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 mod-
eral 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 imple-
mentation 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 require-
ments which could be difficult to integrate into modern hand prostheses.

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