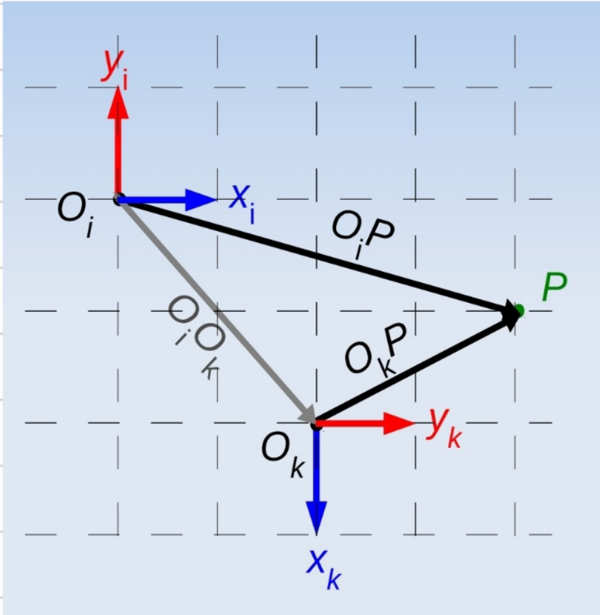
Mouvements, changements de coordonnées

Exercice, calculer ${}^iP = {}^iR_k \cdot {}^kP + {}^iO_k$



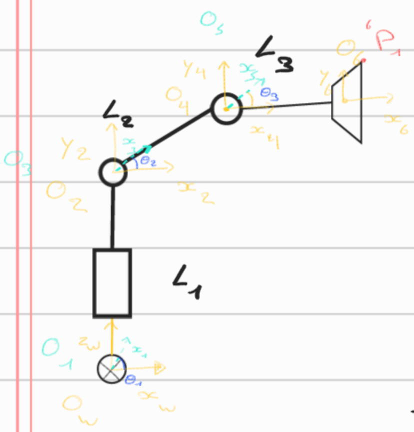
$$
{}^iR_k = \begin{array}{c} \begin{array}{ccc} 0 & -1 & \\ \end{array} \\ \begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \overset{1}{\sin\theta} & \overset{0}{\cos\theta} & 0 \\ 0 & 0 & 1 \end{bmatrix} \\ \begin{array}{ccc} 0 & 0 & 0 \end{array} \end{array} \qquad \theta = \pi/2
$$

$$
{}^kP = \begin{bmatrix} -1 \\ 2 \\ 0 \\ 1 \end{bmatrix} \qquad {}^iO_k = \begin{bmatrix} 2 \\ -2 \\ 0 \\ 1 \end{bmatrix}
$$

$$
\left.\begin{array}{lll}
x_k = -y_i & & \vec{x}_k = \vec{x}_i\, 0 - \vec{y}_i + \vec{z}_i\, 0 \\
y_k = x_i & & \vec{y}_k = \vec{x}_i + \vec{y}_i\, 0 + \vec{z}_i\, 0 \\
z_k = z_i & & \vec{z}_k = \vec{x}_i\, 0 + \vec{y}_i\, 0 + \vec{z}_i
\end{array}\right\} \text{Permet de trouver } {}^iR_k
$$

On a donc

$$
{}^iT_k = \left(\begin{array}{ccc|c} 0 & -1 & 0 & 2 \\ 1 & 0 & 0 & -2 \\ 0 & 0 & 1 & 0 \\ \hline 0 & 0 & 0 & 1 \end{array}\right)
$$



On cherche à exprimer les coordonnées de l'effecteur dans le repère monde

$$
\begin{aligned}
{}^wT_1 &= \mathrm{ROT}/z_w\,(\theta_1) \\
{}^1T_2 &= \mathrm{Trans}\,(0, 0, L_1) \\
{}^2T_3 &= \mathrm{ROT}/y_2\,(\theta_2) \\
{}^3T_4 &= \mathrm{TRANS}\,(0, 0, L_2) \\
{}^4T_5 &= \mathrm{ROT}/y_4\,(\theta_3) \\
{}^5T_6 &= \mathrm{TRANS}\,(0, 0, L_3)
\end{aligned}
$$

Pour trouver les coordonnées de ${}^wP_1$ on a

$$
\begin{bmatrix} {}^wP_1 \\ \hline 1 \end{bmatrix} = {}^wT_6 \begin{bmatrix} {}^6P_1 \\ \hline 1 \end{bmatrix}
$$

Calcul de ${}^{w}T_1 = ROT/z_w(\theta_1)$

$$\begin{pmatrix} \cos\theta_1 & -\sin\theta_1 & 0 \\ \sin\theta_1 & \cos\theta_1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

Calcul de ${}^{2}T_3 = ROT/y_2(\theta_2)$

$$\begin{pmatrix} \cos\theta_2 & 0 & \sin\theta_2 \\ 0 & 1 & 0 \\ -\sin\theta_2 & 0 & \cos\theta_2 \end{pmatrix}$$

Calcul de ${}^{4}T_5 = ROT/y_4(\theta_3)$

$$\begin{pmatrix} \cos\theta_3 & 0 & \sin\theta_3 \\ 0 & 1 & 0 \\ -\sin\theta_3 & 0 & \cos\theta_3 \end{pmatrix}$$

Calcul de ${}^{1}T_2 = TRANS(0, 0, L)$

. . .
