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START THE SIMULATOR WITH TURTLEBOT MODEL (Text Pages 60-74, 81):

roslaunch turtlebot_gazebo turtlebot_world.launch

```
harman@D104-45931:~$ roslaunch turtlebot_gazebo turtlebot_world.launch
... logging to /home/harman/.ros/log/e65d3aa8-93f8-11eb-8748-9cb6d00f6f89/roslaunch-D104-
45931-5264.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.
```

xacro: Traditional processing is deprecated. Switch to --inorder processing!
To check for compatibility of your document, use option --check-order.

For more infos, see http://wiki.ros.org/xacro#Processing_Order
xacro.py is deprecated; please use xacro instead
started roslaunch server <http://D104-45931:34403/>

SUMMARY

=====

PARAMETERS

- * /bumper2pointcloud/pointcloud_radius: 0.24
- * /cmd_vel_mux/yaml_cfg_file: /opt/ros/kinetic/...
- * /depthimage_to_laserscan/output_frame_id: /camera_depth_frame
- * /depthimage_to_laserscan/range_min: 0.45
- * /depthimage_to_laserscan/scan_height: 10
- * /robot_description: <?xml version="1....
- * /robot_state_publisher/publish_frequency: 30.0
- * /roscdistro: kinetic
- * /rosversion: 1.12.16
- * /use_sim_time: True

NODES

/

- bumper2pointcloud (nodelet/nodelet)
- cmd_vel_mux (nodelet/nodelet)
- depthimage_to_laserscan (nodelet/nodelet)
- gazebo (gazebo_ros/gzserver)
- gazebo_gui (gazebo_ros/gzclient)
- laserscan_nodelet_manager (nodelet/nodelet)
- mobile_base_nodelet_manager (nodelet/nodelet)
- robot_state_publisher (robot_state_publisher/robot_state_publisher)
- spawn_turtlebot_model (gazebo_ros/spawn_model)

auto-starting new master

process[master]: started with pid [5279]

ROS_MASTER_URI=http://localhost:11311 This is a ROS 1 Master

setting /run_id to e65d3aa8-93f8-11eb-8748-9cb6d00f6f89

process[rosout-1]: started with pid [5292]

started core service [/rosout]

process[gazebo-2]: started with pid [5295]

process[gazebo_gui-3]: started with pid [5297]

process[spawn_turtlebot_model-4]: started with pid [5305]

process[mobile_base_nodelet_manager-5]: started with pid [5306]

process[cmd_vel_mux-6]: started with pid [5307]

process[bumper2pointcloud-7]: started with pid [5308]

process[robot_state_publisher-8]: started with pid [5311]

process[laserscan_nodelet_manager-9]: started with pid [5316]

process[depthimage_to_laserscan-10]: started with pid [5317]

[INFO] [1617398296.320570801]: Finished loading Gazebo ROS API Plugin.

```

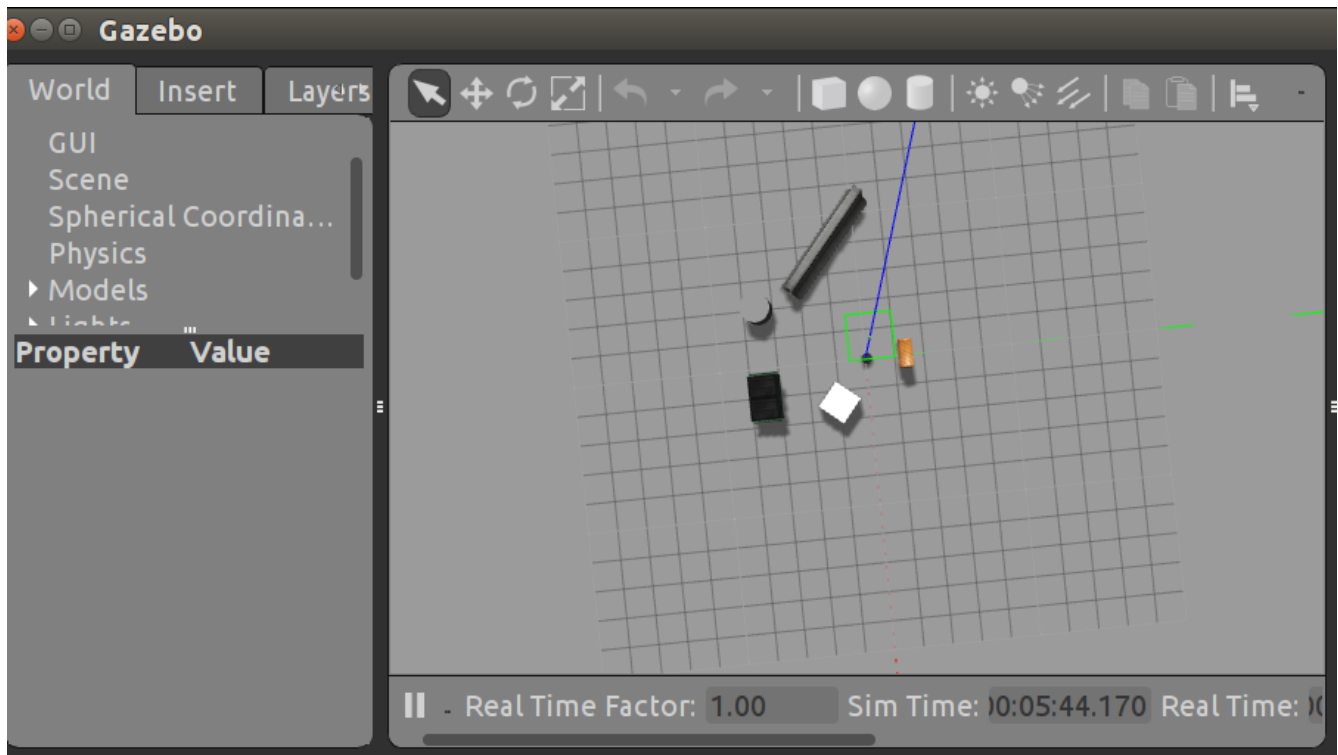
[ INFO] [1617398296.321289798]: waitForService: Service [/gazebo/set_physics_properties] has not
been advertised, waiting...
[ INFO] [1617398296.325231887]: Finished loading Gazebo ROS API Plugin.
[ INFO] [1617398296.325532184]: waitForService: Service [/gazebo/set_physics_properties] has not
been advertised, waiting...
[ INFO] [1617398297.660944163]: waitForService: Service [/gazebo/set_physics_properties] is now
available.
[ INFO] [1617398297.668130445]: waitForService: Service [/gazebo/set_physics_properties] is now
available.
[ INFO] [1617398297.944188348]: Physics dynamic reconfigure ready.
[ INFO] [1617398297.948292405]: Physics dynamic reconfigure ready.
[ INFO] [1617398299.245449560, 0.010000000]: Camera Plugin: Using the 'robotNamespace' param:
 '/'
[ INFO] [1617398299.249319725, 0.010000000]: Camera Plugin (ns = /) <tf_prefix_>, set to ""
[ INFO] [1617398299.412207121, 0.010000000]: Starting plugin Kobuki(ns = //)
[ WARN] [1617398299.412276140, 0.010000000]: Kobuki(ns = //): missing <rosDebugLevel> default
is na
[ INFO] [1617398299.506388027, 0.010000000]: Kobuki(ns = //): <tf_prefix> =
[ INFO] [1617398299.506614631, 0.010000000]: Will publish tf. [mobile_base]
[ INFO] [1617398299.509173854, 0.010000000]: Kobuki(ns = //): Advertise joint_states[joint_states]!
[ INFO] [1617398299.510479740, 0.010000000]: Kobuki(ns = //): Advertise Odometry[odom]!
[ INFO] [1617398299.515786227, 0.010000000]: Kobuki(ns = //): Try to subscribe to
mobile_base/commands/motor_power!
[ INFO] [1617398299.520219821, 0.010000000]: Kobuki(ns = //): Try to subscribe to
mobile_base/commands/reset_odometry!
[ INFO] [1617398299.524422242, 0.010000000]: Kobuki(ns = //): Try to subscribe to
mobile_base/commands/velocity!
[ INFO] [1617398299.525171108, 0.010000000]: Kobuki(ns = //): Advertise
Cliff[mobile_base/events/cliff]!
[ INFO] [1617398299.525876648, 0.010000000]: Kobuki(ns = //): Advertise
Bumper[mobile_base/events/bumper]!
[ INFO] [1617398299.527647198, 0.010000000]: Kobuki(ns = //): Advertise
IMU[mobile_base/sensors/imu_data]!
[ INFO] [1617398299.527708639, 0.010000000]: GazeboRosKobuki plugin ready to go!
[mobile_base]
[spawn_turtlebot_model-4] process has finished cleanly
log file: /home/harman/.ros/log/e65d3aa8-93f8-11eb-8748-9cb6d00f6f89/spawn_turtlebot_model-
4*.log

