



Towards a Non-invasive Brain Stimulation Guided by Neural Biomarkers for Enhancing Neuromotor Performance



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Abstract

Neurological disorders and age-related motor declines are leading causes of long-term disability. Current rehabilitation strategies, such as physical therapy and robotic-assisted rehabilitation, provide limited benefits as they do not promote the brain's neuroplastic mechanisms. Brain-Computer Interfaces (BCI), on the other hand, have shown potential by decoding brain activity to actuate rehabilitation devices, but they lack to provide brain stimulation to promote cortical re-organization. We aim to develop a neurotechnology system that integrates real-time decoding of neural biomarkers with non-invasive brain stimulation targeting motor circuits to enhance neuromotor performance. The system will focus on transcranial direct current stimulation (tDCS) as a therapeutic intervention for older adults with reduced mobility and individuals with neuromotor impairments. In this talk I will show results of experiments devoted to identifying and decode EEG-based marker and the effects of tDCS, both during the execution of motor tasks with the upper limb.

Biography

Mauricio is professor and researcher in the Department of Computing at the School of Engineering and Sciences of Tecnológico de Monterrey, Mexico. He graduated in electronics engineering from the Francisco de Paula Santander University, Cúcuta, Colombia. He received a M.Sc. degree in electronic systems from the Tecnológico de Monterrey, Mexico, and M.Sc. and Ph.D. degrees in biomedical engineering from the University of Zaragoza, Spain. He leads the Neurotechnology and Brain-Computer Interface Research Lab (NTLab), where he works in the field of brain-machine interfaces (BMI), bioelectrical signal processing, brain imaging, decoding of cognitive states from electrophysiological recordings, and instrumentation and data acquisition. In his research, he aims to understand and to decode electrophysiological responses and the brain-electrical activity acquired with the noninvasive electroencephalogram (EEG) technique to develop novel solutions for people with reduced mobility and communication. He employs AI methods for the examination, diagnosis, neurorehabilitation, treatment and follow-up of neurodegenerative diseases and neurological and chronic disorders originated by illnesses and by natural aging.

*** ALL ARE WELCOME ***

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