

# Quick Setup Guide

## 1. Prerequisites

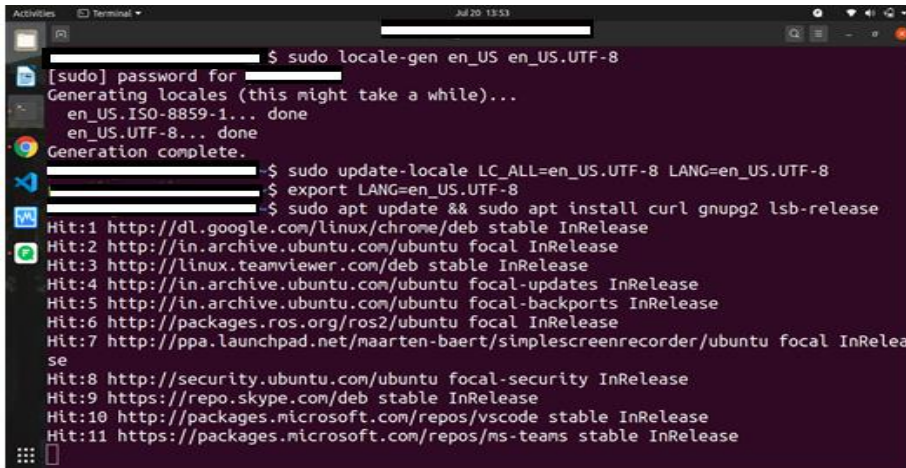
- OS on host machine - Ubuntu 20.04 LTS release.
- ROS2 Package - Foxy Fitzroy LTS release.
- ToF sensor connected to host machine.

## 2. ROS2 Installation

- Open terminal in Ubuntu and enter set of below commands for ROS2 installation and environment setup. Refer the screenshot given for each command for reference.

- `sudo locale-gen en_US en_US.UTF-8`
- `sudo update-locale LC_ALL=en_US.UTF-8 LANG=en_US.UTF-8`
- `export LANG=en_US.UTF-8`
- `sudo apt update && sudo apt install curl gnupg2 lsb-release`

(Reference: <https://index.ros.org/doc/ros2/Installation/Foxy/Linux-Install-Debians/>)



```

$ sudo locale-gen en_US en_US.UTF-8
[sudo] password for [redacted]:
Generating locales (this might take a while)...
en_US.ISO-8859-1... done
en_US.UTF-8... done
Generation complete.
$ sudo update-locale LC_ALL=en_US.UTF-8 LANG=en_US.UTF-8
$ export LANG=en_US.UTF-8
$ sudo apt update && sudo apt install curl gnupg2 lsb-release
Hit:1 http://dl.google.com/linux/chrome/deb stable InRelease
Hit:2 http://in.archive.ubuntu.com/ubuntu focal InRelease
Hit:3 http://linux.teamviewer.com/deb stable InRelease
Hit:4 http://in.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:5 http://in.archive.ubuntu.com/ubuntu focal-backports InRelease
Hit:6 http://packages.ros.org/ros2/ubuntu focal InRelease
Hit:7 http://ppa.launchpad.net/maarten-baert/simplescreenrecorder/ubuntu focal InRelease
Hit:8 http://security.ubuntu.com/ubuntu focal-security InRelease
Hit:9 https://repo.skype.com/deb stable InRelease
Hit:10 http://packages.microsoft.com/repos/vscode stable InRelease
Hit:11 https://packages.microsoft.com/repos/ms-teams stable InRelease

