

Assignment 3 - Deadline 1 week

Problem

For a KUKA LWR robot, let $\theta \in \mathbb{R}^7$ be the joint variables. For kinematic analysis, assign frames on Fig. 1 and Fig. 2(left), where the robot is shown in its configuration $\theta=0$. Assume $l_1 = l_2 = l_3 = l_4 = l_5 = l$ (while l_0 and l_6 are different). Watch the videos on the course website to understand the motion of the robot.

- Assign frames on each link and assign generalized coordinates for all degrees of freedom of the robot.
- Calculate the homogenous transformation (${}^0T^7$) between the base and the end-effector.
- Find an expression, $x = \varphi(\theta)$, to relate the position of the end-effector to the controlled joints.
- Derive the forward kinematics and inverse kinematics in the position, velocity, acceleration levels.



Figure 1: KUKA LWR robot

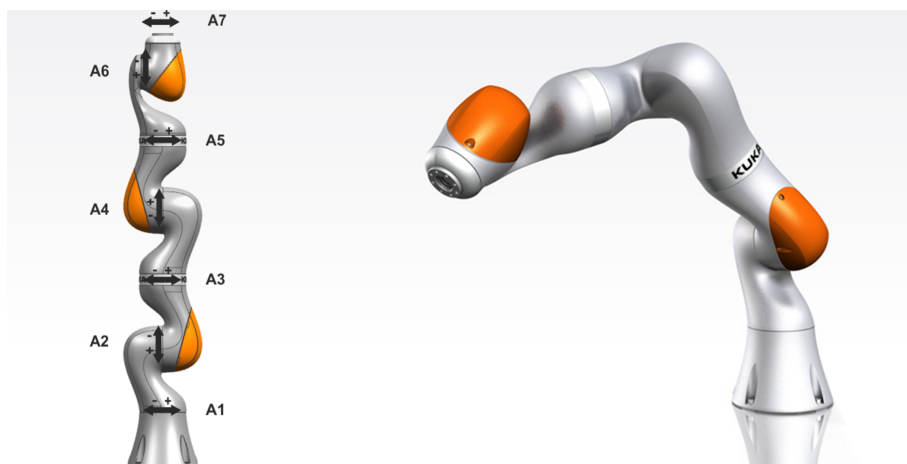


Figure 2: KUKA LWR robot