Dabai_DCW2 camera

Before starting this function, you need to close the process of the big program and APP. If you need to start the big program and APP again later, start the terminal,

```
bash ~/dofbot_pro/APP_DOFBOT_PRO/start_app.sh
```

1. Function description

After starting the camera, you can get RGB color images, Depth depth images and IR infrared images.

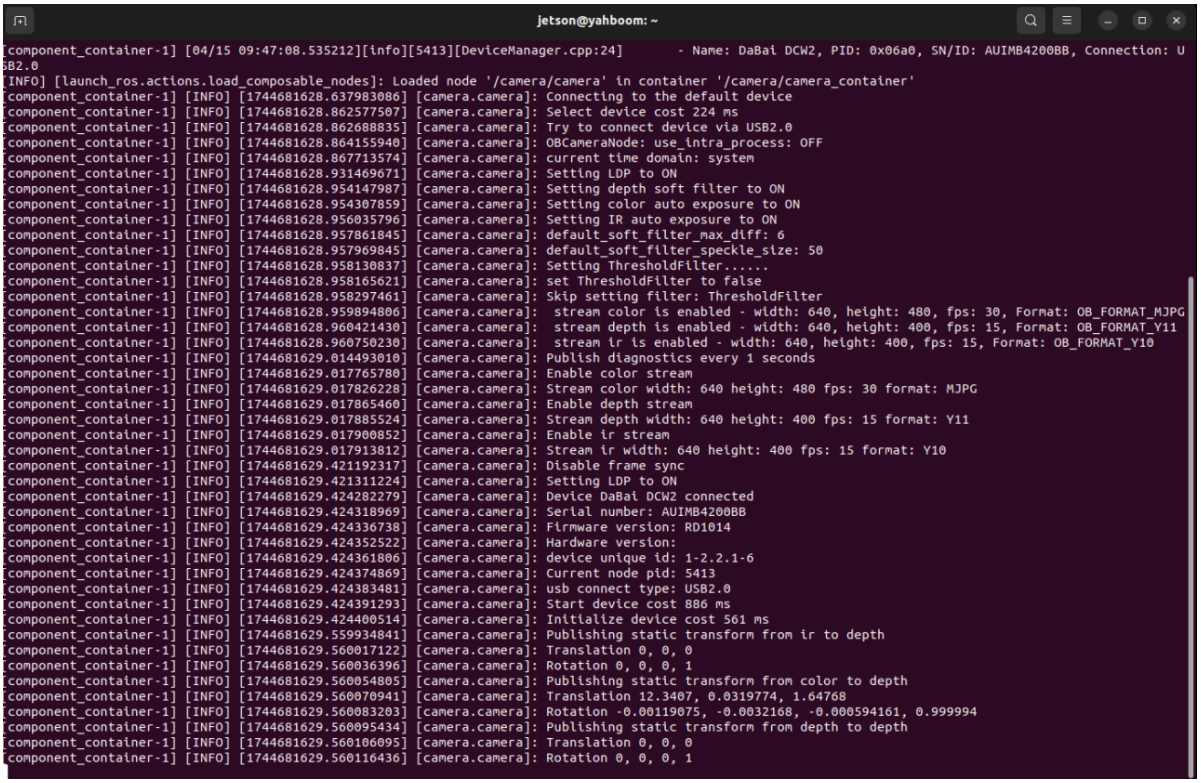
2. Startup and operation

2.1. Startup

After the camera is connected to the motherboard via a data cable, open the terminal and input,

```
ros2 launch orbbec_camera dabai_dcw2.launch.py
```

As shown in the figure below, if the terminal prints the above content, it means that the camera is running normally and the startup is successful. You can view the topics published by the camera node through the following command, and enter the endpoint.




```
ros2 node info /camera/camera
```

As shown in the figure below, the published color image topic is **/camera/color/image_raw**, the published depth image topic is **/camera/depth/image_raw**, the published infrared image topic is **/camera/ir/image_raw**, and the published point cloud data topic is **/camera/depth/points**.

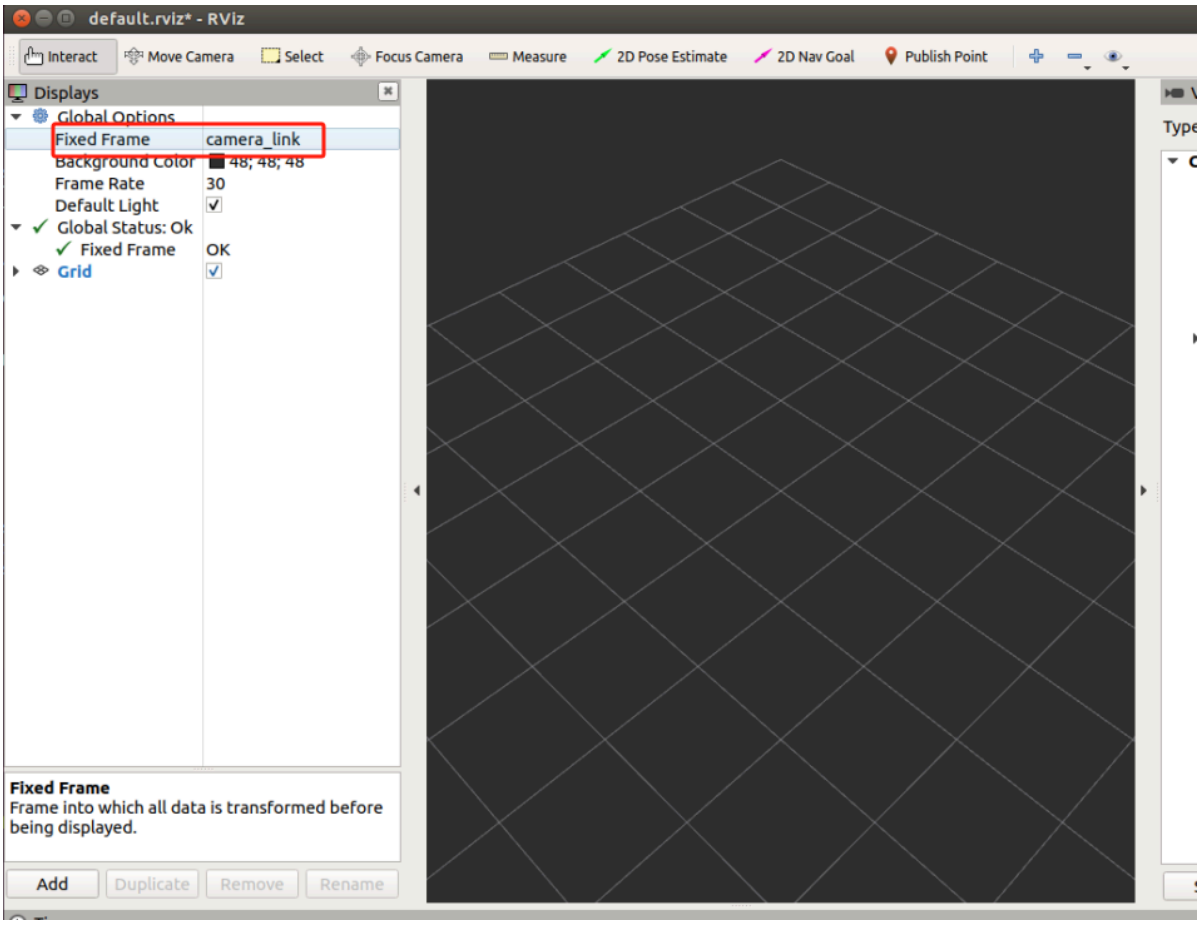
```
jetson@yahboom:~$ ros2 node info /camera/camera
/camera/camera
  Subscribers:
    /parameter_events: rcl_interfaces/msg/ParameterEvent
  Publishers:
    /camera/color/camera_info: sensor_msgs/msg/CameraInfo
    /camera/color/image_raw: sensor_msgs/msg/Image
    /camera/color/image_raw/compressed: sensor_msgs/msg/CompressedImage
    /camera/color/image_raw/compressedDepth: sensor_msgs/msg/CompressedImage
    /camera/color/image_raw/theora: theora_image_transport/msg/Packet
    /camera/depth/camera_info: sensor_msgs/msg/CameraInfo
    /camera/depth/image_raw: sensor_msgs/msg/Image
    /camera/depth/image_raw/compressed: sensor_msgs/msg/CompressedImage
    /camera/depth/image_raw/compressedDepth: sensor_msgs/msg/CompressedImage
    /camera/depth/image_raw/theora: theora_image_transport/msg/Packet
    /camera/depth/points: sensor_msgs/msg/PointCloud2
    /camera/depth_filter_status: std_msgs/msg/String
    /camera/depth_to_color: orbbec_camera_msgs/msg/Extrinsics
    /camera/depth_to_ir: orbbec_camera_msgs/msg/Extrinsics
    /camera/ir/camera_info: sensor_msgs/msg/CameraInfo
    /camera/ir/image_raw: sensor_msgs/msg/Image
    /camera/ir/image_raw/compressed: sensor_msgs/msg/CompressedImage
    /camera/ir/image_raw/compressedDepth: sensor_msgs/msg/CompressedImage
    /camera/ir/image_raw/theora: theora_image_transport/msg/Packet
    /diagnostics: diagnostic_msgs/msg/DiagnosticArray
    /parameter_events: rcl_interfaces/msg/ParameterEvent
    /rosout: rcl_interfaces/msg/Log
    /tf: tf2_msgs/msg/TFMessage
    /tf_static: tf2_msgs/msg/TFMessage
```