```

- Download ROS2 and update the local installation repo

- `curl -s https://raw.githubusercontent.com/ros/rosdistro/master/ros.asc | sudo apt-key add -`
- `sudo sh -c 'echo "deb [arch=$(dpkg --print-architecture)] http://packages.ros.org/ros2/ubuntu $(lsb_release -cs) main" > /etc/apt/sources.list.d/ros2-latest.list'`
- `sudo apt update`

```

~$ curl -s https://raw.githubusercontent.com/ros/rosdistro/master
/ros.asc | sudo apt-key add -
OK
~$ sudo sh -c 'echo "deb [arch=$(dpkg --print-architecture)] http
://packages.ros.org/ros2/ubuntu $(lsb_release -cs) main" > /etc/apt/sources.list.d/ros
2-latest.list'
~$ sudo apt update
Hit:1 http://in.archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://in.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:3 http://in.archive.ubuntu.com/ubuntu focal-backports InRelease
Hit:4 https://repo.skype.com/deb stable InRelease
Hit:5 http://dl.google.com/linux/chrome/deb stable InRelease
Hit:6 http://ppa.launchpad.net/naarten-baert/simplescreenrecorder/ubuntu focal InRelea
se
Hit:7 http://linux.teamviewer.com/deb stable InRelease
0% [Connecting to security.ubuntu.com] [Waiting for headers] [Connecting to packages.

```

- Install ROS2 and run setup script

- `sudo apt install ros-foxy-desktop`

```

Activities Terminal Jul 20 13:56
~$ sudo apt install ros-foxy-desktop
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
ros-foxy-turtlesim
The following NEW packages will be installed:
ros-foxy-turtlesim
The following packages will be upgraded:
ros-foxy-desktop
1 upgraded, 1 newly installed, 0 to remove and 530 not upgraded.
Need to get 868 kB of archives.
After this operation, 9,245 kB of additional disk space will be used.
Do you want to continue? [Y/n]

```

Press “Y” to continue the setup.

### 3. Environment Setup & Workspace Creation

- Run setup bash file available in ROS structure

o `source /opt/ros/foxy/setup.bash`

```
creative@creative-ThinkCentre-M920s:~$ source /opt/ros/foxy/setup.bash
creative@creative-ThinkCentre-M920s:~$
```

- Open a new terminal and set below set of commands to create Workspace and package with “omron\_b5l\_a” name

o `source /opt/ros/foxy/setup.bash`  
o `mkdir -p ~/omron_b5l_a/src`  
o `cd ~/omron_b5l_a/src`  
o `ros2 pkg create --build-type ament_cmake omron_b5l_a`

```
creative@creative-ThinkCentre-M920s:~$ source /opt/ros/foxy/setup.bash
```

```
creative@creative-ThinkCentre-M920s:~$ mkdir -p ~/omron_b5l_a/src
creative@creative-ThinkCentre-M920s:~$ cd ~/omron_b5l_a/
```

```
creative@creative-ThinkCentre-M920s:~/omron_b5l_a$ ros2 pkg create --build-type ament_cmake omron_b5l_a
going to create a new package
package name: omron_b5l_a
destination directory: /home/creative/omron_b5l_a
package format: 3
version: 0.0.0
description: TODO: Package description
maintainer: ['creative <creative@todo.todo>']
licenses: ['TODO: License declaration']
build type: ament_cmake
dependencies: []
creating folder ./omron_b5l_a
creating ./omron_b5l_a/package.xml
creating source and include folder
creating folder ./omron_b5l_a/src
creating folder ./omron_b5l_a/include/omron_b5l_a
creating ./omron_b5l_a/CMakeLists.txt
```

- Download the source code package and extract it.
- Copy the required files from downloaded code to the package “omron\_b5l\_a” created in earlier steps
  - Navigate to “omron\_b5l\_a” directory in release package

```
cd ~/omron_b5l_a/src/omron_b5l_a/
```

- Copy files in ROS package in “omron\_b5l\_a/src/omron\_b5l\_a/” directory created in workspace. Refer the screenshot below for more reference
  - “src” directory
  - “CMakeLists.txt” file
  - “include” directory

```
cp -r /home/creative/tof-ros2-integration/source/omron_b5l_a/*  
~/omron_b5l_a/src/omron_b5l_a/
```

