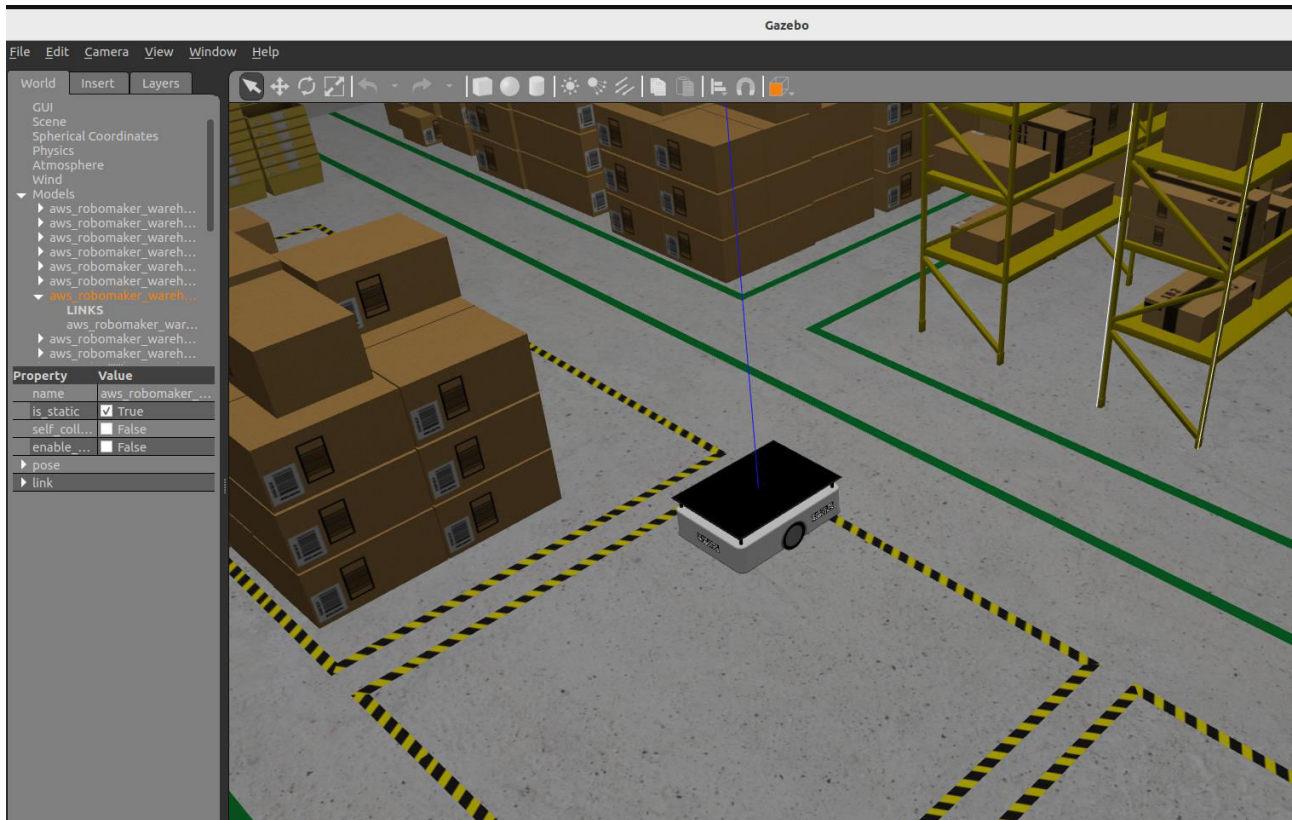ROS2 BAGS:
recording and playing back data in a ROS2 system

Procedure:

1) Run a Robot in the Gazebo environment. In my case I have used bcrbot


2) Check the list of current topics using 'ros2 topic list'

```
reynash@reynash-Victus-by-HP-Gaming-Laptop-15-fa0xxx:~/bcrbot/src/bcr_bot$ ros2
topic list
/bcr_bot/cmd_vel
/bcr_bot/imu
/bcr_bot/joint_states
/bcr_bot/kinect_camera/camera_info
/bcr_bot/kinect_camera/depth/camera_info
/bcr_bot/kinect_camera/depth/image_raw
/bcr_bot/kinect_camera/image_raw
/bcr_bot/kinect_camera/points
/bcr_bot/odom
/bcr_bot/p3d_ground_truth
/bcr_bot/scan
/clock
/parameter_events
/performance_metrics
/robot_description
/rosout
/tf
/tf_static
reynash@reynash-Victus-by-HP-Gaming-Laptop-15-fa0xxx:~/bcrbot/src/bcr_bot$
```

