02/08/18 **TurtleBot1 Cheat Sheet with Mapping**

I. ON TURTLEBOT

1. POWER TO NETBOOK
2. LOG ON NETBOOK PASS: TB
3. **POWER ON BASE (Button to right of base)**
4. CONNECT NETBOOK TO BASE (lower left of base)
5. **CONNECT TO BUFFALO ROUTER**

II. ON WORKSTATION FOR KEYBOARD TELEOP

1. CONNECT TO BUFFALO ROUTER (System settings > Network)

2. Terminal 1: **$ . .turtlebot** (Set up Netbook as ROS MASTER)

#This makes TurtleBot the Master through the Buffalo Router 9/29/2015
export ROS_MASTER_URI=http://192.168.11.123:11311 # TurtleBot IP as MASTER
export ROS_IP=192.168.11.139 # Alienware 3/21/2017

harman@D104-45931:~$ **echo $ROS_MASTER_URI**
http://192.168.11.123:11311
harman@D104-45931:~$ **echo $ROS_IP**
192.168.11.139

3. Terminal 1 $ **ssh turtlebot@192.168.11.123**
Enter Password turtlebot@192.168.11.123's password: xxxxxxxx

4. $ **roslaunch turtlebot_bringup minimal.launch**

If a problem check 1. Base is on 2. Connected everywhere to Router 3. $ ping 192.168.11.123 4. $ env | grep ROS ROS_Master_ URI is TurtleBot IP

ROS_MASTER_URI=http://192.168.11.123:11311
ROS_IP=192.168.11.120 (See page 87 in our book)

OR $ gedit .bashrc on TurtleBot ROS_MASTER_URI is TurtleBot IP and ROS_IP is also TurtleBot.

Terminal 2

1$ . .turtlebot

1a. $ rostopic echo /odom/pose/pose -n 1

2. $ roslaunch turtlebot_teleop keyboard_teleop.launch

Control Your Turtlebot!

Moving around:
u i o
j k l
m , .

q/z : increase/decrease max speeds by 10%
w/x : increase/decrease only linear speed by 10%
e/c : increase/decrease only angular speed by 10%
space key, k : force stop
anything else : stop smoothly

CTRL-C to quit

3. Check Odometry

harman@D104-45931:~$ **rostopic echo /odom/pose/pose -n 1**

```
position:
  x: 1.16159591488              Notice Distance in x
  y: 0.0083827220684
  z: 0.0
orientation:
  x: 0.0
  y: 0.0
  z: 0.00767937322778           A little off
  w: 0.999970513179
---
```

II. TO TEST CAMERAS (RVIZ and Mapping below)

(If New Start at Beginning See I. 1-5; II. 1-4)

NEW TERMINAL
$ **. .turtlebot**

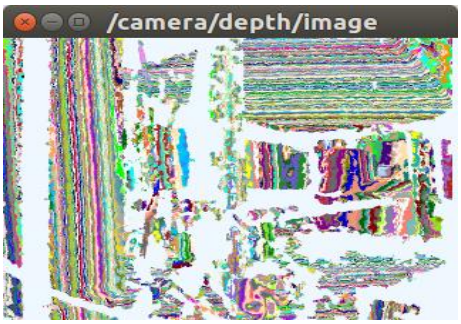
$ ssh turtlebot@192.168.11.123 Enter Password tuxxxxxxxx

$ **roslaunch freenect_launch freenect.launch** Kinect Camera Driver - No picture yet No viewer?

NEW TERMINAL -3
$ . .turtlebot
$ **rosrun image_view image_view image:=/camera/rgb/image_color**

Cntl+c to exit or Open a New Terminal Window to see raw and depth.

$ . .turtlebot
$ **rosrun image_view image_view image:=/camera/depth/image** – depth view
Try other topics $ **rostopic list**



RVIZ - Start Over
1. CONNECT TO BUFFALO ROUTER (System settings > Network)

New Terminal 1
$ . .turtlebot
$ Terminal 1: $ . .turtlebot (Set up Netbook as ROS MASTER)
#This makes TurtleBot the Master through the Buffalo Router 9/29/2015
export ROS_MASTER_URI=http://192.168.11.123:11311 # TurtleBot IP as MASTER
export ROS_IP=192.168.11.120 # Wireless IP on Workstation
2. Terminal 1 $ **ssh turtlebot@192.168.11.123**
Enter Password turtlebot@192.168.11.123's password: xxxxxxxx
4. $ roslaunch turtlebot_bringup minimal.launch

Terminal 2
$ . .turtlebot
$ **ssh** turtlebot@192.168.11.123 **Password txxx New Driver**

