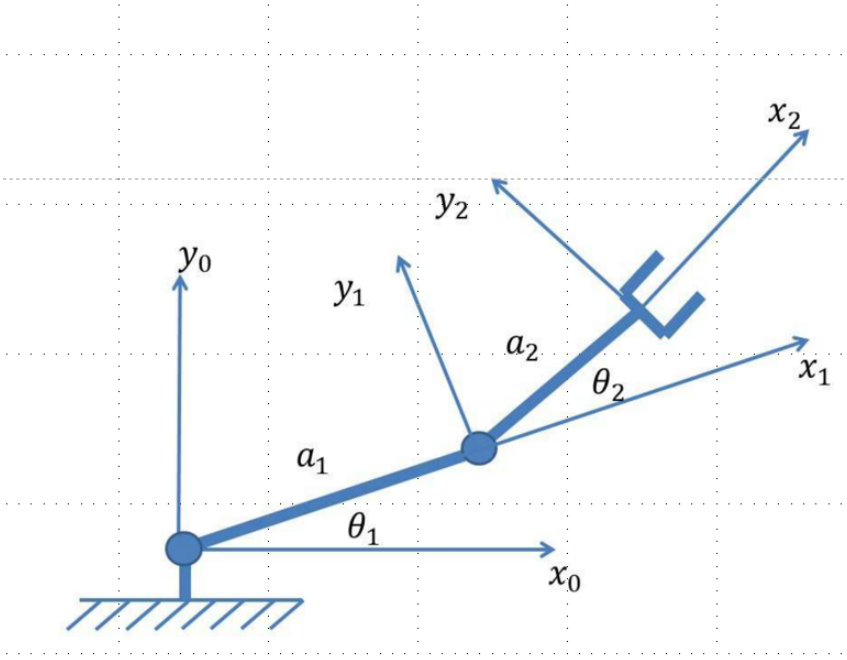
ROBOTICS HOMEWORK #5

Calculate the Homogeneous Transformation Matrix for the following DH parameters



Link	Θ	a	d	α
1	30 degrees	5 cm	0	0
2	60 degrees	3 cm	0	0

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HOMEWORK 05

$$H_1 = \begin{bmatrix} \cos 30^\circ & -\sin 30^\circ \cos 0^\circ & \sin 30^\circ \sin 0^\circ & 5\cos 30^\circ \\ \sin 30^\circ & \cos 30^\circ \cos 0^\circ & -\cos 30^\circ \sin 0^\circ & 5\sin 30^\circ \\ 0 & \sin 0^\circ & \cos 0^\circ & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} \sqrt{3}/2 & -1/2 & 0 & 5\sqrt{3}/2 \\ 1/2 & \sqrt{3}/2 & 0 & 5/2 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$H_2 = \begin{bmatrix} \cos 60^\circ & -\sin 60^\circ \cos 0^\circ & \sin 60^\circ \sin 0^\circ & 3\cos 60^\circ \\ \sin 60^\circ & \cos 60^\circ \cos 0^\circ & -\cos 60^\circ \sin 0^\circ & 3\sin 60^\circ \\ 0 & \sin 0^\circ & \cos 0^\circ & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 1/2 & -\sqrt{3}/2 & 0 & 3/2 \\ \sqrt{3}/2 & 1/2 & 0 & 3\sqrt{3}/2 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$T = H_1 \times H_2$$

$$= \begin{bmatrix} \sqrt{3}/2 & -1/2 & 0 & 5\sqrt{3}/2 \\ 1/2 & \sqrt{3}/2 & 0 & 5/2 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} 1/2 & -\sqrt{3}/2 & 0 & 3/2 \\ \sqrt{3}/2 & 1/2 & 0 & 3\sqrt{3}/2 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & -1 & 0 & 5\sqrt{3}/2 \\ 1 & 0 & 0 & 11/2 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 0 & -1 & 0 & 4.330 \\ 1 & 0 & 0 & 5.5 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$