Will Install TurtleBot3 Simulation Packages for ROS Neotic

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

```
1.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
```

```
2.sudo apt install ros-noetic-dynamixel-sdk
3.sudo apt install ros-noetic-turtlebot3-msgs
4.sudo apt install ros-noetic-turtlebot3
```

5. Creating PAckage

If YOu have not build workspace yet Please follow this

```
mkdir -p ~/catkin_ws/src
$ cd ~/catkin_ws/
$ catkin_make
```

```
Otherwise directly jump to this
```

```
$ cd ~/catkin_ws/src/
$ git clone -b noetic https://github.com/ROBOTIS-GIT/turtlebot3_simulations.git
$ cd ~/catkin_ws && catkin_make
```

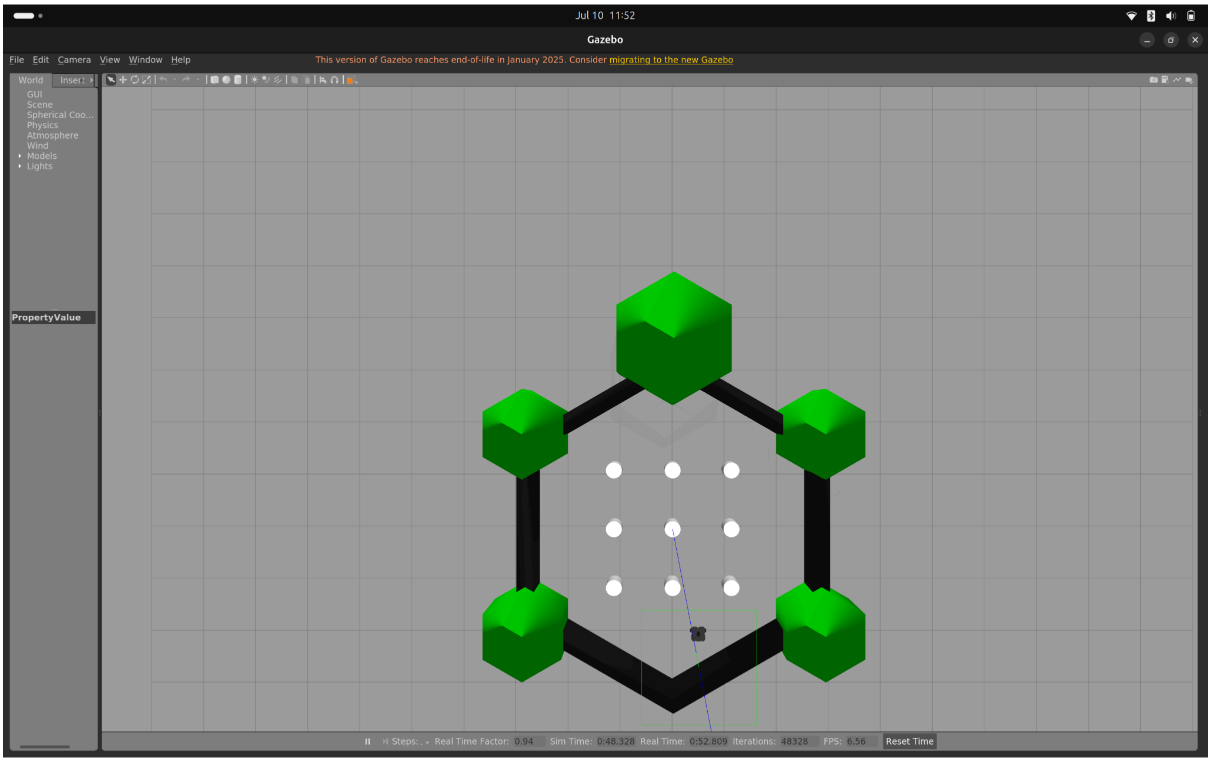
```
$ source devel/setup.bash
```

Now set the parameter

```
export TURTLEBOT3_MODEL=waffle
```

Now Launch the simulation

```
roslaunch turtlebot3_gazebo turtlebot3_world.launch
```



