

Frontier Exploration

Step 1: Downloading and installing the frontier_exploration package for ROS KINETIC
'sudo apt-get install ros-kinetic-frontier-exploration'.

Step 2: Creating and configuring move_base.launch file for your robot

the content of the launch file:

```
<launch>

  <arg name="odom_topic" default="odom" />

  <node pkg="move_base" type="move_base" respawn="false" name="move_base"
output="screen">
    <rosparam file="$(find chefbot_gazebo)/param/costmap_common_params.yaml"
command="load" ns="global_costmap" />
    <rosparam file="$(find chefbot_gazebo)/param/costmap_common_params.yaml"
command="load" ns="local_costmap" />
    <rosparam file="$(find chefbot_gazebo)/param/local_costmap_params.yaml"
command="load" />
    <rosparam file="$(find chefbot_gazebo)/param/global_costmap_params.yaml"
command="load" />
    <rosparam file="$(find chefbot_gazebo)/param/base_local_planner_params.yaml"
command="load" />
    <rosparam file="$(find chefbot_gazebo)/param/dwa_local_planner_params.yaml"
command="load" />
    <rosparam file="$(find chefbot_gazebo)/param/move_base_params.yaml"
command="load" />

    <remap from="cmd_vel" to="/mobile_base/commands/velocity"/>
    <remap from="odom" to="$(arg odom_topic)"/>
  </node>
</launch>
```

Step 3: configuring the global planner to the move base parameter file

move_base_params.yaml

'base_global_planner: "global_planner/GlobalPlanner"' add this to the end of the line.

Step 4: Starting the roscore gazebo slam and rviz respectively

```
/home/abi/catkin_ws/src/chebot_gazebo/launch/chebot_hotel_world.launch http://localhost:11311
abi@abi-Aspire-E51-571:~$ roslaunch chebot_gazebo chebot_hotel_world.launch
... logging to /home/abi/.ros/log/8a6d3b12-c758-11e9-8cd5-a250504720b5/roslaunch-abi-Aspire-E51-571-3482.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://abi-Aspire-E51-571:38427/

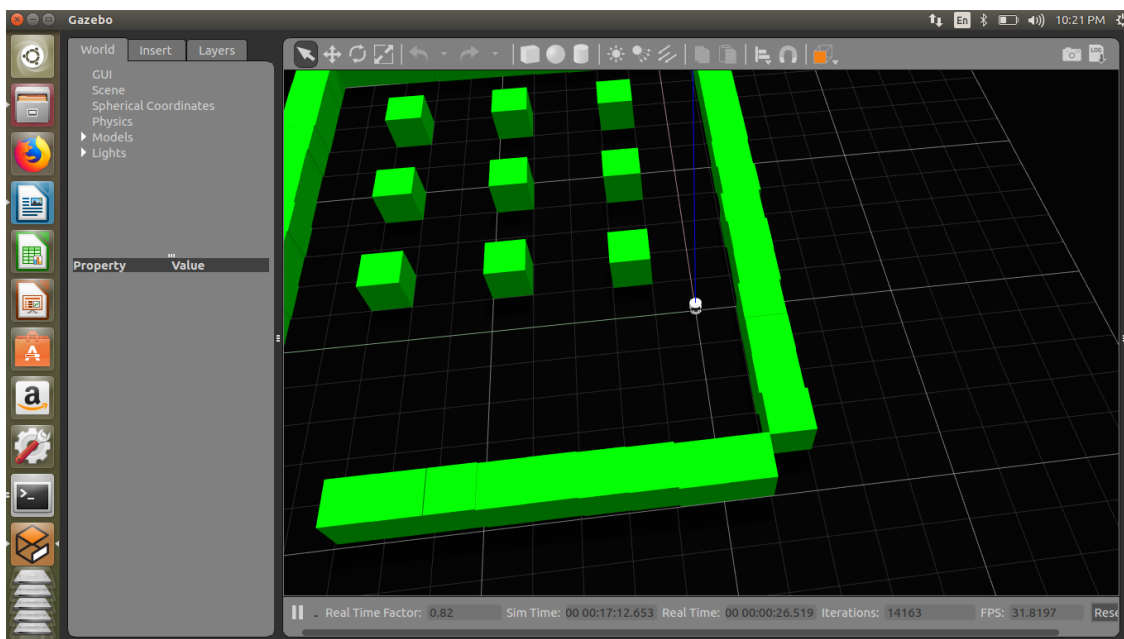
SUMMARY
=====
PARAMETERS
* /depthimage_to_laserscan/output_frame_id: /camera_depth_frame
* /depthimage_to_laserscan/range_min: 0.45
* /depthimage_to_laserscan/scan_height: 10
* /robot_description: <?xml version="1....
* /robot_state_publisher/publish_frequency: 30.0
* /roscpp: Kinetic
* /rosversion: 1.12.14
* /use_sim_time: True

NODES
/
  depthimage_to_laserscan (nodelet/nodelet)
  gazebo (gazebo_ros/gzserver)
  gazebo_gui (gazebo_ros/gzclient)
  laserscan_nodelet_manager (nodelet/nodelet)
  robot_state_publisher (robot_state_publisher/robot_state_publisher)
  spawn_urdf (gazebo_ros/spawn_model)

auto-starting new master
process[master]: started with pid [3496]
ROS_MASTER_URI=http://localhost:11311

setting /run_id to 8a6d3b12-c758-11e9-8cd5-a250504720b5
process[rosout-1]: started with pid [3509]
started core service [/rosout]
process[gazebo-2]: started with pid [3512]
process[gazebo_gui-3]: started with pid [3517]
process[spawn_urdf-4]: started with pid [3522]
process[robot_state_publisher-5]: started with pid [3527]
process[laserscan_nodelet_manager-6]: started with pid [3530]
process[depthimage_to_laserscan-7]: started with pid [3533]
```