CHECK IT!
turtlebot@turtlebot-0428:~$ env | grep TURTLEBOT_3D_SENSOR
TURTLEBOT_3D_SENSOR=kinect

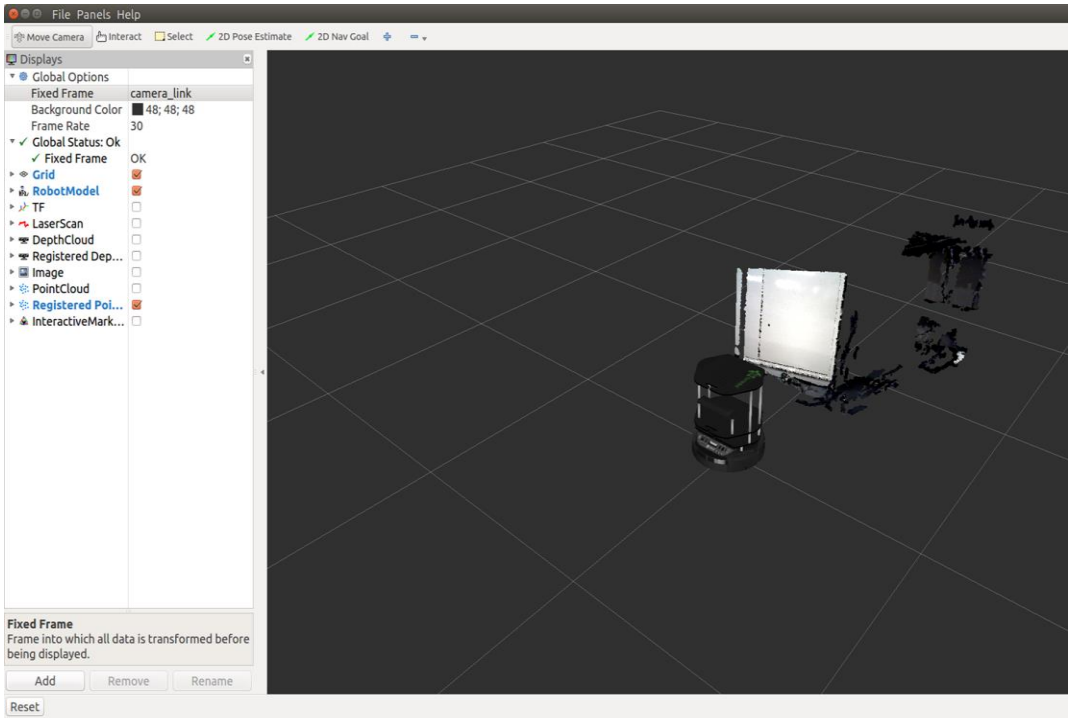
5. **$ roslaunch turtlebot_bringup 3dsensor.launch** (Start camera nodelet manager – no picture)
Wait for:
[INFO] [1458678210.602479260]: Stopping device RGB and Depth stream flush.

New Terminal 3
$ . .turtlebot
$ **roslaunch turtlebot_rviz_launchers view_robot.launch** rviz working Look at screen
Wait for Screen with TurtleBot

As shown in the next screenshot we choose the following: **(BE PATIENT!)**

- Under **Global Options** in the left panel for **Fixed Frame**, change **base_link** or **base_footprint** to **camera_link**.
- To select the view – **Check box under Displays** Select: **Registered Point Cloud** (as here)

New



Terminal 4 MOVE TURTLEBOT AND WATCH RVIZ

$ . .turtlebot

(We need to move TurtleBot so that odom topic feeds TF information to Rviz)

