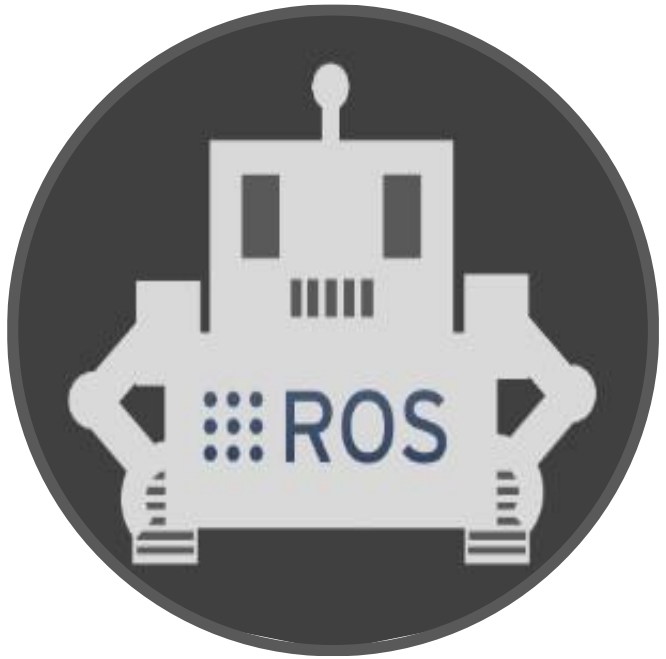
# ROS 기초 강의

## Chapter 10. 유용한 ROS 도구

구선생 로보틱스




Update 20240620

# 강의 자료 다운로드

ROS 기초 강의 강의노트

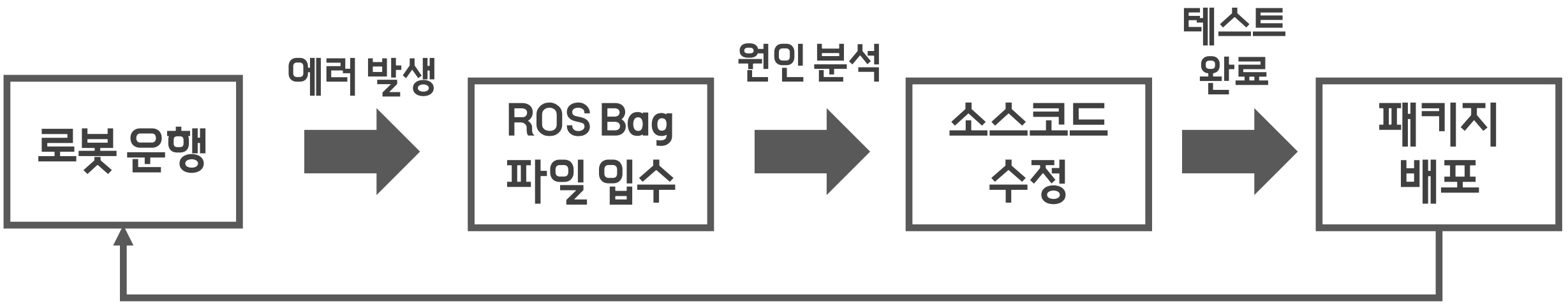
https://drive.google.com/drive/folders/1rRwS2j98HNyj5Is_yVXEGj30ILvMPtrz?usp=drive_link

