2. Environment setup

Note: The supporting virtual machine environment has already been set up, so there is no need to set it up again. Here is an explanation of what needs to be done to set up 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

2.1. Install related dependencies

Terminal input,

```
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
```

2.2. Create ROS workspace

Take creating a workspace named orbitec_ws in the ~ directory as an example.

Terminal input,

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

Unzip the ""source code"" folder, copy the Orbbec-ros-sdk folder to ~/orbbec_ws/src, and then enter the following command to compile,

```
cd ~/orbbec_ws
catkin_make
```

After compilation is completed, enter the following command to open and edit the ~/.bashrc file,

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

Press the [i] key to enter editing mode, add the workspace to the environment variable, and add in the last sentence of the file,

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

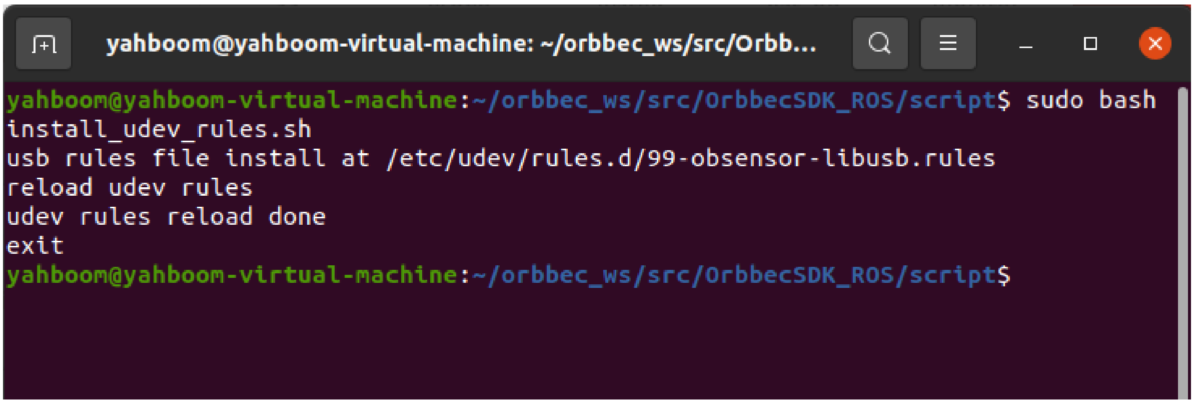
Press [ESC] to exit the editing mode, then enter [:] followed by [wq] and press Enter to save and exit, then enter the following command to refresh again,

```
source ~/.bashrc
```

2.3. Install camera udev rule file

Terminal input,

```
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$
```

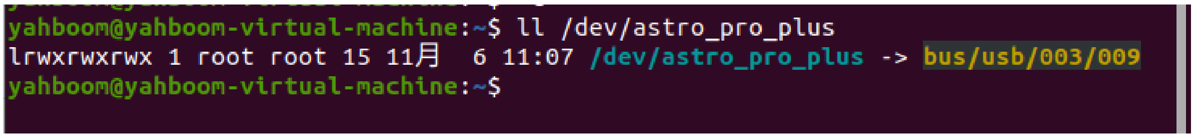
After the installation is complete, it is best to restart.

Enter the following command to verify,

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

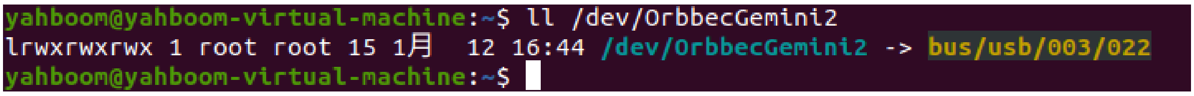
The following content appears, indicating that the binding is successful

astraproplus shows,



```
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:~$
```

