Angela Colantonio

Community Integration: Relevance for Robotics

Dr. Angela Colantonio is a Senior Research Scientist at Toronto Rehab, where she holds the Saunderson Family Chair in Acquired Brain Injury Research. She is also a Professor of Occupational Science and Occupational Therapy at the University of Toronto where she holds a Canadian Institute for Health Research Chair in Gender, Work and Health. She leads an internationally recognized program of research on acquired brain injury (ABI) that includes examination of ABI in the population for both injury prevention and post acute care purposes, with a special focus on vulnerable populations. Other areas of Dr. Colantonio's research program include long term outcomes, sex- and gender-related issues, and innovative approaches to intervention, such as the use of theatre as a knowledge mobilization strategy. She has over 160 publications and has received funding from numerous agencies in both the United States and Canada.

George Demiris

Smart homes: redefining residence as a platform for health and rehabilitation

Dr. George Demiris is the Alumni Endowed Professor in Nursing at the School of Nursing and Biomedical and Health Informatics at the School of Medicine, University of Washington. He is the Director of the Clinical Informatics and Patient Centered Technologies Program at the University of Washington. He has served as the Chair of the International Medical Informatics Association Working Group on Smart homes and Ambient Assisted Living and the Lead Convener of the Technology and Aging Special Interest Group of the Gerontological Society of America. He is investigating the use of advanced information technologies such as web-based videoconferencing, remote monitoring devices and sensors to support patients at home and enable them to interact with care providers at a clinical site. His research also focuses on the concept of a "smart home", i.e., a residence equipped with sensors and other devices that enhance safety and monitor the residents' health conditions. This includes both design and evaluation of ambient assisted living applications. His research involves social and clinical dimensions of the so-called area of "gerontechnology", namely the use of information technology to support aging.

Maja Matarić

Socially Assistive Robotics: Non-Physical Human-Machine Interaction for Personalized Care

Dr. Maja Matarić is Professor and Chan Soon-Shiong Chair in Computer Science, Neuroscience, and Pediatrics at the University of Southern California. Her research involves developing human-machine interaction methods, in particular human-robot interaction methods, for gaining novel insights into human behavior and enabling technology-assisted diagnosis, assessment, intervention, and/or therapy. The research is aimed at endowing robots with the ability to help people, especially those with special needs, through social interaction rather than through physical contact, by providing coaching, motivation, and companionship.

Her Interaction Lab focuses on socially assistive systems capable of providing personalized assistance in convalescence, rehabilitation, skill training, and education. Some of the user populations she works with include stroke patients, children with autism spectrum disorders, children at risk for obesity and individuals suffering from dementia/Alzheimer's disease.

Todd Kuiken

Targeted Reinnervation: a Neural Interface for Robotic Limb Systems

Dr. Todd Kuiken is the Director of the Center for Bionic Medicine at the Rehabilitation Institute of Chicago. He is also a Professor in the Department of Physical Medicine and Rehabilitation, the McCormick School of Engineering and the Department of Surgery of the Feinberg School of Medicine at Northwestern University. He is conducting research to improve the function of artificial limbs for amputees, particularly those with proximal amputations. He has pioneered a technique called 'targeted reinnervation' in which surviving branches of amputated nerves are directed to reinnervate spared regions of muscle. The signals recorded from these reinnervated muscles serve as control signals for the myoelectric arm. This allows simultaneous control of multiple joints in a natural way. Similarly, sensory nerves formerly innervating the hand can be directed to reinnervate spare skin in or near the residual limb so that when this skin is touched, the amputee experiences a sensation akin to the missing hand being touched. This neural interface is now being enhanced using pattern recognition algorithms to enable the intuitive control of more degrees of freedom.

David Reinkensmeyer

Robot-assisted rehabilitation therapy and sensory motor restoration: Toward a computational approach

Dr. David Reinkensmeyer is Professor in the Departments of Mechanical and Aerospace Engineering, Anatomy and Neurobiology, Biomedical Engineering, and Physical Medicine and Rehabilitation at the University of California Irvine. His research interests are in neuromuscular control, motor learning, robotics, and rehabilitation. A major goal of his research is to develop physically interacting, robotic and mechatronic devices to help the nervous system recover the ability to control movement of the arm, hand, and leg after neurologic injuries such as stroke and spinal cord injury. He is also investigating the computational mechanisms of human motor learning in order to provide a rational basis for designing movement training devices. His laboratory has helped develop a variety of robotic devices for manipulating and measuring movement in humans and rodents, including the T-WREX arm training system, now in clinical use worldwide as the Hocoma ArmeoSpring.