PhD studentship (Full-time)

Institution	Xi'an Jiaotong-Liverpool University, China
School	School of Advanced Technology
Supervisors	Principal supervisor: Professor Ka Lok Man (XJTLU) Co-supervisor: Dr. Yutao Yue (JITRI) Co-supervisor: Professor Eng Gee Lim (XJTLU)
Application Deadline	Open until the position is filled
Funding Availability	Funded PhD project (world-wide students)
Project Title	Radar signal processing based on neural network sequence model 基于神经网络时序模型的雷达信号处理
Contact	Please email ka.man@xjtlu.edu.cn (XJTLU principal supervisor's email address) or yueyutao@idpt.org (JITRI supervisor's email) 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 Computer Science/Electrical Engineering/Electronic Engineering/Computer Engineering.

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) Institute of Deep Perception in Wuxi. 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 Wuxi.

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 Wuxi , the PhD candidate will be provided with monthly living allowance at a standard of 3000-7000RMB by JITRI Institute of Deep Perception.

Project Description:

Intelligent transportation and intelligent driving represent the current major trends in the development of the transportation industry, while environmental perception is the key core technology of transportation intelligence and is also a hot area of long-term academic research. Millimeter-wave radar has the characteristics of short wavelength, wide frequency band, narrow beam, and strong anti-interference ability. It can realize high-precision measurement of the measured target, and has the advantages of mature technology, wide application, and low cost. Based on radar sensors and relying on target echoes for signal processing, it can perform tasks such as target recognition, classification, and tracking. Compared with traditional image processing, radar automatic target classification and recognition technology is more complicated, but with the development of artificial intelligence technology In the application of radar signal processing, the performance of radar target recognition and tracking is constantly improving. Therefore, the combination of related technologies in the field of machine learning and millimeter wave radar can achieve the purpose of technological complementarity. First of all, how to extract effective features from radar signals is a difficult problem, and deep learning weakens this problem, and can mine potential features as much as possible to improve the accuracy of target recognition or indirectly improve the use of radar. Secondly, deep learning can also solve the problem of insufficient training sample size and model optimization under small sample conditions. Therefore, applying the ideas and technologies of machine learning and deep learning to radar signal processing can assist the radar to better realize various perception tasks, which has high scientific research significance.

This project intends to adopt the following research methods:

1. Based on the millimeter-wave radar system, master its basic working principles (including ranging, speed, angle measurement, etc.), and analyze the key factors that affect millimeter-wave radar imaging.
2. Grasp the signal processing method based on the millimeter wave radar system, analyze the optimal signal processing method corresponding to the millimeter wave radar under different interference conditions, and apply and improve it in some scenarios.
3. Based on the working principle of the millimeter wave radar system and the signal processing system, research its target characteristic information measurement theory, according to the information carried by the target

scattering echo, the target's electro-ceramic scattering characteristics, motion characteristics, wave characteristics, polarization characteristics, image characteristics, etc. The feature is analyzed, and the feature set is extracted based on the common sense of feature engineering theory in machine learning.

4. According to the target task, first use some traditional machine learning ideas and algorithms to conduct a pre-experiment on the task, play a role of qualitative analysis, and understand its difficulties and the possibility of optimization. Design and develop the corresponding neural network sequence model, and adjust the parameters and optimization methods of the model according to the model evaluation results. Read and try to apply some excellent methods or ideas in ImageNet Large Scale Visual Recognition Challenge to the target task.
5. Transition the task of static target recognition to dynamic target tracking, understand the differences and difficulties, try to use the generative countermeasure network in deep learning to solve the problem of too few samples of radar tracking targets, and study the strengthening of the adaptive The possibility of integrating self-learning methods into neural network sequence models.
6. Using engineering-related ideas, the project is optimized for all aspects of project deployment and engineering applications, including consideration and optimization of time and space complexity in different functional scenarios.

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:

Ka Lok Man is currently a Professor in the School of Advanced Technology at Xi'an Jiaotong-Liverpool University (XJTLU) in Suzhou, China and an Adjunct Professor in the Faculty of Engineering and Science, Swinburne University of Technology Sarawak, Malaysia. He is an Honorary Recognized Professor at Big Data Excellence Centre, Kazimieras Simonavicius University, Lithuania. He is also a Visiting Professor at imec-DistriNet, KU, Leuven, Belgium and at the Faculty of Informatics, Vytautas Magnus University, Lithuania. He has about 20 years of international teaching experience, several years of industrial experience in integrated circuit design and has been involving in many industry-oriented research projects in Microelectronics and Computer Science, many of them in cooperation with STMicroelectronics, Synopsys

and LG. He has a good publication record and to date has more than 500 published academic articles. Also, he has received more than 50 international research awards and fellowships. Ka Lok Man has become a well-established international researcher within a number of related areas, including formal methods, process algebras, hybrid systems, cyber physical systems, recommendation systems, data analytics, low power integrated circuits, wireless sensor networks & communication, IoT, photovoltaic & battery management systems and signal processing. Currently, he is supervising/co-supervising about 20 PhD students, 3 MSc students, a number of UG students and research assistants in the areas of solar energy, wireless sensor networks, communication, middleware, IoT, signal processing, data mining, machine learning, deep learning, cloud computing and image/video identification.

JITRI co-supervisor:

Yutao Yue received his B.S. degree of applied physics from University of Science and Technology of China in 2004, Ph.D. degree of computational physics from Purdue University in 2010. He then served as senior scientist of Kuang-Chi Institute, team leader of Guangdong "Zhujiang Plan" Introduced Innovation Scientific Research Team, and associate professor of Southern University of Science and Technology of China, etc. He has authored 17 papers and over 300 patents, and advised 13 postdoc researchers. He also serves as the "Industrial Professor" of Jiangsu Province, advisory panel member of SAIIA, technical review expert of Guangdong, Jiangsu, Shenzhen, and Wuxi. He is now the founder and director of Institute of Deep Perception Technology (IDPT), Jiangsu Industrial Technology Research Institute (JITRI). His research interests include modeling and optimization, computational electromagnetics, radar perception, artificial intelligence theories.

How to Apply:

Interested applicants are advised to email ka.man@xjtlu.edu.cn (XJTLU principal supervisor's email address) or yueyutao@idpt.org (JITRI supervisor's email) 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