gemini2 shows,



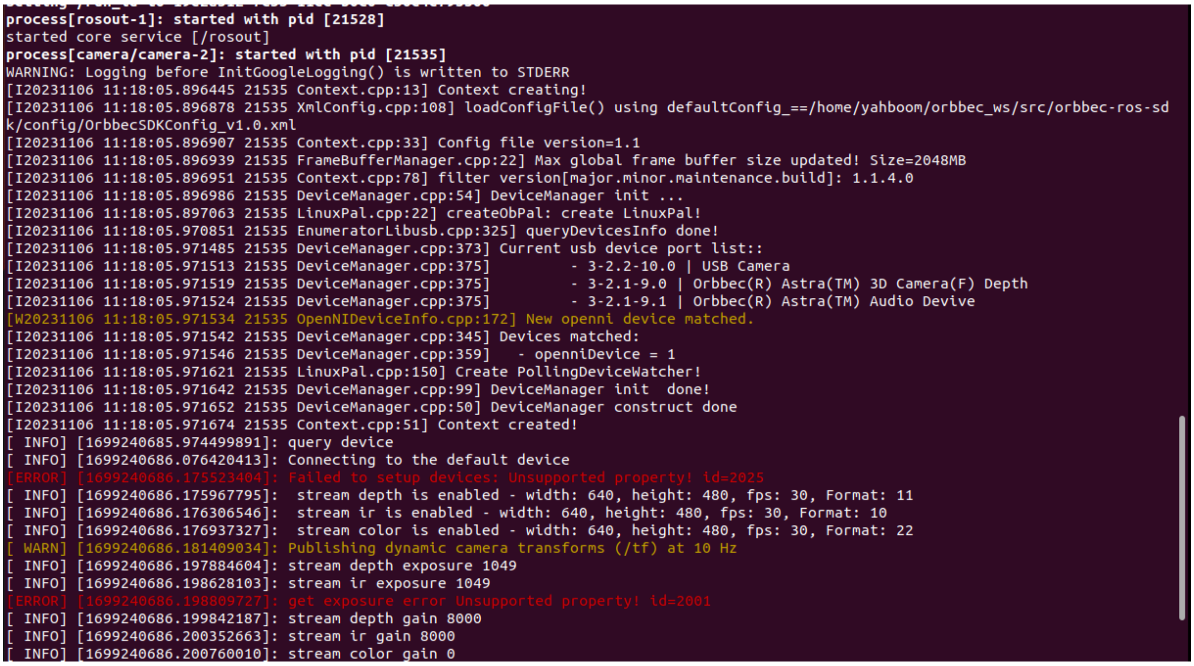
```
yahboom@yahboom-virtual-machine:~$ ll /dev/OrbbecGemini2
lrwxrwxrwx 1 root root 15 1月  12 16:44 /dev/OrbbecGemini2 -> bus/usb/003/022
yahboom@yahboom-virtual-machine:~$
```

