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ROBOTIC EXOSKELETON FOR REHABILITATION AND MOTION ASSIST-DESIGN, DEVELOPMENT, AND CONTROL
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Physical disabilities such as full or partial loss of function in the upper/lower limb are a common impairment due to stroke, cardiovascular diseases, trauma, sports injuries, occupational injuries, and spinal cord injuries. The occurrence of strokes has been progressively increasing. The World Health Organization reports that stroke affects each year more than 17 million people worldwide. Among these, 85 % of stroke survivors will incur acute arm impairment, and 40% of victims are chronically impaired or permanently disabled. The majority of stroke survivors live with long-term disabilities leading to serious social and economic impacts: it is estimated that stroke and heart disease cost Canada more than $22.2 billion annually. This cost burden is triple in the United States, estimated $65.5 billion annually. Treatment upper extremity impairment following a stroke or cardiovascular diseases mostly depends on rehabilitation therapy. Research shows that intensive and repetitive therapy significantly improves motor function. However, treatment duration of such therapeutic protocols is usually long and also requires a long-term commitment from therapists/clinicians. On top of these facts, the number of such cases is constantly growing. Therefore, an alternative to the conventional treatments is essential. To contribute to this area, we have been researching the design, development and control of wearable robots, to provide rehabilitation therapy (which includes intensive and repetitive therapies) while alleviating the work burden from those therapists/clinicians. Recent studies also revealed that stroke-affected patients who received robot-assisted therapy showed significant reduction in motor impairments and regained significant functional abilities. The presentation will highlight some research challenges of robotic interventions for upper/lower extremity rehabilitation, our ongoing research works in this area and some future works of this technology.

Brief Biography:
Mohammad Habib Rahman is with the Mechanical and Biomedical Engineering Department, University of Wisconsin-Milwaukee, WI, USA. He received a BSc Engineering (mechanical) degree from Khulna University of Engineering & Technology, Bangladesh in 2001, a Master of Engineering (bio-robotics) degree from Saga University, Japan in 2005 and a PhD in Engineering (bio-robotics) from École de technologie supérieure (ETS), Université du Québec, Canada in 2012. He worked as a postdoctoral research fellow in the School of Physical & Occupational Therapy, McGill University (2012-2014). His research interests are in bio-robotics, exoskeleton robot, intelligent system and control, mobile robotics, nonlinear control, control using biological signal such as electromyogram signals.