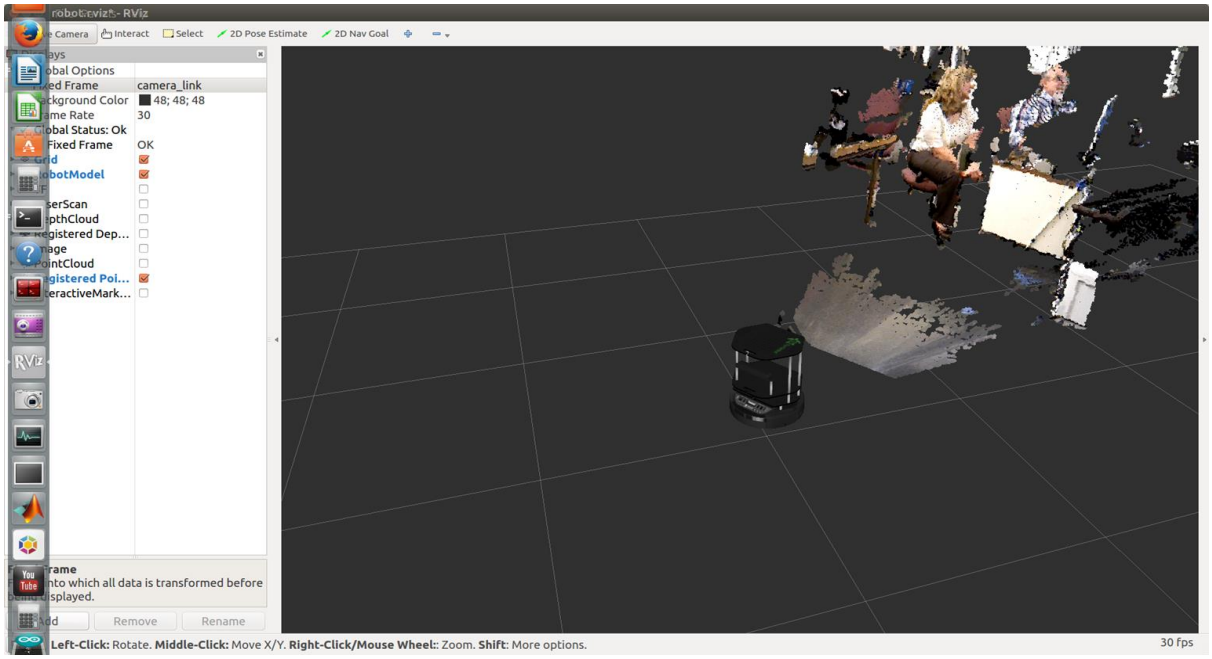
$ **roslaunch turtlebot_teleop keyboard_teleop.launch** OR

$ roslaunch turtlebot_teleop xbox360_teleop.launch (Joystick)

(Hold Deadman Button – Left Upper Button

*** /turtlebot_teleop_joystick/axis_deadman: 4**

(Be patient for Updates to RVIZ)


robot.rviz* - RViz
Interact
Select
2D Pose Estimate
2D Nav Goal
Fixed Frame
camera_link
48; 48; 48
30
OK
RobotModel
Remove
Rename
Left-Click: Rotate. Middle-Click: Move X/Y. Right-Click/Mouse Wheel:: Zoom. Shift: More options.
30 fps

MAKE A MAP

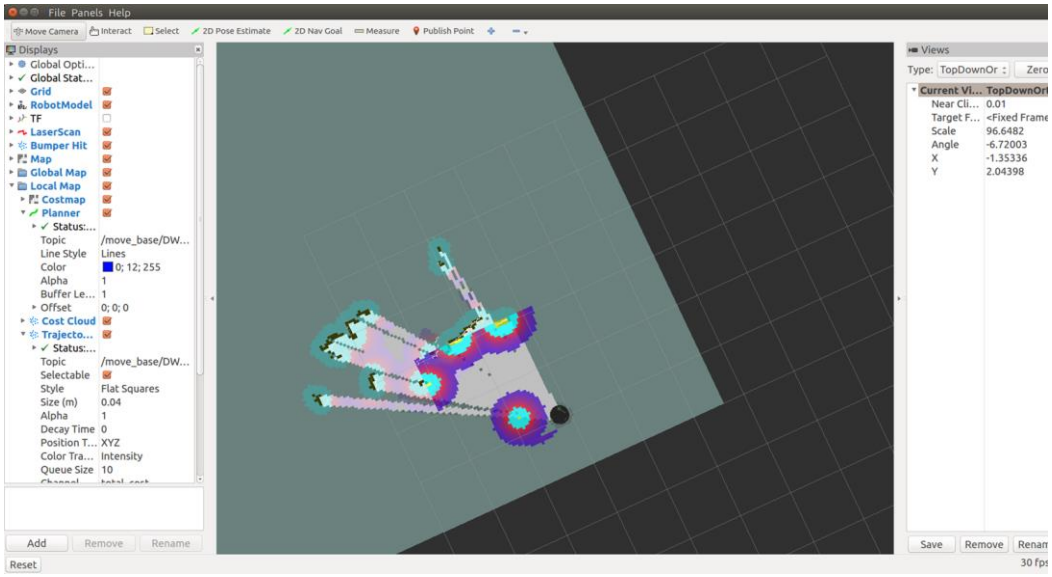
Terminal 1
$ . .turtlebot
$ ssh turtlebot@192.168.11.123 Enter Password t
$ **roslaunch turtlebot_bringup minimal.launch**

Reset Odometry if Needed – New Terminal
$ . .turtlebot
harman@D104-45931:~$ rostopic pub /mobile_base/commands/reset_odometry std_msgs/Empty

Terminal 2
$ . .turtlebot
$ ssh turtlebot@192.168.11.123 Password
$ **roslaunch turtlebot_navigation gmapping_demo.launch**

(Wait for [INFO] [1456876362.958566171]: odom received!)

