A HYBRID TOOL FOR REACHING AND GRASPING REHABILITATION: THE ARMEOFES.

SourceAutomatic Control Laboratory, Swiss Federal Institute of Technology, Zurich, Switzerland.
cremaa@control.ee.ethz.ch

ABSTRACT

Many research groups are currently working with robotic devices for hand grasp rehabilitation and restoration. A common problem in this area is the fact that existing and commercially available robotic exoskeletons are able to provide gravity compensation of the shoulder and elbow but do not provide any support for the grasping and releasing movements of the hand. The lack of a flexible support technology for the hand reduces the possible ways in which clinicians can deal with the issue of a personalized, effective rehabilitation. This paper presents new software that allows FES assisted grasping to integrate with the ArmeoSpring (Hocoma AG). The system uses a Man-In-The-Loop control approach, whereby surface EMG signals from proximal muscles are used to trigger and modulate multichannel FES applied to distal muscles, thus allowing patient induced and strength adapted movement control of the hand. Combining volitionally controlled FES with arm-weight-compensation allows early adoption of FES assisted therapy for patients, augmenting their functionalities and extending training capabilities with the ArmeoSpring.

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