(\*Update path ‘/home/creative/tof-ros2-integration/’ in above command with your system path)

- Check OUTPUT\_FORMAT parameter in configuration file stored at location “omron\_b5l\_a/src/omron\_b5l\_a/src/config/ToF\_Sample.prm”. We are supporting 2 different formats
  - i) If OUTPUT\_FORMAT = 257 or 258 then sample application will publish pointcloud2 data on “pointcloud2\_xyzi” topic.
  - ii) If OUTPUT\_FORMAT = 1 or 2 then sample application will publish pointcloud2 data on “pointcloud2\_xyz”. So set this parameter according to your requirement.

```
creative@creative-ThinkCentre-M920s:~/omron_b5l_a/src/omron_b5l_a$ cd ~/omron_b5l_a/src/omron_b5l_a/  
creative@creative-ThinkCentre-M920s:~/omron_b5l_a/src/omron_b5l_a$ cp -r /home/creative/tof-ros2-integration/source/omron_b5l_a/* ~/omron_b5l_a/src/omron_b5l_a/
```

#### 4. Compile and Run ToF interface Node

- Compile and Run ToF interface node with below steps

```
o cd ~/omron_b5l_a/src/
o colcon build --packages-select omron_b5l_a
```

```
creative@creative-ThinkCentre-M920s:~/omron_b5l_a/src/omron_b5l_a$ cd ~/omron_b5l_a/src/
creative@creative-ThinkCentre-M920s:~/omron_b5l_a/src$ colcon build --packages-select omron_b5l_a
Starting >>> omron_b5l_a
--- stderr: omron_b5l_a
** WARNING ** io features related to openni will be disabled
** WARNING ** io features related to openni2 will be disabled
** WARNING ** io features related to pcap will be disabled
** WARNING ** io features related to png will be disabled
** WARNING ** io features related to libusb-1.0 will be disabled
** WARNING ** visualization features related to openni will be disabled
** WARNING ** visualization features related to openni2 will be disabled
** WARNING ** apps features related to openni will be disabled
/home/creative/omron_b5l_a/src/omron_b5l_a/src/TOFApiZ.cpp:330: warning: ignoring #pragma warning [-Wunknown-pragmas]
330 | #pragma warning(suppress : 4996)
|
/home/creative/omron_b5l_a/src/omron_b5l_a/src/uart_linux.c: In function 'com_init':
/home/creative/omron_b5l_a/src/omron_b5l_a/src/uart_linux.c:94:9: warning: variable 'rtn' set but not used [-Wunused-but-set-variable]
94 |     int rtn;
|         ^
/home/creative/omron_b5l_a/src/omron_b5l_a/src/uart_linux.c: In function 'ExecThread':
/home/creative/omron_b5l_a/src/omron_b5l_a/src/uart_linux.c:237:24: warning: unused parameter 'pParam' [-Wunused-parameter]
237 | void *ExecThread(void *pParam)
|                   ~~~~~^
---
Finished <<< omron_b5l_a [7.61s]

Summary: 1 package finished [7.69s]
1 package had stderr output: omron_b5l_a
```

