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## Public Lecture



### Dr. Fady S. Alnajjar

Intelligent Behavior Control Unit, Brain Science Institute and  
TOYOTA Collaboration Center (BTCC), RIKEN, Japan

## “Neural Synergy: The Advanced Platform for Motor Function Recovery”

**Monday, April 27, 2015, at 3:30 PM**  
**Conference Room - Building D**

#### *Abstract*

Human behaviors are a result of complex neural dynamics between the central nervous system (CNS), proprioceptors, and the musculoskeletal system. Understanding these dynamics is essential to gain fundamental knowledge of our neural system; not only to assist its development and recovery, but also to support the development of various bio-inspired intelligent systems. The notion of muscle synergy, defined as relative weight of muscle activations driven by common excitation primitives, has recently received considerable attention from the neuroscience community as a way to interpret, in a quantitative way, the neural strategy adopted by the CNS to simplify the coordination and controlling of muscles. Muscle synergies have been well investigated in several areas including the: classifying and modeling human and animal motor skills, identifying the degree of brain damage after neurological lesion, and assisting stroke therapy. In this particular study, we are targeting neuromuscular strategies behind behavioral control and adaptation in both healthy and stroke patients. We believe that our study outcomes can be utilized to build a robust background that is essential to design effective stroke rehabilitation or skill-acquisition training programs by: assisting neural-synergy reorganization, controlling exoskeleton robots, predicting models of human locomotion, controlling multi-degree of freedom prostheses, designing online robotic therapy, etc.

#### *About the Speaker*

Dr. Fady Alnajjar received his MSc in Artificial Intelligence and his PhD in System Design Engineering at the University of Fukui, Japan in 2007 and 2010. Since 2010, he is a research scientist at brain science institute (BSI), at the Institute of Physical and Chemical Research (RIKEN). He conducted neuro-robotics study with Prof. Jun Tani to understand the underlying mechanisms for embodied cognition and mind. Currently, he is with Dr. S. Shimoda, and Prof. H. Kimura in exploring the neural mechanisms of motor learning, adaptation, and recovery after brain injury from the sensory- and muscle-synergies perspectives. His research target is to propose practical neurorehabilitation applications for patients with brain injuries. The current work is conducted in collaboration with the National Center for Geriatrics and Gerontology, Aichi, Japan.