

## Table of Contents

MAPPING -----	1
Start Afresh - New Terminals Have Gazebo running.....	1
II_1 Gazebo and TurtleBot.....	1
Reset Odom for Turtlebot and Model pose in Gazebo .....	2
II_2 Run Mapping DEMO Pg 171 But for Simulator.....	2
gmapping_demo_launch file.....	3
gedit gmapping_demo.launch .....	4
II_3 RVIZ view_navigation_launch.....	4
harman@D104-45931:~\$ roslaunch turtlebot_rviz_launchers view_navigation.launch .....	4
II_4 Launch turtlebot_teleop keyboard_teleop.launch .....	6
After about 15- 20 minutes ... We have a map. ....	8
II_5 SAVE THE MAP.....	8
/home/harman/Desktop/OurMap_4_4_2021.yaml .....	9
/home/harman/Desktop/OurMap_4_4_2021.pgm.....	9
III. NOW Localization and Navigation.....	10
III_1 \$ roslaunch turtlebot_gazebo turtlebot_world.launch .....	10
III_2 \$ roslaunch turtlebot_gazebo amcl_demo.launch \	
map_file:=/home/harman/Desktop/OurMap_4_4_2021.yaml.....	10
View Pages of Parameters .....	14
Find the costmaps .....	14
local_costmap_params .....	15
global_costmap_params.yaml .....	15
III_3 roslaunch turtlebot_rviz_launchers view_navigation.launch.....	16
Move Turtlebot to new position and orientation.....	18

## MAPPING -----

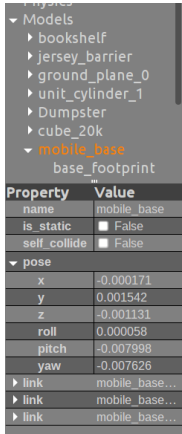
### Start Afresh - New Terminals Have Gazebo running

#### II\_1 Gazebo and TurtleBot

```
$ roslaunch turtlebot_gazebo turtlebot_world.launch
```

#### Reset Odom for Turtlebot and Model pose in Gazebo

```
Pg 170 Check Model pose = 0 (about); Reset with Edit: Reset Check Model pose again
$ rostopic echo /odom -n1
```



```
$ rostopic pub /mobile_base/commands/reset_odometry std_msgs/Empty
```

```
$ rostopic echo /odom/pose -n1
pose:
```

position:

x: 1.44468352064e-08  
y: -1.84578891437e-09  
z: 0.0

orientation:

x: 0.0  
y: 0.0  
z: -0.00823701225098  
w: 0.999966075239

covariance: [0.1, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.1, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1000000.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1000000.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1000000.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.05]

## II\_2 Run Mapping DEMO Pg 171 But for Simulator

```
$ roslaunch turtlebot_gazebo gmapping_demo.launch
```

```
... logging to /home/harman/.ros/log/f41127c4-9590-11eb-9dbd-9cb6d00f6f89/roslaunch-D104-45931-7394.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://D104-45931:38962/
```

SUMMARY

=====

PARAMETERS

```
* /rostdistro: kinetic
* /rosversion: 1.12.16
* /slam_gmapping/angularUpdate: 0.436
* /slam_gmapping/astep: 0.05
* /slam_gmapping/base_frame: base_footprint
```

```

* /slam_gmapping/delta: 0.05
* /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/lisamplerange: 0.01
* /slam_gmapping/lisamplestep: 0.01
* /slam_gmapping/lisigma: 0.075
* /slam_gmapping/liskip: 0
* /slam_gmapping/lisstep: 0.05
* /slam_gmapping/map_update_interval: 5.0
* /slam_gmapping/maxRange: 8.0
* /slam_gmapping/maxUrange: 6.0
* /slam_gmapping/minimumScore: 200
* /slam_gmapping/odom_frame: odom
* /slam_gmapping/ogain: 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
* /slam_gmapping/ymax: 1.0
* /slam_gmapping/ymin: -1.0

```

NODES

```

/
  slam_gmapping (gmapping/slam_gmapping)

```

ROS\_MASTER\_URI=http://localhost:11311

process[slam\_gmapping-1]: started with pid [7411]

process[slam\_gmapping-1]: started with pid [6172]

```

[ INFO] [1617586840.597473082, 46.920000000]: Laser is mounted upwards.
-maxUrange 6 -maxUrange 8 -sigma 0.05 -kernelSize 1 -lstep 0.05 -lobGain 3 -astep 0.05
-srr 0.01 -srt 0.02 -str 0.01 -stt 0.02
-linearUpdate 0.5 -angularUpdate 0.436 -resampleThreshold 0.5
-xmin -1 -xmax 1 -ymin -1 -ymax 1 -delta 0.05 -particles 80
[ INFO] [1617586840.599244803, 46.920000000]: Initialization complete
update frame 0
update ld=0 ad=0
Laser Pose= -0.0859552 0.0493663 -0.0202184
m_count 0
Registering First Scan

