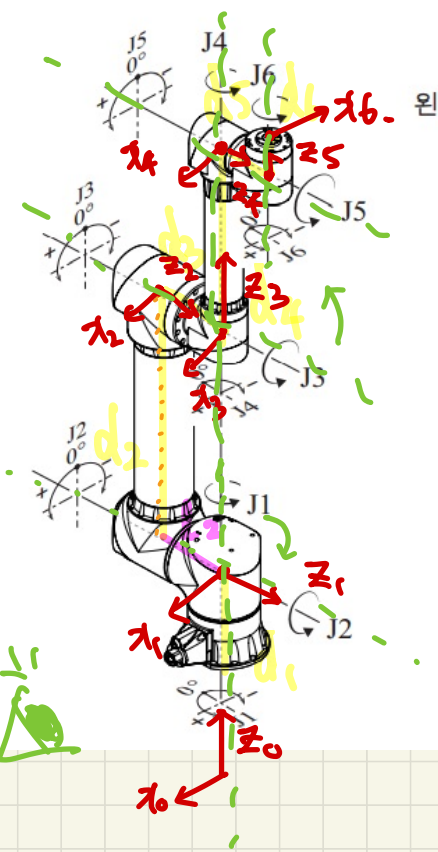
6R Robot Manipulator.



왼쪽 그림의 자세 (원점자세)

축	각도
J1	0°
J2	0°
J3	0°
J4	0°
J5	0°
J6	0°

	a_i	α_i	d_i	θ_i
1	0	0	d_1	θ_1
2	l_2	$-\frac{\pi}{2}$	d_2	θ_2
3	0	0	d_3	θ_3
4	0	$+\frac{\pi}{2}$	d_4	θ_4
5	0	$-\frac{\pi}{2}$	d_5	θ_5
6	0	$+\frac{\pi}{2}$	d_6	θ_6

3. Formulate homogeneous transformation matrix for each.

$$
{}^{i-1}\mathbf{T}_i = \begin{bmatrix} \cos\theta_i & -\sin\theta_i\cos\alpha_i & \sin\theta_i\sin\alpha_i & a_i\cos\theta_i \\ \sin\theta_i & \cos\theta_i\cos\alpha_i & -\cos\theta_i\sin\alpha_i & a_i\sin\theta_i \\ 0 & \sin\alpha_i & \cos\alpha_i & d_i \\ 0 & 0 & 0 & 1 \end{bmatrix}
$$

	a_i	α_i	θ_i	d_i
1	0	0	θ_1	d_1
2	l_2	$-\pi/2$	θ_2	d_2
3	0	0	θ_3	d_3
4	0	$\pi/2$	θ_4	d_4
5	0	$-\pi/2$	θ_5	d_5
6	0	$-\pi/2$	θ_6	d_6

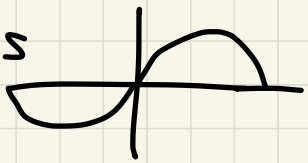
$$
{}^0\pi_1 = \begin{bmatrix} C_1 & -S_1 & 0 & 0 \\ S_1 & C_1 & 0 & 0 \\ 0 & 0 & 1 & d_1 \\ 0 & 0 & 0 & 1 \end{bmatrix}
$$

$$
{}^1\pi_2 = \begin{bmatrix} C_2 & 0 & -S_2 & l_2C_2 \\ S_2 & 0 & C_2 & l_2S_2 \\ 0 & -1 & 0 & d_2 \\ 0 & 0 & 0 & 1 \end{bmatrix}
$$

$$
{}^2\pi_3 = \begin{bmatrix} C_3 & -S_3 & 0 & 0 \\ S_3 & C_3 & 0 & 0 \\ 0 & 0 & 1 & d_3 \\ 0 & 0 & 0 & 1 \end{bmatrix}
$$

C

S



$\therefore$ ${}^0\pi_6 = {}^0\pi_1 \cdot \pi_2 \cdots {}^5\pi_6$

calculated with python.