

PhD studentship (Full-time)

Institution	Xi'an Jiaotong-Liverpool University, China
School	School of Advanced Technology
Supervisors	<p><i>Please list all the names in the supervisory team. It should be consistent with the information on your approved PGRS proposal.</i></p> <p>Principal supervisor: Professor/Dr. Yin Cao (XJTLU) Co-supervisor: Professor/Dr. Jimin Xiao (XJTLU) Co-supervisor: Professor/Dr. Meng Fang(UoL)</p>
Application Deadline	Open until the position is filled
Funding Availability	Funded PhD project (world-wide students)
Project Title	Methods Study on Multi-Task Learning for 3D computational Environmental Audio Analysis
Contact	<p>Please email yin.cao@xjtlu.edu.cn (XJTLU principal supervisor's email address) with a subject line of the PhD project title.</p> <p>The principal supervisor's profile is linked here: https://scholar.xjtlu.edu.cn/en/persons/YinCao https://scholar.google.com/citations?user=J9edRm4AAAAJ&hl=zh-CN</p>

Requirements:

A Master's degree with Merit and a Bachelor's degree with first-class or upper second-class honors are required for PhD admissions. Exceptional candidates holding only a Bachelor's degree may be considered on an individual basis in certain disciplines.

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

Degree:

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

Funding:

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). It also provides up to RMB 16,500 to allow participation at international conferences during the period of the award. The scholarship holders are expected to conduct the majority of their

research at XJTLU in Suzhou, China. However, they may apply for a short-term research visit to the University of Liverpool if the project requires it.

Project Description:

This PhD project aims to develop a unified multi-task learning framework for 3D computational environmental audio analysis, integrating sound event detection, localization, separation, and natural language-guided editing. It combines advances in machine listening, spatial audio modeling, and audio-language interaction to create intelligent systems capable of interpreting and manipulating real-world acoustic scenes.

The research centers on **positive information transfer across tasks**, leveraging structured multi-modal embeddings, Pareto-optimal optimization, and knowledge distillation across diverse architectures (CNNs, transformers, autoencoders). The project introduces innovative methodologies such as a **dual-branch encoder** design to disentangle semantic and spatial audio representations, aligned via contrastive learning with natural language prompts.

Key objectives include:

- Developing a multi-task framework that supports **joint learning** across event detection, localization, and separation
- Creating large-scale synthetic **spatial audio-language datasets** with 3D annotations and rich textual descriptions
- Exploring **zero-shot and few-shot capabilities** in spatial reasoning and captioning
- Implementing **text-driven spatial audio editing** through embedding manipulation and directional control
- Reducing model complexity for deployment in real-time applications (e.g., robotics, smart homes, AR/VR)

This interdisciplinary project bridges machine learning, signal processing, and natural language understanding. It offers substantial contributions to the **Detection and Classification of Acoustic Scenes and Events (DCASE)** community and aims for publication in leading venues, particularly **IEEE/ACM Transactions on Audio, Speech, and Language Processing (TASLP)**.

The student will receive robust training in spatial acoustics, deep learning, and multi-modal AI, supported by strong supervision and access to high-performance computing resources. Participation in international conferences (e.g., ICASSP, Interspeech, DCASE) is also encouraged.

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

<https://www.xjtlu.edu.cn/en/admissions/global/entry-requirements/>

<https://www.xjtlu.edu.cn/en/admissions/global/fees-and-scholarship>

How to Apply:

Interested applicants are advised to email yin.cao@xjtlu.edu.cn (XJTLU principal supervisor's email address) the following documents for initial review and assessment (please put the project title in the subject line).

- CV
- Two formal reference letters
- Personal statement outlining your interest in the position
- Certificates of English language qualifications (IELTS or equivalent)
- Full academic 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