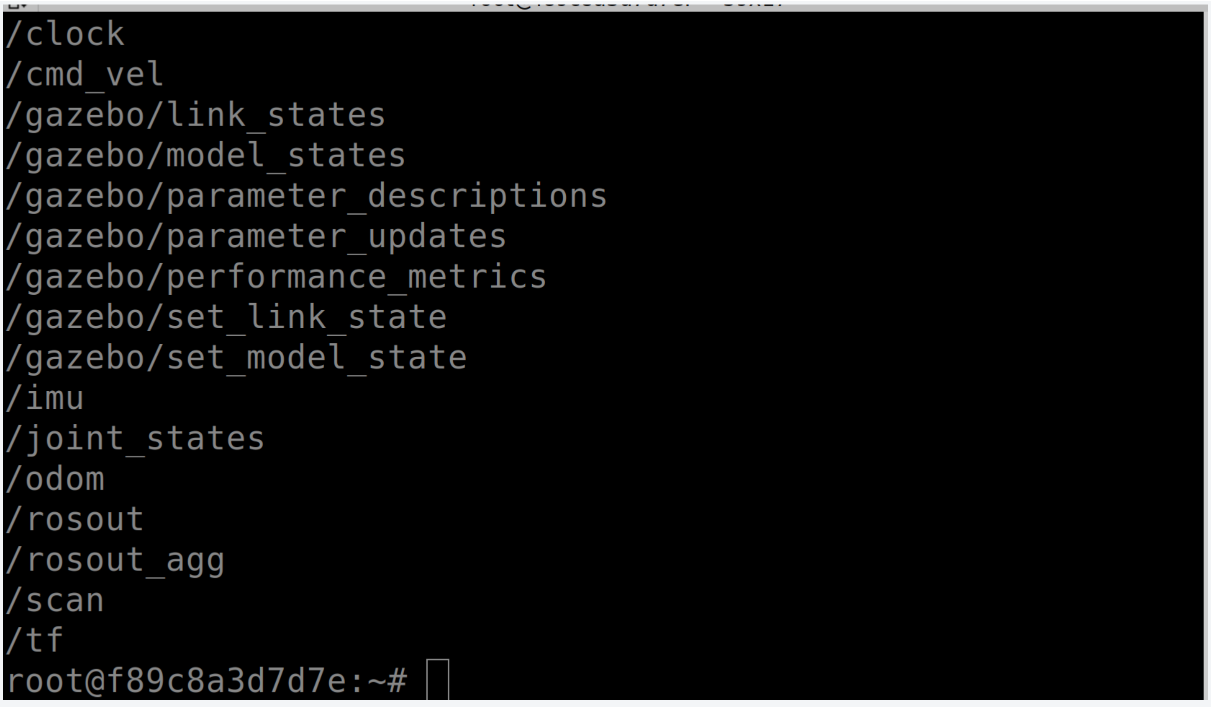
This version of Gazebo reaches end-of-life in January 2025. Consider migrating to the new Gazebo

Steps: Real Time Factor: 0.94 Sim Time: 0:48.328 Real Time: 0:52.809 Iterations: 48328 FPS: 6.56

Now will see the topics which are active

```
source /opt/ros/noetic/setup.bash
```

```
rostopic list
```



```
/clock
/cmd_vel
/gazebo/link_states
/gazebo/model_states
/gazebo/parameter_descriptions
/gazebo/parameter_updates
/gazebo/performance_metrics
/gazebo/set_link_state
/gazebo/set_model_state
/imu
/joint_states
/odom
/rosout
/rosout_agg
/scan
/tf
root@f89c8a3d7d7e:~# 
```