2.4. Using the camera

Terminal input,

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

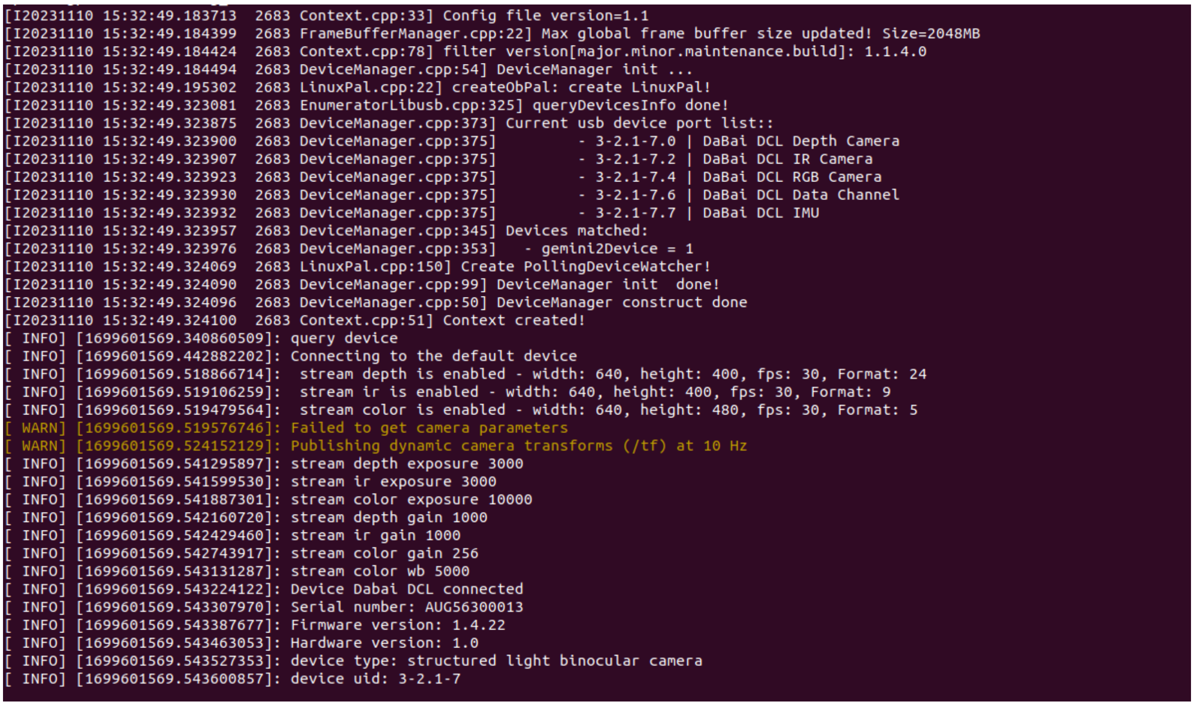
astraproplus camera



```
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 adapted to multiple cameras and the corresponding camera model is not found. The log printed by the terminal does not affect the use.

gemini2 camera

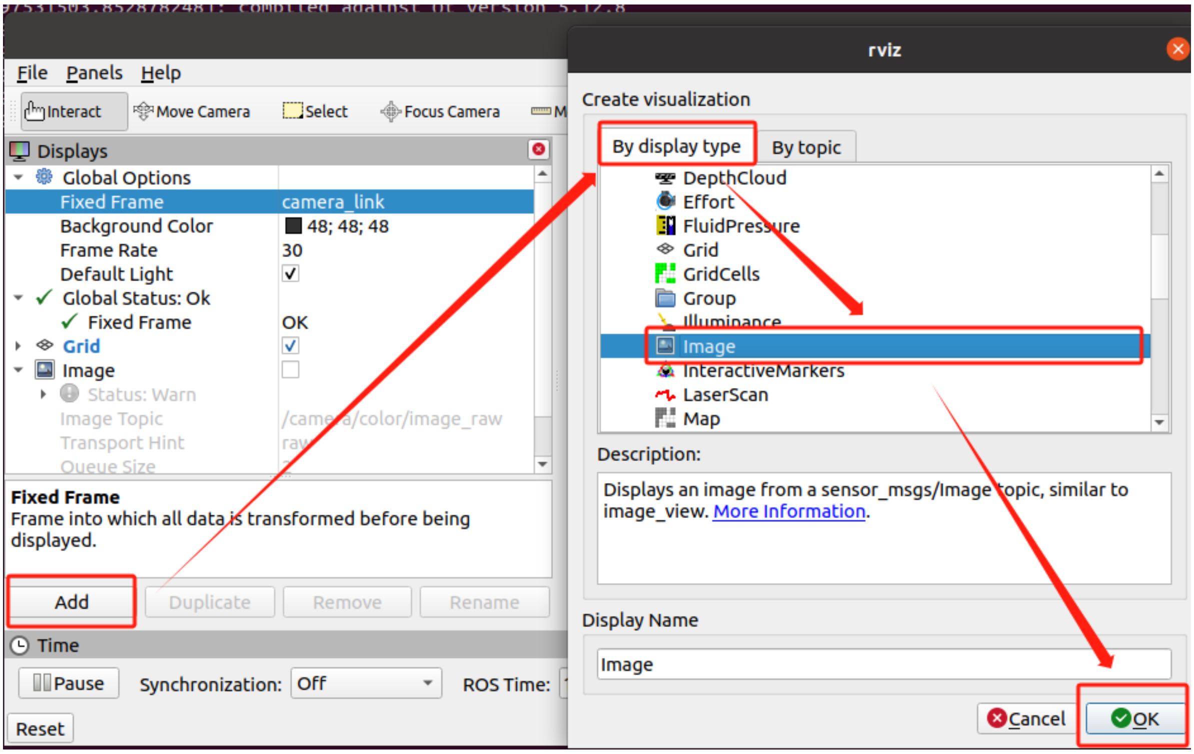


```
[I20231110 15:32:49.183713  2683 Context.cpp:33] Config file version=1.1
[I20231110 15:32:49.184399  2683 FrameBufferManager.cpp:22] Max global frame buffer size updated! Size=2048MB
[I20231110 15:32:49.184424  2683 Context.cpp:78] filter version[major.minor.maintenance.build]: 1.1.4.0
[I20231110 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
```

Use rviz to view images, terminal input,

```
rviz
```

Change Fixed Frame to camera_link, then install as shown in the figure below, and add the Image display plug-in.



