REFER github link given below for more information:
https://github.com/PoojaKurdekar/ROS_ROBOTICS

ros_robotics

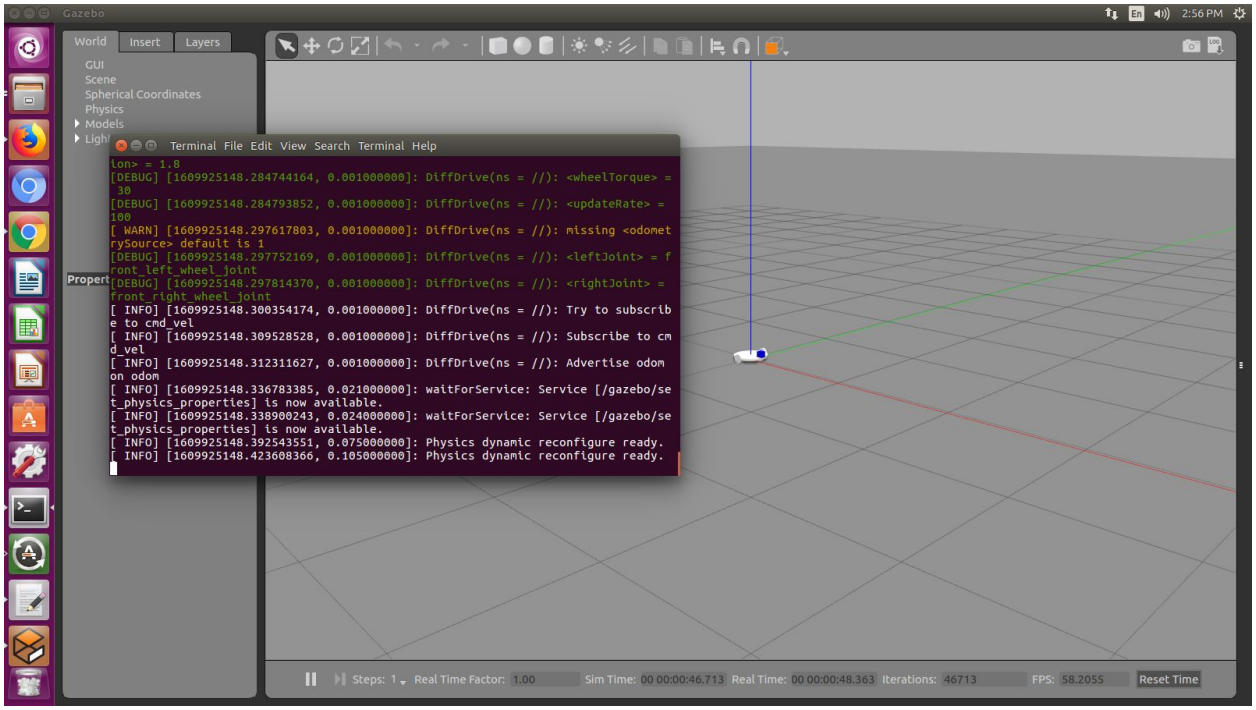
(catkin_ws_1/src/ros_robotics)

1. ROS Robotics By Example -- Carol Fairchild & Dr.Thomas L.Harman
   - Complete chapter 1,2 & 3 from above book.

2. Creating own Two wheeled Differential Robot

   Reference : Learning Robotics Using Python by Lentin Joseph(chapter 3)

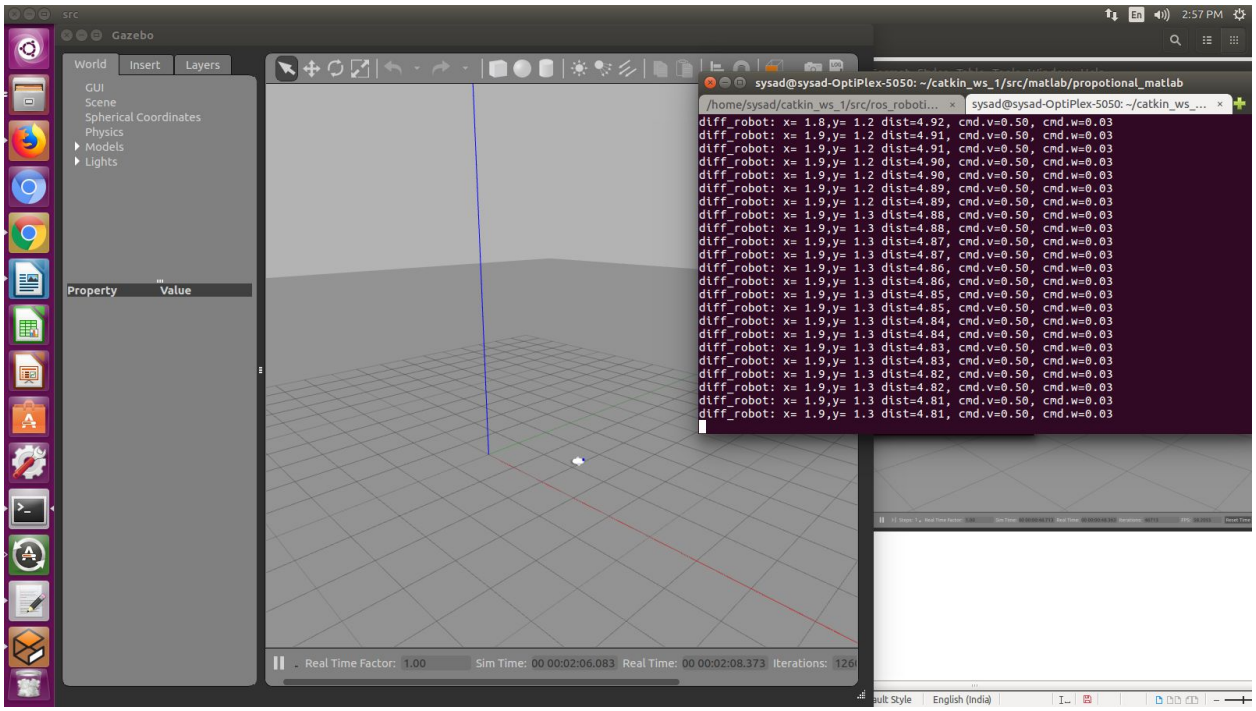
3. Launching and moving robot
   - **roslaunch ros_robotics diff_wheeled_gazebo_final.launch**