```

## gmapping\_demo\_launch file

```

harman@D104-45931:/opt/ros/kinetic/share/turtlebot_navigation/launch$ la -la
total 24
drwxr-xr-x 4 root root 4096 Sep 30 2020 .
drwxr-xr-x 8 root root 4096 Sep 30 2020 ..
-rw-r--r-- 1 root root 1739 Nov 1 2016 amcl_demo.launch

```

```
-rw-r--r-- 1 root root 956 Nov 1 2016 gmapping_demo.launch
drwxr-xr-x 2 root root 4096 Sep 30 2020 graveyard
drwxr-xr-x 4 root root 4096 Sep 30 2020 includes
```

## gedit gmapping\_demo.launch

```
harman@D104-45931:/opt/ros/kinetic/share/turtlebot_navigation/launch$ gedit gmapping_demo.launch
<launch>
  <!-- 3D sensor -->
  <arg name="3d_sensor" default="$(env TURTLEBOT_3D_SENSOR)"/> <!-- r200, kinect, asus_xtion_pro -->
  <include file="$(find turtlebot_bringup)/launch/3dsensor.launch">
    <arg name="rgb_processing" value="false" />
    <arg name="depth_registration" value="false" />
    <arg name="depth_processing" value="false" />

    <!-- We must specify an absolute topic name because if not it will be prefixed by "$(arg camera)".
    Probably is a bug in the nodelet manager: https://github.com/ros/nodelet_core/issues/7 -->
    <arg name="scan_topic" value="/scan" />
  </include>

  <!-- Gmapping -->
  <arg name="custom_gmapping_launch_file" default="$(find turtlebot_navigation)/launch/includes/gmapping/$(arg
3d_sensor)_gmapping.launch.xml"/>
  <include file="$(arg custom_gmapping_launch_file)"/>

  <!-- Move base -->
  <include file="$(find turtlebot_navigation)/launch/includes/move_base.launch.xml"/>

</launch>
```

## II\_3 RVIZ view\_navigation\_launch

### harman@D104-45931:~\$ roslaunch turtlebot\_rviz\_launchers view\_navigation.launch

```
... logging to /home/harman/.ros/log/f41127c4-9590-11eb-9dbd-9cb6d00f6f89/roslaunch-D104-45931-8885.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://D104-45931:38984/
```

```
SUMMARY
```

```
=====
```

```
PARAMETERS
```

```
* /rostdistro: kinetic
```

```
* /rosversion: 1.12.16
```

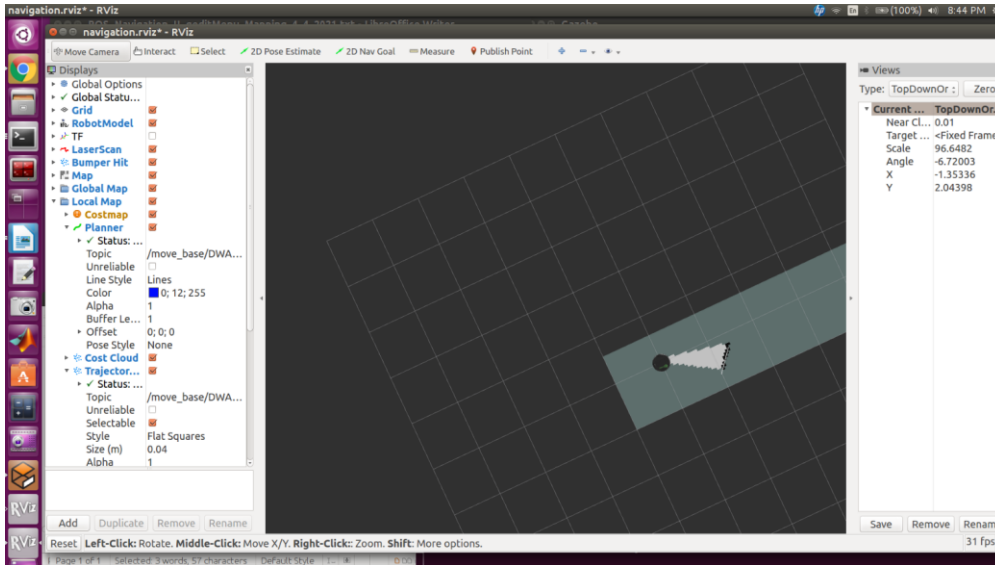
```
NODES
```

```
/
```

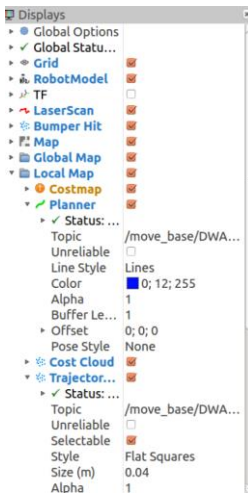
```
  rviz (rviz/rviz)
```

```
ROS_MASTER_URI=http://localhost:11311
```

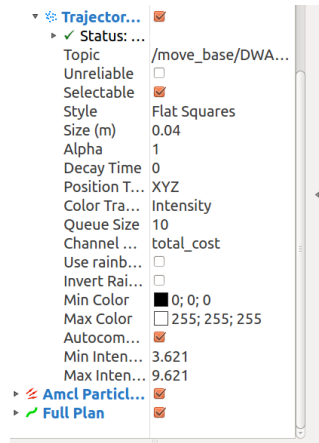
process[rviz-1]: started with pid [8902]