\* If an error occurs, that colcon command not found, please install colcon. Refer to below screenshot.

```
creative@creative-ThinkCentre-M920s:~/omron_b5l_a/src$ colcon build --packages-select omron_b5l_a
colcon: command not found
creative@creative-ThinkCentre-M920s:~/omron_b5l_a/src$ sudo apt install python3-colcon-common-extensions
[sudo] password for creative:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  debugedit librpmbuild8 librpmisgn8 libsqlite0 python-libxml2 python-pycurl
  python-rpm python-sqlite rpm
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  libjs-jquery-hotkeys libjs-jquery-isonscreen libjs-jquery-metadata
  libjs-jquery-tablesorter libjs-jquery-throttle-debounce python3-argcomplete
  python3-colcon-argcomplete python3-colcon-bash python3-colcon-cd
  python3-colcon-cmake python3-colcon-core python3-colcon-defaults
  python3-colcon-devtools python3-colcon-library-path python3-colcon-metadata
  python3-colcon-notification python3-colcon-output
  python3-colcon-package-information python3-colcon-package-selection
  python3-colcon-parallel-executor python3-colcon-pkg-config
  python3-colcon-powershell python3-colcon-python-setup-py
  python3-colcon-recursive-crawl python3-colcon-ros python3-colcon-test-result
  python3-colcon-zsh python3-cov-core python3-coverage python3-distlib
  python3-nose2 python3-notify2 python3-pytest-cov
Suggested packages:
  python-coverage-doc python-nose2-doc
The following NEW packages will be installed:
  libjs-jquery-hotkeys libjs-jquery-isonscreen libjs-jquery-metadata
  libjs-jquery-tablesorter libjs-jquery-throttle-debounce python3-argcomplete
```



- o `sudo su`
- o `source /opt/ros/foxy/setup.bash`
- o `. install/setup.bash`

```
creative@creative-ThinkCentre-M920s:~/omron_b5l_a/src$ sudo su
[sudo] password for creative:
root@creative-ThinkCentre-M920s:/home/creative/omron_b5l_a/src# source /opt/ros/foxy/setup.bash
root@creative-ThinkCentre-M920s:/home/creative/omron_b5l_a/src# . install/setup.bash
```

- o `ros2 run omron_b5l_a omron_b5l_a`

```
root@creative-ThinkCentre-M920s:/home/creative/omron_b5l_a/src# ros2 run omron_b5l_a omron_b5l_a
omron_b5l_a application version 0.1 started
/dev/ttyUSB0 is opened successfully.
OMRON ToF Sensor: B5L-A2S-U01 3.0.0 Revision:15182 Serial:02020120085
```

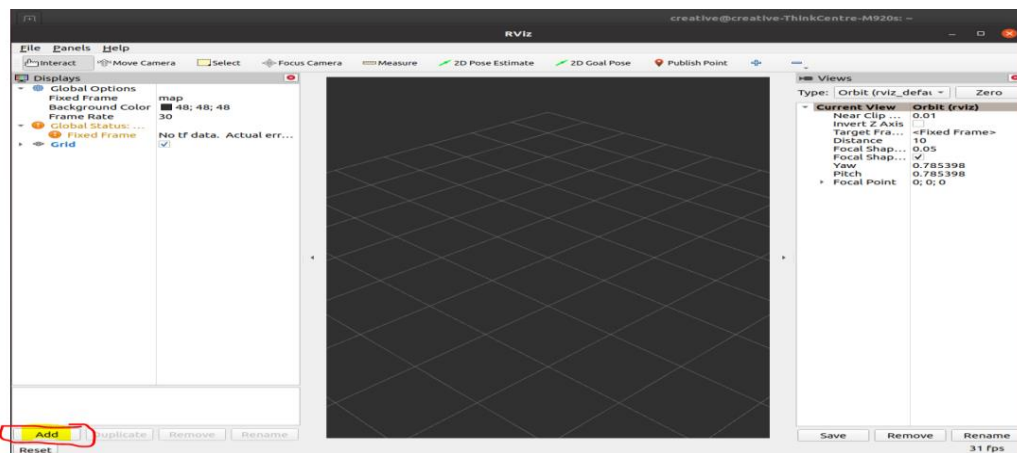
## 5. Configure and Run RVIZ2 Node

- Configure and Run RVIZ2 node with below steps.
  - o Open new terminal and hit below commands

