

1. Use depth camera

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Before driving the depth camera, the Astra camera device needs to be identified at the cart end. The environment has been set up in the system image. After SSH connects to the car, type in the terminal,

```
ll /dev/astra*
```

```
root@ubuntu:~# ll /dev/astra*
lrwxrwxrwx 1 root root 6 May 23 18:17 /dev/astra -> video8
lrwxrwxrwx 1 root root 15 May 23 18:17 /dev/astra_pro -> bus/usb/001/010
lrwxrwxrwx 1 root root 15 May 23 18:17 /dev/astrauvc -> bus/usb/001/008
```

If the following figure is displayed, the Astra camera device is successfully connected. If no result is displayed, reinsert the camera USB.

1.1. Description of program function

After the program is run, Astra camera can be driven to obtain color RGB, Depth depth, infrared IR image information and depth point cloud information.

Official website link: <https://orbbec3d.com/develop/>

Astra Camera: https://github.com/orbbec/ros_astra_camera

Developer community: <https://developer.orbbec.com.cn/download.html?id=53>

1.2. Program Code Reference path

After SSH connection car, the location of the function source code is located at,

```
/userdata/software/astramini_ws/src/ros2_astra_camera/astra_camera/launch
```

1.3. Program Startup

Launch startup command,

launch file	Camera model
ros2 launch astra_camera astra_pro.launch.xml	Astrapro
ros2 launch astra_camera astro_pro_plus.launch.xml	Astraproplus
ros2 launch astra_camera astra.launch.xml	Astramini

Take Astrapro camera as an example, after SSH connection to the car, terminal input,

```
ros2 launch astra_camera astra_pro.launch.xml
```

```
root@ubuntu:~# ros2 launch astra_camera astra_pro.launch.xml
[INFO] [launch]: All log files can be found below /root/.ros/log/2023-05-24-09-26-50-806713-ubuntu-56923
[INFO] [launch]: Default logging verbosity is set to INFO
[INFO] [astra_camera_node-1]: process started with pid [57161]
[astra_camera_node-1] Warning: class_loader.impl: SEVERE WARNING!!! A namespace collision has occurred with plugin factory for class rclcpp_components::NodeFactoryTemplate<astra_camera::OBCameraNodeFactory>. New factory will OVERWRITE existing one. This situation occurs when libraries containing plugins are directly linked against an executable (the one running right now generating this message). Please separate plugins out into their own library or just don't link against the library and use either class_loader::ClassLoader/MultiLibraryClassLoader to open.
[astra_camera_node-1] at line 253 in /opt/tros/include/class_loader/class_loader_core.hpp
