FIU Biomedical Engineering
FLORIDA INTERNATIONAL UNIVERSITY

Biomedical Engineering
Wallace H. Coulter Foundation
Lecture Series

WALLACE H. COULTER Foundation

"EEG-Based Brain-Computer Interface for Prosthetic Control "

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Director of Human Cyber-Physical Systems (HCPS) Laboratory in FIU

Friday, February 17th, 2017
Lecture: 11:00 AM-12:00 PM
ENGINEERING CENTER
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Abstract: : A brain-computer interface (BCI) is purposed to provide the brain with a new, non-muscular communication and control channel for conveying messages and commands to the external world. Despite of invasive BCIs using neural spikes or local field potentials, noninvasive BCIs mainly using scalp electroencephalography (EEG) can function in most environments, and require relatively simple and inexpensive equipment, offering the realistic possibility for patients with motor impairments to use their brain signals to directly control external devices. The major challenge in a noninvasive EEG-based BCI is to accurately and reliably decode user's intents from noisy and complex-patterned EEG signal. Our laboratory has focused on the recognition of user's voluntary motor intentions from the movement-related cortical potentials and the associated cortical activity desynchronization and synchronizations in EEG signal. We have developed signal processing and machine learning algorithms for decoding motor intentions online in real-time by enhancing the spatiotemporal resolution of scalp EEG. We have also investigated the feasibility of BCI-based clinical applications for restoring motor functions including the intentional control of prosthetic leg in amputees, real-time wheelchair control from brain, and cursor control in patients with amyotrophic lateral sclerosis.

Biography: Dr. Bai received post-doctoral research training in EEG and clinical neurophysiology in the National Institutes of Health, where he developed his interest in the human motor control physiology and brain-computer interface for the motor rehabilitation. Dr. Bai has been the Faculty in the Department of Biomedical Engineering, Virginia Commonwealth University. He currently serves as the Director of Human Cyber-Physical Systems Laboratory in the Department of Electrical and Computer Engineering, Florida International University. Dr. Bai's Lab has been actively involved in the science and engineering development of novel signal processing methods for understanding human motor control, and developing neural interface technology and prosthetic devices for the motor rehabilitation. Dr. Bai has published more than 100 peer-reviewed Journal papers and conference proceeding papers. Dr. Bai's research is highly interdisciplinary with collaborations from academia, industry, medical institutes and government Laboratories. Dr. Bai's research has been supported by industry and federal agents including National Institutes of Health and National Science Foundation.