2. Environment setup

Note: The supporting virtual machine has already set up the environment, so there is no need to set it up again. Here is the work that needs to be done 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 a ROS workspace

Take the creation of a workspace named orbbec_ws in the ~ directory as an example.

Input in the terminal,

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

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

```
cd ~/orbbec_ws
catkin_make
```

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

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

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

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

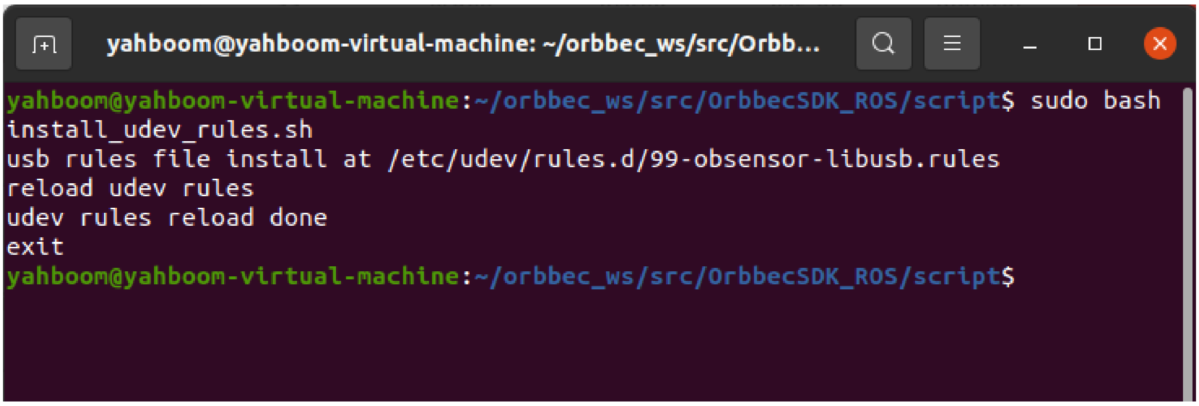
Press [ESC] to exit the editing mode, then input [:] and then input [wq] and press Enter, save and exit, then input the following command to refresh,

```
source ~/.bashrc
```

2.3. Install the 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$
```

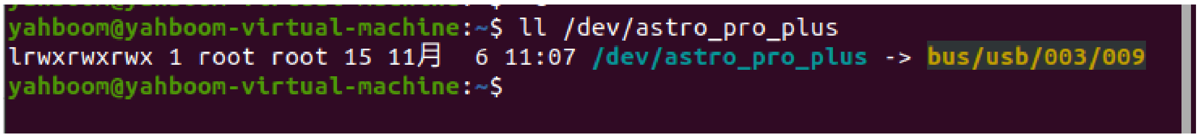
After the installation is complete, it is best to restart.

Enter the following command to verify,

```
#astraproplus
ll /dev/astro_pro_plus
#gemini
ll /dev/gemini*
```

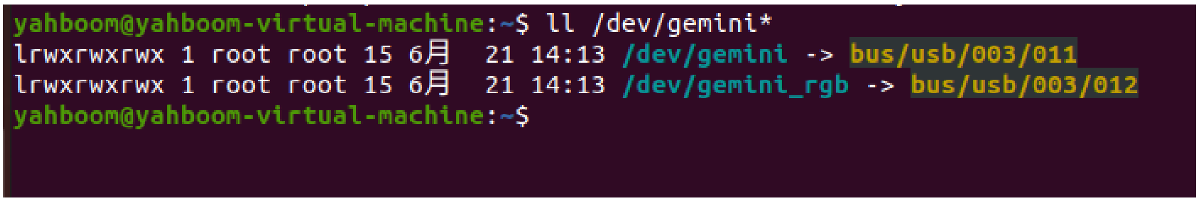
The following content indicates successful binding

astraproplus displays,