1. ROS Bag
2. Rviz
3. ROS Bag to csv
4. ROS Plotjuggler

# ROS Bag

## ROS Bag란?

동영상 강의 - 유용한 ROS 도구
https://youtu.be/eXbpyVkdCe4?si=bm8VYxydBfqtTwIC




실시간으로 ROS Topic의 값을 기록하고 파일로 저장하는 도구

# ROS Bag

## ROS Bag 명령어

### 1) ROS Bag Topic 기록

```
$ rosbag record <topic_1> <topic_2> <topic_3>
```

### 2) ROS Bag 재생

```
$ rosbag play <bagFile_Name>
```

**기타 명령어는 아래 위키 참고**

http://wiki.ros.org/rosbag/Commandline

# ROS Bag

## 튜토리얼

### 1) rqt_robot_steering 실행

```
$ rosrun rqt_robot_steering rqt_robot_steering
```

### 2) ROS Bag cmd_vel Topic 기록

```
$ rosbag record cmd_vel
```

### 3) ROS Bag 재생

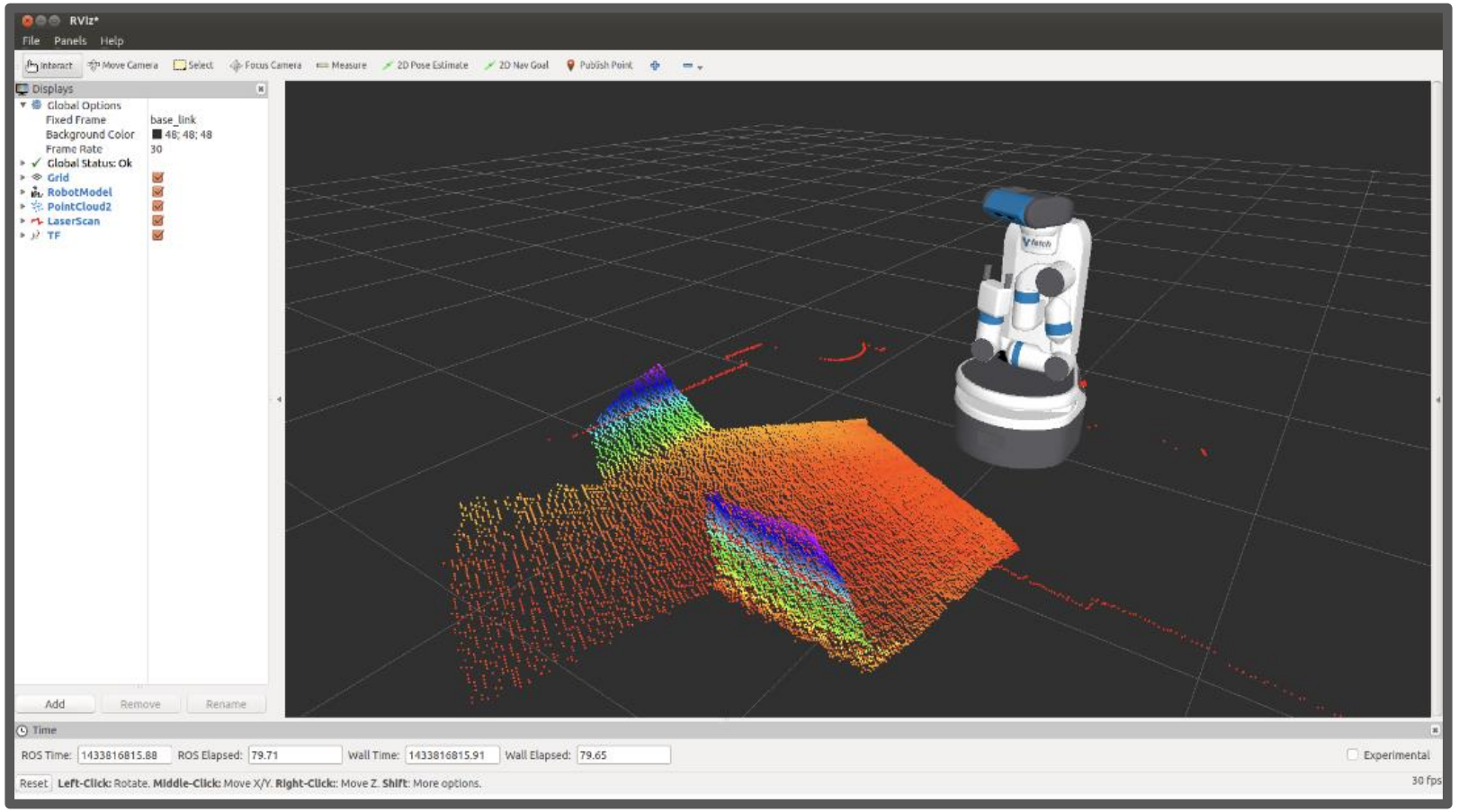
```
$ rosbag play <bagFile_Name>
```

```
ubuntu@ubuntu:~$ rosbag play 2023-08-14-04-41-27.bag
[ INFO] [1692013306.437425681]: Opening 2023-08-14-04-41-27.bag

Waiting 0.2 seconds after advertising topics... done.

Hit space to toggle paused, or 's' to step.
 [DELAYED]  Bag Time: 1692013290.204008   Duration: 0.000000 / 5.077304
 [RUNNING]  Bag Time: 1692013290.204008   Duration: 0.000000 / 5.077304
 [RUNNING]  Bag Time: 1692013290.204008   Duration: 0.000000 / 5.077304
```

