exercise 6.3 Find the IK ?

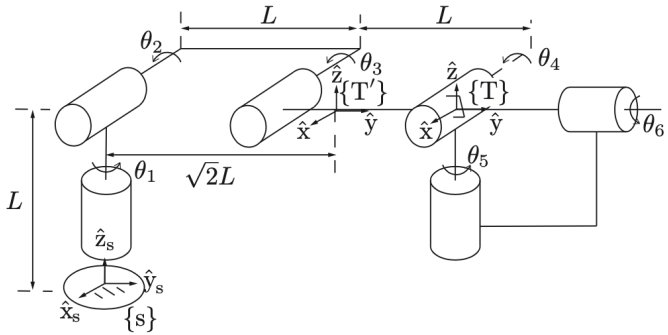


Figure 6.10: A 6R open chain.

exercise 6.4 Find θ_2 and θ_3 when $\theta_1 = 0$ and $p = \begin{bmatrix} -6 \\ 5 \\ \sqrt{3} \end{bmatrix}$?

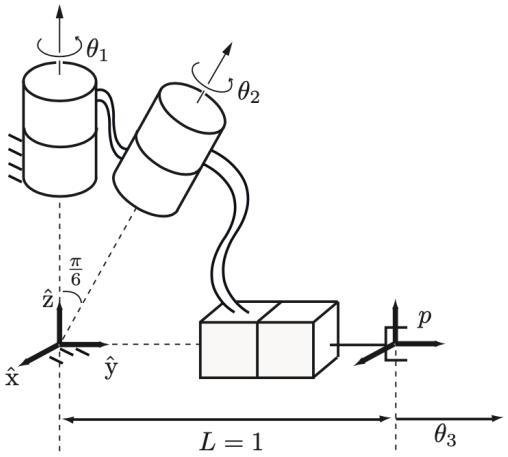


Figure 6.11: An RRP open chain.

exercise 6.5 Find the IK from $p = (p_x, p_y, p_z)$ and the orientation of end-effector α when the joint 1 has a screw joint of pitch h?

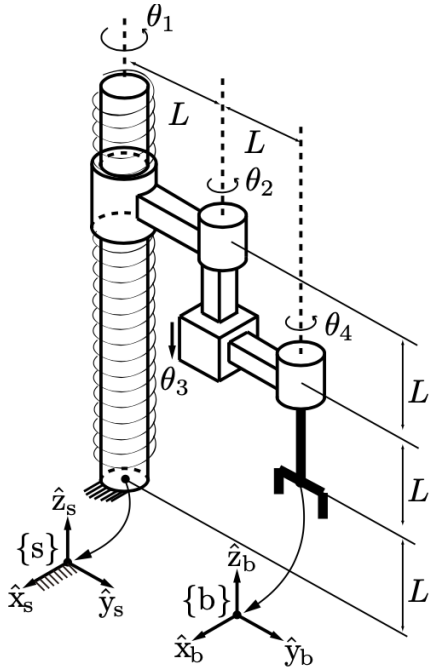


Figure 6.12: An open chain with a screw joint.

exercise 5.11 Find $\dot{\theta}_1$, $\dot{\theta}_2$ and $\dot{\theta}_3$ from $\dot{p} = \begin{bmatrix} 10 \\ 0 \\ 0 \end{bmatrix}$?

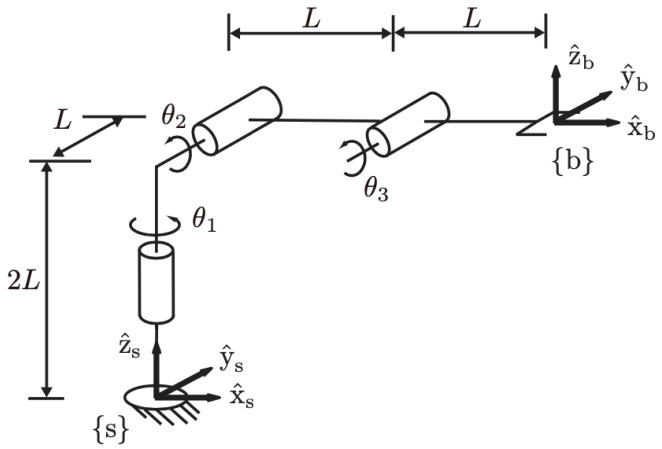
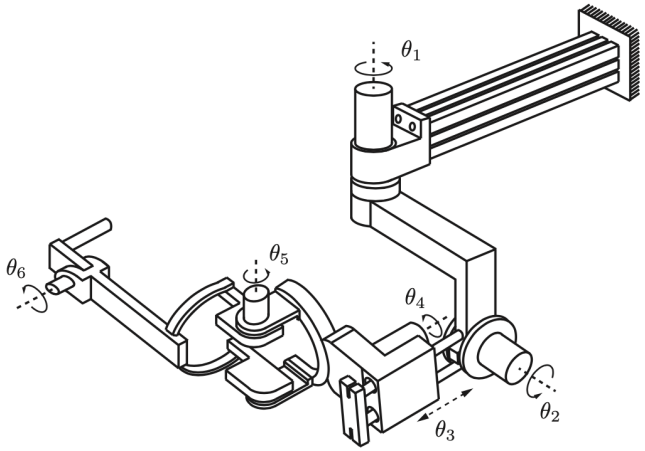


