Zhang's method:

- Goal of calibration is to precisely know direction of ray of the 3D point corresponding to 2D pixel

- Normal of checkerboard is Z-axis

- Checkerboard points are now fully known - Crossing b/w tiles

- Assume z-coordinate = 0 for all points

- Constraints - Orthogonality of r_1 & r_2
  $$||r_1|| = ||r_2|| = 1 \text{ and } r_1^T r_2 = 0$$

- Atleast 3 views of checkerboard needed

- We get back K and extrinsics as required

- Process so far disregards non-linear lens distortions.

- Least squares to estimate

- These can be used to correct distortion

- $\overbrace{K(r, q)}^{a} = \begin{bmatrix} 1 & 0 & \Delta x(r, q) \\ 0 & 1 & \Delta y(r, q) \\ 0 & 0 & 1 \end{bmatrix} K$

  Pixel coordinates

  Distortion params

  - Checkerboard pattern can be corrected to ensure straight lines are straight lines