2.2、Operation

Use rviz to view the three images and point cloud provided by the camera, restart a terminal input,

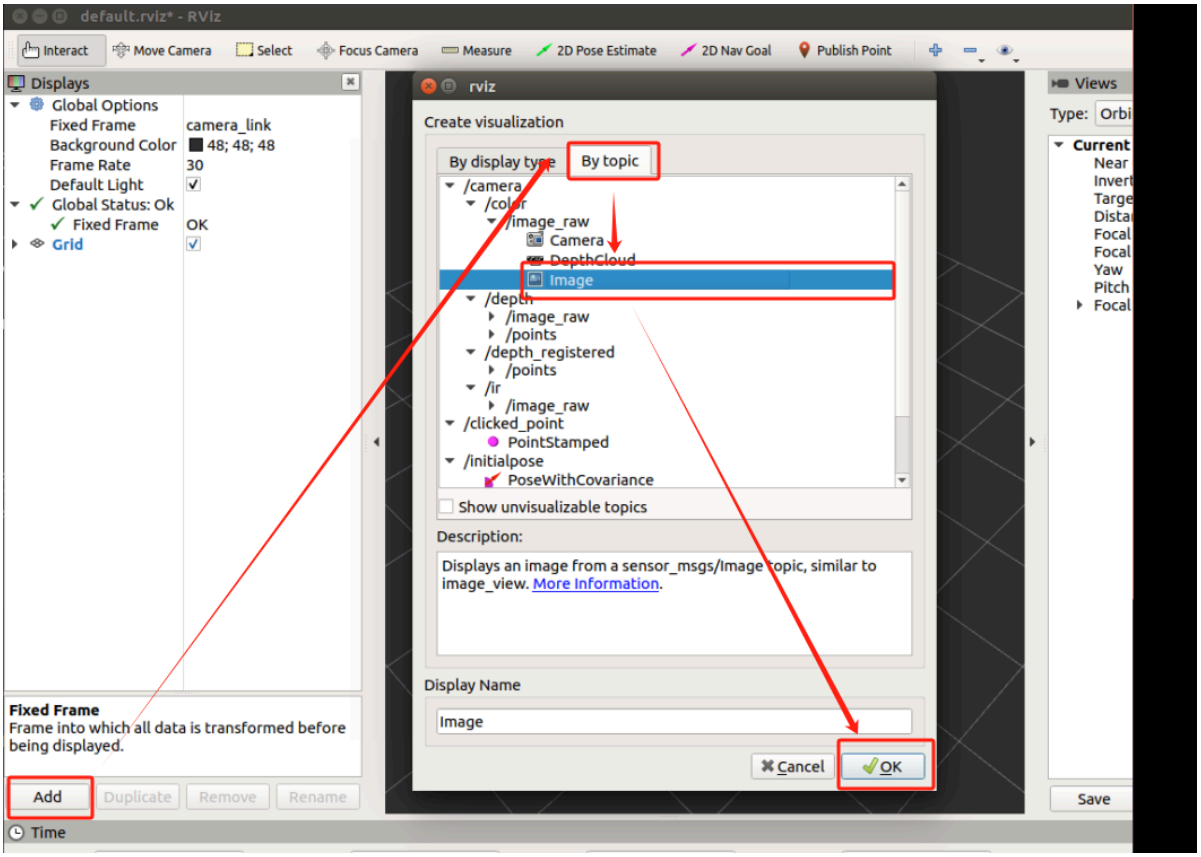
```
rviz2
```

After rviz is started, set rviz according to the following diagram,

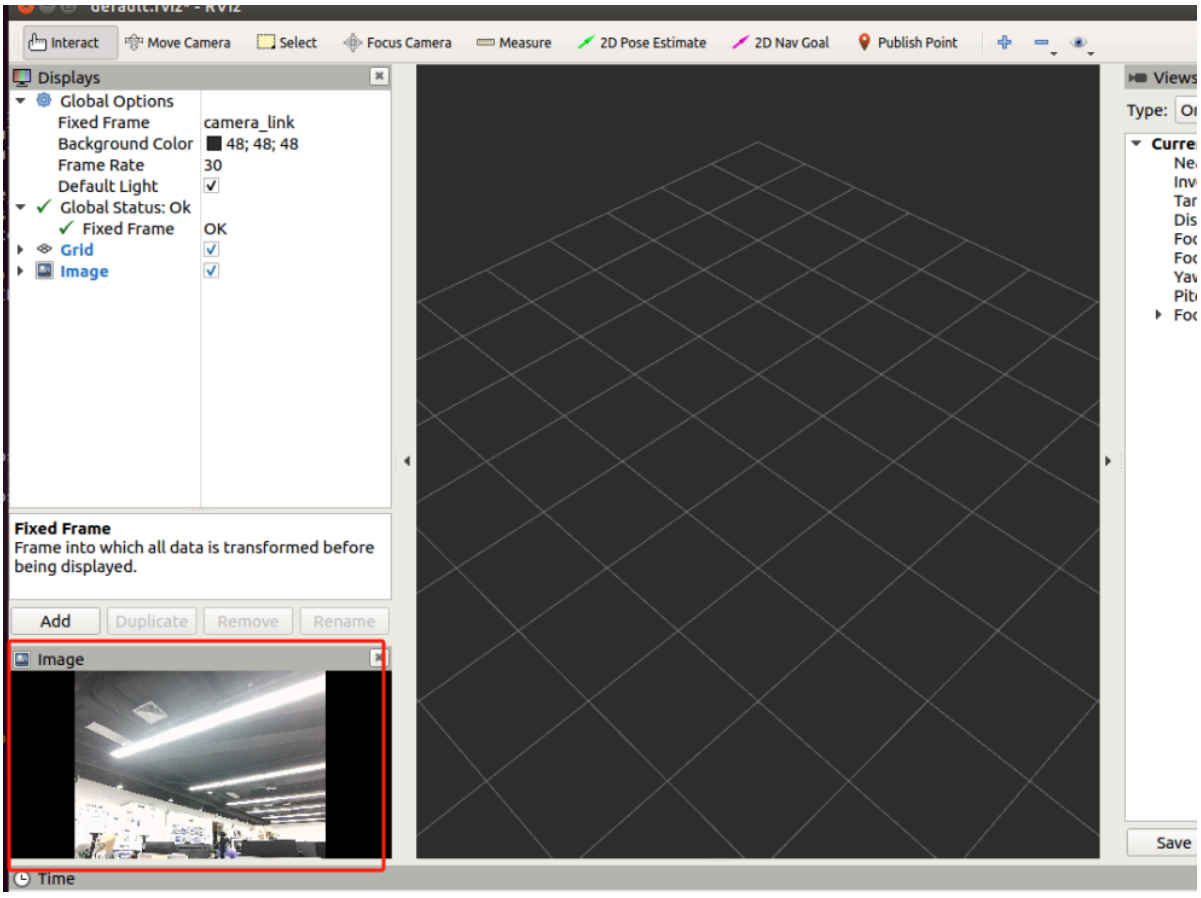


