Title: **Research Trends in Rehabilitation Robotics**

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**Abstract:**  
Rehabilitation robotics can be divided into two main areas, assistive robotics including personal care robots, and rehabilitation therapeutic systems. Trends show these areas of rehabilitation robots branching into several directions. In rehabilitation robots for therapy, new trends are seen in the provision of robots for stroke therapy that assist in training of the whole arm and hand in both reaching and grasping and the use of robot therapy systems that are coupled with methods for uncovering how motor learning is occurring and how cerebral plasticity such as fMRI. In contrast, there is the trend to provide novel systems for home rehabilitation and monitoring that are low-cost and affordable. The use of wireless, wearable and portable technology to provide home monitoring and the use of low-cost gaming technology or VR systems to provide home therapy is frequently seen. In assistive and personal robotics for rehabilitation, we uncover to provide more home personal and service robots that can provide more natural assistance, i.e., functioning as personal rehabilitation robots that provide service, are socially interactive, and more anthropomorphic approaching humanoid. Another clear trend is the move to novel control interfaces such as brain computing interfaces for control of a wheelchair robots and new control interfaces for control of new prostheses. This lecture will focus on these trends and seek to uncover what they tell us about the future of the field.

**Biography:**  
Michelle J. Johnson, Ph.D., is Assistant professor of Physical medicine and rehabilitation at the Medical College of Wisconsin, and Research assistant professor in Biomedical engineering at Marquette University. She received her Doctor of Philosophy degree in Mechanical Engineering, with an emphasis in mechatronics, robotics, and design from Stanford University. She completed a National Science Foundation-NATO post-doctoral fellowship at the Advanced Robotics Technology and Systems Laboratory at the Scuola Superiore Sant’Anna in Pisa, Italy. Dr. Johnson specializes in the design, development, and therapeutic use of novel, affordable, intelligent robotic assistants to help those with disabilities recover function or live independently. Her current research focuses on using robotic tools to understanding upper extremity dysfunction after stroke and the process of functional recovery of activities of daily living. Dr. Johnson teaches and directs the Rehabilitation Robotic Research and Design Laboratory located at the Clement J. Zablocki VA. The laboratory is jointly supported by Rehabilitation Medicine at the Medical College and Rehabilitation Engineering at Marquette University. It is also affiliated with the Orthopedic and Rehabilitation Engineering Center, a joint program of Marquette University and the Medical College, and the Falk NeuroRehabilitation Center at Marquette University.

**References:**

**HUMANOID HELPERS/SERVICE ROBOTS:**


**WEARABLE REHAB/HOME**


P. Bonato, “Advances in wearable technology and applications in physical medicine and rehabilitation”, *Journal of NeuroEngineering and Rehabilitation* 2005.


**HOME REHAB/LOW-COST**


**OTHER**