Seminar Talk

Yalda Shahriari
PhD student
Department of Electrical and Computer Engineering
Old Dominion University

Friday, January 23, 2015
3:00 p.m. KH 224

Title: Multichannel characterization of brain activity in neurological impairments

Abstract:
Amyotrophic lateral sclerosis (ALS) is a neurodegenerative disease caused by motor nervous system impairment that often leads to locked-in syndrome (LIS) and causes the muscle weakness and atrophy as a result of degradation of both upper and lower motor cortex of the brain, spinal cord and brainstem. In this type of neurological disorder although patients suffer from dysfunction of nervous system, the brain function is still intact. Rehabilitation strategies have tried to improve a communication way for these patients through developing brain-computer interface (BCI) systems and made them able to convey their intention and thus being more involved with their family and community. In fact these systems can open a channel for such patients to communicate with their external world through their brain signals. In a BCI system brain signal activity is recorded, processed and decoded, translated into different commands and finally transferred to an external device in order to convey the person's intention. However, speed and reliability are two critical factors for any BCI users, and a myriad of studies have explored new methods for improving the information transfer rate in BCI systems. The Wadsworth Center and Helen Hayes Hospital provide an electroencephalogram (EEG)-based BCI device for independent home use by people with ALS. These home users can experience significant variation in day-to-day BCI performance that can both frustrate and discourage users and caregivers alike. The overriding objective of this study is to create a novel characterization of multichannel EEG activity for these selected neurological disorders. Specifically, this work will provide spatial, spectral, and temporal characterizations of brain activity differences between patients models and healthy controls, with focus on modern techniques that quantify cortical connectivity, which is widely believed to be abnormal in such disorders. Exploring the functional brain networks in these patients can provide a better understanding of the pathology of the respective diseases/disorders and possibly lead to developing a model for enhancement in the biology of neural interactions in these patients. Moreover, the outcomes of such investigation and characterization can lead to development of a more sophisticated BCI system through optimum parameters and factors.

Bio:

Yalda Shahriari was born in Mashhad, Iran in 1985. She received her B.Sc degree in electrical engineering from the Ferdowsi University of Mashhad, Iran in 2008 and her M.Sc degree in biomedical engineering from Iran University of Science and Technology, Tehran in 2011. She is currently a PhD candidate in the Applied Signal Processing in Engineering and Neuroscience (ASPEN) Lab at Old Dominion University in Norfolk, Virginia. Her research interests include brain-computer interfaces, biomedical signal processing, machine learning, cognitive and computational neuroscience.