Environmental construction

Note: The supporting virtual machine has already been set up in the environment, and there is no need to build it again. Here is an explanation of the work required to build on a new motherboard or virtual machine.

The configuration of the virtual machine environment is as follows:

Ubuntu20.04 + ROS-Noetic+ OpenCV 4.2+Python3.8

1. Installation related dependencies

Input following command:

```
sudo apt install libgflags-dev  ros-$ROS_DISTRO-image-geometry ros-$ROS_DISTRO-camera-info-manager ros-$ROS_DISTRO-image-transport ros-$ROS_DISTRO-image-publisher libgoogle-glog-dev libusb-1.0-0-dev libeigen3-dev
```

2. Create ROS workspace

In the~directory, create a file named orbbec_ws workspace.

Input the following command

```
mkdir -p ~/orbbec_ws/src
```

Extract "source code " folder and copy the Orbbec ros sdk folder to~/orbbec_ ws/src in the directory,

Then, input the following command to compile.

```
cd ~/orbbec_ws
catkin_make
```

After compiling, input following command to open the edit~/. bashrc file.

```
sudo vim ~/.bashrc
```

Press the [i] key to enter editing mode, add the workspace to the environment variable.

Add in the last sentence of the file.

```
source ~/orbbec_ws/devel/setup.bash
```

Press [ESC] to exit editing mode, then enter [:] followed by [wq], press Enter, save and exit.

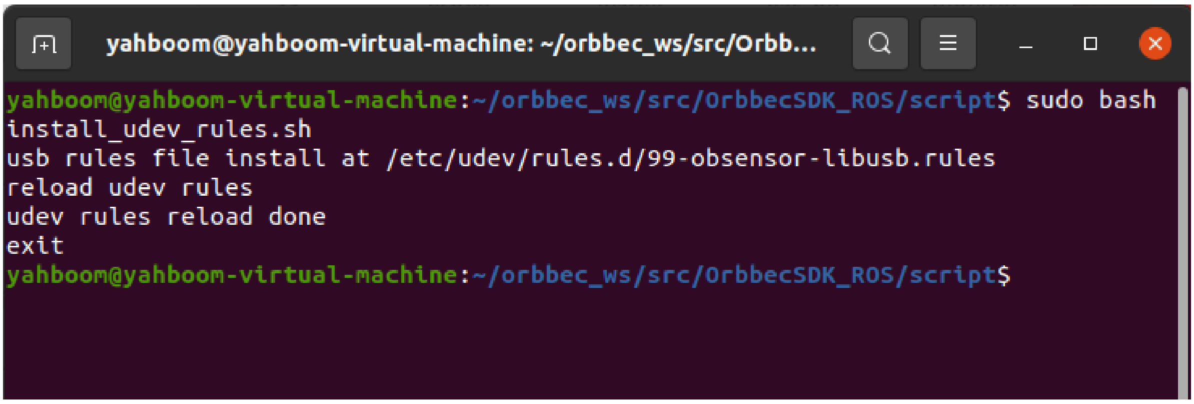
Then, input following command to refresh again.

```
source ~/.bashrc
```

3. Install camera udev rule files

Input the following command:

```
cd ~/orbbec_ws/src/orbbec-ros-sdk/script
sudo chmod 777 install.sh
sudo bash install.sh
```



```
yahboom@yahboom-virtual-machine:~/orbbec_ws/src/OrbbecSDK_ROS/script$ sudo bash
install_udev_rules.sh
usb rules file install at /etc/udev/rules.d/99-obsensor-libusb.rules
reload udev rules
udev rules reload done
exit
yahboom@yahboom-virtual-machine:~/orbbec_ws/src/OrbbecSDK_ROS/script$
```

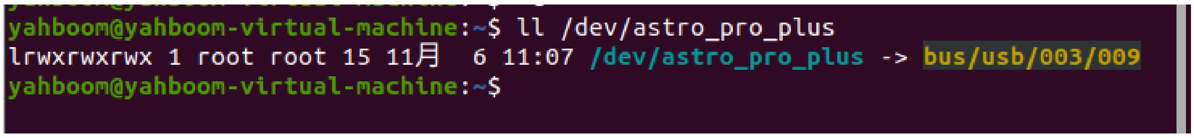
After the installation is completed, we need to restart it.