[astra_camera_node-1] [INFO] [1684891614.513072450] [camera.camera]: init done.
[astra_camera_node-1] [INFO] [1684891614.513152229] [camera.camera]: Waiting for device connection...
[astra_camera_node-1] [INFO] [1684891614.515147657] [device_listener]: Found 1 devices
[astra_camera_node-1] [INFO] [1684891614.515279491] [camera.camera]: Trying to open device: 2bc5/0403@1/10
[astra_camera_node-1] [INFO] [1684891614.686104738] [camera.camera]: Device connected: Astra serial number: 21061510028
[astra_camera_node-1] [INFO] [1684891614.686440699] [camera.camera]: starting device
[astra_camera_node-1] [INFO] [1684891614.840685367] [camera.camera]: set depth video mode Resolution :640x480@30Hz
[astra_camera_node-1] format PIXEL_FORMAT_DEPTH_1_MM
[astra_camera_node-1] [INFO] [1684891614.843909721] [camera.camera]: set ir video mode Resolution :640x480@30Hz
[astra_camera_node-1] format
[astra_camera_node-1] [INFO] [1684891614.893423130] [camera.camera]: open uvc camera
[astra_camera_node-1] [INFO] [1684891614.968211531] [camera.camera]: uvc config: vendor_id: 2bc5
[astra_camera_node-1] product_id: 501
[astra_camera_node-1] width: 640
[astra_camera_node-1] height: 480
[astra_camera_node-1] fps: 30
[astra_camera_node-1] serial_number: 21061510028
[astra_camera_node-1] format: mjpeg
[astra_camera_node-1] frame_id: camera_color_frame
[astra_camera_node-1] optical_frame_id : camera_color_optical_frame
[astra_camera_node-1]
[astra_camera_node-1] unsupported descriptor subtype VS_COLORFORMAT
[astra_camera_node-1] unsupported descriptor subtype VS_COLORFORMAT
[astra_camera_node-1] [INFO] [1684891615.024924278] [camera.camera]: open camera success
[astra_camera_node-1] [WARN] [1684891615.044325250] [camera.camera]: Publishing dynamic camera transforms (/tf) at 10 Hz
[astra_camera_node-1] [INFO] [1684891615.044341364] [camera.camera]: set depth video mode Resolution :640x480@30Hz
[astra_camera_node-1] format PIXEL_FORMAT_DEPTH_1_MM
[astra_camera_node-1] [INFO] [1684891615.045994874] [camera.camera]: set ir video mode Resolution :640x480@30Hz
[astra_camera_node-1] format
[astra_camera_node-1] [INFO] [1684891615.059155986] [camera.camera]: depth is started
[astra_camera_node-1] [INFO] [1684891615.065648438] [camera.camera]: ir is started
[astra_camera_node-1] [INFO] [1684891615.066811621] [camera.camera]: Start UVC camera
[astra_camera_node-1] [INFO] [1684891615.241528014] [camera.camera]: set uvc mode 640x480@30 format UVC_FRAME_FORMAT_MJPEG
[astra_camera_node-1] attempt to claim already-claimed interface 1
[astra_camera_node-1] [INFO] [1684891615.370596926] [camera.camera]: device started.
[]
```

