Tabla de parametros.

Link	a_i	α_i	d_i	θ_i
0	0	0	0	θ_1
1	L_1	0	L_1	θ_2
2	L_2	90°	0	θ_3

Joint No	Type	Join offset	Join angle θ	Link lenght
1	revolute	0	θ_1	0
2	revolute	L_1	θ_2	L_1
3	revolute	0	θ_3	L_2

Joint No	Twist angle α	initial Value (Jv) degrm	Final value
1	0	θ	
2	0	0	
3	90°	0	

→ Para mostrar simulación

$$A_0 = \begin{bmatrix} C(\theta_1) & -C(0)S(\theta_1) & S(0)\,S(\theta_1) & 0\,C(\theta_1) \\ S(\theta_1) & C(0)C(\theta_1) & -S(0)\,C(\theta_1) & 0\,S(\theta_1) \\ 0 & S(0) & \cos(0) & d_1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$A_0 = \begin{bmatrix} C(\theta_1) & -S(\theta_1) & 0 & 0 \\ S(\theta_1) & C(\theta_1) & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$A_1 = \begin{bmatrix} C(\theta_2) & -S(\theta_2) & 0 & L_1 \cos(\theta_2) \\ S(\theta_2) & C(\theta_2) & 0 & L_1 \operatorname{sen}(\theta_2) \\ 0 & 0 & 1 & L_1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$A_2 = \begin{bmatrix} C(\theta_3) & -C(90^\circ) S(\theta_3) & S(90^\circ) S(\theta_3) & L_2 C\theta_3 \\ S(\theta_3) & C(90^\circ) C(\theta_3) & -S(90^\circ) C(\theta_3) & L_2 S\theta_3 \\ 0 & S(90^\circ) & C(90^\circ) & L_2 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$A_2 = \begin{bmatrix} C(\theta_3) & 0 & S(\theta_3) & L_2 C(\theta_3) \\ S(\theta_3) & 0 & -C(\theta_3) & L_2 S(\theta_3) \\ 0 & 1 & 0 & L_2 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$H_2^0 = A_0 * A_1 * A_2$$

$A_0 * A_1 = C$

$C_{11} = C(\theta_1) C(\theta_2) - S(\theta_1) S(\theta_2)$

$C_{12} = C(\theta_1)(-S(\theta_2)) - S(\theta_1) C(\theta_2)$

$C_{13} = 0$

$$C_{14} = C(\theta_1)\left[L_1 C(\theta_2)\right] - S(\theta_1)\left(L_1 S(\theta_2)\right)$$
$$C_{21} = S(\theta_1)\,C(\theta_2) + C(\theta_1)\,S(\theta_2)$$
$$C_{22} = -S(\theta_2)\,S(\theta_1) + C(\theta_1)\,C(\theta_2)$$
$$C_{23} = 0$$
$$C_{24} = S(\theta_1)\left(L_1 \cos(\theta_2)\right) + C(\theta_1)\left(L_1 \operatorname{sen}(\theta_2)\right)$$

$$C_{31} = 0 \;;\; C_{32} = 0 \;;\; C_{33} = 1 \;;\; C_{34} = L_1$$
$$C_{41} = 0 \;;\; C_{42} = 0 \;;\; C_{43} = 0 \;;\; C_{44} = 1$$

$$A_0 \cdot A_1 = \begin{bmatrix} C(\theta_1)C(\theta_2) - S(\theta_1)S(\theta_2) & -S(\theta_2)C(\theta_1) - S(\theta_1)C(\theta_2) & 0 & 0 \\ S(\theta_1)C(\theta_2) + C(\theta_1)S(\theta_2) & -S(\theta_2)S(\theta_1) + C(\theta_1)C(\theta_2) & 0 & 0 \\ 0 & 0 & 1 & L_1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & C(\theta_1)\left(L_1 C(\theta_2)\right) - S(\theta_1)\left(L_1 S(\theta_2)\right) \\ 0 & S(\theta_1)\left(L_1 C(\theta_2)\right) + C(\theta_1)\left(L_1 S(\theta_2)\right) \\ 1 & L_1 \\ 0 & 1 \end{bmatrix}$$

$$(A_0 \cdot A_1) \cdot A_2 = \begin{aligned} C_{11} &= \left[C(\theta_3)\left[C(\theta_1)C(\theta_2) - S(\theta_1)S(\theta_2)\right]\right] \\ C_{12} &= \left[C(\theta_3)\left[-S(\theta_2)C(\theta_1) - S(\theta_1)\right]\right] \\ C_{13} &= S(\theta_3) \\ C_{14} &= \left[C(\theta_3)\left[C(\theta_1)\left(L_1 C(\theta_2)\right) - S(\theta_1)\left(L_1 S(\theta_2)\right)\right]\right] \\ &\quad + \left[S(\theta_3)\,L_1\right] + \left[L_2 C(\theta_3)\right] \end{aligned}$$

