

Camera calibration (CSI)

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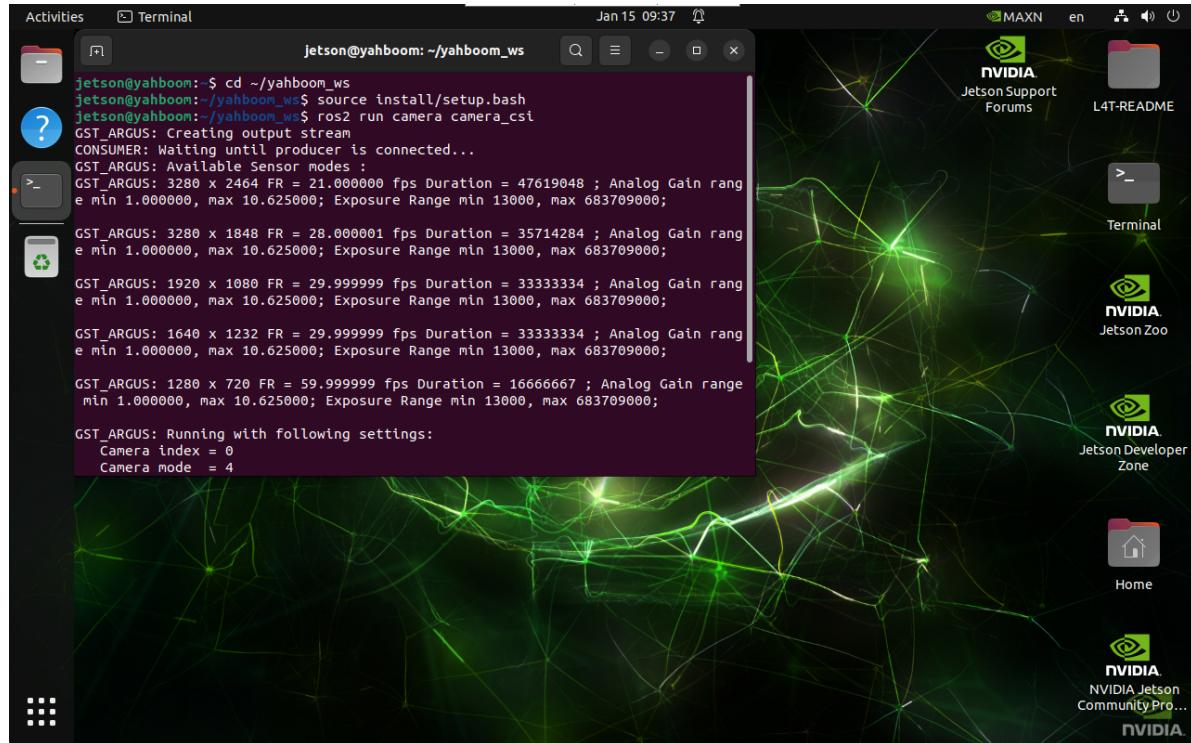
1. Start the camera
2. Image calibration
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 - 2.3. Image calibration
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 - 2.3.3. Calibration process
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1. Start the camera

```
cd ~/yahboom_ws
```