Change [Fixed Frame] here to **camera_link**

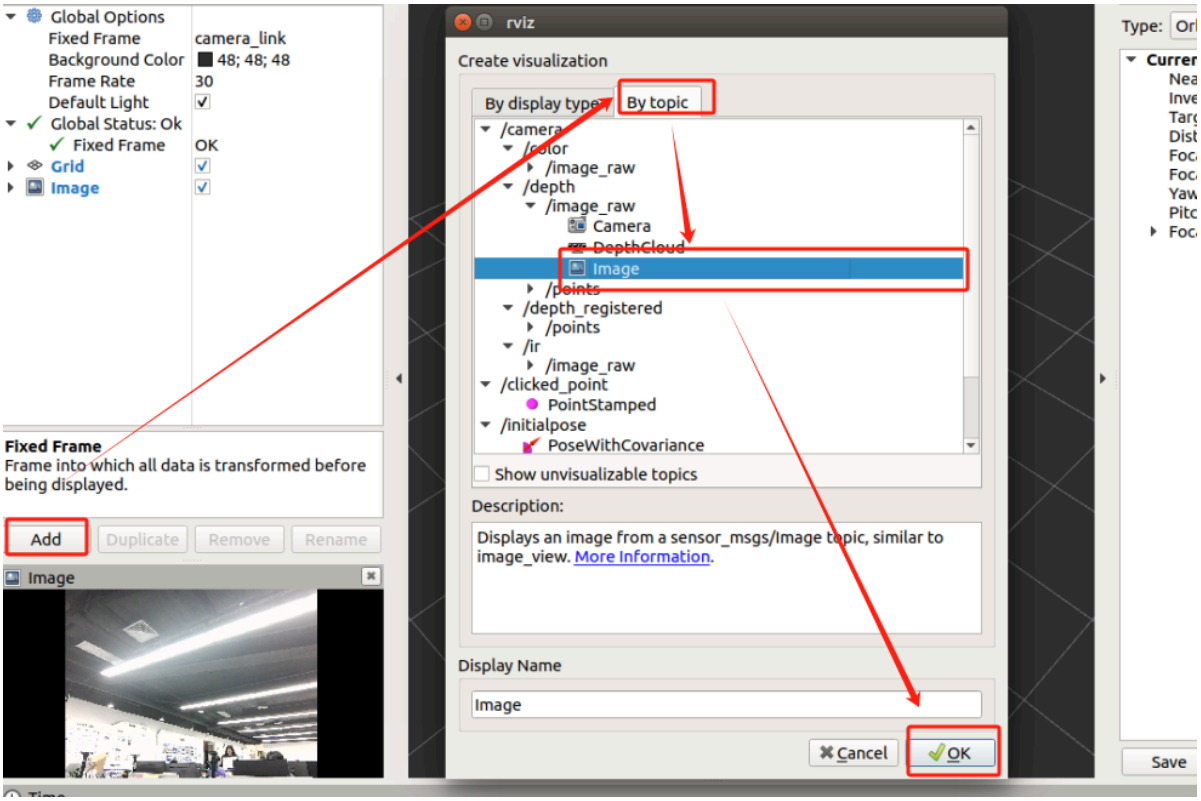
Add color image display



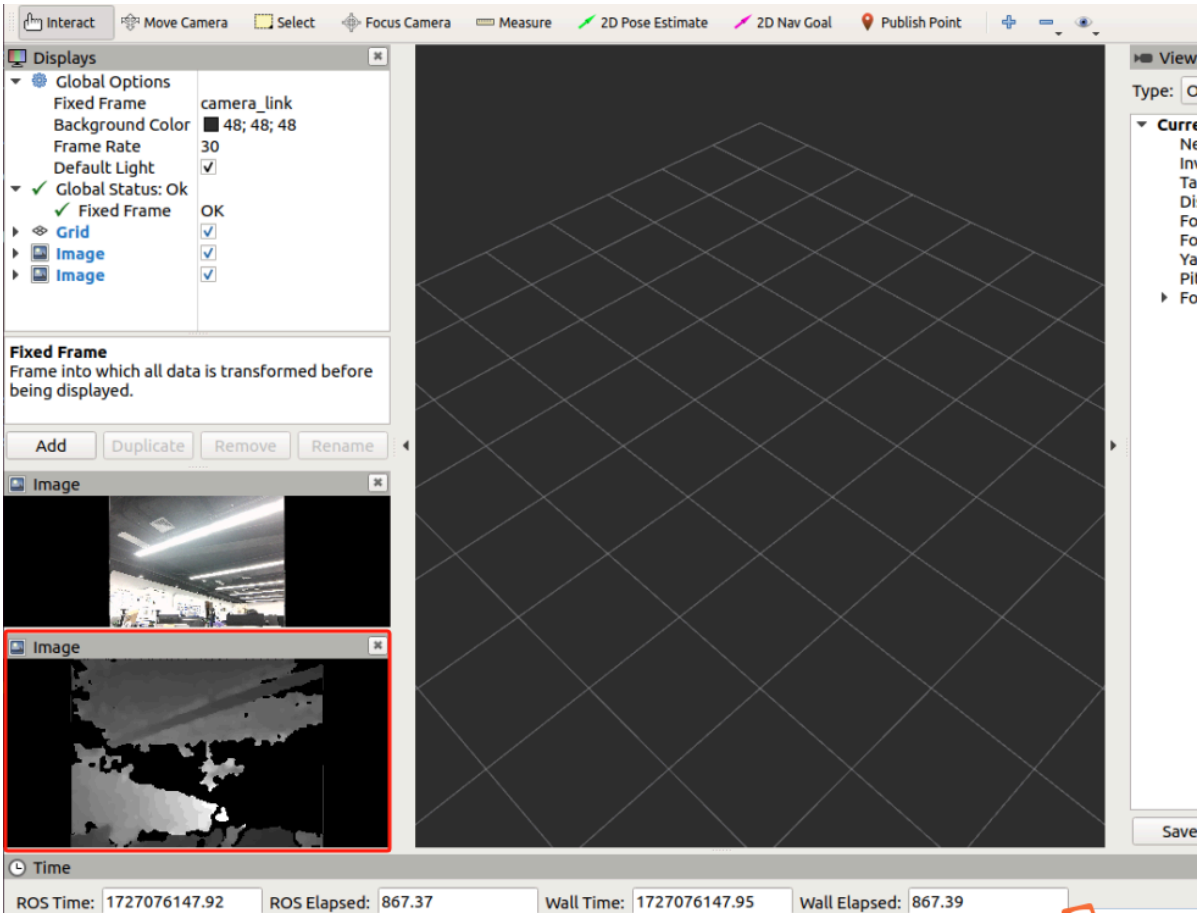
Click [Add], then click [By topic】, select [/color/image_raw/Image], and finally click [ok] to confirm. The color image is as follows.