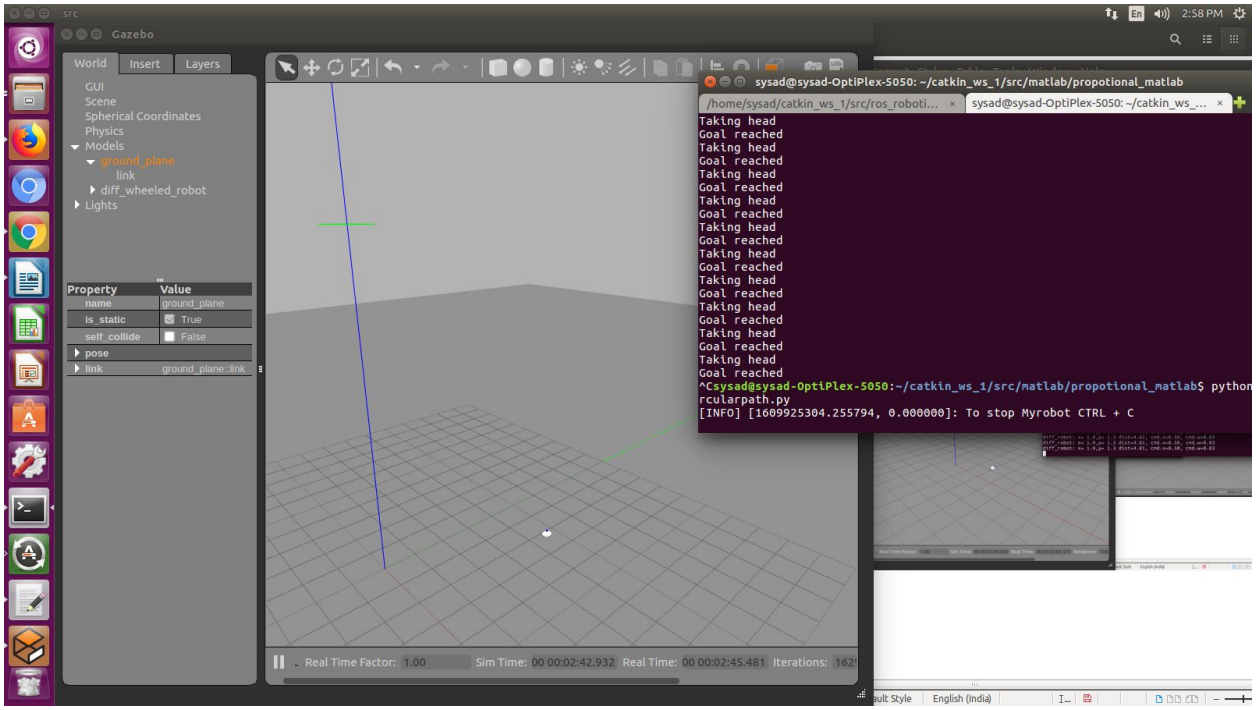


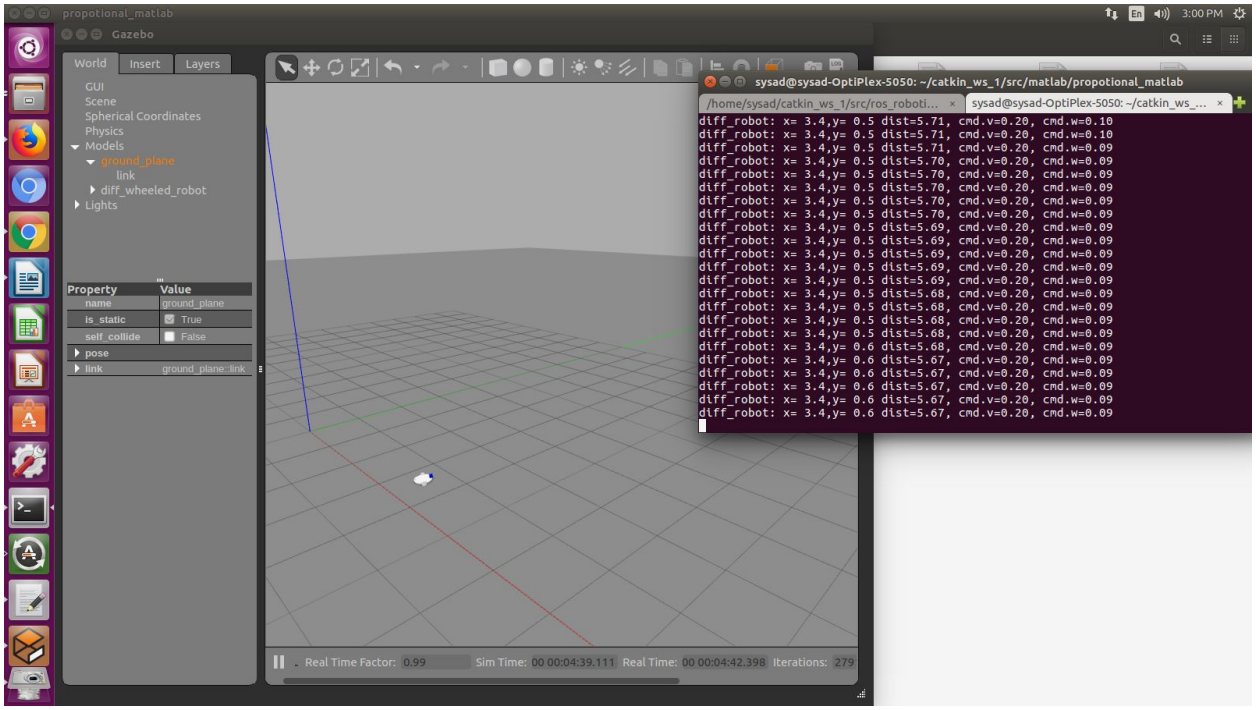
- ❖ Files required:

- ❏ diff_wheeled_gazebo_final.launch
- ❏ diff_wheeled_robot_with_sensor_final.xacro
- ❏ wheel.urdf .xacro

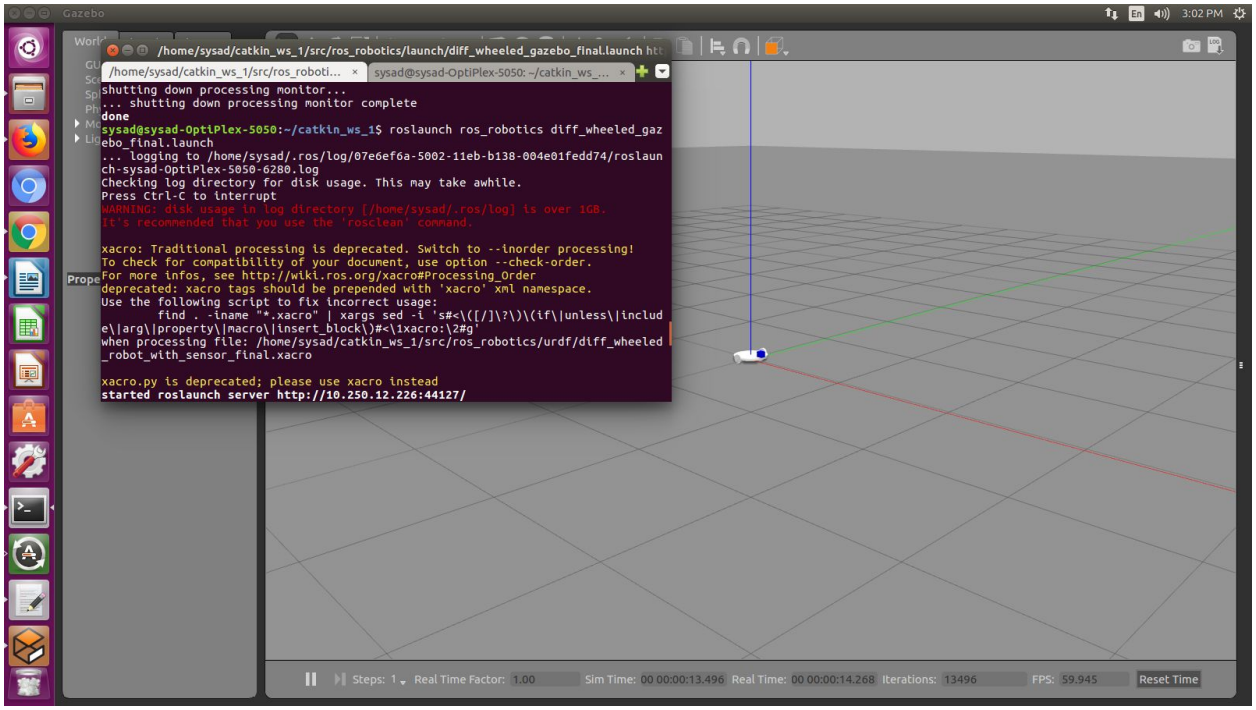
- **cd ~/catkin_ws_1/src/matlab/propotional_matlab**
- **python propotinal_head_.py**
- **python circularpath.py**
- **python move_robot.py**
- **python Propotional.py**