Input the following command for verification,

```
#astraproplus
ll /dev/astro_pro_plus
#gemini2
ll /dev/OrbbecGemini2
```

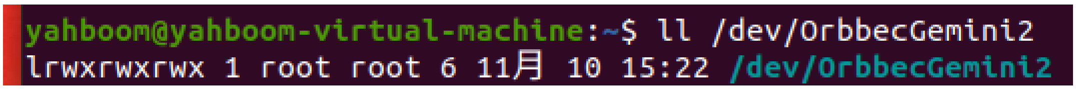
The following message indicates successful binding:

If you use astraproplus camera, the system will display the following content.



```
yahboom@yahboom-virtual-machine:~$ ll /dev/astro_pro_plus
lrwxrwxrwx 1 root root 15 11月  6 11:07 /dev/astro_pro_plus -> bus/usb/003/009
yahboom@yahboom-virtual-machine:~$
```

If you use gemini2 camera, the system will display the following content.



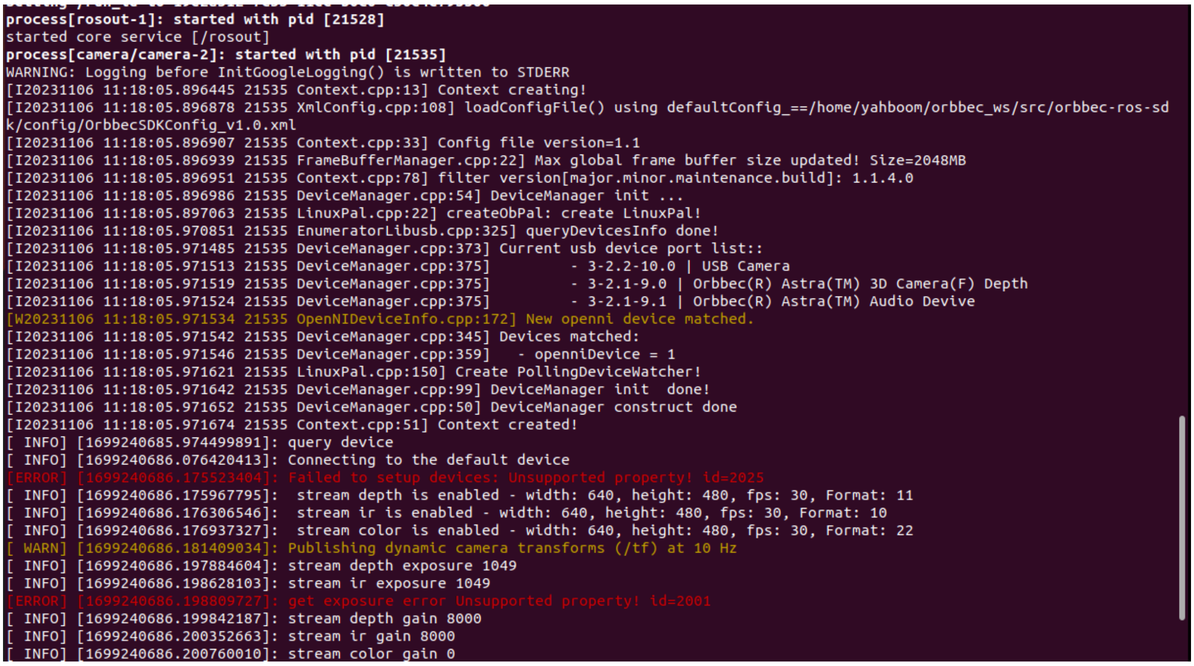
```
yahboom@yahboom-virtual-machine:~$ ll /dev/OrbbecGemini2
lrwxrwxrwx 1 root root 6 11月 10 15:22 /dev/OrbbecGemini2
```

4. Use camera

Input the following command:

```
#astraproplus
roslaunch orbbec_camera astra.launch
#gemini2
roslaunch orbbec_camera gemini2.launch
```