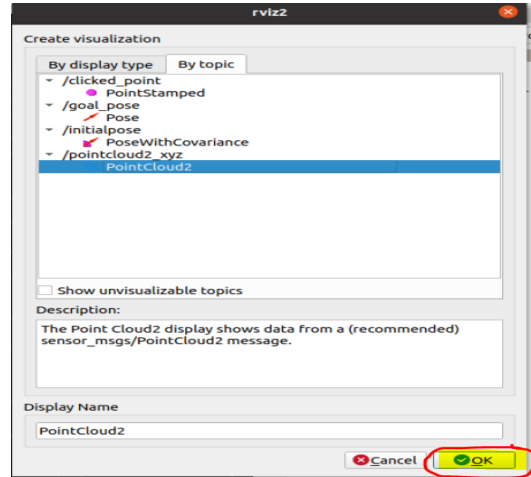
- o `source /opt/ros/foxy/setup.bash`
- o `ros2 run rviz2 rviz2`

```
creative@creative-ThinkCentre-M920s: ~
creative@creative-ThinkCentre-M920s:~$ source /opt/ros/foxy/setup.bash
creative@creative-ThinkCentre-M920s:~$ ros2 run rviz2 rviz2
[INFO] [1596057000.651569479] [rviz2]: Stereo is NOT SUPPORTED
[INFO] [1596057000.651654222] [rviz2]: OpenGL version: 4.6 (GLSL 4.6)
[INFO] [1596057000.683302224] [rviz2]: Stereo is NOT SUPPORTED
```

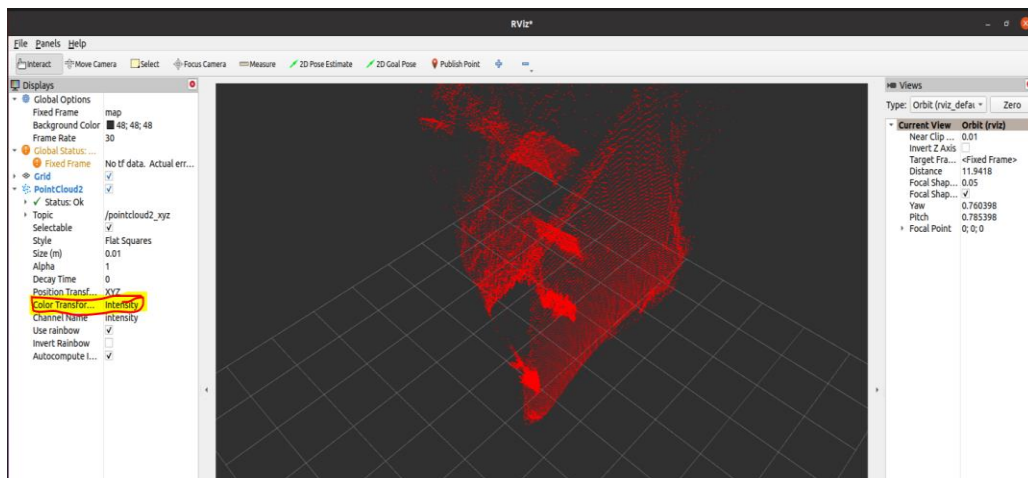
- Following screen will show up. Click on add.