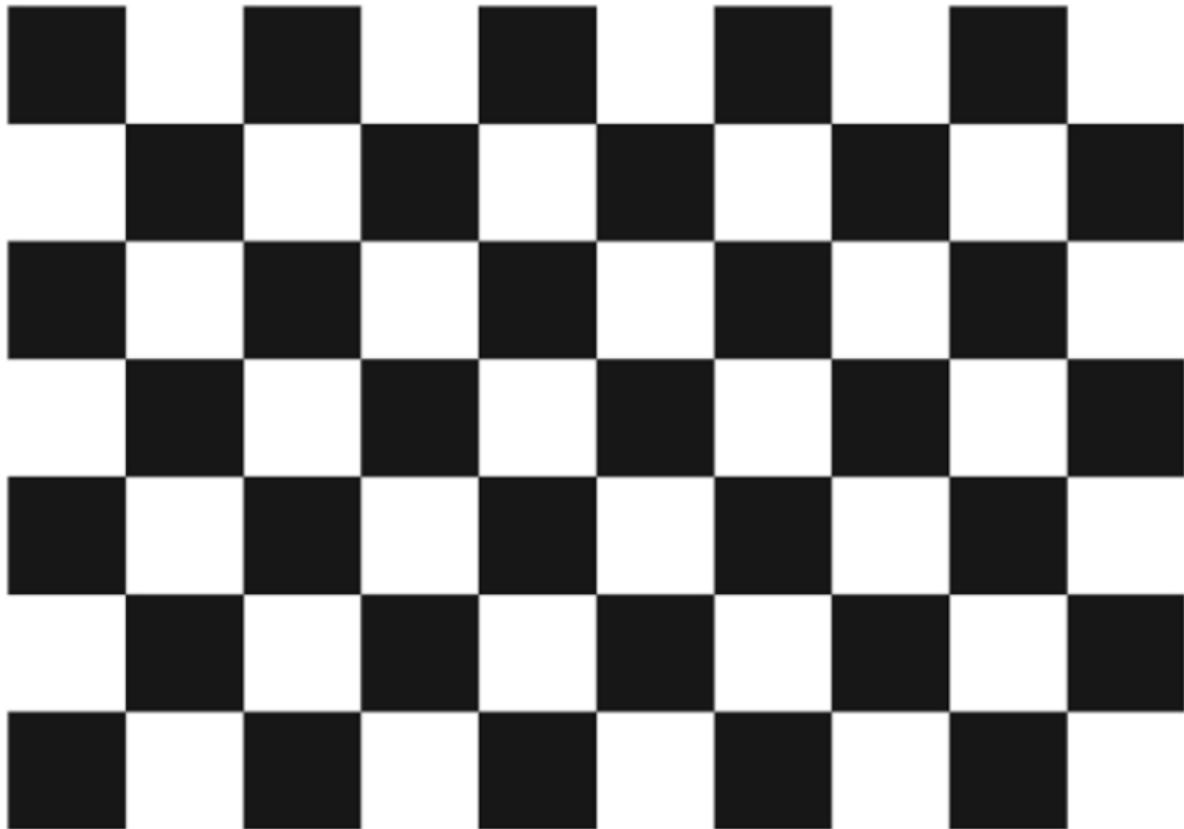
```
source install/setup.bash
```

```
ros2 run camera camera_csi
```