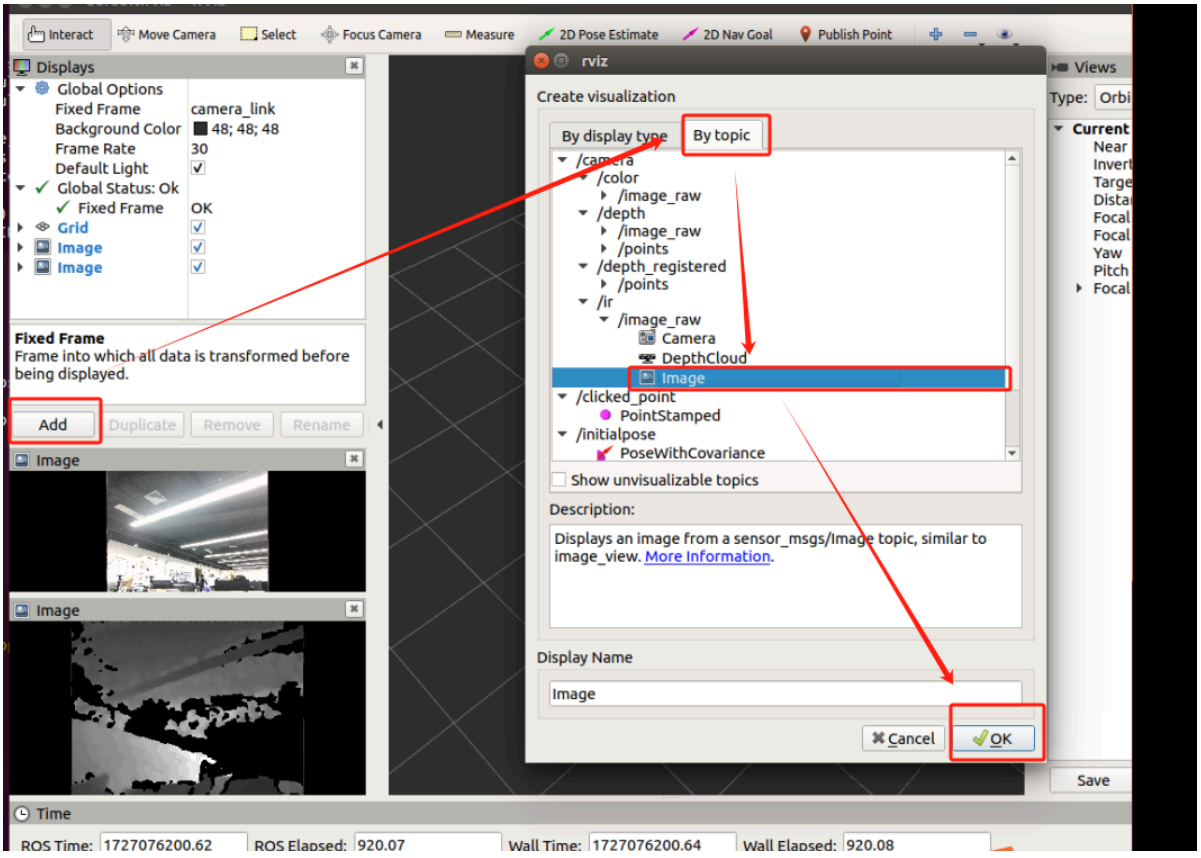
Add depth image display



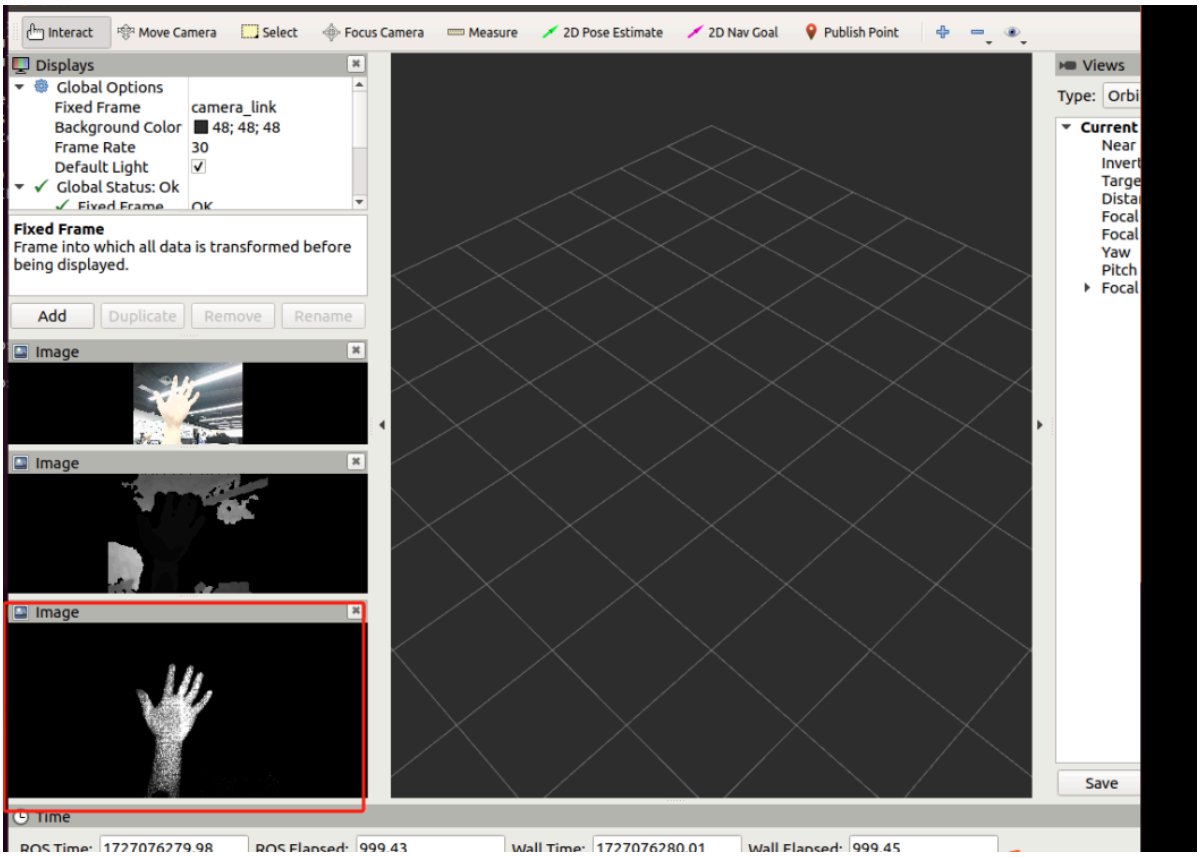
Click [Add], then click [By topic】, select [/depth/image_raw/Image], and finally click [ok] to confirm. The depth color image is as follows.