3) Go to the directory where you want to store your ros2 bag and in the terminal type 'ros2 bag record /topic1 /topic2'. In my case I have used /bcr_bot/cmd_vel and /bcr_bot/odom.


```
/tf
/tf_static
reynash@reynash-Victus-by-HP-Gaming-Laptop-15-fa0xxx:~/bcrbot/src/bcr_bot$ ros2
bag record /bcr_bot/cmd_vel /bcr_bot/scan
[INFO] [1735557054.130018593] [rosbag2_recorder]: Press SPACE for pausing/resumi
ng
[INFO] [1735557054.132708167] [rosbag2_storage]: Opened database 'rosbag2_2024_1
2_30-16_40_54/rosbag2_2024_12_30-16_40_54_0.db3' for READ_WRITE.
[INFO] [1735557054.134043096] [rosbag2_recorder]: Listening for topics...
[INFO] [1735557054.134072982] [rosbag2_recorder]: Event publisher thread: Starti
ng
[INFO] [1735557054.136605471] [rosbag2_recorder]: Subscribed to topic '/bcr_bot/
scan'
[INFO] [1735557054.138170059] [rosbag2_recorder]: Subscribed to topic '/bcr_bot/
cmd_vel'
[INFO] [1735557054.138440930] [rosbag2_recorder]: Recording...
[INFO] [1735557054.139098200] [rosbag2_recorder]: All requested topics are subsc
ribed. Stopping discovery...
[INFO] [1735557069.878534544] [rosbag2_cpp]: Writing remaining messages from cac
he to the bag. It may take a while
[INFO] [1735557069.880383345] [rosbag2_recorder]: Event publisher thread: Exitin
g
[INFO] [1735557069.880564791] [rosbag2_recorder]: Recording stopped
reynash@reynash-Victus-by-HP-Gaming-Laptop-15-fa0xxx:~/bcrbot/src/bcr_bot$
```

4) Move the robot as you want, the ros2 bag will capture all messages published
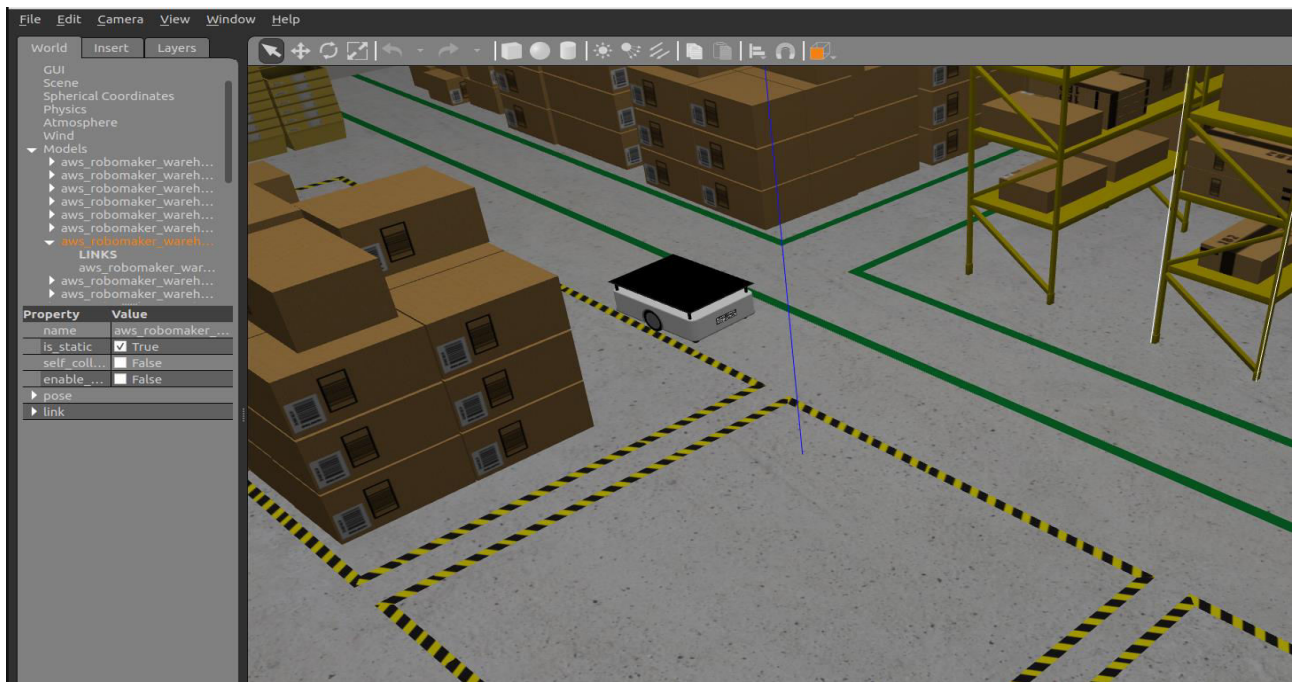
5) Press ctrl+c to stop the record command. The folder will be created in the directory
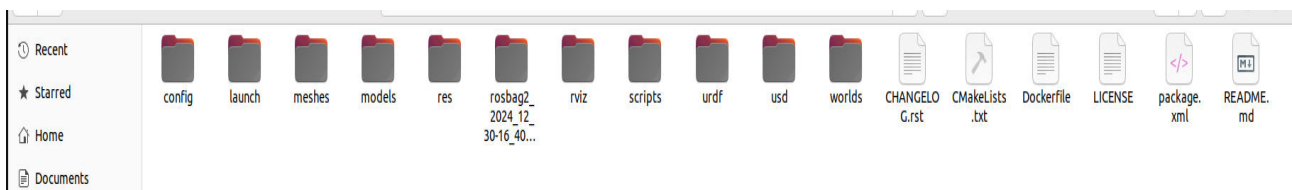
6) To play recorded data, 'ros2 bag play path_to_bag_directory'
7) To see bag content type 'ros2 bag info path_to_bag_directory'