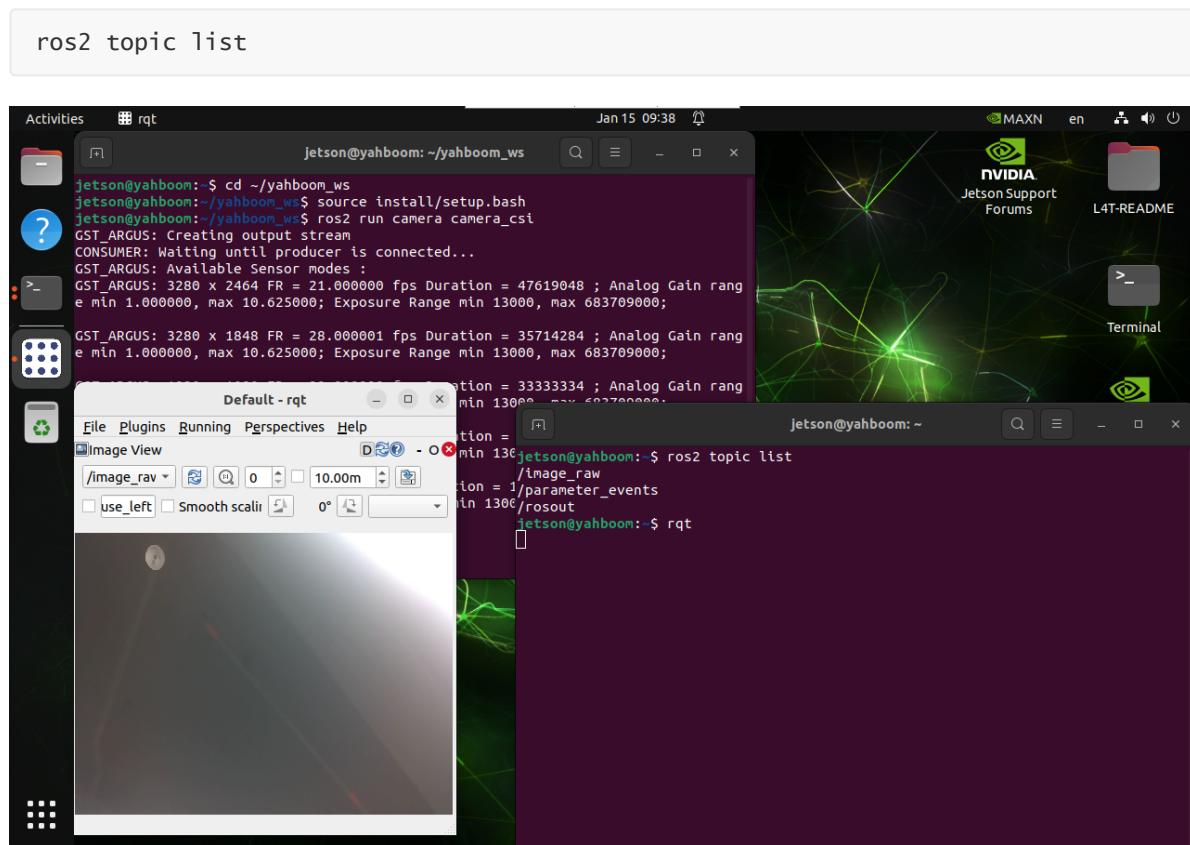
2. Image calibration

2.1. Calibration board



7×10 | Size: 20mm

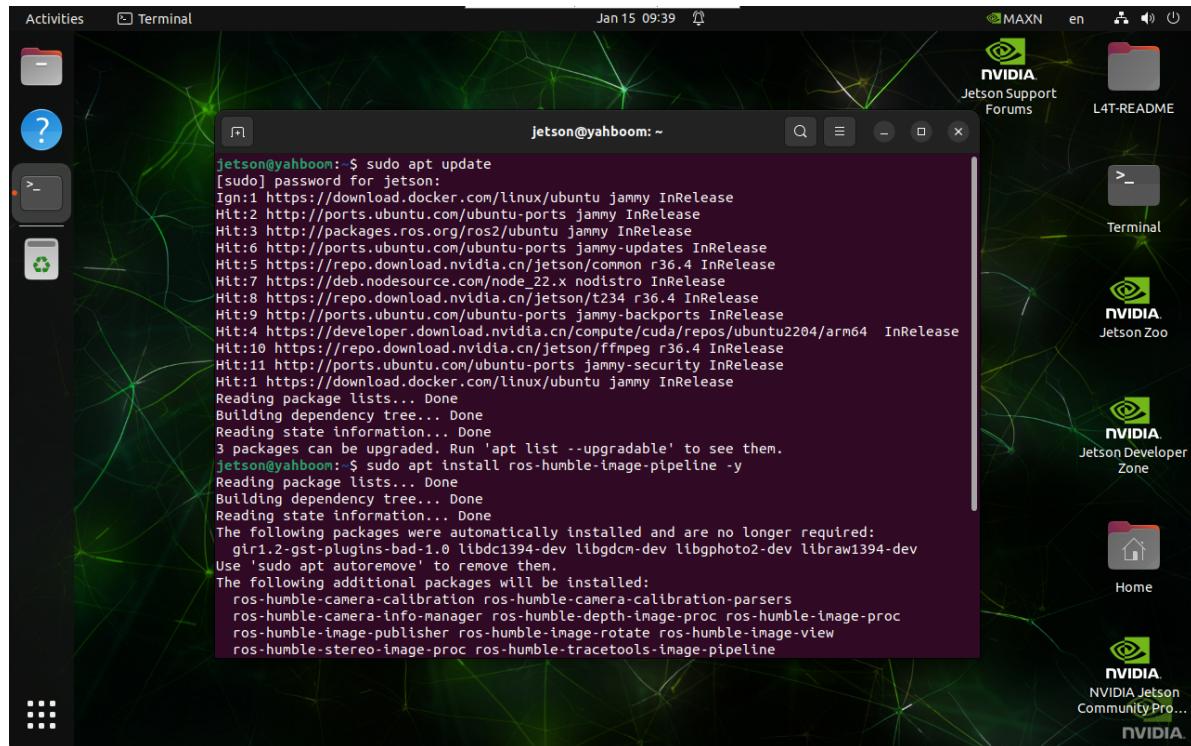
2.2. View topics



2.3, Image calibration

2.3.1, Install the image calibration tool

```
sudo apt update  
sudo apt install ros-humble-image-pipeline -y
```



2.3.2, Start the image calibration tool

Start the ROS2 camera calibration tool `camera_calibration` and perform camera calibration:
You need to start the camera before calibration

