

MTE 544 PreLab 3: Introduction to ROS2

Introduction

This lab focuses getting you comfortable with the basic concepts of ROS2.

No lab report is required for prelab 3, but a prelabHW3 will be due on Thursday October 27th to ensure completion of this prelab.

Lab Instructions

Step #1: Introduction to ROS2

- a. Complete the tutorials provided by ROS2 Galactic **step by step**. Please take note of any indications of steps to skip. These were included because some installation steps can cause a version mismatch for the environment that was setup in the first prelab.

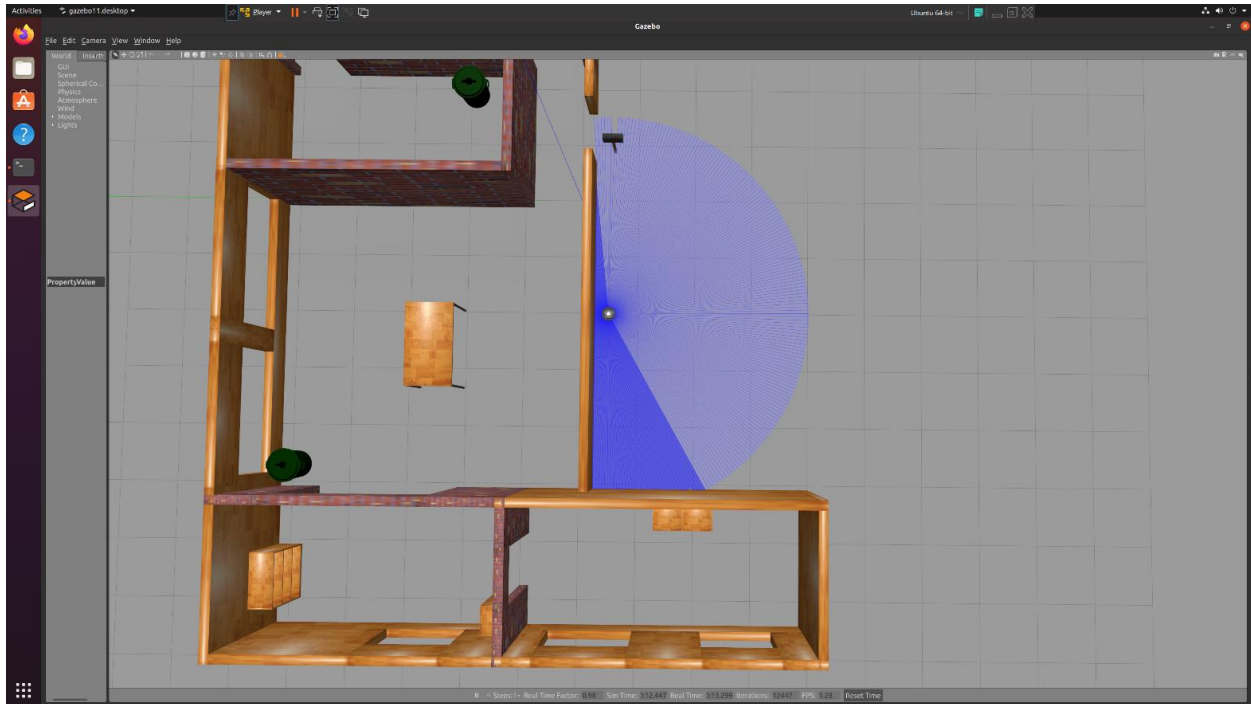
- [Understanding Nodes](#)
- [Understanding Topics](#)
- [Understanding Services](#)
- [Understanding Parameters](#)
- [Understanding Actions](#)
- [Using rqt_console](#)
- [Launching Nodes](#)
- [Recording and Playing Back Data](#) (skip the **Prerequisites** step)
- [Using colcon to Build Packages](#) (skip the **Install colcon** step)
- [Creating a Workspace](#)
- [Creating a Package](#)
- [Writing a Simple Publisher and Subscriber](#)
- [Writing a Simple Service and Client](#)

Step #2: Introduction to Turtlebot3 Simulation

- a. You can open the Gazebo turtlebot3 simulation with the turtlebot3_house world with the following command:

```
$ ros2 launch turtlebot3_gazebo turtlebot3_house.launch.py
```

- b. Gazebo should display the robot model and the world selected when using the launch command
 - Familiarize yourself with the mouse commands in gazebo (rotate, zoom and pan) and the bottom bar which outlines your real time factor, simulation time elapsed and real time elapsed



- c. You can control the pose of the robot with the turtlebot3_teleop package:

```
$ ros2 run turtlebot3_teleop teleop_keyboard
```