Simplificación

$$C_{11} = C\theta_1 C\theta_2 C\theta_3 - C\theta_3 S\theta_1 S\theta_3$$
$$C\theta_3 (C\theta_2 C\theta_1 - S\theta_1 S\theta_2)$$

$$C_{14} = C\theta_3 C\theta_1 L_1 C\theta_2 - C\theta_3 S\theta_1 L_1 S\theta_2 + S\theta_3 L_1 + L_2 C\theta_3$$

$$C\theta_3 L_1 (C\theta_1 C\theta_2 - S\theta_1 S\theta_2) + S\theta_3 L_1 + L_2 C\theta_3$$

$$C_{21} = S\theta_3 (S\theta_1 C\theta_2 + C\theta_1 S\theta_2)$$
$$C_{22} = -S\theta_3 (S\theta_2 C\theta_1 + S\theta_1 C\theta_2)$$
$$C_{23} = -C\theta_3$$
$$C_{24} = L_1 S\theta_3 (C\theta_1 C\theta_2 - S\theta_1 S\theta_2) - C\theta_3 L_1 + L_2 S\theta_3$$
$$C_{31} = S\theta_1 C\theta_2 + C\theta_1 S\theta_2$$
$$C_{32} = C\theta_1 C\theta_2 - S\theta_2 S\theta_1$$
$$C_{33} = 0; \quad C_{34} = L_1 (S\theta_1 C\theta_2 + C\theta_1 S\theta_2) + L_2$$
$$C_{41} = 0; \quad C_{42} = 0; \quad C_{43} = 0; \quad C_{44} = 1;$$

$$A_0 * A_1 * A_2 = \begin{bmatrix} C\theta_3(C\theta_2 C\theta_1 - S\theta_1 S\theta_2) & -C\theta_3(S\theta_2 C\theta_1 + S\theta_1 C\theta_2) & S\theta_3 \\ S\theta_3(S\theta_1 C\theta_2 + C\theta_1 S\theta_2) & -S\theta_3(S\theta_2 C\theta_1 + S\theta_1 C\theta_2) & -C\theta_3 \\ S\theta_1 C\theta_2 + C\theta_1 S\theta_2 & C\theta_1 C\theta_2 - S\theta_2 S\theta_1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} C\theta_3 L_1(C\theta_1 C\theta_2 - S\theta_1 S\theta_2) + S\theta_3 L_1 + L_2 C\theta_3 \\ L_1 S\theta_3(C\theta_1 C\theta_2 - S\theta_1 S\theta_2) - C\theta_3 L_1 + L_2 S\theta_3 \\ L_1(S\theta_1 C\theta_2 + C\theta_1 S\theta_2) + L_2 \\ 1 \end{bmatrix}$$

C. link 1 = 630 mm ; link 2 = 374 mm
Rotación 45° en cada joint

$$H_2^0 \begin{bmatrix} 0 & -\frac{\sqrt{2}}{4} & \frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2}\left(630\left(\frac{\sqrt{2}}{2}\right)\right) \\ 0 & -\frac{\sqrt{2}}{4} & -\frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2}\left(630\left(\frac{\sqrt{2}}{2}\right)\right) \\ 1 & 0 & 0 & 187+187+445.48 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$H_2^0 \begin{bmatrix} 0 & -\frac{\sqrt{2}}{4} & \frac{\sqrt{2}}{2} & 315 \\ 0 & -\frac{\sqrt{2}}{4} & -\frac{\sqrt{2}}{2} & 315 \\ 1 & 0 & 0 & 819.48 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$H_2^0 \begin{bmatrix} 0 & -0.35 & 0.70 & 315 \\ 0 & -0.35 & -0.70 & 315 \\ 1 & 0 & 0 & 819.48 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$