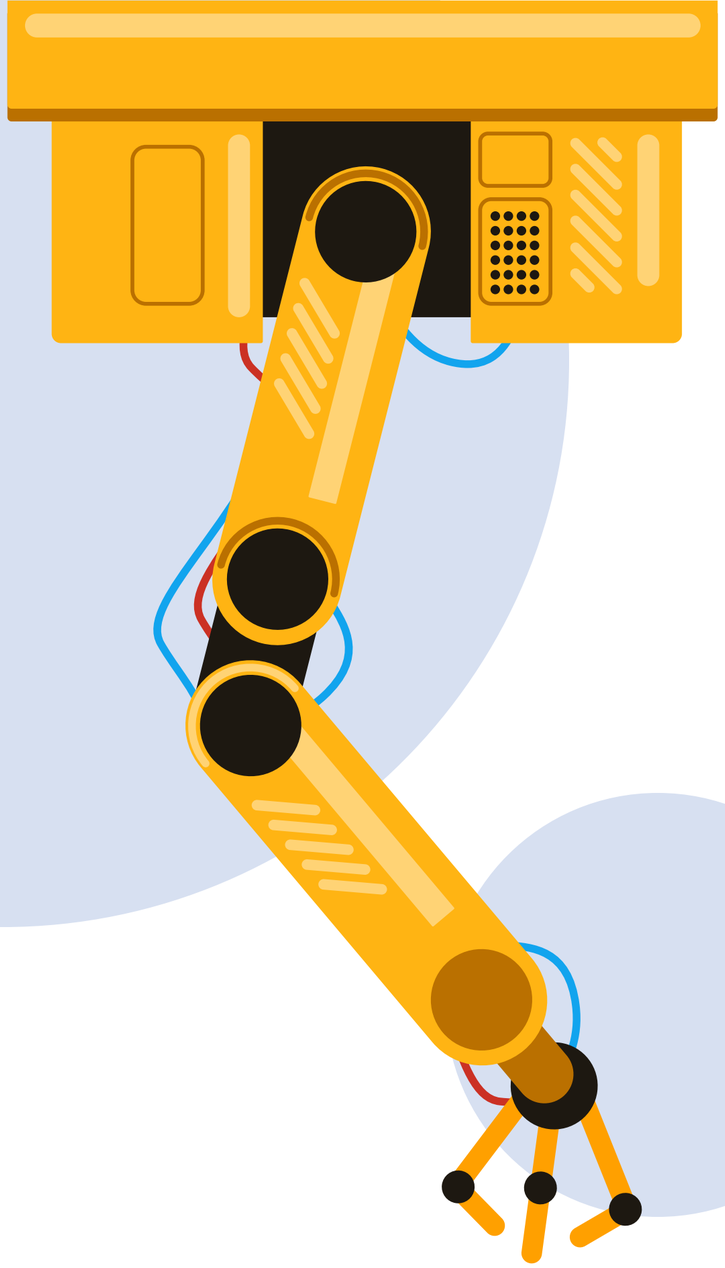
CLASE 4

Robótica



CONCEPTOS BASICOS DE ROBOTICA

Matriz de Transformación 2D

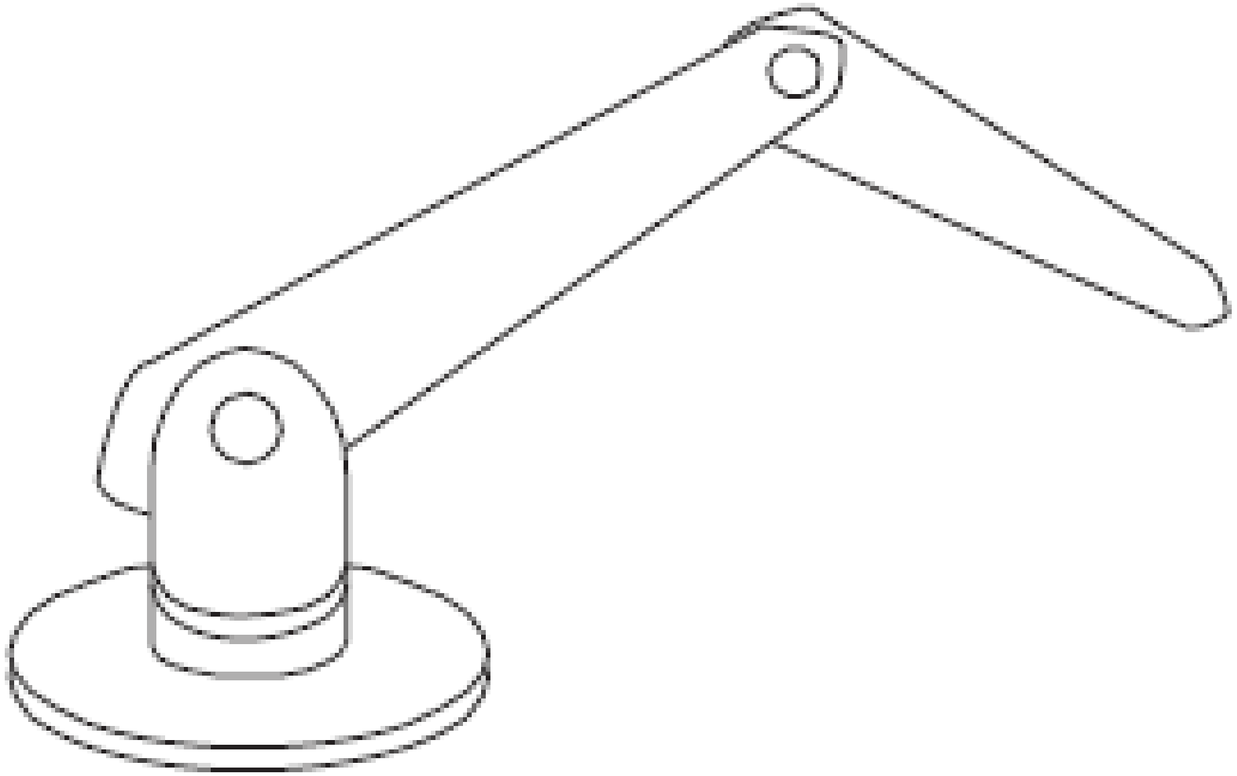
$$R = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$$

$$T = \begin{bmatrix} R & P \\ 0 & 1 \end{bmatrix}$$

$$P = \begin{bmatrix} d_x \\ d_y \\ 1 \end{bmatrix}$$

$$T = T_2 * T_1 \longrightarrow T_n = \begin{bmatrix} \cos\theta & -\sin\theta & d_x \\ \sin\theta & \cos\theta & d_y \\ 0 & 0 & 1 \end{bmatrix}$$

Análisis de posición 3D



Matriz de rotación 3D

$$R_x(\theta) = \begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos\theta & -\sin\theta \\ 0 & \sin\theta & \cos\theta \end{bmatrix}$$

$$R_y(\phi) = \begin{bmatrix} \cos\phi & 0 & \sin\phi \\ 0 & 1 & 0 \\ -\sin\phi & 0 & \cos\phi \end{bmatrix}$$

$$R_z(\rho) = \begin{bmatrix} \cos\rho & -\sin\rho & 0 \\ \sin\rho & \cos\rho & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Si las rotaciones
son X->Y->Z:

$$R = R_z(\rho)R_y(\phi)R_x(\theta)$$