Terminal 3
$ . .turtlebot
$ **roslaunch turtlebot_rviz_launchers view_navigation.launch**

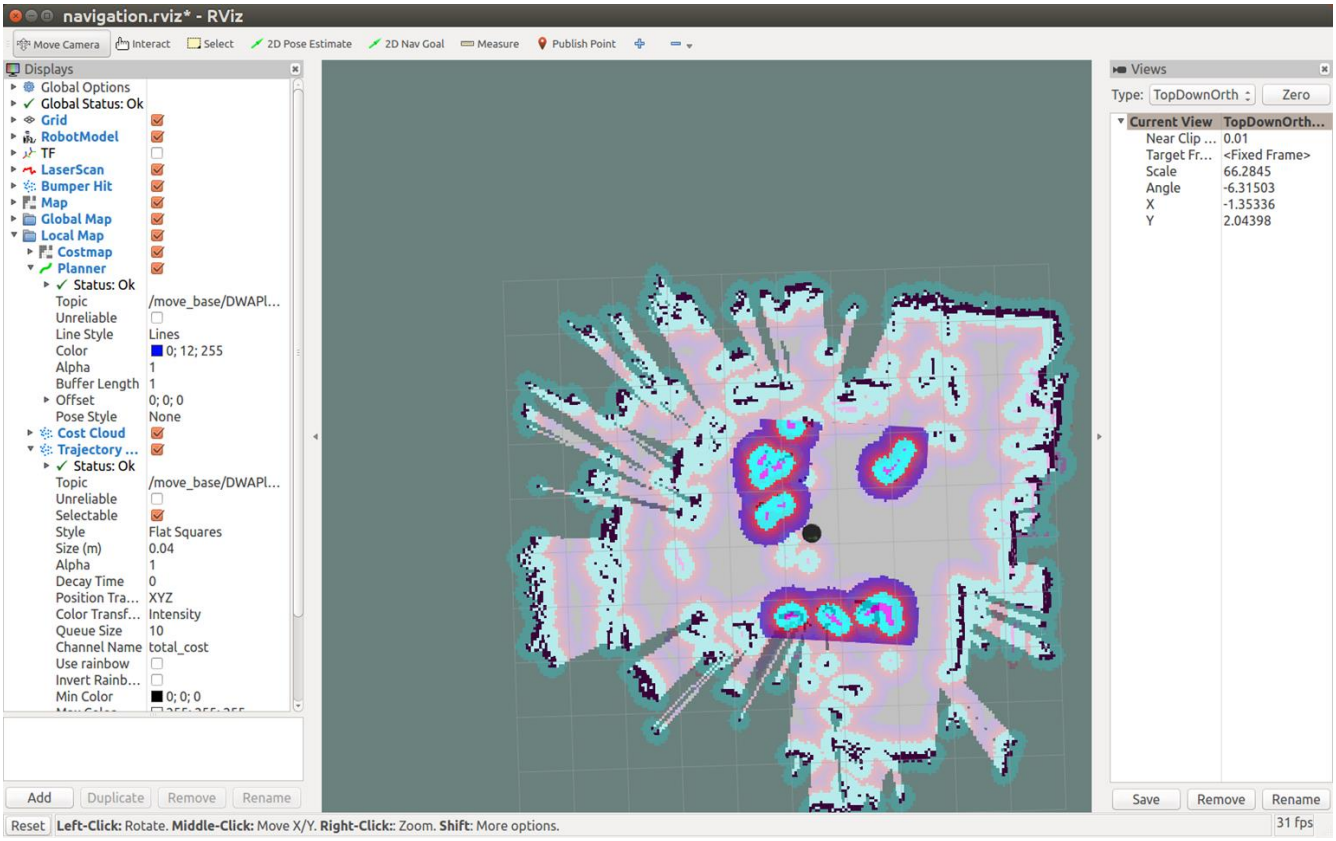


Shows initial location of TurtleBot (Black) – arbitrary position.