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

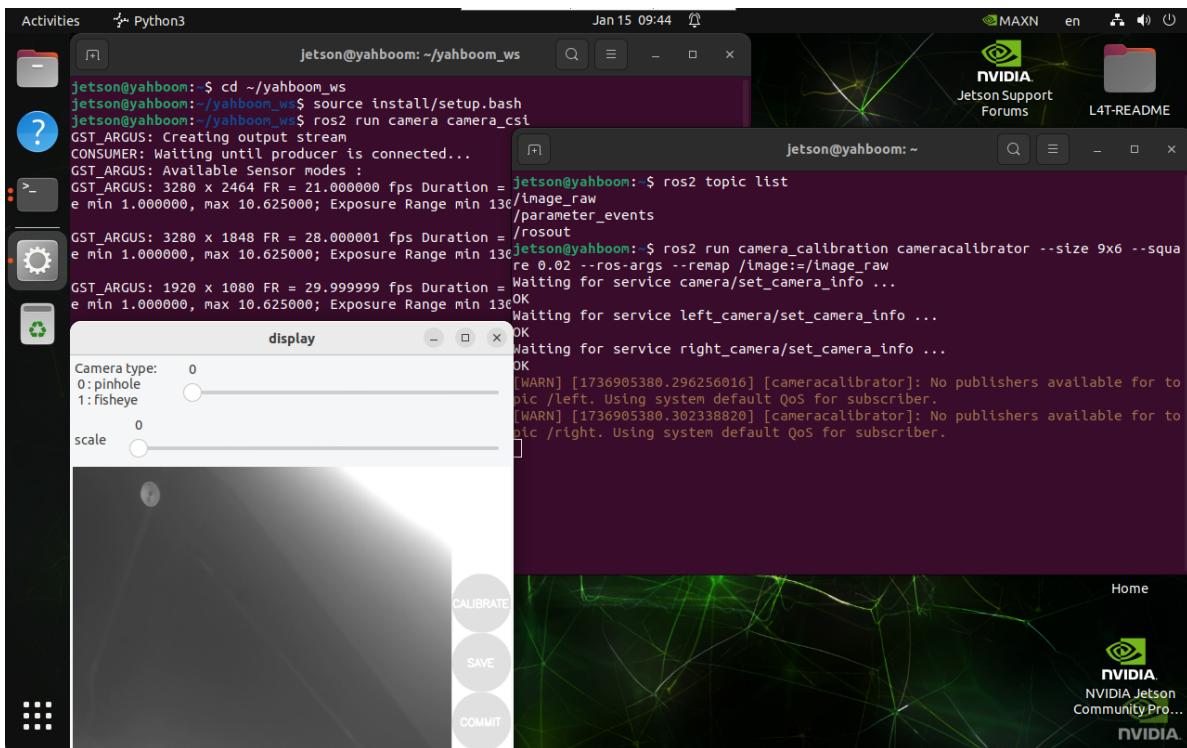
Parameter Description

`--size`: Number of inner corner points of the chessboard → 9 rows and 6 columns of inner corner points

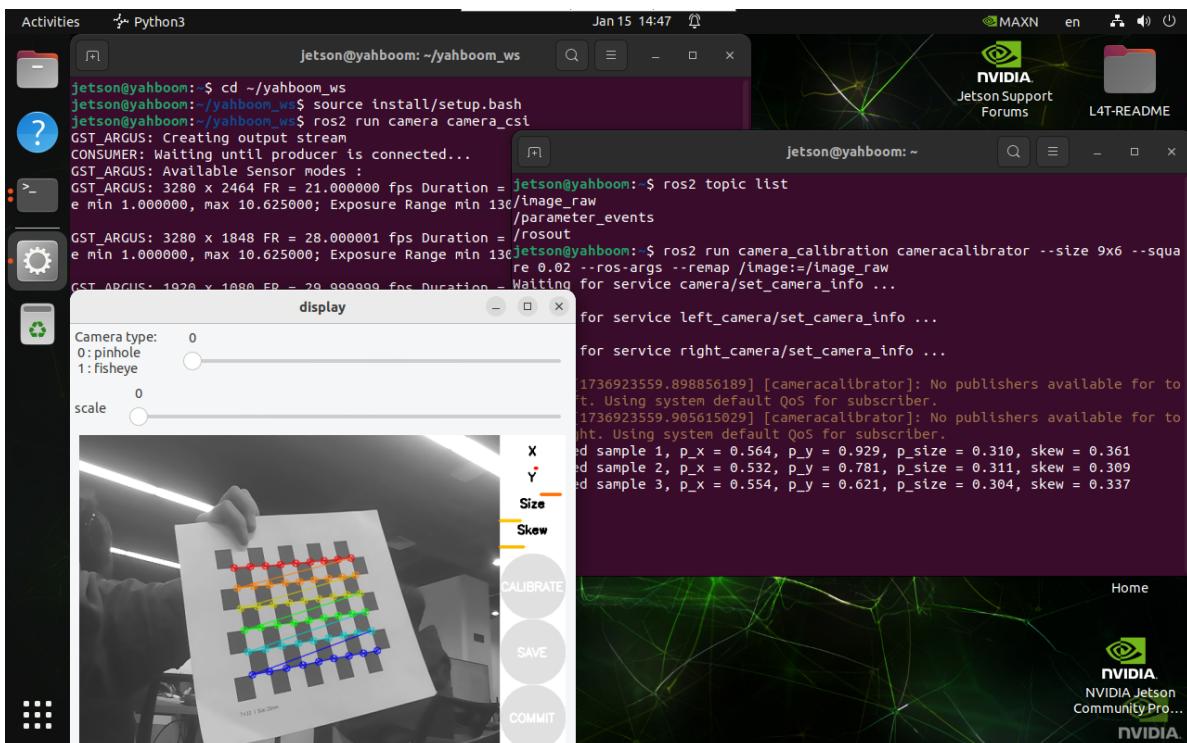
`--square`: Side length of the chessboard → 0.02 meters