```
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 displays,



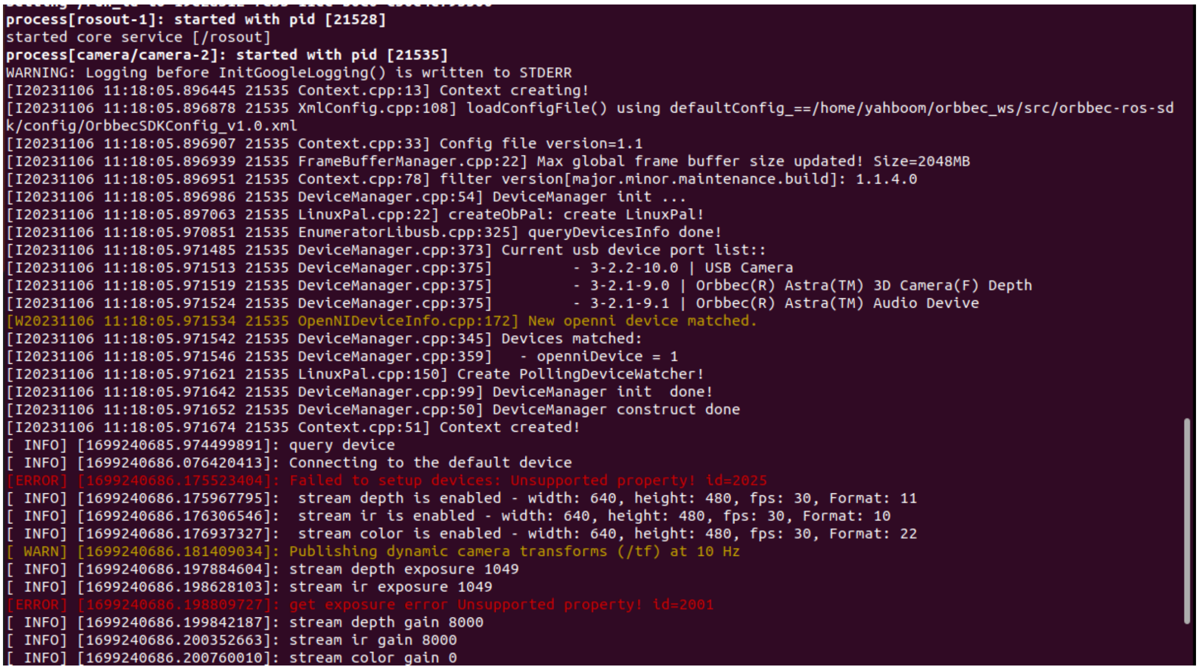
```
yahboom@yahboom-virtual-machine:~$ ll /dev/gemini*
lrwxrwxrwx 1 root root 15 6月  21 14:13 /dev/gemini -> bus/usb/003/011
lrwxrwxrwx 1 root root 15 6月  21 14:13 /dev/gemini_rgb -> bus/usb/003/012
yahboom@yahboom-virtual-machine:~$
```

