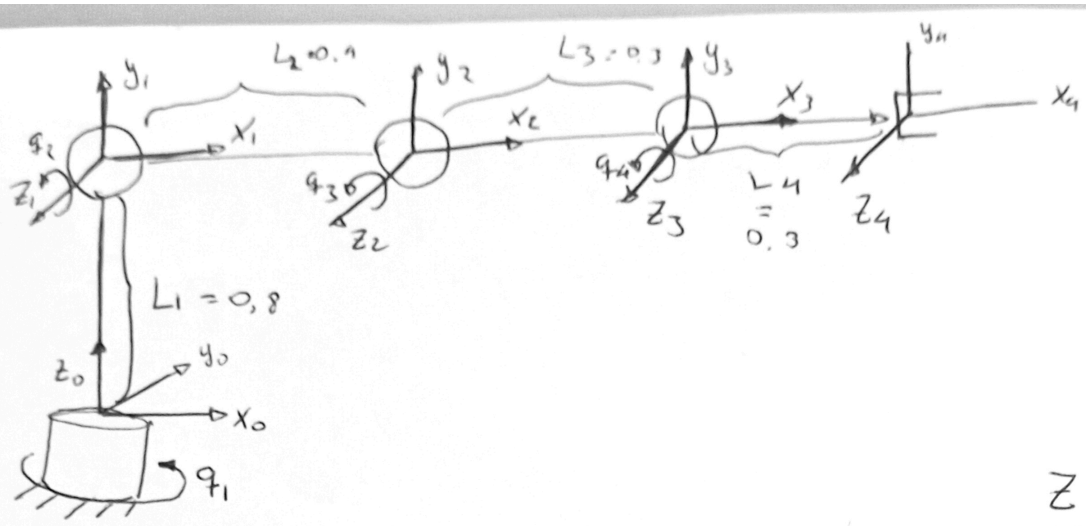

	Z		X	
	θ_i	d_i	a_i	α_i
1	q_1	L_1	0	90°
2	q_2	0	L_2	0
3	q_3	0	L_3	0
4	q_4	0	L_4	0

$$A_1 = \begin{bmatrix} \cos(q_1) & -\sin q_1 \cos 90^{0} & \sin q_1 \sin 90^{1} & 0 \\ \sin q_1 & \cos q_1 \cos 90^{0} & -\cos q_1 \sin 90 & 0 \\ 0 & \sin 90 & \cos 90 & L_1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$A_1 = \begin{bmatrix} \cos(q_1) & 0 & \sin q_1 & 0 \\ \sin(q_1) & 0 & -\cos q_1 & 0 \\ 0 & 1 & 0 & 0,8 \\ 0 & 0 & 0 & 1 \end{bmatrix} //$$

$$A_2 = \begin{bmatrix} \cos q_2 & -\sin q_2 \cos 1 & \sin q_2 \sin 0 & L_2 \cos q_2 \\ \sin q_2 & \cos q_2 \cos 1 & \sin q_2 \sin 0 & L_2 \sin q_2 \\ 0 & \sin 0 & \cos 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$A_2 = \begin{bmatrix} \cos q_2 & -\sin q_2 & 0 & 0.4\cos q_2 \\ \sin q_2 & \cos q_2 & 0 & 0.4\sin q_2 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$A_3 = \begin{bmatrix} \cos q_3 & -\operatorname{sen} q_3 & 0 & 0.3\cos q_3 \\ \operatorname{sen} q_3 & \cos q_3 & 0 & 0.3\operatorname{sen} q_3 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$A_4 = \begin{bmatrix} \cos q_4 & -\operatorname{sen} q_4 & 0 & 0.3\cos q_4 \\ \operatorname{sen} q_4 & \cos q_4 & 0 & 0.3\operatorname{sen} q_4 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$T = A_1 * A_2 \cdot A_3 * A_4$$

$$T = \begin{bmatrix} \cos(q_1+q_2+q_3+q_4) & & & \\ & & & \\ & & & \\ & & & \end{bmatrix}$$

