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State of the Art in Robotic Leg Prostheses: Where We Are and Where We Want to Be

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Workshop website: https://belab.mech.utah.edu/iros2020/

Objectives

The goal of this workshop is to discuss the state of the art and open challenges in powered prosthetics. There will be talks from top researchers in the field to discuss their current and future approaches to the design and control of powered prostheses. Additionally, there will be demonstrations of powered prosthetics from leaders in the field to provide hands-on experience with leading technology. This will be the first time that the top lower limb robotic prostheses will be in the same room. Lastly, there will be a poster session for young and new researchers in the field to present their current work. This workshop will allow established researchers, as well as those new to the field of robotic prostheses, to experience firsthand where the field is today and what challenges lie ahead.

Motivation

Ambulation with conventional prostheses is slower, less stable, and less efficient than able-bodied ambulation, causing reduced mobility and quality of life. Robotic powered prostheses have the potential to close the gap between the performance of existing lower limb prostheses and human legs. In contrast to conventional passive prostheses, powered prostheses can provide biomechanically accurate kinetics and kinematics including during activities that require energy injection. Powered prostheses have evolved from devices tethered to a power supply or computer to devices that have onboard electronics and batteries. Powered prosthetic devices are now able to assist during walking, ambulation on stairs and ramps, and sit-stand transitions. However, there are significant challenges that the field needs to address for powered prostheses to fully realize their potential. Powered prostheses are often heavy, bulky, noisy, and fragile compared to conventional prostheses. Even the most advanced controllers cannot match the agility of the human body. Powered prostheses have made many advances but there are still challenges ahead of us.

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Topics of interest

- Robotic leg prosthesis
- Wearable robotics
- Rehabilitation and Assistive Robotics
- Bioinspired design and control
- Compliant actuation and control
- Legged robotics
- Locomotion

Invited Speakers

MICHAEL GOLDFARB, VANDERBILT UNIVERSITY, USA.
ROBERT GREGG, UNIVERSITY OF MICHIGAN, USA.
HELEN HUANG, UNIVERSITY OF NC STATE /UNC CHAPEL HILL, USA.
DIRK LEFEBER, VRIJE UNIVERSITY, BELGIUM.
TOMMASO LENZI, UNIVERSITY OF UTAH, USA.
ELLIOTT ROUSE, UNIVERSITY OF MICHIGAN, USA.
TOM SUGAR, ARIZONA STATE UNIVERSITY, USA.
QINING WANG, PEKING UNIVERSITY, CHINA.

Powered Leg Demonstration

CENTER FOR INTELLIGENT MECHATRONICS
LOCOMOTOR CONTROL SYSTEM LAB
BRUBOTICS
BIONIC ENGINEERING LAB
NEUROBIONICS LAB
HUMAN MACHINE INTEGRATION LAB
NEUROMUSCULAR REAHBILITATION ENGINEERING LABORATORY
PEKING UNIVERSITY