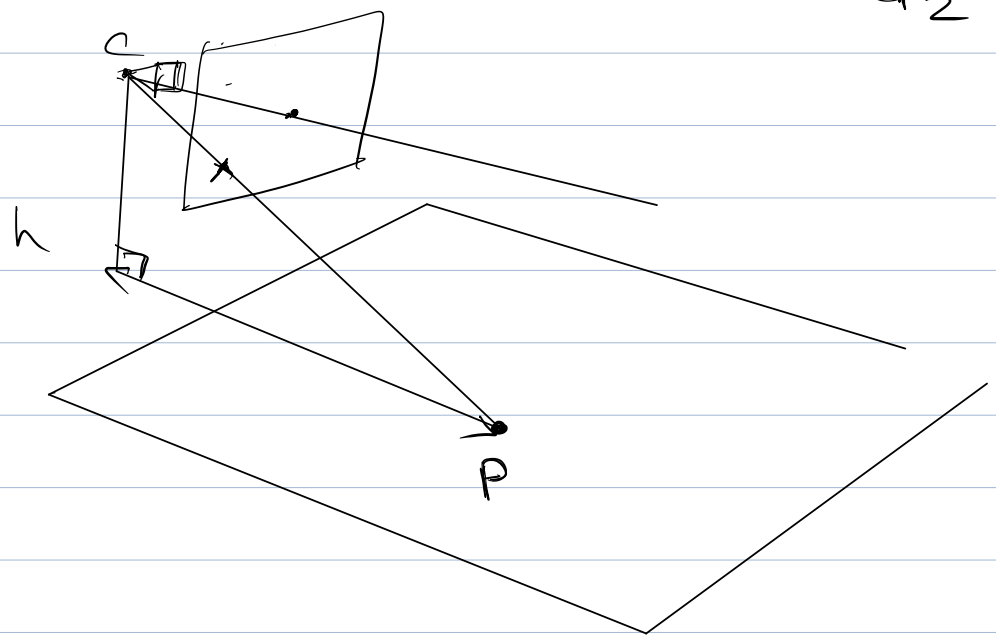
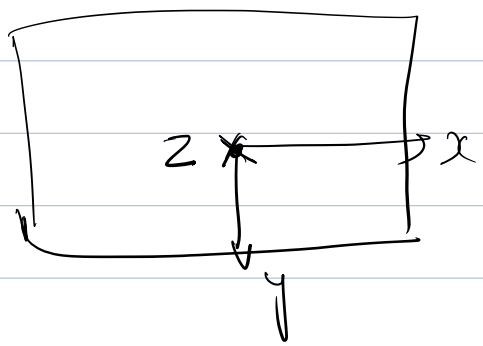
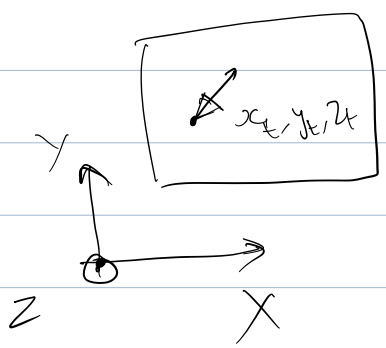
$CP_z$




$-\frac{10}{5}$ 2.

