PhD Scholarship

3-D Modelling and Analysis of the Human Brain using High-resolution MRI

Project description
Magnetic resonance imaging (MRI) is one of the major tools for analysing the human anatomy and physiology. In recent years, MRI can record three-dimensional (3-D) images of living human tissues at submillimeter resolutions. This has created a wide range of opportunities for clinical applications and also posed several new challenges for MRI research.

This project aims to develop new algorithms and tools for studying the human brain using MRI and functional MRI (fMRI). The project has three main aspects. The first aspect is to construct a high-resolution 3-D model of the human brain, which involves removing motion-induced image distortions and sensor noise, and fusing data acquired from multiple sources. The second aspect is to segment different parts of the human brain (e.g. blood vessels, white matter and gray matter) and obtain quantitative measures to discover how the human brain responds to different classes of static and dynamic visual stimuli. The third aspect is to apply the developed tools to study specific areas of the human brain, especially the brainstem and possibly at a later stage the forebrain and cerebellum. The project is expected to produce new image processing algorithms (3-D reconstruction, image registration/segmentation, and data fusion) and lead to better understanding of the human brain and its visual perception processes.

The project is funded by the ARC, NHMRC, and UOW. It is located at the University of Wollongong, Australia, and will jointly supervised by Dr. Lam Phung, Prof. Salim Bouzerdoum (School of Electrical, Computer, and Telecommunications Engineering) and Dr. Mark Schira (School of Psychology).

Eligibility
The scholarship is open to both domestic and international applicants. Applicants should possess a Bachelor or Masters degree in either biomedical engineering, computer engineering, electrical engineering, biophysics, psychology, computer science or related disciplines. The successful applicant should demonstrate excellent research capability, and strong analytical and communication skills.

Selection criteria
1. An Honours degree or equivalent (i.e. a 4-year Bachelor degree with high GPA), or a Masters degree.
2. Good knowledge of signal/image processing and machine learning algorithms.
3. Good oral and written communication skills (English).
4. Strong programming skills in MATLAB, C or C++.
5. Publication track record (desirable).

Remuneration
This is a 3.5-year scholarship; it includes a standard living stipend of $25849 per year and a tuition award.

Expression of Interest
Email your CV, full academic records, a 2-page synopsis of your research experience, and a sample publication or research report to Dr. Lam Phung (phung@uow.edu.au).

Expressions of Interest deadline: 10 August 2015.