The Chinese University of Hong Kong

Department of Biomedical Engineering

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Seminar Link:

https://cuhk.zoom.us/j/98326875405?pwd=NDZ2Vk9ONm1UT25DNjhXVUh3NEpFdz09

Fast Magnetic Resonance Imaging and Its Applications in Diagnosis and Navigation

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Abstract

Magnetic resonance imaging (MRI) is one of the medical imaging modalities which can provide superior soft tissue contrast without the need of ionizing radiation. However, MRI is more susceptible to motion compared to other medical imaging modalities because of its relative long scan time. Therefore, several fast MRI techniques, such as echo-planar imaging (EPI), have been proposed to improve the acquisition efficiency of MRI and reduce the susceptibility to motion, and even to enable functional and real-time imaging. Combining EPI and diffusion-weighted imaging (DWI) has been demonstrated for a wide range of clinical applications, such as detecting acute stroke and differentiating tumor type. Moreover, EPI-based diffusion-tensor imaging (DTI) and functional MRI (fMRI) are important imaging tools for neuroscience research, such as depicting the neural fiber map of human brain. Currently, the image quality and spatial resolution of EPI is enormously influenced by some kinds of artifacts and limited by its data sampling scheme. In this presentation, I will present our recent works on pushing the spatial resolution of EPI, thereby improving the diagnostic accuracy and firstly demonstrating submillimeter resolution DTI attainable at clinical MRI scanner. In addition, the recent use of fast MRI for image-based navigation will be demonstrated as an emerging application, such as MR-guided robotic system and MR-guided treatment.

Biography

Dr. Hing-Chiu Chang received his PhD degree in Biomedical Electronics from the National Taiwan University in 2012, and completed his postdoc training at Duke University Medical Center. He is currently a research assistant professor at the Department of Diagnostic Radiology, The University of Hong Kong. Before joining the academia, he worked in a medical imaging industry and developed prototype magnetic resonance imaging (MRI) software for research purpose. His research interests include image reconstruction and artifact reduction for fast MRI technique, especially for multi-shot echo-planar imaging (EPI). He has pioneered several 2D and 3D multi-shot EPI techniques to enable high-resolution and time-efficient brain diffusion-tensor imaging (DTI), such as 2D DTI based on multi-band interleaved EPI with multiplexed

sensitivity encoding (MB-MUSE), 3D DTI based on interleaved EPI acquisition and multiplexed sensitivity encoding and reconstruction (3D-MUSER), self-calibrated and collaborative Propeller-EPI Reconstruction (SCOPER), etc. To date, he has published 45 peer-reviewed papers and near 100 international conference papers. He also serves as review editor for Radiation Oncology, and reviewer for several international journals in medical imaging.

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

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