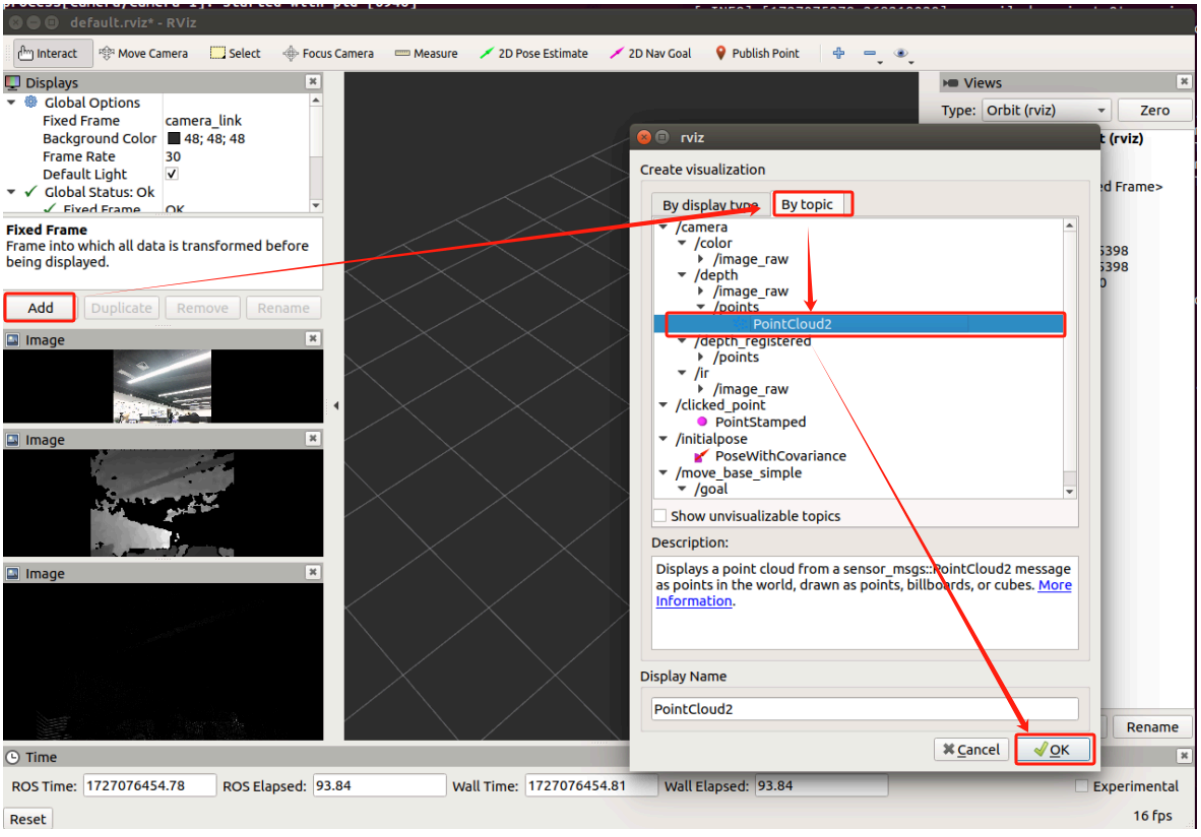
Add infrared image display



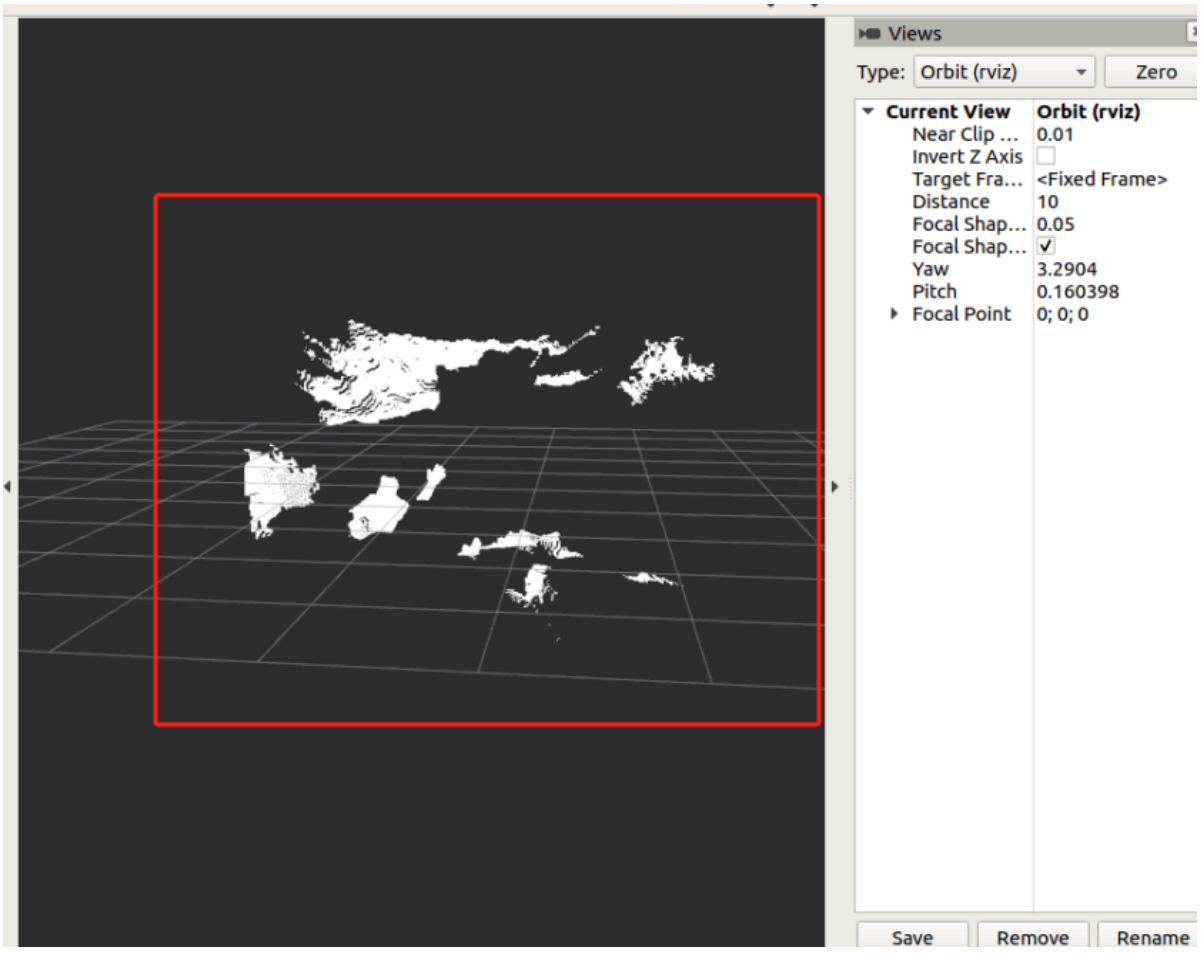
Click [Add], then click [By topic】, select [/ir/image_raw/Image], and finally click [ok] to confirm. The infrared image is as follows.



