Department of
Biomedical Engineering
UNIVERSITY OF WISCONSIN–MADISON

Spring 2019 Seminar Series

Semi-Active Prostheses for Lightweight, Low-Power Gait Restoration

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A critical requirement in lower-limb prostheses is maintaining low system weight, as users strongly prefer light prostheses over heavy ones. This requirement of light weight is at odds with most robotic prostheses, whose primary goal is to actively power ankle push-off - an approach that requires heavy motors and batteries. However, artificial limbs offer an opportunity to improve function in other ways as well. One alternative approach is to modulate the passive mechanical properties of the prosthesis using lightweight, low-power actuators, without actively powering the body's motion. This approach aims to improve gait by exploiting biomechanical workarounds for lost function, rather than direct replacement of the ankle joint. These workarounds may mimic alternative aspects of foot and ankle function, or may not be biomimetic at all. This presentation discusses such "semi-active" devices and the concepts underlying their biomechanical function.

ABOUT the SPEAKER

Peter G. Adamczyk received the B.S.E. degree in mechanical engineering from Case Western Reserve University in 2002. He earned his M.S.E. in 2003 and Ph.D. in 2008 at the University of Michigan, studying wheeled mobile robots and gait biomechanics, respectively. From 2008 to 2015, he was President of Intelligent Prosthetic Systems, LLC, a research startup aimed at developing technologies for lower limb prosthetics and wearable movement analysis. He joined UW-Madison as an Assistant Professor in 2015. Dr. Adamczyk directs the UW Biomechatronics, Assistive Devices, Gait Engineering and Rehabilitation Laboratory (UW BADGER Lab), which aims to enhance physical and functional recovery from orthopedic and neurological injury through advanced biomechatronic devices, including lower-limb prostheses, wearable sensors, and rehabilitation robotics.

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