Session: MA1-B
Control Theory and Application

Adaptive Predictor-Based Sliding PID Uncalibrated Visual Servoing with Uncertain Jacobian for Dynamic Tracking of Robots

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One of the technological challenges of closed-loop dynamic visual servoing is the latency induced by the CCD camera. In this paper, the experimental validation of a new decentralized non-linear PID-like structure of a visual feedback controller under an uncalibrated fixed-camera configuration is addressed. By using a projection algorithm as an adaptive prediction technique, our scheme evades the time delay problem associated CCD cameras. Image trajectories are specified directly in image coordinates. Additionally, finite-time tracking is ensured. Formal stability results are presented and experimental validation is discussed.

Distributed Cooperative Control System for Multi-jointed Redundant Manipulator

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Currently, efforts are made to put human life support robot to practical use, whereas control system for manipulator is a critical technology to be discussed in current development of human life support robot. The purpose of this study is to develop a control methodology of multi-jointed redundant manipulator for its practical use of human life support where flexible operability will be required. In this study, component based distributed cooperative control system as shown in figure has been proposed for improving operating technology of multi-jointed redundant manipulator and the principle and basic structure of control system has been discussed.

Second Order Neuro-Sliding Mode Control for Fast Force-Position Tracking of Robots

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A synergistic combination of neural networks and second order sliding modes guarantee analytically convergence of tracking errors is proposed. It is based on an adaptive neural network which roughly estimates inverse robot dynamics, and an inner control loop implements two continuous orthogonal sliding PID controllers, one for the force subspace and another one for the position subspace, to guarantee simultaneously very fast tracking. The neural network structure is driven by the sliding mode and one neuron with four weights arise for each degree of freedom. Simulations are provided to visualize the expected performance.