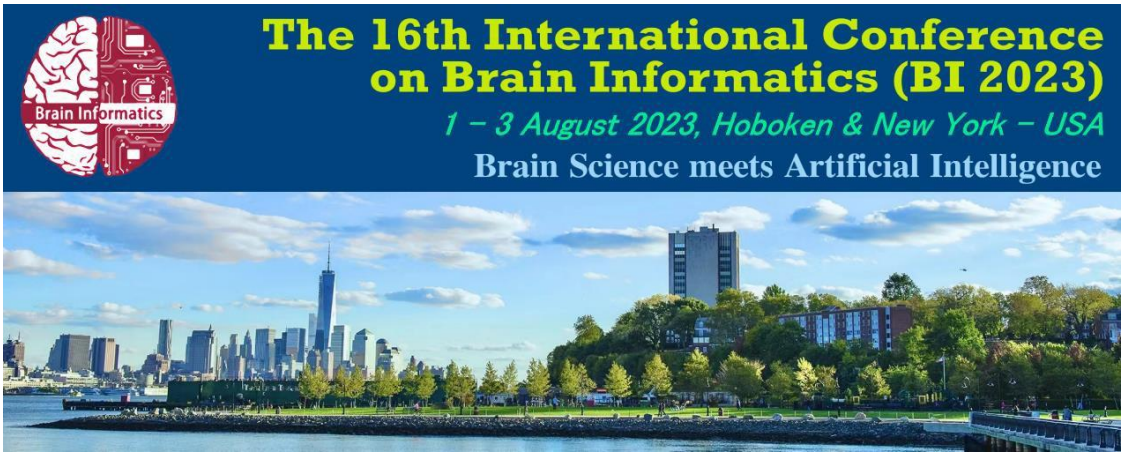

BI 2023 Workshop on External Sources of Brain Stimulation to "Inform" Motor Function

Workshop Description and Scope

In this half-day (~4 hours) workshop, we will present talks that cover topics touching upon a ***broad array of applications involving neural stimulation to alter and improve motor function***. External sources of neural stimulation that may be discussed include (but are not restricted to):

- electrical/magnetic stimulation to modulate neuromotor circuitry
- robotic devices actively injecting power to affect motor function and associated neuroplasticity responses
- sensory-driven human-computer interfaces, including virtual reality, to support neural engagement during rehabilitative training

Workshop Format

We expect to hold 6-10 talks, each ~20-30 minutes, including Q&A. Each talk will conclude its scientific portion (i.e., explanation of application/context whereby the brain is "stimulated" and movement function subsequently affected) with suggestions outlining how artificial intelligence, machine learning, or general data mining techniques can be applied to improve related clinical or preclinical paradigms.

Workshop Organizers (also among presenters)

Raviraj Nataraj, Ph.D. (main contact, e-mail: rnataraj@stevens.edu):

- Currently an Assistant Professor in the Department of Biomedical Engineering at Stevens Institute of Technology.
- Background in developing musculoskeletal simulations and creating sensor-based feedback control systems for real-time operation of powered assistive neuroprostheses.

- Research areas include assessing how augmented sensory feedback can be optimally delivered to promote neural engagement during motor training and creating computerized interfaces, e.g., virtual reality and instrumented wearables, for motor rehabilitation after brain or spinal cord trauma.

Noam Y. Harel, M.D./Ph.D. (e-mail: noam.harel@mountsinai.org)

- Currently, Associate Professor and Physician (Neurology) with James J. Peters VA Medical Center and Icahn School of Medicine at Mount Sinai
- Focus on rehabilitation from and treatment of spinal cord injury (SCI) and amyotrophic lateral sclerosis (ALS).
- Research areas include developing new methodologies to reactivate weakened nerve circuits, including physical exercises, electrical stimulation, drug repurposing, and ischemic conditioning.

Soha Saleh, Ph.D. (e-mail: salehsh@shp.rutgers.edu)

- Currently an Assistant Professor in the Department of Rehabilitation and Movement Sciences, School of Health Professions
- Focus on improving function and quality-of-life of persons with motor and cognitive disabilities (e.g., stroke, traumatic brain injury).
- Research areas include neuroimaging-based prognosis models, cognitive-motor interactions driven by novel rehabilitative and assistive technologies, and neuromodulation methods for neuroplasticity in humans.

Kasia Bieszczad, Ph.D. (e-mail: kasia.bie@rutgers.edu)

- Currently an Associate Professor in the Department of Psychology at Rutgers University.
- Focus on neurobiological substrates of learning and memory, including brain processes supporting long-term memory.
- Research areas include identifying circuit and molecular mechanisms that regulate auditory systems, remodeling cortical and subcortical representations of sounds, and employing advanced electrophysiological and pharmacological techniques to analyze animal models for functional, molecular, and genetic markers of brain-behavior relationships.

George McConnell, Ph.D. (e-mail: gmcconne@stevens.edu)

- Currently an Assistant Professor in the Department of Biomedical Engineering at Stevens Institute of Technology.
- Focus on designing and implementing innovative electrical therapies to treat neurological and psychiatric disorders.
- Research areas include employing implantable neural stimulation, e.g., deep brain stimulation, to recover motor and cognitive function, model-based analysis of motor behaviors, electrophysiological signals, and histological patterns to characterize post-therapeutic gains in motor (gait) function with rats.