

Evaluation of Prosthesis Grasp Control Systems on the UB Hand IV

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Abstract

This paper covers the development and testing of a control system for multifunctional myoelectric prosthetic hands. The functionality of modern hand prostheses is often focused on the task of grasping, which can be divided into high-level grasp planning and low-level finger control. Though initially models can be used to test these control systems, actual implementation on a physical system is required for proper evaluation. The University of Bologna (UB) Hand IV prototype is an anthropomorphic, tendon-driven robotic hand, which makes it well-suited to represent the structure of modern prostheses. The main control system tested in this paper is based on the intrinsically passive controller (IPC), the structure of which offers guaranteed passivity and stability. After several grasping tests on the UB Hand IV, the system is evaluated on compliant behavior, grasping ability, and dynamic appearance. IPC proves to be a powerful approach to interaction control, without the associated sensor requirements which could be difficult to integrate into modern hand prostheses.

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