

ROS Documentation Task – 2

- Swaminathan S K

Sources:

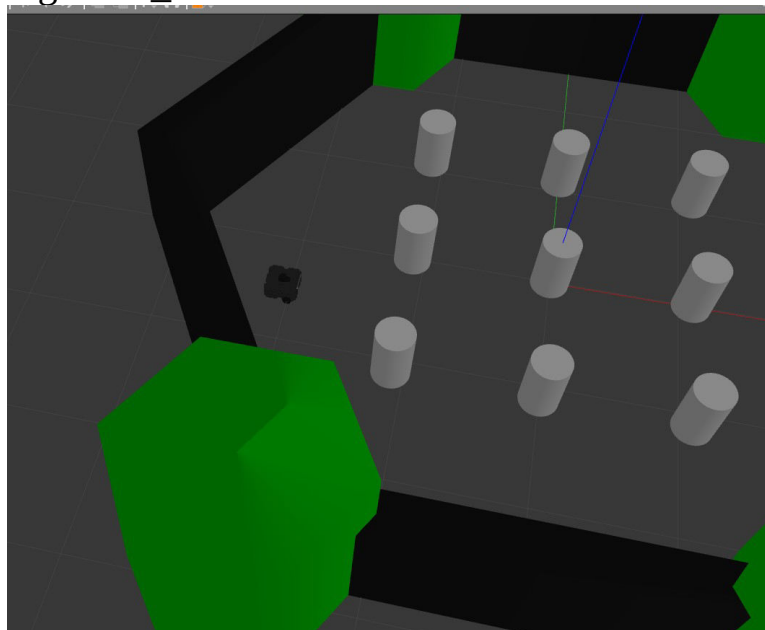
<https://emanual.robotis.com/docs/en/platform/turtlebot3/quick-start/>

<https://emanual.robotis.com/docs/en/platform/turtlebot3/simulation/#gazebo-simulation>

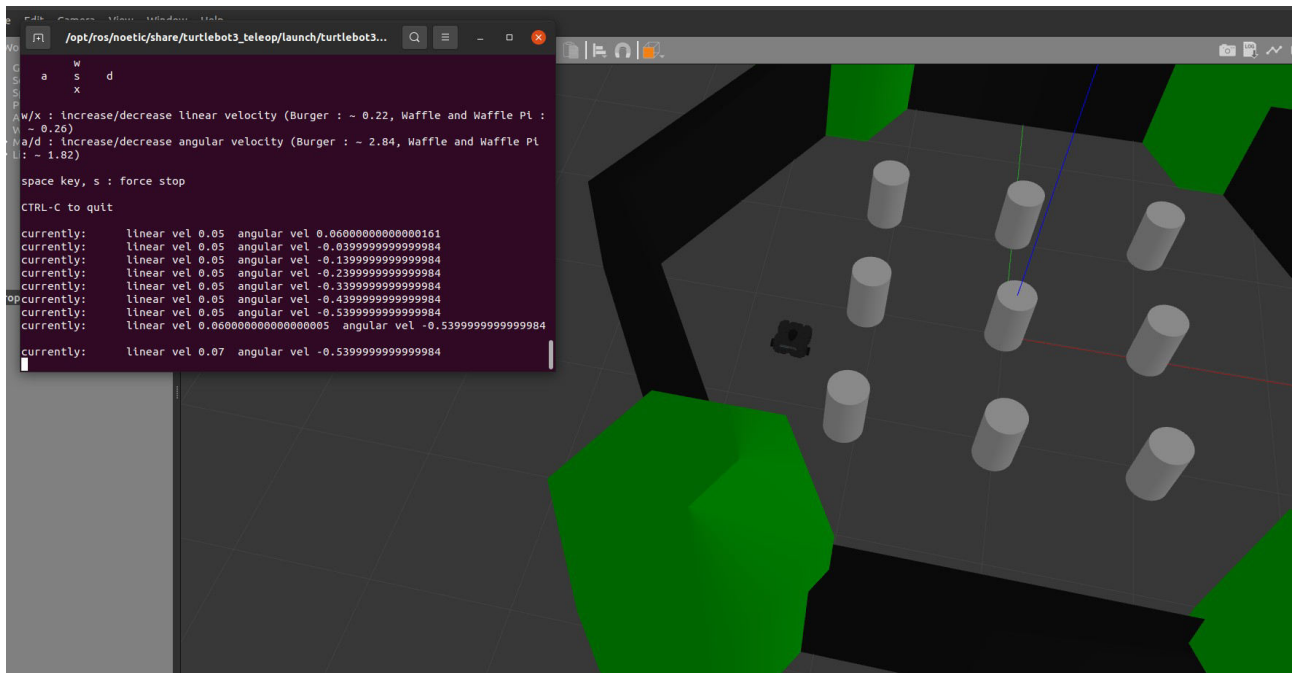
- Installing the dependencies and packages for turtlebot3 -

```
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~/workspaces$ cd
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~$ sudo apt-get install
ros-noetic-joy ros-noetic-teleop-twist-joy \
> ros-noetic-teleop-twist-keyboard ros-noetic-laser-proc \
> ros-noetic-rgbd-launch ros-noetic-rosserial-arduino \
> ros-noetic-rosserial-python ros-noetic-rosserial-client \
> ros-noetic-rosserial-msgs ros-noetic-amcl ros-noetic-map-server \
> ros-noetic-move-base ros-noetic-urdf ros-noetic-xacro \
> ros-noetic-compressed-image-transport ros-noetic-rqt* ros-noetic-rviz \
> ros-noetic-gmapping ros-noetic-navigation ros-noetic-interactive-markers
```

- ifconfig could only be done after installing net-tools.
- cd to the task_ws2 workspace. and catkin_make package of turtlebot3_simulations.
- running the gazebo_simulator -



Controlling the turtlebot3 gazebo with arrow keys:



Code used:

```

swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~/Workspaces/task_ws2/
src$ export TURTLEBOT3_MODEL=burger
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~/Workspaces/task_ws2/
src$ roslaunch turtlebot3_teleop turtlebot3_teleop_key.launch
... logging to /home/swaminathan/.ros/log/c278eeee-450c-11ee-9761-c76877ae137e/r
oslaunch-swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM-64839.log
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

```

The cmd_vel topic messages were recorded in a bag file, converted to .yaml file and then edited with python.