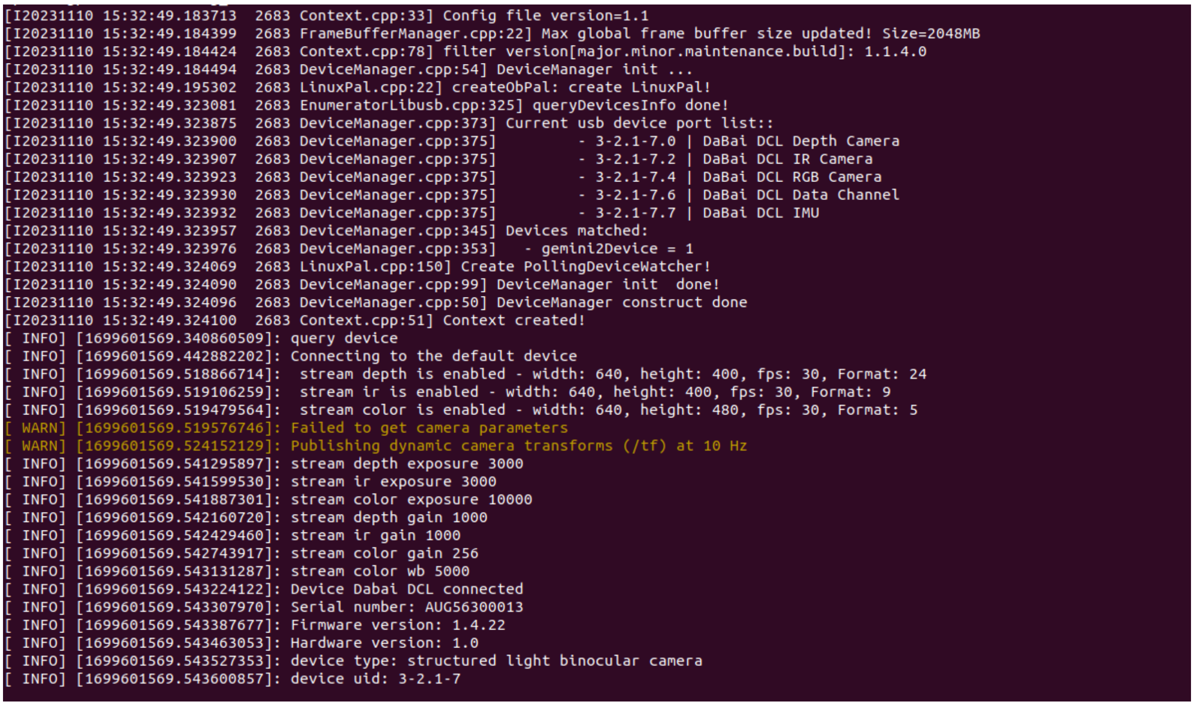
For astraproplus camera:



```
process[rosout-1]: started with pid [21528]
started core service [/rosout]
process[camera/camera-2]: started with pid [21535]
WARNING: Logging before InitGoogleLogging() is written to STDERR
[I20231106 11:18:05.896445 21535 Context.cpp:13] Context creating!
[I20231106 11:18:05.896878 21535 XmlConfig.cpp:108] loadConfigFile() using defaultConfig_==/home/yahboom/orbbec_ws/src/orbbec-ros-sd
k/config/OrbbecSDKConfig_v1.0.xml
[I20231106 11:18:05.896907 21535 Context.cpp:33] Config file version=1.1
[I20231106 11:18:05.896939 21535 FrameBufferManager.cpp:22] Max global frame buffer size updated! Size=2048MB
[I20231106 11:18:05.896951 21535 Context.cpp:78] filter version[major.minor.maintenance.build]: 1.1.4.0
[I20231106 11:18:05.896986 21535 DeviceManager.cpp:54] DeviceManager init ...
[I20231106 11:18:05.897063 21535 LinuxPal.cpp:22] createObPal: create LinuxPal!
[I20231106 11:18:05.970851 21535 EnumeratorLibusb.cpp:325] queryDevicesInfo done!
[I20231106 11:18:05.971485 21535 DeviceManager.cpp:373] Current usb device port list::
[I20231106 11:18:05.971513 21535 DeviceManager.cpp:375]         - 3-2.2-10.0 | USB Camera
[I20231106 11:18:05.971519 21535 DeviceManager.cpp:375]         - 3-2.1-9.0 | Orbbec(R) Astra(TM) 3D Camera(F) Depth
[I20231106 11:18:05.971524 21535 DeviceManager.cpp:375]         - 3-2.1-9.1 | Orbbec(R) Astra(TM) Audio Devive
[W20231106 11:18:05.971534 21535 OpenNIDeviceInfo.cpp:172] New openni device matched.
[I20231106 11:18:05.971542 21535 DeviceManager.cpp:345] Devices matched:
[I20231106 11:18:05.971546 21535 DeviceManager.cpp:359]   - openniDevice = 1
[I20231106 11:18:05.971621 21535 LinuxPal.cpp:150] Create PollingDeviceWatcher!
[I20231106 11:18:05.971642 21535 DeviceManager.cpp:99] DeviceManager init  done!
[I20231106 11:18:05.971652 21535 DeviceManager.cpp:50] DeviceManager construct done
[I20231106 11:18:05.971674 21535 Context.cpp:51] Context created!
[ INFO] [1699240685.974499891]: query device
[ INFO] [1699240686.076420413]: Connecting to the default device
[ERROR] [1699240686.175523404]: Failed to setup devices: Unsupported property! id=2025
[ INFO] [1699240686.175967795]:  stream depth is enabled - width: 640, height: 480, fps: 30, Format: 11
[ INFO] [1699240686.176306546]:  stream ir is enabled - width: 640, height: 480, fps: 30, Format: 10
[ INFO] [1699240686.176937327]:  stream color is enabled - width: 640, height: 480, fps: 30, Format: 22
[ WARN] [1699240686.181409034]: Publishing dynamic camera transforms (/tf) at 10 Hz
[ INFO] [1699240686.197884604]: stream depth exposure 1049
[ INFO] [1699240686.198628103]: stream ir exposure 1049
[ERROR] [1699240686.198809727]: get exposure error Unsupported property! id=2001
[ INFO] [1699240686.199842187]: stream depth gain 8000
[ INFO] [1699240686.200352663]: stream ir gain 8000
[ INFO] [1699240686.200760010]: stream color gain 0
```