2.4, Use the camera

Terminal input,

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

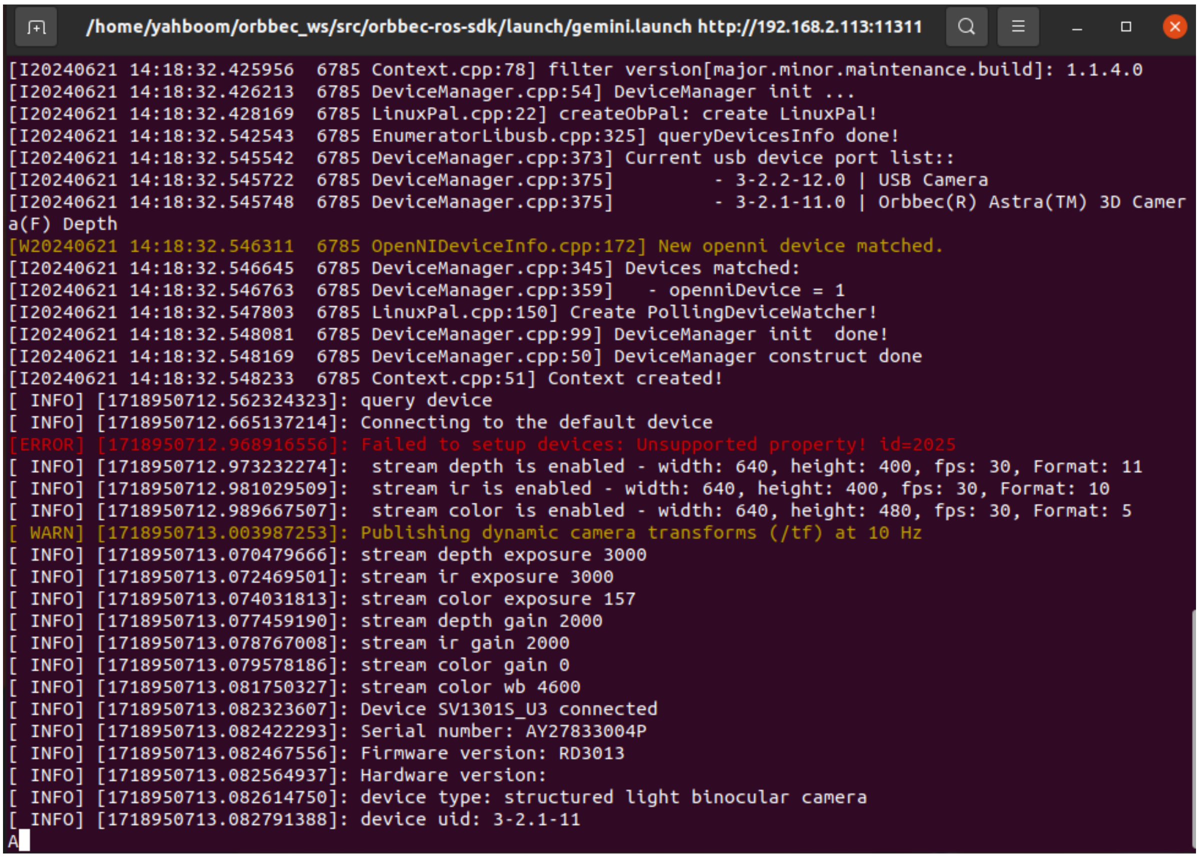
astraproplus camera



```
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 are because the SDK is compatible with multiple cameras and the corresponding camera model is not found. The log printed by the terminal does not affect the use.

gemini camera



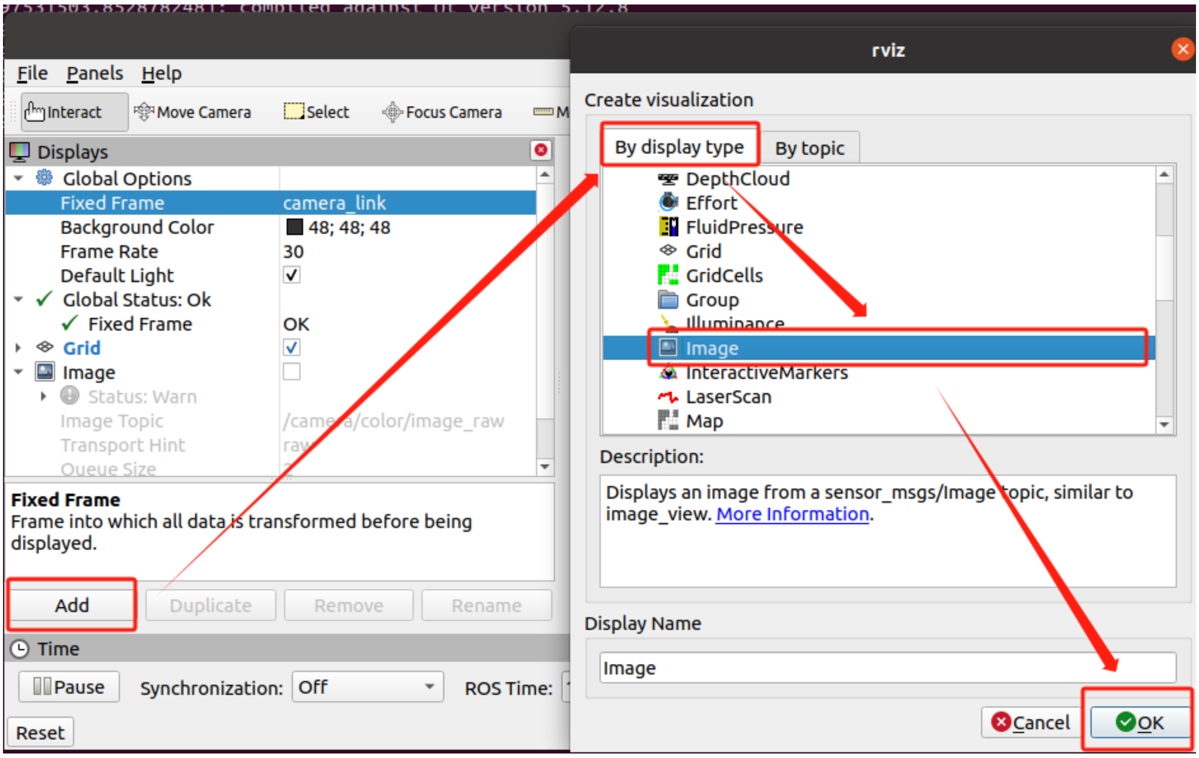
/home/yahboom/orbbec_ws/src/orbbec-ros-sdk/launch/gemini.launch http://192.168.2.113:11311

