PhD studentship (Full-time)

Institution	Xi'an Jiaotong-Liverpool University, China
School	Design School
Supervisors	Principal supervisor: Dr Charles Loo (XJTLU) Co-supervisor: Dr Li Huang (JITRI) Co-supervisor: Professor Weijian Han (JITRI) Co-supervisor: Professor Yuyuan Zhao (UoL)
Application Deadline	Open until the position is filled
Funding Availability	Funded PhD project
Project Title	面向汽车结构碰撞安全的数字孪生样机研究及应用 Digital Twin Prototype for Vehicle Structural and Crashworthiness Design
Contact	Please email charles.loo@xjtlu.edu.cn (XJTLU principal supervisor's email address) or HLi@jitri-amrd.com (JITRI principal supervisor's email address) 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 Mechanical Engineering, Manufacturing Engineering, Materials Engineering, Civil Engineering, Data Science, Computer Science, Applied Mechanics or related fields.

The candidate should have solid background in finite element analysis (It is a plus but not a must for applicants majored in Applied Mathematics, Data Science, or Computer Science), and some basic programming is required. 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.

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) Yangtze Delta Region Institute of Advanced Materials in Suzhou. The student will be registered as an XJLTU PhD student but is expected to carry out the major part of his or her research at the Institute in Suzhou.
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 80,000 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 5000 RMB by Yangtze Delta Region Institute of Advanced Materials.

Project Description:

New cars on the market are faster and more energy-efficient. Nowadays, new energy-efficient cars are booming on the market, with customers requesting faster but energy-efficient vehicles. Meanwhile, fully/semi-autonomous cars and trucks are the future of transportation and may soon become a reality. These self-driving or new energy vehicles bring significant changes to vehicles' architecture, therefore posing a massive challenge for a more accurate and intelligent design model for their crashworthiness and safety.

Traditionally, experimental testings are used to evaluate vehicles' performances and certify them to meet regulatory safety requirements in a limited number of scenarios. Safety requirements around the globe are becoming more stringent in different markets. As a result, it is a great challenge to meet the aggressive development timing and cost associated with the increased number of prototype build/test. To reduce development cycle and cost, CAE is widely used for Vehicle Structural and Crashworthiness Design, by simulating vehicle interior, restraint system, and occupants in various impact modes. Machine learning, Model Validation, and Design Optimization are three key enablers to archive Digital Twin Prototyping (DTP) in CAE activities. However, a series of barriers exist in machine learning, uncertainty quantification, and optimization fields before a DTP model can be ready for digital validation and verification of a real vehicle.

In that perspective, the main objective of this project is to take advantage of Subject Matter Expert (SME)'s expertise and prior program knowledge together with the advanced statistical methods and machine learning to develop advanced Digital Twin Prototype (DTP) modelling technology for Vehicle Structural and Crashworthiness Design.

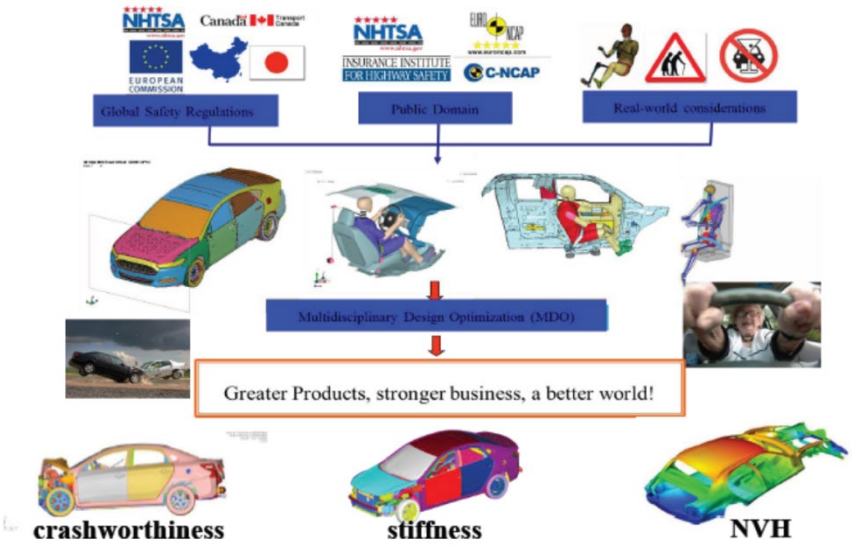

Figure 1. Typical Vehicle Attributes for Digital Twin Prototype.