$$R = \begin{bmatrix} \cos\rho & -\sin\rho & 0 \\ \sin\rho & \cos\rho & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \cos\phi & 0 & \sin\phi \\ 0 & 1 & 0 \\ -\sin\phi & 0 & \cos\phi \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos\theta & -\sin\theta \\ 0 & \sin\theta & \cos\theta \end{bmatrix}$$

Matriz de transformación 3D

$$R = \begin{bmatrix} \cos\rho\cos\phi & \cos\rho\sin\phi\sin\theta - \sin\rho\cos\theta & \cos\rho\sin\phi\cos\theta + \sin\rho\sin\theta \\ \sin\rho\cos\phi & \sin\rho\sin\phi\sin\theta + \cos\rho\cos\theta & \sin\rho\sin\phi\cos\theta - \cos\rho\sin\theta \\ -\sin\phi & \cos\phi\sin\theta & \cos\phi\cos\theta \end{bmatrix}$$

$$T = \begin{bmatrix} \cos\rho\cos\phi & \cos\rho\sin\phi\sin\theta - \sin\rho\cos\theta & \cos\rho\sin\phi\cos\theta + \sin\rho\sin\theta & x \\ \sin\rho\cos\phi & \sin\rho\sin\phi\sin\theta + \cos\rho\cos\theta & \sin\rho\sin\phi\cos\theta - \cos\rho\sin\theta & y \\ -\sin\phi & \cos\phi\sin\theta & \cos\phi\cos\theta & z \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Matriz de transformación 3D

Matriz de transformación 3D