

Scientific/Clinical Workshop

Workshop Title

Intuitive Bidirectional Control of Bionic Limbs: Bridging across Accademia, Clinics, and Industry

Workshop Responsible

Massimo Sartori (University of Twente)
Jose Gonzalez (OttoBock HealthCare)
Hans Rietman (Roessingh Research and Development)
Strahinja Dosen (Aalborg University)
Herman van der Kooij (University of Twente)

Speakers

Jose Gonzalez, Michael Goldfarb, Tommaso Lenzi, Elliot Rouse, Hans Rietman, Strahinja Dosen, Massimo Sartori, Herman van der Kooij

Attendee Engagement

We will engage the attendees by motivating them to freely ask questions not only after but also during the provided lectures. This will foster direct interaction between attendees and the experts. As explained earlier in the form, in the second session we will provide live demos to facilitate an in depth discussion on the topics. The attendees will be divided in 3 to 5 groups that will visit each demonstration booth in rounds. Attendees will get the chance to try out by themselves some of the technologies presented including real-time sensory-feedback as well as real-time musculoskeletal modeling. Attendees will be asked to provide insights and open questions regarding what they have seen during the lectures and DEMOs. The questions will be noted, summarized and discussed during the panel discussion at the end of the session. This will allow attendees to leave the workshop with a broader view of the topic, especially considering the future challenges that need to be addressed to achieve clinical impact and successful technology transfer. We trust that this will have an impact on their future research and promote new ideas and innovations in the field.

Abstract

Developing successful bionic limb technologies is an endeavour that needs a deep understanding of diverse aspects spanning from rehabilitation medicine to biomechanics, engineering, and technology transfer. For such innovations to have a true impact in society, it is necessary to consider not only new scientific and technological ideas, but also the requirements of all stakeholders (e.g., healthcare system, clinicians, regulatory agencies, producers, etc.), as well as business-related factors (e.g., operation cost, market placement, etc.). This hands-on workshop discusses the development of next-generation bionic limb technologies in the context of three major aspects: scientific advances, clinical translation, and industrial exploitation. The workshop is organized in two 90-minute slots. The first slot provides talks from eight internationally recognised scientific, clinical, and industrial leaders in the field (all speakers are already confirmed). The scheduled talks will present latest scientific advances in mechatronic design, control, and sensory feedback towards the creation of bidirectionally controlled powered prostheses that operate as an extension of the human body. That

is, prostheses that are controlled by the human nervous system and provide sensory feedback to the amputee to enhance proprioception and embodiment. The second slot is framed as a hands-on demonstration session where participants can freely move across five DEMO boots. Each boot will provide live DEMOs of bionic limb-related technologies including powered prosthetic legs (i.e. 4 novel bionic leg prototypes are demonstrated live), real-time myoelectric musculoskeletal models for control, and real-time somatosensory feedback technologies. The proposed setting will move the workshop beyond the classical presentation-based paradigm and it will provide direct insights into relevant bionic limb-related problems and solutions.