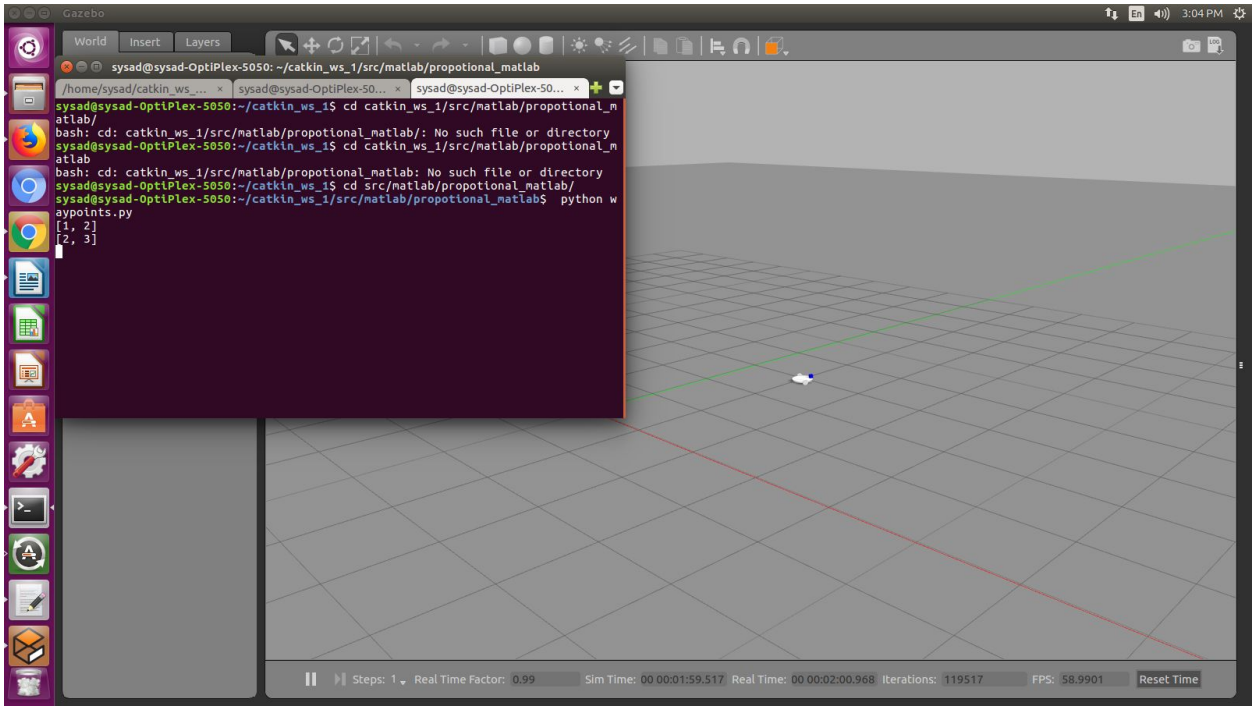




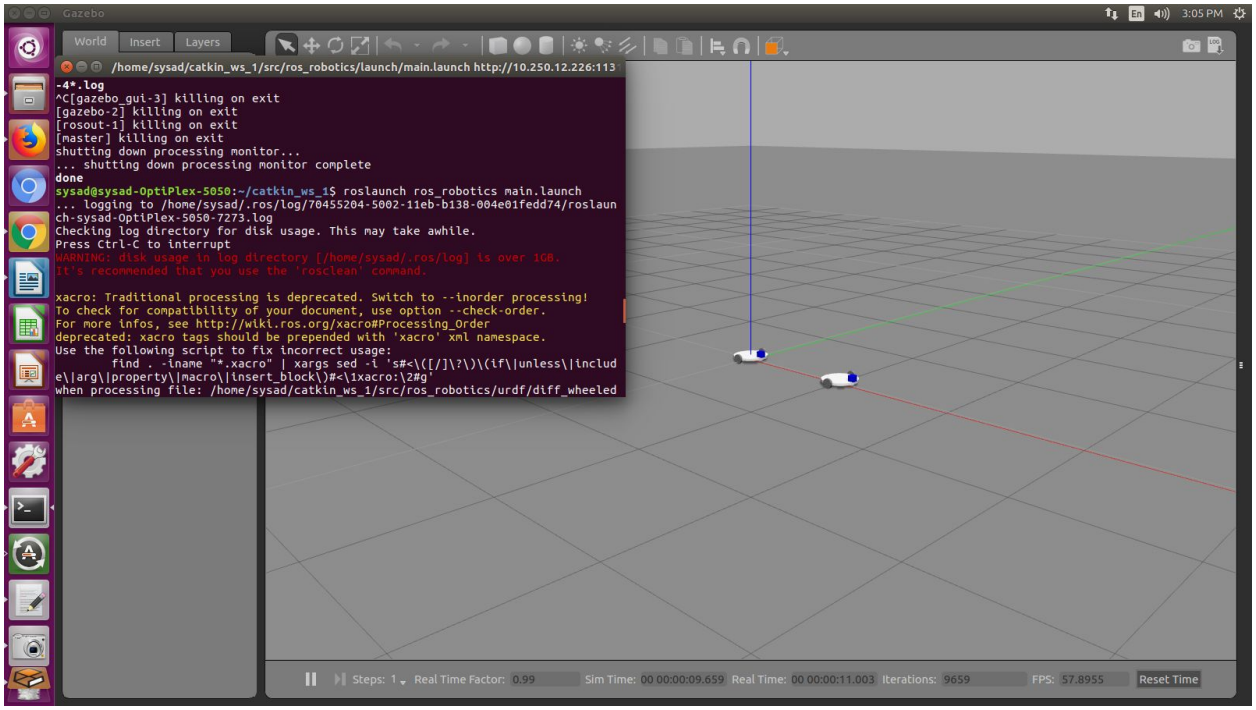
4. ROBOT moving along given waypoints using proportional controller
    - **roslaunch ros_robotics diff_wheeled_gazebo_final.launch**



- **cd catkin_ws_1/src/matlab/propotional_matlab/**
- **python waypoints.py**

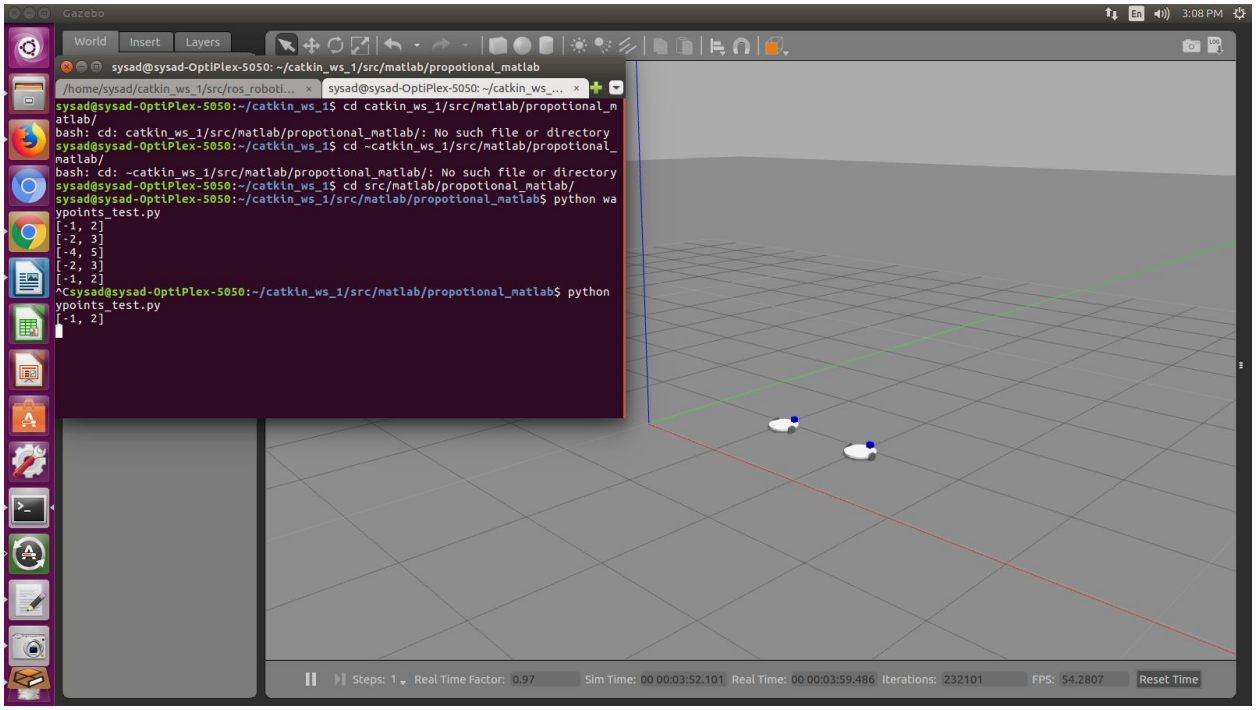


5. Two ROBOTS moving along given waypoints using proportional controller
   - **roslaunch ros_robotics main.launch**

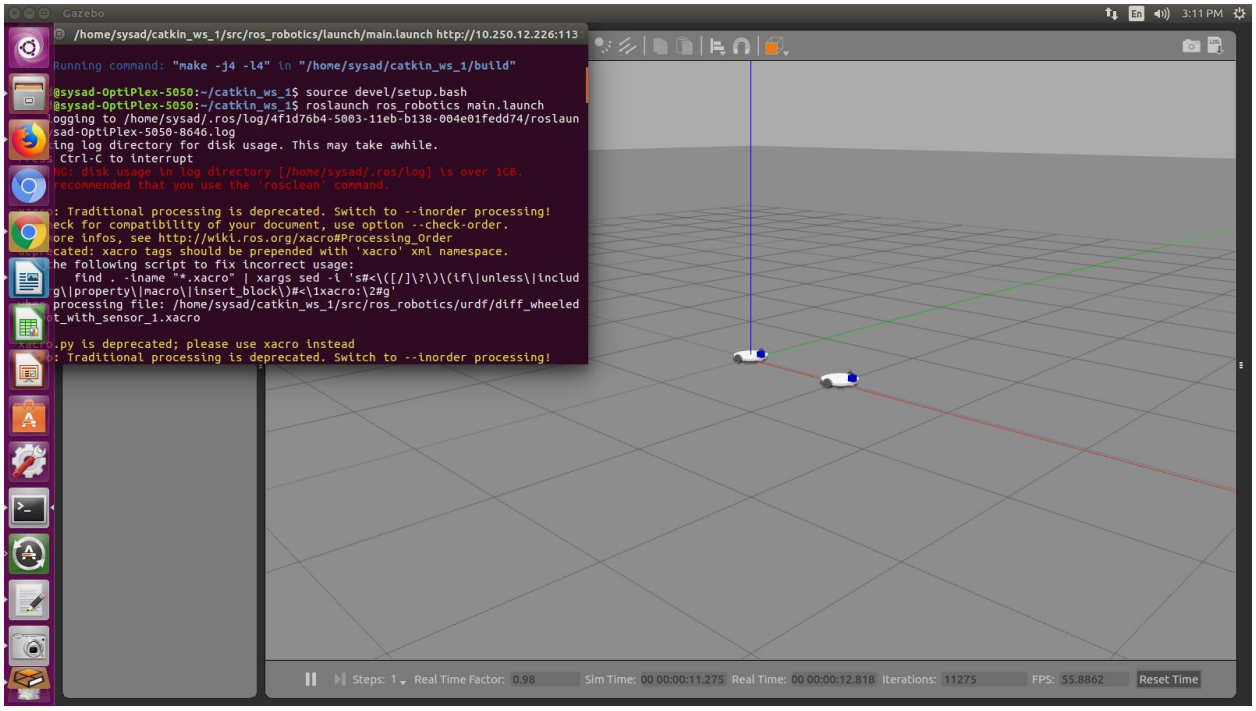


- Files required:
  - main.launch
  - robot_1.launch
  - diff_wheeled_robot_with_sensor_1.xacro
  - wheel_1.urdf .xacro
  - robot_2.launch
  - diff_wheeled_robot_with_sensor_2.xacro
  - wheel_2.urdf .xacro