1. ROS Bag
2. Rviz
3. ROS Bag to csv
4. ROS Plotjuggler

# Rviz

## Rviz란?



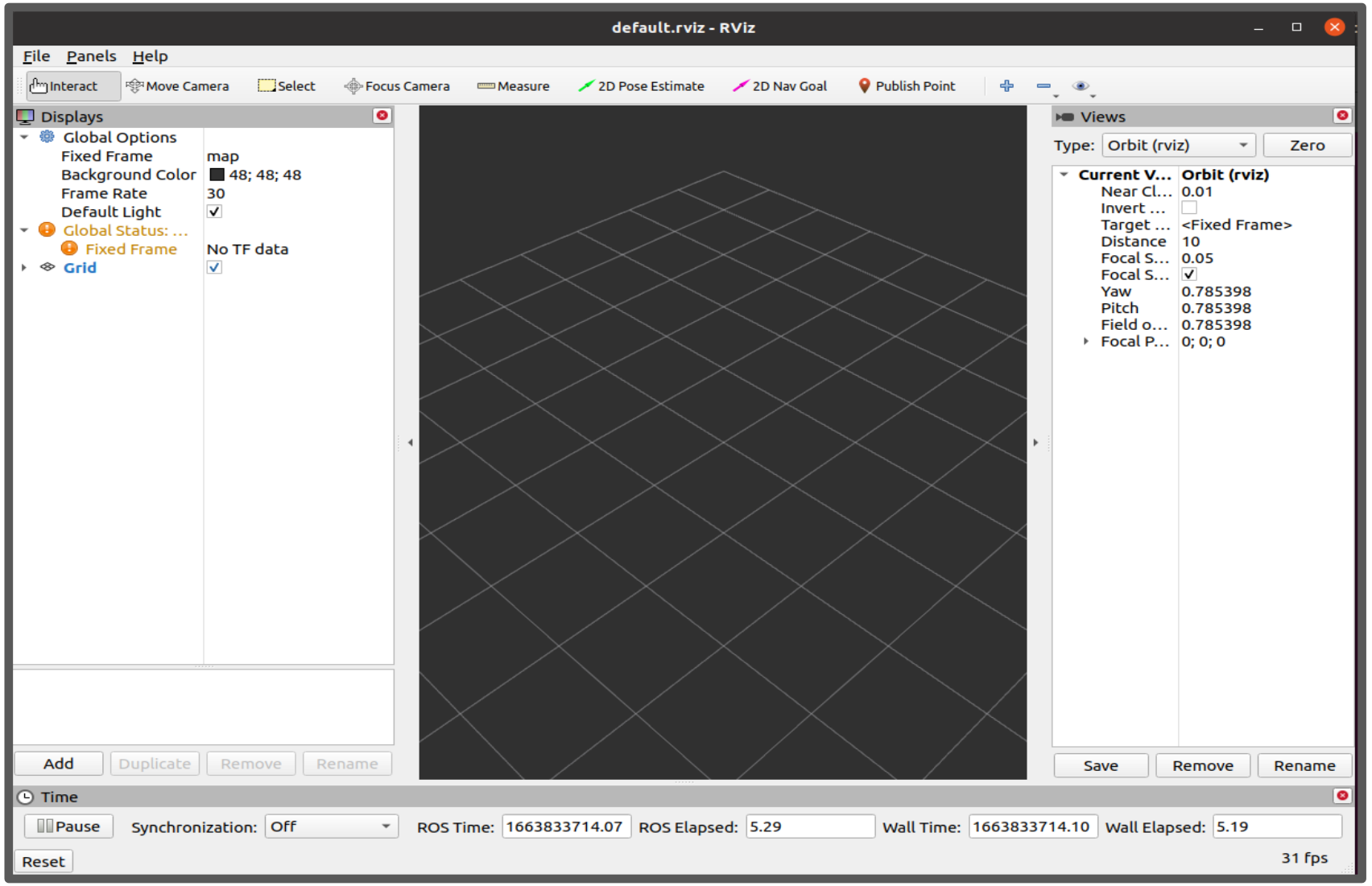

ROS용 3D 시각화 도구

# Rviz

## 실행 방법

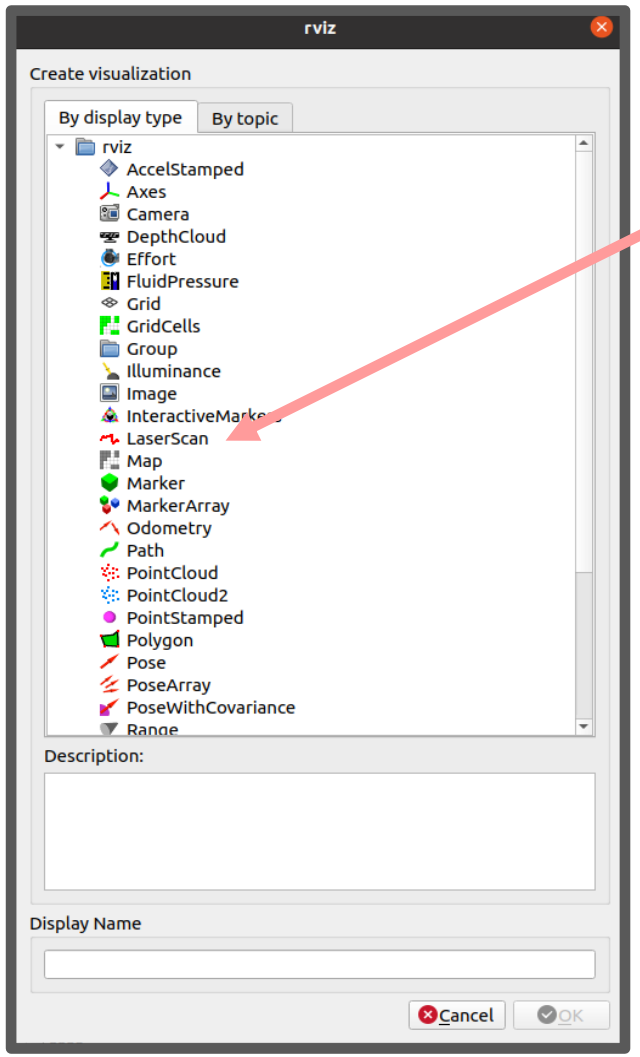
### Rviz 실행

```
$ rviz
```



# Rviz

## 사용 방법




Rviz에 호환되는 메시지 타입으로 토픽을 퍼블리시 해주면
데이터를 시각화하여 볼 수 있다.

laserScan 데이터를 시각화 하고자 하는 경우 아래 메시지 타입을 퍼블리시 한다.

sensor_msgs/LaserScan Message

File: sensor_msgs/LaserScan.msg

Raw Message Definition

```
# Single scan from a planar laser range-finder
#
# If you have another ranging device with different behavior (e.g. a sonar
# array), please find or create a different message, since applications
# will make fairly laser-specific assumptions about this data

Header header           # timestamp in the header is the acquisition time of
                        # the first ray in the scan.
                        #
                        # in frame frame_id, angles are measured around
                        # the positive Z axis (counterclockwise, if Z is up)
                        # with zero angle being forward along the x axis

float32 angle_min       # start angle of the scan [rad]
float32 angle_max       # end angle of the scan [rad]
float32 angle_increment # angular distance between measurements [rad]

float32 time_increment  # time between measurements [seconds] - if your scanner
                        # is moving, this will be used in interpolating position
                        # of 3d points
float32 scan_time       # time between scans [seconds]

float32 range_min       # minimum range value [m]
float32 range_max       # maximum range value [m]

float32[] ranges        # range data [m] (Note: values < range_min or > range_max should be discarded)
float32[] intensities   # intensity data [device-specific units].  If your
                        # device does not provide intensities, please leave
                        # the array empty.
```

# Rviz

## 튜토리얼

### 1) Fake Laser 패키지 다운로드

```
$ git clone https://github.com/theja2289/fake_laser.git
```

### 2) Fake Laser 패키지 실행

```
$ roslaunch fake_laser fake_laser.launch
```

```
ubuntu@ubuntu:~$ rostopic list
/clicked_point
/initialpose
/move_base_simple/goal
/rosout
/rosout_agg
/scan
/tf
/tf_static
```

```
ubuntu@ubuntu:~$ rostopic info /scan
Type: sensor_msgs/LaserScan

Publishers:
 * /fake_laser_publisher (http://192.168.209.128:39077/)

Subscribers:
 * /rviz (http://192.168.209.128:37381/)
```