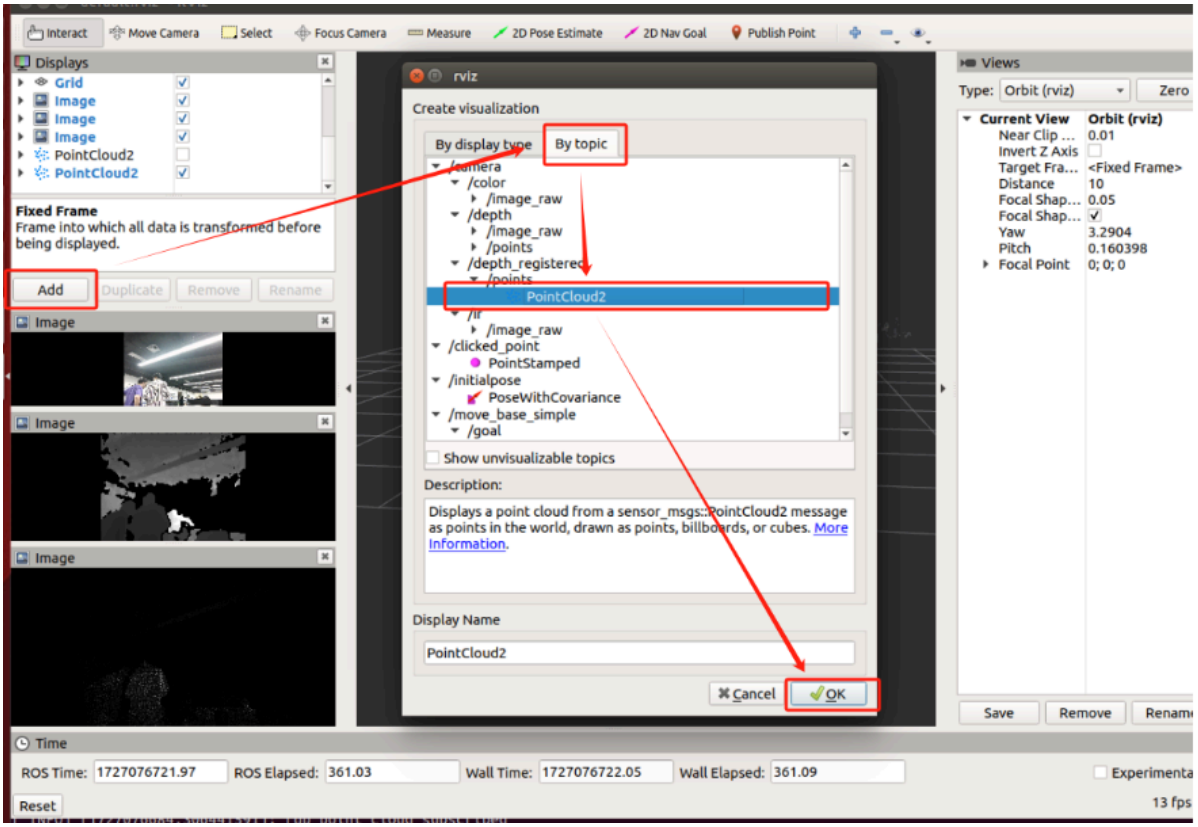
View the depth point cloud data



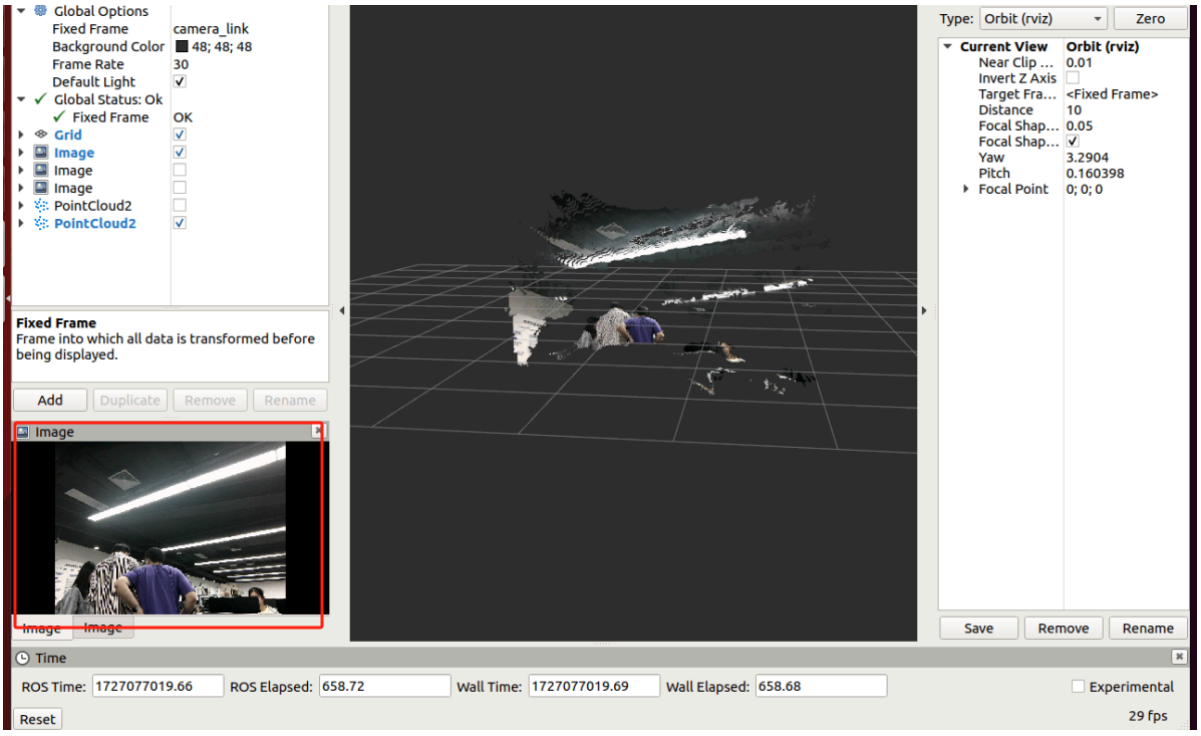
Click [Add], then click [By topic】, select [/depth/points/PointCloud2], and finally click [ok] to confirm. The depth point cloud image is as follows.



