



Introduction to Trigonometry with Applications

APPLICATION EXAMPLE – TIP OF TWO LINK ROBOT

PROFESSOR PANOS S. SHIAKOLAS
MECHANICAL AND AEROSPACE ENGINEERING DEPARTMENT
COLLEGE OF ENGINEERING
UNIVERSITY OF TEXAS AT ARLINGTON



UNIVERSITY OF
TEXAS
ARLINGTON

COLLEGE OF ENGINEERING



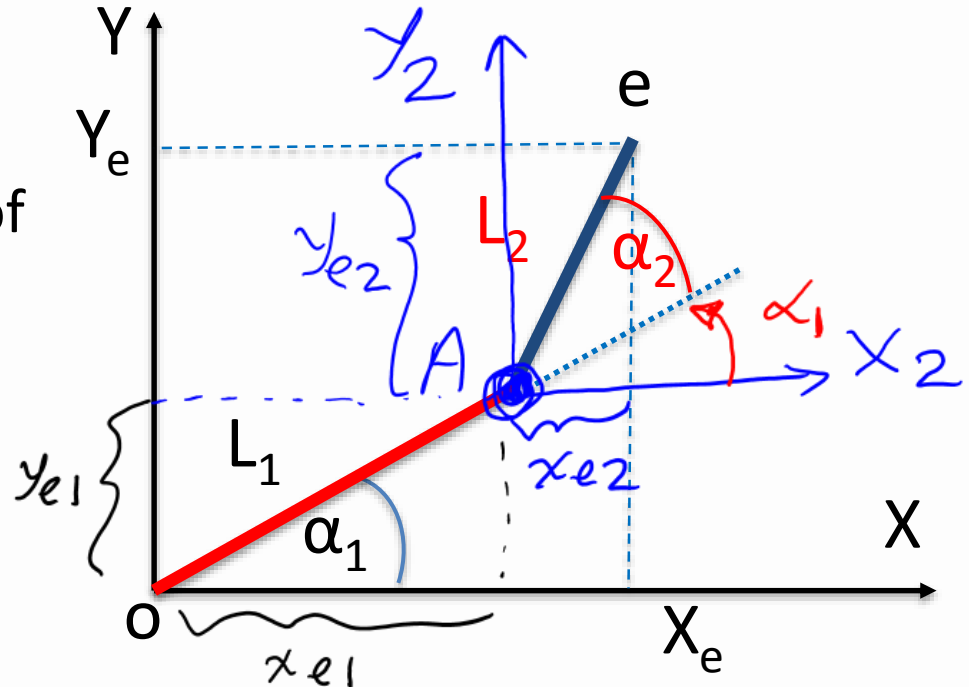
Application Example

Tip Location of Two-Link Planar Robot

- Given: lengths L_1 and L_2 and rotation angles α_1 and α_2 .
- Find the coordinates (X_e, Y_e) of the tip of the robot.

$$\begin{aligned}x_{e2} &= L_2 * \cos(\alpha_1 + \alpha_2) \\y_{e2} &= L_2 * \sin(\alpha_1 + \alpha_2) \\x_{e1} &= L_1 * \cos(\alpha_1) \\y_{e1} &= L_1 * \sin(\alpha_1)\end{aligned}$$

$$X_e = X_{e1} + X_{e2} \quad ; \quad Y_e = Y_{e1} + Y_{e2}$$





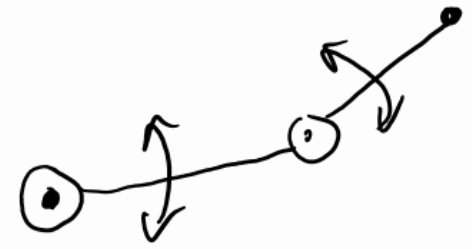
Application Example

Two-Link Planar Robot

$$x_e = L_1 * \cos(\alpha_1) + L_2 * \underline{\cos(\alpha_1 + \alpha_2)}$$

$$y_e = L_1 * \sin(\alpha_1) + L_2 * \underline{\sin(\alpha_1 + \alpha_2)}$$

SCARA



ANTHROPOMORPHIC