fake_laser에서 퍼블리시 하고 있는 scan 토픽은 Rviz와 호환되는 토픽임

# Rviz

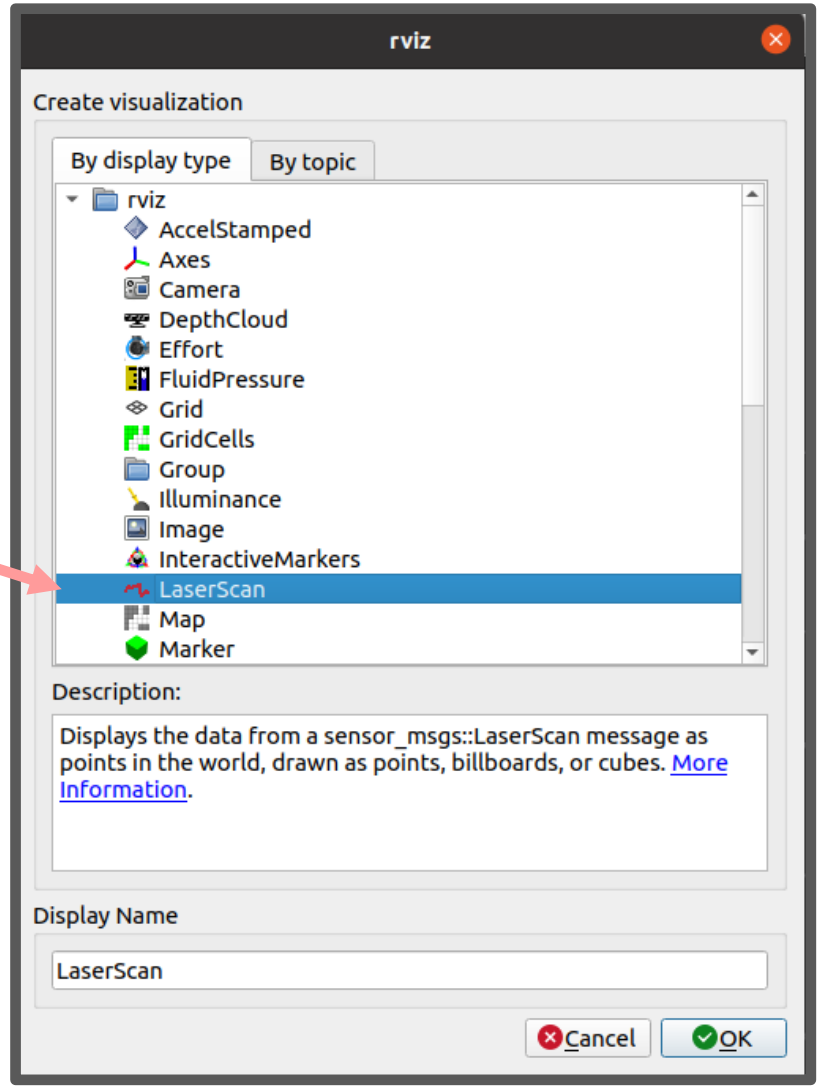
## 튜토리얼

### 3) Rviz 실행

```
$ rviz
```

### 4) Topic 종류 선택

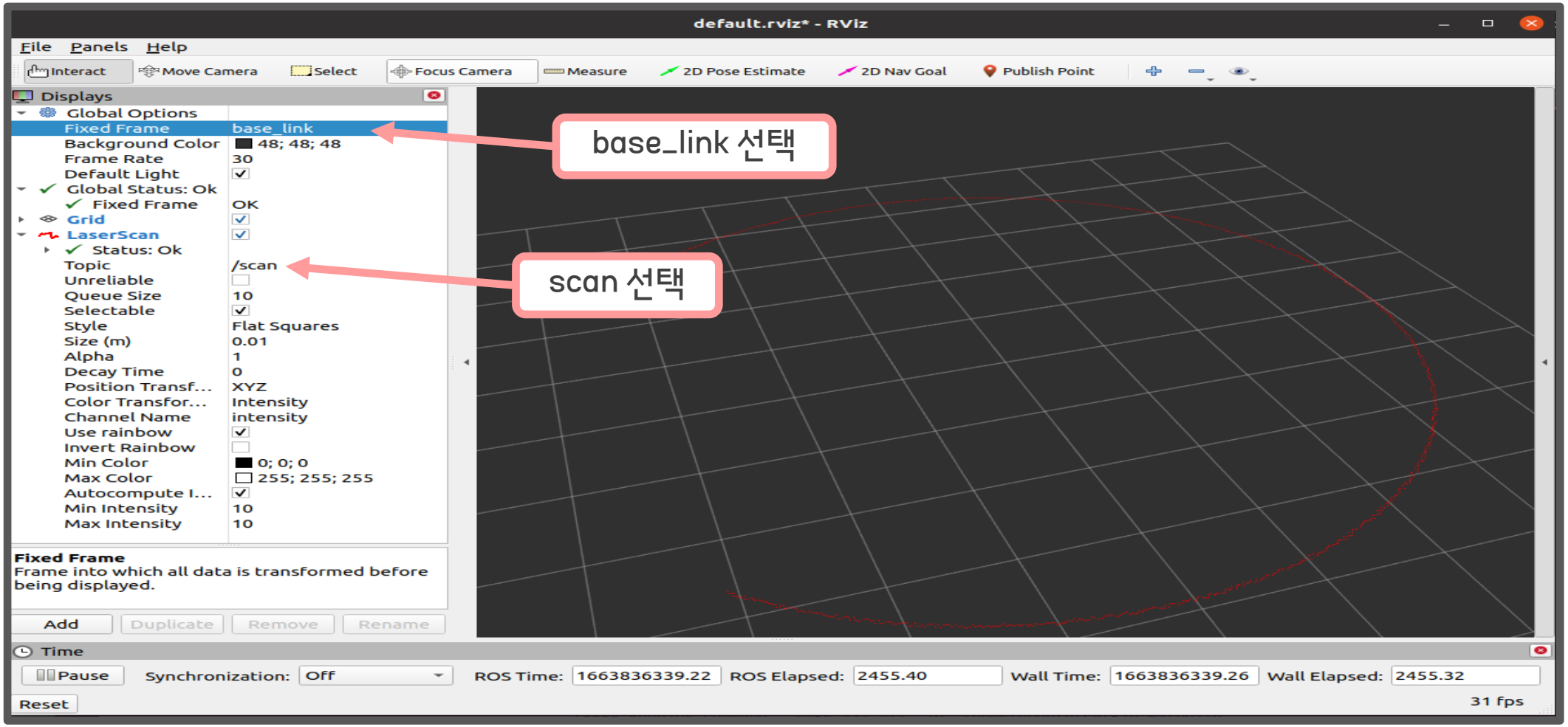
scan Topic의 타입
LaserScan 선택



# Rviz

## 튜토리얼

### 5 ) Topic이름 및 TF 설정



1. ROS Bag
2. Rviz
3. **ROS Bag to csv**
4. ROS Plotjuggler

# ROS Bag to csv

## ROS Bag to csv란?

ROS Bag 파일을 csv 파일로 변환 하는 도구

ROS Bag File

csv
파일 변환

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | time | .linear.x | .linear.y | .linear.z | .angular.x | .angular.y | .angular.z |
| 2 | 2022/09/26/01:02:34.818761 | 0.022 | 0 | 0 | 0 | 0 | 0 |
| 3 | 2022/09/26/01:02:34.822799 | 0.022 | 0 | 0 | 0 | 0 | 0 |
| 4 | 2022/09/26/01:02:34.851154 | 0.078 | 0 | 0 | 0 | 0 | 0 |
| 5 | 2022/09/26/01:02:34.882480 | 0.116 | 0 | 0 | 0 | 0 | 0 |
| 6 | 2022/09/26/01:02:34.911950 | 0.166 | 0 | 0 | 0 | 0 | 0 |
| 7 | 2022/09/26/01:02:34.922727 | 0.166 | 0 | 0 | 0 | 0 | 0 |
| 8 | 2022/09/26/01:02:34.944152 | 0.216 | 0 | 0 | 0 | 0 | 0 |
| 9 | 2022/09/26/01:02:34.973582 | 0.223 | 0 | 0 | 0 | 0 | 0 |
| 10 | 2022/09/26/01:02:35.005923 | 0.26 | 0 | 0 | 0 | 0 | 0 |
| 11 | 2022/09/26/01:02:35.022511 | 0.26 | 0 | 0 | 0 | 0 | 0 |
| 12 | 2022/09/26/01:02:35.122237 | 0.26 | 0 | 0 | 0 | 0 | 0 |
