

MECHANICAL ENGINEERING

SEMINAR

Biomechanical Analyses of Human Movement Aimed at Improving Rehabilitation Outcomes

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Abstract

The human neuromusculoskeletal system is exceedingly complex due to highly nonlinear multi-body dynamics and musculotendon actuators, and redundant muscle control that isn't well understood. As a result, gaining insight into normal and pathological movement remains a challenge due to the extremely difficult task of identifying causal relationships between muscle force development and resulting movement dynamics. This talk will discuss how experimental and modeling and simulation techniques are being used to gain insight into the biomechanics and neuromotor control of human movement with the goal to improve rehabilitation outcomes for those with movement disabilities. Specifically, we will look at how biomechanical analyses of specific movement tasks can give insight into how individual muscles contribute to specific biomechanical functions such as providing body support, forward propulsion and balance control and how clinical interventions can help or hinder the performance of these functions.

Biography

Dr. Richard R. Neptune earned his Ph.D. in Mechanical Engineering from the University of California, Davis and has served on the Department of Mechanical Engineering faculty at UT Austin since 2001. His research integrates musculoskeletal modeling, computer simulation and experimental analyses to identify the neuromotor and biomechanical mechanisms that contribute to locomotor impairments in those with movement disabilities including lower-limb amputees, stroke patients and wheelchair users. His research also seeks to improve the performance of orthotic and prosthetic devices using advanced additive manufacturing techniques. He has received a number of awards for his teaching and research including the CAREER award from the National Science Foundation, the Joe and Bettie Branson Ward Endowed Excellence Award from The University of Texas at Austin for his teaching and research that has contributed to changes of positive value to society, the Lockheed Martin Aeronautics Company Award for Excellence in Engineering Teaching, the Van C. Mow Medal from the American Society of Mechanical Engineers, and the Founders Award from the American Society of Biomechanics. He is currently the Chair of the Department of Mechanical Engineering and holds the John T. MacGuire Professorship in Mechanical Engineering.