15

w − 10 10

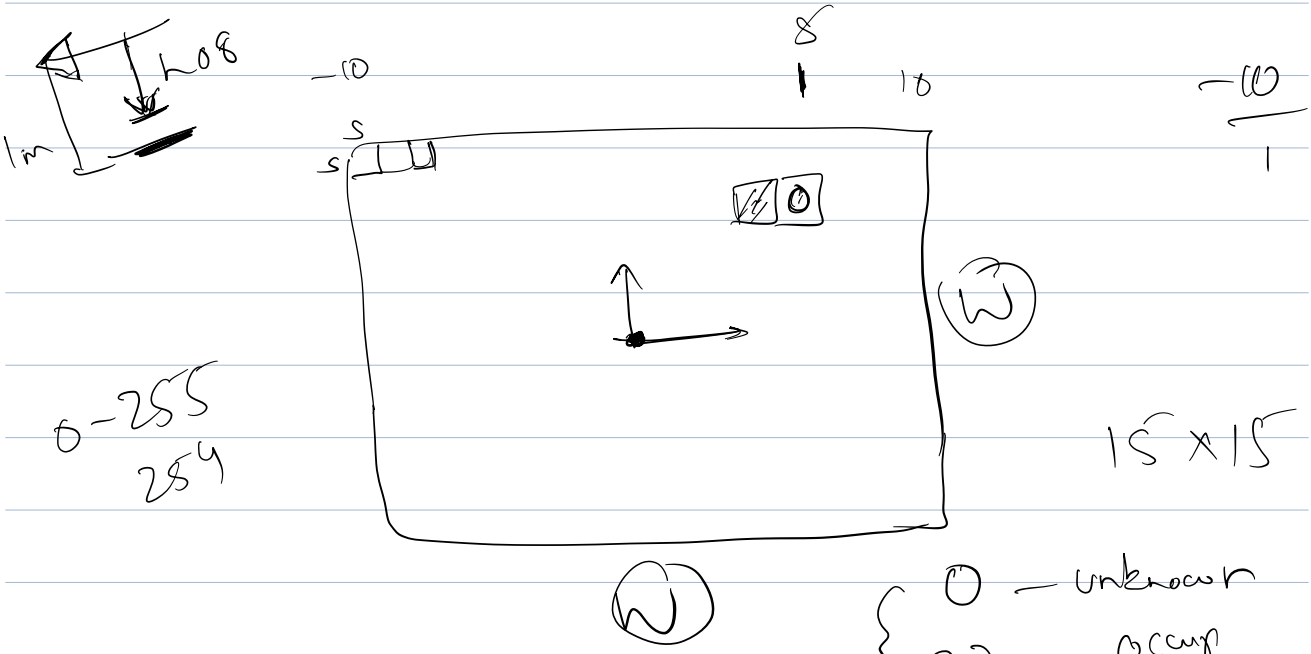
10×10

→ min_x → min_y

→ max_x → max_y

w − 15

W B W/S




0-255
254

15 x 15

0 — unknown
127 — occup
254 — free

W = 30 x 30

W/2, H/2

127

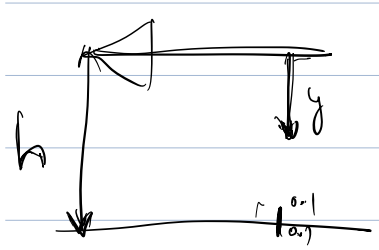
0, 1, 2

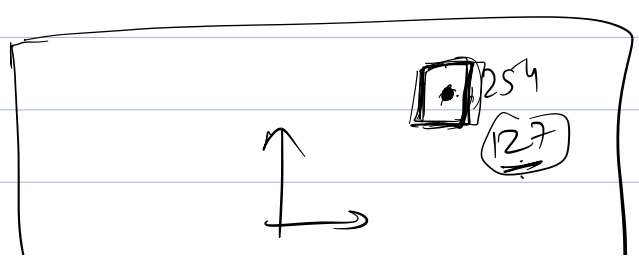
x_t/s, y_t/s

y = W/2 + x_t/s

v = H/2 + y_t/s

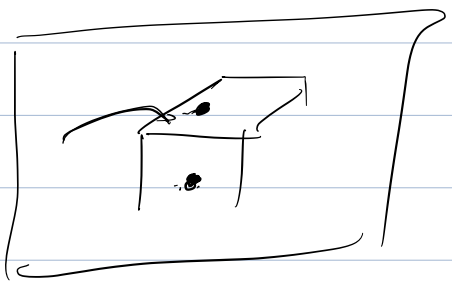
0.5
0.4
0.8



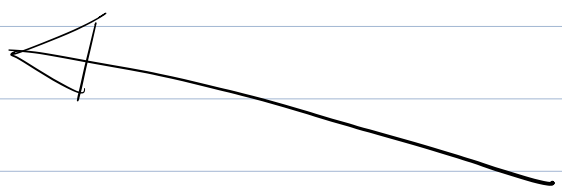

F ← H
0 ← H

$\text{abs}(h - y) \leq 0.1$



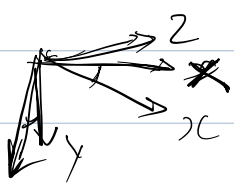
vote

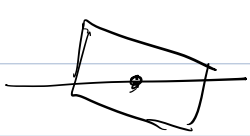
2

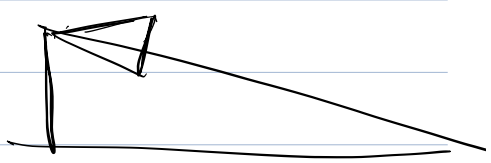


Pseudo code

1)