Grid, Robot Model, Laser Scan topic name /scan;  
Bumper hit, Map topic name /map, Global&Local Map, AMCL particles,  
Full Plan - Page 176 explains terms II\_4



II\_4



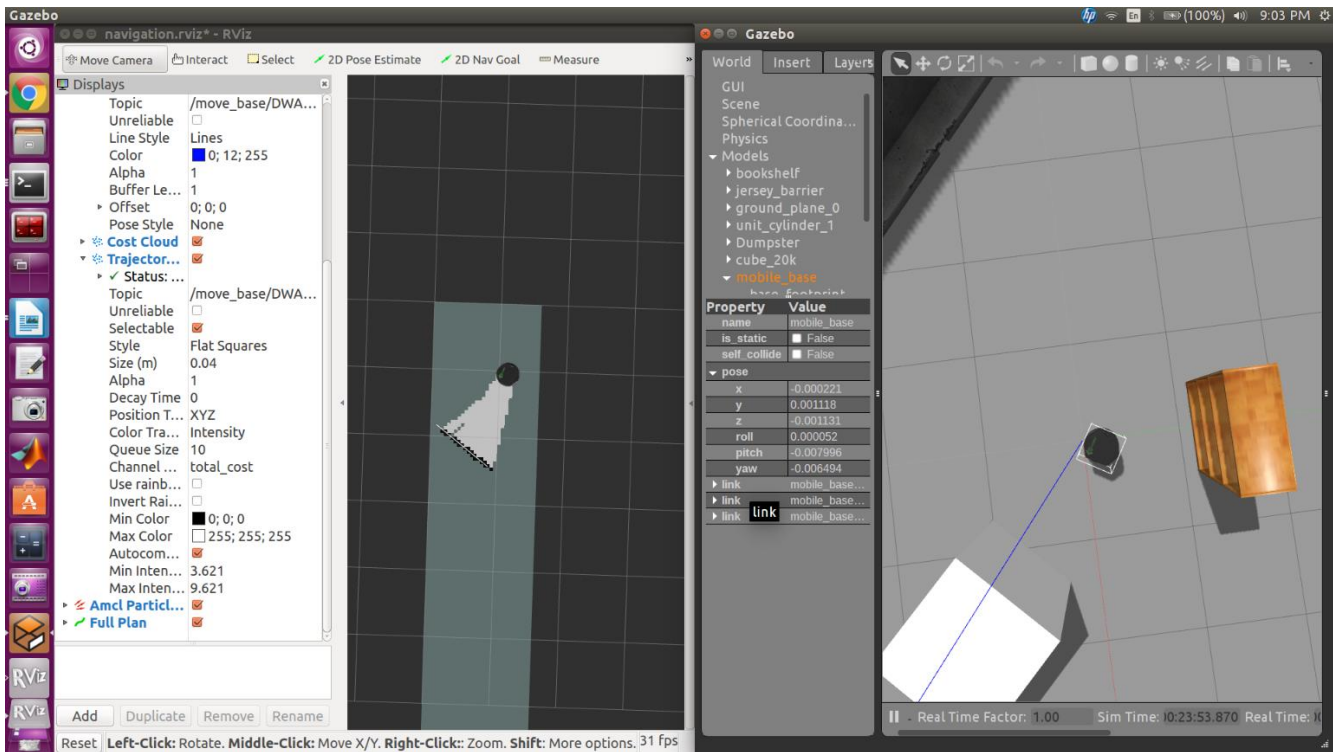
Launch turtlebot\_teleop

keyboard\_teleop.launch

\$ roslaunch turtlebot\_teleop keyboard\_teleop.launch

Start driving the robot using keyboard keys and observe how the map is updated in Rviz Move TB and rotate TB to draw map.