You can run the following command to view the topic, enter in the VM terminal,

```
ros2 topic list
```

```
yahboom@yahboom-virtual-machine:~$ ros2 topic list
/camera/color/camera_info
/camera/color/image_raw
/camera/depth/camera_info
/camera/depth/image_raw
/camera/depth/points
/camera/ir/camera_info
/camera/ir/image_raw
/parameter_events
/rosout
/tf
/tf_static
```

The main topics are as follows,

Topic name	Topic content
/camera/color/image_raw	RGB color image data
/camera/depth/image_raw	Depth Image data
/camera/depth/points	Depth Indicates the depth point cloud data
/camera/ir/image_raw	IR infrared image data

1.4. Visualize images

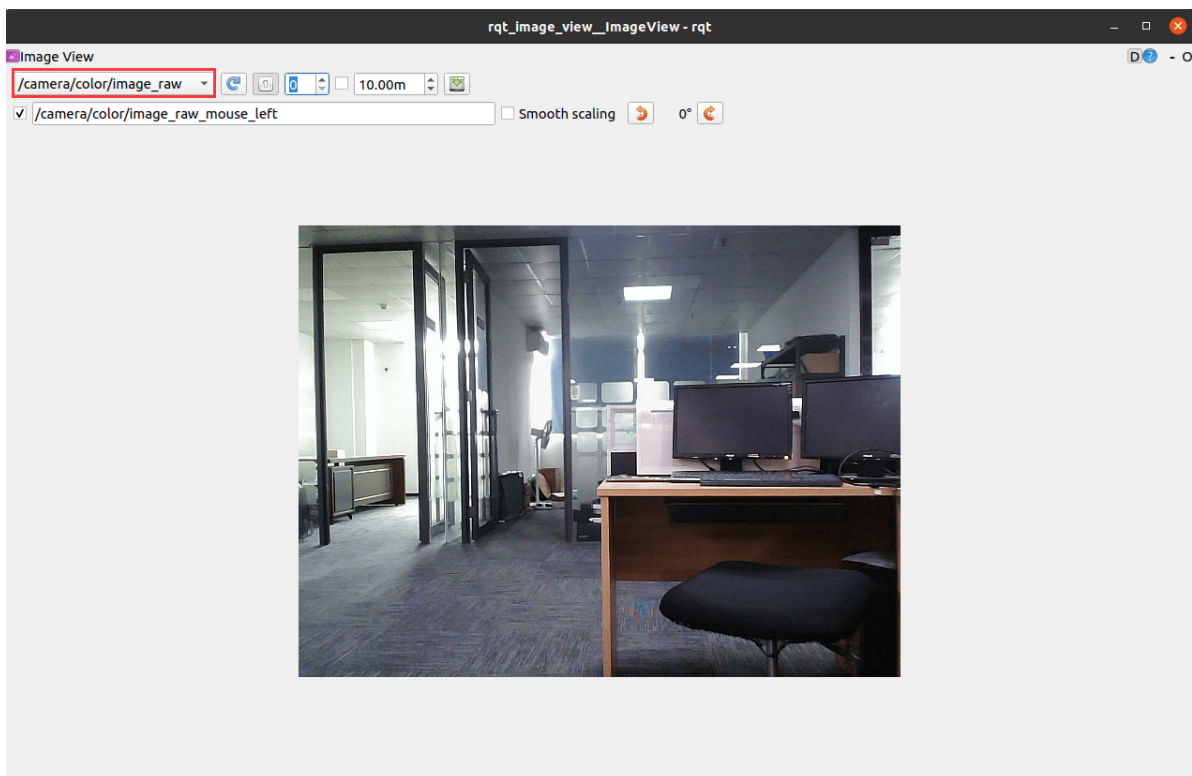
After the camera is started, you can display the topic image in the following ways.

1.4.1 rqt_image_view

Use the rqt_image_view tool to view the image data, enter in the virtual machine terminal,

```
ros2 run rqt_image_view rqt_image_view
```

Then select the corresponding image topic to be displayed in the upper left corner. Here, take the display of RGB images as an example.

