Robotic Vision - Asgm #1

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Q1 a) $f = 10\,mm = 1\,cm$

$d = 9\,cm = 90\,mm$

$z = 1\,m = 1000\,m.$

$K_u = K_v = 1$

$U_0 = V_0 = 0.$

Since point ${}^LX$ is in front of left camera,
$X_L = 0$.

We can ~~assume~~ Thus find

$$z = \frac{d \times f \times K_u}{x_L - x_R}$$

$$\therefore \quad x_R = \frac{9 \times 1 \times 1}{-1000} = -0.09\,cm.$$

$$\therefore \quad \boxed{\begin{aligned} x_R &= -0.09\,cm \\ x_L &= 0\,cm \end{aligned}}$$

b). Given: $\lambda_L \begin{bmatrix} x_L \\ f \end{bmatrix} - \begin{bmatrix} d \\ 0 \end{bmatrix} = \lambda_R \begin{bmatrix} x_R \\ f \end{bmatrix}$

$\therefore$ Substituting values given into above equa

$$\lambda_L \begin{bmatrix} 0 \\ f \end{bmatrix} - \begin{bmatrix} 9 \\ 0 \end{bmatrix} = \lambda_R \begin{bmatrix} -0.09 \\ f \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} -9 \\ \lambda_L \end{bmatrix} = \begin{bmatrix} -0.09\,\lambda_R \\ \lambda_R \end{bmatrix}$$

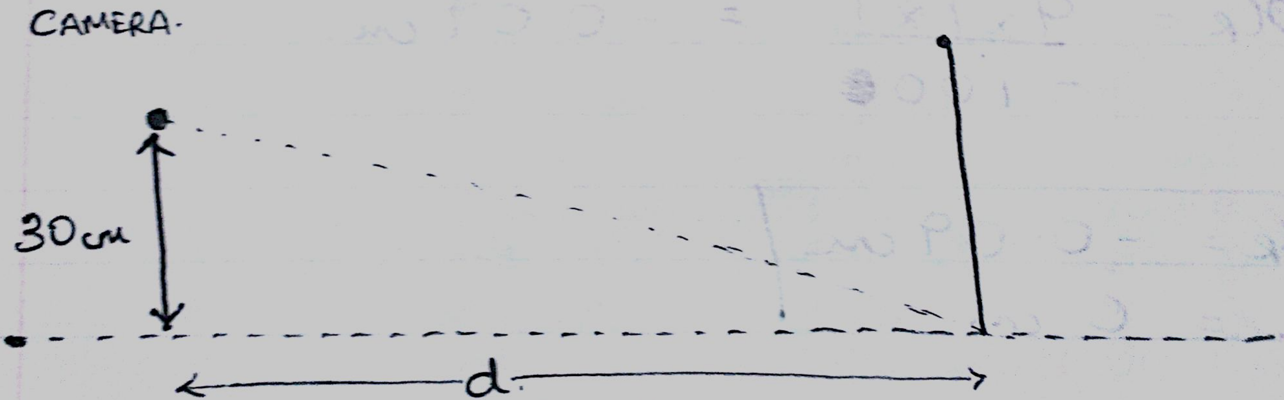
$\therefore \lambda_R = 100$
& $\therefore \lambda_L = \lambda_R = 100$.

$\therefore$ Depth of point $\Rightarrow \lambda_L f$ (Since the point is directly in front of the left camera).

Depth $= \lambda_2 f = 100$ cm $= 1$ m.

— x —

Q2.



height of Camera $= 30$ cm $:= Y_c$

$f \cdot k_u = f \cdot k_v = (1039 \times 4.4 \times 10^{-6})$ m.

Given $k_u = k_v$ & 1 pixel $= 4.4\ \mu m$ each side

$$\therefore Z_c = \frac{f \cdot k_v * Y_c}{(v - v_0)} \quad -②$$

We get $[u_0 \, V_0] = [584.500 \, , \, 361.2500]$
& $[u \, , \, V] = [700.000 \, , \, 371.7500]$

$\therefore$ using V & V_0 values in eq ②

we get

$$\boxed{x_c = 29.685714 \text{ mts.}}$$

—x—