Category: Development and Implementation of Technology, Human Centered Design

Workshop Title: Intuitive Bidirectional Control of Bionic Limbs: Bringing across Accademia, Clinics, and Industry

Workshop Organizer(s): Jose Eduardo Gonzalez, Strahinja Dosen, Massimo Sartori, Herman van der Kooij

In person Speaker(s):

- Herr, Hugh, MIT (USA)
- Huang, Hellen, North Carolina State University (USA)
- De Michelli, Lorenzo, IIT (IT)
- Bicchi, Antonio, University of Pisa, IIT (USA)
- Hargrove, Levi, Northwestern University, Shirley Ryan Ability Lab (USA)
- Gonzalez, Jose, Ottobock SE & KGaA (DE)
- Rietman,Johan, Roessingh Research and Development (NL)

Virtual Speaker(s): TBA

Workshop Time: 16:00 - 17:30

Attendee Engagement:

Due to the success and active interaction between the attendees and the presenters in the edition of this workshop in RehabWeek2022, we will follow a similar approach, improving it with lessons learned. In the edition of this workshop in RehabWeek2022 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 above, in the second session we will provide live demos to facilitate an in-depth discussion on the topics. The attendees will be divided in small groups that will visit each demonstration booth in round about fashion. They 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 the 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 hope 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 endeavor 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 provides talks from internationally recognized scientific, clinical, and industrial leaders in the field. The scheduled talks will present latest scientific advances in mechatronic design, control, and sensory feedback towards the creation of powered prostheses that operate as an extension of the human body. That is, the prostheses that are controlled by the human nervous system and provide sensory feedback to the amputee to enhance proprioception and embodiment. The presenters will provide live DEMOs of bionic limb-related technologies including powered prosthetic legs, 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