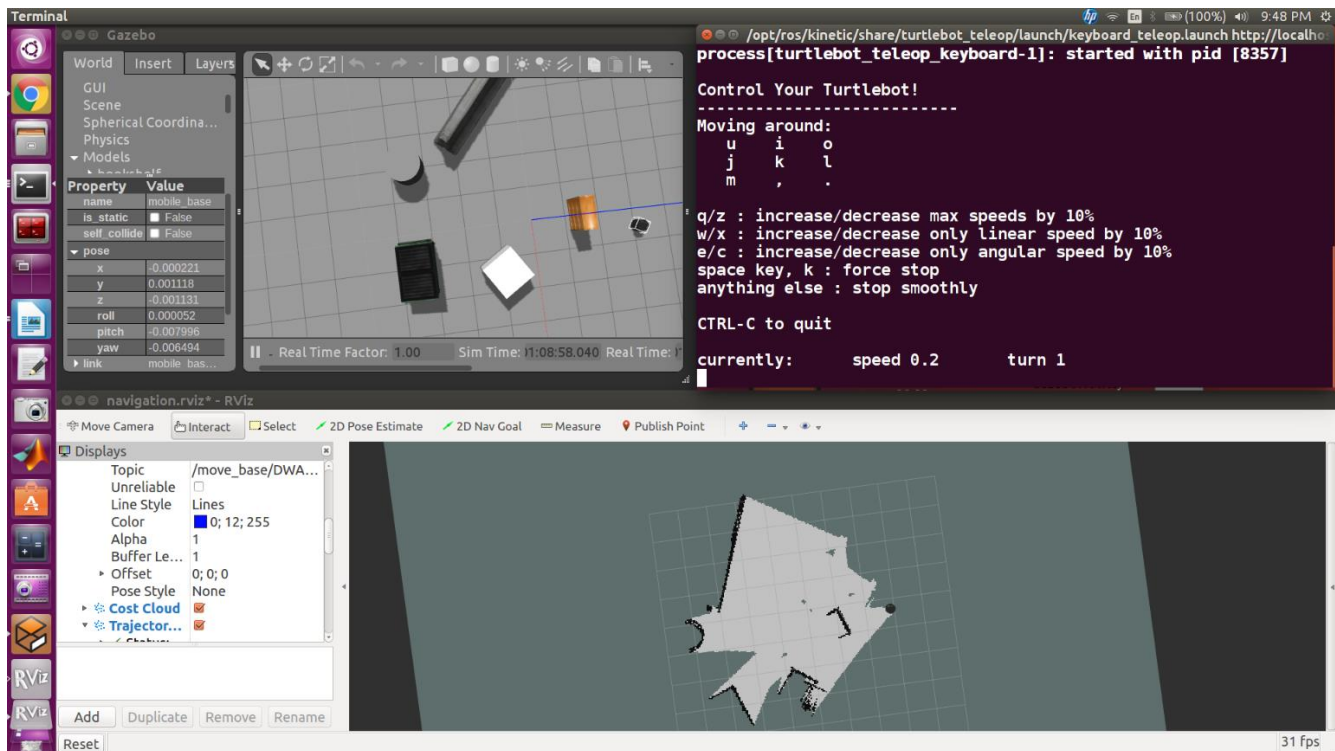
Line up RVIZ and Gazebo images.  
Turtlebot looks at cube in RVIZ and Gazebo



Focus on teleop window and start with l -CW rotation/ Try J – CCW  
Now move Turtlebot I or , and rotate again -

Use Shift+click to move image. Use wheel to change scale.

After about 15- 20 minutes ...We have a map.



## II\_5 SAVE THE MAP

```
$ rosrn map_server map_saver -f home/harman/Desktop/OurMap_4_4_2021
```

```
harman@D104-45931:~$
```

```
rosrun map_server map_saver -f /home/harman/Desktop/OurMap_4_4_2021
```

\* Be sure that command is on one line!

```
rosrun map_server map_saver -f \  
/home/harman/Desktop/OurMap2
```

or multi-line

```
$ rosrn map_server map_saver -f \  
> /home/harman/Desktop/OurMap2
```

```
[ INFO] [1617591680.423699879]: Waiting for the map
```

```
[ INFO] [1617591680.650330511]: Received a 544 X 512 map @ 0.050 m/pix
```

```
[ INFO] [1617591680.650371794]: Writing map occupancy data to /home/harman/Desktop/OurMap_4_4_2021.pgm
```

```
[ INFO] [1617591680.657492153, 4885.110000000]: Writing map occupancy data to
```

```
/home/harman/Desktop/OurMap_4_4_2021.yaml
```

```
[ INFO] [1617591680.657599479, 4885.110000000]: Done
```

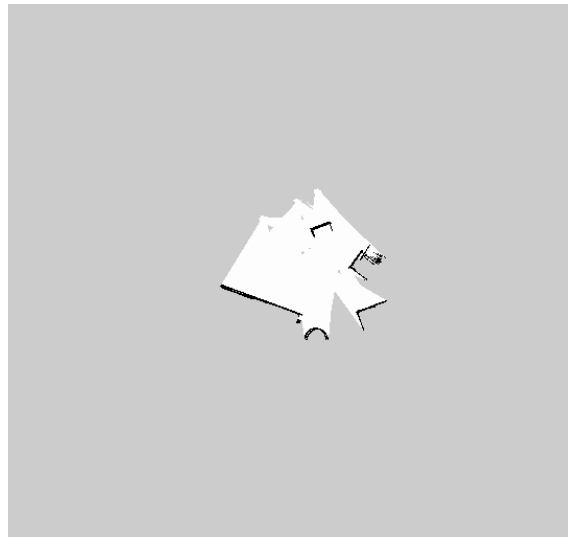
Two files created <map\_name>.yaml and <map\_name>.pgm

## /home/harman/Desktop/OurMap\_4\_4\_2021.yaml

```
image: /home/harman/Desktop/OurMap_4_4_2021.pgm
resolution: 0.050000
origin: [-15.400000, -13.800000, 0.000000]
negate: 0
occupied_thresh: 0.65
free_thresh: 0.196
```

## /home/harman/Desktop/OurMap\_4\_4\_2021.pgm

The file format known as “Portable Greymap”, is a text-greyscale images. PGM extension “.pgm”.



