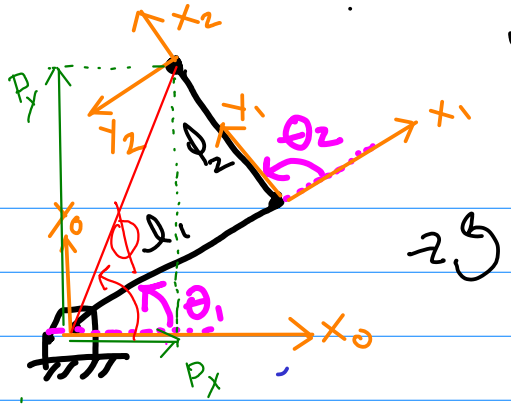
"HW#2 Intro to Robotics"

2RR plan Man.



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$\theta_1 = ?$
θ_2

Position/orientation Matrix H,

$$H = \left[\begin{array}{ccc|c} c\phi & -s\phi & 0 & p_x \\ s\phi & c\phi & 0 & p_y \\ 0 & 0 & 1 & 0 \\ \hline 0 & 0 & 0 & 1 \end{array}\right]$$

$$H = {}^0_2T = {}^0_1T \cdot {}^1_2T$$

$c_1 = c\theta_1$

$$ {}^0_1T = \left[\begin{array}{ccc|c} C_1 & -S_1 & 0 & l_1C_1 \\ S_1 & C_1 & 0 & l_1S_1 \\ 0 & 0 & 1 & 0 \\ \hline 0 & 0 & 0 & 1 \end{array}\right] \qquad {}^1_2T = \left[\begin{array}{ccc|c} C_2 & -S_2 & 0 & l_2C_1 \\ S_2 & C_2 & 0 & l_2S_1 \\ 0 & 0 & 1 & 0 \\ \hline 0 & 0 & 0 & 1 \end{array}\right]$$

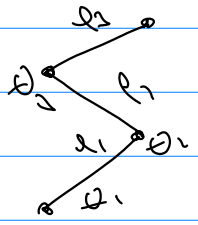
$c(\theta_1+\theta_2)$

θ_1 θ_2 ✗

$$\left[\begin{array}{ccc|c} c\phi & -s\phi & 0 & p_x \\ s\phi & c\phi & 0 & p_y \\ 0 & 0 & 1 & 0 \\ \hline 0 & 0 & 0 & 1 \end{array}\right] = \left[\begin{array}{ccc|c} C_{123} & -S_{123} & 0 & l_1C_1+l_2C_{12} \\ S_{12} & C_{12} & 0 & l_1S_1+l_2S_{12} \\ 0 & 0 & 1 & 0 \\ \hline 0 & 0 & 0 & 1 \end{array}\right]$$

① $+l_1C_{12}$

② $+l_1S_{12}$



$H = {}^0_2T$

eq1 eq2

sol = solve($p_x = l_1C_1 + l_2C_{12}$, ...); MATLAB

sol.eq1 = sol.(p_x = ...

$l_1 = l_2 = 1$ unit

$\psi = 45^\circ$

$p_x = \frac{\sqrt{2}}{2} \times 2 = \sqrt{2}$

$p_y = \sqrt{2}$