```

GAZEBO TUTORIAL

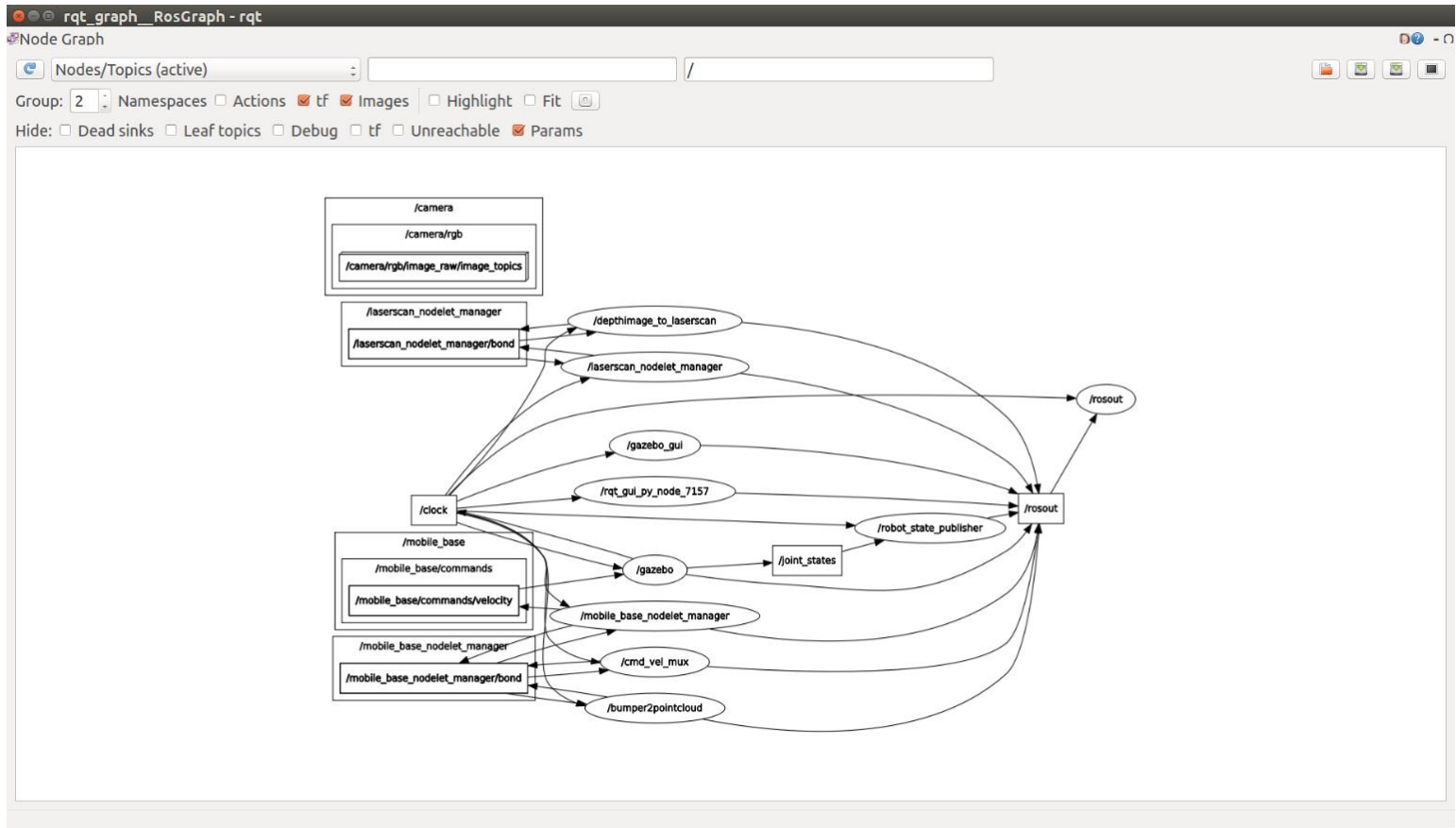
This is an introduction to the Gazebo Graphical User Interface, or GUI. We will learn interface basics like what the buttons do and how to navigate in the scene.

http://gazebosim.org/tutorials?tut=guided_b2&cat=



\$ rqt_graph

RQT_GRAPH VIEW – Nodes and Topics (Text Page 105-107)



WHAT ARE THE PARAMETERS?