“plain PGM”, which stands for based image. format for files normally have the

**Open** the Terminal window  
type **eog**

program. To **open** the **image** use the **image** name followed by the eog command. eog <name of the **image file**> //  
You can use tab to auto-complete the filename. Nov 7, 2014

in **Ubuntu** (Alt + Cntrl + T) and  
to **open** the **image** viewer

Eye of Gnome Or just Double Click to view. Or use gimp



### III. NOW Localization and Navigation

III\_1 \$ roslaunch turtlebot\_gazebo turtlebot\_world.launch

III\_2 \$ roslaunch turtlebot\_gazebo amcl\_demo.launch \  
map\_file:=/home/harman/Desktop/OurMap\_4\_4\_2021.yaml

Page 177 Wait for odom received!

```
harman@D104-45931:~$ roslaunch turtlebot_gazebo amcl_demo.launch \  
> map_file:=/home/harman/Desktop/OurMap_4_4_2021.yaml  
... logging to /home/harman/.ros/log/39c4bbac-95c6-11eb-9716-9cb6d00f6f89/roslaunch-D104-45931-5182.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://D104-45931:44799/

#### SUMMARY

=====

#### PARAMETERS

```
* /amcl/base_frame_id: base_footprint  
* /amcl/global_frame_id: map  
* /amcl/gui_publish_rate: 10.0  
* /amcl/initial_pose_a: 0.0  
* /amcl/initial_pose_x: 0.0  
* /amcl/initial_pose_y: 0.0  
* /amcl/kld_err: 0.05  
* /amcl/kld_z: 0.99  
* /amcl/laser_lambda_short: 0.1  
* /amcl/laser_likelihood_max_dist: 2.0  
* /amcl/laser_max_beams: 60  
* /amcl/laser_max_range: 12.0  
* /amcl/laser_model_type: likelihood_field  
* /amcl/laser_sigma_hit: 0.2  
* /amcl/laser_z_hit: 0.5  
* /amcl/laser_z_max: 0.05  
* /amcl/laser_z_rand: 0.5  
* /amcl/laser_z_short: 0.05  
* /amcl/max_particles: 2000  
* /amcl/min_particles: 500  
* /amcl/odom_alpha1: 0.2  
* /amcl/odom_alpha2: 0.2  
* /amcl/odom_alpha3: 0.2  
* /amcl/odom_alpha4: 0.2  
* /amcl/odom_alpha5: 0.1  
* /amcl/odom_frame_id: odom  
* /amcl/odom_model_type: diff  
* /amcl/recovery_alpha_fast: 0.0  
* /amcl/recovery_alpha_slow: 0.0  
* /amcl/resample_interval: 1  
* /amcl/transform_tolerance: 1.0  
* /amcl/update_min_a: 0.2  
* /amcl/update_min_d: 0.25
```

```

* /amcl/use_map_topic: False
* /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/sim_time: 1.0
* /move_base/DWAPlanerROS/stop_time_buffer: 0.2
* /move_base/DWAPlanerROS/trans_stopped_vel: 0.1
* /move_base/DWAPlanerROS/vtheta_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/GlobalPlanner/allow_unknown: True
* /move_base/GlobalPlanner/cost_factor: 3.0
* /move_base/GlobalPlanner/default_tolerance: 0.0
* /move_base/GlobalPlanner/lethal_cost: 253
* /move_base/GlobalPlanner/neutral_cost: 50
* /move_base/GlobalPlanner/old_navfn_behavior: False
* /move_base/GlobalPlanner/planner_costmap_publish_frequency: 0.0
* /move_base/GlobalPlanner/planner_window_x: 0.0
* /move_base/GlobalPlanner/planner_window_y: 0.0
* /move_base/GlobalPlanner/publish_potential: True
* /move_base/GlobalPlanner/publish_scale: 100
* /move_base/GlobalPlanner/use_dijkstra: True
* /move_base/GlobalPlanner/use_grid_path: False
* /move_base/GlobalPlanner/use_quadratic: True
* /move_base/NavfnROS/allow_unknown: False
* /move_base/NavfnROS/default_tolerance: 0.0
* /move_base/NavfnROS/planner_window_x: 0.0
* /move_base/NavfnROS/planner_window_y: 0.0
* /move_base/NavfnROS/visualize_potential: False
* /move_base/base_global_planner: navfn/NavfnROS
* /move_base/base_local_planner: dwa_local_planner...
* /move_base/controller_frequency: 5.0
* /move_base/controller_patience: 3.0
* /move_base/global_costmap/global_frame: map
* /move_base/global_costmap/inflation_layer/cost_scaling_factor: 5.0
* /move_base/global_costmap/inflation_layer/enabled: True
* /move_base/global_costmap/inflation_layer/inflation_radius: 0.5
* /move_base/global_costmap/map_type: voxel

```