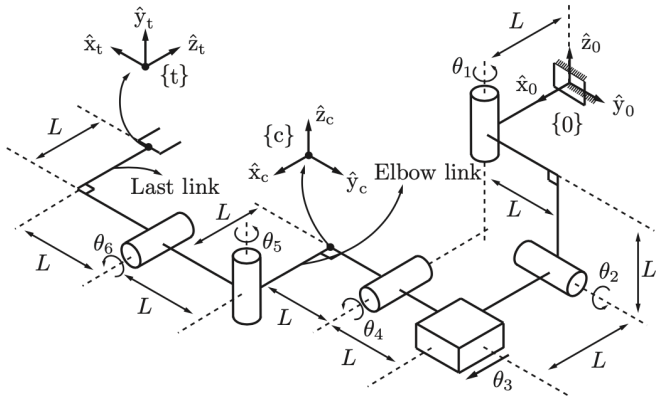
Figure 5.21: A spatial 3R open chain.

exercise 5.21 Find $\mathcal{A}_2$, $\mathcal{A}_4$ and $\mathcal{A}_5$ from the following FK ?

$$T_{ot} = e^{[\mathcal{A}_1]\theta_1} e^{[\mathcal{A}_2]\theta_2} M_{oc} e^{[\mathcal{A}_3]\theta_3} e^{[\mathcal{A}_4]\theta_4} M_{ct} e^{[\mathcal{A}_5]\theta_5} e^{[\mathcal{A}_6]\theta_6}$$



(a) Rehabilitation robot ARMin III [123]. Figure courtesy of ETH Zürich.



(b) Kinematic model of the ARMin III.

Figure 5.31: The ARMin III rehabilitation robot.

exercise 6.11 Find IK of 3R non-orthogonal chain ?

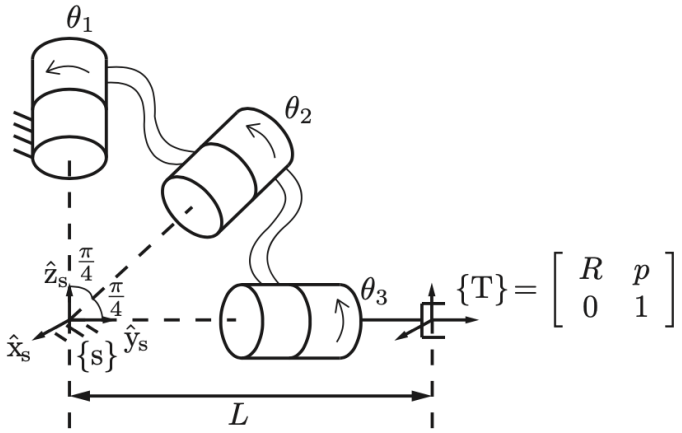


Figure 6.15: A 3R nonorthogonal chain.

exercise 6.15 Solve the following optimization ?

$$\min_{x \in \Re^n} \frac{1}{2} x^T Q x + c^T x \qquad \text{subject to} \quad Hx = b$$

use

$$\begin{bmatrix} A & D \\ C & B \end{bmatrix}^{-1} = \begin{bmatrix} A^{-1} + EG^{-1}F & -EG^{-1} \\ -G^{-1}F & G^{-1} \end{bmatrix}$$

where $G = B - CA^{-1}D$, $E = A^{-1}D$ and $F = CA^{-1}$