this will open gazebo with it's hotel enviornment loaded



-Next start the slam

```
/home/abi/catkin_ws/src/chefbot_gazebo/launch/gmapping_demo.launch http://localhost:11311
abi@abi-Aspire-E51-571:~$ roslaunch chefbot_gazebo gmapping_demo.launch
... logging to /home/abi/.ros/log/adcfab22-c8e2-11e9-83a8-57e6d363d749/roslaunch-abi-Aspire-E51-571-3885.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://abi-Aspire-E51-571:36063/

SUMMARY
=====
PARAMETERS
* /roscd: /home/abi/catkin_ws/src/chefbot_gazebo
* /rosversion: 1.12.14
* /slam_gmapping/angularUpdate: 0.436
* /slam_gmapping/astep: 0.05
* /slam_gmapping/base_frame: base_footprint
* /slam_gmapping/delta: 0.01
* /slam_gmapping/iterations: 5
* /slam_gmapping/kernelSize: 1
* /slam_gmapping/lasamplerange: 0.005
* /slam_gmapping/lasamplestep: 0.005
* /slam_gmapping/linearUpdate: 0.5
* /slam_gmapping/lssamplerange: 0.01
* /slam_gmapping/lssamplestep: 0.01
* /slam_gmapping/lssigma: 0.075
* /slam_gmapping/lstep: 0
* /slam_gmapping/lstep: 0.05
* /slam_gmapping/map_update_interval: 5.0
* /slam_gmapping/maxRange: 6.0
* /slam_gmapping/maxUrange: 0.0
* /slam_gmapping/odom_frame: odom
* /slam_gmapping/ogin: 3.0
* /slam_gmapping/particles: 80
* /slam_gmapping/resampleThreshold: 0.5
* /slam_gmapping/sigma: 0.05
* /slam_gmapping/srr: 0.01
* /slam_gmapping/srt: 0.02
* /slam_gmapping/str: 0.01
* /slam_gmapping/stt: 0.02
* /slam_gmapping/temporalUpdate: -1.0
* /slam_gmapping/xmax: 1.0
* /slam_gmapping/xmin: -1.0
```

