# Assignment 3

In this assignment, a polynomial joint-space trajectory was used as the baseline motion between the initial and final joint configurations. The quartic trajectory ensures smooth position and velocity profiles and enforces zero velocity and acceleration at the start of motion, but does not constrain acceleration at the final time. Trajectory optimization was then performed by minimizing the sum of squared joint accelerations while satisfying the same boundary conditions. The optimized trajectory differs slightly from the quartic trajectory, particularly near the end of the motion, where acceleration is redistributed to reduce the overall cost. This results in smoother acceleration behavior and a lower total acceleration cost compared to the quartic baseline. The velocity plots further confirm improved smoothness in the optimized trajectory. These results demonstrate how optimization can improve trajectory quality beyond analytically designed polynomial trajectories. Optimization-based methods also provide flexibility to incorporate additional objectives and constraints in real robotic systems.