\$ rosparam list

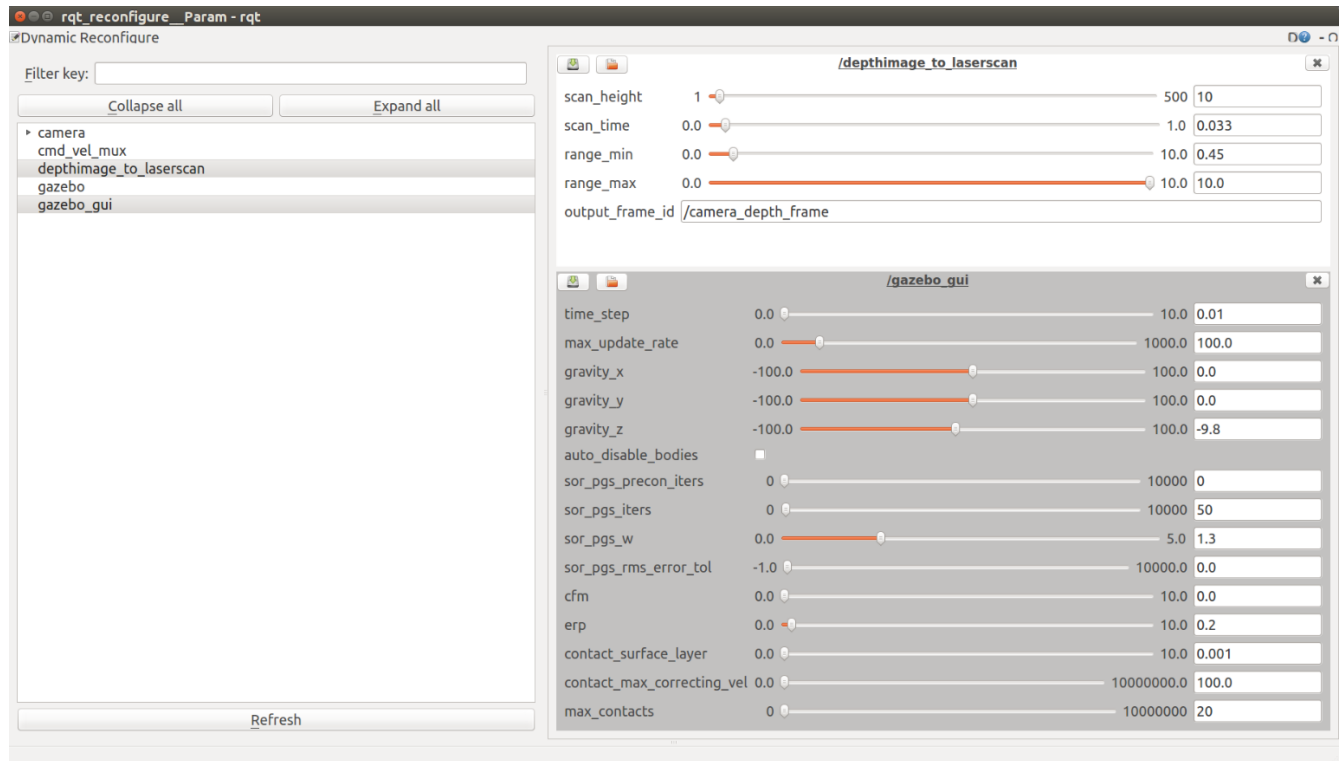
/bumper2pointcloud/pointcloud_radius
/camera/imager_rate
/camera/rgb/image_raw/compressed/format
/camera/rgb/image_raw/compressed/jpeg_quality
/camera/rgb/image_raw/compressed/png_level
/camera/rgb/image_raw/compressedDepth/depth_max
/camera/rgb/image_raw/compressedDepth/depth_quantization
/camera/rgb/image_raw/compressedDepth/png_level
/camera/rgb/image_raw/theora/keyframe_frequency
/camera/rgb/image_raw/theora/optimize_for

/camera/rgb/image_raw/theora/quality
/camera/rgb/image_raw/theora/target_bitrate
/cmd_vel_mux/yaml_cfg_data
/cmd_vel_mux/yaml_cfg_file
/depthimage_to_laserscan/output_frame_id
/depthimage_to_laserscan/range_max
/depthimage_to_laserscan/range_min
/depthimage_to_laserscan/scan_height
/depthimage_to_laserscan/scan_time
/gazebo/auto_disable_bodies
/gazebo/cfm
/gazebo/contact_max_correcting_vel
/gazebo/contact_surface_layer
/gazebo/erp
/gazebo/gravity_x
/gazebo/gravity_y
/gazebo/gravity_z
/gazebo/max_contacts
/gazebo/max_update_rate
/gazebo/sor_pgs_iters
/gazebo/sor_pgs_precon_iters
/gazebo/sor_pgs_rms_error_tol
/gazebo/sor_pgs_w
/gazebo/time_step
/gazebo_gui/auto_disable_bodies
/gazebo_gui/cfm
/gazebo_gui/contact_max_correcting_vel
/gazebo_gui/contact_surface_layer
/gazebo_gui/erp
/gazebo_gui/gravity_x

```
/gazebo_gui/gravity_y  
/gazebo_gui/gravity_z  
/gazebo_gui/max_contacts  
/gazebo_gui/max_update_rate  
/gazebo_gui/sor_pgs_iters  
/gazebo_gui/sor_pgs_precon_iters  
/gazebo_gui/sor_pgs_rms_error_tol  
/gazebo_gui/sor_pgs_w  
/gazebo_gui/time_step  
/robot_description  
/robot_state_publisher/publish_frequency  
/roscistro  
/roslaunch/uris/host_d104_45931__34403  
/rosversion  
/run_id  
/use_sim_time  
harman@D104-45931:~$
```

CHANGE PARAMETERS ON THE FLY

\$ rosrun rqt_reconfigure rqt_reconfigure



WHERE ARE THE PACKAGES?

\$ locate turtlebot_world.launch

/opt/ros/kinetic/share/turtlebot_gazebo/launch/turtlebot_world.launch

\$ cd /opt/ros/kinetic/share/turtlebot_gazebo/launch/

harman@D104-45931:/opt/ros/kinetic/share/turtlebot_gazebo/launch\$ ls -la
total 24

```
drwxr-xr-x 3 root root 4096 Sep 30 2020 .  
drwxr-xr-x 7 root root 4096 Sep 30 2020 ..  
-rw-r--r-- 1 root root 953 Sep 18 2017 amcl_demo.launch  
-rw-r--r-- 1 root root 321 Sep 18 2017 gmapping_demo.launch  
drwxr-xr-x 2 root root 4096 Sep 30 2020 includes  
-rw-r--r-- 1 root root 1747 Sep 18 2017 turtlebot_world.launch
```


Launch File

```
harman@D104-45931:/opt/ros/kinetic/share/turtlebot_gazebo/launch$ gedit turtlebot_world.launch
<launch>
  <arg name="world_file" default="$(env TURTLEBOT_GAZEBO_WORLD_FILE)"/>

  <arg name="base" value="$(optenv TURTLEBOT_BASE kobuki)"/> <!-- create, roomba -->
  <arg name="battery" value="$(optenv TURTLEBOT_BATTERY /proc/acpi/battery/BAT0)"/> <!--
/proc/acpi/battery/BAT0 -->
  <arg name="gui" default="true"/>
  <arg name="stacks" value="$(optenv TURTLEBOT_STACKS hexagons)"/> <!-- circles, hexagons -->
  <arg name="3d_sensor" value="$(optenv TURTLEBOT_3D_SENSOR kinect)"/> <!-- kinect, asus_xtion_pro -->

  <include file="$(find gazebo_ros)/launch/empty_world.launch">
    <arg name="use_sim_time" value="true"/>
    <arg name="debug" value="false"/>
    <arg name="gui" value="$(arg gui)" />
    <arg name="world_name" value="$(arg world_file)"/>
  </include>

  <include file="$(find turtlebot_gazebo)/launch/includes/$(arg base).launch.xml">
    <arg name="base" value="$(arg base)"/>
    <arg name="stacks" value="$(arg stacks)"/>
    <arg name="3d_sensor" value="$(arg 3d_sensor)"/>
  </include>

  <node pkg="robot_state_publisher" type="robot_state_publisher" name="robot_state_publisher">
    <param name="publish_frequency" type="double" value="30.0" />
  </node>

  <!-- Fake laser -->
  <node pkg="nodelet" type="nodelet" name="laserscan_nodelet_manager" args="manager"/>
  <node pkg="nodelet" type="nodelet" name="depthimage_to_laserscan"
    args="load depthimage_to_laserscan/DepthImageToLaserScanNodelet laserscan_nodelet_manager">
    <param name="scan_height" value="10"/>
    <param name="output_frame_id" value="/camera_depth_frame"/>
    <param name="range_min" value="0.45"/>
    <remap from="image" to="/camera/depth/image_raw"/>
    <remap from="scan" to="/scan"/>
  </node>
</launch>
```