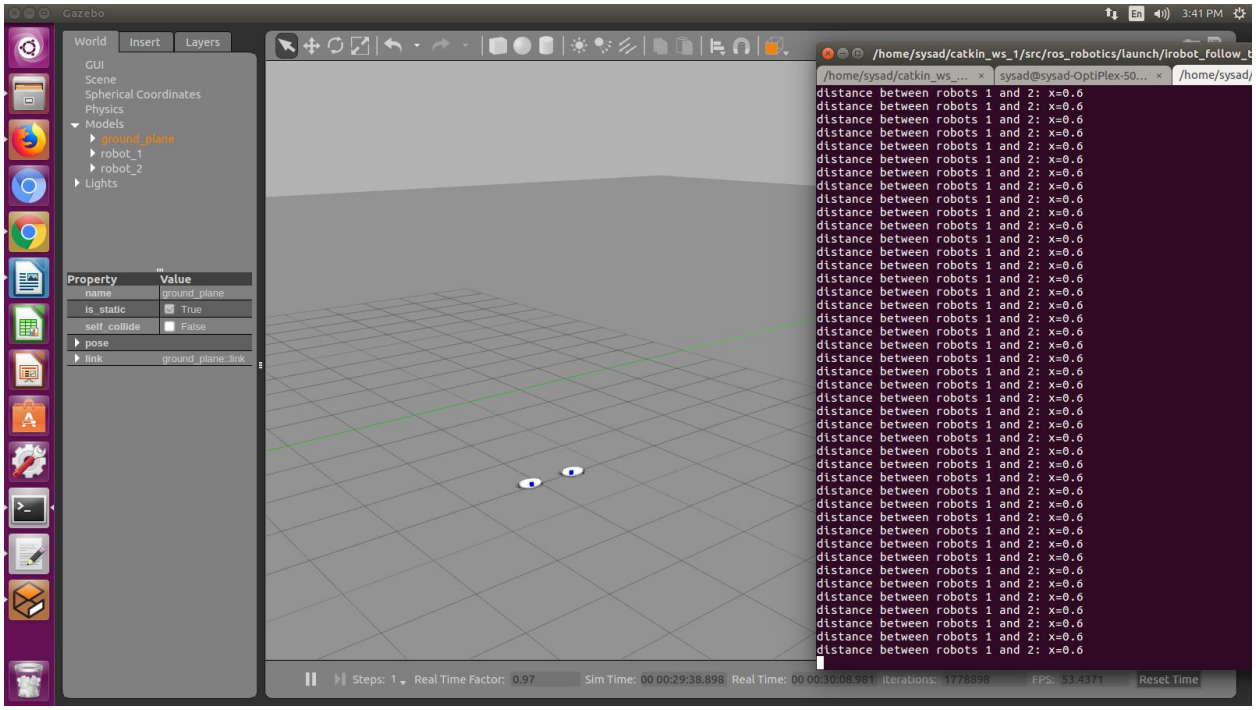
- **cd catkin_ws_1/src/matlab/propotional_matlab/**
- **python waypoints_test.py**



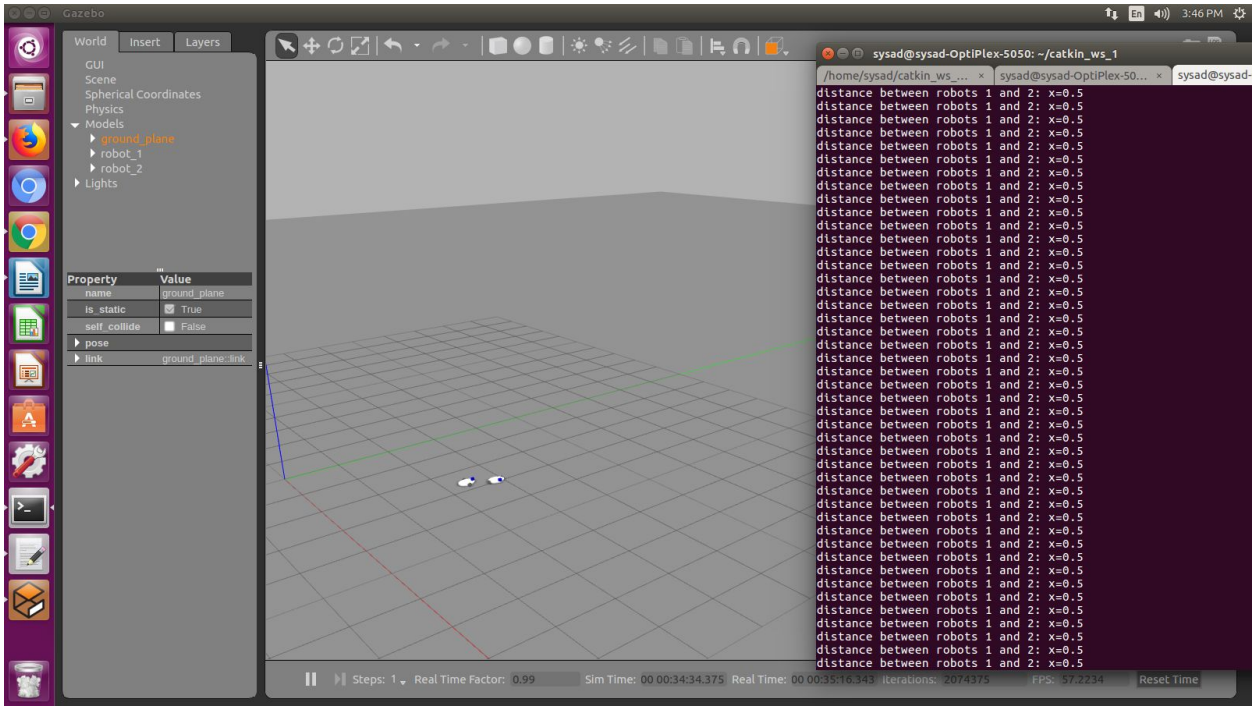
6. One ROBOT following another ROBOT and controlling the master robot using proportional controllers.
    - **roslaunch ros_robotics main.launch**



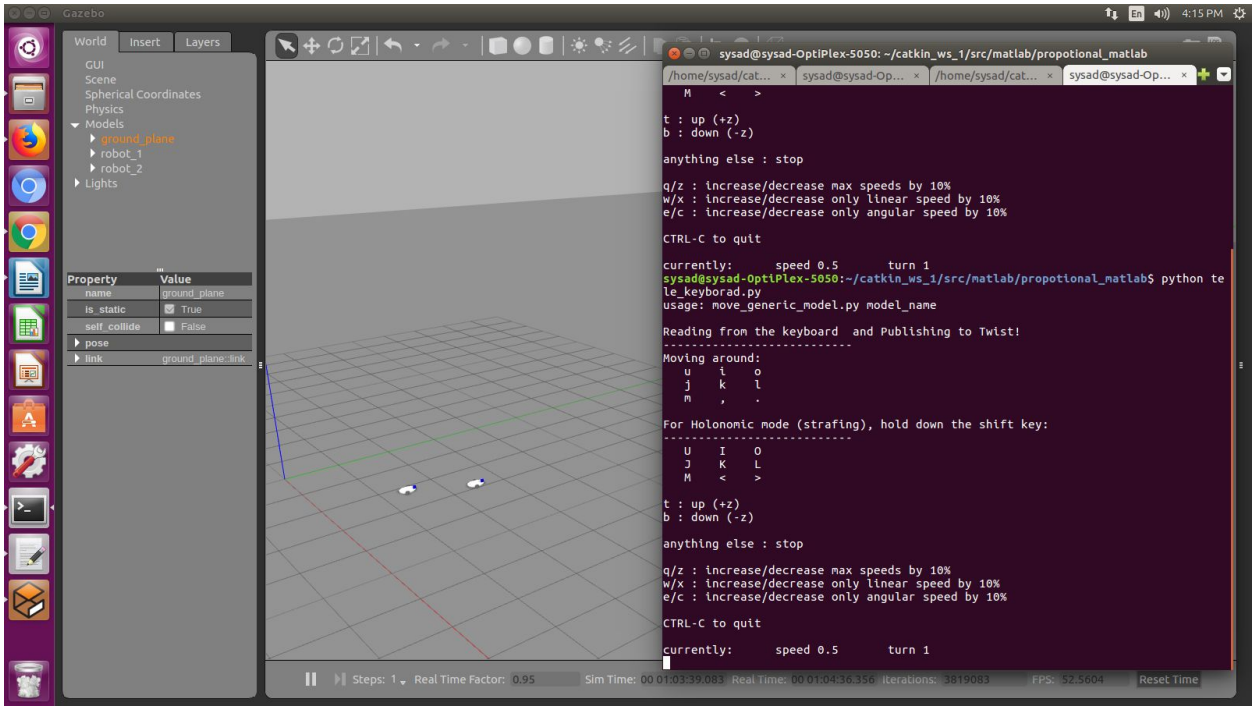
- **roslaunch ros_robotics irobot_follow_turtle.launch**