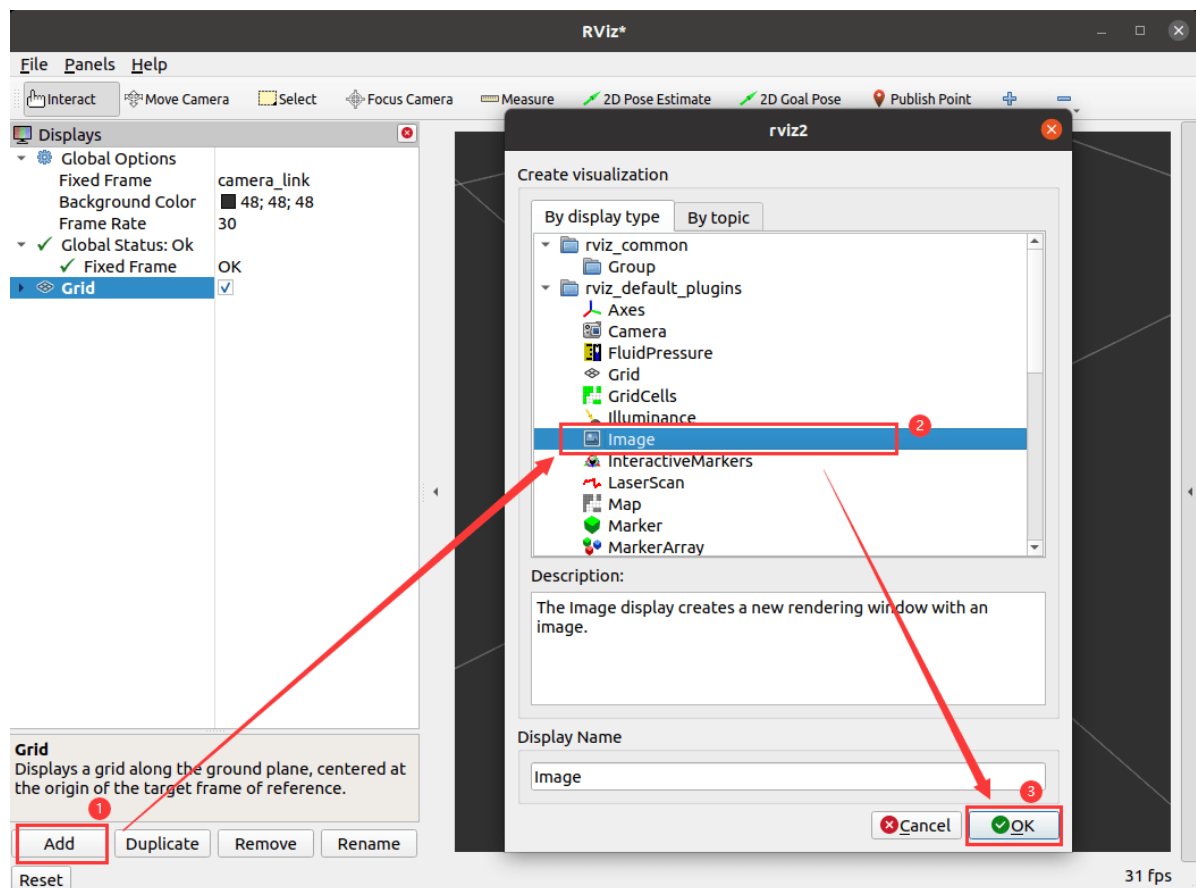


1.4.2. rviz2

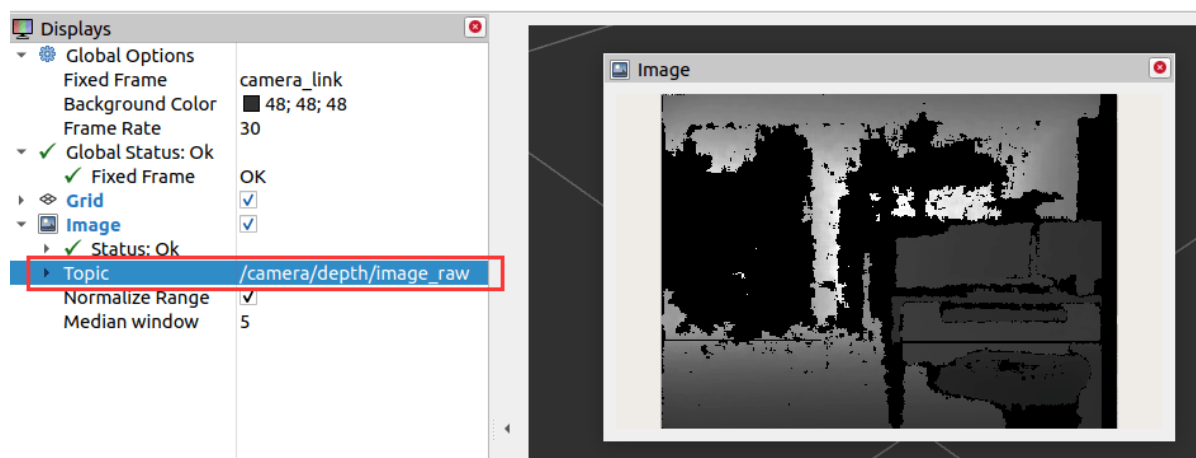
Use rviz2 to display images or deep point clouds, enter in the virtual machine terminal,

```
rviz2
```