**WE CAN ASK QUESTIONS ABOUT THE MODULES THAT ARE ACTIVE
(ROS commands Text Page 32):**

ROSNODE LIST

```
harman@D104-45931:~$ rosnodet list
/bumper2pointcloud
/cmd_vel_mux
/depthimage_to_laserscan
/gazebo
/gazebo_gui
/laserscan_nodelet_manager
```

```
/mobile_base_nodelet_manager
/robot_state_publisher
/rosout
```

GAZEBO ROSNODE INFO

```
harman@D104-45931:~$ rosnode info gazebo
```

```
-----
Node [/gazebo]
```

Publications:

```
* /camera/depth/camera_info [sensor_msgs/CameraInfo]
* /camera/depth/image_raw [sensor_msgs/Image]
* /camera/depth/points [sensor_msgs/PointCloud2]
* /camera/parameter_descriptions [dynamic_reconfigure/ConfigDescription]
* /camera/parameter_updates [dynamic_reconfigure/Config]
* /camera/rgb/camera_info [sensor_msgs/CameraInfo]
* /camera/rgb/image_raw [sensor_msgs/Image]
* /camera/rgb/image_raw/compressed [sensor_msgs/CompressedImage]
* /camera/rgb/image_raw/compressed/parameter_descriptions
[dynamic_reconfigure/ConfigDescription]
* /camera/rgb/image_raw/compressed/parameter_updates [dynamic_reconfigure/Config]
* /camera/rgb/image_raw/compressedDepth [sensor_msgs/CompressedImage]
* /camera/rgb/image_raw/compressedDepth/parameter_descriptions
[dynamic_reconfigure/ConfigDescription]
* /camera/rgb/image_raw/compressedDepth/parameter_updates [dynamic_reconfigure/Config]
* /camera/rgb/image_raw/theora [theora_image_transport/Packet]
* /camera/rgb/image_raw/theora/parameter_descriptions [dynamic_reconfigure/ConfigDescription]
* /camera/rgb/image_raw/theora/parameter_updates [dynamic_reconfigure/Config]
* /clock [roscpp_msgs/Clock]
* /gazebo/link_states [gazebo_msgs/LinkStates]
* /gazebo/model_states [gazebo_msgs/ModelStates]
* /gazebo/parameter_descriptions [dynamic_reconfigure/ConfigDescription]
* /gazebo/parameter_updates [dynamic_reconfigure/Config]
* /joint_states [sensor_msgs/JointState]
* /mobile_base/events/bumper [kobuki_msgs/BumperEvent]
* /mobile_base/events/cliff [kobuki_msgs/CliffEvent]
* /mobile_base/sensors/imu_data [sensor_msgs/Imu]
* /odom [nav_msgs/Odometry]
* /rosout [roscpp_msgs/Log]
* /tf [tf2_msgs/TFMessage]
```

Subscriptions:

```
* /clock [roscpp_msgs/Clock]
* /gazebo/set_link_state [unknown type]
* /gazebo/set_model_state [unknown type]
* /mobile_base/commands/motor_power [unknown type]
* /mobile_base/commands/reset_odometry [unknown type]
* /mobile_base/commands/velocity [geometry_msgs/Twist]
```

Services:

- * /camera/rgb/image_raw/compressed/set_parameters
- * /camera/rgb/image_raw/compressedDepth/set_parameters
- * /camera/rgb/image_raw/theora/set_parameters
- * /camera/set_camera_info
- * /camera/set_parameters
- * /gazebo/apply_body_wrench
- * /gazebo/apply_joint_effort
- * /gazebo/clear_body_wrenches
- * /gazebo/clear_joint_forces
- * /gazebo/delete_light
- * /gazebo/delete_model
- * /gazebo/get_joint_properties
- * /gazebo/get_light_properties
- * /gazebo/get_link_properties
- * /gazebo/get_link_state
- * /gazebo/get_loggers
- * /gazebo/get_model_properties
- * /gazebo/get_model_state
- * /gazebo/get_physics_properties
- * /gazebo/get_world_properties
- * /gazebo/pause_physics
- * /gazebo/reset_simulation
- * /gazebo/reset_world
- * /gazebo/set_joint_properties
- * /gazebo/set_light_properties
- * /gazebo/set_link_properties
- * /gazebo/set_link_state
- * /gazebo/set_logger_level
- * /gazebo/set_model_configuration
- * /gazebo/set_model_state
- * /gazebo/set_parameters
- * /gazebo/set_physics_properties
- * /gazebo/spawn_sdf_model
- * /gazebo/spawn_urdf_model
- * /gazebo/unpause_physics

GAZEBO_GUI ROSNODE INFO

harman@D104-45931:~\$ rosnodetool info gazebo_gui

Node [/gazebo_gui]

Publications:

- * /gazebo_gui/parameter_descriptions [dynamic_reconfigure/ConfigDescription]
- * /gazebo_gui/parameter_updates [dynamic_reconfigure/Config]
- * /rosout [roscpp_msgs/Log]

Subscriptions:

- * /clock [roscgraph_msgs/Clock]

Services:

- * /gazebo_gui/get_loggers
- * /gazebo_gui/set_logger_level
- * /gazebo_gui/set_parameters

contacting node http://D104-45931:36476/ ...

