Ankle-Foot Function: From Neuromechanical Principles to Prosthetic Technology

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**Abstract:** Lower-limb amputees struggle with mobility-related challenges, which make ambulation more fatiguing, health more precarious and independent living more challenging. However, amputee health and mobility may be improved by developing prostheses that more effectively interface with the human body and restore lower-limb function, in particular that of the ankle and foot. This presentation summarizes a series of experimental and computational studies that explore the natural function of the ankle during walking, specifically the energy-saving benefits of the Achilles tendon, the enigmatic role of the foot, and how the ankle and foot motivate us to rethink our conventional understanding of gait. I emphasize how the integration of techniques from biomechanics, engineering, and neuromotor control can aid in discerning fundamental neuromechanical principles underlying locomotion, and then how these insights can translate to advances in prosthetic technologies and other assistive devices.

**Bio:** Karl Zelik is a post-doctoral researcher in the Laboratory of Neuromotor Physiology at the Santa Lucia Foundation in Rome, Italy. He obtained B.S. and M.S. degrees in Biomedical Engineering from Washington University in St. Louis in 2007, and received his Ph.D. in Mechanical Engineering from the University of Michigan in 2012.

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