- d. Investigate what happens to various topics such as /scan while moving the turtlebot3 robot around
- To view topics please refer to the **Understanding Topics** section
- e. With rviz2, topics such as /scan can also be visualized. To set this up, in a new terminal type the following command:

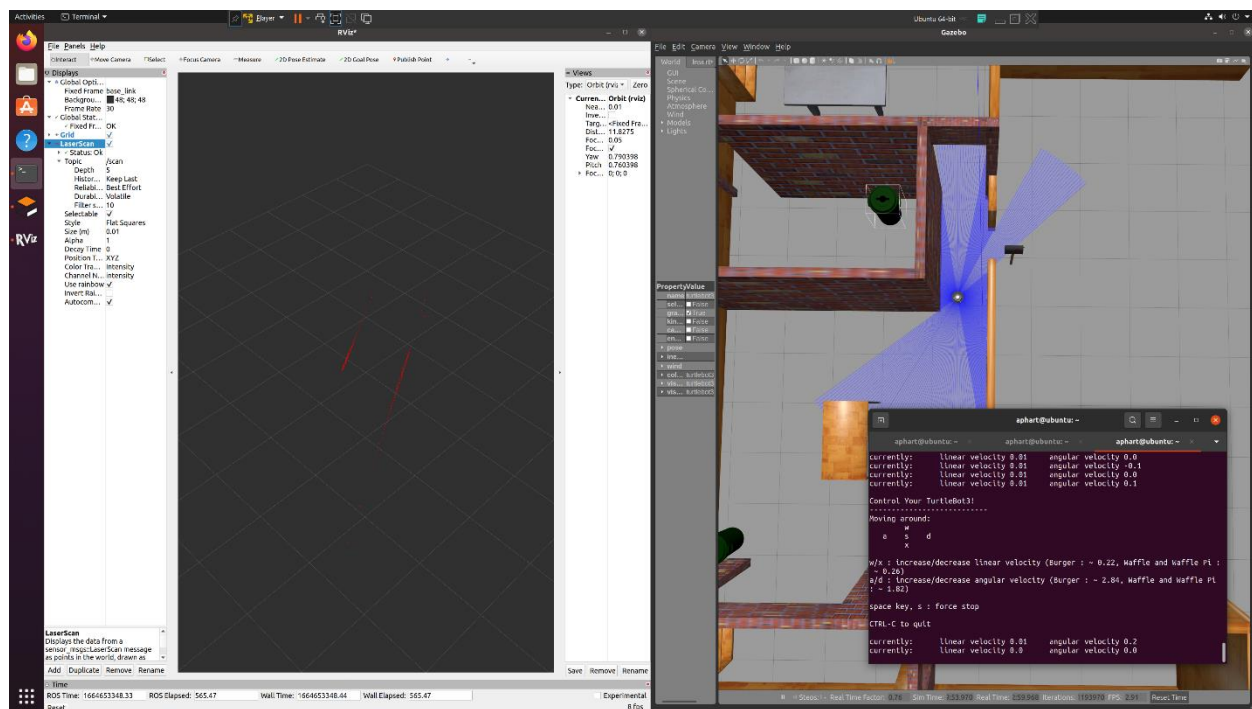
```
$ rviz2
```

- f. Once rviz2 opens, set the **Fixed Frame** to **base_link**, then select **Add>By topic>/scan>LaserScan** (more topics can be added in a similar way by going to **Add>By topic**).
- If the scan topic does not display after this change the following setting, **LaserScan>Topic>Reliability**, to **Best Effort** instead of **Reliable**
- g. Read over the rviz2 global and quality of services (QoS) options table below while rviz2 is open and familiarize yourself with them and how they work

Option	Description
Fixed Frame	Frame into which all data is transformed before being displayed.
History	Keep last: only store up to N samples, configurable via the queue depth option. Keep all: store all samples, subject to the configured resource limits of the underlying middleware.

Depth	Queue size: only honored if the “history” policy was set to “keep last”.
Reliability	Best effort: attempt to deliver samples, but may lose them if the network is not robust. Reliable: guarantee that samples are delivered, may retry multiple times.
Durability	Transient local: the publisher becomes responsible for persisting samples for “late-joining” subscriptions. Volatile: no attempt is made to persist samples.
Filter Size	Filter size of the message filter display.

- More details on QoS can be found on the ROS2 Galactic documentation page [About Quality of Service settings](#)
- h. Now with the gazebo simulation, rviz2 and teleop open in 3 terminals, move the turtlebot3 around the world and visualize how the /scan topic changes



Further Reading

Here are some great resources to prepare for the upcoming labs:

[ROS 2 Galactic Documentation](#)

[TurtleBot4 User Manual](#)