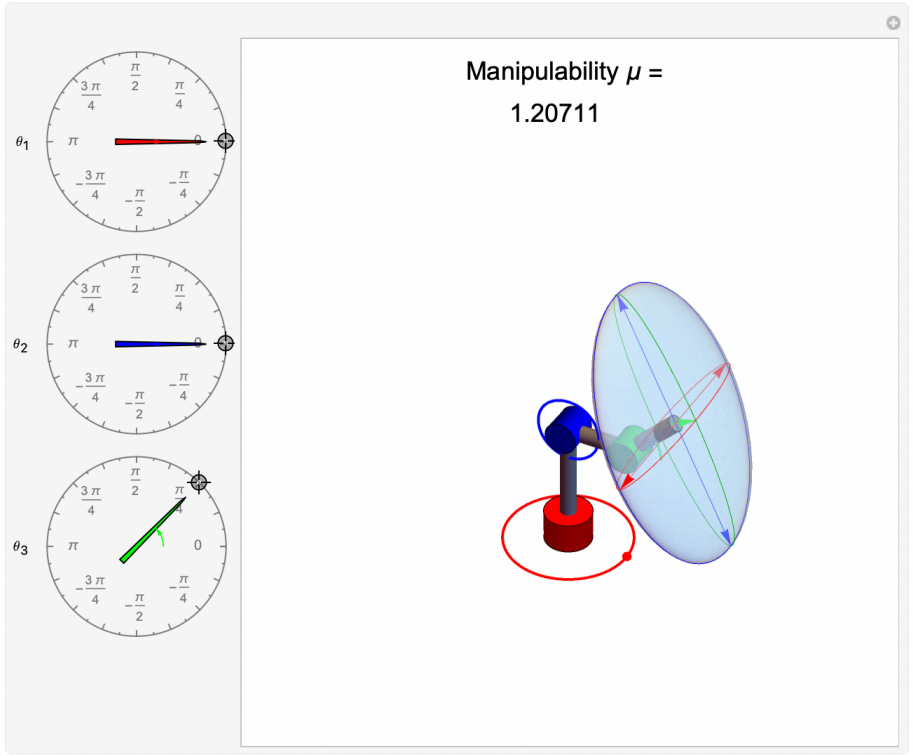
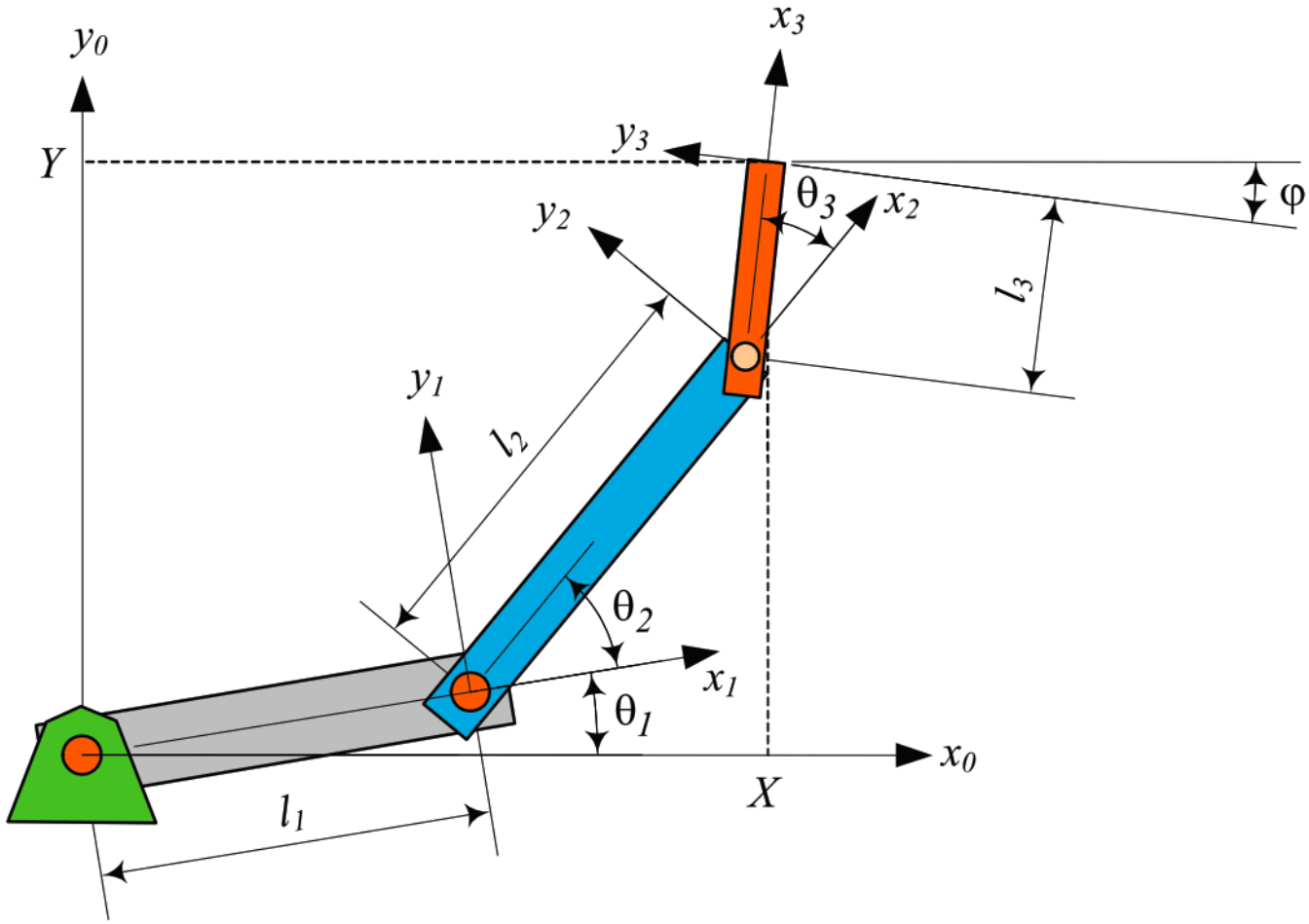
https://www.youtube.com/watch?v=lD2HQcxeNoA