PLOT JUGGLER:
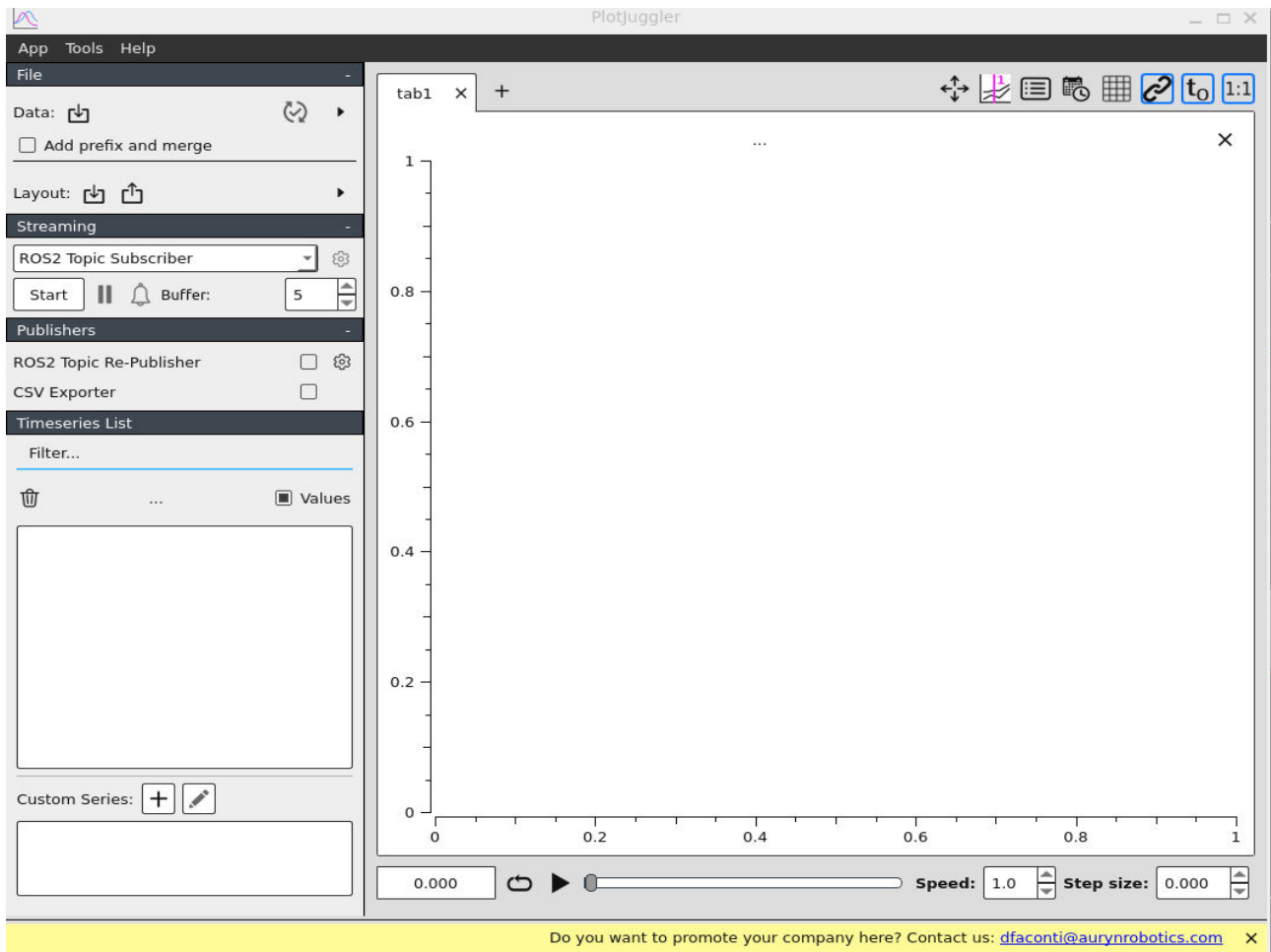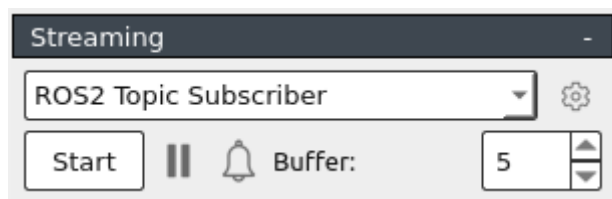to monitor and analyze the performance of your robot in real time

