

### PhD studentship (Full-time)

Institution	Xi'an Jiaotong-Liverpool University, China
School	School of Science
Supervisors	Principal supervisor: Dr Shuihua Wang (XJTLU) Co-supervisor: Dr Hongyi Zhu (JITRI) Co-supervisor: Professor John Moraros (XJTLU) Co-supervisor: Dr Guangliang Cheng (UoL)
Application Deadline	Open until the position is filled
Funding Availability	Funded PhD project
Project Title	Perioperative brain state monitoring algorithms based on EEG big data and deep learning technology
Contact	Please email <a href="mailto:Shuihua.Wang@xjtlu.edu.cn">Shuihua.Wang@xjtlu.edu.cn</a> (XJTLU principal supervisor's email address) or <a href="mailto:hongyi.zhu@apon.com.cn">hongyi.zhu@apon.com.cn</a> with a subject line of the PhD project title

#### **Requirements:**

The candidate should have a first class or upper second class honours degree, or a master's degree (or equivalent qualification) in subject of Computer science or related disciplines

Evidence of good spoken and written English is essential. The candidate should have an IELTS score of 6.5 or above, if the first language is not English. This position is open to all qualified candidates irrespective of nationality.

**Please note that the joint PhD project is industry-based and the candidate is expected to undertake part of the research at the partner organization in China.**

#### **Degree:**

The student will be awarded a PhD degree from the University of Liverpool (UK) upon successful completion of the program.

#### **Funding:**

This PhD project is a collaborative research project between XJTLU (<http://www.xjtlu.edu.cn>) in Suzhou and JITRI (Jiangsu Industrial Technology

Research Institute) R&D center of Apon Medical. The student will be registered as an XJTLU PhD student but is expected to carry out the major part of his or her research at the Institute in Shanghai.

The PhD studentship is available for three years subject to satisfactory progress by the student. The award covers tuition fees for three years (currently equivalent to RMB 99,000 per annum). In addition, during the period of undertaking main research at institute in Suzhou, the PhD candidate will be provided with monthly living allowance at a standard 3000 RMB per month, Transportation at a standard 1000 RMB/Month and Accommodation at a standard 1000RMB/Month by Apon Medical.

### **Project Description:**

Hundreds of millions of people around the world undergo surgeries and anesthesia every year due to the personal health condition to improve the quality and expectancy of human life, and especially the number is as high as 70 million every year in China.

During the surgery with anesthesia, brain monitoring is essential for an immediate assessment of the impact of anesthetics on consciousness as the anesthetics may cause cognitive disturbance. EEG is an efficient non-invasive method of assessing brain function, and perioperative EEG monitoring has important clinical values, including monitoring the depth of anesthesia during surgery, maintaining the anesthetic dose at an appropriate level and avoiding anesthesia depth to be too shallow or too deep and reducing the potential of perioperative neurocognitive disorders (PND). EEG can promptly detect perioperative epileptic discharges, postoperative delirium and other abnormal brain states. EEG can also be used to evaluate perioperative sleep conditions. Currently, the interpretation of clinical EEG mainly relies on manual methods by neurologists, anesthesiologist and sleep medicine experts. It is time-consuming, inefficient, boring as well as biased from experts to experts. On the other hand, an EEG clinical experts needs decades of training. The lack of Qualified EEG clinical experts makes a large number of patients hard to access EEG monitoring services. In the era marked by the fourth technological revolution, artificial intelligence has ushered in transformative changes across various industries, showcasing its remarkable potential. While AI has achieved significant breakthroughs in numerous fields, it's important to note that the application of artificial intelligence in EEG (Electroencephalography) has been an area where progress is still evolving. Despite the current pace, there is immense promise and untapped potential for AI to further revolutionize EEG technology, paving the way for innovative advancements in understanding and interpreting brain signals.

This study plans to collect clinical EEG data of 100,000 people (100TB) and aims to establish a deep learning technology framework for EEG data analysis. On the basis of the above two aspects of work, specific AI models for various perioperative brain state monitoring scenarios will be developed, including: intraoperative anesthesia

depth monitoring, postoperative delirium diagnosis, perioperative sleep staging, and abnormal brain state monitoring of critically ill ICU patients. These models may make the interpretation of clinical EEG to be automatic and assists anesthesiologists, neurologists and sleep medicine experts in making clinical decisions.

For more information about doctoral scholarship and PhD programme at Xi'an Jiaotong-Liverpool University (XJTLU): Please visit

<http://www.xjtlu.edu.cn/en/study-with-us/admissions/entry-requirements>

<http://www.xjtlu.edu.cn/en/admissions/phd/feescholarships.html>

### **Supervisor Profile:**

**Principal Supervisor: Dr Shuihua Wang**

**<https://scholar.xjtlu.edu.cn/en/persons/ShuihuaWang>**

**JITRI co-supervisor: Dr Hongyi Zhu**

**<https://www.xjtlu.edu.cn/zh/study/departments/jitri/academy-staff/jitri-industrial-supervisor/staff/hongyi-zhu>**

### **How to Apply:**

Interested applicants are advised to email [Shuihua.Wang@xjtlu.edu.cn](mailto:Shuihua.Wang@xjtlu.edu.cn) (XJTLU principal supervisor's email address) or [hongyi.zhu@apon.com.cn](mailto:hongyi.zhu@apon.com.cn) the following documents for initial review and assessment (please put the project title in the subject line).

- CV
- Two reference letters with company/university letterhead
- Personal statement outlining your interest in the position
- Proof of English language proficiency (an IELTS score of 6.5 or above)
- Verified school transcripts in both Chinese and English (for international students, only the English version is required)
- Verified certificates of education qualifications in both Chinese and English (for international students, only the English version is required)
- PDF copy of Master Degree dissertation (or an equivalent writing sample) and examiners reports available