

Point cloud

Collider (Linux Firmware driver)

Vision by "tasks"

(30) scene reconstruction

Vision by "levels"

Signal Processing: (2d) filtering, point, edge and region features

Model selection and data fitting

Olshausen and Field

→ Data: curiosity

→ Implementation effort

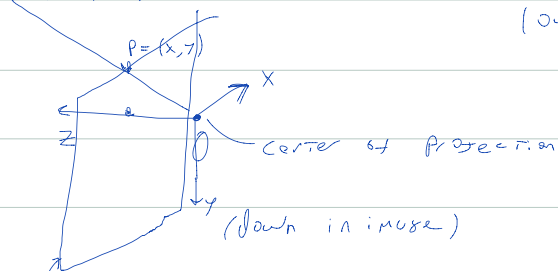
→ Report (10-20 pages well presented, show failures)

Perspective Projection (T & V)

$P = (X, Y, Z)$

upper case: scene

lower case: image



$$x = \left(\frac{f}{Z}\right) X$$

$$y = \left(\frac{f}{Z}\right) Y$$

(image plane (in front of camera))

(2) Orthographic projection

$$x = X; y = Y$$

(3) Weak perspective

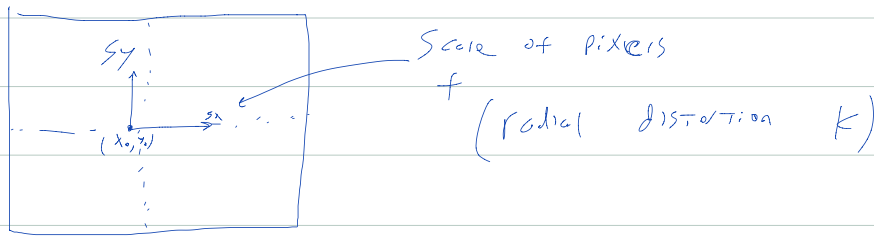
Let \bar{z} be average depth

$$x = \left(\frac{f}{\bar{z}}\right)X; y = \left(\frac{f}{\bar{z}}\right)Y$$

like orthographic except for scale factor

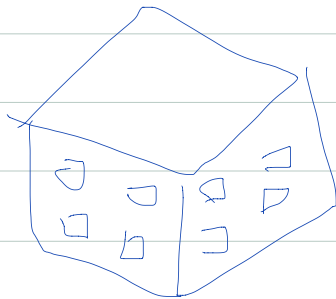
$\left(\frac{f}{\bar{z}}\right)$ accurate if $\delta z \ll \bar{z}$

Practical case

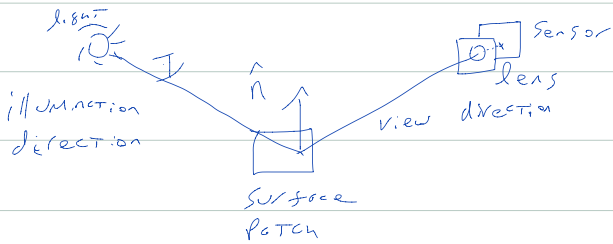


T & V CL6

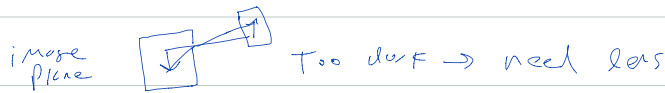
Camera Calibration



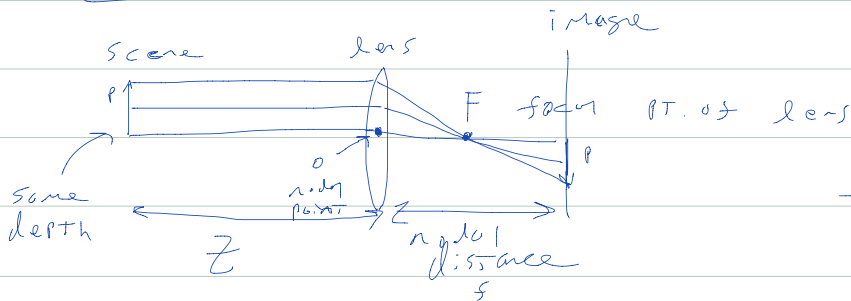
Imaging Process



Pinhole camera



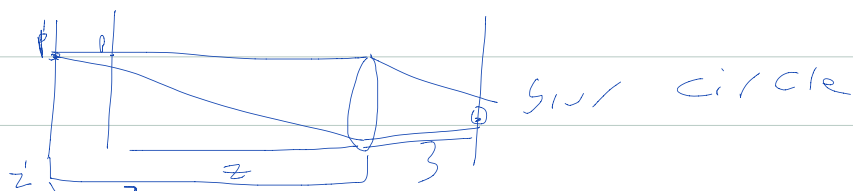
Thin lens model

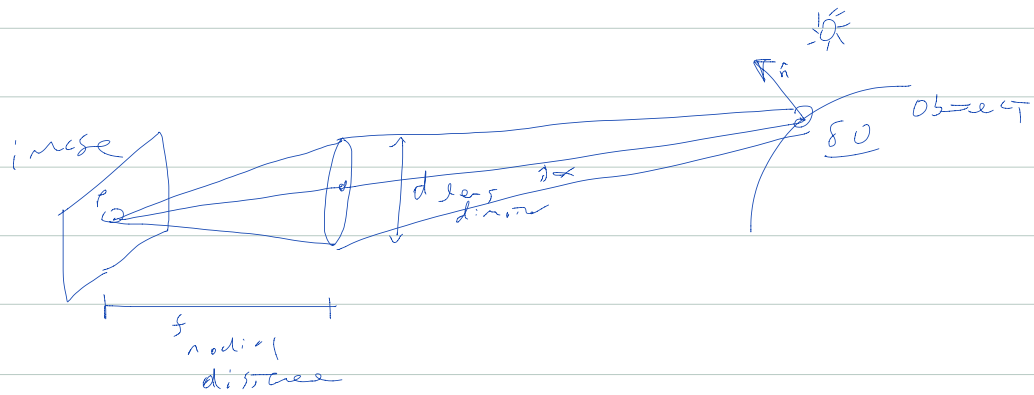


lens equation

$$\frac{1}{f} + \frac{1}{z} = \frac{1}{F}$$

object of another depth $z' \neq z$ will blur.





$$E(\rho) = L(\rho) \frac{\pi}{4} \left(\frac{d}{f}\right)^2 \cos^4(\alpha)$$