostics data from hardware drivers and robot hardware.



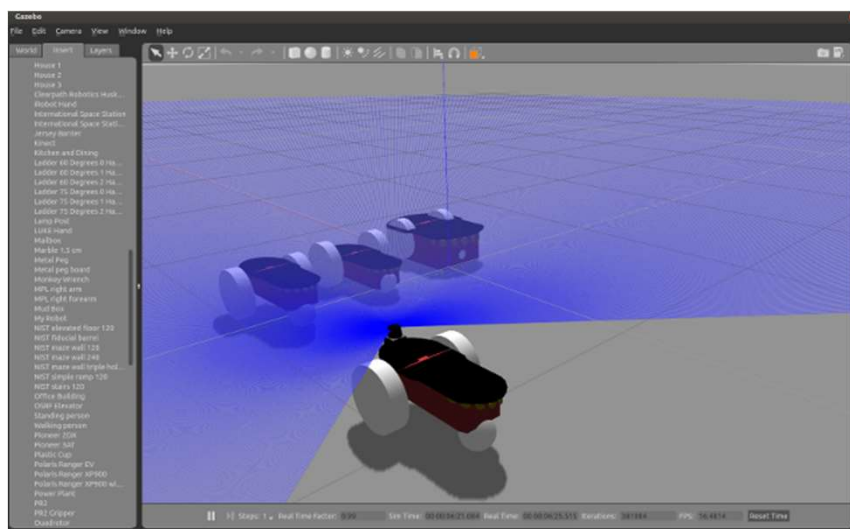
ROS diagnostic monitors

14



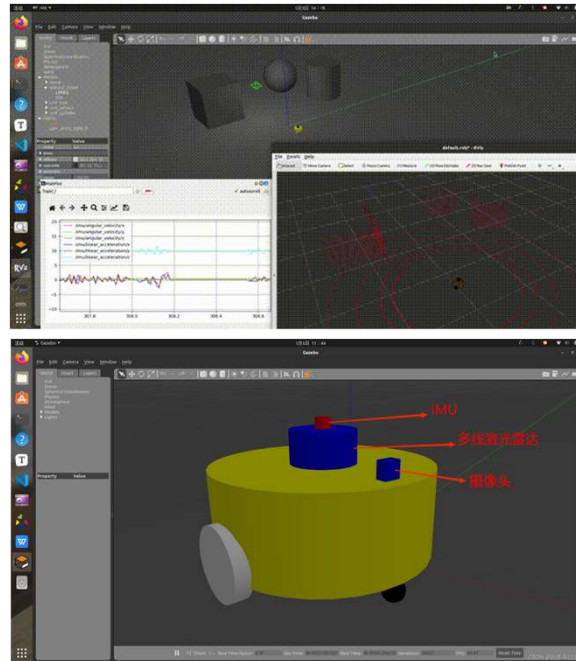
ROS community

15



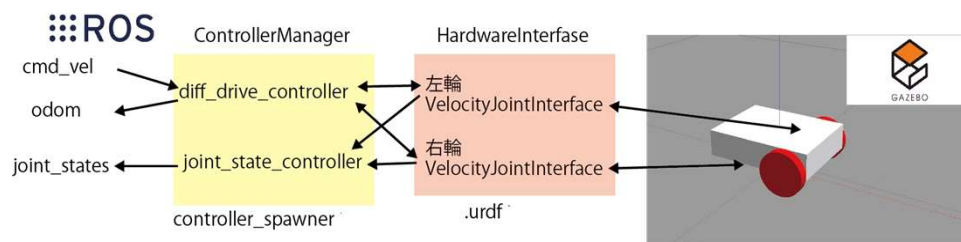
Simulation bringup - LiDAR

16



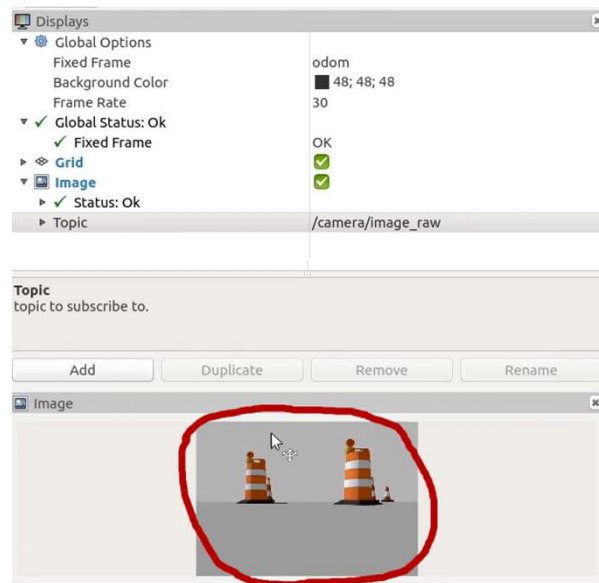
Simulation bringup - IMU

17



Simulation bringup – wheel odometry

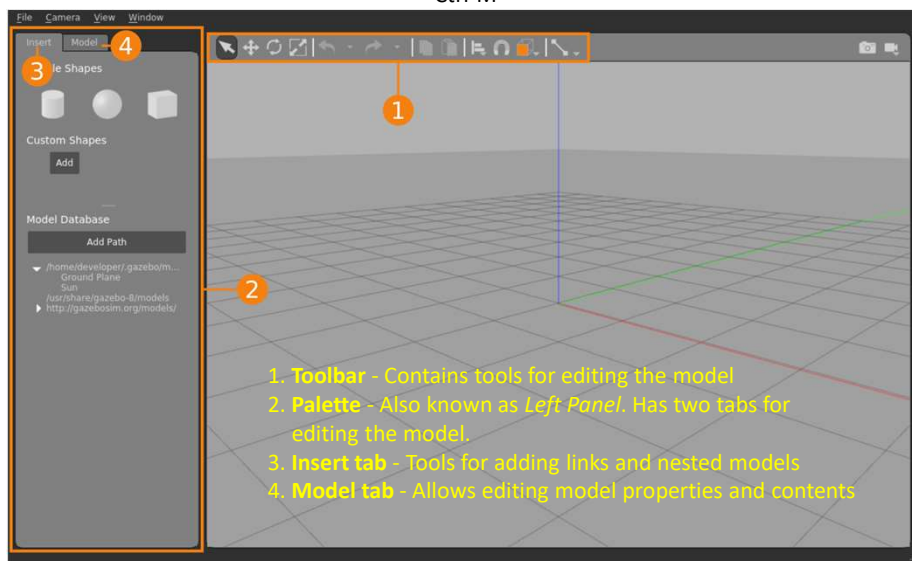
18



Simulation bringup - camera

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Ctrl-M

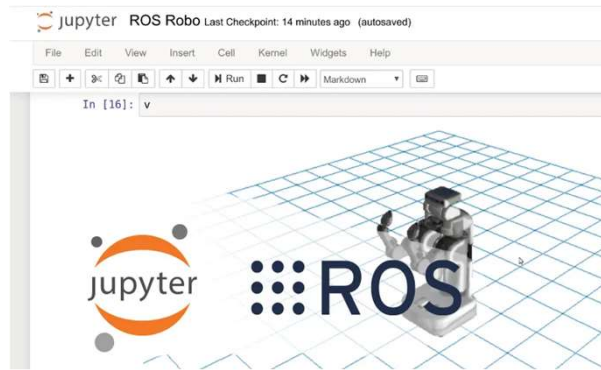


Gazebo editor

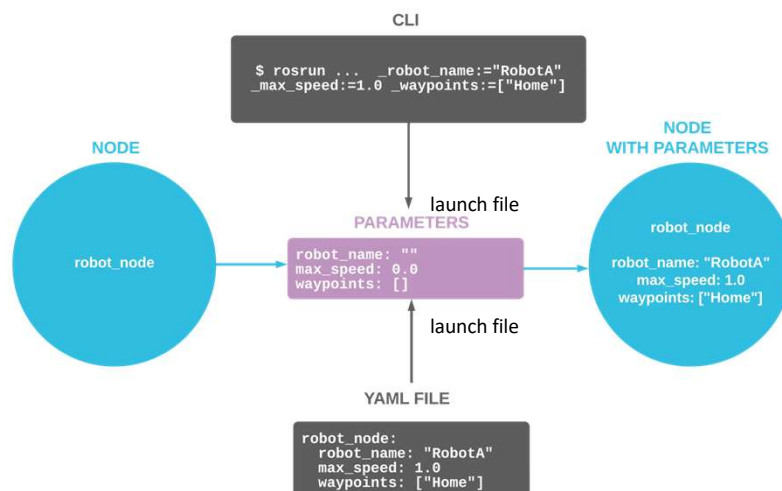
20



rospy API with Notebook