View the color point cloud data



Click [Add], then click [By topic], select [/depth_registered/points/PointCloud2], and finally click [ok] to confirm. The color point cloud image is as follows.



3. Camera parameters

3.1. Hardware parameter table

DaBai DCW2/DW2 Depth Camera

	Parameters	Specifications	Remarks
Basic parameters	Name	DaBai DCW2/DW2	
	Model	DaBai DCW2：G10254-001 DaBai DW2：G11254-001	
	Working distance	Regular Level Mode: 0.15-3m High level mode: 0.15-5m	
	Overall size	89.82mm*25.1mm*25.1mm	
	Power consumption	2.5W DaBaiDW2: peak power <6W: average power < 2.0W	
	Baseline	40mm	
	Interface form	USB Type-C	
	Communication/power supply mc	USB 2.0	
	Working temperature	Regular Level Mode:-10 #-50 # High level mode:-10 #-40 #	
	Working humidity	5% - 95%RH	
	Storage temperature	-20 #-70 #	
	RE	-6dB@10m，Class B	With 3 m long cable
	ESD	8k/15k Class A	With 3 m long cable
	Relative Accuracy	<1%@1m；<1.3%@2m	

3.2. Camera parameter acquisition and setting

The initialization parameters of the camera have been set in the launch file. The launch file path is

```
/home/jetson/dofbot_pro_ws/src/OrbbecSDK_ROS2-
main/orbbec_camera/launch/dabai_dcw2.launch.py
```

The contents are as follows,

```
from launch import LaunchDescription
from launch.actions import DeclareLaunchArgument
from launch.substitutions import LaunchConfiguration
from launch_ros.actions import PushRosNamespace
from launch.actions import GroupAction
from launch_ros.actions import ComposableNodeContainer
from launch_ros.descriptions import ComposableNode
from launch_ros.actions import Node
import os


def generate_launch_description():
    # Declare arguments
    args = [
        DeclareLaunchArgument('camera_name', default_value='camera'),
        DeclareLaunchArgument('depth_registration', default_value='true'),
        DeclareLaunchArgument('serial_number', default_value=''),
        DeclareLaunchArgument('usb_port', default_value=''),
        DeclareLaunchArgument('device_num', default_value='1'),
        DeclareLaunchArgument('vendor_id', default_value='0x2bc5'),
        DeclareLaunchArgument('product_id', default_value=''),
        DeclareLaunchArgument('enable_point_cloud', default_value='true'),
        DeclareLaunchArgument('enable_colored_point_cloud',
default_value='true'),
        DeclareLaunchArgument('cloud_frame_id', default_value=''),
        DeclareLaunchArgument('point_cloud_qos', default_value='default'),
        DeclareLaunchArgument('connection_delay', default_value='100'),
        DeclareLaunchArgument('color_width', default_value='640'),
        DeclareLaunchArgument('color_height', default_value='480'),
        DeclareLaunchArgument('color_fps', default_value='30'),
        DeclareLaunchArgument('color_format', default_value='MJPG'),
        DeclareLaunchArgument('enable_color', default_value='true'),
        DeclareLaunchArgument('flip_color', default_value='false'),
        DeclareLaunchArgument('color_qos', default_value='default'),
        DeclareLaunchArgument('color_camera_info_qos', default_value='default'),
        DeclareLaunchArgument('enable_color_auto_exposure',
default_value='true'),
        DeclareLaunchArgument('color_exposure', default_value='-1'),
        DeclareLaunchArgument('color_gain', default_value='-1'),
        DeclareLaunchArgument('enable_color_auto_white_balance',
default_value='true'),
        DeclareLaunchArgument('color_white_balance', default_value='-1'),
        DeclareLaunchArgument('color_ae_max_exposure', default_value='-1'),
        DeclareLaunchArgument('color_brightness', default_value='-1'),
        DeclareLaunchArgument('color_sharpness', default_value='-1'),
        DeclareLaunchArgument('color_saturation', default_value='-1'),
```

```
        DeclareLaunchArgument('color_contrast', default_value='-1'),
        DeclareLaunchArgument('color_gamma', default_value='-1'),
        DeclareLaunchArgument('color_hue', default_value='-1'),
        DeclareLaunchArgument('depth_width', default_value='640'),
        DeclareLaunchArgument('depth_height', default_value='400'),
        DeclareLaunchArgument('depth_fps', default_value='15'),
        DeclareLaunchArgument('depth_format', default_value='Y11'),
        DeclareLaunchArgument('enable_depth', default_value='true'),
        DeclareLaunchArgument('flip_depth', default_value='false'),
        DeclareLaunchArgument('depth_qos', default_value='default'),
        DeclareLaunchArgument('depth_camera_info_qos', default_value='default'),
        # /config/depthfilter/Openni_device.json, need config path.
        DeclareLaunchArgument('depth_filter_config', default_value=''),
        DeclareLaunchArgument('ir_width', default_value='640'),
        DeclareLaunchArgument('ir_height', default_value='400'),
        DeclareLaunchArgument('ir_fps', default_value='15'),
        DeclareLaunchArgument('ir_format', default_value='Y10'),
        DeclareLaunchArgument('enable_ir', default_value='true'),
        DeclareLaunchArgument('flip_ir', default_value='false'),
        DeclareLaunchArgument('ir_qos', default_value='default'),
        DeclareLaunchArgument('ir_camera_info_qos', default_value='default'),
        DeclareLaunchArgument('enable_ir_auto_exposure', default_value='true'),
        DeclareLaunchArgument('ir_exposure', default_value='-1'),
        DeclareLaunchArgument('ir_gain', default_value='-1'),
        DeclareLaunchArgument('publish_tf', default_value='true'),
        DeclareLaunchArgument('tf_publish_rate', default_value='0.0'),
        DeclareLaunchArgument('ir_info_url', default_value=''),
        DeclareLaunchArgument('color_info_url', default_value=''),
        DeclareLaunchArgument('log_level', default_value='none'),
        DeclareLaunchArgument('enable_publish_extrinsic', default_value='false'),
        DeclareLaunchArgument('enable_soft_filter', default_value='true'),
        DeclareLaunchArgument('enable_ldp', default_value='true'),
        DeclareLaunchArgument('soft_filter_max_diff', default_value='-1'),
        DeclareLaunchArgument('soft_filter_speckle_size', default_value='-1'),
        DeclareLaunchArgument('ordered_pc', default_value='false'),
        DeclareLaunchArgument('use_hardware_time', default_value='false'),
        DeclareLaunchArgument('enable_depth_scale', default_value='true'),
        DeclareLaunchArgument('align_mode', default_value='HW'),
        DeclareLaunchArgument('laser_energy_level', default_value='-1'),
        DeclareLaunchArgument('enable_heartbeat', default_value='false'),
    ]

    # Node configuration
    parameters = [{arg.name: LaunchConfiguration(arg.name)} for arg in args]
    # get  ROS_DISTRO
    ros_distro = os.environ["ROS_DISTRO"]
    if ros_distro == "foxy":
        return LaunchDescription(
            args
            + [
                Node(
                    package="orbbec_camera",
                    executable="orbbec_camera_node",
                    name="ob_camera_node",
                    namespace=LaunchConfiguration("camera_name"),
                    parameters=parameters,
```

```
                    output="screen",
                )
            ]
        )
    # Define the ComposableNode
    else:
        # Define the ComposableNode
        compose_node = ComposableNode(
            package="orbbec_camera",
            plugin="orbbec_camera::OBCameraNodeDriver",
            name=LaunchConfiguration("camera_name"),
            namespace="",
            parameters=parameters,
        )
        # Define the ComposableNodeContainer
        container = ComposableNodeContainer(
            name="camera_container",
            namespace="",
            package="rclcpp_components",
            executable="component_container",
            composable_node_descriptions=[
                compose_node,
            ],
            output="screen",
        )
        # Launch description
        ld = LaunchDescription(
            args
            + [
                GroupAction(
                    [PushRosNamespace(LaunchConfiguration("camera_name")),
container]
                )
            ]
        )
        return ld
```