The red error and yellow warning that appear are because the SDK is compatible with multiple cameras and the corresponding camera model cannot be found. The log printed on the terminal does not affect usage.

For gemini2 camera

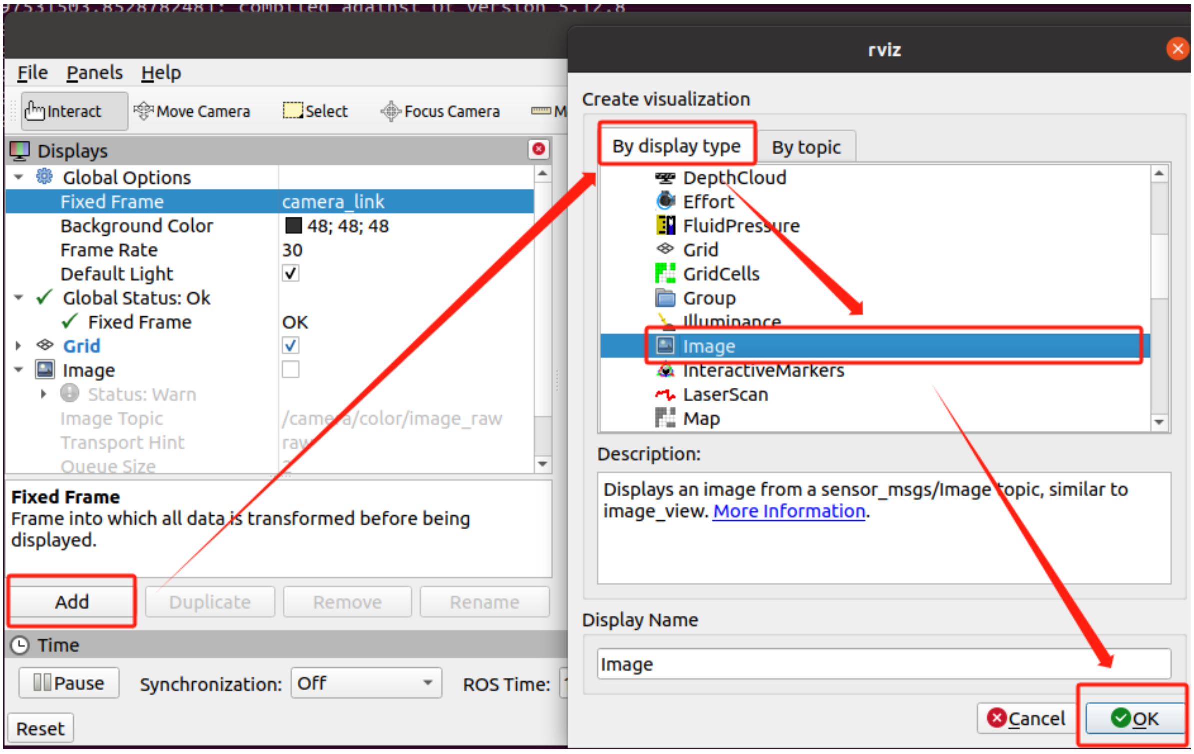


```
[I20231110 15:32:49.183713  2683 Context.cpp:33] Config file version=1.1
[I20231110 15:32:49.184399  2683 FrameBufferManager.cpp:22] Max global frame buffer size updated! Size=2048MB
[I20231110 15:32:49.184424  2683 Context.cpp:78] filter version[major.minor.maintenance.build]: 1.1.4.0
[I20231110 15:32:49.184494  2683 DeviceManager.cpp:54] DeviceManager init ...
[I20231110 15:32:49.195302  2683 LinuxPal.cpp:22] createObPal: create LinuxPal!
[I20231110 15:32:49.323081  2683 EnumeratorLibusb.cpp:325] queryDevicesInfo done!
[I20231110 15:32:49.323875  2683 DeviceManager.cpp:373] Current usb device port list::
[I20231110 15:32:49.323900  2683 DeviceManager.cpp:375]         - 3-2.1-7.0 | DaBai DCL Depth Camera
[I20231110 15:32:49.323907  2683 DeviceManager.cpp:375]         - 3-2.1-7.2 | DaBai DCL IR Camera
[I20231110 15:32:49.323923  2683 DeviceManager.cpp:375]         - 3-2.1-7.4 | DaBai DCL RGB Camera
[I20231110 15:32:49.323930  2683 DeviceManager.cpp:375]         - 3-2.1-7.6 | DaBai DCL Data Channel
[I20231110 15:32:49.323932  2683 DeviceManager.cpp:375]         - 3-2.1-7.7 | DaBai DCL IMU
[I20231110 15:32:49.323957  2683 DeviceManager.cpp:345] Devices matched:
[I20231110 15:32:49.323976  2683 DeviceManager.cpp:353]   - gemini2Device = 1
[I20231110 15:32:49.324069  2683 LinuxPal.cpp:150] Create PollingDeviceWatcher!