$$T = \begin{bmatrix} \frac{\cos(q_1+q_2+q_3+q_4)+\cos(q_1-q_2-q_3-q_4)}{2} & -\frac{\operatorname{sen}(q_1+q_2+q_3+q_4)-\operatorname{sen}(q_1-q_2-q_3-q_4)}{2} & 0 & \\ \frac{\operatorname{sen}(q_1+q_2+q_3+q_4)+\operatorname{sen}(q_1+q_2-q_3-q_4)}{2} & \frac{\cos(q_1+q_2+q_3+q_4)-\cos(q_1-q_2-q_3-q_4)}{2} & 0 & \\ \operatorname{sen}(q_2+q_3+q_4) & \cos(q_2+q_3+q_4) & 0 & \\ 0 & 0 & 0 & \\ \operatorname{Sin} q_1 & 0.1\cos(q_1)\left(3\cos(q_2+q_3+q_4)+3\cos(q_2+q_3)+4\cos q_2\right) & & \\ -\cos q_1 & 0.1\operatorname{sen}(q_1)\left(3\cos(q_2+q_3+q_4)+3\cos(q_2+q_3)+4\cos(q_2)\right) & & \\ 0 & 0.1\left(3\operatorname{sen}(q_2+q_3+q_4)+3\operatorname{Sen}(q_2+q_3)+4\operatorname{sen}(q_2)+8\right) & & \\ 0 & 1 & & \end{bmatrix}$$

Simplificando

$\cos(q_1)\cos(q_2+q_3+q_4)$	$-\cos(q_1)\,\text{sen}(q_2+q_3+q_4)$	$\text{sen}(q_1)$	$\cos(q_1)(0.4\cos(q_2)+0.3\cos(q_2+q_3)+0.3\cos(q_2+q_3+q_4))$
$\text{sen}(q_1)\cos(q_2+q_3+q_4)$	$-\text{sen}(q_1)\,\text{sen}(q_2+q_3+q_4)$	$-\cos(q_1)$	$\text{sen}(q_1)(0.4\cos(q_2)+0.3\cos(q_2+q_3)+0.3\cos(q_2+q_3+q_4))$
$\text{sen}(q_2+q_3+q_4)$	$\cos(q_2+q_3+q_4)$	0	$0.4\,\text{sen}(q_2)+0.3\,\text{sen}(q_2+q_3)+0.3\,\text{sen}(q_2+q_3+q_4)+0.8$
0	0	0	0

Matriz Jacobiana

$$\begin{bmatrix} -(0.4\cos(q_2)+0.3\cos(q_2+q_3)+0.3\cos(q_2+q_3+q_4))\sin(q_1) & -(0.4\sin(q_2)+0.3\sin(q_2+q_3)+0.3\sin(q_2+q_3+q_4))\cos(q_1) & -0.3(\sin(q_2+q_3)+\sin(q_2+q_3+q_4))\cos(q_1) & -0.3\sin(q_2+q_3+q_4)\cos(q_1) \\ 0 & \sin(q_1) & \sin(q_1) & \sin(q_1) \\ (0.4\cos(q_2)+0.3\cos(q_2+q_3)+0.3\cos(q_2+q_3+q_4))\cos(q_1) & -(0.4\sin(q_2)+0.3\sin(q_2+q_3)+0.3\sin(q_2+q_3+q_4))\sin(q_1) & -0.3(\sin(q_2+q_3)+\sin(q_2+q_3+q_4))\sin(q_1) & -0.3\sin(q_1)\sin(q_2+q_3+q_4) \\ 0 & -\cos(q_1) & -\cos(q_1) & -\cos(q_1) \\ 0 & 0.4\cos(q_2)+0.3\cos(q_2+q_3)+0.3\cos(q_2+q_3+q_4) & 0.3\cos(q_2+q_3)+0.3\cos(q_2+q_3+q_4) & 0.3\cos(q_2+q_3+q_4) \\ 1 & 0 & 0 & 0 \end{bmatrix}$$