-starting Rviz

```
/home/abi/catkin_ws/src/chefbot_description/launch/view_navigation.launch http://localhost:11311
abi@abi-Aspire-E51-571:~$ roslaunch chefbot_description view_navigation.launch
... logging to /home/abi/.ros/log/adcfab22-c8e2-11e9-83a8-57e6d363d749/roslaunch-abi-Aspire-E51-571-4087.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.

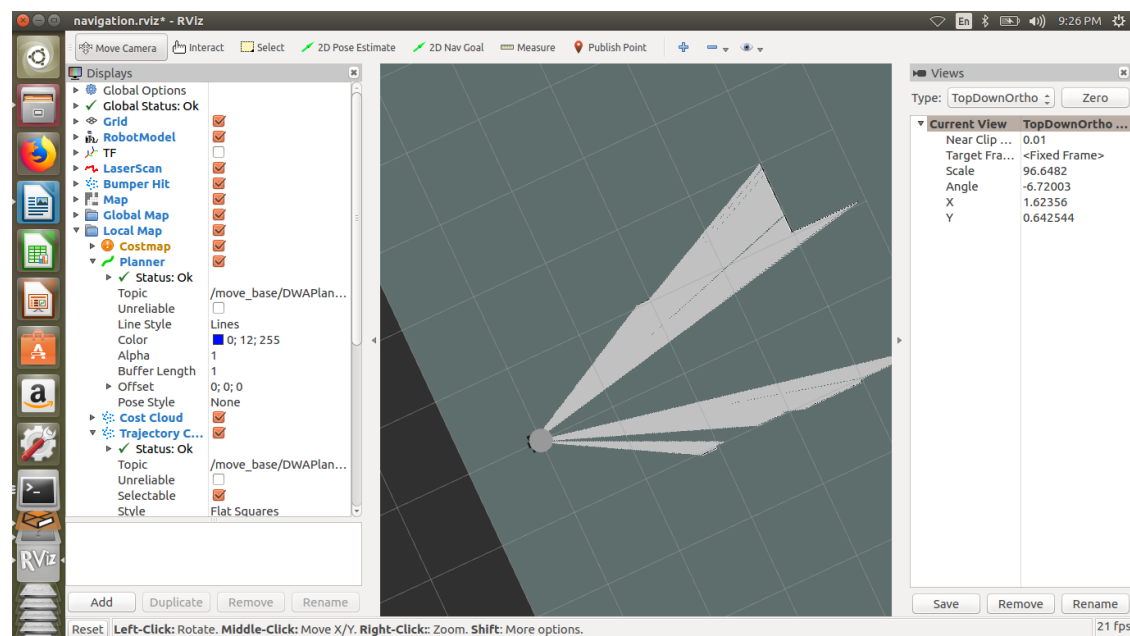
started roslaunch server http://abi-Aspire-E51-571:34979/

SUMMARY
=====
PARAMETERS
* /robot_description: <?xml version="1...
* /roscd: /home/abi/catkin_ws/src/chefbot_description
* /rosversion: 1.12.14

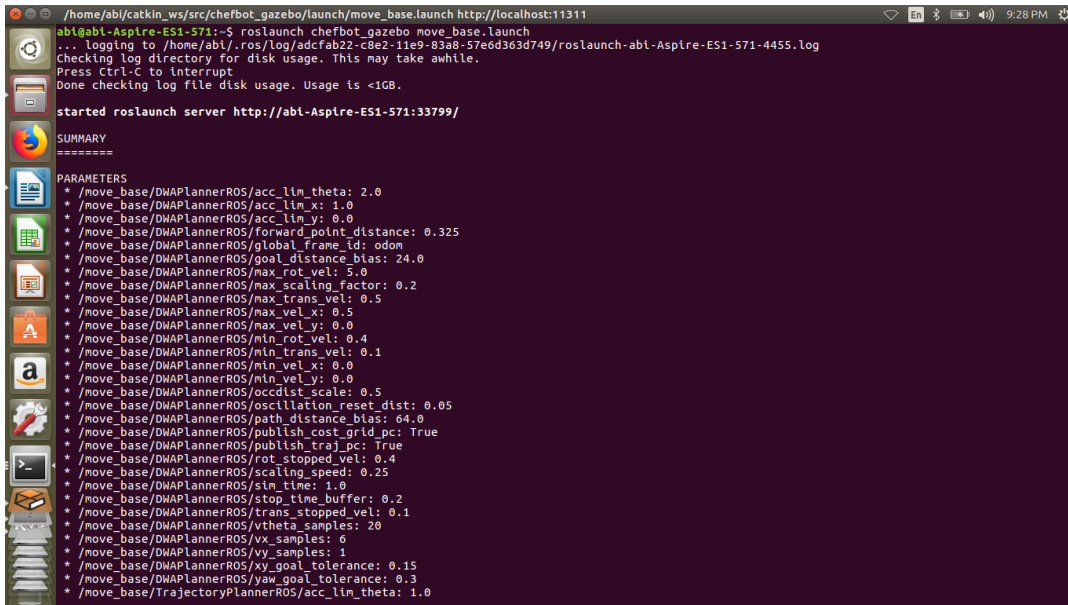
NODES
/
  joint_state_publisher (joint_state_publisher/joint_state_publisher)
  robot_state_publisher (robot_state_publisher/robot_state_publisher)
  rviz (rviz/rviz)

ROS_MASTER_URI=http://localhost:11311

process[robot_state_publisher-1]: started with pid [4107]
process[joint_state_publisher-2]: started with pid [4114]
process[rviz-3]: started with pid [4137]
```