```
97531503.852878248]: compiled against Qt version 5.12.8
```

Displays

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.

Create visualization

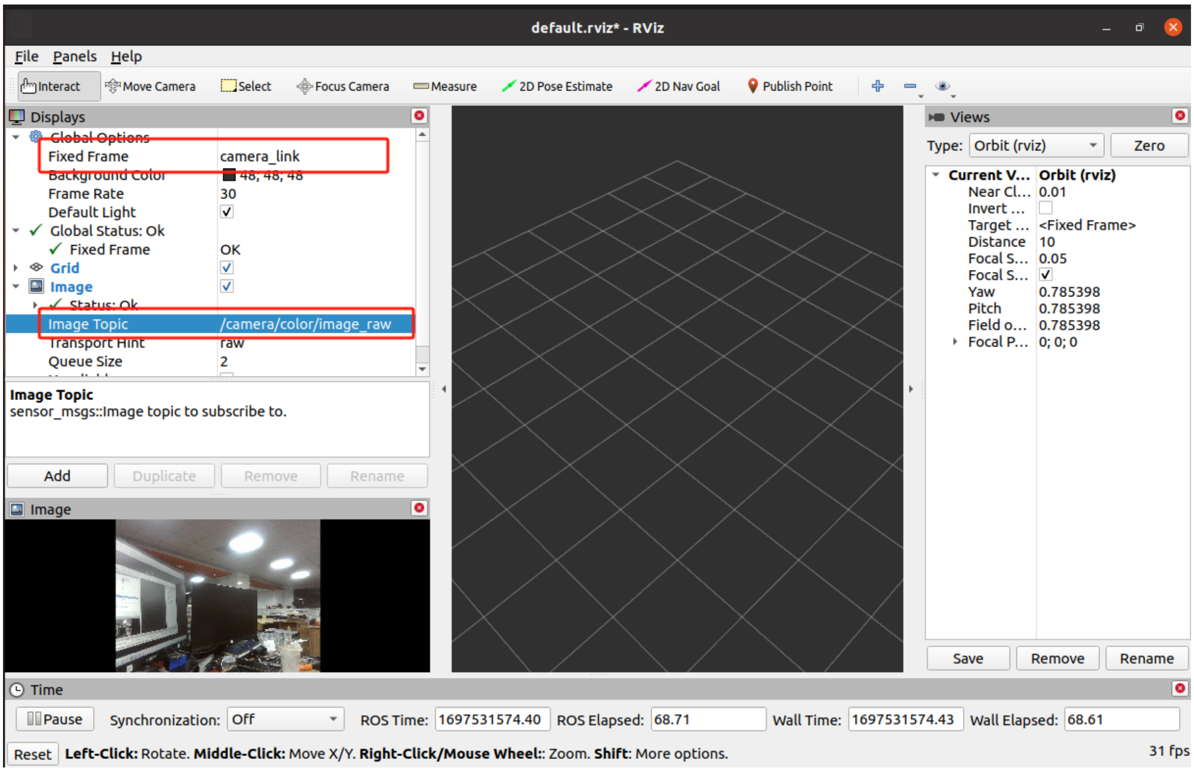
By display type | By topic

DepthCloud
Effort
FluidPressure
Grid
GridCells
Group
Illuminance
Image
InteractiveMarkers
LaserScan
Map

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

Display Name: Image

Then, click Image and select to display the color image in the Image Topic column: **/camera/color/image_raw**



default.rviz* - RViz

Displays