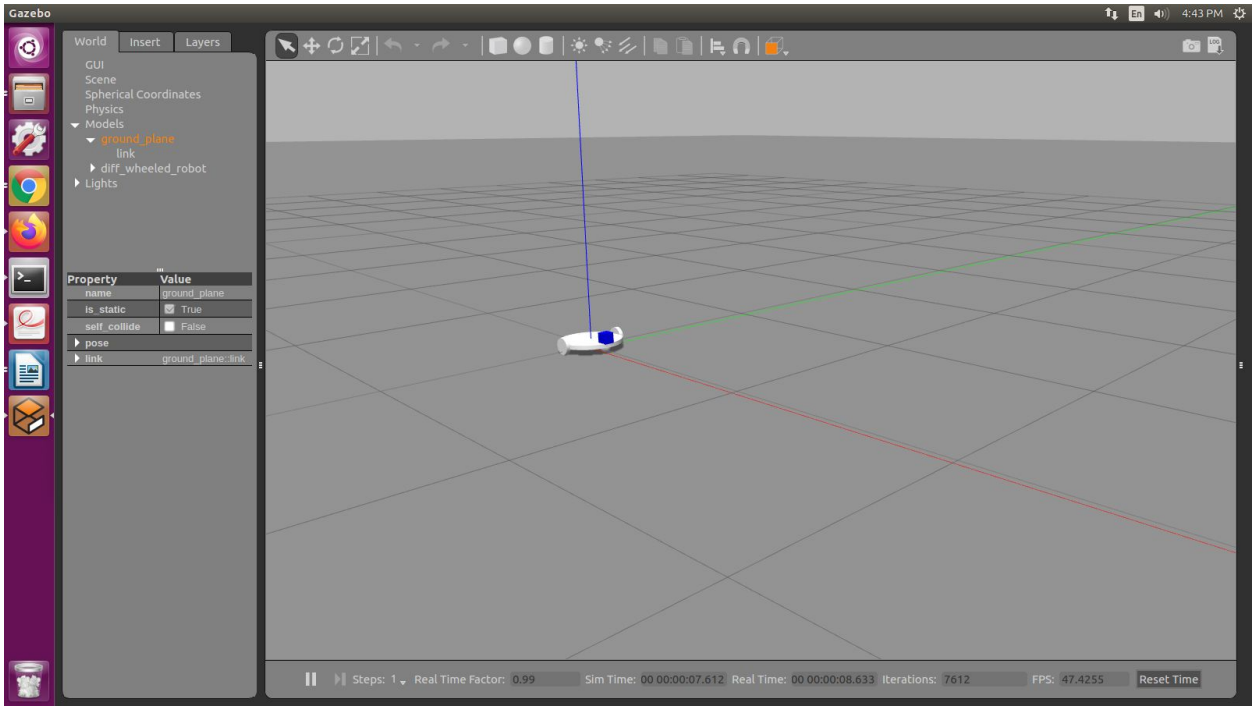
- Files Required:
  - run_turtle_tf_broadcaster.launch
  - run_turtle_tf_listener.launch
  - turtle_tf_broadcaster.py
  - turtle_tf_listener.py
  - Turtle_tf_3d

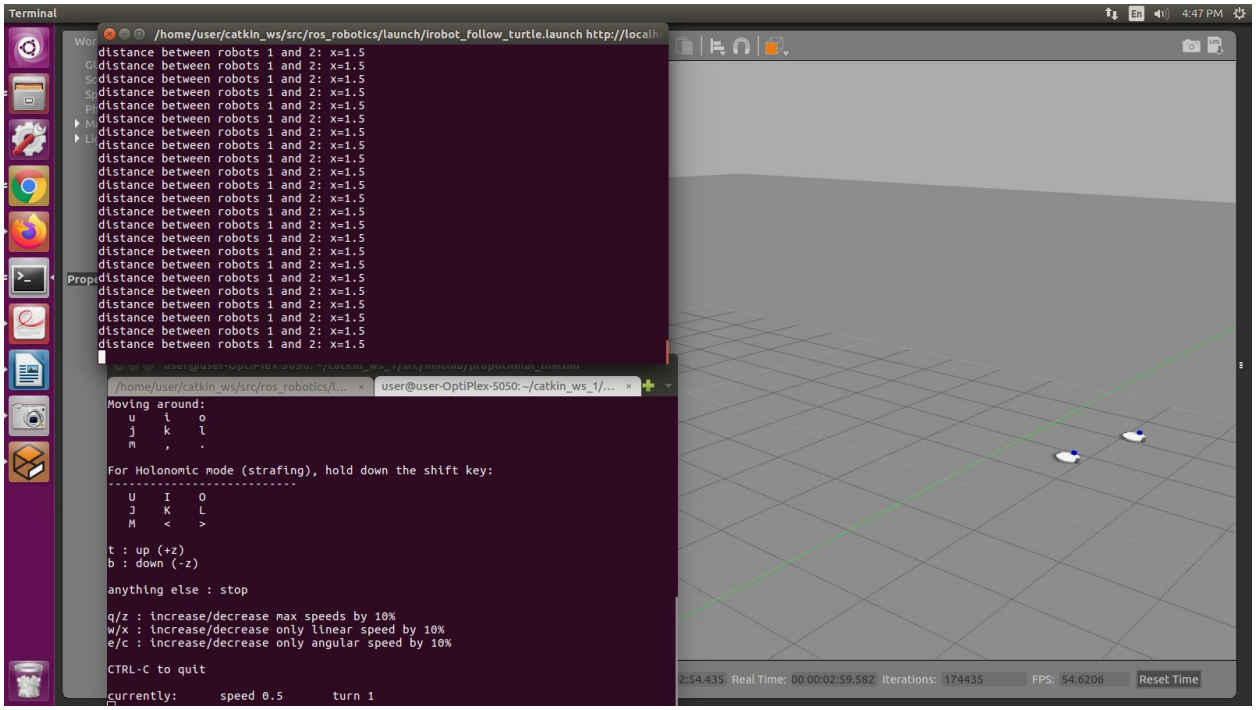


- **cd ~/catkin_ws_1/src/matlab/propotional_matlab**
- **python propotinal_head_.py**
- **python tele_keyborad.py**



Reference :
https://www.theconstructsim.com/make-robot-follow-another-robot/





7. Launching N number of robots and common proportional controller

In kinetic : 0-7 number of robots can be launched

- **roscore**
- **cd catkin_ws_1/src/ros_robotics/launch/**
- **python multi16.py**
    - ❖ Files Required:

        (Are in catkin_ws/src/ros_robotics/launch/robots)

        - ❏ diff_wheeled_gazebo_full.launch
        - ❏ diff_wheeled_gazebo_full_1.launch
        - ❏ diff_wheeled_gazebo_full_2.launch
        - ❏ diff_wheeled_gazebo_full_3.launch
        - ❏ diff_wheeled_gazebo_full_4.launch
        - ❏ diff_wheeled_gazebo_full_5.launch
        - ❏ diff_wheeled_gazebo_full_6.launch

        (Are in catkin_ws/src/ros_robotics/urdf/robots_des)

        - ❏ diff_wheeled_robot_with_sensor.xacro
        - ❏ wheel.urdf .xacro
        - ❏ diff_wheeled_robot_with_sensor_1.xacro
        - ❏ wheel_1.urdf .xacro
        - ❏ diff_wheeled_robot_with_sensor_2.xacro
        - ❏ wheel_2.urdf .xacro
        - ❏ diff_wheeled_robot_with_sensor_3.xacro
        - ❏ wheel_3.urdf .xacro
        - ❏ diff_wheeled_robot_with_sensor_4.xacro
        - ❏ wheel_4.urdf .xacro
        - ❏ diff_wheeled_robot_with_sensor_5.xacro
        - ❏ wheel_5.urdf .xacro
        - ❏ diff_wheeled_robot_with_sensor_6.xacro
        - ❏ wheel_6.urdf .xacro

- **cd ~/catkin_ws_1/src/matlab/propotional_matlab**
- **python comm_controller.py (proportional controller)**
- **python comm_move.py (move to a point)**

8. Launching N number of robots IN MELODIC (in Chandan's laptop)
    - **cd pooja/robo_ws/**
    - **catkin_make**
    - **source devel/setup.bash**
    - **cd src/ros_robotics/launch/**
    - **python multi26.py**
        - ❖ Files Required:

(/home/user/catkin_ws_1/src/melodic files/src/ros_robotics/launch)

- ❏ multi26.py
- ❏ diff_arg_1.launch

(/home/user/catkin_ws_1/src/melodic files/src/ros_robotics/urdf)

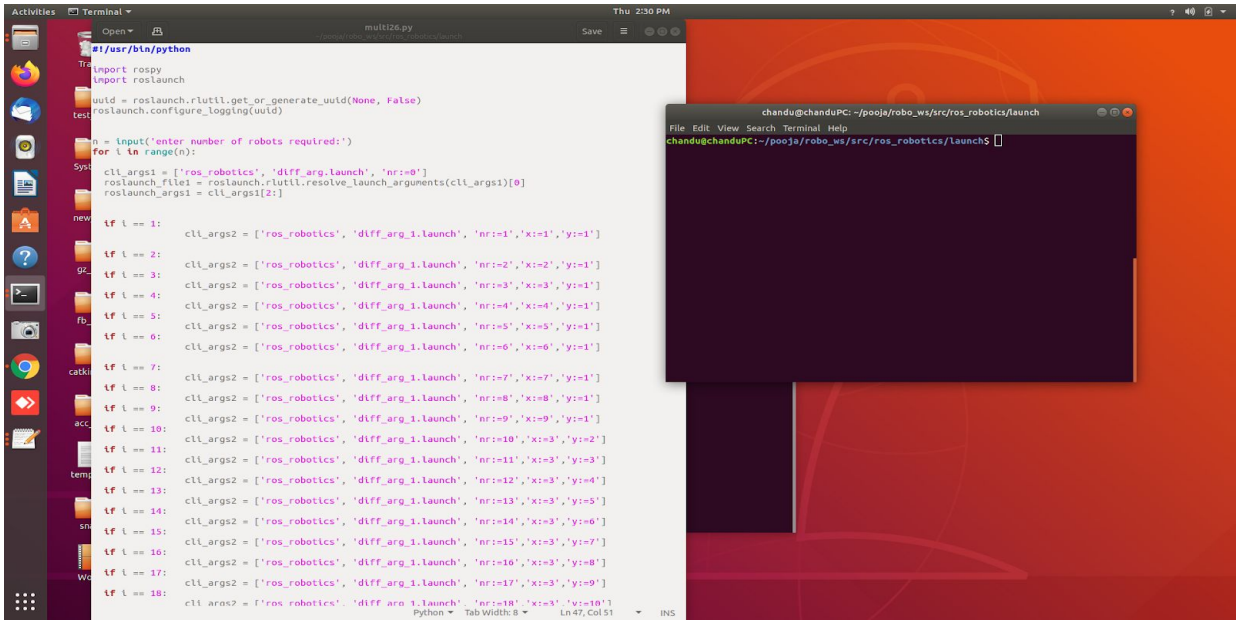
- ❏ diff_wheeled_robot_with_sensor.xacro
- ❏ wheel.urdf .xacro