```

* /move_base/global_costmap/max_obstacle_height: 0.6
* /move_base/global_costmap/obstacle_layer/bump/clearing: False
* /move_base/global_costmap/obstacle_layer/bump/data_type: PointCloud2
* /move_base/global_costmap/obstacle_layer/bump/marketing: True
* /move_base/global_costmap/obstacle_layer/bump/max_obstacle_height: 0.15
* /move_base/global_costmap/obstacle_layer/bump/min_obstacle_height: 0.0
* /move_base/global_costmap/obstacle_layer/bump/topic: mobile_base/senso...
* /move_base/global_costmap/obstacle_layer/combination_method: 1
* /move_base/global_costmap/obstacle_layer/enabled: True
* /move_base/global_costmap/obstacle_layer/mark_threshold: 0
* /move_base/global_costmap/obstacle_layer/max_obstacle_height: 0.6
* /move_base/global_costmap/obstacle_layer/observation_sources: scan bump
* /move_base/global_costmap/obstacle_layer/obstacle_range: 2.5
* /move_base/global_costmap/obstacle_layer/origin_z: 0.0
* /move_base/global_costmap/obstacle_layer/publish_voxel_map: False
* /move_base/global_costmap/obstacle_layer/raytrace_range: 3.0
* /move_base/global_costmap/obstacle_layer/scan/clearing: True
* /move_base/global_costmap/obstacle_layer/scan/data_type: LaserScan
* /move_base/global_costmap/obstacle_layer/scan/marketing: True
* /move_base/global_costmap/obstacle_layer/scan/max_obstacle_height: 0.35
* /move_base/global_costmap/obstacle_layer/scan/min_obstacle_height: 0.25
* /move_base/global_costmap/obstacle_layer/scan/topic: scan
* /move_base/global_costmap/obstacle_layer/track_unknown_space: True
* /move_base/global_costmap/obstacle_layer/unknown_threshold: 15
* /move_base/global_costmap/obstacle_layer/z_resolution: 0.2
* /move_base/global_costmap/obstacle_layer/z_voxels: 2
* /move_base/global_costmap/plugins: [{'type': 'costma...
* /move_base/global_costmap/publish_frequency: 0.5
* /move_base/global_costmap/robot_base_frame: base_footprint
* /move_base/global_costmap/robot_radius: 0.2
* /move_base/global_costmap/static_layer/enabled: True
* /move_base/global_costmap/static_map: True
* /move_base/global_costmap/transform_tolerance: 0.5
* /move_base/global_costmap/update_frequency: 1.0
* /move_base/local_costmap/global_frame: odom
* /move_base/local_costmap/height: 4.0
* /move_base/local_costmap/inflation_layer/cost_scaling_factor: 5.0
* /move_base/local_costmap/inflation_layer/enabled: True
* /move_base/local_costmap/inflation_layer/inflation_radius: 0.5
* /move_base/local_costmap/map_type: voxel
* /move_base/local_costmap/max_obstacle_height: 0.6
* /move_base/local_costmap/obstacle_layer/bump/clearing: False
* /move_base/local_costmap/obstacle_layer/bump/data_type: PointCloud2
* /move_base/local_costmap/obstacle_layer/bump/marketing: True
* /move_base/local_costmap/obstacle_layer/bump/max_obstacle_height: 0.15
* /move_base/local_costmap/obstacle_layer/bump/min_obstacle_height: 0.0
* /move_base/local_costmap/obstacle_layer/bump/topic: mobile_base/senso...
* /move_base/local_costmap/obstacle_layer/combination_method: 1
* /move_base/local_costmap/obstacle_layer/enabled: True
* /move_base/local_costmap/obstacle_layer/mark_threshold: 0
* /move_base/local_costmap/obstacle_layer/max_obstacle_height: 0.6
* /move_base/local_costmap/obstacle_layer/observation_sources: scan bump
* /move_base/local_costmap/obstacle_layer/obstacle_range: 2.5
* /move_base/local_costmap/obstacle_layer/origin_z: 0.0
* /move_base/local_costmap/obstacle_layer/publish_voxel_map: False
* /move_base/local_costmap/obstacle_layer/raytrace_range: 3.0
* /move_base/local_costmap/obstacle_layer/scan/clearing: True
* /move_base/local_costmap/obstacle_layer/scan/data_type: LaserScan
* /move_base/local_costmap/obstacle_layer/scan/marketing: True

```