Errors and Fixes:

```

swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~/Workspaces/task_ws2/
bag$ python3 noise.py
Traceback (most recent call last):
  File "noise.py", line 6, in <module>
    list_doc = yaml.safe_load(f)
  File "/usr/lib/python3/dist-packages/yaml/__init__.py", line 162, in safe_load
    return load(stream, SafeLoader)
  File "/usr/lib/python3/dist-packages/yaml/__init__.py", line 114, in load
    return loader.get_single_data()
  File "/usr/lib/python3/dist-packages/yaml/constructor.py", line 49, in get_single_data
    node = self.get_single_node()
  File "/usr/lib/python3/dist-packages/yaml/composer.py", line 41, in get_single_node
    raise ComposerError("expected a single document in the stream",
yaml.composer.ComposerError: expected a single document in the stream
  in "cmd_vel.yaml", line 1, column 1
but found another document
  in "cmd_vel.yaml", line 9, column 1

```

<https://stackoverflow.com/questions/14359557/reading-yaml-file-with-python-results-in-yaml-composer-composererror-expected-a>

the --- in a line creates a separate yaml file each time.

```
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~/Workspaces/task_ws2/
bag$ python3 noise.py
{'linear': {'x': 0.07, 'y': 0.0, 'z': 0.0}, 'angular': {'x': 0.0, 'y': 0.0, 'z':
-0.5399999999999984}}
{'linear': {'x': 0.07, 'y': 0.0, 'z': 0.0}, 'angular': {'x': 0.0, 'y': 0.0, 'z':
-0.5399999999999984}}
{'linear': {'x': 0.07, 'y': 0.0, 'z': 0.0}, 'angular': {'x': 0.0, 'y': 0.0, 'z':
-0.5399999999999984}}
{'linear': {'x': 0.07, 'y': 0.0, 'z': 0.0}, 'angular': {'x': 0.0, 'y': 0.0, 'z':
-0.5399999999999984}}
{'linear': {'x': 0.07, 'y': 0.0, 'z': 0.0}, 'angular': {'x': 0.0, 'y': 0.0, 'z':
-0.5399999999999984}}
{'linear': {'x': 0.07, 'y': 0.0, 'z': 0.0}, 'angular': {'x': 0.0, 'y': 0.0, 'z':
-0.5399999999999984}}
{'linear': {'x': 0.07, 'y': 0.0, 'z': 0.0}, 'angular': {'x': 0.0, 'y': 0.0, 'z':
-0.5399999999999984}}
{'linear': {'x': 0.07, 'y': 0.0, 'z': 0.0}, 'angular': {'x': 0.0, 'y': 0.0, 'z':
-0.5399999999999984}}
{'linear': {'x': 0.07, 'y': 0.0, 'z': 0.0}, 'angular': {'x': 0.0, 'y': 0.0, 'z':
-0.5399999999999984}}
{'linear': {'x': 0.07, 'y': 0.0, 'z': 0.0}, 'angular': {'x': 0.0, 'y': 0.0, 'z':
-0.5399999999999984}}
```

The code for the noise:

```
import yaml
import numpy as np
import random

stream = open("cmd_vel (copy).yaml", "r")
docs = yaml.load_all(stream, yaml.FullLoader)
with open("cmd_vel.yaml", "w") as f:
    for list_doc in docs:
        if list_doc:
            noise = np.random.multivariate_normal(np.array([list_doc["linear"]['x'], list_doc["linear"]['y'], list_doc["linear"]['z']]), [[2, 0, 0], [0, 2, 0], [0, 0, 2]], size=None, check='
list_doc = {"angular": list_doc["angular"], "linear": {"x": list_doc["linear"]['x'] + noise[0], "y": list_doc["linear"]['y'] + noise[1], "z": list_doc["linear"]['z'] + noise[2]
            print(list_doc)
            yaml.dump(list_doc, f)
```

The final publisher.py code:

```
1
2 import rospy
3 from geometry_msgs.msg import Twist
4 import yaml
5
6 def talker():
7     twist_msg = Twist()
8     with open("cmd_vel.yaml", "r") as file_handle:
9         data = yaml.load(file_handle)
10        for list_doc in data:
11            linear = list_doc["linear"]
12            angular = list_doc["angular"]
13            twist_msg.linear.x = linear["x"]
14            twist_msg.linear.y = linear["y"]
15            twist_msg.linear.z = linear["z"]
16            twist_msg.angular.x = angular["x"]
17            twist_msg.angular.y = angular["y"]
18            twist_msg.angular.z = angular["z"]
19
20            pub = rospy.Publisher('noise', Twist, queue_size=10)
21            rospy.init_node('talker', anonymous=True)
22            rate = rospy.Rate(10) # 10hz
23            while not rospy.is_shutdown():
24                pub.publish(twist_msg)
25                rate.sleep()
26
27 if __name__ == '__main__':
28     try:
29         talker()
30     except rospy.ROSInterruptException:
31         pass
```

- Error occurs. (Not fixed yet)