**Rehabilitation Robotics**

Recent advances in robotic technology and clinical neuroscience have greatly expanded the development of machines for improving function and mobility in individuals with disabilities. The machines include devices such as powered braces or artificial limbs, and brain-computer interfaces for connecting patients to computers via electrical signals. The devices can be used during therapy to retrain motor abilities or during everyday activities to assist individuals with disabilities. The advances in technology are coming at a time of great need due to increasing patient populations with motor and mobility impairments. In the United States alone, over 1.7 million people live with limb loss, over 5 million people use orthoses to combat paralysis, deformity or orthopedic impairments, and over 10 million people have mobility impairments due to spinal cord injury, stroke, traumatic brain injury, or cerebral palsy. Although rehabilitation robotics is a research area that is growing rapidly, it also faces key challenges that need to be addressed through a multi-disciplinary thrust. Many promising rehabilitation technologies have failed to achieve successful transfer to the clinic or home. It is important for the design and engineering of new rehabilitation devices to be conducted in close collaboration with clinicians with expertise in patient care, and with scientists who understand the interface between human and machine. Rehabilitation devices are not merely operated by a person, but must work in concert with the patient as a system. To truly understand the system of human and machine in rehabilitation robotics, there are multiple aspects that need to be studied. First is how human and machine work independently. Second is how the two interact, including both the mechanical transfer between human and machine and the electrical transfer between human and machine. To address these issues, we will recruit four new assistant professors across four different units with complementary research expertise. We will hire a biomechanist in the School of Kinesiology, a clinical researcher in the Department of Physical Medicine and Rehabilitation, a mechatronics expert in the Department of Mechanical Engineering, and a neural engineer in the Department of Biomedical Engineering. Together, the researchers will be able to address the multidisciplinary problems in developing new technology for rehabilitation. In addition to the benefits in the research activities at the University of Michigan and the potential health care benefits to society, the hires will also provide an important addition to the education of undergraduate students through new courses and research experiences.