```

* /move_base/local_costmap/obstacle_layer/scan/max_obstacle_height: 0.35
* /move_base/local_costmap/obstacle_layer/scan/min_obstacle_height: 0.25
* /move_base/local_costmap/obstacle_layer/scan/topic: scan
* /move_base/local_costmap/obstacle_layer/track_unknown_space: True
* /move_base/local_costmap/obstacle_layer/unknown_threshold: 15
* /move_base/local_costmap/obstacle_layer/z_resolution: 0.2
* /move_base/local_costmap/obstacle_layer/z_voxels: 2
* /move_base/local_costmap/plugins: [{'type': 'costma...
* /move_base/local_costmap/publish_frequency: 2.0
* /move_base/local_costmap/resolution: 0.05
* /move_base/local_costmap/robot_base_frame: base_footprint
* /move_base/local_costmap/robot_radius: 0.2
* /move_base/local_costmap/rolling_window: True
* /move_base/local_costmap/static_layer/enabled: True
* /move_base/local_costmap/static_map: False
* /move_base/local_costmap/transform_tolerance: 0.5
* /move_base/local_costmap/update_frequency: 5.0
* /move_base/local_costmap/width: 4.0
* /move_base/oscillation_distance: 0.2
* /move_base/oscillation_timeout: 10.0
* /move_base/planner_frequency: 1.0
* /move_base/planner_patience: 5.0
* /move_base/shutdown_costmaps: False
* /navigation_velocity_smoother/accel_lim_v: 1.0
* /navigation_velocity_smoother/accel_lim_w: 2.0
* /navigation_velocity_smoother/decel_factor: 1.5
* /navigation_velocity_smoother/frequency: 20.0
* /navigation_velocity_smoother/robot_feedback: 2
* /navigation_velocity_smoother/speed_lim_v: 0.8
* /navigation_velocity_smoother/speed_lim_w: 5.4
* /roscpp: kinetic
* /rosversion: 1.12.16

```

## NODES

```

/
  amcl (amcl/amcl)
  kobuki_safety_controller (nodelet/nodelet)
  map_server (map_server/map_server)
  move_base (move_base/move_base)
  navigation_velocity_smoother (nodelet/nodelet)

```

ROS\_MASTER\_URI=http://localhost:11311

```

process[map_server-1]: started with pid [5199]
process[amcl-2]: started with pid [5200]
process[navigation_velocity_smoother-3]: started with pid [5201]
process[kobuki_safety_controller-4]: started with pid [5202]
process[move_base-5]: started with pid [5241]
[ WARN] [1617596527.488051920, 90.340000000]: Timed out waiting for transform from
base_footprint to map to become available before running costmap, tf error: canTransform:
target_frame map does not exist.. canTransform returned after 90.34 timeout was 0.1.
[ INFO] [1617596528.611426797, 91.460000000]: Using plugin "static_layer"
[ INFO] [1617596528.689304952, 91.540000000]: Requesting the map...
[ INFO] [1617596528.888582137, 91.740000000]: Resizing costmap to 544 X 512 at 0.050000 m/pix
[ INFO] [1617596528.988027724, 91.840000000]: Received a 544 X 512 map at 0.050000 m/pix
[ INFO] [1617596528.992019343, 91.840000000]: Using plugin "obstacle_layer"
[ INFO] [1617596528.994543952, 91.840000000]: Subscribed to Topics: scan bump
[ INFO] [1617596529.037193414, 91.880000000]: Using plugin "inflation_layer"
[ INFO] [1617596529.103984074, 91.950000000]: Using plugin "obstacle_layer"

```

```
[ INFO] [1617596529.106108120, 91.950000000]: Subscribed to Topics: scan bump
[ INFO] [1617596529.146659337, 91.990000000]: Using plugin "inflation_layer"
[ INFO] [1617596529.202943432, 92.050000000]: Created local_planner
dwa_local_planner/DWAPlannerROS
[ INFO] [1617596529.206431382, 92.050000000]: Sim period is set to 0.20
[ INFO] [1617596530.193775914, 93.040000000]: Recovery behavior will clear layer obstacles
[ INFO] [1617596530.209411899, 93.060000000]: Recovery behavior will clear layer obstacles
[ INFO] [1617596530.244056637, 93.090000000]:
```

odom received!

## View Pages of Parameters

```
harman@D104-45931:~$ rosparam get /
```

## Find the costmaps

```
harman@D104-45931:~$ cd /opt/ros/kinetic/share/turtlebot_navigation/param/
harman@D104-45931:/opt/ros/kinetic/share/turtlebot_navigation/param$ ls
astra_costmap_params.yaml          global_planner_params.yaml
asus_xtion_pro_costmap_params.yaml kinect_costmap_params.yaml
asus_xtion_pro_offset_costmap_params.yaml local_costmap_params.yaml
costmap_common_params.yaml         move_base_params.yaml
dummy.yaml                         navfn_global_planner_params.yaml
dwa_local_planner_params.yaml      r200_costmap_params.yaml
global_costmap_params.yaml
```

## local\_costmap\_params

```
local_costmap:
  global_frame: odom
  robot_base_frame: /base_footprint
  update_frequency: 5.0
  publish_frequency: 2.0
  static_map: false
  rolling_window: true
  width: 4.0
  height: 4.0
  resolution: 0.05
  transform_tolerance: 0.5
  plugins:
    - {name: obstacle_layer, type: "costmap_2d::VoxelLayer"}
    - {name: inflation_layer, type: "costmap_2d::InflationLayer"}
```

## global\_costmap\_params.yaml

```
global_costmap:
  global_frame: /map
  robot_base_frame: /base_footprint
  update_frequency: 1.0
  publish_frequency: 0.5
  static_map: true
  transform_tolerance: 0.5
  plugins:
    - {name: static_layer,      type: "costmap_2d::StaticLayer"}
    - {name: obstacle_layer,   type: "costmap_2d::VoxelLayer"}
    - {name: inflation_layer,  type: "costmap_2d::InflationLayer"}
```

## III\_3 roslaunch turtlebot\_rviz\_launchers view\_navigation.launch