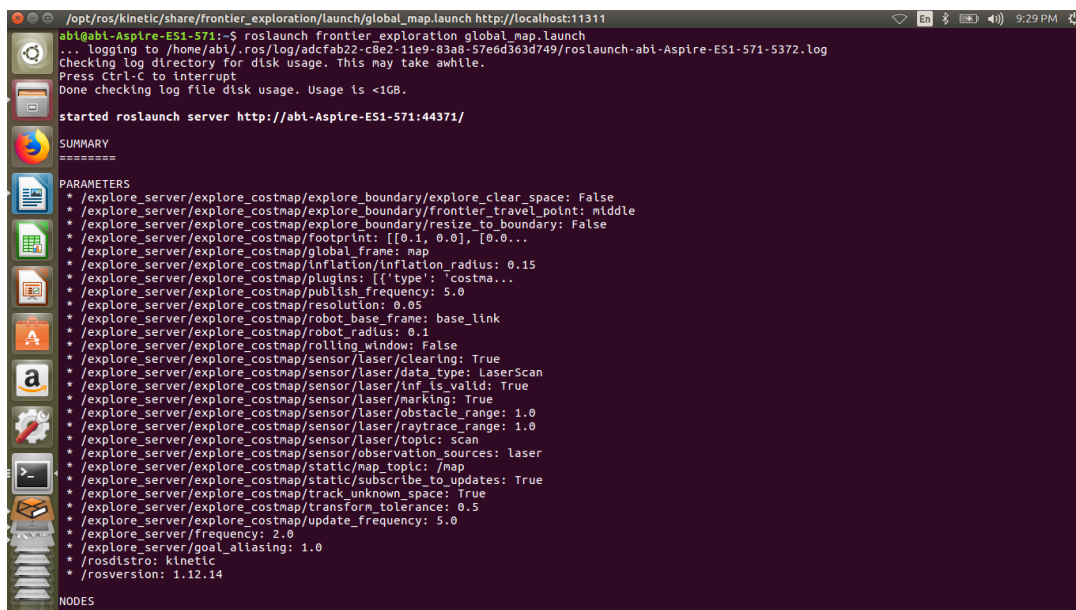
-Launching the move_base file



A terminal window showing the execution of a ROS launch file. The command is `roslaunch chefbot_gazebo move_base.launch`. The output shows logging to a file, checking disk usage, and starting the `roslaunch` server. A summary of parameters is displayed, including settings for the `DWAPlanerROS` and `TrajectoryPlannerROS` packages. The parameters are listed as follows:

```
PARAMETERS
* /move_base/DWAPlanerROS/acc_lim_theta: 2.0
* /move_base/DWAPlanerROS/acc_lim_x: 1.0
* /move_base/DWAPlanerROS/acc_lim_y: 0.0
* /move_base/DWAPlanerROS/forward_point_distance: 0.325
* /move_base/DWAPlanerROS/global_frame_id: odom
* /move_base/DWAPlanerROS/goal_distance_bias: 24.0
* /move_base/DWAPlanerROS/max_rot_vel: 5.0
* /move_base/DWAPlanerROS/max_scaling_factor: 0.2
* /move_base/DWAPlanerROS/max_trans_vel: 0.5
* /move_base/DWAPlanerROS/max_vel_x: 0.5
* /move_base/DWAPlanerROS/max_vel_y: 0.0
* /move_base/DWAPlanerROS/min_rot_vel: 0.4
