UNIVERSITY of GREENWICH

Information on Postgraduate Research Scholarship - Ref: CS2-FES-01-24			
Faculty:	Engineering and Science	**Department:**	School of Engineering and School of Computing and Mathematical Science
Lead Supervisor:	Dr Kamran Pedram		
Project Title:	Developing Sustainable Intrusion Detection Systems for Industrial IoT by Leveraging Digital Twin and Signal Processing		
Project Description:	The rapid adoption of Industrial Internet of Things (IIoT) technologies has transformed manufacturing, offering greater efficiency, real-time monitoring, and data-driven decision-making. However, this interconnectivity introduces significant cybersecurity vulnerabilities, leaving systems exposed to cyber-attacks. Traditional intrusion detection systems (IDS) often fall short in handling the real-time, large-scale data demands of IIoT and lack sustainability considerations, such as energy efficiency. This research proposes a sustainable, high-performance IDS that leverages digital twin technology and advanced signal processing to detect cyber threats in real-time while minimizing energy consumption. Digital twins, as virtual replicas of physical systems, enable continuous monitoring and anomaly detection with minimal latency. Combined with efficient signal processing, this approach enhances detection accuracy while optimizing resource use, supporting cybersecurity and sustainability in IIoT networks. This study aims to develop a low-energy IDS solution tailored to IIoT's unique security needs, balancing robust threat detection with reduced energy demands. By integrating digital twins and resource-efficient signal processing, this research sets a new standard for sustainable cybersecurity in IIoT. The PhD candidate undertaking this research will gain expertise in cybersecurity, IIoT, signal processing, and artificial intelligence. The project offers access to state-of-the-art research facilities at the University of Greenwich, where cutting-edge cybersecurity solutions for industrial systems are developed. Throughout the project, the candidate will be encouraged to publish findings in high-impact journals, present at international conferences, and contribute to the growing body of knowledge on IIoT security. This PhD project presents an exciting opportunity for researchers passionate about cybersecurity, artificial intelligence, and industrial automation to contribute to a high-impact area of research. The growing interconnectivity of industrial systems highlights the urgency of developing robust and efficient security mechanisms, making this research both relevant and essential for future IIoT deployments. The successful development of a Digital Twin-enabled IDS will not only improve the cybersecurity of industrial networks but also establish a foundation for further advancements in intelligent, self-learning security systems. The PhD candidate will work under the primary supervision of Dr Kamran Pedram at the **Centre for Sustainable Cyber Security (CS2)** https://www.gre.ac.uk/research/groups/sustainable-cyber-security-cs2		

	The University of Greenwich (through CS2) has been recently recognised by the UK government as a NCSC Academic Centre of Excellence in Cyber Security Research (https://www.ncsc.gov.uk/information/academic-centres-excellence-cyber-security-research).
Duration:	3 years, Full-Time Study or 6 years, Part-Time Study

Bursary available (subject to satisfactory performance):
Year 1: £19,237 (FT) or pro-rata (PT) Year 2: In line with UKRI rate Year 3: In line with UKRI rate

In addition, the successful candidate will receive a contribution to tuition fees equivalent to the university's Home rate, currently £4,786 (FT) or pro-rata (PT), for the duration of their scholarship. International applicants will need to pay the remainder tuition fee for the duration of their scholarship.

This fee is subject to an annual increase.

Person Specification of Essential (E) or Desirable (D) requirements:

Criteria:	**E or D**
Education and Training:	
• 1st Class or 2nd class, First Division (Upper Second Class) honours degree or a taught master's degree with a minimum average of 60% in all areas of assessment (UK or UK equivalent) in a relevant area to the proposed research project	**E**
• For those whose first language is not English and/or if from a country where English is not the majority spoken language (as recognised by the UKBA), a language proficiency score of at least IELTS 6.5 (in all elements of the test) or an equivalent UK VISA and Immigration secure English Language Test is required, if your programme falls within the faculty of Engineering and Science a language proficiency score of at least IELTS 6.5 overall with a minimum of 6.0 in all elements of the test or an equivalent UK VISA and Immigration secure English Language Test is required. Unless the degree above was taught in English **and** obtained in a majority English speaking country, e.g. UK, USA, Australia, New Zealand, etc, as recognised by the UKBA.	**E**
Experience & Skills:	
• Strong understanding of Industrial IoT (IIoT), Intrusion Detection Systems (IDS), Digital Twin technology, and Signal Processing.	**E**
• Proficiency in Python, MATLAB, or other relevant programming languages for machine learning, digital signal processing, and cybersecurity applications.	**E**
• Prior experience conducting independent research, including data collection, analysis, and implementation of security solutions for IoT or industrial networks.	**E**
• Strong analytical and problem-solving skills with the ability to develop novel cybersecurity solutions for IIoT applications.	**E**
• Experience working with real-world cybersecurity systems, industrial networks, or digital twins in research or industry settings.	**D**
• Understanding of lightweight machine learning models for intrusion detection in IIoT environments.	**D**
Personal Attributes:	

• Understands the fundamental differences between a taught degree and a research degree in terms of approach and personal discipline/motivation	**E**
• Able to, under guidance, complete independent work successfully	**E**
• Strong motivation, with evidence of independent research skills relevant to the research topic.	**E**
Other Requirements:	
• This scholarship may require Academic Technology Approval Scheme approval for the successful candidate if from outside of the EU/EEA	**E**
• The scholarship must commence before **01 December 2025**	**E**
Closing date for applications:	***midnight UTC on 15/04/2025***
For further information contact:	**Dr Kamran Pedram (Kamran.pedram@gre.ac.uk)**

Making an application:

Please read this information before making an application. Information on the application process is available at: https://www.gre.ac.uk/research/study/apply/application-process. Applications need to be made online via this link. **No other form of application will be considered**.

All applications **must include** the following information. **Applications not containing these documents will not be considered.**

- **Scholarship Reference Number (CS2-FES-01-24)**– included in the personal statement section together with your personal statement as to why you are applying
- **a CV including 2 referees** *
- **academic qualification certificates/transcripts and IELTs/English Language certificate if you are an international applicant or if English is not your first language or you are from a country where English is not the majority spoken language as defined by the UK Border Agency** *

**upload to the qualification section of the application form. Attachments must be a PDF format.*

Before submitting your application, you are encouraged to liaise with the Lead Supervisor on the details above.