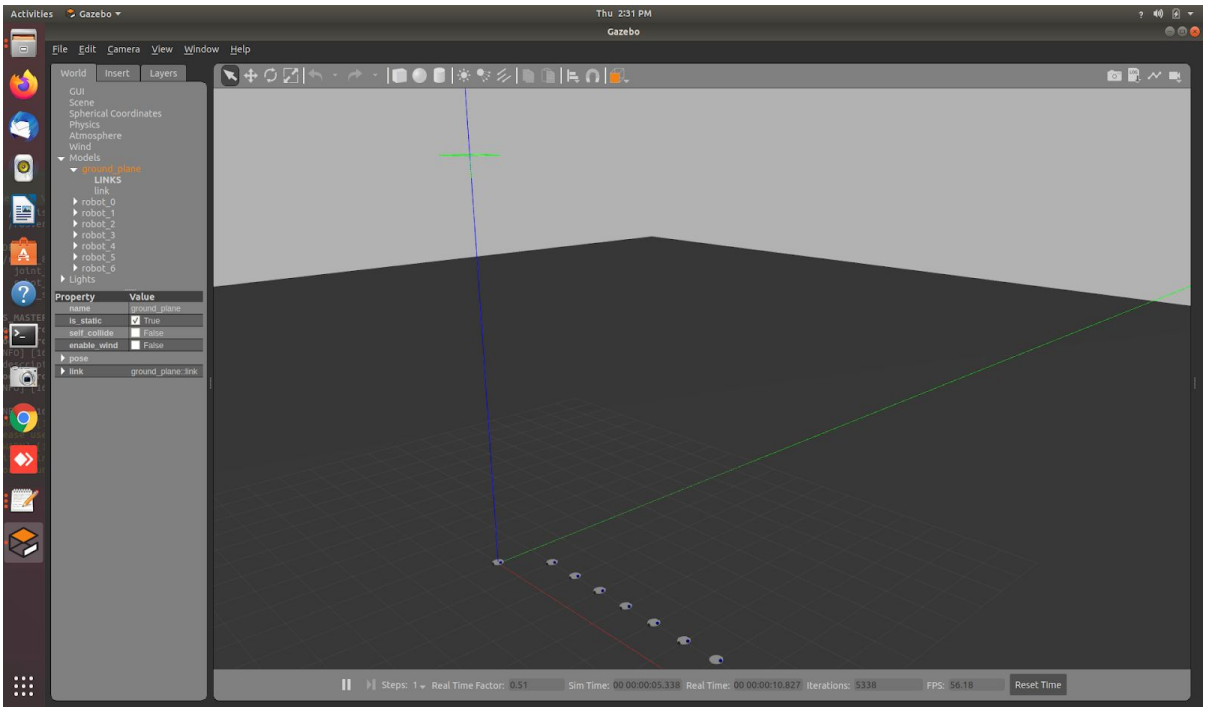
- **cd ~/catkin_ws_1/src/melodic files/src/ros_robotics/src**
- **python comm_controller.py (proportional controller)**
- **python comm_move.py (move to a point)**

Reference : http://wiki.ros.org/roslaunch/XML

https://answers.ros.org/question/229489/how-do-i-create-dynamic-launch-files/

https://github.com/ros/ros_comm/issues/1734

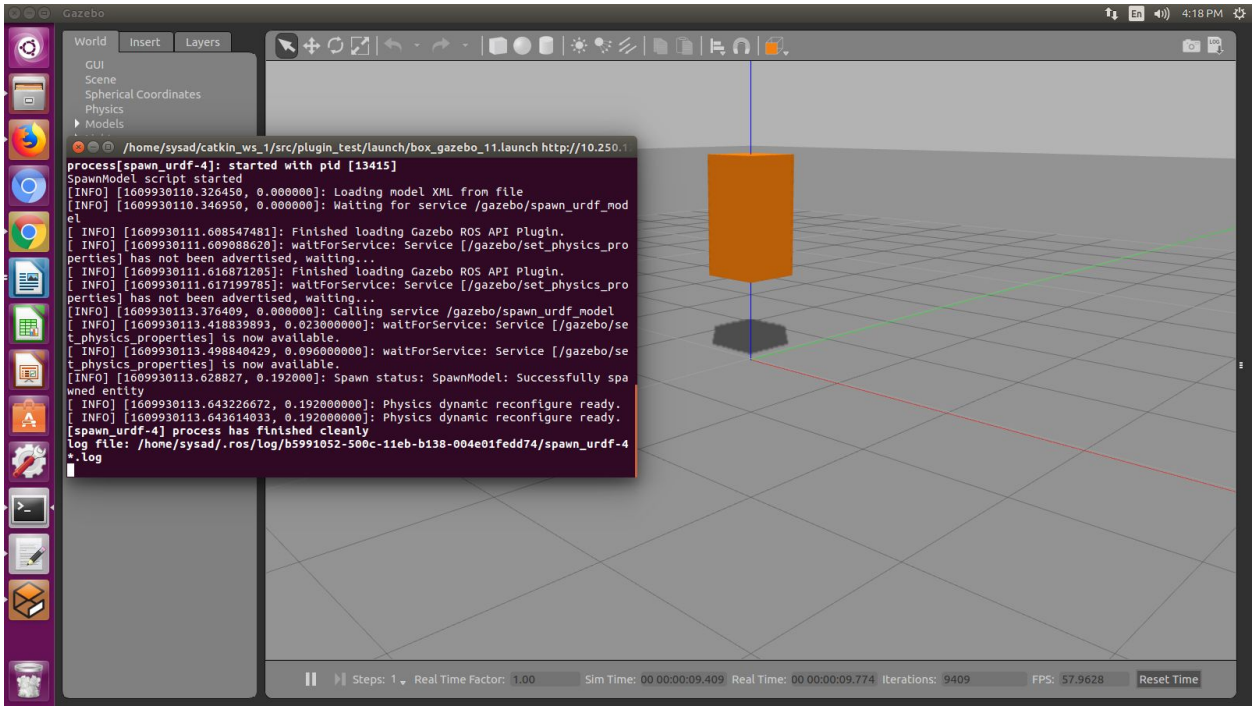




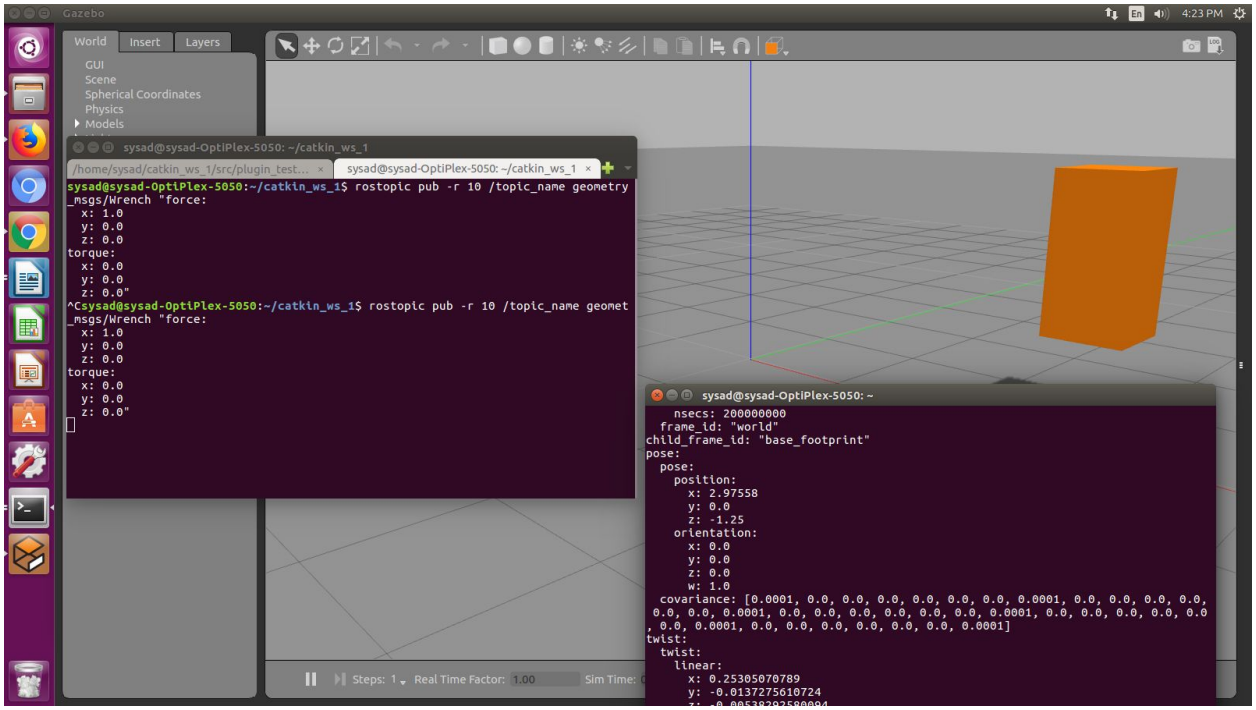
plugin_test

(/home/user/catkin_ws_1/src/plugin_test)