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roslaunch parameters

22

Accessing and setting Parameters

Via command line

- 1) To list all the parameters : `rosparam list`
- 2) To assign a value to an already existing parameter or to set a new one :
`rosparam set <parameter_name> <parameter_value>`
- 3) To get/read a parameter value : `rosparam get <parameter_name>`

Via launch files

Parameters can be set, created and loaded into the parameter server while creating launch files.

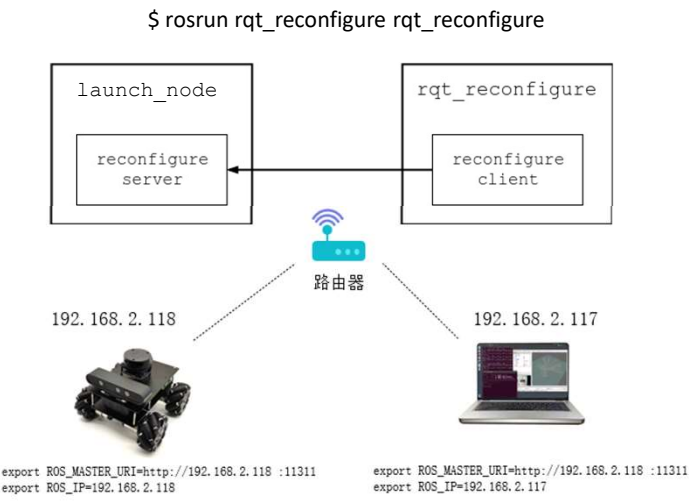
Via the rospy API library

This is generally used when the parameters are to be used by a node during the runtime.

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rqt_reconfigure