* /move_base/DWAPlanerROS/min_trans_vel: 0.1
* /move_base/DWAPlanerROS/min_vel_x: 0.0
* /move_base/DWAPlanerROS/min_vel_y: 0.0
* /move_base/DWAPlanerROS/occdist_scale: 0.5
* /move_base/DWAPlanerROS/oscillation_reset_dist: 0.05
* /move_base/DWAPlanerROS/path_distance_bias: 64.0
* /move_base/DWAPlanerROS/publish_cost_grid_pc: True
* /move_base/DWAPlanerROS/publish_traj_pc: True
* /move_base/DWAPlanerROS/rot_stopped_vel: 0.4
* /move_base/DWAPlanerROS/scaling_speed: 0.25
* /move_base/DWAPlanerROS/sin_time: 1.0
* /move_base/DWAPlanerROS/stop_time_buffer: 0.2
* /move_base/DWAPlanerROS/trans_stopped_vel: 0.1
* /move_base/DWAPlanerROS/ytheta_samples: 20
* /move_base/DWAPlanerROS/vx_samples: 6
* /move_base/DWAPlanerROS/vy_samples: 1
* /move_base/DWAPlanerROS/xy_goal_tolerance: 0.15
* /move_base/DWAPlanerROS/yaw_goal_tolerance: 0.3
* /move_base/TrajectoryPlannerROS/acc_lim_theta: 1.0
```

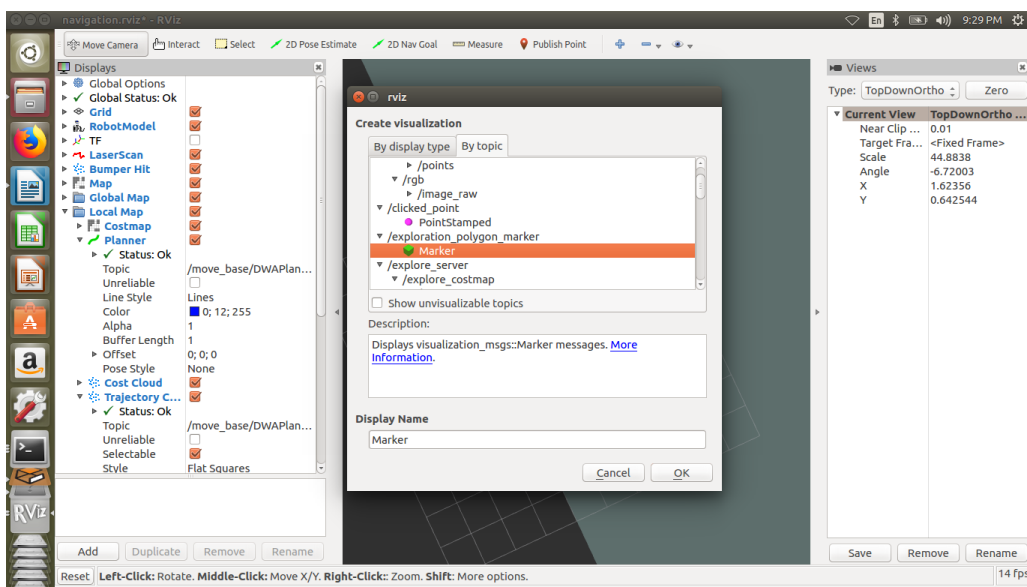
-launching the frontier_exploration package