After the camera is running, we can use some services to get or set some parameters, such as getting exposure value and setting exposure value. First, check which services can be called by the camera node, and enter in the terminal,

```
ros node info /camera/camera
```

As shown in the figure below, after the camera node is started, some services are provided to us,

```
Service Servers:
  /camera/camera/describe_parameters: rcl_interfaces/srv/DescribeParameters
  /camera/camera/get_parameter_types: rcl_interfaces/srv/GetParameterTypes
  /camera/camera/get_parameters: rcl_interfaces/srv/GetParameters
  /camera/camera/list_parameters: rcl_interfaces/srv/ListParameters
  /camera/camera/set_parameters: rcl_interfaces/srv/SetParameters
  /camera/camera/set_parameters_atomically: rcl_interfaces/srv/SetParametersAtomically
  /camera/get_auto_white_balance: orbbec_camera_msgs/srv/GetInt32
  /camera/get_color_exposure: orbbec_camera_msgs/srv/GetInt32
  /camera/get_color_gain: orbbec_camera_msgs/srv/GetInt32
  /camera/get_depth_exposure: orbbec_camera_msgs/srv/GetInt32
  /camera/get_depth_gain: orbbec_camera_msgs/srv/GetInt32
  /camera/get_device_info: orbbec_camera_msgs/srv/GetDeviceInfo
  /camera/get_ir_exposure: orbbec_camera_msgs/srv/GetInt32
  /camera/get_ir_gain: orbbec_camera_msgs/srv/GetInt32
  /camera/get_ldp_measure_distance: orbbec_camera_msgs/srv/GetInt32
  /camera/get_ldp_status: orbbec_camera_msgs/srv/GetBool
  /camera/get_sdk_version: orbbec_camera_msgs/srv/GetString
  /camera/get_white_balance: orbbec_camera_msgs/srv/GetInt32
  /camera/reboot_device: std_srvs/srv/Empty
  /camera/save_images: std_srvs/srv/Empty
  /camera/save_point_cloud: std_srvs/srv/Empty
  /camera/set_auto_white_balance: std_srvs/srv/SetBool
  /camera/set_color_auto_exposure: std_srvs/srv/SetBool
  /camera/set_color_exposure: orbbec_camera_msgs/srv/SetInt32
  /camera/set_color_gain: orbbec_camera_msgs/srv/SetInt32
  /camera/set_color_mirror: std_srvs/srv/SetBool
  /camera/set_depth_auto_exposure: std_srvs/srv/SetBool
  /camera/set_depth_exposure: orbbec_camera_msgs/srv/SetInt32
  /camera/set_depth_gain: orbbec_camera_msgs/srv/SetInt32
  /camera/set_depth_mirror: std_srvs/srv/SetBool
  /camera/set_fan_work_mode: orbbec_camera_msgs/srv/SetInt32
  /camera/set_floor_enable: std_srvs/srv/SetBool
  /camera/set_ir_auto_exposure: std_srvs/srv/SetBool
  /camera/set_ir_exposure: orbbec_camera_msgs/srv/SetInt32
  /camera/set_ir_gain: orbbec_camera_msgs/srv/SetInt32
  /camera/set_ir_long_exposure: std_srvs/srv/SetBool
  /camera/set_ir_mirror: std_srvs/srv/SetBool
  /camera/set_laser_enable: std_srvs/srv/SetBool
  /camera/set_ldp_enable: std_srvs/srv/SetBool
  /camera/set_white_balance: orbbec_camera_msgs/srv/SetInt32
  /camera/switch_ir: orbbec_camera_msgs/srv/SetString
  /camera/toggle_color: std_srvs/srv/SetBool
  /camera/toggle_depth: std_srvs/srv/SetBool
  /camera/toggle_ir: std_srvs/srv/SetBool
```

3.2.1, camera parameter acquisition

Take the exposure value as an example, call the service, and enter in the terminal,

```
ros2 service call /camera/get_color_exposure orbbec_camera_msgs/srv/GetInt32 '{}'
```

As shown in the figure below, the exposure value obtained is 100

```
jetson@yahboom:~$ ros2 service call /camera/get_color_exposure orbbec_camera_msgs/srv/GetInt32 '{}'
requester: making request: orbbec_camera_msgs.srv.GetInt32_Request()

response:
orbbec_camera_msgs.srv.GetInt32_Response(data=100, success=True, message='')

jetson@yahboom:~$
```

3.2.2, Camera parameter settings

Take the automatic exposure value switch as an example, call the service, terminal input,

```
ros2 service call /camera/set_color_auto_exposure std_srvs/srv/SetBool '{data:
true}'
```

```
jetson@yahboom:~$ ros2 service call /camera/set_color_auto_exposure std_srvs/srv/SetBool '{data: true}'
requester: making request: std_srvs.srv.SetBool_Request(data=True)

response:
std_srvs.srv.SetBool_Response(success=True, message='')

jetson@yahboom:~$
```

Manual setting

```
ros2 service call /camera/set_color_exposure orbbec_camera_msgs/srv/SetInt32
'{data: 50}'
```

```
jetson@yahboom:~/dofbot_pro_ws$ ros2 service call /camera/set_color_expos
ure orbbec_camera_msgs/srv/SetInt32 '{data: 50}'
waiting for service to become available...
requester: making request: orbbec_camera_msgs.srv.SetInt32_Request(data=5
0)

response:
orbbec_camera_msgs.srv.SetInt32_Response(success=True, message='')
```

After setting the automatic exposure value, the color image will change the exposure value according to the setting environment.