Digital Twin KR3

ROS2 Controller and Path Planning

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1 Introduction

The KUKA KR3 R540 robot, like many industrial robots, is equipped with a native controller capable of executing predefined motion types, such as Point-to-Point (PTP), linear (LIN), and circular (CIRC). In typical setups, these motion types are manually programmed on the robot side using KUKA Robot Language (KRL). However, in modern robotics applications, there is an increasing demand to integrate robotic systems into external frameworks like ROS 2, where trajectory planning and execution are handled externally.

2 Robot Trajectory Representation

3 Joint Trajectory Controller

A controller for executing joint-space trajectories on a group of joints. The controller interpolates in time between the points so that their distance can be arbitrary. Even trajectories with only one point are accepted. Trajectories are specified as a set of waypoints to be reached at specific time instants, which the controller attempts to execute as well as the mechanism allows. Waypoints consist of positions, and optionally velocities and accelerations. [1]

3.1 Trajectory Representation

References

[1] "Joint trajectory controller — ros 2 controllers documentation," 2024, accessed: 2024-12-01. [Online]. Available: https://control.ros.org/foxy/doc/ros2_controllers/joint_trajectory_controller/doc/userdoc.html#hardware-interface-type