Pid: 11726

C

ROSTOPIC LIST

```
harman@D104-45931:~$ rostopic list
/camera/depth/camera_info
/camera/depth/image_raw
/camera/depth/points
/camera/parameter_descriptions
/camera/parameter_updates
/camera/rgb/camera_info
/camera/rgb/image_raw
/camera/rgb/image_raw/compressed
/camera/rgb/image_raw/compressed/parameter_descriptions
/camera/rgb/image_raw/compressed/parameter_updates
/camera/rgb/image_raw/compressedDepth
/camera/rgb/image_raw/compressedDepth/parameter_descriptions
/camera/rgb/image_raw/compressedDepth/parameter_updates
/camera/rgb/image_raw/theora
/camera/rgb/image_raw/theora/parameter_descriptions
/camera/rgb/image_raw/theora/parameter_updates
/clock
/cmd_vel_mux/active
/cmd_vel_mux/input/navi
/cmd_vel_mux/input/safety_controller
/cmd_vel_mux/input/switch
/cmd_vel_mux/input/teleop
/cmd_vel_mux/parameter_descriptions
/cmd_vel_mux/parameter_updates
/depthimage_to_laserscan/parameter_descriptions
/depthimage_to_laserscan/parameter_updates
/gazebo/link_states
/gazebo/model_states
/gazebo/parameter_descriptions
/gazebo/parameter_updates
/gazebo/set_link_state
/gazebo/set_model_state
/gazebo_gui/parameter_descriptions
/gazebo_gui/parameter_updates
/joint_states
/laserscan_nodelet_manager/bond
/mobile_base/commands/motor_power
/mobile_base/commands/reset_odometry
/mobile_base/commands/velocity
```

```
/mobile_base/events/bumper
/mobile_base/events/cliff
/mobile_base/sensors/bumper_pointcloud
/mobile_base/sensors/core
/mobile_base/sensors/imu_data
/mobile_base/nodelet_manager/bond
/odom
/rosout
/rosout_agg
/scan
/tf
/tf_static
harman@D104-45931:~$
```

ROSMMSG LIST

```
harman@D104-45931:~$ rosmmsg list
actionlib/TestAction
actionlib/TestActionFeedback
actionlib/TestActionGoal
actionlib/TestActionResult
actionlib/TestFeedback
actionlib/TestGoal
actionlib/TestRequestAction
actionlib/TestRequestActionFeedback
actionlib/TestRequestActionGoal
actionlib/TestRequestActionResult
actionlib/TestRequestFeedback
actionlib/TestRequestGoal
actionlib/TestRequestResult
actionlib/TestResult
actionlib/TwoIntsAction
actionlib/TwoIntsActionFeedback
actionlib/TwoIntsActionGoal
actionlib/TwoIntsActionResult
actionlib/TwoIntsFeedback
actionlib/TwoIntsGoal
actionlib/TwoIntsResult
actionlib_msgs/GoalID
actionlib_msgs/GoalStatus
actionlib_msgs/GoalStatusArray

base_local_planner/Position2DInt

baxter_core_msgs/AnalogIOState
baxter_core_msgs/AnalogIOStates
baxter_core_msgs/AnalogOutputCommand
baxter_core_msgs/AssemblyState
baxter_core_msgs/AssemblyStates
baxter_core_msgs/CameraControl
baxter_core_msgs/CameraSettings
baxter_core_msgs/CollisionAvoidanceState
baxter_core_msgs/CollisionDetectionState
baxter_core_msgs/DigitalIOState
baxter_core_msgs/DigitalIOStates
baxter_core_msgs/DigitalOutputCommand
baxter_core_msgs/EndEffectorCommand
```

baxter_core_msgs/EndEffectorProperties
 baxter_core_msgs/EndEffectorState
 baxter_core_msgs/EndpointState
 baxter_core_msgs/EndpointStates
 baxter_core_msgs/HeadPanCommand
 baxter_core_msgs/HeadState
 baxter_core_msgs/JointCommand
 baxter_core_msgs/NavigatorState
 baxter_core_msgs/NavigatorStates
 baxter_core_msgs/RobustControllerStatus
 baxter_core_msgs/SEAJointState
 baxter_core_msgs/URDFConfiguration
 baxter_maintenance_msgs/CalibrateArmData
 baxter_maintenance_msgs/CalibrateArmEnable
 baxter_maintenance_msgs/TareData
 baxter_maintenance_msgs/TareEnable
 baxter_maintenance_msgs/UpdateSource
 baxter_maintenance_msgs/UpdateSources
 baxter_maintenance_msgs/UpdateStatus
 bond/Constants Modules bond by a heartbeat.
 bond/Status
 capabilities/Capability Interface information
 capabilities/CapabilityEvent
 capabilities/CapabilitySpec
 capabilities/Remapping
 capabilities/RunningCapability

control_msgs/FollowJointTrajectoryAction
 control_msgs/FollowJointTrajectoryActionFeedback
 control_msgs/FollowJointTrajectoryActionGoal
 control_msgs/FollowJointTrajectoryActionResult
 control_msgs/FollowJointTrajectoryFeedback
 control_msgs/FollowJointTrajectoryGoal
 control_msgs/FollowJointTrajectoryResult
 control_msgs/GripperCommand
 control_msgs/GripperCommandAction
 control_msgs/GripperCommandActionFeedback
 control_msgs/GripperCommandActionGoal
 control_msgs/GripperCommandActionResult
 control_msgs/GripperCommandFeedback
 control_msgs/GripperCommandGoal
 control_msgs/GripperCommandResult
 control_msgs/JointControllerState
 control_msgs/JointJog
 control_msgs/JointTolerance
 control_msgs/JointTrajectoryAction
 control_msgs/JointTrajectoryActionFeedback
 control_msgs/JointTrajectoryActionGoal
 control_msgs/JointTrajectoryActionResult
 control_msgs/JointTrajectoryControllerState
 control_msgs/JointTrajectoryFeedback
 control_msgs/JointTrajectoryGoal
 control_msgs/JointTrajectoryResult
 control_msgs/PidState
 control_msgs/PointHeadAction
 control_msgs/PointHeadActionFeedback
 control_msgs/PointHeadActionGoal
 control_msgs/PointHeadActionResult
 control_msgs/PointHeadFeedback

control_msgs/PointHeadGoal
control_msgs/PointHeadResult
control_msgs/SingleJointPositionAction
control_msgs/SingleJointPositionActionFeedback
control_msgs/SingleJointPositionActionGoal
control_msgs/SingleJointPositionActionResult
control_msgs/SingleJointPositionFeedback
control_msgs/SingleJointPositionGoal
control_msgs/SingleJointPositionResult
controller_manager_msgs/ControllerState
controller_manager_msgs/ControllerStatistics
controller_manager_msgs/ControllersStatistics
controller_manager_msgs/HardwareInterfaceResources

costmap_2d/VoxelGrid
crazyflie_driver/GenericLogData Small Drone
crazyflie_driver/LogBlock
crazyflie_driver/crtpPacket

create_node/BatteryState iRobot Create ROS driver node ROS bindings for the Create/Roomba driver.
create_node/Drive
create_node/RawTurtlebotSensorState
create_node/RoombaSensorState
create_node/Turtle
create_node/TurtlebotSensorState

diagnostic_msgs/DiagnosticArray messages which provide the standardized interface for the diagnostic and runtime monitoring systems in ROS
diagnostic_msgs/DiagnosticStatus
diagnostic_msgs/KeyValue

dynamic_reconfigure/BoolParameter The dynamic_reconfigure package provides a means to update parameters at runtime without having to restart the node. (Text Pages 197-199 – Now rqt_reconfigure.)
dynamic_reconfigure/Config
dynamic_reconfigure/ConfigDescription
dynamic_reconfigure/DoubleParameter
dynamic_reconfigure/Group
dynamic_reconfigure/GroupState
dynamic_reconfigure/IntParameter
dynamic_reconfigure/ParamDescription
dynamic_reconfigure/SensorLevels
dynamic_reconfigure/StrParameter