| 13 | 2022/09/26/01:02:35.223278 | 0.26 | 0 | 0 | 0 | 0 | 0 |
| 14 | 2022/09/26/01:02:35.284345 | 0.273 | 0 | 0 | 0 | 0 | 0 |
| 15 | 2022/09/26/01:02:35.294257 | 0.361 | 0 | 0 | 0 | 0 | 0 |
| 16 | 2022/09/26/01:02:35.313616 | 0.373 | 0 | 0 | 0 | 0 | 0 |
| 17 | 2022/09/26/01:02:35.322698 | 0.373 | 0 | 0 | 0 | 0 | 0 |
| 18 | 2022/09/26/01:02:35.378944 | 0.379 | 0 | 0 | 0 | 0 | 0 |
| 19 | 2022/09/26/01:02:35.423550 | 0.379 | 0 | 0 | 0 | 0 | 0 |
| 20 | 2022/09/26/01:02:35.499852 | 0.373 | 0 | 0 | 0 | 0 | 0 |
| 21 | 2022/09/26/01:02:35.522732 | 0.373 | 0 | 0 | 0 | 0 | 0 |
| 22 | 2022/09/26/01:02:35.529666 | 0.31 | 0 | 0 | 0 | 0 | 0 |
| 23 | 2022/09/26/01:02:35.559695 | 0.248 | 0 | 0 | 0 | 0 | 0 |
| 24 | 2022/09/26/01:02:35.591864 | 0.166 | 0 | 0 | 0 | 0 | 0 |
| 25 | 2022/09/26/01:02:35.622963 | 0.166 | 0 | 0 | 0 | 0 | 0 |

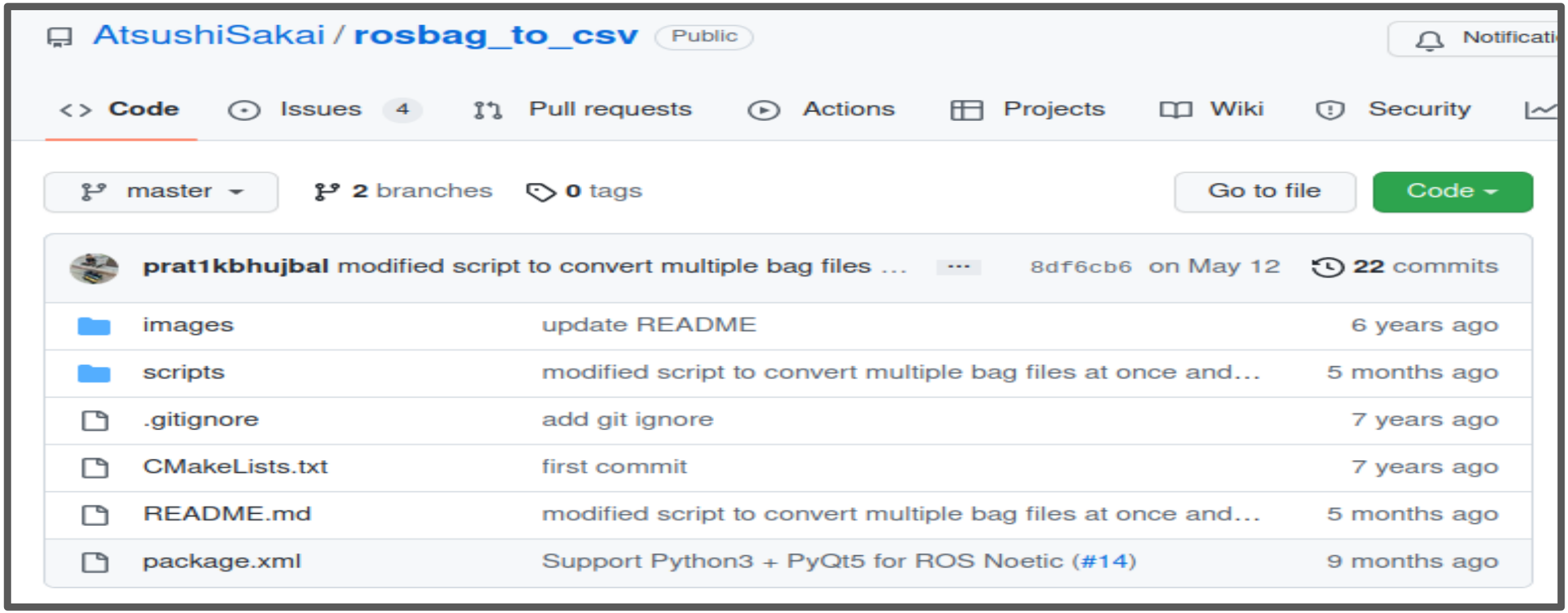
csv 파일을 이용하면 엑셀 작업이 가능하여 디버깅에 편리하다

# ROS Bag to csv

## 설치

1) Ros bag to csv GitHub 주소 방문

https://github.com/AtsushiSakai/rosbag_to_csv



# ROS Bag to csv

## 설치

2) Readme.md 문서의 절차에 따라 설치 진행

### Install Dependencies and Build

#### Python3

clone this repository

```
$ cd ~/catkin_ws/src
$ git clone https://github.com/AtsushiSakai/rosbag_to_csv.git
$ cd ~/catkin_ws && rosdep install -r --ignore-src --from-paths src
$ catkin_make
```

