

Camera internal parameter calibration

1.Preparation before calibration

- The tutorial uses a 9x6 checkerboard and a 20mm square, which needs to be flattened during calibration. The calibration uses the internal vertices of the chessboard grid, so the "10x7" chessboard uses the internal vertex parameter "9x6", as shown in the following example.
- Monocamera for publishing images through ROS

2. Start calibration

Install the calibrated feature pack camera_Calibration, using foxy as an example.

Input following command:

```
sudo apt install ros-foxy-camera-calibration*
```

Start the camera before calibration, and then turn off the camera until all calibration is completed.

Start the camera and input following command:

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

Input following command:

```
ros2 topic list
```

The topic we need to use to calibrate RGB color images is/camera/color/image_raw.

Input following command:

```
ros2 run camera_calibration cameracalibrator --size 9x6 --square 0.02 --ros-args  
--remap /image:=/camera/color/image_raw
```

size: Calibrate the number of internal corner points on the chessboard, such as 9X6, with a total of six rows and nine columns of corner points.

square: The side length of a chessboard, measured in meters.

Topic name:/camera/color/image_raw, if starting **USB_If cam**, modify it to **/image here_raw**

X: The left and right movement of the checkerboard in the camera's field of view

Y: Move the checkerboard up and down in the camera's field of view

Size: The forward and backward movement of the checkerboard in the camera's field of view

Skew: Skew rotation of the checkerboard in the camera's field of view

As shown in the above figure, it is necessary to capture the image by flipping it up, down, back, left, right, and left to make the X, Y, Size, and Skew on the right turn green, as shown in the following figure. Then, click [CALIBRATE] to start calibration.

After calibration, click [SAVE], as shown in the following figure.

Save the calibration results to [/tmp/calibrationdata.tar.gz], and the saved path is in the terminal directory where the calibration program was started.

After calibration, you can move out the file [/tmp/calibrationdata.tar.gz] to see the content

```
sudo mv /tmp/calibrationdata.tar.gz ~
```

Input following command:

```
cd ~  
tar -xvf calibrationdata.tar.gz
```

Obtain the calibrated png file, ost.yaml, and ost.txt files in the terminal directory.

Due to the fact that the camera driver starts with built-in parameters calibrated in the code, there is no need to load these calibrated parameters.

However, when starting the USB camera, parameters need to be loaded. Therefore, after calibration, the parameters need to be replaced with the original built-in parameters, and the calibrated ost.yaml needs to be renamed camera_Info.yaml, then replace the original camera_Info.yaml.

Input following command:

```
sudo cp ost.yaml /opt/ros/foxy/share/usb_cam/config  
  
cd /opt/ros/foxy/share/usb_cam/config  
  
sudo mv camera_info.yaml camera_info_BK.yaml  
  
sudo mv ost.yaml camera_info.yaml
```