



Introduction to Robotics

CSE461

Assignment - 1, 2

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Section: 09

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Assignment-2

~~Table~~ DH-Parameters:

joint	α	a	d	θ
1	-90°	a_1	d_1	θ_1
2	0°	a_2	0	θ_2
3	0°	a_3	0	θ_3
4	90°	0	0	θ_4
5	0°	0	d_5	θ_5

Assignment-2

~~Table~~ DH Parameters:

joint	α	a	d	θ
1	0°	10	0	30°
2	0°	8	0	45°
3	0°	3	0	10°

Now,

$$T_1 = \begin{bmatrix} \cos 30^\circ & -\cos 0^\circ \sin 30^\circ & \sin 0^\circ \sin 30^\circ & 10 \cos 30^\circ \\ \sin 30^\circ & \cos 0^\circ \cos 30^\circ & -\sin 0^\circ \cos 30^\circ & 10 \sin 30^\circ \\ 0 & \sin 0^\circ & \cos 0^\circ & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

~~$$T_2 = \begin{bmatrix} \cos 45^\circ & -\cos 0^\circ \sin 45^\circ & \sin 0^\circ \sin 45^\circ & 8 \cos 45^\circ \\ \sin 45^\circ & \cos 0^\circ \cos 45^\circ & -\sin 0^\circ \cos 45^\circ & 8 \sin 45^\circ \\ 0 & \sin 0^\circ & \cos 0^\circ & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$~~

$$T_2 = \begin{bmatrix} \cos 45^\circ & -\cos 0^\circ \sin 45^\circ & \sin 0^\circ \sin 45^\circ & 8 \cos 45^\circ \\ \sin 45^\circ & \cos 0^\circ \cos 45^\circ & -\sin 0^\circ \cos 45^\circ & 8 \sin 45^\circ \\ 0 & \sin 0^\circ & \cos 0^\circ & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$T_3 = \begin{bmatrix} \cos 10^\circ & -\cos 0^\circ \sin 10^\circ & \sin 0^\circ \sin 10^\circ & 3 \cos 10^\circ \\ \sin 10^\circ & \cos 0^\circ \cos 10^\circ & -\sin 0^\circ \cos 10^\circ & 3 \sin 10^\circ \\ 0 & \sin 10^\circ & \cos 0^\circ & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Now,

$$T = T_1 \cdot T_2 \cdot T_3$$

$$= \begin{bmatrix} 0.0872 & -0.996 & 0 & 10.9923 \\ 0.9961 & 0.0871 & 0 & 15.7156 \\ 0 & 0.1736 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$\therefore x = 10.99$$

$$\therefore y = 15.715$$

$$\therefore z = 0$$

(Signature)