3) 실행

```
$ rosrun rosbag_to_csv rosbag_to_csv.py
```

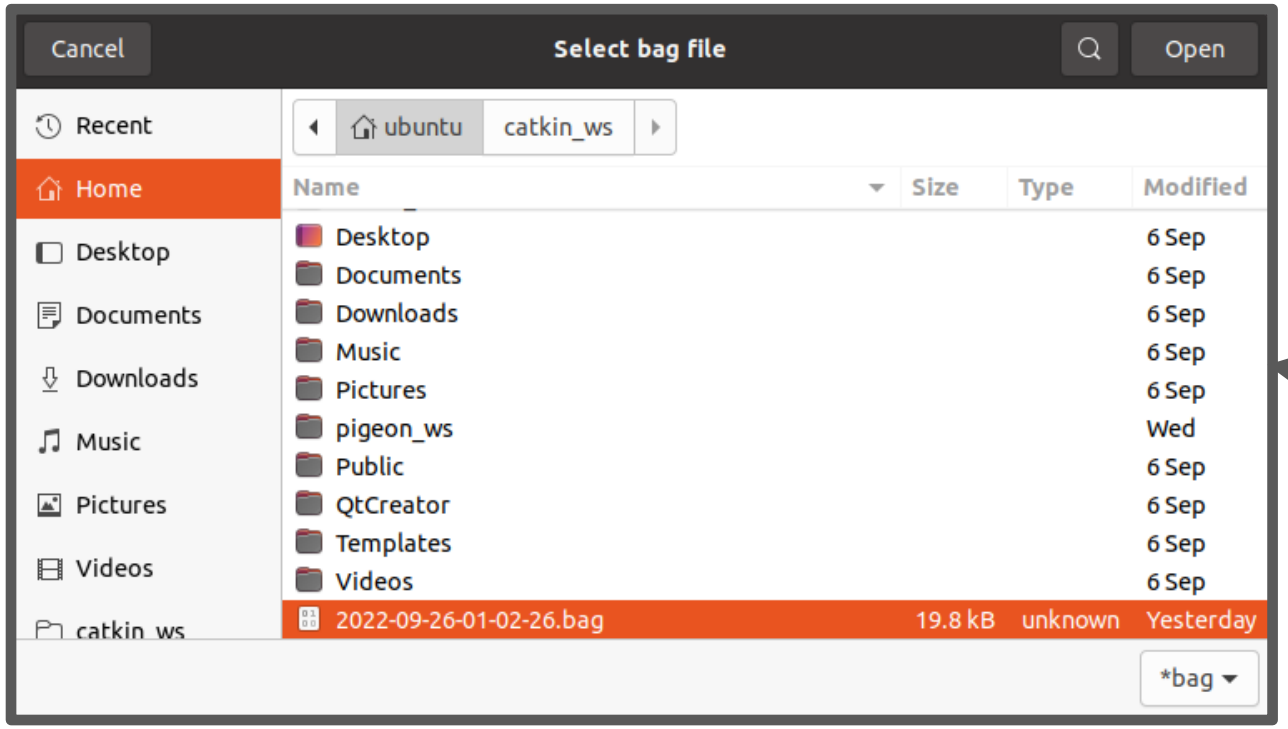
# ROS Bag to csv

## 튜토리얼

### 1) 실행

```
$ rosrun rosbag_to_csv rosbag_to_csv.py
```

### 2) Bag File 선택

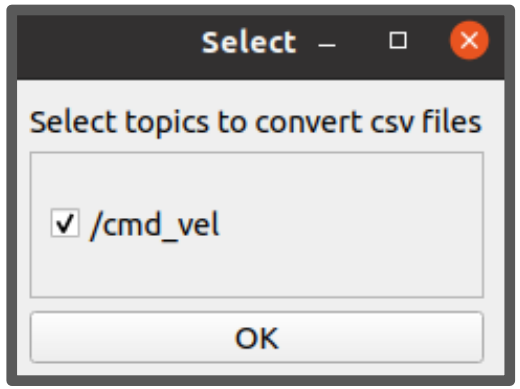



경로에 한글이 있을 시 실행 불가

# ROS Bag to csv

## ROS Bag to csv란?

3) 변환 할 Topic 선택




4) 파일 확인

2022-09-26-01-02-26-cmd_vel.csv

엑셀을 통해 열기

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | time | .linear.x | .linear.y | .linear.z | .angular.x | .angular.y | .angular.z |
| 2 | 2022/09/26/01:02:34.818761 | 0.022 | 0 | 0 | 0 | 0 | 0 |
| 3 | 2022/09/26/01:02:34.822799 | 0.022 | 0 | 0 | 0 | 0 | 0 |
| 4 | 2022/09/26/01:02:34.851154 | 0.078 | 0 | 0 | 0 | 0 | 0 |
| 5 | 2022/09/26/01:02:34.882480 | 0.116 | 0 | 0 | 0 | 0 | 0 |
| 6 | 2022/09/26/01:02:34.911950 | 0.166 | 0 | 0 | 0 | 0 | 0 |
| 7 | 2022/09/26/01:02:34.922727 | 0.166 | 0 | 0 | 0 | 0 | 0 |
| 8 | 2022/09/26/01:02:34.944152 | 0.216 | 0 | 0 | 0 | 0 | 0 |
| 9 | 2022/09/26/01:02:34.973582 | 0.223 | 0 | 0 | 0 | 0 | 0 |
| 10 | 2022/09/26/01:02:35.005923 | 0.26 | 0 | 0 | 0 | 0 | 0 |
| 11 | 2022/09/26/01:02:35.022511 | 0.26 | 0 | 0 | 0 | 0 | 0 |
| 12 | 2022/09/26/01:02:35.122237 | 0.26 | 0 | 0 | 0 | 0 | 0 |
| 13 | 2022/09/26/01:02:35.223278 | 0.26 | 0 | 0 | 0 | 0 | 0 |
| 14 | 2022/09/26/01:02:35.284345 | 0.273 | 0 | 0 | 0 | 0 | 0 |
| 15 | 2022/09/26/01:02:35.294257 | 0.361 | 0 | 0 | 0 | 0 | 0 |
| 16 | 2022/09/26/01:02:35.313616 | 0.373 | 0 | 0 | 0 | 0 | 0 |
| 17 | 2022/09/26/01:02:35.322698 | 0.373 | 0 | 0 | 0 | 0 | 0 |
| 18 | 2022/09/26/01:02:35.378944 | 0.379 | 0 | 0 | 0 | 0 | 0 |
| 19 | 2022/09/26/01:02:35.423550 | 0.379 | 0 | 0 | 0 | 0 | 0 |
| 20 | 2022/09/26/01:02:35.499852 | 0.373 | 0 | 0 | 0 | 0 | 0 |
| 21 | 2022/09/26/01:02:35.522732 | 0.373 | 0 | 0 | 0 | 0 | 0 |
| 22 | 2022/09/26/01:02:35.529666 | 0.31 | 0 | 0 | 0 | 0 | 0 |
| 23 | 2022/09/26/01:02:35.559695 | 0.248 | 0 | 0 | 0 | 0 | 0 |
| 24 | 2022/09/26/01:02:35.591864 | 0.166 | 0 | 0 | 0 | 0 | 0 |
| 25 | 2022/09/26/01:02:35.622963 | 0.166 | 0 | 0 | 0 | 0 | 0 |

