

Scientific/Educational Workshop

Workshop information

Workshop responsible :

Hermano Igo Krebs

Workshop title :

Mechanical Impedance and its Role in Rehabilitation

Abstract:

To enable the successful application of robotics to assist in rehabilitation, we employ a competent model of movement and in this workshop we will discuss one of the components of this model: mechanical impedance. We will briefly discuss the model, how to measure mechanical impedance, describe impedance values obtained for different joints, and how it is modulated during movement. We will conclude discussing its implications for rehabilitation.

More specifically, we will show that mechanical impedance of the upper limb affects almost every aspect of movement, including path curvature, movement smoothness, and division of motion among degrees of freedom (DOF). We will show that careful regulation of lower limb joint mechanics is important for stable, safe, and efficient locomotion. We will discuss methods to characterize the mechanical impedance when holding fixed postures, during reaching or pointing movements, or during gait. We will present a few results and discuss how these data relate to neuromotor control. Examples will include:

- how the intrinsic impedance of the upper limb causes tremor to propagate along the upper limb, and how to use extrinsic impedance to suppress tremor in an optimal manner.
- how to provide an objective assessment of Parkinson's disease joint rigidity.
- how to measure ankle properties during push-off and gait

We will use these studies to underscore that improved understanding of joint impedance may lead to improvements in design and control strategies for rehabilitation and assistive robotics.

Speakers:

Steven Charles

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