`--ros-args`: Pass ROS parameters

`--remap`: Topic remapping → `/image_raw` as image input stream



2.3.3, Calibration process



Parameter Description

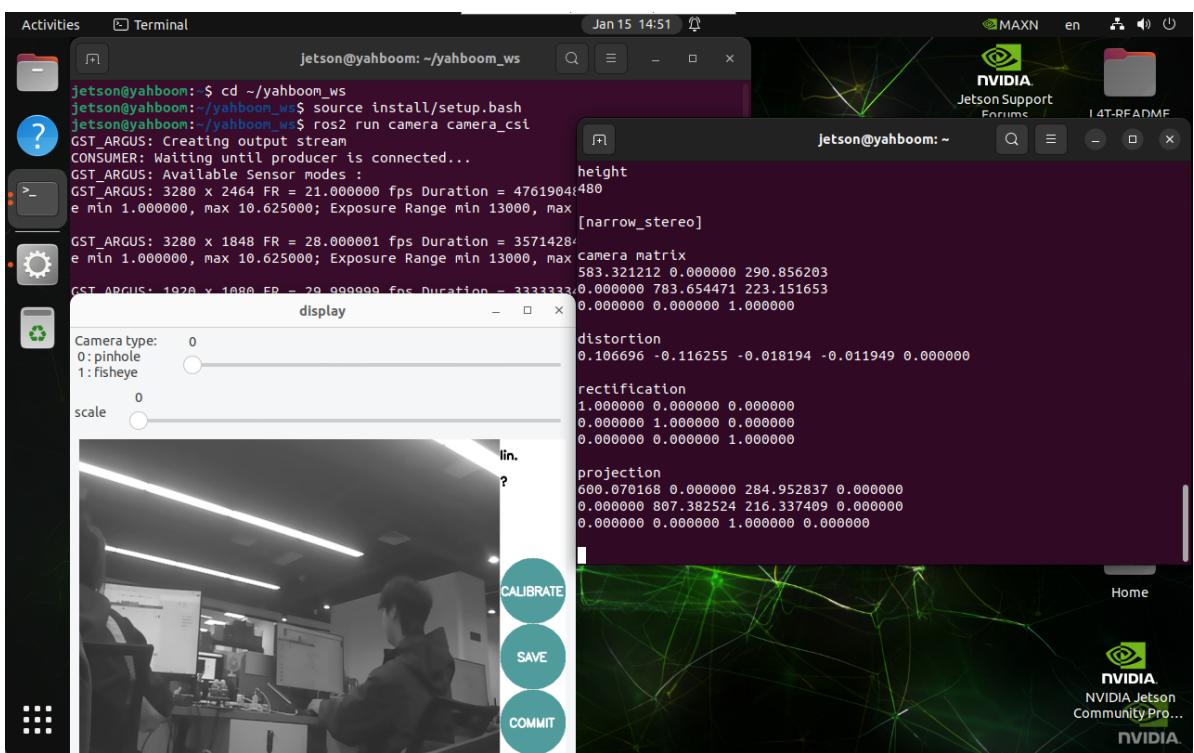
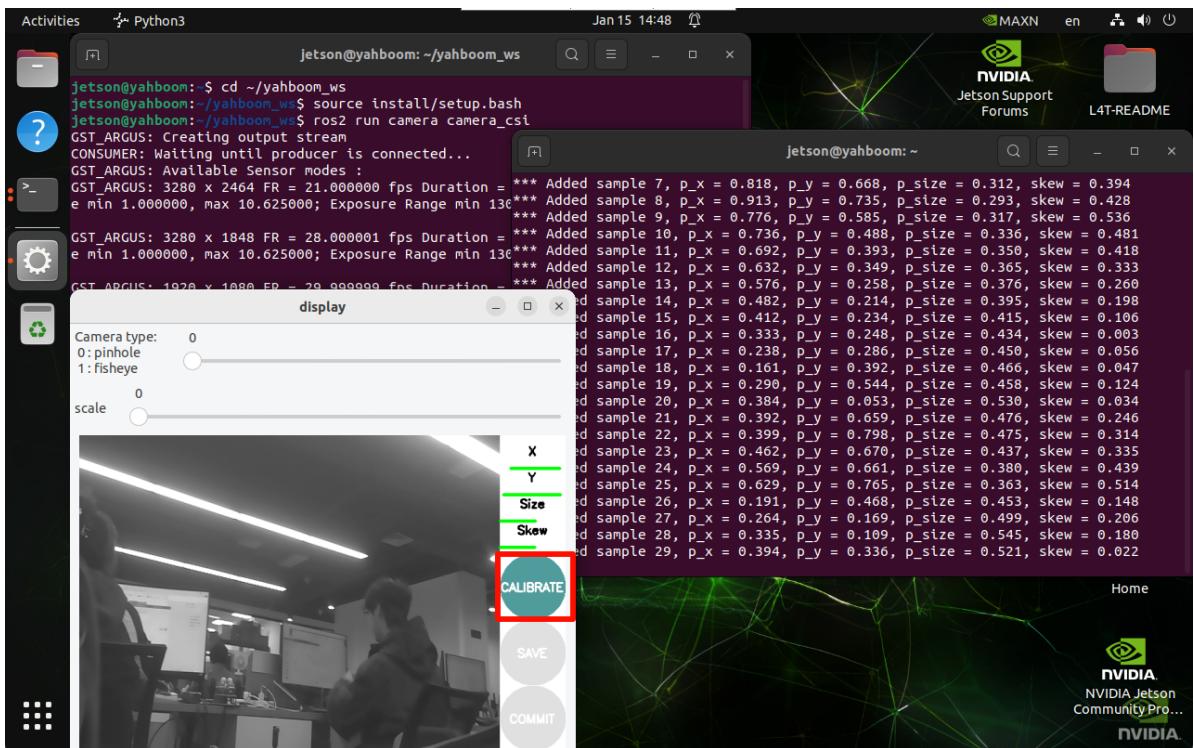
`X`: The chessboard moves left and right in the camera field of view