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.

Views

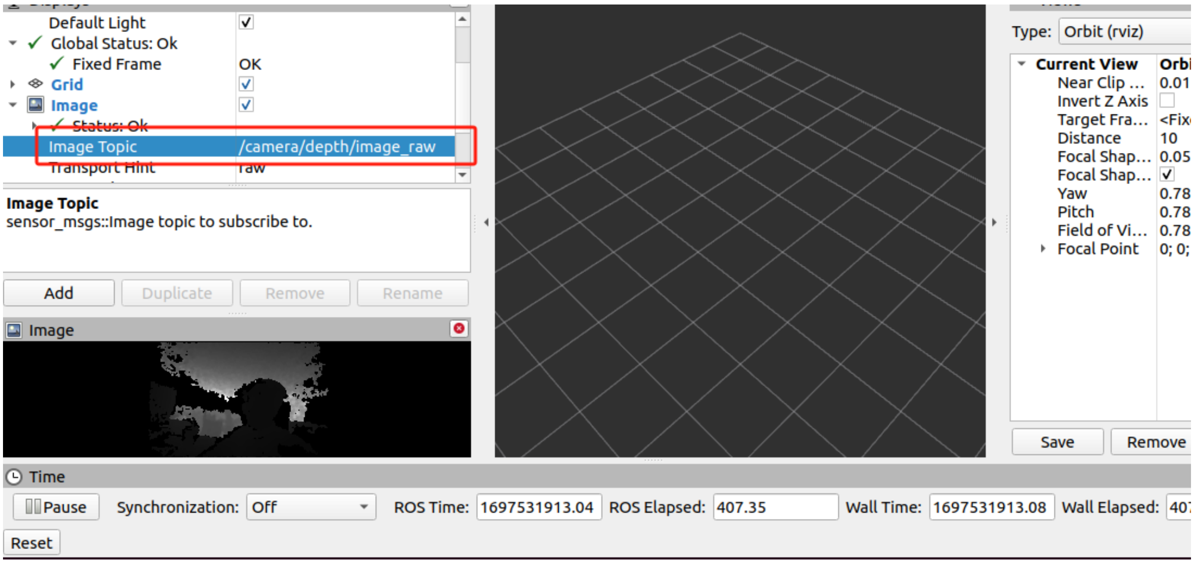
Type: Orbit (rviz)

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

Also select to display the depth image in the Image Topic column: **/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

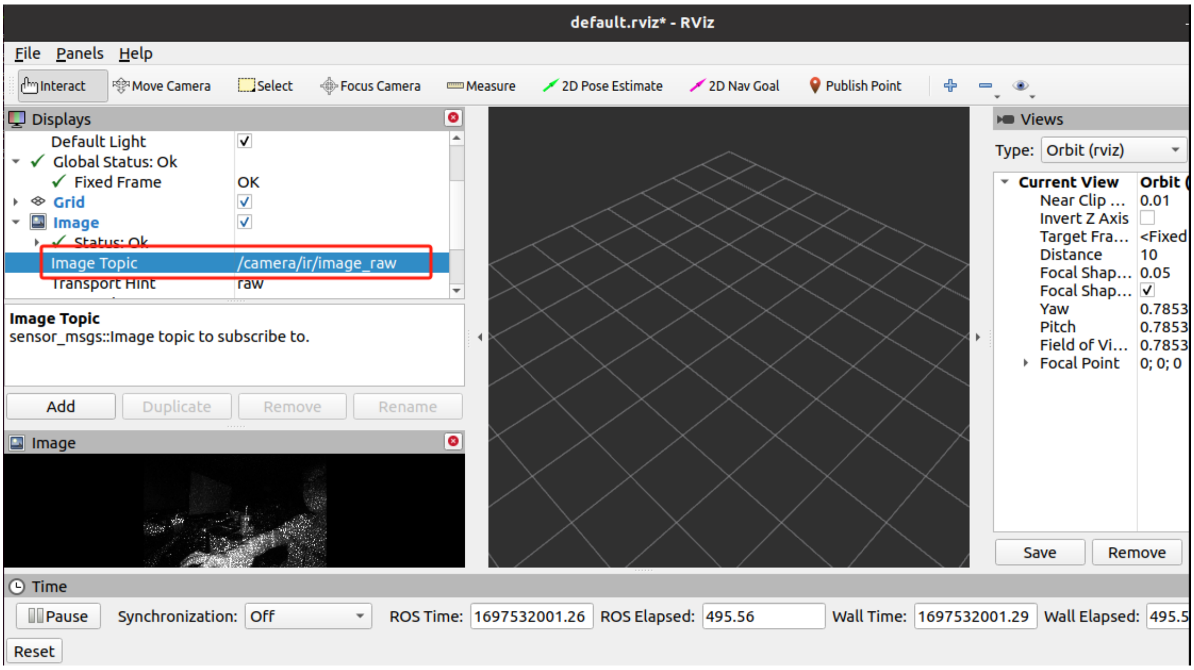
Image Topic
sensor_msgs::Image topic to subscribe to.

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

Also select to display the IR image in the Image Topic column: **/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