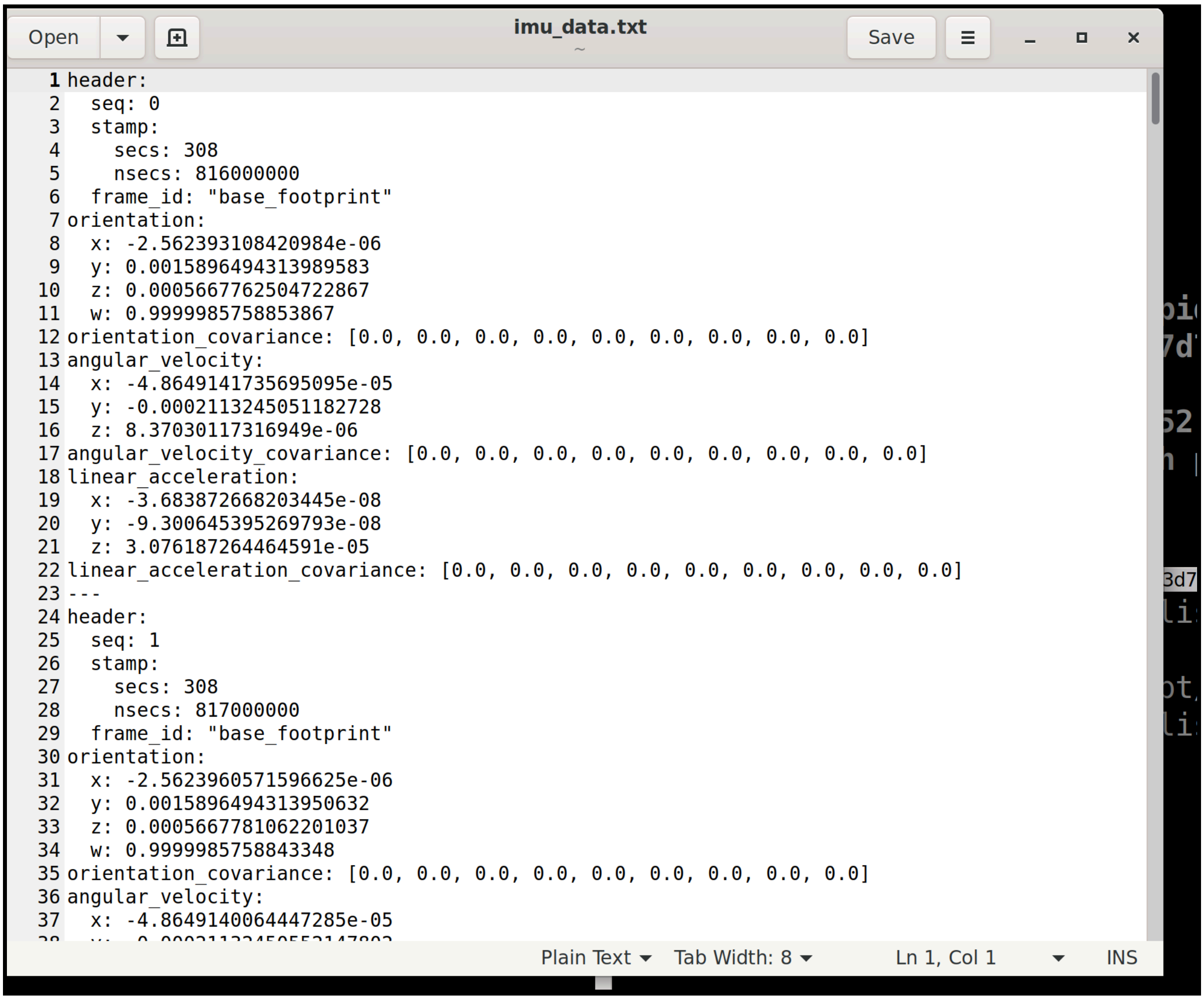
```
rostopic echo /imu > imu_data.txt
```

```
Saving imu data in txt file
```

```
Now Install gedit text editor using
```

```
sudo apt install gedit
```

```
gedit imu_data.txt
```



```
header:
  seq: 0
  stamp:
    secs: 308
    nsecs: 816000000
  frame_id: "base_footprint"
orientation:
  x: -2.562393108420984e-06
  y: 0.0015896494313989583
  z: 0.0005667762504722867
  w: 0.9999985758853867
orientation_covariance: [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]
angular_velocity:
  x: -4.8649141735695095e-05
  y: -0.0002113245051182728
  z: 8.37030117316949e-06
angular_velocity_covariance: [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]
linear_acceleration:
  x: -3.683872668203445e-08
  y: -9.300645395269793e-08
  z: 3.076187264464591e-05
linear_acceleration_covariance: [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]
---
header:
  seq: 1
  stamp:
    secs: 308
    nsecs: 817000000
  frame_id: "base_footprint"
orientation:
  x: -2.5623960571596625e-06
  y: 0.0015896494313950632
  z: 0.0005667781062201037
  w: 0.9999985758843348
orientation_covariance: [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]
angular_velocity:
  x: -4.8649140064447285e-05
```

Now Study :_
1.Quaterinon
2.How To find Position From IMU Data?
3.Create a ros node for same.
4. Visulaize data in RViz
5.Study Kalman Filter
5.Create a node for kalmanfilter for two imus
6. Visulaize data in RViz