XJTLU-XJTU-UoL Joint Doctoral Supervision Project (Full-time)

Reference No.	SFXJTU2508
XJTLU School	School of Intelligent Manufacturing Ecosystem
PhD Programme	Computer Science and Software Engineering
Supervisors	XJTLU supervisor: Dr Long Huang XJTU supervisor: Professor Suxin Qian UoL supervisor: Dr Guangliang Cheng
Project Title	Intelligent flow control for heat transfer devices using thermo-responsive shape memory alloy 基于热响应形状记忆合金的传热装置智能流动控制
Application Deadline	Open until the position is filled

Requirements:

A UK first-class or upper second-class honours Bachelor's degree and a UK Master's degree with Merit (or their equivalent) are required for PhD admissions. Exceptional candidates holding only a Bachelor's degree may be considered on an individual basis.

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.

For more information about entry requirements and admission procedures of PhD programme at XJTLU, please visit:

Entry Requirement - Xi'an Jiaotong-Liverpool University

How to Apply - Xi'an Jiaotong-Liverpool University

Other Requirements (if any):

Students with backgrounds in energy and power engineering, physics, or materials science are warmly encouraged to apply.

Programme Structure:

Doctoral students in the joint programme are registered with both XJTLU and the UoL. Upon successful completion of the programme, the students will be awarded a PhD degree from University of Liverpool.

During their doctoral studies at XJTLU, students are expected to conduct research at XJTU as visiting students. Additionally, students have the opportunity to apply for a three to six-month research visit to UoL.

Project Description:

Microchannel heat exchangers (MCHEs) offer high energy density and compactness, making

them increasingly popular in modern thermal systems. However, their small hydraulic diameters lead to significant frictional losses, necessitating parallel configurations and manifolds for efficient flow distribution. Under variable operating conditions, such as fluctuating temperatures and flow rates, achieving uniform two-phase flow distribution remains a major challenge without active control. This project proposes the use of thermo-responsive shape memory alloys (SMAs) as an intelligent, passive-active control mechanism to regulate refrigerant distribution in MCHE manifolds. The core challenge lies in the fluid–structure interaction between refrigerant flow and the thermomechanical behavior of SMAs. Key research tasks include: (1) deformation and porosity control of SMA matrices under thermal cycling, (2) hydraulic performance characterization via experiments and CFD simulations, (3) flow distribution analysis in SMA-integrated manifolds, (4) development of machine learning-assisted control models, and (5) design of active flow regulation strategies using SMAs. The outcomes aim to enable self-adaptive, energy-efficient thermal systems with enhanced robustness under dynamic conditions.

Joint Supervisory Team:

XJTLU supervisor: Dr Long Huang

XJTU supervisor: Professor Suxin Qian

UoL supervisor: Dr Guangliang Cheng

How to Apply:

Interested applicants are advised to email Dr Long Huang (long.huang@xjtlu.edu.cn) or Professor Suxin Qian (qiansuxin@xjtu.edu.cn) following documents for initial review and assessment (Please include 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