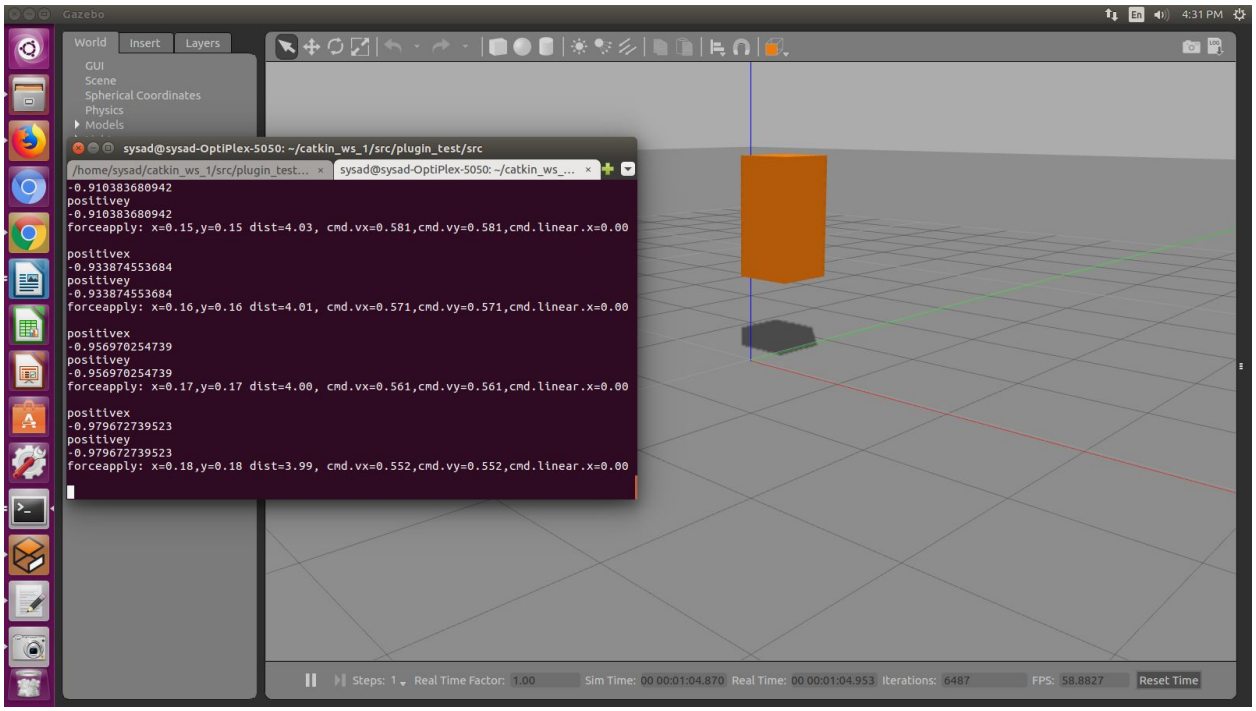
1. Creating Floating box (box without any force acting on it)
    - **roslaunch plugin_test box_gazebo.launch**
        - **Files required:**
            - **box_gazebo_11.launch**
            - **floating_box_11.gazebo**



2. Moving box by applying force
    - **rostopic pub -r 10 /topic_name geometry_msgs/Wrench "force:**
      x: 0.0
      y: 0.0
      z: 0.0
      torque:
      x: 0.0
      y: 0.0
      z: 0.0"

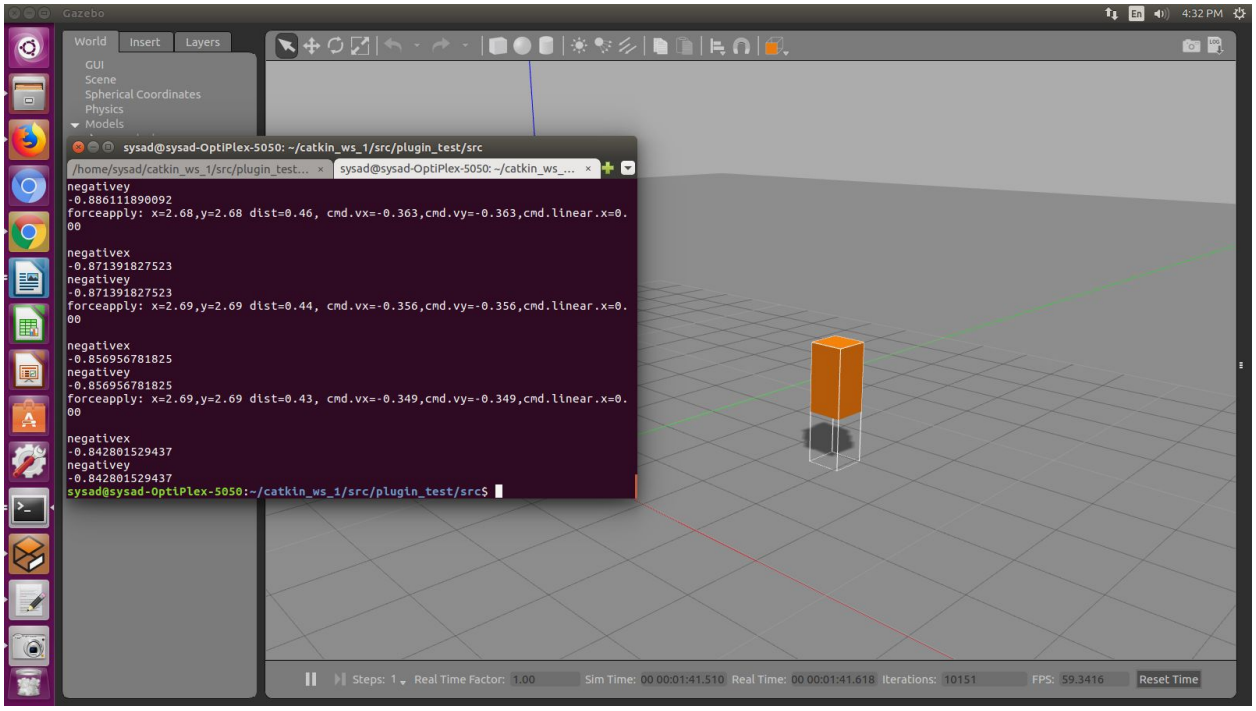


3. Moving box to given point by applying force.
    - **roslaunch plugin_test box_gazebo.launch**
    - **cd ~/catkin_ws/src/plugin_test/src**
    - **python force_controller_XY.py**

