

Scientific/Educational Workshop

Workshop title

Simple or Complex Rehabilitation Robots? Choosing Appropriate Tools for Neurorehabilitation

Workshop responsible

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Speakers

Prof. Dr. Georg Rauter (rehabilitation robotics, moderator),
Dr. med. Verena Klamroth-Marganska (clinician),
Prof. Dr. Etienne Burdet (neuroscience),
Dr. Olivier Lambercy (rehabilitation robotics),
Prof. Dr. Marcia O'Malley (rehabilitation robotics),
Prof. Dr. Catherine E. Lang PT (neuroscience)
Ms. Evelyne Wiskerke (physiotherapist)
Prof. Dr. Brendan Smith (mechanical engineering)

Workshop goals

Currently, there is a big debate how complex robots need to be for enabling individualized training in neurorehabilitation. Which tools allow patients (e.g. post-stroke) to recover best from sensorimotor deficits and to relearn complex real-life tasks? Exoskeletons with many degrees of freedom allow practicing an entire sequence of movements while devices with few degrees of freedom are useful for sequence practice (i.e., part-whole transfer). The workshop aims at discussing who benefits when and how from which of these training tools.

Abstract

Rehabilitation robots have been recognized to benefit neurorehabilitation. However, opinions diverge on whether it is more reasonable to strengthen research on simple robotic devices to train simple tasks, or rather to support future work on complex rehabilitation robots to train complex real-life tasks. In particular, this question seems interesting since task-related and personalized rehabilitation (e.g. complex real-life tasks) seems to lead to better outcomes than pure training of isolated functions. However, some results support that breaking complex movements into simple ones leads to better results than training the complex task as a whole. Remains the question how to teach the coordination between these simple movements or the complex movement as a whole? In short, both robotic concepts seem to have strong arguments that deserve a deepened discussion. But which ones are more convincing? Do we have to follow one or the other concept, or is a combination of concepts the best solution for the individual patient? In this workshop, we will first have presentations from promoters of the two approaches of simple robots to train simple tasks vs. complex robots to train complex real-life tasks. We will then discuss the requirements for rehabilitation of complex real-life tasks, and also understand the best solution for an application of the appropriate rehabilitation device from different points of view: engineering, neuroscience, clinical, and commercial. The attendee of the workshop will obtain a good understanding of the different points of view, the different arguments from different perspectives, and should be able to understand what is best for their own patients and clinics.