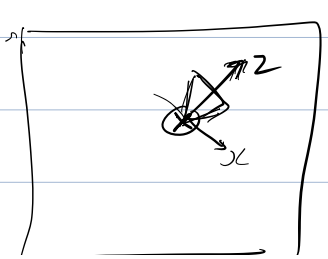


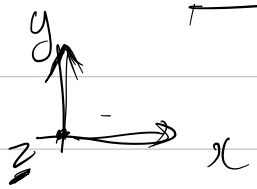



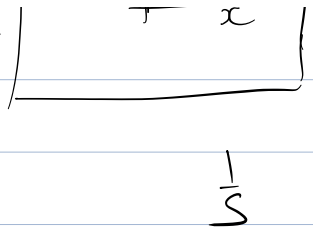


y

pose






$\frac{1}{s}$

$y \times \hat{g} = |y||g| \sin\alpha$ $\quad \frac{w}{2}, \frac{w}{2}$

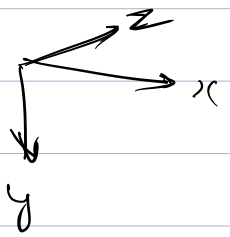
$$\frac{\|y \times \hat{g}\|}{\|y\|\|g\|} = \sin\alpha$$

$$\begin{bmatrix} \left(u - \frac{w}{2}\right)s \\ \left(v - \frac{w}{2}\right)s \\ 1 \end{bmatrix}$$

$\alpha = \sin^{-1}(\quad)$

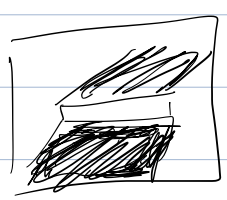
$\text{rotvec} = \alpha \times \vec{v}$

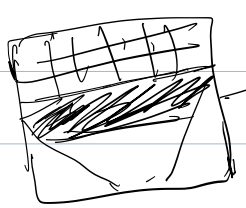
$\vec{R}$




$P = T_{WC}$

$P^{-1} = T_{CW}$





VO

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

$$= \begin{bmatrix} R & t \\ 0 & 1 \end{bmatrix}_{4\times4}$$

$= 4 \times 3$

RGB

$$\begin{bmatrix} x' \\ y' \\ z' \end{bmatrix} = \begin{bmatrix} r_{11} & r_{12} & t_x \\ r_{21} & r_{22} & t_y \\ r_{31} & r_{32} & t_z \end{bmatrix}_{3\times3} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$$

3×3

Pseudo code:

1) save point cloud along with world coordinate frame

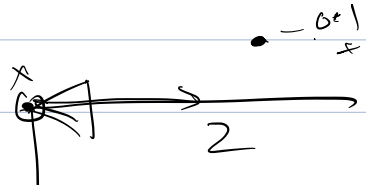
2) bound calculation
max of abs (x_min, x_max, y_min, y_max)

3) $\frac{W}{2}$ ⇒ bound + pad

4) one origin ⟶ $\frac{W}{2}, \frac{W}{2}$

5) create fn:

a) to-grid
x, y, z : i) $\frac{x}{s} + \frac{W}{2}, \frac{y}{s} + \frac{W}{2}$




b) from-grid

$\downarrow y$ $\quad -(y+t)$ $\quad$ " $\quad u, v$ : $\left(u - \frac{w}{2}\right) s$

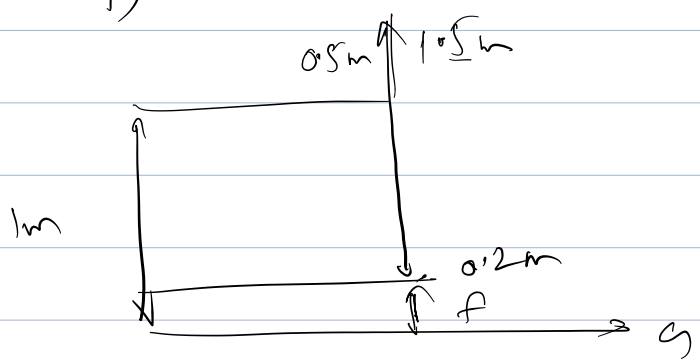
$\left(v - \frac{w}{2}\right) s$

6) save_metadata as

'json:

pad, bounds,

(x-min, x-max

ymin, y-max)

7)