Séminaires ISIR

Vendredi 13 juin 2014 à 10h00

Hugh Herr

Campus Jussieu, 4 place Jussieu, Paris
Salle 56-66 / 211

Title : **On the Design of Bionic Leg Devices: The Science of Extreme Interface**

Abstract : Critical to the advancement of bionic legs that emulate or extend normal physiological function is the design of extreme interfaces between the human body and electromechanics. In this talk, I describe research activities underway to advance the science of mechanical and electrical interface design. I present novel exoskeletal, orthotic and prosthetic limbs that behave dynamically like their biological counterpart, peripheral neural implants that serve as an electrical interface with the external bionic limb, and novel socket and bracing technology for the mechanical attachment of the bionic device to the residual limb. For each of these interfaces, anatomical, biomechanical and neuromechanical models are employed in the motivation of subsystem design. The therapeutic distinction of bionic leg devices to increase walking speed, reduce gait metabolism, enhance stability, and mitigate musculoskeletal stress is examined. Finally, critical areas of future research are discussed that must be advanced to step towards the next generation of bionic leg systems.

Short Bio : Hugh Herr is Associate Professor within MIT's Program of Media Arts and Sciences, and The Harvard-MIT Division of Health Sciences and Technology. His primary research objective is to apply principles of limb neuromechanics to the design of bionic limbs for human rehabilitation and physical augmentation. In the area of human augmentation, Professor Herr has employed cross bridge models of skeletal muscle to the design and optimization of a new class of human-powered mechanisms that amplify endurance for cyclic anaerobic activities. He has also built elastic shoes that increase metabolic economy for running, and leg exoskeletons for walking load-carrying augmentation. In the area of assistive technology, Professor Herr's group has developed powered orthotic and prosthetic mechanisms for use as assistive interventions in the treatment of leg disabilities caused by amputation, stroke, cerebral palsy, and multiple sclerosis. Herr is the author and co-author of over 150 peer-reviewed manuscripts and patents within the emerging field of biomechatronics. His many innovations have been covered in episodes and articles featured in CNN, The Economist, Discover and Nature.

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