

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

PROJECT TITLE	DIAGNOSTIC AND PREDICTIVE MRI AND PET BIOMARKERS IN FIRST SEIZURE AND REFRACTORY EPILEPSY PATIENTS: A MACHINE LEARNING APPROACH.
PROJECT CODE	UQIDAR 00128
PROJECT DESCRIPTION	<p>The ability to extract information from images using machine learning has increased tremendously with the development of deep Convolutional Neural Networks, which consistently outperform classical machine learning techniques. In this project, deep Convolutional Neural Networks will be used to derive new magnetic resonance imaging (MRI) and positron emission tomography (PET)-based biomarkers of seizure recurrence and medication unresponsiveness following a first unprovoked seizure and of seizure focus localisation in patients undergoing presurgical investigation for epilepsy surgery. Multi-contrast MRI, PET and EEG datasets and clinical information on focus localization, seizure recurrence and treatment responsiveness gathered at AIIMS and at RBWH will be used to develop and test the predictive biomarkers. The overall objective is to develop novel prognostic and diagnostic biomarkers. The specific aims are:</p> <ol style="list-style-type: none"> 1. To develop imaging biomarkers that predict seizure recurrence following the first unprovoked seizure. 2. To develop imaging biomarkers that distinguish patients with newly diagnosed epilepsy who respond to medication from those who do not. 3. To identify diagnostic biomarkers that identify the seizure focus in candidates for epilepsy surgery.
PROJECT OUTCOMES	<p>The research has the potential to influence clinical practice by altering the way that patients are investigated and managed following a first unprovoked seizure and in surgical workup. Its outcomes will contribute to the therapeutic goal of no seizures, no side effects. Identifying imaging biomarkers of treatment resistance and of focus localization will also facilitate more timely and better informed selection of treatment strategies such as epilepsy surgery. Adding to its innovativeness is the potential to develop new methodological approaches that will broaden scientific impact beyond epilepsy.</p>
ADVISORY TEAM	<p>Professor David Reutens https://cai.centre.uq.edu.au/ d.reutens@uq.edu.au Centre for Advanced Imaging The University of Queensland</p> <p>Assistant Professor Anup Singh http://cbme.iitd.ac.in/content/dr-anup-singh Anup.Singh@cbme.iitd.ac.in Department of Biomedical Engineering Indian Institute of Technology Delhi</p> <p>Dr Bruce Spottiswoode Siemens Medical Solutions USA</p>
TYPE OF STUDENT	<p>Applications are open to i/a students who meet eligibility criteria.</p> <p>note: i-students must have own scholarship to apply (CSIR, UCG-NET, etc)</p>

DISCIPLINE
BACKGROUND
OF STUDENT

Ideally, this project requires students with a background in biomedical engineering, computer science, applied mathematics, neuroscience.

IDEAL
CANDIDATE

Essential capabilities:

- Data analytical skills,
- Expertise in a programming language (eg, C/C++ or Matlab)

Desirable capabilities:

- Expertise in machine learning / artificial intelligence methods

Expected qualifications (courses, degrees, etc):

- Bachelor/Master/MPhil in a relevant field of Science, Biology, or Medicine

APPLICATION
PROCESS

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