Procedure:
1) sudo snap install plotjuggler
2) sudo apt install ros-humble-plotjuggler-ros
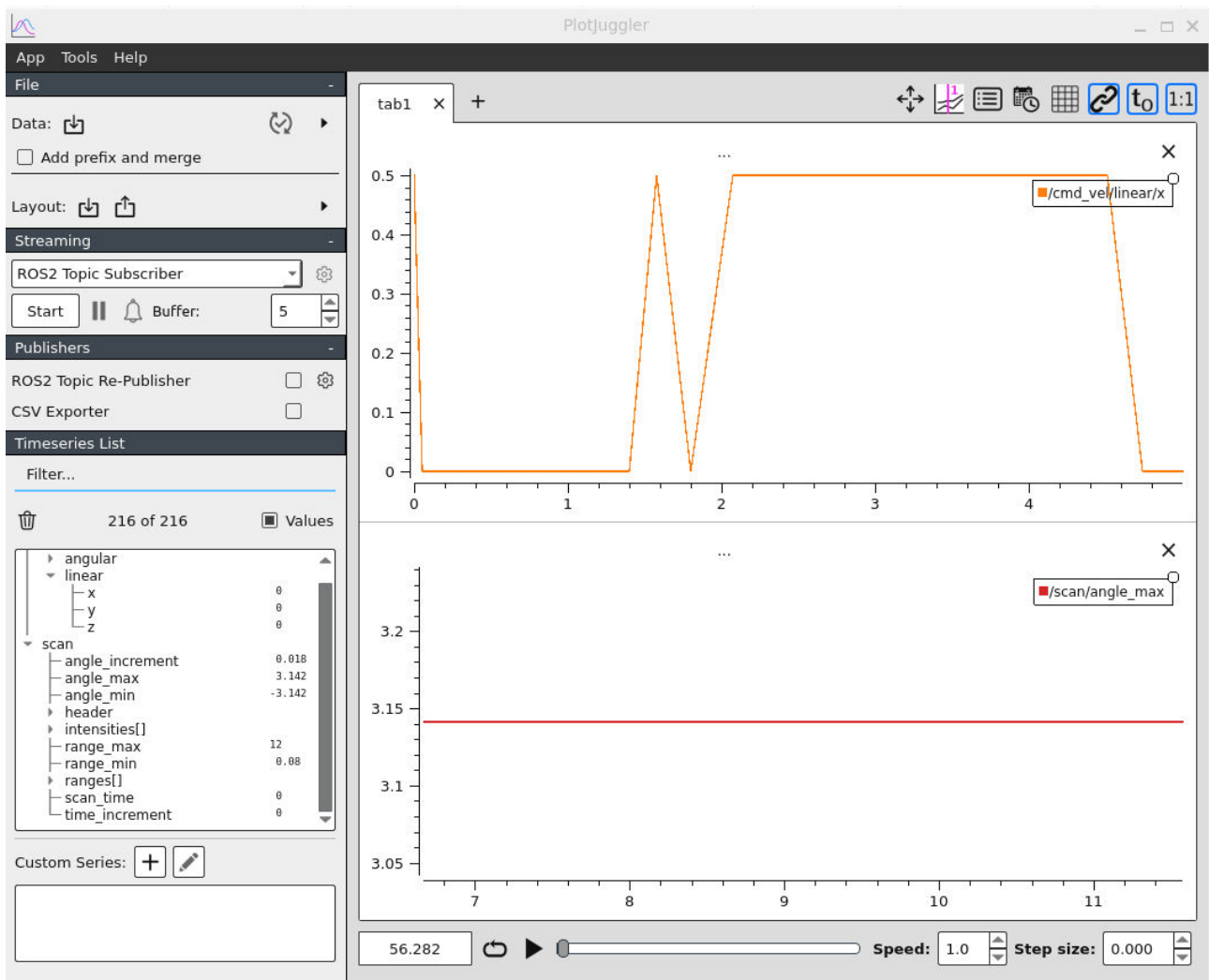3) Run robot. For me its 'ros2 launch linorobot2_gazebo gazebo.launch.py'
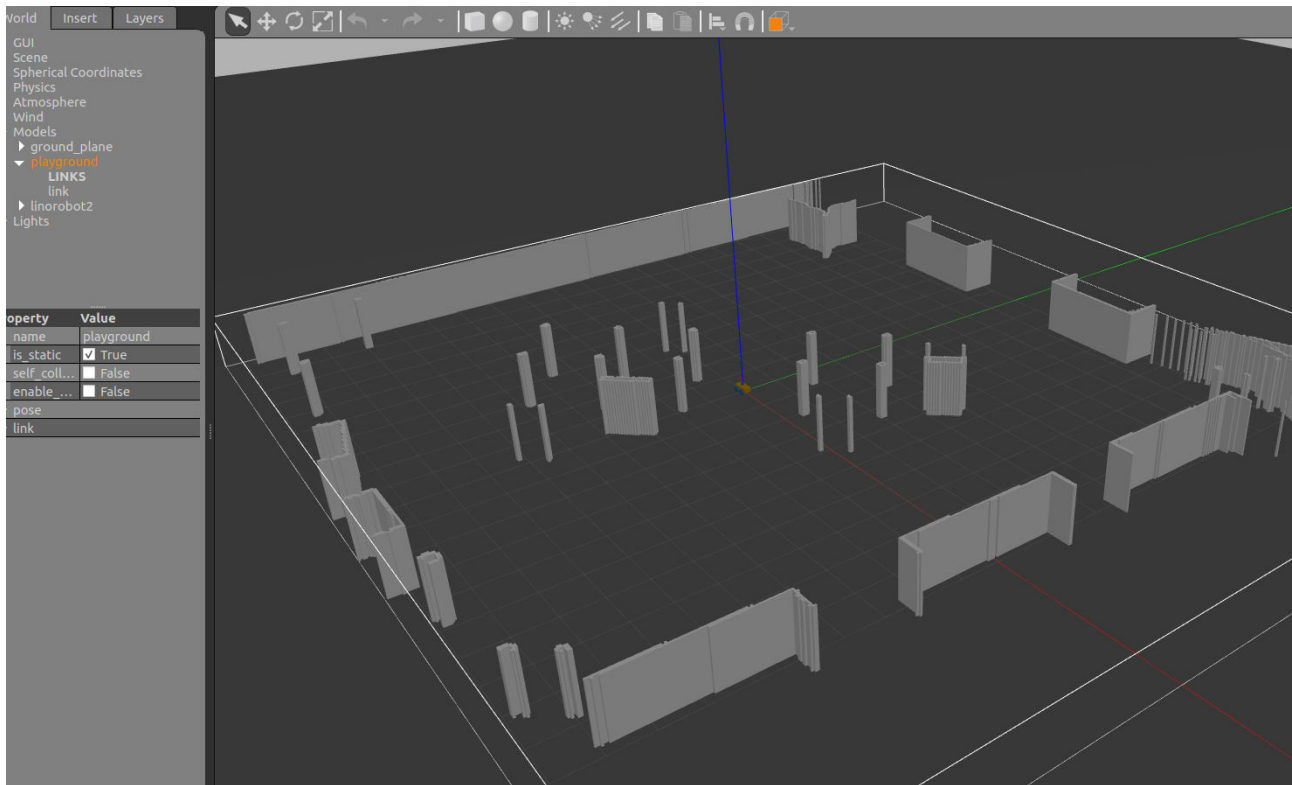
4) 'plotjuggler --plugin ROS2'

5) In plot juggler, in streaming section, click on "start" and begin subscribing to active topics.

6) Drag and drop the selected topics onto the plotting area within PlotJuggler to visualize the data in real-time

7) Customize the plots as needed to analyze the robot's performance or sensor outputs.

Diff between plot juggler and rqt: Plot juggler specializes in advanced plotting and real-time data analysis whereas rqt is a general-purpose ROS GUI with multiple tools, including basic plotting (via plugins).