Cinemática Directa de un robot 5R

i	a_i	d_i	α_i	θ_i
1	0	l_1	$\pi/2$	θ_1
2	l_2	0	0	θ_2
3	l_3	0	0	θ_3
4	0	0	$\pi/2$	θ_4
5	0	l_4+l_5	0	θ_5

$$^0H_1(\theta_1) = \begin{bmatrix} C\theta_1 & 0 & S\theta_1 & 0 \\ S\theta_1 & 0 & -C\theta_1 & 0 \\ 0 & 1 & 0 & l_1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$^1H_2(\theta_2) = \begin{bmatrix} C\theta_2 & -S\theta_2 & 0 & l_2 C\theta_2 \\ S\theta_2 & C\theta_2 & 0 & l_2 S\theta_2 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$^0H_2 = \begin{bmatrix} C\theta_1 C\theta_2 & -C\theta_1 S\theta_2 & S\theta_1 & l_2 C\theta_1 C\theta_2 \\ C\theta_2 S\theta_1 & -S\theta_1 S\theta_2 & -C\theta_1 & l_2 C\theta_2 S\theta_1 \\ S\theta_2 & C\theta_2 & 0 & (l_1+l_2) S\theta_2 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$^2H_3(\theta_3) = \begin{bmatrix} C\theta_3 & -S\theta_3 & 0 & l_3 C\theta_3 \\ S\theta_3 & C\theta_3 & 0 & l_3 S\theta_3 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$^0H_3 = \begin{bmatrix} C(\theta_2+\theta_3)C\theta_1 & -S(\theta_2+\theta_3)C\theta_1 & S\theta_1 & C\theta_1 l_3 C(\theta_2+\theta_3) + l_2 C\theta_2 \\ C(\theta_2+\theta_3)S\theta_1 & -S(\theta_2+\theta_3)S\theta_1 & -C\theta_1 & S\theta_1 l_3 C(\theta_2+\theta_3) + l_2 C\theta_2 \\ S(\theta_2+\theta_3) & C(\theta_2+\theta_3) & 0 & (l_1+l_3)S(\theta_2+\theta_3) + l_2 S\theta_2 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$^3H_4(\theta_4) = \begin{bmatrix} C\theta_4 & 0 & S\theta_4 & 0 \\ S\theta_4 & 0 & -C\theta_4 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$^0H_4 = \begin{bmatrix} C(\theta_2+\theta_3+\theta_4)C\theta_1 & S\theta_1 & S(\theta_2+\theta_3+\theta_4)C\theta_1 & C\theta_1 l_3 C(\theta_2+\theta_3) + l_2 C\theta_2 \\ C(\theta_2+\theta_3+\theta_4)S\theta_1 & -C\theta_1 & S(\theta_2+\theta_3+\theta_4)S\theta_1 & S\theta_1 l_3 C(\theta_2+\theta_3) + l_2 C\theta_2 \\ S(\theta_2+\theta_3+\theta_4) & 0 & -C(\theta_2+\theta_3+\theta_4) & (l_1+l_3)S(\theta_2+\theta_3) + l_2 S\theta_2 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$^4H_5(\theta_5) = \begin{bmatrix} C\theta_5 & -S\theta_5 & 0 & 0 \\ S\theta_5 & C\theta_5 & 0 & 0 \\ 0 & 0 & 1 & l_4+l_5 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$^0H_5 = \begin{bmatrix} S\theta_1 S\theta_5 + C(\theta_2+\theta_3+\theta_4)C\theta_1 C\theta_5 & C\theta_5 S\theta_1 - C(\theta_2+\theta_3+\theta_4)C\theta_1 S\theta_5 & S(\theta_2+\theta_3+\theta_4)C\theta_1 & C\theta_1 l_3 C(\theta_2+\theta_3) + l_2 C\theta_2 + l_4 S(\theta_2+\theta_3+\theta_4) + l_5 S(\theta_2+\theta_3+\theta_4) \\ C(\theta_2+\theta_3+\theta_4)C\theta_5 S\theta_1 - C\theta_1 S\theta_5 & -C\theta_1 C\theta_5 - C(\theta_2+\theta_3+\theta_4)S\theta_1 S\theta_5 & S(\theta_2+\theta_3+\theta_4)S\theta_1 & S\theta_1 l_3 C(\theta_2+\theta_3) + l_2 C\theta_2 + l_4 S(\theta_2+\theta_3+\theta_4) + l_5 S(\theta_2+\theta_3+\theta_4) \\ S(\theta_2+\theta_3+\theta_4)C\theta_5 & -S(\theta_2+\theta_3+\theta_4)S\theta_5 & -C(\theta_2+\theta_3+\theta_4) & (l_1+l_3)S(\theta_2+\theta_3) + l_2 S\theta_2 - l_4 C(\theta_2+\theta_3+\theta_4) - l_5 C(\theta_2+\theta_3+\theta_4) \\ 0 & 0 & 0 & 1 \end{bmatrix}$$