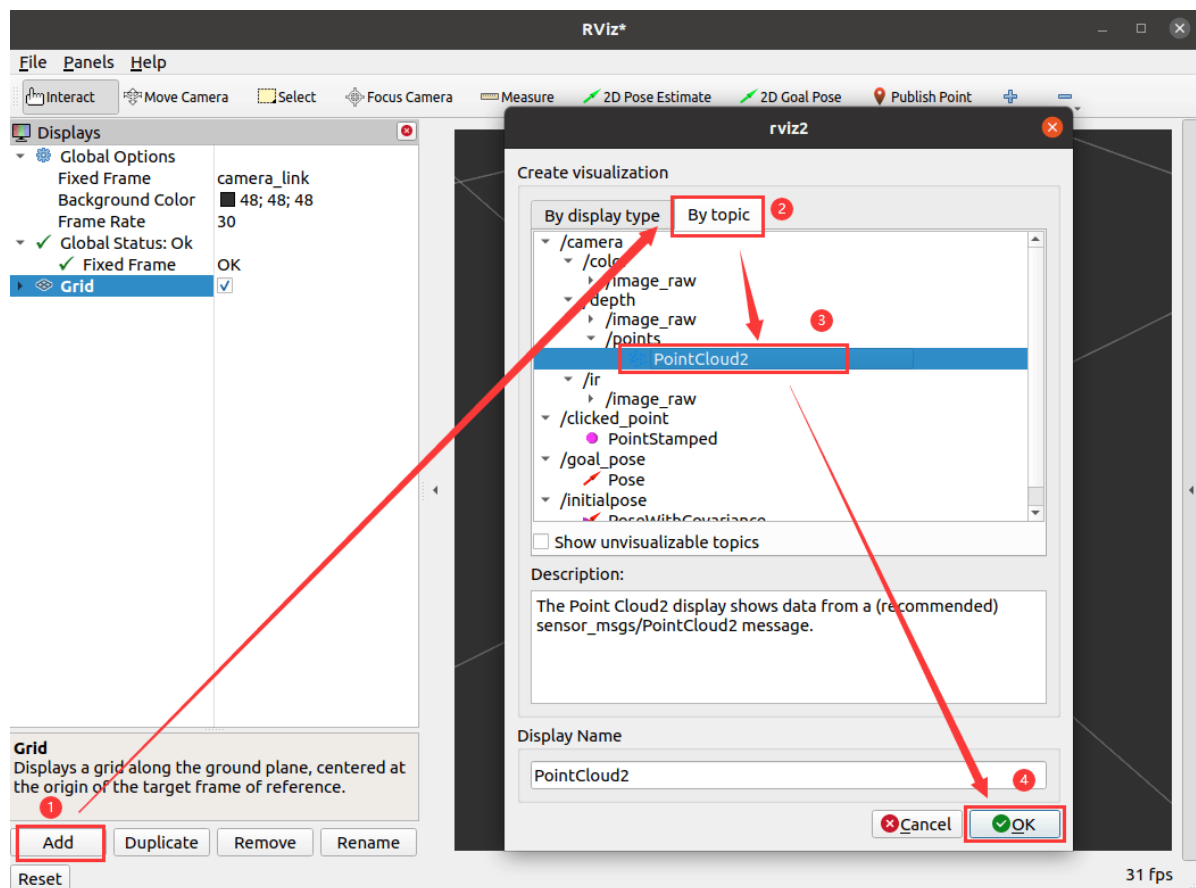
(1) Add Image information to rviz.