```
[I20240621 14:18:32.425956  6785 Context.cpp:78] filter version[major.minor.maintenance.build]: 1.1.4.0
[I20240621 14:18:32.426213  6785 DeviceManager.cpp:54] DeviceManager init ...
[I20240621 14:18:32.428169  6785 LinuxPal.cpp:22] createObPal: create LinuxPal!
[I20240621 14:18:32.542543  6785 EnumeratorLibusb.cpp:325] queryDevicesInfo done!
[I20240621 14:18:32.545542  6785 DeviceManager.cpp:373] Current usb device port list::
[I20240621 14:18:32.545722  6785 DeviceManager.cpp:375]         - 3-2.2-12.0 | USB Camera
[I20240621 14:18:32.545748  6785 DeviceManager.cpp:375]         - 3-2.1-11.0 | Orbbec(R) Astra(TM) 3D Camer
a(F) Depth
[W20240621 14:18:32.546311  6785 OpenNIDeviceInfo.cpp:172] New openni device matched.
[I20240621 14:18:32.546645  6785 DeviceManager.cpp:345] Devices matched:
[I20240621 14:18:32.546763  6785 DeviceManager.cpp:359]   - openniDevice = 1
[I20240621 14:18:32.547803  6785 LinuxPal.cpp:150] Create PollingDeviceWatcher!
[I20240621 14:18:32.548081  6785 DeviceManager.cpp:99] DeviceManager init  done!
[I20240621 14:18:32.548169  6785 DeviceManager.cpp:50] DeviceManager construct done
[I20240621 14:18:32.548233  6785 Context.cpp:51] Context created!
[ INFO] [1718950712.562324323]: query device
[ INFO] [1718950712.665137214]: Connecting to the default device
[ERROR] [1718950712.968916556]: Failed to setup devices: Unsupported property! id=2025
[ INFO] [1718950712.973232274]:  stream depth is enabled - width: 640, height: 400, fps: 30, Format: 11
[ INFO] [1718950712.981029509]:  stream ir is enabled - width: 640, height: 400, fps: 30, Format: 10
[ INFO] [1718950712.989667507]:  stream color is enabled - width: 640, height: 480, fps: 30, Format: 5
[ WARN] [1718950713.003987253]: Publishing dynamic camera transforms (/tf) at 10 Hz
[ INFO] [1718950713.070479666]: stream depth exposure 3000
[ INFO] [1718950713.072469501]: stream ir exposure 3000
[ INFO] [1718950713.074031813]: stream color exposure 157
[ INFO] [1718950713.077459190]: stream depth gain 2000
[ INFO] [1718950713.078767008]: stream ir gain 2000
[ INFO] [1718950713.079578186]: stream color gain 0
[ INFO] [1718950713.081750327]: stream color wb 4600
[ INFO] [1718950713.082323607]: Device SV1301S_U3 connected
[ INFO] [1718950713.082422293]: Serial number: AY27833004P
[ INFO] [1718950713.082467556]: Firmware version: RD3013
[ INFO] [1718950713.082564937]: Hardware version:
[ INFO] [1718950713.082614750]: device type: structured light binocular camera
[ INFO] [1718950713.082791388]: device uid: 3-2.1-11
A
```

Use rviz to view the image, input in the terminal,