1. ROS Bag
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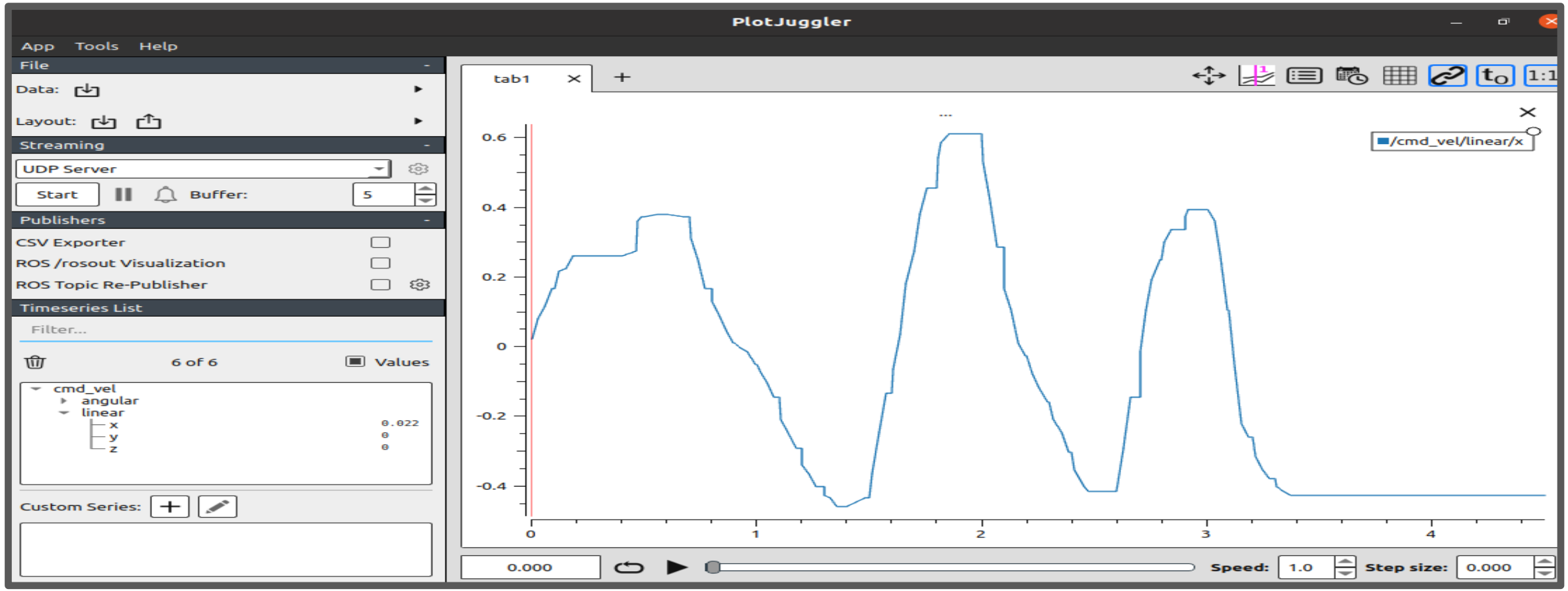
4. ROS Plotjuggler

