

Simulation and Modelling Lab – 7

Turtle Bot and Irritated Robot

20BRS1193

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Instructions:

Today Exercise will be on Irritated Robot:

If the robot encounters an obstacle at a threshold distance of 0.5, then the robot engage in a twisted motion or circular motion

If no obstacle, the robot moves forward with a nominal speed.

You can make use of Burger as the Turtlebot model

Exercise 2: From the above example, make the irritated robot to a diplomat robot where the robot moves away from the obstacle and move forward with a nominal speed.

How to do: Open a terminal

Step 1: `$ roscore`

Step 2: Open another terminal

`$ export TURTLEBOT3_MODEL=burger`

`$ roslaunch turtlebot3_gazebo turtlebot3_empty_world.launch`

Step 3:

Copy the irritated_robot.py from the following folder

`$ scp lab21@172.16.10.7:irritational_robot.py`

move the file to pradeep_ws/src/ros_tutorial1/src/

Go to the above folder and execute the following command.

`$ chmod 777 irritational_robot.py`

`$ rosrunc ros_tutorial1 irritational_robot.py`

and check the gazebo platform and add the obstacles and check the status of the robot (Burger).

Code:

```
#!/usr/bin/python3

import rospy
import numpy as np
from numpy import inf
from geometry_msgs.msg import Twist
from sensor_msgs.msg import LaserScan
import time
import sys

class object_irritation_robot:

    def __init__(self):
        rospy.Subscriber("/scan", LaserScan, self.laserData_cb)
        self.pub = rospy.Publisher('/cmd_vel', Twist, queue_size=10)
        self.robot_velocity=Twist()

    def laserData_cb(self,data):
        laser_data=np.array(data.ranges)
        laser_data[laser_data == inf] = 0
        laser_data=max(laser_data)
        rospy.loginfo(laser_data)

        if(laser_data > 0.5):
            if(self.robot_velocity.linear.x==0.5):
                self.evade()
            else:
                self.move_forward()
        else:
            self.move_forward()

        self.pub.publish(self.robot_velocity)

    """
    def irritated(self):
        rospy.loginfo("I am Irritated")
        self.robot_velocity.linear.x=0.0
        self.robot_velocity.angular.z=2.0
    """

    def move_forward(self):
        rospy.loginfo("Lets Moving ON ")
        self.robot_velocity.linear.x=0.5
```

```

self.robot_velocity.angular.z=0.0

def evade(self):
    rospy.loginfo("EVADE")
    self.robot_velocity.linear.x=-0.5
    self.robot_velocity.angular.z=3

if __name__ == '__main__':
    rospy.init_node('object_irritation_robot', anonymous=True)
    object_irritation_robot()
    rospy.spin()

```

Terminal Outputs:

First Install turtlebot3_gazebo, then run the roslaunch command.

```

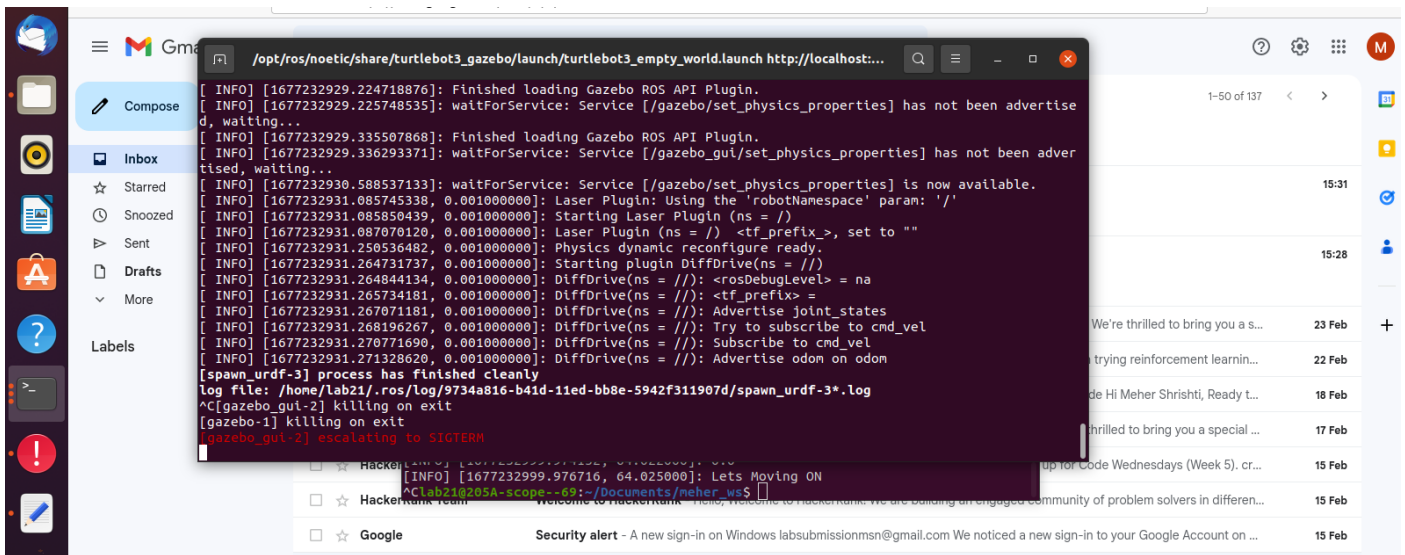
/opt/ros/noetic/share/turtlebot3_gazebo/launch/turtlebot3_empty_world.launch http://localhost:...
Reading state information... Done
E: Unable to locate package ros-melodic-turtlebot3-description
lab21@205A-scope--69:~/Documents/meher_ws$ rosversion -d
noetic
lab21@205A-scope--69:~/Documents/meher_ws$ sudo apt-get install ros-noetic-turtlebot3-description
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  ros-noetic-turtlebot3-description
0 upgraded, 1 newly installed, 0 to remove and 30 not upgraded.
Need to get 2,284 kB of archives.
After this operation, 28.5 MB of additional disk space will be used.
Get:1 http://packages.ros.org/ros/ubuntu focal/main amd64 ros-noetic-turtlebot3-description amd64 1.2.5-1focal.20221124.030727 [2,284 kB]
Fetched 2,284 kB in 4s (588 kB/s)
Selecting previously unselected package ros-noetic-turtlebot3-description.
(Reading database ... 327196 files and directories currently installed.)
Preparing to unpack .../ros-noetic-turtlebot3-description_1.2.5-1focal.20221124.030727_amd64.deb ...
Unpacking ros-noetic-turtlebot3-description (1.2.5-1focal.20221124.030727) ...
Setting up ros-noetic-turtlebot3-description (1.2.5-1focal.20221124.030727) ...
lab21@205A-scope--69:~/Documents/meher_ws$ sudo apt-get install ros-noetic-turtlebot3-gazebo
Reading package lists... Done
Building dependency tree

