

University of Houston - Biomedical Engineering Seminar

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Via Zoom:

<https://uh-edu-cougarnet.zoom.us/j/91584753211?pwd=YUY3Q3puekZ5THljNjFoU2dCTjNuQT09>

Neural Engineering for Sensorimotor Rehabilitation in Hemiparetic Stroke



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Abstract

After a unilateral or hemiparetic stroke, damage to the corticospinal tract in the lesioned side of the brain increases the abnormal reliance on motor pathways in the contralesional side of the brain. Based on computational modeling and human subject experiments, we developed a novel brain-muscular connectivity measure that allows the determination of the stroke-induced change to the usage of different motor pathways and its link with post-stroke motor impairments. We found the change to the motor pathways is likely associated with and permitted by a hemispheric shift of sensory processing toward the contralesional sensorimotor areas. To combat these maladaptive functional changes, we developed a novel non-invasive brain stimulation intervention that targets specific brain regions in a precise way. Early results from clinical trials in moderate-to-severe impaired stroke individuals demonstrated effective reduction in post-stroke movement impairments. The multimodal brain imaging and brain stimulation developed in our stroke research have broader impacts that can be translated to investigate other neurological disorders and brain functions.

Biosketch

Dr. Yuan Yang has a B.S and M.S. in BME, and Ph.D. in Signal and Image Processing. He then was a Post-Doc in Bio-Mechanical Engineering at the Delft University of Technology. He then was an Assistant Professor in Physical Therapy and Human Movement Sciences at Northwestern. He is currently leading a multi-site clinical-oriented biomedical engineering laboratory at Tulsa and Oklahoma City with the main research topic on stroke rehabilitation and new research directions on pain and opioid control, aging and sex differences in the brain. His research includes hypothesis-driven human subject mechanistic studies and registered clinical trials. His research is currently supported by the NIH, AHA, and multiple regional/local research grants. He has been serving as a grant reviewer for NIH, NSF Smart Health Program, and many others.