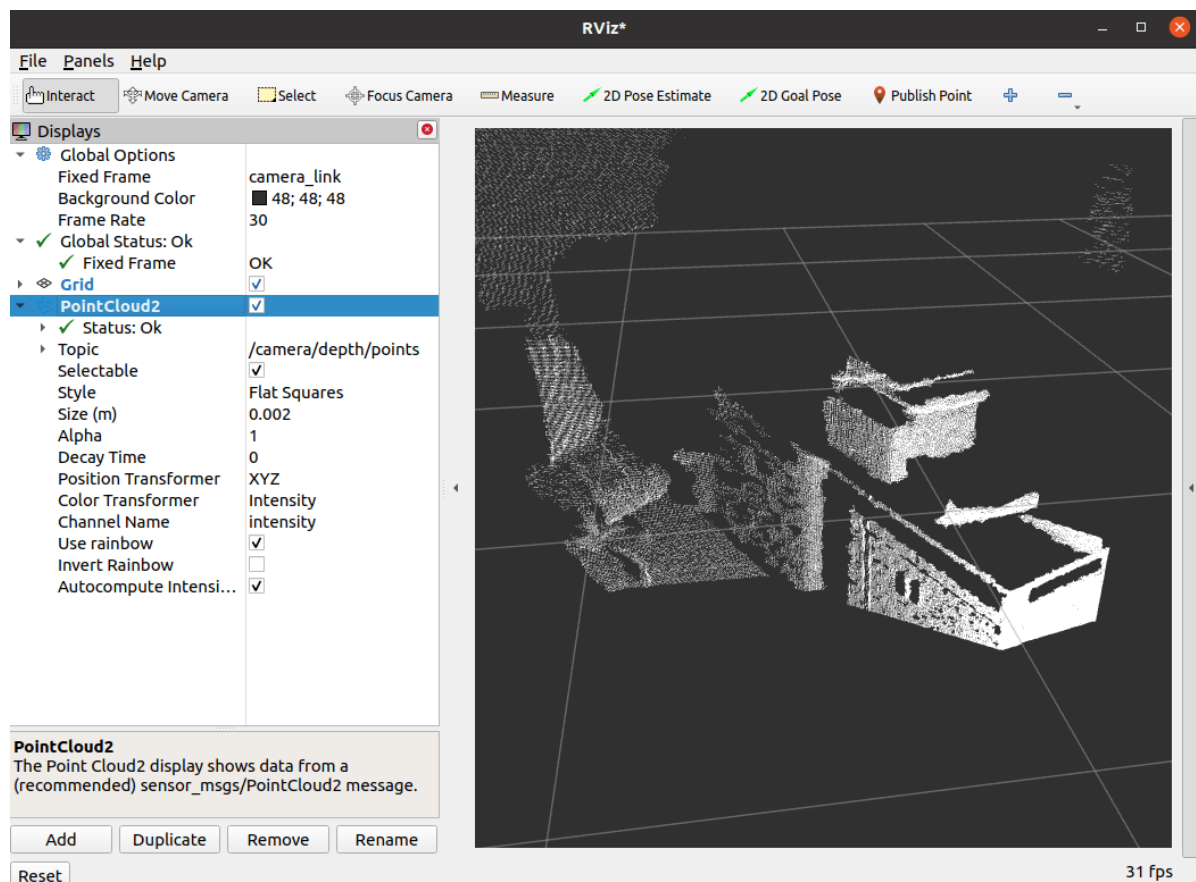
Change **Fixed Frame** to **camera_link** and select a suitable Topic in the topic bar to display the image. Here, the depth map is shown as an example.



(2) Add depth point cloud information to rviz,



Change **Fixed Frame** to **camera_link** to view the point cloud information.



In fact, if you only need in-depth information, Astra pro just needs to launch the following command,

```
ros2 launch astra_camera astra.launch.xml
```

1.4.3. Web display

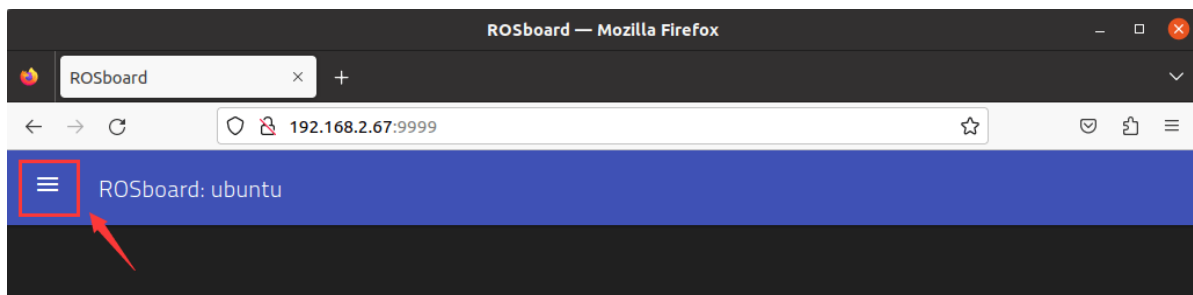
In the subsequent courses related to the functions of depth camera, the ROSboard tool is developed to achieve web-side interaction. Here, the tool is preliminarily used for image display.