[I20231110 15:32:49.324090  2683 DeviceManager.cpp:99] DeviceManager init  done!
[I20231110 15:32:49.324096  2683 DeviceManager.cpp:50] DeviceManager construct done
[I20231110 15:32:49.324100  2683 Context.cpp:51] Context created!
[ INFO] [1699601569.340860509]: query device
[ INFO] [1699601569.442882202]: Connecting to the default device
[ INFO] [1699601569.518866714]:  stream depth is enabled - width: 640, height: 400, fps: 30, Format: 24
[ INFO] [1699601569.519106259]:  stream ir is enabled - width: 640, height: 400, fps: 30, Format: 9
[ INFO] [1699601569.519479564]:  stream color is enabled - width: 640, height: 480, fps: 30, Format: 5
[ WARN] [1699601569.519576746]: Failed to get camera parameters
[ WARN] [1699601569.524152129]: Publishing dynamic camera transforms (/tf) at 10 Hz
[ INFO] [1699601569.541295897]: stream depth exposure 3000
[ INFO] [1699601569.541599530]: stream ir exposure 3000
[ INFO] [1699601569.541887301]: stream color exposure 10000
[ INFO] [1699601569.542160720]: stream depth gain 1000
[ INFO] [1699601569.542429460]: stream ir gain 1000
[ INFO] [1699601569.542743917]: stream color gain 256
[ INFO] [1699601569.543131287]: stream color wb 5000
[ INFO] [1699601569.543224122]: Device Dabai DCL connected
[ INFO] [1699601569.543307970]: Serial number: AUG56300013
[ INFO] [1699601569.543387677]: Firmware version: 1.4.22
[ INFO] [1699601569.543463053]: Hardware version: 1.0
[ INFO] [1699601569.543527353]: device type: structured light binocular camera
[ INFO] [1699601569.543600857]: device uid: 3-2.1-7
```

