09/29/18 Python Turtlesim & Turtlebot Examples Alienware

1. Locate Files:

```
harman@D104-45931:~/Desktop/Turtlebot_Python_Scripts$ ls -la
total 252
drwxrwxr-x  2 harman harman   4096 Sep 29 18:03 .
drwxr-xr-x 24 harman harman   4096 Sep 29 18:03 ..
-rw-rw-r--  1 harman harman   1975 Feb  5  2018 ControlTurtleBot_circle.py
-rw-rw-r--  1 harman harman   2099 Feb  2  2018 go_in_circleTurtlesim.py
-rw-r--r--  1 harman harman   1562 Jul 20  2017 MoveTBtoGoalPoints.py
-rw-r--r--  1 harman harman    403 Jan 31  2018 range_ahead.py
-rw-rw-r--  1 harman harman   4112 Feb  1  2018 timed_out_and_back_TLH.py
-rw-rw-r--  1 harman harman   4113 Feb  9  2018 timed_out_and_back_TLH_rate100.py
-rw-rw-r--  1 harman harman   4111 Feb  9  2018 timed_out_and_back_TLH_rate1.py
-rw-rw-r--  1 harman harman 205203 Sep 29 18:02 TurtlesimTurtleBot_go_in_circle_remap.odt
```

2. Make Executable

```
harman@D104-45931:~/Desktop/Turtlebot_Python_Scripts$ chmod +x *.py
harman@D104-45931:~/Desktop/Turtlebot_Python_Scripts$ ls -la
total 252
drwxrwxr-x  2 harman harman   4096 Sep 29 18:03 .
drwxr-xr-x 24 harman harman   4096 Sep 29 18:03 ..
-rwxrwxr-x  1 harman harman   1975 Feb  5  2018 ControlTurtleBot_circle.py
-rwxrwxr-x  1 harman harman   2099 Feb  2  2018 go_in_circleTurtlesim.py
-rwxr-xr-x  1 harman harman   1562 Jul 20  2017 MoveTBtoGoalPoints.py
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-rwxrwxr-x  1 harman harman   4112 Feb  1  2018 timed_out_and_back_TLH.py
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-rwxrwxr-x  1 harman harman   4111 Feb  9  2018 timed_out_and_back_TLH_rate1.py
-rw-rw-r--  1 harman harman 205203 Sep 29 18:02 TurtlesimTurtleBot_go_in_circle_remap.odt


harman@D104-45931:~/Desktop/Turtlebot_Python_Scripts$
```

3. **Go the the proper directory to run programs**

```
harman@D104-45931:~/Desktop$ cd Turtlebot_Python_Scripts/
harman@D104-45931:~/Desktop/Turtlebot_Python_Scripts$ ls
ControlTurtleBot_circle.py  timed_out_and_back_TLH.py
go_in_circleTurtlesim.py    timed_out_and_back_TLH_rate100.py
MoveTBtoGoalPoints.py       timed_out_and_back_TLH_rate1.py
range_ahead.py              TurtlesimTurtleBot_go_in_circle_remap.odt
```

4. Run with turtlebot_gazebo turtlebot_world.launch

harman@D104-45931:~$ roscd turtlebot_gazebo/
harman@D104-45931:/opt/ros/kinetic/share/turtlebot_gazebo$ ls
cmake launch maps package.xml worlds

harman@D104-45931:~$ roscd turtlebot_gazebo/launch

harman@D104-45931:/opt/ros/kinetic/share/turtlebot_gazebo/launch$ ls
amcl_demo.launch gmapping_demo.launch includes turtlebot_world.launch