After SSH connects to the car, terminal input,

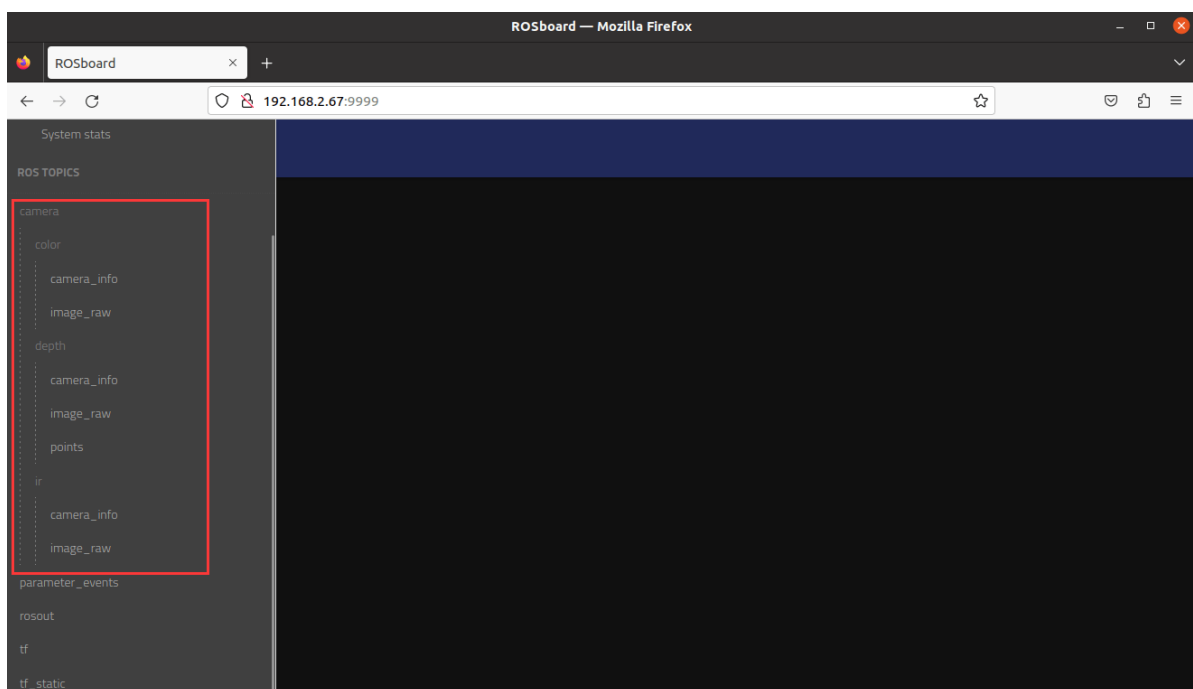
```
ros2 run rosboard rosboard_node
```

Then open the browser on the PC side (note that the computer and the Rising Sun network must be in the same LAN), enter the URL: car IP:9999, for example, my car IP is 192.168.2.67, enter the URL in the browser on the virtual machine side to open the ROSboard webpage:

192.168.2.67:9999



Click the button in the upper left corner to display the ROS topic that currently exists. We can select one or more image topic data to display.



For example, rgb images, depth images, and ir images are displayed here.