MAKE MAP - KEYBOARD OR JOYSTICK OR INTERACTIVE MARKERS

Terminal 4
tlharmanphd@D125-43873:~$ . .turtlebot
tlharmanphd@D125-43873:~$ **roslaunch turtlebot_teleop xbox360_teleop.launch**

(Move TB around)



SAVE THE MAP

Terminal 5

tlharmanphd@D125-43873:~$ . .turtlebot

tlharmanphd@D125-43873:~$ ssh turtlebot@192.168.11.123

turtlebot@turtlebot-0428:~$ **rosrun map_server map_saver -f /home/turtlebot/<Map Name>**

Example
rosrun map_server map_saver -f /home/turtlebot/Map<date> Saves Map<date>.yaml Map<date>.pgm

turtlebot@turtlebot-0428:~$ ls
catkin_ws JSmap.pgm **Map2_8_2018.yaml** **my_map.yaml**
Desktop JSmap.yaml map30.pgm Pictures
Documents Map10_31_2017_5435.pgm map30.yaml Public
Downloads Map10_31_2017_5435.yaml Music Templates
examples.desktop **Map2_8_2018.pgm** my_map.pgm Videos

NOW WE HAVE A MAP - HAVE TURTLEBOT NAVIGATE WITH RVIZ

Have Minimal Launch running

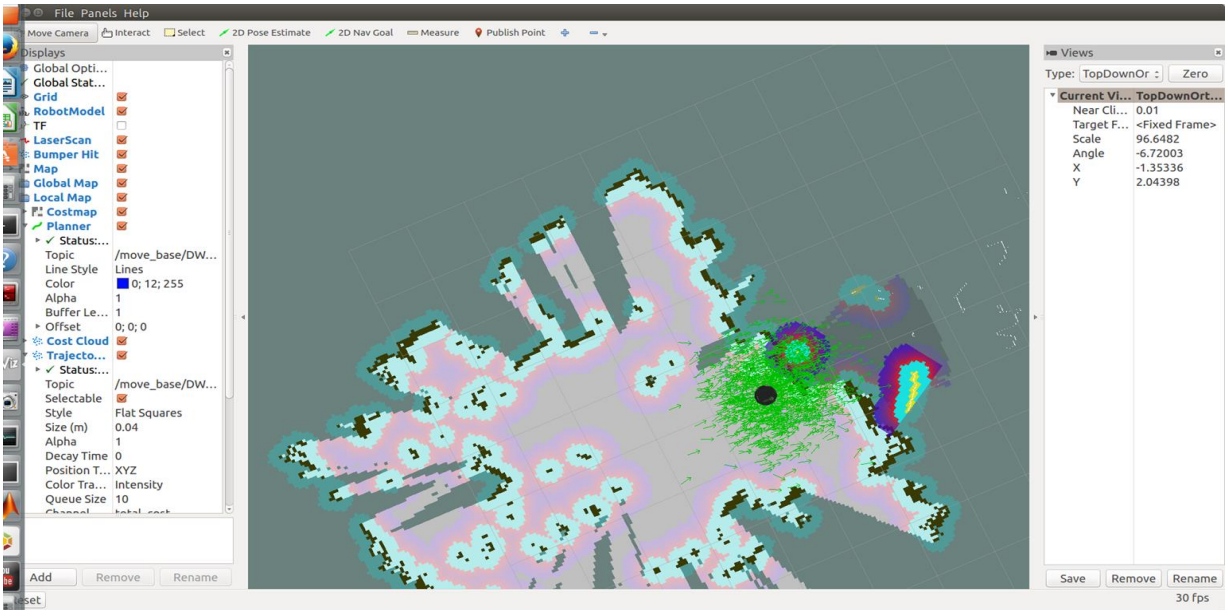
New Terminal 2

tlharmanphd@D125-43873:~$ . .turtlebot
tlharmanphd@D125-43873:~$ **ssh turtlebot@192.168.11.123** Password

TurtleBot 1 In Memory a MAP Map2_8_2018.yaml

turtlebot@turtlebot-0428:~$ roslaunch turtlebot_navigation amcl_demo.launch map_file:=/home/turtlebot/Map2_8_2018.yaml
[INFO] [1518128292.156325400]: odom received!

Terminal 3
$ . .turtlebot
$ **roslaunch turtlebot_rviz_launchers view_navigation.launch**



1. Select 2D Pose Estimate on the menu bar- Left Click and keep pressing on TB's approximate location on the map and move mouse in direction that TB is pointing. (TB in map will appear to his location)

2. Select 2D Nav Goal on menu bar - Left Click on goal location and drag mouse so that Big Green Arrow points in the direction that you want TB to face when TB reaches the goal. Maybe do this is several trips to avoid crashes!

DO THIS CAREFULLY – TURTLEBOT CANNOT SEE BAXTER'S "FEET" FOR EXAMPLE.