4a. Let's see the 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>
```

5. Run some Python

5a. Fire up Gazebo and Turtlebot
Terminal 1
harman@D104-45931:~/Desktop/Turtlebot_Python_Scripts$ roslaunch turtlebot_gazebo turtlebot_world.launch
started roslaunch server http://D104-45931:46073/

SUMMARY
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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
 * /rosdistro: kinetic
 * /rosversion: 1.12.7
 * /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
… (Some Red stuff - ignore)
[spawn_turtlebot_model-4] process has finished cleanly

Moved some of the objects out of the way in Gazebo.

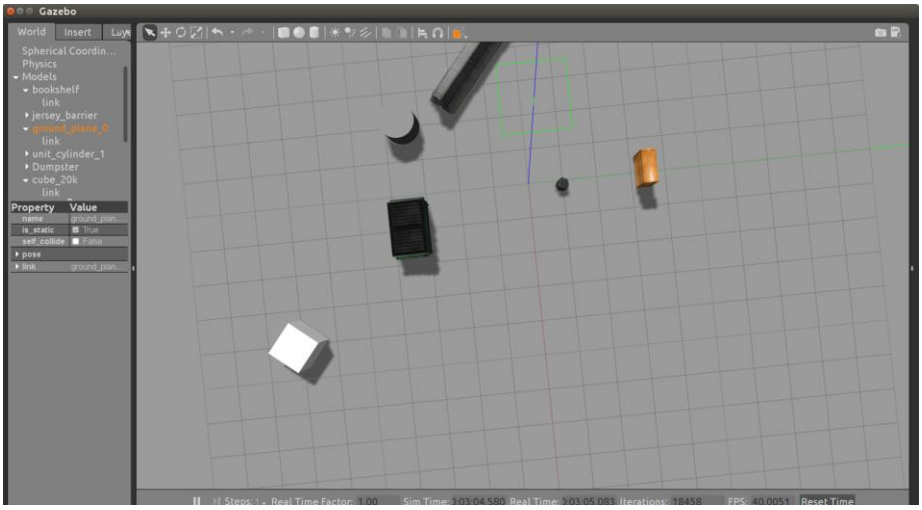
harman@D104-45931:~$ cd Desktop/Turtlebot_Python_Scripts/

5b. Check Odom – Should be at Origin (Do $ rostopic list to see Topics or $ rqt_graph)
Terminal 2
harman@D104-45931:~$ cd Desktop/Turtlebot_Python_Scripts/

harman@D104-45931:~/Desktop/Turtlebot_Python_Scripts$ rostopic echo /odom -n1
header:
  seq: 3166
  stamp:
    secs: 32
    nsecs: 0
  frame_id: odom
child_frame_id: base_footprint
pose:
  pose:

position:
  x: -2.30103655237e-07 (Call x,y Zero)
  y: 6.99013108074e-07
  z: 0.0
orientation:
  x: 0.0
  y: 0.0
  z: -0.00788937546165
  w: 0.999968878393 (Pointing in x direction)
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, 0.05]

Terminal 3
harman@D104-45931:~$ cd Desktop/Turtlebot_Python_Scripts/
harman@D104-45931:~/Desktop/Turtlebot_Python_Scripts$ python timed_out_and_back_TLH.py



Odom Again:

header:
  seq: 10170
  stamp:
    secs: 102
    nsecs: 40000000
  frame_id: odom
child_frame_id: base_footprint
pose:
  pose:
    position:
      x: 0.13620049902
      y: 0.959021634292
      z: 0.0
    orientation:
      x: 0.0
      y: -0.0
      z: 0.202996772143
      w: -0.979179406697

Out about 5 meters and slightly off course. Returned off in Y by almost a meter.

Don’t forget to close out gazebo for sure:
harman@D104-45931:~$ rosnode kill -a

killing:
 * /gazebo
 * /rosout
killed

6. Talk about other Python Scripts

harman@D104-45931:~/Desktop/Turtlebot_Python_Scripts$ ls

timed_out_and_back_TLH.py Run out in x and return to Origin
timed_out_and_back_TLH_rate1.py
timed_out_and_back_TLH_rate100.py

ControlTurtleBot_circle.py

MoveTBtoGoalPoints.py

range_ahead.py

TurtlesimTurtleBot_go_in_circle_remap.odt

go_in_circleTurtlesim.py