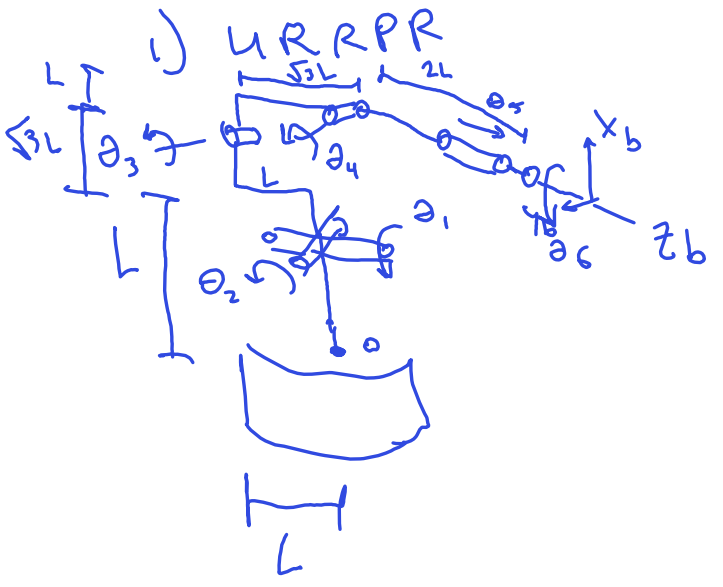
# § 4 HW

1) URRPPR




$$M = T_{01} T_{12} T_{23} T_{34} T_{45} T_{56}$$

or by inspection $R_{sb} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

$$\Rightarrow M = \begin{bmatrix} R & p \\ 0 & \end{bmatrix} \quad p = \begin{bmatrix} 2+\sqrt{3} \\ 0 \\ 1+\sqrt{3} \\ 1 \end{bmatrix} = \begin{bmatrix} 3.73 \\ 0 \\ 2.73 \\ 1 \end{bmatrix}$$

2) screw axes $S_i$ in $\{0\}$

- recall, space screw is when $\{0\}$ moves w.r.t. the pivot

$$S_1 = \begin{bmatrix} w_1 \\ v_1 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 1 \\ 0 \\ -L \\ 0 \end{bmatrix} \quad S_2 = \begin{bmatrix} 0 \\ 1 \\ 0 \\ 0 \\ 0 \\ L \end{bmatrix}$$

$$S_3 = \begin{bmatrix} 0 \\ 1 \\ 0 \\ L \\ 0 \\ L+\sqrt{3}L \end{bmatrix} \quad S_4 = \begin{bmatrix} 0 \\ 1 \\ 0 \\ +L-\sqrt{3}L \\ 0 \\ 2L+\sqrt{3}L \end{bmatrix} \quad S_5 = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 1 \end{bmatrix}$$

$$S_6 = \begin{bmatrix} 0 \\ 0 \\ 1 \\ 0 \\ -(2+\sqrt{3}L) \\ 0 \end{bmatrix}$$

3) find all $B_i$'s ($i$ in $\{b\}$) EE frame

$$B's = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & -L+\sqrt{3}L+2L & \sqrt{3}L+2L & 2L & 0 & 0 \\ L+\sqrt{3}L & 0 & 0 & 0 & 0 & 0 \\ 0 & -(L+\sqrt{3}L) & -L & 0 & 1 & 0 \end{bmatrix}$$

4) sw

all correct ✓