```
$ roslaunch turtlebot_rviz_launchers view_navigation.launch
```

```
... logging to /home/harman/.ros/log/39c4bbac-95c6-11eb-9716-9cb6d00f6f89/roslaunch-D104-45931-13383.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://D104-45931:34945/
```

```
SUMMARY
```

```
=====
```

```
PARAMETERS
```

```
* /rostdistro: kinetic
```

```
* /rosversion: 1.12.16
```

```
NODES
```

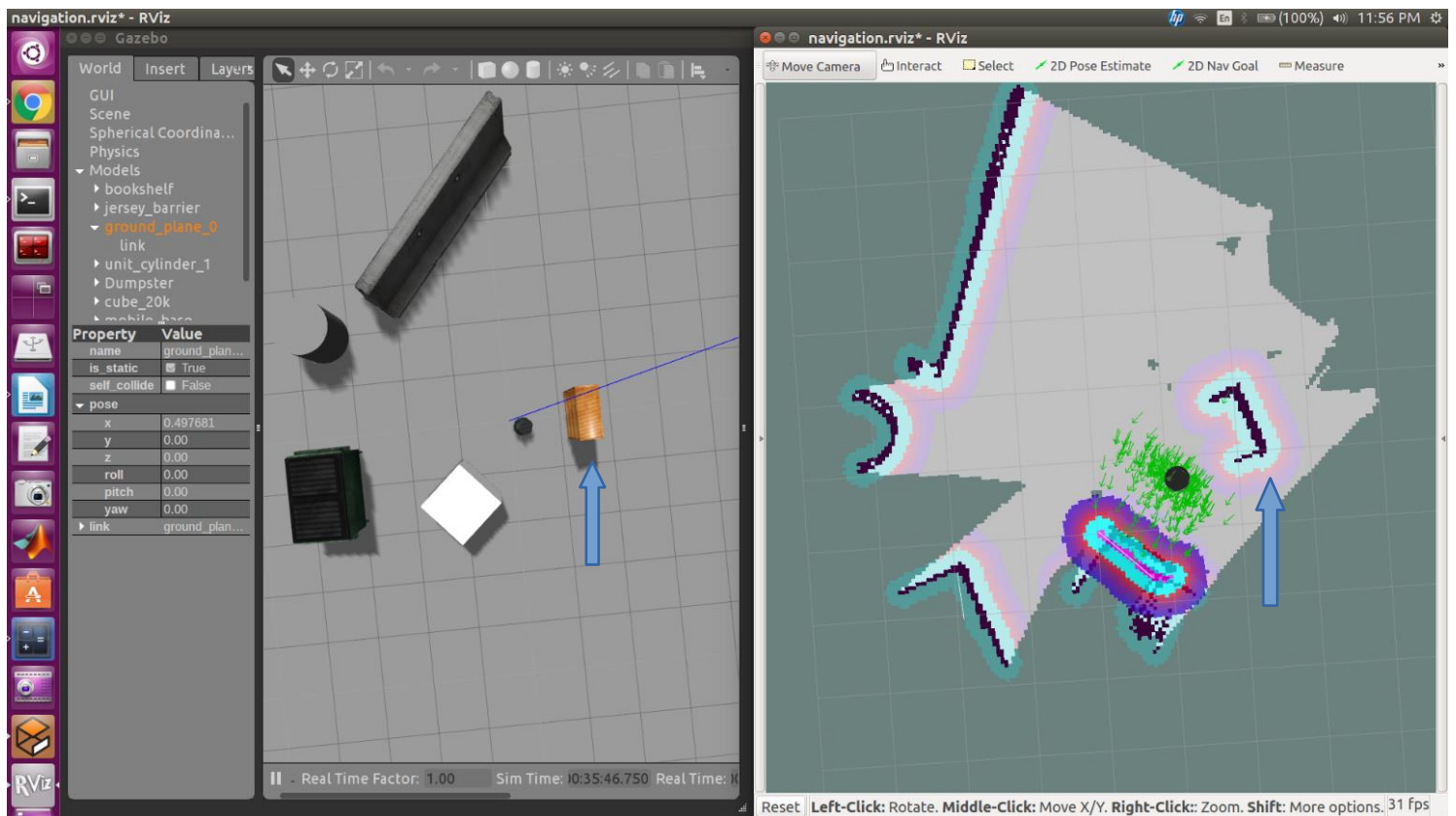
```
/
```

```
  rviz (rviz/rviz)
```

ROS\_MASTER\_URI=http://localhost:11311

process[rviz-1]: started with pid [13406]

### III\_3 \$ roslaunch turtlebot\_rviz\_launchers view\_navigation.launch P177 Align Gazebo grid with RVIZ Map x-y



Text Page 178





## Move Turtlebot to new position and orientation

Text Page 178 2D Pose Estimate in RVIZ

Text Page 179-180 Set 2D Nav Goal in RVIZ