Manipulability Visualization



https://demonstrations.wolfram.com/ManipulabilityEllipsoidOfARobotArm/

HW3 Hints



HW3 Hints

$$
\begin{aligned}
{}^{0}T_{3} &= {}^{0}T_{1}\ {}^{1}T_{2}\ {}^{2}T_{3} \\
&= \begin{bmatrix}
\cos(\theta_1+\theta_2+\theta_3) & -\sin(\theta_1+\theta_2+\theta_3) & 0 & r_{14} \\
\sin(\theta_1+\theta_2+\theta_3) & \cos(\theta_1+\theta_2+\theta_3) & 0 & r_{24} \\
0 & 0 & 1 & 0 \\
0 & 0 & 0 & 1
\end{bmatrix} \\
r_{14} &= l_1\cos\theta_1 + l_2\cos(\theta_1+\theta_2) + l_3\cos(\theta_1+\theta_2+\theta_3) \\
r_{24} &= l_1\sin\theta_1 + l_2\sin(\theta_1+\theta_2) + l_3\sin(\theta_1+\theta_2+\theta_3)
\end{aligned}
$$

Matlab Resources

https://www.mathworks.com/help/robotics/index.html?s_tid=CRUX_lftnav

https://www.mathworks.com/help/fusion/referencelist.html?type=function&s_tid=CRUX_topnav

https://www.mathworks.com/help/nav/referencelist.html?type=function&listtype=cat&category=index&blocktype=all&capability=&s_tid=CRUX_lftnav

https://www.mathworks.com/help/aerotbx/referencelist.html?type=function&listtype=cat&category=index&blocktype=all&capability=&s_tid=CRUX_lftnav