gateway_msgs/ConnectionStatistics Gateways interpose themselves between a ros system and other ros systems and are the co-ordinators of traffic going in and out of a ros system to remote ros systems.
gateway_msgs/ConnectionType
gateway_msgs/ErrorCodes
gateway_msgs/GatewayInfo
gateway_msgs/RemoteGateway
gateway_msgs/RemoteRule
gateway_msgs/RemoteRuleWithStatus
gateway_msgs/Rule

gazebo_msgs/ContactState
gazebo_msgs/ContactsState
gazebo_msgs/LinkState
gazebo_msgs/LinkStates

gazebo_msgs/ModelState
 gazebo_msgs/ModelStates
 gazebo_msgs/ODEJointProperties
 gazebo_msgs/ODEPhysics
 gazebo_msgs/WorldState

geometry_msgs/Accel
 geometry_msgs/AccelStamped
 geometry_msgs/AccelWithCovariance
 geometry_msgs/AccelWithCovarianceStamped
 geometry_msgs/Inertia
 geometry_msgs/InertiaStamped
 geometry_msgs/Point
 geometry_msgs/Point32
 geometry_msgs/PointStamped
 geometry_msgs/Polygon
 geometry_msgs/PolygonStamped
 geometry_msgs/Pose
 geometry_msgs/Pose2D
 geometry_msgs/PoseArray
 geometry_msgs/PoseStamped
 geometry_msgs/PoseWithCovariance
 geometry_msgs/PoseWithCovarianceStamped
 geometry_msgs/Quaternion
 geometry_msgs/QuaternionStamped
 geometry_msgs/Transform
 geometry_msgs/TransformStamped
 geometry_msgs/Twist
 geometry_msgs/TwistStamped
 geometry_msgs/TwistWithCovariance
 geometry_msgs/TwistWithCovarianceStamped
 geometry_msgs/Vector3
 geometry_msgs/Vector3Stamped
 geometry_msgs/Wrench
 geometry_msgs/WrenchStamped

hector_mapping/HectorDebugInfo
 hector_mapping/HectorIterData
 hector_uav_msgs/Altimeter
 hector_uav_msgs/AttitudeCommand
 hector_uav_msgs/Compass
 hector_uav_msgs/ControllerState
 hector_uav_msgs/HeadingCommand
 hector_uav_msgs/HeightCommand
 hector_uav_msgs/MotorCommand
 hector_uav_msgs/MotorPWM
 hector_uav_msgs/MotorStatus
 hector_uav_msgs/PositionXYCommand
 hector_uav_msgs/RC
 hector_uav_msgs/RawImu
 hector_uav_msgs/RawMagnetic
 hector_uav_msgs/RawRC
 hector_uav_msgs/RuddersCommand
 hector_uav_msgs/ServoCommand
 hector_uav_msgs/Supply
 hector_uav_msgs/ThrustCommand
 hector_uav_msgs/VelocityXYCommand
 hector_uav_msgs/VelocityZCommand
 hector_uav_msgs/YawrateCommand

- kobuki_msgs/AutoDockingAction
- kobuki_msgs/AutoDockingActionFeedback
- kobuki_msgs/AutoDockingActionGoal
- kobuki_msgs/AutoDockingActionResult
- kobuki_msgs/AutoDockingFeedback
- kobuki_msgs/AutoDockingGoal
- kobuki_msgs/AutoDockingResult
- kobuki_msgs/BumperEvent
- kobuki_msgs/ButtonEvent
- kobuki_msgs/CliffEvent
- kobuki_msgs/ControllerInfo
- kobuki_msgs/DigitalInputEvent
- kobuki_msgs/DigitalOutput
- kobuki_msgs/DockInfraRed
- kobuki_msgs/ExternalPower
- kobuki_msgs/KeyboardInput
- kobuki_msgs/Led
- kobuki_msgs/MotorPower
- kobuki_msgs/PowerSystemEvent
- kobuki_msgs/RobotStateEvent
- kobuki_msgs/ScanAngle
- kobuki_msgs/SensorState
- kobuki_msgs/Sound
- kobuki_msgs/VersionInfo
- kobuki_msgs/WheelDropEvent

- map_msgs/OccupancyGridUpdate
- map_msgs/PointCloud2Update
- map_msgs/ProjectedMap
- map_msgs/ProjectedMapInfo

- move_base_msgs/MoveBaseAction
- move_base_msgs/MoveBaseActionFeedback
- move_base_msgs/MoveBaseActionGoal
- move_base_msgs/MoveBaseActionResult
- move_base_msgs/MoveBaseFeedback
- move_base_msgs/MoveBaseGoal
- move_base_msgs/MoveBaseResult

moveit_msgs/AllowedCollisionEntry MoveIt! is state of the art software for mobile manipulation, incorporating the latest advances in motion planning, manipulation, 3D perception, kinematics, control and navigation. Text Page 284-292

- moveit_msgs/AllowedCollisionMatrix
- moveit_msgs/AttachedCollisionObject
- moveit_msgs/BoundingBoxVolume
- moveit_msgs/CollisionObject
- moveit_msgs/ConstraintEvalResult
- moveit_msgs/Constraints
- moveit_msgs/ContactInformation
- moveit_msgs/CostSource
- moveit_msgs/DisplayRobotState
- moveit_msgs/DisplayTrajectory
- moveit_msgs/ExecuteTrajectoryAction
- moveit_msgs/ExecuteTrajectoryActionFeedback
- moveit_msgs/ExecuteTrajectoryActionGoal
- moveit_msgs/ExecuteTrajectoryActionResult
- moveit_msgs/ExecuteTrajectoryFeedback

moveit_msgs/ExecuteTrajectoryGoal
moveit_msgs/ExecuteTrajectoryResult
moveit_msgs/Grasp
moveit_msgs/GripperTranslation
moveit_msgs/JointConstraint
moveit_msgs/JointLimits
moveit_msgs/KinematicSolverInfo
moveit_msgs/LinkPadding
moveit_msgs/LinkScale
moveit_msgs/MotionPlanDetailedResponse
moveit_msgs/MotionPlanRequest
moveit_msgs/MotionPlanResponse
moveit_msgs/MoveGroupAction
moveit_msgs/MoveGroupActionFeedback
moveit_msgs/MoveGroupActionGoal
moveit_msgs/MoveGroupActionResult
moveit_msgs/MoveGroupFeedback
moveit_msgs/MoveGroupGoal
moveit_msgs/MoveGroupResult
moveit_msgs/MoveItErrorCodes
moveit_msgs/ObjectColor
moveit_msgs/OrientationConstraint
moveit_msgs/OrientedBoundingBox
moveit_msgs/PickupAction
moveit_msgs/PickupActionFeedback
moveit_msgs/PickupActionGoal
moveit_msgs/PickupActionResult
moveit_msgs/PickupFeedback
moveit_msgs/PickupGoal
moveit_msgs/PickupResult
moveit_msgs/PlaceAction
moveit_msgs/PlaceActionFeedback
moveit_msgs/PlaceActionGoal
moveit_msgs/PlaceActionResult
moveit_msgs/PlaceFeedback
moveit_msgs/PlaceGoal
moveit_msgs/PlaceLocation
moveit_msgs/PlaceResult
moveit_msgs/PlannerInterfaceDescription
moveit_msgs/PlannerParams
moveit_msgs/PlanningOptions
moveit_msgs/PlanningScene
moveit_msgs/PlanningSceneComponents
moveit_msgs/PlanningSceneWorld
moveit_msgs/PositionConstraint
moveit_msgs/PositionIKRequest
moveit_msgs/RobotState
moveit_msgs/RobotTrajectory
moveit_msgs/TrajectoryConstraints
moveit_msgs/VisibilityConstraint
moveit_msgs/WorkspaceParameters

