Sensor_msgs/CameraInfo

⇒This message defines meta information for a camera.

⇒It should be in a camera namespace on topic "camera_info".

⇒It is accompanied by up to five image topics named:

1. image_raw - raw data from the camera driver, possibly Bayer encoded
2. image - monochrome, distorted
3. image_color - color, distorted
4. image_rect - monochrome, rectified
5. image_rect_color - color, rectified

⇒The image_geometry package provides a user-friendly interface to common operations using this meta information.

⇒If the camera is uncalibrated, the matrices D, K, R, P should be left zeroed out.

0.00391	0	-0.03516	-0.03125	-0.03516	0	0.00391
0	0	0	0	0	0	0
-0.03516	0	0.31641	0.28125	0.31641	0	-0.03516
-0.03125	0	0.28125	1.00000	0.28125	0	-0.03125
-0.03516	0	0.31641	0.28125	0.31641	0	-0.03516
0	0	0	0	0	0	0
0.00391	0	-0.03516	-0.03125	-0.03516	0	0.00391

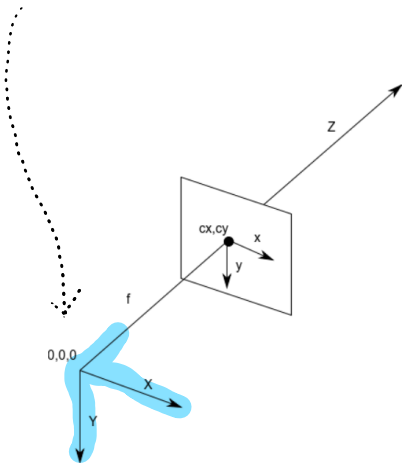
std_msgs/Header header
uint32 height
uint32 width
string distortion_model
float64[] D
float64[9] K
float64[9] R
float64[12] P
uint32 binning_x
uint32 binning_y
sensor_msgs/RegionOfInterest roi

{Data in the message}

1. Header

- Time of image acquisition
- Camera coordinate frame ID
- sequence ID: consecutively increasing ID

origin of frame should be optical center of camera
+x should point to the right in the image
+y should point down in the image
+z should point into the plane of the image



2. height and width

- Number of pixel in the image in x-direction
- Number of pixel in the image in y-direction.

3. distortion model

- Name of distortion model used.

{Most Common} plumb_bob rational_polynomial {Presently supported distortion model}

4. D

- The distortion parameters, size depending on the distortion model.
- For "plumb_bob", the 5 parameters are: (k1, k2, t1, t2, k3).

5. K

- Intrinsic camera matrix for the raw (distorted) images.
- K = [fx 0 cx; 0 fy cy; 0 0 1]
  - focal lengths (fx, fy)
  - principal point (cx, cy)
- Projects 3D points in the camera coordinate frame to 2D pixel coordinates.

6. R — Rectification matrix (stereo cameras only)

- A rotation matrix aligning the camera coordinate system to the ideal stereo image plane so that epipolar lines in both stereo images are parallel.

7. P

- Projection/camera matrix
  P = [fx' 0 cx' Tx; 0 fy' cy' Ty; 0 0 1 0]
- By convention, this matrix specifies the intrinsic (camera) matrix of the processed (rectified) image.
- Focal lengths (fx', fy') and principal point (cx', cy'), may differ from the values in K.
- For monocular cameras, Tx = Ty = 0.
- Normally, monocular cameras will also have R = the identity and P[1:3,1:3] = K.
- For a stereo pair, the fourth column [Tx Ty 0]' is related to the position of the optical center of the second camera in the first camera's frame.
  - We assume Tz = 0 so both cameras are in the same stereo image plane.
- The first camera always has Tx = Ty = 0.
  For the right (second) camera of a horizontal stereo pair, Ty = 0 and Tx = -fx' * B, where B is the baseline between the cameras

8. binning_x and binning_y

- It reduces the resolution of the output image to (width / binning_x) * (height / binning_y).
- The default values binning_x = binning_y = 0 is considered the same as binning_x = binning_y = 1 (no subsampling).

9. Region of Interest

Subwindow of full camera resolution.

The default setting of roi (all values 0) is considered the same as full resolution (roi.width = width, roi.height = height).

- uint32 x_offset — Leftmost pixel of the ROI
- uint32 y_offset — Topmost pixel of the ROI
- uint32 height — Height of ROI
- uint32 width — Width of ROI
- bool do_rectify — Typically this should be False if the full image is captured (ROI not used), and True if a subwindow is captured (ROI used).