```
rviz
```

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



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

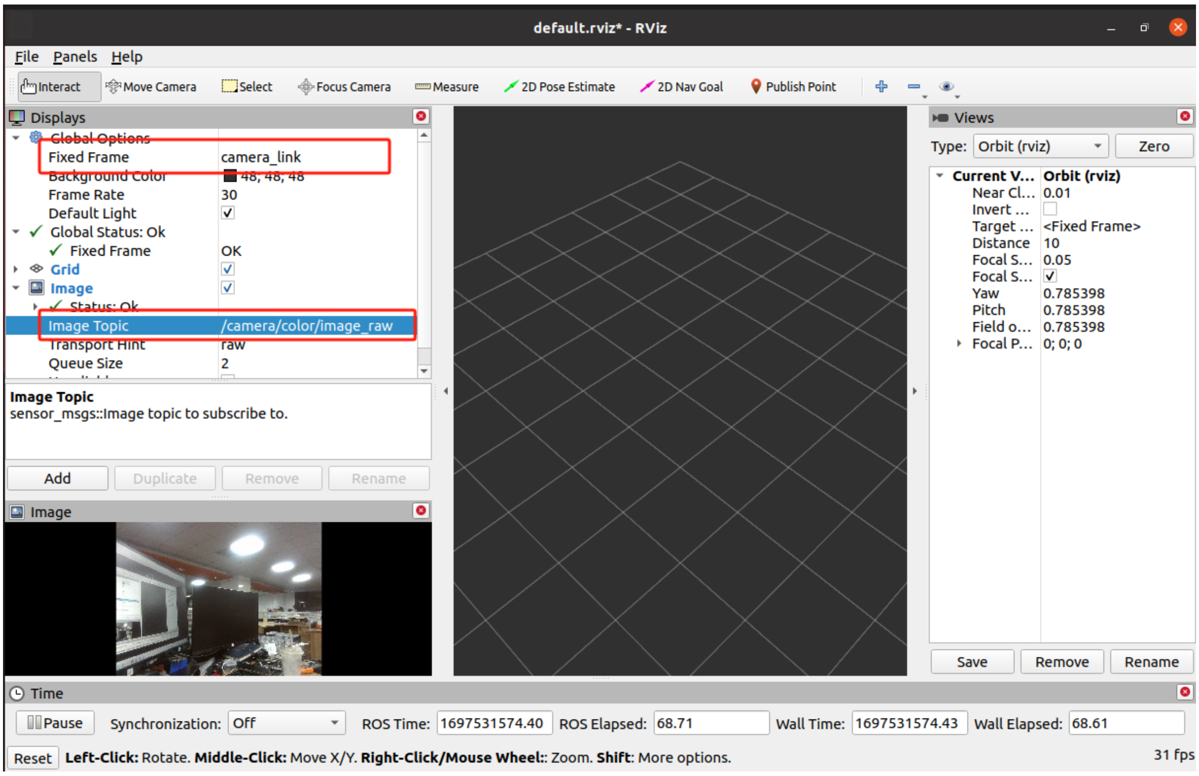
Fixed Frame
Frame into which all data is transformed before being displayed.

Synchronization: Off

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

Display Name: Image

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


default.rviz* - RViz
File Panels Help
Interact Move Camera Select Focus Camera Measure 2D Pose Estimate 2D Nav Goal Publish Point
Displays
Add Duplicate Remove Rename
Image
Views
Zero
Save Remove Rename
Time
Pause