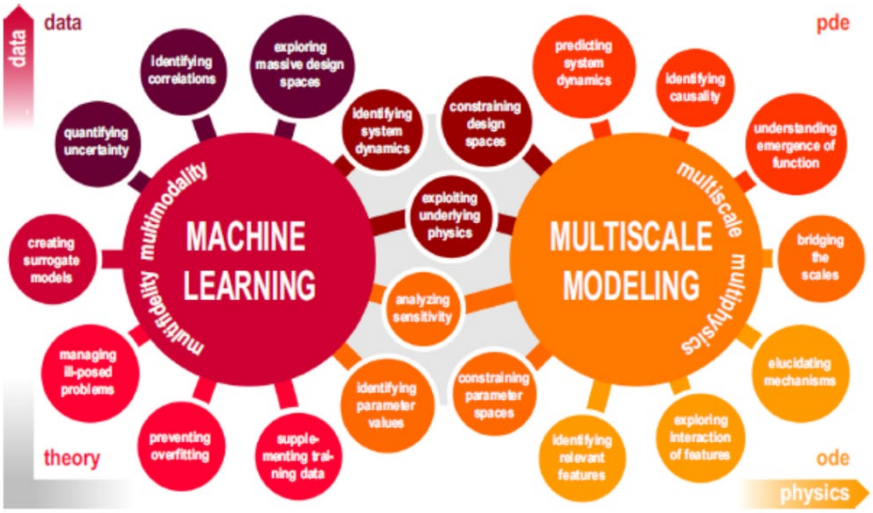

Figure 2. Machine learning in multi-scale modelling[1].

Provision of Training in Current Project could include: (a) Provide necessary FEA Software and Basic Data Science Training; (b) On-site Training on Experiments; (c) Support to attend External Academic Conference if needed, and; (d) Provide opportunities to meet with Top developer in CAE and Digital Twin Areas.

Ref: [1] Alber, M., Buganza Tepole, A., Cannon, W.R. et al. Integrating machine learning and multiscale modeling—perspectives, challenges, and opportunities in the biological, biomedical, and behavioral sciences. npj Digit. Med. 2, 115 (2019).

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/feesscholarships.html

Supervisor Profile:

Principal Supervisor:

Dr. Charles Loo is an Assistant Professor in Structural and Materials Engineering in the department of Civil Engineering at Xi'an Jiaotong-Liverpool University (XJTLU). He holds a BEng. (1st Class Hons) in Civil Engineering, and a MEng. in Structural and Foundation Engineering and a PhD in Structural Engineering from the University of Sydney. Prior to joining XJTLU, he was a Senior Lecturer at Curtin University. Dr. Loo also worked in the consulting industry for a number of years, designing complex structural facilities. He is a Chartered Professional Engineer with Engineers Australia with the Civil and Structural Engineering colleges (MIEAust CPEng NER APEC Engineer IntPE Aus). His research interests include multi-physical computational modelling, inverse analysis and optimisation, metamaterials, structural engineering, composites and smart sensors.

JITRI co-supervisor:

Dr. Li Huang, Research Manager and Director Assistant at Yangtze Delta Region Institute of Advanced Materials, Professor at Nanjing Tech University. He has been a Senior Research Scientist at Ford Research and Development Center, and visiting scholar at the University of Michigan. His research interests include manufacturing digitalization, integrated computational materials engineering, machine learning and its applications, big data, and AI-driven joining design and equipment development. His research has been successfully implemented into 10+ massively produced vehicles, including Ford Fusion and Ford F-series Truck, and significantly reduced the design cycle and cost. He received awards include "Talent in Suzhou Key Industries", "Youth Science and Technology Innovation Leader in Suzhou", "Ford Global Tech Achievement Award", "Ford Global Body & Safety VCSE Tech Award", etc. He has been the Key Investigator in 10+ University-Industry Joint R&D Projects, 4 Provincial/ National/ International Key R&D Program.

Professor Weijian Han, received his Ph.D of Mechanical Engineering in Tulsa University, served as Director of Research and Advanced Engineering for Asia Pacific at Ford before retired in 2019. He led the team to carry out more than 100 research projects in China, published 8 books and over 40 academic articles on vehicle engineering. His technical expertise includes lightweight materials, smart manufacturing, and environmental sciences etc. In 2020, Dr. Han joined the Yangtze Delta Region Institute of Advanced Materials, and served as Director, focusing on the industrial materials database/platform construction and data-driven product design digital tools development.

How to Apply:

Interested applicants are advised to email charles.loo@xjtlu.edu.cn (XJTLU principal supervisor's email address) or HLi@jitri-amrd.com (JITRI principal supervisor's email address) 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 if applicable