

Lecture 7: Multiple View Vision

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1 Epipolar Geometry

Considering two pinhole cameras with different projection centres, in order to relate the two images one can use *Epipolar Geometry*.

- p_l & p_r are the vectors from the centres of projections O_l in the left and O_r in the right image to the corresponding projections P_l & P_r of the same 3D point P .
- h_l & h_r are called **epipolar lines** — they are located at the intersection between the image plane and the plane formed by the points P , O_l & O_r . Each point P will have an epipolar line in each image plane.
- e_l & e_r are epipoles representing the intersection points of O_lO_r with the left and right image planes. They may be located outside the actual images.

To estimate the epipolar geometry, determine the mapping between corresponding points in the two images.

$$\begin{aligned}p_r &= Rp_l + t \\ O_lO_r &= t\end{aligned}$$

The left and right images are connected by means of a matrix representing rotation \mathbf{R} in the plane PO_lO_r and translation \mathbf{t} .