Input following command to view image on rviz:

```
rviz
```

Modify Fixed Frame to camera_ Link, and then install the image display plugin as shown in the following figure.



Global Options
Fixed Frame camera_link
Background Color 48; 48; 48
Frame Rate 30
Default Light ☑
Global Status: Ok
Fixed Frame OK
Grid ☑
Image □
Status: Warn
Image Topic /camera/color/image_raw
Transport Hint raw
Queue Size 2

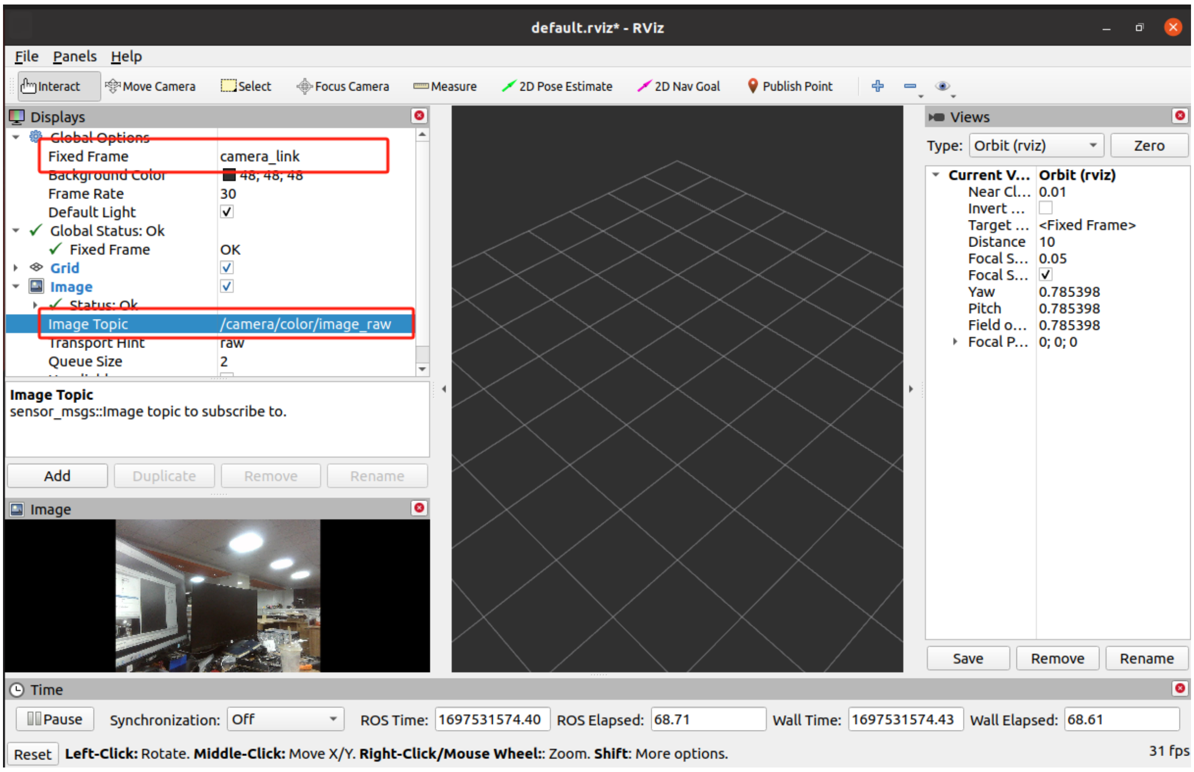
Fixed Frame
Frame into which all data is transformed before being displayed.