```

```

/opt/ros/noetic/share/turtlebot3_gazebo/launch/turtlebot3_empty_world.launch http://localhost:...
Preparing to unpack .../ros-noetic-turtlebot3-description_1.2.5-1focal.20221124.030727_amd64.deb ...
Unpacking ros-noetic-turtlebot3-description (1.2.5-1focal.20221124.030727) ...
Setting up ros-noetic-turtlebot3-description (1.2.5-1focal.20221124.030727) ...
lab21@205A-scope--69:~/Documents/meher_ws$ sudo apt-get install ros-noetic-turtlebot3-gazebo
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  ros-noetic-turtlebot3-gazebo
0 upgraded, 1 newly installed, 0 to remove and 30 not upgraded.
Need to get 1,334 kB of archives.
After this operation, 2,696 kB of additional disk space will be used.
Get:1 http://packages.ros.org/ros/ubuntu focal/main amd64 ros-noetic-turtlebot3-gazebo amd64 1.3.2-2focal.202211209.221005 [1,334 kB]
Fetched 1,334 kB in 3s (382 kB/s)
Selecting previously unselected package ros-noetic-turtlebot3-gazebo.
(Reading database ... 327237 files and directories currently installed.)
Preparing to unpack .../ros-noetic-turtlebot3-gazebo_1.3.2-2focal.202211209.221005_amd64.deb ...
Unpacking ros-noetic-turtlebot3-gazebo (1.3.2-2focal.202211209.221005) ...
Setting up ros-noetic-turtlebot3-gazebo (1.3.2-2focal.202211209.221005) ...
lab21@205A-scope--69:~/Documents/meher_ws$ roslaunch turtlebot3_gazebo turtlebot3_empty_world.launch
... logging to /home/lab21/.ros/log/9734a816-b41d-11ed-bb8e-5942f311907d/roslaunch-205A-scope--69-36182.log
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt

```



Then run `irritational_robot.py` using `roslaunch`.

```
lab21@205A-scope--69: ~/Documents/meher_ws
^C lab21@205A-scope--69:~/Documents/meher_ws$ roslaunch ros_tutorial1 irritational_
robot.py
[INFO] [1677232485.960397, 72.973000]: 1.5566035509109497
[INFO] [1677232485.962981, 72.978000]: Lets Moving ON
[INFO] [1677232486.187430, 73.175000]: 1.6427478790283203
[INFO] [1677232486.188949, 73.177000]: EVADE
[INFO] [1677232486.410090, 73.373000]: 1.6553903818130493
[INFO] [1677232486.413289, 73.380000]: Lets Moving ON
[INFO] [1677232486.638068, 73.574000]: 1.6731226444244385
[INFO] [1677232486.639315, 73.574000]: EVADE
[INFO] [1677232486.876296, 73.774000]: 1.700697898864746
[INFO] [1677232486.877877, 73.776000]: Lets Moving ON
[INFO] [1677232487.094511, 73.975000]: 1.7065201997756958
[INFO] [1677232487.098262, 73.980000]: EVADE
[INFO] [1677232487.295397, 74.174000]: 1.6904511451721191
[INFO] [1677232487.296702, 74.175000]: Lets Moving ON
[INFO] [1677232487.545878, 74.376000]: 1.7002450227737427
[INFO] [1677232487.549254, 74.377000]: EVADE
[INFO] [1677232487.768923, 74.577000]: 1.7070956230163574
[INFO] [1677232487.771556, 74.580000]: Lets Moving ON
[INFO] [1677232487.978790, 74.778000]: 1.706688642501831
[INFO] [1677232487.980755, 74.780000]: EVADE
[INFO] [1677232488.191211, 74.976000]: 1.7475736141204834
```

Gazebo Outputs:

Thus, the robot successfully evades the obstacle.