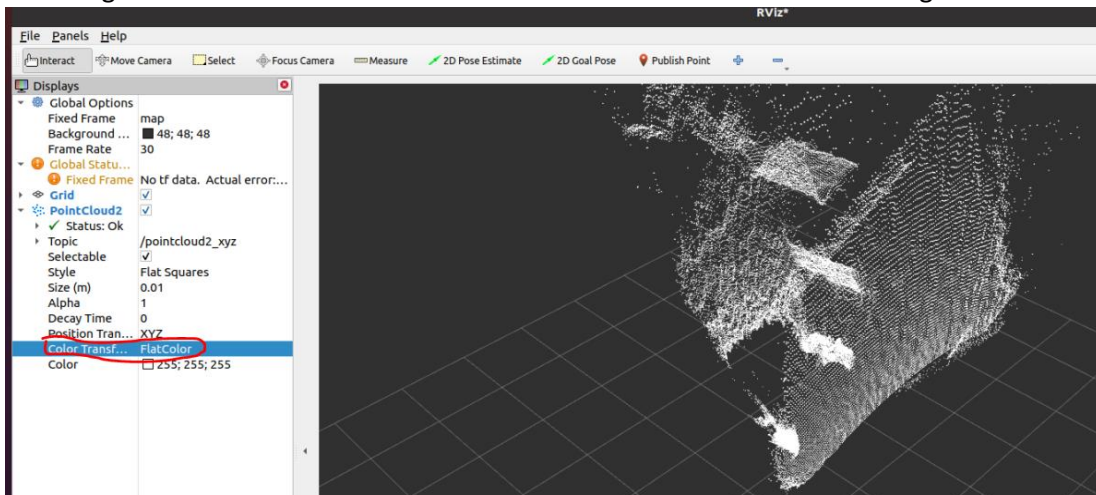
- A pop of rviz2 will open. Select By topic and then select PointCloud2. Press ok.



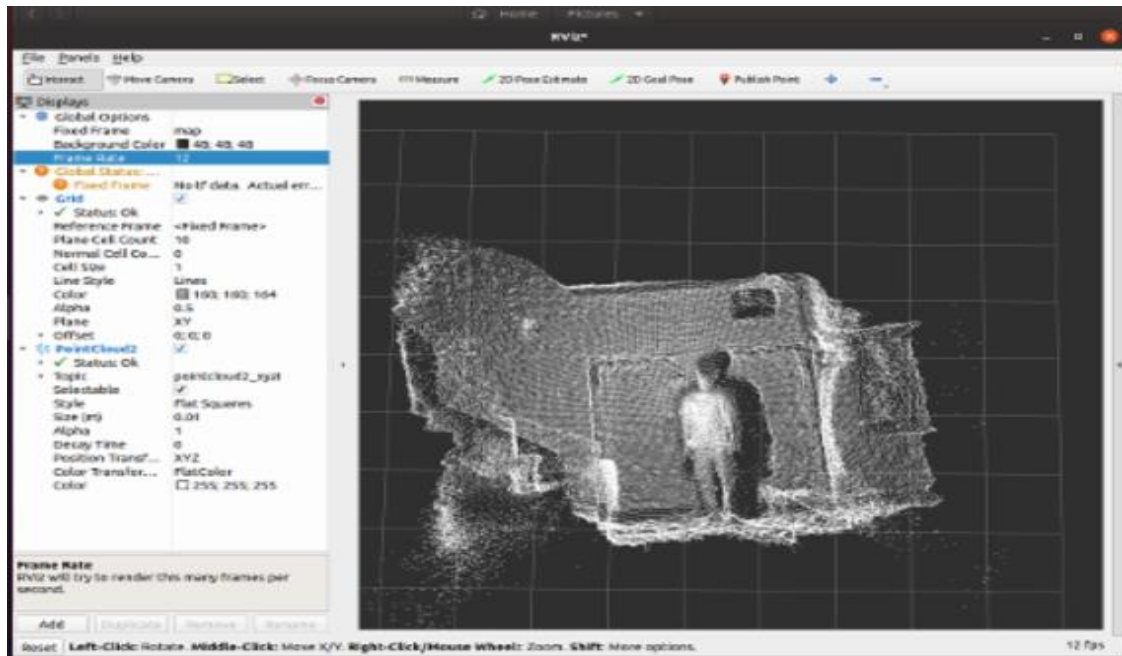
- By default, the color Transform will be intensity.



- Change Color Transform field with "FlatColor" to see black and white image



- Adjust RVIZ2 screen by zoom in/out and drag left/right with mouse pointer to see complete view.



## 6. Exit the Application

- Press "Ctrl+C" on application console (ToF publisher node OR RVIZ2) to exit the application.