`Y`: The chessboard moves up and down in the camera field of view

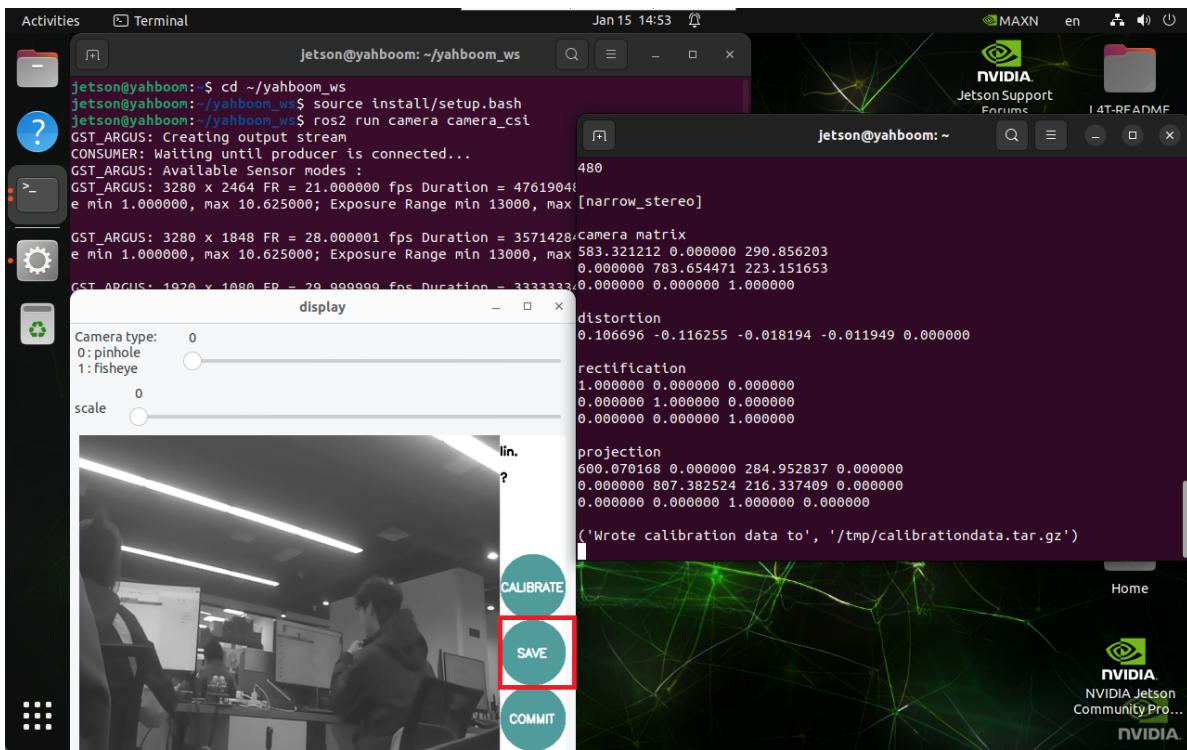
`size`: The chessboard moves forward and backward in the camera field of view