Synchronization: Off
ROS Time:

Description:
Displays an image from a sensor_msgs/Image topic, similar to image_view. More Information.

Display Name
Image

Then, click on Image and select Display Color Image in the Image Topic bar: **/camera/color/image_ raw**.



Global Options
Fixed Frame camera_link
Background Color 48; 48; 48
Frame Rate 30
Default Light ☑
Global Status: Ok
Fixed Frame OK
Grid ☑
Image ☑
Status: Ok
Image Topic /camera/color/image_raw
Transport Hint raw
Queue Size 2

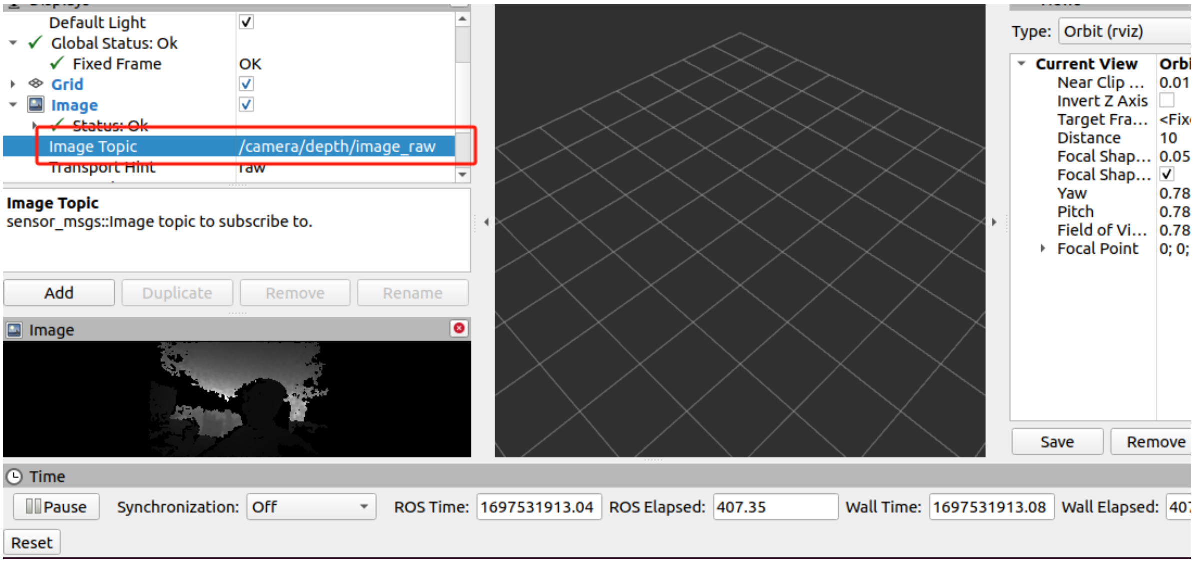
Image Topic
sensor_msgs::Image topic to subscribe to.

Type: Orbit (rviz)
Current V... Orbit (rviz)
Near Cl... 0.01
Invert ... □
Target ... <Fixed Frame>
Distance 10
Focal S... 0.05
Focal S... ☑
Yaw 0.785398
Pitch 0.785398
Field o... 0.785398
Focal P... 0; 0; 0

Synchronization: Off ROS Time: 1697531574.40 ROS Elapsed: 68.71 Wall Time: 1697531574.43 Wall Elapsed: 68.61

Left-Click: Rotate. **Middle-Click:** Move X/Y. **Right-Click/Mouse Wheel:**: Zoom. **Shift**: More options. 31 fps

In the Image Topic column, select Display Depth Image: **/camera/depth/image_ raw**



