UBSN
University Research Facility in Behavioral and Systems Neuroscience
神經科學中心實驗室

NEWSLETTER

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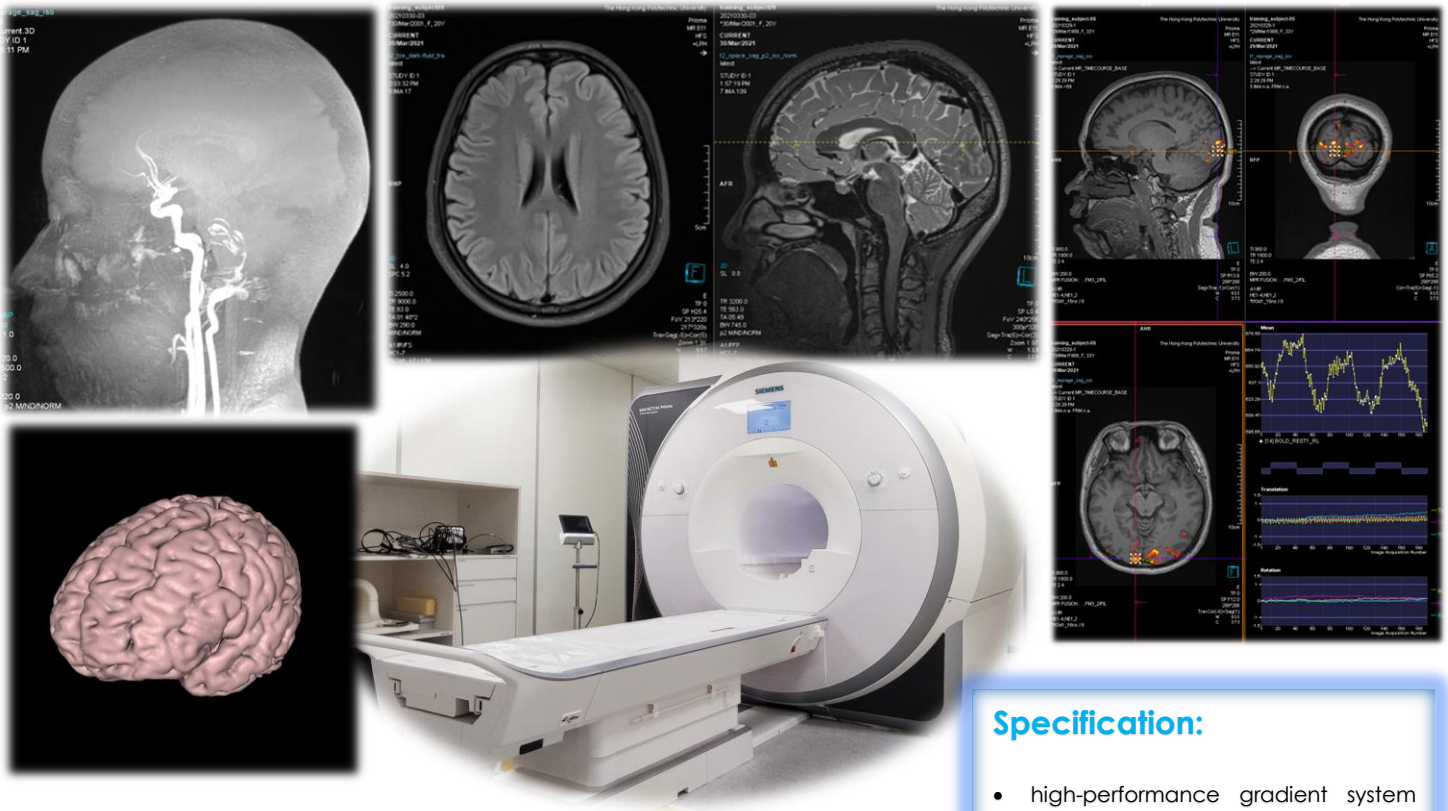


Magnetic Resonance Imaging - MAGNETOM Prisma 3T MRI Scanner

Magnetic Resonance Imaging (MRI) is an advanced non-invasive and safe imaging technology that has been widely used in research and clinical settings. UBSN has recently installed the state-of-the-art Siemens MAGNETOM Prisma 3T scanner dedicated to scientific research. It allows researchers to perform both structural and functional scanning. Various MRI-compatible equipment and data processing systems have also been installed to support a wide range of MRI research.