`Skew`: The chessboard tilts and rotates in the camera field of view

When `X`, `Y`, `size`, and `Skew` turn green, you can click `CALIBRATE` to calculate the camera internal parameters: the more images you calibrate, the longer it takes, and the program may freeze



After calibration, click **SAVE** to save the results!



Close the program after successful saving!

2.3.4, Calibration results

Default save location and file name of calibration results:

```
/tmp/calibrationdata.tar.gz
```

Copy and decompress the calibration results:

```
sudo mv /tmp/calibrationdata.tar.gz ~
mkdir calibrationdata
tar -xzvf calibrationdata.tar.gz -C ~/calibrationdata
```

The decompressed files contain the calibration `*.png`, `ost.yaml` and `ost.txt` files. We mainly copy the data in the `ost.yaml` file to the `camera_usb.yaml` file.

ost.yaml

Replace the `camera_usb.yaml` file data with `image_width`, `image_height`, `data` in `camera_matrix`, `data` in `projection_matrix`, and `data` in `distortion_coefficients`.

```
image_width: 640
image_height: 480
camera_name: narrow_stereo
camera_matrix:
  rows: 3
  cols: 3
  data: [583.32121, 0., 290.8562,
         0., 783.65447, 223.15165,
         0., 0., 1.]
distortion_model: plumb_bob
distortion_coefficients:
  rows: 1
  cols: 5
```

```
data: [0.106696, -0.116255, -0.018194, -0.011949, 0.000000]
rectification_matrix:
  rows: 3
  cols: 3
  data: [1., 0., 0.,
          0., 1., 0.,
          0., 0., 1.]
projection_matrix:
  rows: 3
  cols: 4
  data: [600.07017,    0.        , 284.95284,    0.        ,
          0.        , 807.38252, 216.33741,    0.        ,
          0.        ,    0.        ,    1.        ,    0.        ]
```

camera_csi.yaml

Modified file:

```
%YAML:1.0
---
image_width: 1920
image_height: 1080
camera_name: camera
camera_matrix: !!opencv-matrix
  rows: 3
  cols: 3
  dt: d
  data: [583.32121,    0.        , 290.8562 ,
          0.        , 783.65447, 223.15165,
          0.        ,    0.        ,    1.        ]
distortion_model: plumb_bob
distortion_coefficients: !!opencv-matrix
  rows: 1
  cols: 5
  dt: d
  data: [0.106696, -0.116255, -0.018194, -0.011949, 0.000000]
rectification_matrix:
  rows: 3
  cols: 3
  data: [1., 0., 0.,
          0., 1., 0.,
          0., 0., 1.]
projection_matrix:
  rows: 3
  cols: 4
  data: [600.07017,    0.        , 284.95284,    0.        ,
          0.        , 807.38252, 216.33741,    0.        ,
          0.        ,    0.        ,    1.        ,    0.        ]
```