Robot Coordinate System

Define X_w-Y_w-Z_w as a World Coordinate System. Right Hand System.

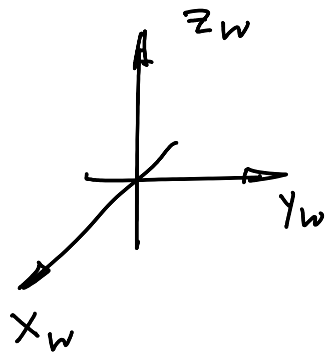


Fig 1.

Define X_u-Y_u-Z_u Right Hand System

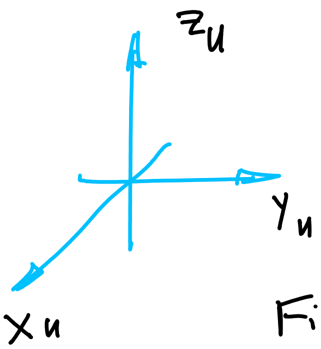


Fig 2.

Definition 1. (World ~) Define everything in X_w-Y_w-Z_w World Coordinate System including X_u-Y_u-Z_u.

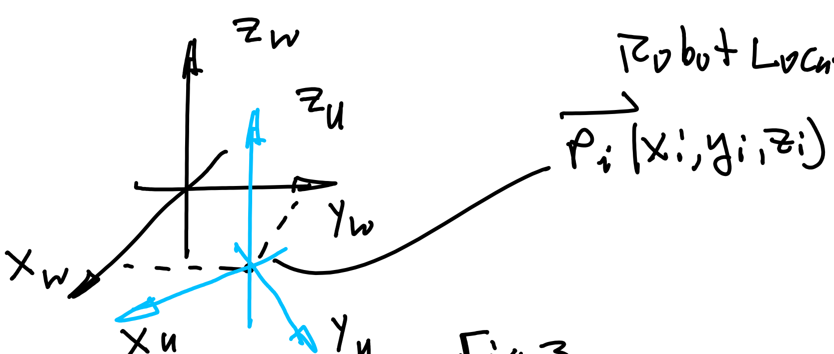


Fig. 3

Definition 2: (home Position): Define a Robot home position, and let this home position to be the point for the origin of X_w-Y_w-Z_w.

Definition 3 (Robot Init Position)

The Robot initial position is defined at the Home Position in such a way whose $X_u = X_w, Y_u = Y_w, Z_u = Z_w$. as shown in the figure below.

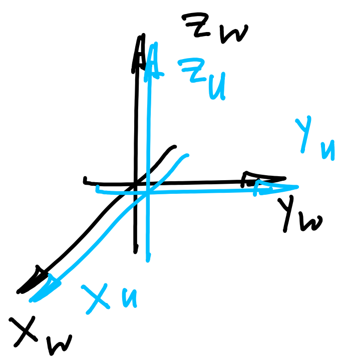


Fig. 4

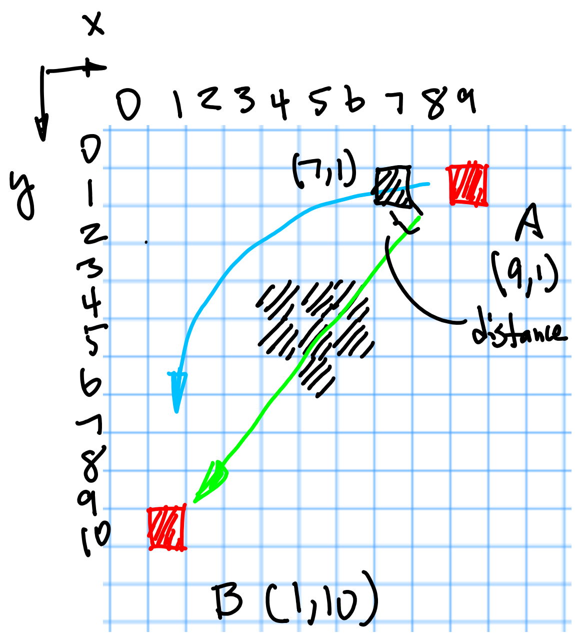
Note, at Any given time t, we have X_u-Y_u-Z_u defined in X_w-Y_w-Z_w as in Fig. 3

Definition 4 (obstacles in X_w-Y_w-Z_w.) A given obstacle in the world coordinate System X_w-Y_w-Z_w, we can Perform mapping operation to redefine it in the X_u-Y_u-Z_u coordinate System.

$$\phi : (x_i, y_i, z_i) \in (x_w, y_w, z_w) \rightarrow (x_i', y_i', z_i') \in (x_n, y_n, z_n) \quad \ldots (1)$$

where ϕ is a mapping function, for Example:

$$\begin{pmatrix} x_i' \\ y_i' \\ z_i' \\ 1 \end{pmatrix} = \phi \cdot \begin{pmatrix} x_i \\ y_i \\ z_i \\ 1 \end{pmatrix} \quad \ldots (2)$$



(END)