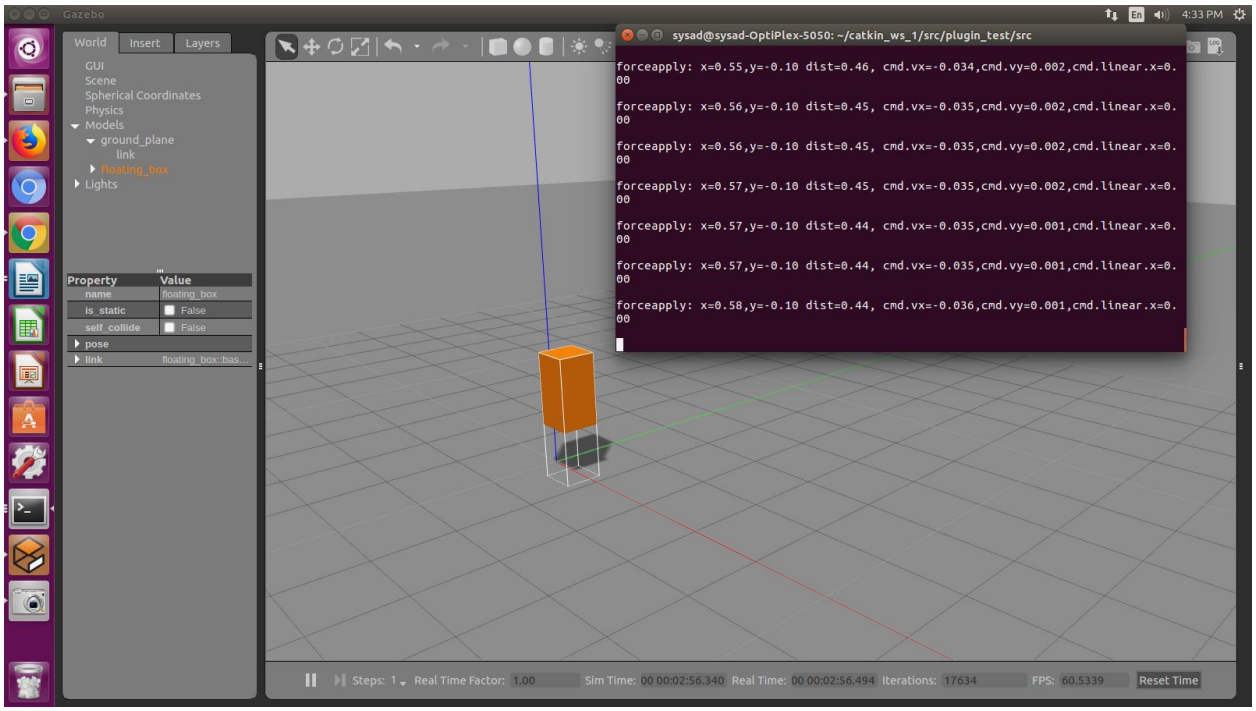


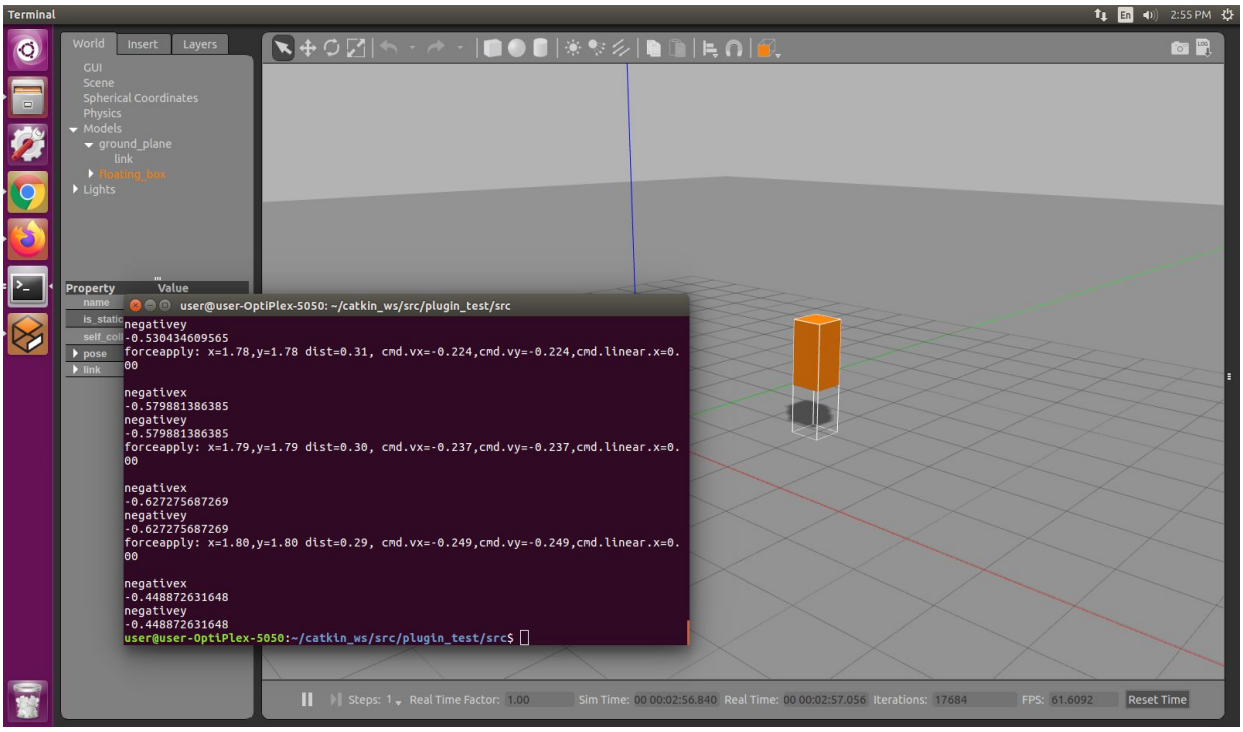
4. Moving box to given point by applying force and by controlling force and speed parameters

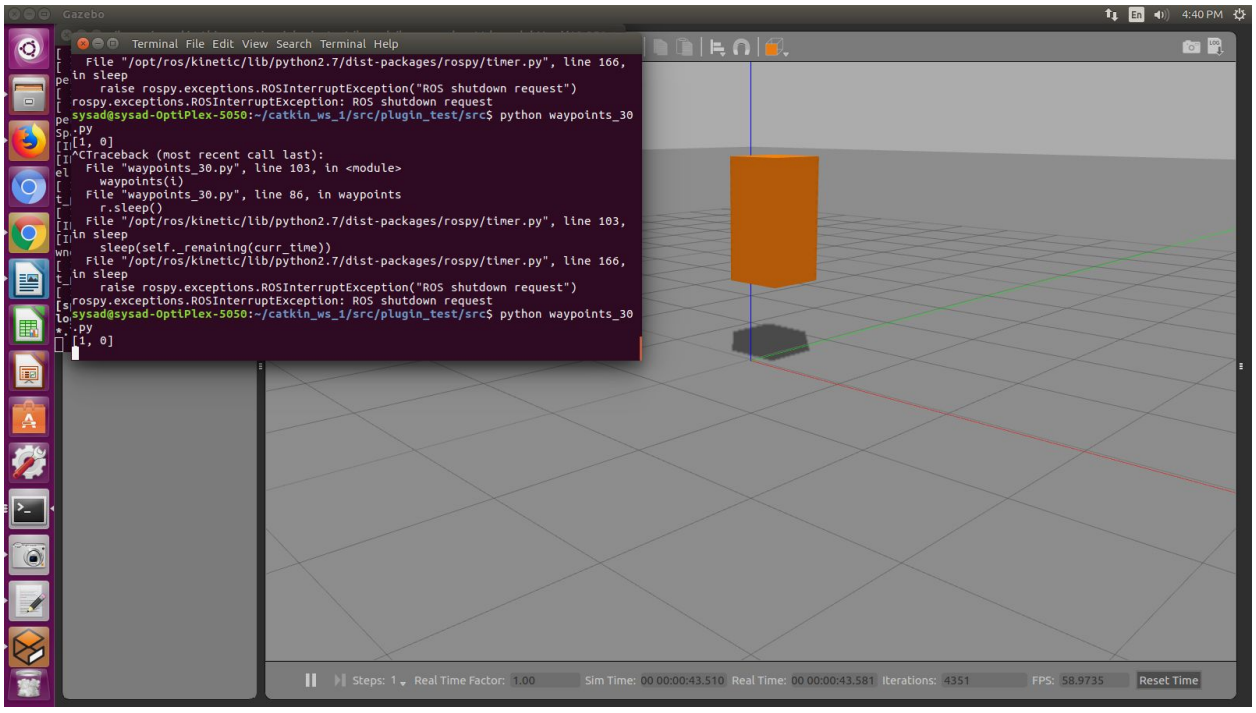
- **roslaunch plugin_test box_gazebo_11.launch**
- **cd ~/catkin_ws/src/plugin_test/src**
- **python force_controller_construct1_xy.py**



5. Moving box along waypoints
    - **roslaunch plugin_test box_gazebo.launch**
    - **cd ~/catkin_ws/src/plugin_test/src**
    - **python waypoints_30.py**




Terminal
2:55 PM
World
Insert
Layers
GUI
Scene
Spherical Coordinates
Physics
Models
ground_plane
link
floating_box
Lights
Property
Value
user@user-OptiPlex-5050: ~/catkin_ws/src/plugin_test/src
negativey
-0.530434609565
forceapply: x=1.78,y=1.78 dist=0.31, cmd.vx=-0.224,cmd.vy=-0.224,cmd.linear.x=0.00
negativex
-0.579881386385
negativey
-0.579881386385
forceapply: x=1.79,y=1.79 dist=0.30, cmd.vx=-0.237,cmd.vy=-0.237,cmd.linear.x=0.00
negativex
-0.627275687269
negativey
-0.627275687269
forceapply: x=1.80,y=1.80 dist=0.29, cmd.vx=-0.249,cmd.vy=-0.249,cmd.linear.x=0.00
negativex
-0.448872631648
negativey
-0.448872631648
user@user-OptiPlex-5050:~/catkin_ws/src/plugin_test/src$
Steps: 1
Real Time Factor: 1.00
Sim Time: 00 00:02:56.840
Real Time: 00 00:02:57.056
Iterations: 17684
FPS: 61.6092
Reset Time


Gazebo
4:40 PM
Terminal File Edit View Search Terminal Help
File "/opt/ros/kinetic/lib/python2.7/dist-packages/rospy/timer.py", line 166, in sleep
raise rospy.exceptions.ROSInterruptException("ROS shutdown request")
rospy.exceptions.ROSInterruptException: ROS shutdown request
sysad@sysad-OptiPlex-5050:~/catkin_ws_1/src/plugin_test/src$ python waypoints_30.py
[1, 0]
^CTraceback (most recent call last):
File "waypoints_30.py", line 103, in <module>
waypoints(i)
File "waypoints_30.py", line 86, in waypoints
r.sleep()
File "/opt/ros/kinetic/lib/python2.7/dist-packages/rospy/timer.py", line 103, in sleep
sleep(self._remaining(curr_time))
File "/opt/ros/kinetic/lib/python2.7/dist-packages/rospy/timer.py", line 166, in sleep
raise rospy.exceptions.ROSInterruptException("ROS shutdown request")
rospy.exceptions.ROSInterruptException: ROS shutdown request
sysad@sysad-OptiPlex-5050:~/catkin_ws_1/src/plugin_test/src$ python waypoints_30.py
[1, 0]
Steps: 1
Real Time Factor: 1.00
Sim Time: 00 00:00:43.510
Real Time: 00 00:00:43.581
Iterations: 4351
FPS: 58.9735
Reset Time

TROUBLESHOOTING:

1. Execute following commands:
    - **cd ~/catkin_ws**
    - **catkin_make**
    - **source devel/setup.bash**
2. Check for topic name by executing following command
    - **rostopic list**

   Use same topic names in python program