# ROS Plotjuggler

## ROS Plotjuggler란?

ROS Topic을 그래프로 보는 도구




PlotJuggler를 이용하면 Topic을 시각적으로 볼 수 있어 디버깅에 편리하다

# ROS Plotjuggler

## 설치

### 1) 설치

```
$ sudo apt-get install ros-noetic-plotjuggler*
```

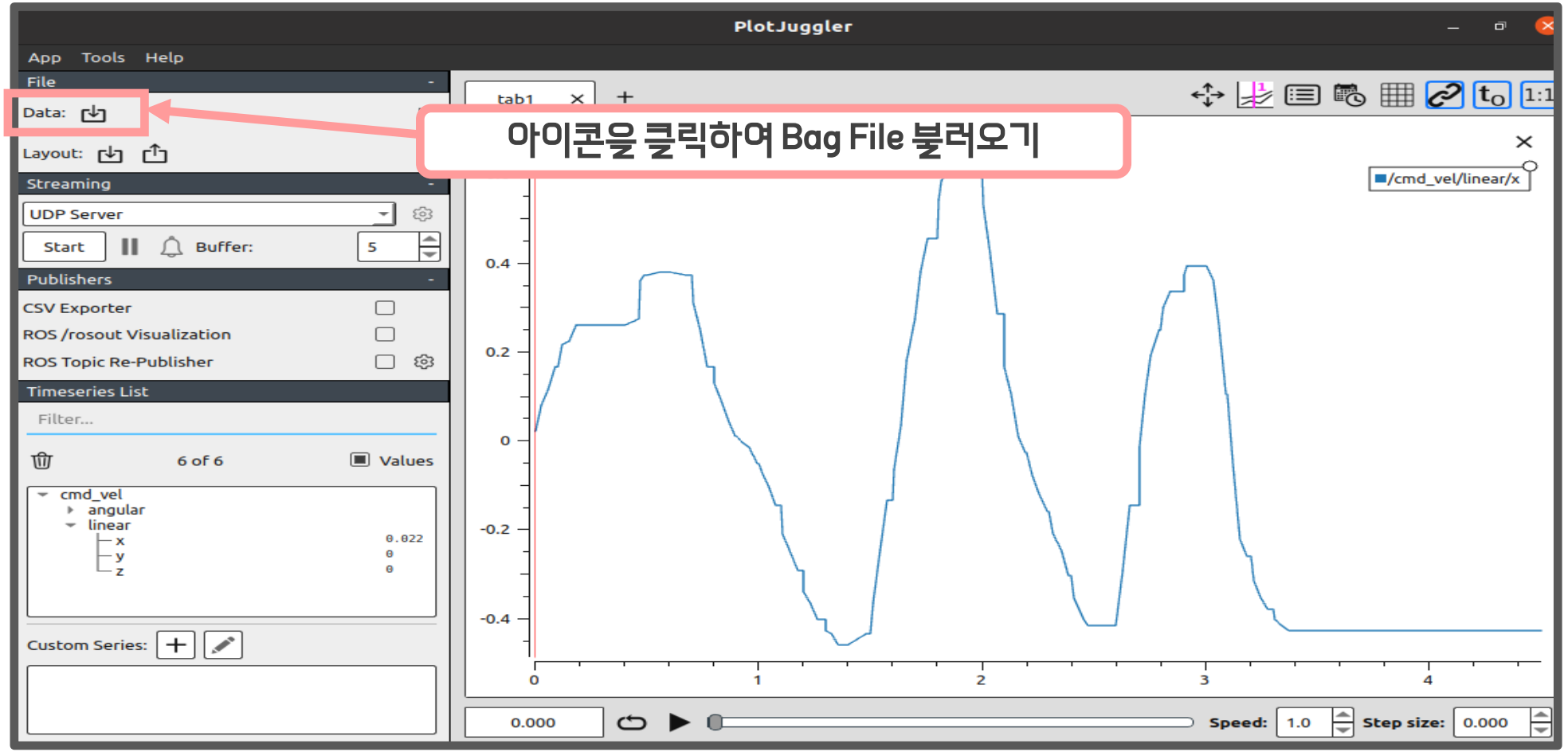
### 2) 실행

```
$ rosrun plotjuggler plotjuggler
```

# ROS Plotjuggler

## 튜토리얼

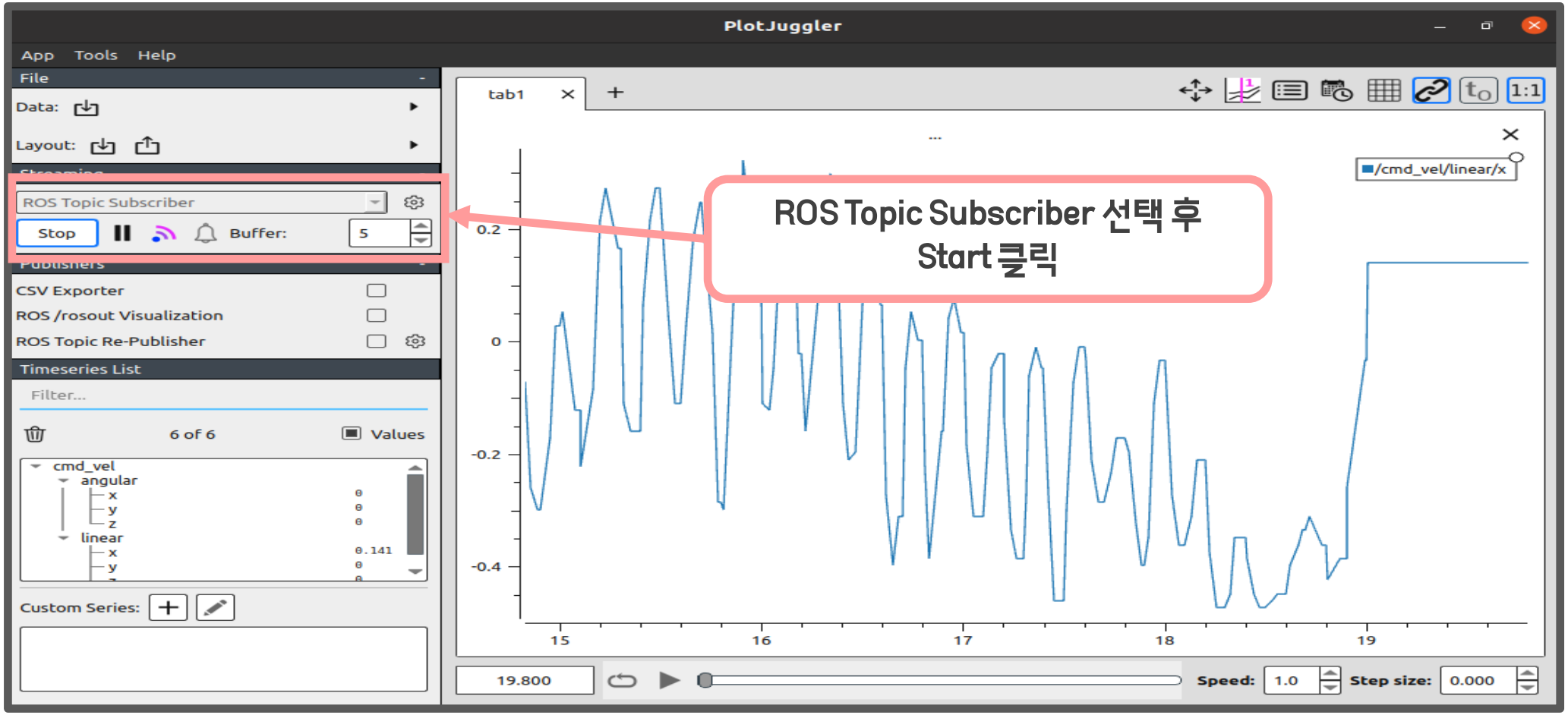
### 1) Bag File을 불러와서 그래프로 보기



# ROS Plotjuggler

## 튜토리얼

### 2) 실시간 Topic을 그래프로 보기



# 감사합니다

구선생 로보틱스