Projekt MORO

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1 Parametry DH

L. p.	a_{i-1}	α_{i-1}	d_i	θ_i
1	0	0	0	θ_1
2	a_1	$-\pi/2$	0	θ_2
3	a_2	0	0	θ_3
4	a_3	$\pi/2$	a_4	θ_4
5	0	$\pi/2$	0	θ_5
6	0	$\pi/2$	0	θ_6

Tabela 1: Parametry DH

2 Kinematyka prosta

Przejścia pomiędzy członami:

$$T_1^0 = \begin{pmatrix} \cos(\theta_1) & -\sin(\theta_1) & 0 & 0 \\ \sin(\theta_1) & \cos(\theta_1) & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

$$T_2^1 = \begin{pmatrix} \cos(\theta_2) & -\sin(\theta_2) & 0 & a_1 \\ 0 & 0 & 1 & 0 \\ -\sin(\theta_2) & -\cos(\theta_2) & 0 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

$$T_3^2 = \begin{pmatrix} \cos(\theta_3) & -\sin(\theta_3) & 0 & a_2 \\ \sin(\theta_3) & \cos(\theta_3) & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

$$T_4^3 = \begin{pmatrix} \cos(\theta_4) & -\sin(\theta_4) & 0 & a_3 \\ 0 & 0 & -1 & -a_4 \\ \sin(\theta_4) & \cos(\theta_4) & 0 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

$$T_5^4 = \begin{pmatrix} \cos(\theta_5) & -\sin(\theta_5) & 0 & 0 \\ 0 & 0 & -1 & 0 \\ \sin(\theta_5) & \cos(\theta_5) & 0 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

$$T_6^5 = \begin{pmatrix} \cos(\theta_6) & -\sin(\theta_6) & 0 & 0 \\ 0 & 0 & -1 & 0 \\ \sin(\theta_6) & \cos(\theta_6) & 0 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

Po wymnożeniu:

$$T_6^0 = \begin{pmatrix} \sin(\theta_6)\ (\cos(\theta_4)\ \sin(\theta_1) - \sin(\theta_4)\ (\cos(\theta_1)\ \sin(\theta_2)\ \sin(\theta_3) - \cos(\theta_1)\ \cos(\theta_2)\ \cos(\theta_3))) - \cos(\theta_6)\ (\cos(\theta_5)\ (\sin(\theta_1)\ \sin(\theta_4) + \text{co} \\ \cos(\theta_6)\ (\cos(\theta_5)\ (\cos(\theta_1)\ \sin(\theta_4) - \cos(\theta_4)\ (\sin(\theta_1)\ \sin(\theta_2)\ \sin(\theta_3) - \cos(\theta_2)\ \cos(\theta_3)\ \sin(\theta_1))) + \sin(\theta_5)\ (\cos(\theta_2)\ \sin(\theta_1)\ \sin(\\ \cos(\theta_6)\ (\sin(\theta_5)\ (\cos(\theta_2)\ \cos(\theta_3) - \sin(\theta_2)\ \sin(\theta_3)) - \cos(\theta_4)\ \cos(\theta_5)\ (\cos(\theta_2)\ \sin(\\ 0 \end{pmatrix}$$

$$T_6^0 = \begin{pmatrix} s_6(c_4 s_1 - s_4(c_1 s_2 s_3 - c_1 c_2 c_3)) - c_6(c_5(s_1 s_4 + c_4(c_1 s_2 s_3 - c_1 c_2 c_3)) - s_5(c_1 c_2 s_3 + c_1 c_3 s_2)) & c_6(c_4 s_1 - s_4(c_1 s_2 s_3 - c_1 c_2 c_3)) - \\ c_6(c_5(c_1 s_4 - c_4(s_1 s_2 s_3 - c_2 c_3 s_1)) + s_5(c_2 s_1 s_3 + c_3 s_1 s_2)) - s_6(c_1 c_4 + s_4(s_1 s_2 s_3 - c_2 c_3 s_1)) & -c_6(c_1 c_4 + s_4(s_1 s_2 s_3 - c_2 c_3 s_1)) \\ c_6(s_5(c_2 c_3 - s_2 s_3) - c_4 c_5(c_2 s_3 + c_3 s_2)) - s_4 s_6(c_2 s_3 + c_3 s_2) & -s_6(s_5(c_2 c_3 - s_2 \\ 0 \end{pmatrix}$$

3 Kinematyka odwrotna