

The University of Queensland - IIT Delhi Academy of Research Joint PhD Project

Project title	Develop ultrafast technique for high-resolution imaging of brain function
Project code	UQIDAR 00214
Project description	Functional magnetic resonance imaging (fMRI) has been widely used for understanding brain function and diagnosis of diseases. However, despite using the latest parallel imaging methods and hardware it still takes nearly a second to acquire a low-resolution whole brain image whereas high-resolution imaging will take longer. The limited spatiotemporal resolution limits the use of fMRI in gaining more detailed understanding of neural processing. This project aims to develop new MRI acquisition and image reconstruction methods to resolve this issue, including the combination of compressed sensing and machine learning image reconstruction. The method will be tested using ultrahigh field MRI to achieve sub-millimetre and sub-second resolutions. The student will learn the physics and maths behind MRI, computer simulation, how to program MRI software, machine learning, and conduct hands-on experiments on MRI scanner to collect empirical data for evaluation.
Project outcomes	The outcome of the project includes new MRI acquisition methods and protocols that can reduce the image artefacts from an implant, and machine learning based image reconstruction methods and software packages.
Advisory team	<p>UQ Principal Supervisor Associate Professor kai-hsiang chuang Queensland Brain Institute (QBI) k.chuang@uq.edu.au https://qbi.uq.edu.au/chuanggroup</p> <p>IITD Principal Supervisor Professor Rahul Garg Computer Science & Engineering rahulgarg@cse.iitd.ac.in http://www.cse.iitd.ernet.in/~rahulgarg/</p> <p>Additional Supervisor(s) Professor Feng Liu http://researchers.uq.edu.au/researcher/951</p>
Type of student	Applications are open to: I or q students who meet eligibility criteria .
Discipline background of student	Ideally, this project requires students with a background in: Physics, engineering, computer science
Ideal candidate	<p>Essential Capabilities: Strong knowledge and skills in physics, maths and programming languages (C/C++).</p> <p>Desirable Capabilities: Strong knowledge and skills in signal processing, image processing, statistics, neuroscience.</p> <p>Expected qualifications (Courses/Degrees etc.): Master of Science, Physics, Engineering or Computer Science.</p>

Application
process

Apply online by the due date: <https://www.uqidar.org/students/how-to-apply/>