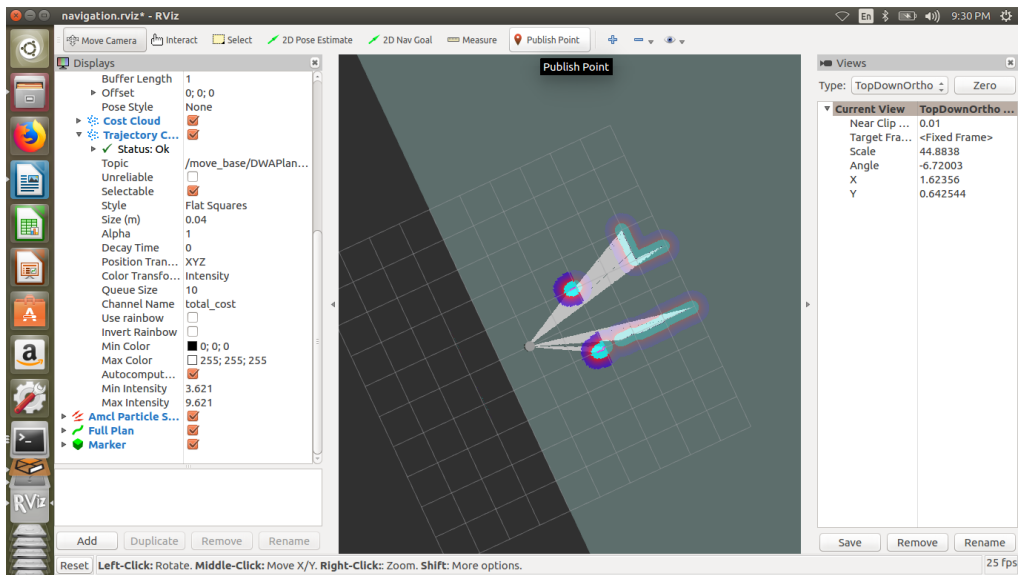
A terminal window showing the execution of a ROS launch file. The command is `roslaunch frontier_exploration global_map.launch`. The output shows logging to a file, checking disk usage, and starting the `roslaunch` server. A summary of parameters is displayed, including settings for the `explore_server` and `explore_costmap` packages. The parameters are listed as follows:

```
PARAMETERS
* /explore_server/explore_costmap/explore_boundary/explore_clear_space: False
* /explore_server/explore_costmap/explore_boundary/frontier_travel_point: middle
* /explore_server/explore_costmap/explore_boundary/resize_to_boundary: False
* /explore_server/explore_costmap/footprint: [[0.1, 0.0], [0.0...
* /explore_server/explore_costmap/global_frame: map
* /explore_server/explore_costmap/inflation/inflation_radius: 0.15
* /explore_server/explore_costmap/plugins: [{'type': 'costma...
* /explore_server/explore_costmap/publish_frequency: 5.0
* /explore_server/explore_costmap/resolution: 0.05
* /explore_server/explore_costmap/robot_base_frame: base_link
* /explore_server/explore_costmap/robot_radius: 0.1
* /explore_server/explore_costmap/rolling_window: False
* /explore_server/explore_costmap/sensor/laser/clearing: True
* /explore_server/explore_costmap/sensor/laser/data_type: LaserScan
* /explore_server/explore_costmap/sensor/laser/inf_is_valid: True
* /explore_server/explore_costmap/sensor/laser/marking: True
* /explore_server/explore_costmap/sensor/laser/obstacle_range: 1.0
* /explore_server/explore_costmap/sensor/laser/raytrace_range: 1.0
* /explore_server/explore_costmap/sensor/laser/topic: scan
* /explore_server/explore_costmap/sensor/observation_sources: laser
* /explore_server/explore_costmap/static/map_topic: /map
* /explore_server/explore_costmap/static/subscribe_to_updates: True
* /explore_server/explore_costmap/track_unknown_space: True
* /explore_server/explore_costmap/transform_tolerance: 0.5
* /explore_server/explore_costmap/update_frequency: 5.0
* /explore_server/frequency: 2.0
* /explore_server/goal_aliasing: 1.0
* /roscpp: kinetic
* /rosversion: 1.12.14
```