nav_msgs/GetMapAction
nav_msgs/GetMapActionFeedback
nav_msgs/GetMapActionGoal
nav_msgs/GetMapActionResult
nav_msgs/GetMapFeedback
nav_msgs/GetMapGoal
nav_msgs/GetMapResult

nav_msgs/GridCells
nav_msgs/MapMetaData
nav_msgs/OccupancyGrid
nav_msgs/Odometry
nav_msgs/Path

object_recognition_msgs/ObjectInformation
object_recognition_msgs/ObjectRecognitionAction
object_recognition_msgs/ObjectRecognitionActionFeedback
object_recognition_msgs/ObjectRecognitionActionGoal
object_recognition_msgs/ObjectRecognitionActionResult
object_recognition_msgs/ObjectRecognitionFeedback
object_recognition_msgs/ObjectRecognitionGoal
object_recognition_msgs/ObjectRecognitionResult
object_recognition_msgs/ObjectType
object_recognition_msgs/RecognizedObject
object_recognition_msgs/RecognizedObjectArray
object_recognition_msgs/Table
object_recognition_msgs/TableArray

octomap_msgs/Octomap
octomap_msgs/OctomapWithPose

pcl_msgs/ModelCoefficients Point Cloud Library
pcl_msgs/PointIndices
pcl_msgs/PolygonMesh
pcl_msgs/Vertices

realsense_camera/IMUInfo

rocon_app_manager_msgs/Constants This is a meta package for robotics in concert(a.k.a rocon)
rocon_app_manager_msgs/ErrorCodes
rocon_app_manager_msgs/IncompatibleRappList
rocon_app_manager_msgs/PublicInterface
rocon_app_manager_msgs/PublishedInterface
rocon_app_manager_msgs/Rapp
rocon_app_manager_msgs/RappList
rocon_app_manager_msgs/Status
rocon_interaction_msgs/ErrorCodes
rocon_interaction_msgs/Interaction
rocon_interaction_msgs/InteractiveClient
rocon_interaction_msgs/InteractiveClients
rocon_interaction_msgs/Pairing
rocon_interaction_msgs/PairingStatus
rocon_interaction_msgs/RemoconStatus
rocon_interaction_msgs/Strings
rocon_service_pair_msgs/TestiesPair
rocon_service_pair_msgs/TestiesPairRequest
rocon_service_pair_msgs/TestiesPairResponse
rocon_service_pair_msgs/TestiesRequest
rocon_service_pair_msgs/TestiesResponse
rocon_std_msgs/Connection
rocon_std_msgs/ConnectionCacheSpin
rocon_std_msgs/ConnectionsDiff
rocon_std_msgs/ConnectionsList
rocon_std_msgs/Float32Stamped
rocon_std_msgs/Icon
rocon_std_msgs/KeyValue
rocon_std_msgs/MasterInfo

rocon_std_msgs/Remapping
rocon_std_msgs/StringArray
rocon_std_msgs/Strings
rocon_std_msgs/StringsPair
rocon_std_msgs/StringsPairRequest
rocon_std_msgs/StringsPairResponse
rocon_std_msgs/StringsRequest
rocon_std_msgs/StringsResponse

roscpp/Logger

rosgraph_msgs/Clock rosgraph contains the rosgraph command-line tool, which prints information about the ROS Computation Graph.

rosgraph_msgs/Log Probably more information than you would need- internal database.

rosgraph_msgs/TopicStatistics

rospy_tutorials/Floats

rospy_tutorials/HeaderString

rosserial_arduino/Adc

rosserial_msgs/Log

rosserial_msgs/TopicInfo

sensor_msgs/BatteryState

sensor_msgs/CameraInfo

sensor_msgs/ChannelFloat32

sensor_msgs/CompressedImage

sensor_msgs/FluidPressure

sensor_msgs/Illuminance

sensor_msgs/Image

sensor_msgs/Imu

sensor_msgs/JointState

sensor_msgs/Joy

sensor_msgs/JoyFeedback

sensor_msgs/JoyFeedbackArray

sensor_msgs/LaserEcho

sensor_msgs/LaserScan

sensor_msgs/MagneticField

sensor_msgs/MultiDOFJointState

sensor_msgs/MultiEchoLaserScan

sensor_msgs/NavSatFix

sensor_msgs/NavSatStatus

sensor_msgs/PointCloud

sensor_msgs/PointCloud2

sensor_msgs/PointField

sensor_msgs/Range

sensor_msgs/RegionOfInterest

sensor_msgs/RelativeHumidity

sensor_msgs/Temperature

sensor_msgs/TimeReference

shape_msgs/Mesh

shape_msgs/MeshTriangle

shape_msgs/Plane

shape_msgs/SolidPrimitive

smach_msgs/SmachContainerInitialStatusCmd

Useful State Machine (Text Page 303-308)

smach_msgs/SmachContainerStatus

smach_msgs/SmachContainerStructure

std_msgs/Bool
 std_msgs/Byte
 std_msgs/ByteMultiArray
 std_msgs/Char
 std_msgs/ColorRGBA
 std_msgs/Duration
 std_msgs/Empty
 std_msgs/Float32
 std_msgs/Float32MultiArray
 std_msgs/Float64
 std_msgs/Float64MultiArray
 std_msgs/Header
 std_msgs/Int16
 std_msgs/Int16MultiArray
 std_msgs/Int32
 std_msgs/Int32MultiArray
 std_msgs/Int64
 std_msgs/Int64MultiArray
 std_msgs/Int8
 std_msgs/Int8MultiArray
 std_msgs/MultiArrayDimension
 std_msgs/MultiArrayLayout
 std_msgs/String
 std_msgs/Time
 std_msgs/UInt16
 std_msgs/UInt16MultiArray
 std_msgs/UInt32
 std_msgs/UInt32MultiArray
 std_msgs/UInt64
 std_msgs/UInt64MultiArray
 std_msgs/UInt8
 std_msgs/UInt8MultiArray

stdr_msgs/CO2SensorMeasurementMsg STDR Simulator - May be done!
 stdr_msgs/CO2SensorMsg
 stdr_msgs/CO2Source
 stdr_msgs/CO2SourceVector
 stdr_msgs/DeleteRobotAction
 stdr_msgs/DeleteRobotActionFeedback
 stdr_msgs/DeleteRobotActionGoal
 stdr_msgs/DeleteRobotActionResult
 stdr_msgs/DeleteRobotFeedback
 stdr_msgs/DeleteRobotGoal
 stdr_msgs/DeleteRobotResult
 stdr_msgs/FootprintMsg
 stdr_msgs/KinematicMsg
 stdr_msgs/LaserSensorMsg
 stdr_msgs/Noise
 stdr_msgs/RegisterRobotAction
 stdr_msgs/RegisterRobotActionFeedback
 stdr_msgs/RegisterRobotActionGoal
 stdr_msgs/RegisterRobotActionResult
 stdr_msgs/RegisterRobotFeedback
 stdr_msgs/RegisterRobotGoal
 stdr_msgs/RegisterRobotResult
 stdr_msgs/RfidSensorMeasurementMsg
 stdr_msgs/RfidSensorMsg
 stdr_msgs/RfidTag