Default Light ☑
Global Status: Ok
Fixed Frame OK
Grid ☑
Image ☑
Status: Ok
Image Topic /camera/depth/image_raw
Transport Hint raw

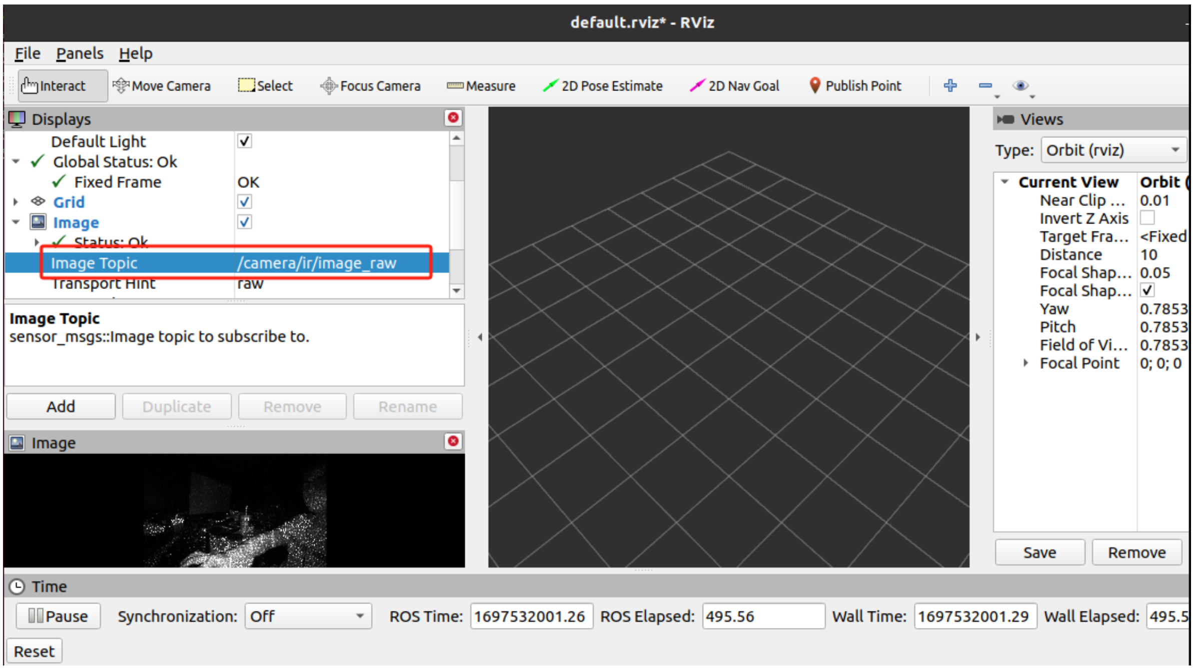
Image Topic
sensor_msgs::Image topic to subscribe to.

Type: Orbit (rviz)

Current View	Orbi
Near Clip ...	0.01
Invert Z Axis	□
Target Fra...	<Fix
Distance	10
Focal Shap...	0.05
Focal Shap...	☑
Yaw	0.78
Pitch	0.78
Field of Vi...	0.78
Focal Point	0; 0;

Synchronization: Off ROS Time: 1697531913.04 ROS Elapsed: 407.35 Wall Time: 1697531913.08 Wall Elapsed: 407

In the Image Topic bar, select to display IR images: **/camera/ir/image_ raw**.



default.rviz* - RViz

Default Light ☑
Global Status: Ok
Fixed Frame OK
Grid ☑
Image ☑
Status: Ok
Image Topic /camera/ir/image_raw
Transport Hint raw

Image Topic
sensor_msgs::Image topic to subscribe to.

Type: Orbit (rviz)

Current View	Orbit (
Near Clip ...	0.01
Invert Z Axis	□
Target Fra...	<Fixed
Distance	10
Focal Shap...	0.05
Focal Shap...	☑
Yaw	0.7853
Pitch	0.7853
Field of Vi...	0.7853
Focal Point	0; 0; 0

Synchronization: Off ROS Time: 1697532001.26 ROS Elapsed: 495.56 Wall Time: 1697532001.29 Wall Elapsed: 495.5