



**The Chinese University of Hong Kong  
Department of Biomedical Engineering**



## **Graduate Seminar – PhD Oral Defence**

**Student** : Mr. TI Chun Hang Eden  
**Supervisor** : Prof. TONG Kai Yu Raymond  
**Date** : 10 August 2023  
**Time** : 4:00 pm  
**Venue** : ERB 1122, William M W Mong Engineering Building (Computer Lab)

### **Title: Optimized transcranial direct current stimulation using individualized finite element model facilitates motor recovery in chronic stroke**

Stroke is one of the most prevalent causes of upper extremity impairment. The disruption of neural connections from the brain to muscles persistently impedes a subject's movement abilities following a stroke. Restoring upper limb functions requires re-establishing the integrity of neural circuits through the process of adaptive neural plasticity. Recently, transcranial direct current stimulation (tDCS) has been utilized to facilitate neural plasticity for motor rehabilitation. tDCS modulates cortical excitability by applying a weak direct electrical current to the scalp. By stimulating the motor cortex during rehabilitative training, the upper limb motor functions can be significantly improved. However, the clinical efficacy of tDCS remains uncertain due to the major challenge that each stroke individual possesses different brain anatomy and motor functional localization. To achieve better rehabilitation outcomes, tDCS needs to be personalized to stimulate the motor-related networks specific to individuals. This seminar focuses on introducing the methodology of tDCS personalization and evaluating the clinical effectiveness of its application. Specifically, the procedures of generating an individualized finite element model for tDCS-induced electric field simulation, the inference of electric field models in tDCS neuromodulation effects, and the effectiveness of optimized tDCS montages targeting individual sensorimotor networks on motor relearning will be discussed.

**\*\*\* ALL ARE WELCOME \*\*\***

*For enquiries, please contact Ms. Joyce Chan, Department of Biomedical Engineering at 3943 8278*