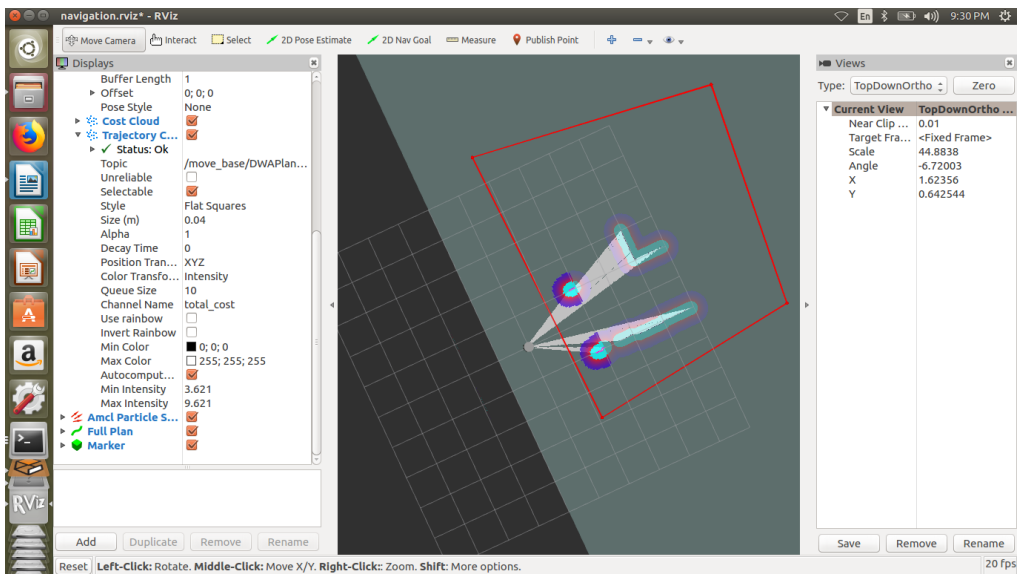
-Add the exploration polygon marker by simply clicking ADD on bottom left corner



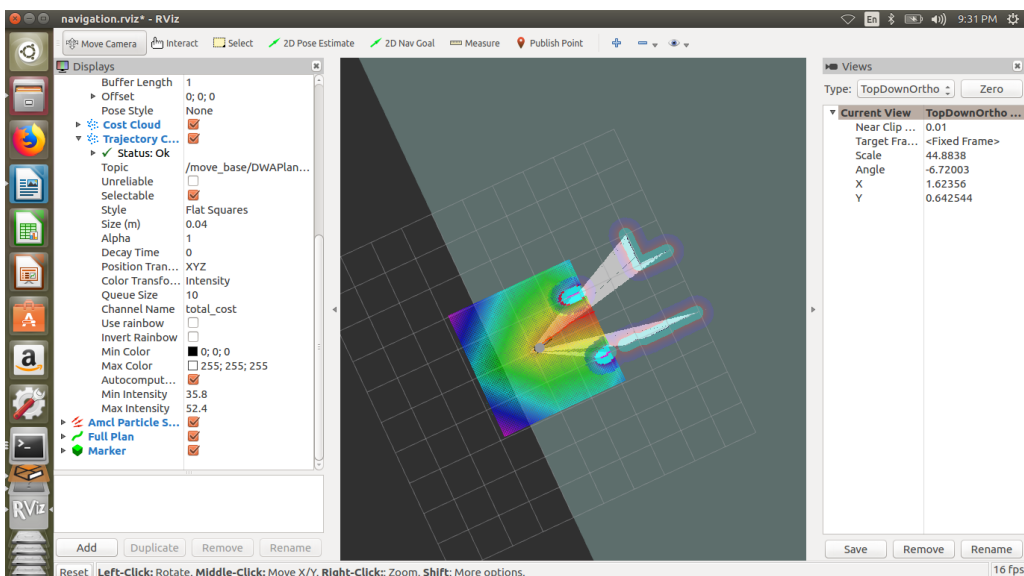
-set the initial boundary point by clicking on publish and then clicking on screen



-repeat this step to form a closed polygon



-once again click on publish and click anywhere inside the polygon and the mapping of that area will begin



TO USE THE EXPLORE_LITE PKG

installation: `sudo apt-get install ros-kinetic explore_lite`

steps are same as above except for using the `explore_lite` instead of `frontier_exploration`.

Roslaunch `explore_lite explore.launch`

THANK YOU