Reset

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

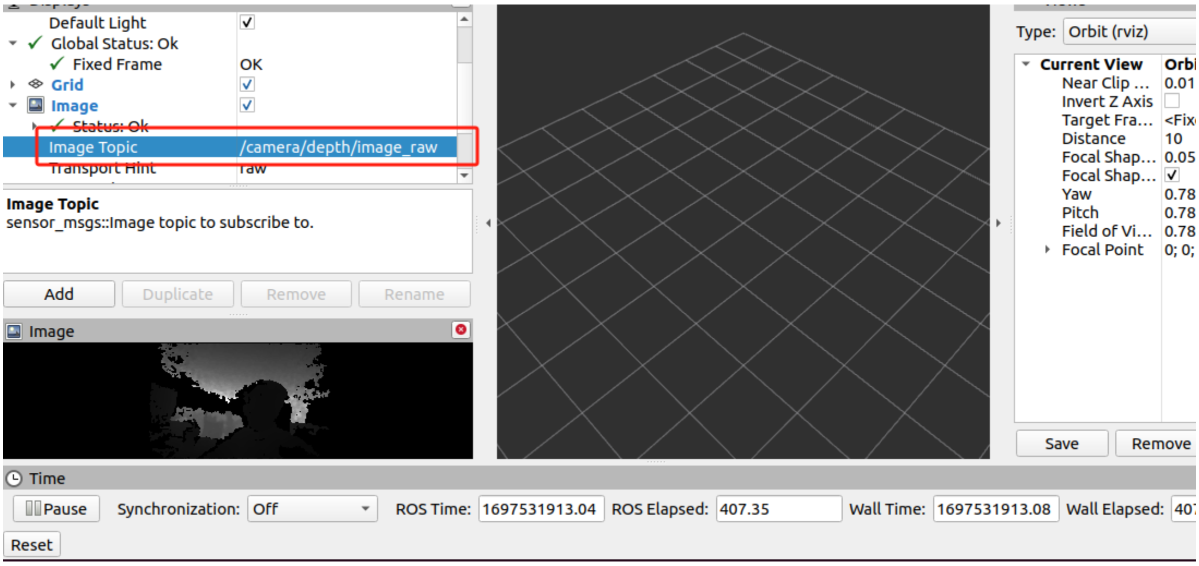
Image Topic
sensor_msgs::Image topic to subscribe to.

Type: Orbit (rviz)
Current View 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 in Image Select the depth image in the 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

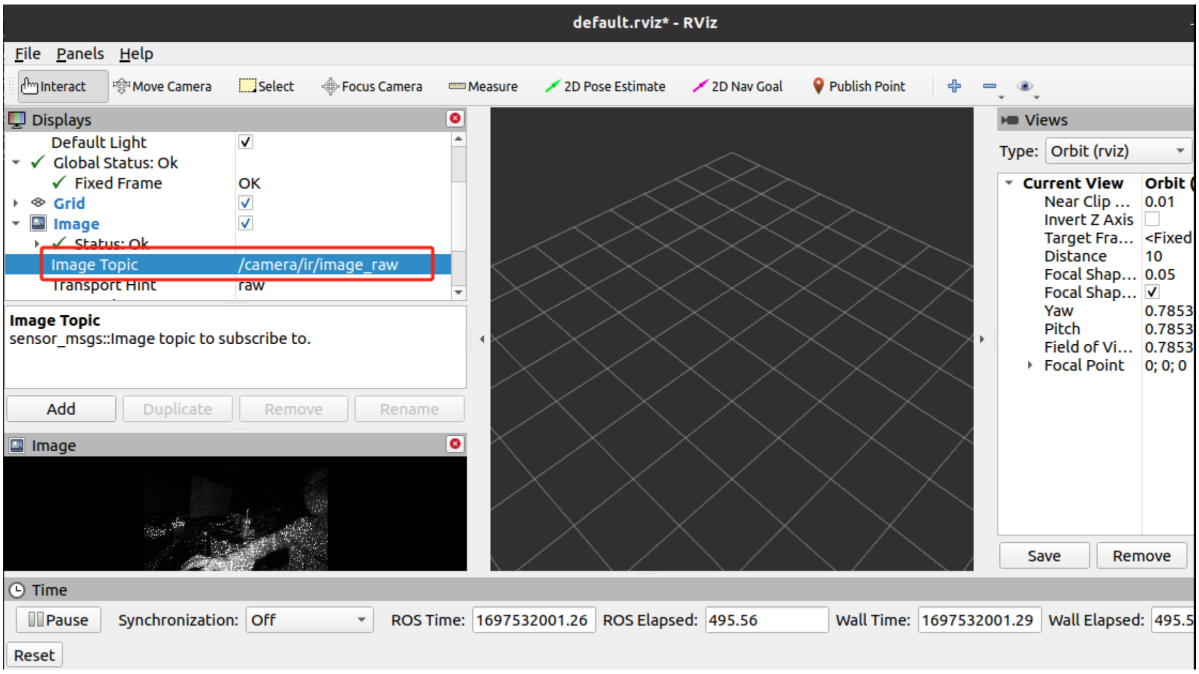
Image Topic
sensor_msgs::Image topic to subscribe to.

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 the IR image in the Image Topic column: **/camera/ir/image_raw**



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