Please refer to our website for more information about our MRI:

https://www.polyu.edu.hk/ubsn/facilities/mri/overview/

Associate Director's message:

MRI has revolutionarized both medical sciences and human research in the last 40 years. Installation of the research dedicated MRI at UBSN represents a major milestone for neuro-biological and health-science research at PolyU. We welcome PolyU and outside members to use this facility for world-class research and education. We envision it as a catalyst for large-scale research collaborations, both locally and internationally. At UBSN we will do our best to serve the community with this facility, to enhance our core missions under PolyU's motto "To learn and to apply, for the benefit of mankind."

Specification:

- high-performance gradient system (80mT/m@200T/m/s simultaneously, on all three axes) with an advanced cooling system
- new hardware and software platform syngo MR XA30 allowing excellent MR imaging and research, such as Diffusion Weighted Imaging (DWI), Susceptibility Weighted Imaging (SWI), functional MRI (fMRI), and Diffusion Spectrum Imaging (DSI)
- multiBand SENSE technology allowing state-of-the-art acceleration factors during scanning with both high speed and high resolution, simultaneously
- a standard integrated whole-body coil, 20- and 64-channel head/neck coils, 32-channel head coil, 18-channel body coil, 15-channel knee coil, 32-channel spine coil, 4-channel large flexible coil, and 4-channel small flexible coil
- MR-compatible systems include an fMRI data presentation package (Sinorad), an eye tracker (EyeLink 1000 Plus), an EEG (BrainAmp), a tES (Soterix), and a physiological monitor (BIOPAC), for multi-modal imaging

Our MRI users and their ongoing research:

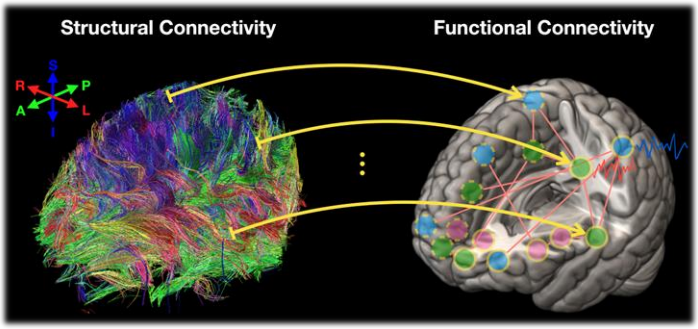
Dr. Momenian's work focuses on tracking the spatiotemporal dynamics of language comprehension in the younger and older speakers. To have a real-time picture of these dynamics in the aging brain, it is critical to use both EEG and fMRI modalities. EEG helps reveal the timing of language when it unfolds incrementally in the brain and fMRI reveals the regions in charge of different steps in language comprehension. The fusion between EEG and fMRI allows us to see how healthy aging could modify the dynamics of language comprehension in the brain and whether individual differences have any effects on this phenomenon.

Dr. Mohammad Momenian
Research Assistant Professor
Department of Chinese and Bilingual Studies

Making important decisions, such as finding a job, buying a house, and getting married to someone, involve complex computational processes in our brain. Dr. Chau's research team has an interest in decision neuroscience that aims at decoding these underlying brain processes and promoting adaptive decision making. This is achieved mainly via performing functional magnetic resonance imaging (fMRI) supplemented by eye-tracking, brain stimulation and artificial intelligence. In a series of work, his team revealed (1) the precise way in which irrational decision making emerges in the brain, (2) these irrational decision making can be modulated via brain stimulation, and (3) these irrational decision making are particularly obvious in patients with damages in specific brain regions. These findings were reported in journals such as *Nature Neuroscience, eLife* and *Journal of Neuroscience*. It is fascinating that a new MRI scanner is recently set up in the UBSN such that it is now possible to conduct these fMRI experiments at PolyU.

Dr. Bolton Chau (middle)
Associate Professor
Department of Rehabilitation Sciences
and his research team Dr. JJ Wong (left) and Mr. Victor Chan (right)

As an MRI scientist, Dr. Hui's research focuses on the characterization of the brain's anatomy not only at the ***regional*** level (using diffusion MRI), but also at the ***system*** level (diffusion and functional MRI). He aims to answer two important questions – 1) how exactly do the dynamic functional connections between different parts of the brain emerge from the underlying static anatomical connections? 2) What is the optimal way to characterize this relationship? His overall goal is to fill the critical knowledge in this ***link*** between the ***static anatomical connections*** and the ***dynamic functional connections*** in the hope of elucidating the neurophysiological mechanisms underlying cognition and stroke recovery.



Dr. Sai Kam Hui
Assistant Professor
Department of Rehabilitation Sciences

Interested in using our equipment? Please contact us:

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