SMU Department of Mechanical Engineering

SEMINAR

"Leveraging Advances in Robotics Technology to Restore Biomechanically Healthy Gait to Lower Limb Amputees"

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Abstract: Lower limb prostheses have traditionally been passive devices that lack the ability to generate net power at the joints. This absence of net power generation impairs the ability of passive prosthesis to restore biomechanically healthy function to lower limb amputees. Recent advances in battery, motor, and microelectronics technologies have enabled the possibility of powered (i.e., active) lower limb prosthesis, which have the potential to generate net power at the joints and actively adapt to varying terrain. Instilling a lower limb prosthesis with power, however, changes greatly the nature and significance of the prosthesis control and interface problem (i.e., a passive prosthesis can fundamentally only react to the user's input, but a powered prosthesis can both act as well as react). This talk describes the development of a lower limb prosthesis with a powered knee and ankle joint, and describes the control methodology through which the prostheses interacts with the user. Results are presented that indicate the effectiveness of the prosthesis and control interface.

Bio: Michael Goldfarb received the B.S. degree in mechanical engineering from the University of Arizona in 1988, and the S.M. and Ph.D. degrees in mechanical engineering from the Massachusetts Institute of Technology in 1992 and 1994, respectively. In 1994 he joined the Department of Mechanical Engineering at Vanderbilt University, where he is currently the H. Fort Flowers Professor of Mechanical Engineering. Dr. Goldfarb directs the Center for Intelligent Mechatronics at Vanderbilt (http://research.vuse.vanderbilt.edu/cim/), which is focused on the design and control of electromechanical devices, with particular emphasis on issues at the intersection of design and control. Much of the Center's work is human-centered, including current research in anthropomorphic robotic upper and lower extremity prostheses; dynamic approaches to the control of robot biped locomotion; and the development of powered exoskeletons to enable gait restoration for spinal cord injured individuals. Dr. Goldfarb has published over 130 technical papers in these and related areas of research, holds 9 US patents, and has directed over $13 million dollars of externally funded research as a principal investigator from federal agencies including the National Science Foundation (NSF), the National Institutes of Health (NIH), the National Aeronautics and Space Administration (NASA), the Defense Advanced Research Projects Agency (DARPA), and the Army Research Office (ARO).