stdr_msgs/RfidTagVector
stdr_msgs/RobotIndexedMsg
stdr_msgs/RobotIndexedVectorMsg
stdr_msgs/RobotMsg
stdr_msgs/SonarSensorMsg
stdr_msgs/SoundSensorMeasurementMsg
stdr_msgs/SoundSensorMsg
stdr_msgs/SoundSource
stdr_msgs/SoundSourceVector
stdr_msgs/SpawnRobotAction
stdr_msgs/SpawnRobotActionFeedback
stdr_msgs/SpawnRobotActionGoal
stdr_msgs/SpawnRobotActionResult
stdr_msgs/SpawnRobotFeedback
stdr_msgs/SpawnRobotGoal
stdr_msgs/SpawnRobotResult
stdr_msgs/ThermalSensorMeasurementMsg
stdr_msgs/ThermalSensorMsg
stdr_msgs/ThermalSource
stdr_msgs/ThermalSourceVector

stereo_msgs/DisparityImage

teleop_tools_msgs/IncrementAction
teleop_tools_msgs/IncrementActionFeedback
teleop_tools_msgs/IncrementActionGoal
teleop_tools_msgs/IncrementActionResult
teleop_tools_msgs/IncrementFeedback
teleop_tools_msgs/IncrementGoal
teleop_tools_msgs/IncrementResult

tf/tfMessage
tf2_msgs/LookupTransformAction
tf2_msgs/LookupTransformActionFeedback
tf2_msgs/LookupTransformActionGoal
tf2_msgs/LookupTransformActionResult
tf2_msgs/LookupTransformFeedback
tf2_msgs/LookupTransformGoal
tf2_msgs/LookupTransformResult
tf2_msgs/TF2Error
tf2_msgs/TFMessage

theora_image_transport/Packet theora_image_transport is a plugin package for [image_transport](#). It enables any node using image_transport classes to publish and subscribe to image topics compressed over the wire using the Theora video codec.

trajectory_msgs/JointTrajectory
trajectory_msgs/JointTrajectoryPoint
trajectory_msgs/MultiDOFJointTrajectory
trajectory_msgs/MultiDOFJointTrajectoryPoint

turtle_actionlib/ShapeAction
turtle_actionlib/ShapeActionFeedback
turtle_actionlib/ShapeActionGoal
turtle_actionlib/ShapeActionResult
turtle_actionlib/ShapeFeedback
turtle_actionlib/ShapeGoal

turtle_actionlib/ShapeResult
turtle_actionlib/Velocity

turtlebot3_example/turtlebot3Action
turtlebot3_example/turtlebot3ActionFeedback
turtlebot3_example/turtlebot3ActionGoal
turtlebot3_example/turtlebot3ActionResult
turtlebot3_example/turtlebot3Feedback
turtlebot3_example/turtlebot3Goal
turtlebot3_example/turtlebot3Result
turtlebot3_msgs/PanoramaImg
turtlebot3_msgs/SensorState
turtlebot3_msgs/Sound
turtlebot3_msgs/VersionInfo

turtlebot_actions/FindFiducialAction
turtlebot_actions/FindFiducialActionFeedback
turtlebot_actions/FindFiducialActionGoal
turtlebot_actions/FindFiducialActionResult
turtlebot_actions/FindFiducialFeedback
turtlebot_actions/FindFiducialGoal
turtlebot_actions/FindFiducialResult
turtlebot_actions/TurtlebotMoveAction
turtlebot_actions/TurtlebotMoveActionFeedback
turtlebot_actions/TurtlebotMoveActionGoal
turtlebot_actions/TurtlebotMoveActionResult
turtlebot_actions/TurtlebotMoveFeedback
turtlebot_actions/TurtlebotMoveGoal
turtlebot_actions/TurtlebotMoveResult
turtlebot_calibration/ScanAngle
turtlebot_msgs/PanoramaImg
turtlesim/Color
turtlesim/Pose

uuid_msgs/UniqueID universally unique identifier (UUID) May be done!

visualization_msgs/ImageMarker
visualization_msgs/InteractiveMarker
visualization_msgs/InteractiveMarkerControl
visualization_msgs/InteractiveMarkerFeedback
visualization_msgs/InteractiveMarkerInit
visualization_msgs/InteractiveMarkerPose
visualization_msgs/InteractiveMarkerUpdate
visualization_msgs/Marker
visualization_msgs/MarkerArray
visualization_msgs/MenuEntry

wiimote/IrSourceInfo The wiimote package allows ROS nodes to communicate with a Nintendo Wiimote and its related peripherals, including the Nunchuk, Motion Plus, and (experimentally) the Classic.
wiimote/State
wiimote/TimedSwitch

world_canvas_msgs/Annotation A component of the world canvas framework, a ROS stack for storing and accessing semantic information about the world, with an initial emphasis on needs and use cases for mobile robots.
world_canvas_msgs/AnnotationData
world_canvas_msgs/Annotations

world_canvas_msgs/MapListEntry
world_canvas_msgs/WorldCanvas

yocs_msgs/ARPair Yujin's Open Control System messages, services and actions- Kobuki base

yocs_msgs/ARPairList
yocs_msgs/Column
yocs_msgs/ColumnList
yocs_msgs/DockingInteractorAction
yocs_msgs/DockingInteractorActionFeedback
yocs_msgs/DockingInteractorActionGoal
yocs_msgs/DockingInteractorActionResult
yocs_msgs/DockingInteractorFeedback
yocs_msgs/DockingInteractorGoal
yocs_msgs/DockingInteractorResult
yocs_msgs/LocalizeAction
yocs_msgs/LocalizeActionFeedback
yocs_msgs/LocalizeActionGoal
yocs_msgs/LocalizeActionResult
yocs_msgs/LocalizeFeedback
yocs_msgs/LocalizeGoal
yocs_msgs/LocalizeResult
yocs_msgs/NavigateToAction
yocs_msgs/NavigateToActionFeedback
yocs_msgs/NavigateToActionGoal
yocs_msgs/NavigateToActionResult
yocs_msgs/NavigateToFeedback
yocs_msgs/NavigateToGoal
yocs_msgs/NavigateToResult
yocs_msgs/NavigationControl
yocs_msgs/NavigationControlStatus
yocs_msgs/Table
yocs_msgs/TableList
yocs_msgs/Trajectory
yocs_msgs/TrajectoryList
yocs_msgs/Wall
yocs_msgs/WallList
yocs_msgs/Waypoint
yocs_msgs/WaypointList

zeroconf_msgs/DiscoveredService zeroconf is about automatically discovering your robots or services on your local area network.

zeroconf_msgs/Protocols
zeroconf_msgs/PublishedService
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