UNIVERSITY of GREENWICH

Information on Postgraduate Research Scholarship – Ref: FES-PhD-2324-04			
Faculty:	Engineering and Science	**Department:**	School of Computing and Mathematical Sciences
Lead Supervisor:	Dr Tuan Nguyen		
Project Title:	Generative AI Enhanced Hyperspectral Imaging Techniques for Estimating Bone Fracture Risk in Osteoporosis		
Project Description:	Osteoporosis (OP) is a global burden affecting 3.5m individuals in the UK alone, causing bone weakening and fractures ranking the fourth greatest cause of death. Bone Mineral Density (BMD) via dual- energy X-ray absorptiometry (DXA) currently serves as the tool to diagnose OP and risk of fractures. However, BMD is insufficient to fully describe bone tissues quality so mechanical properties must be considered. Hyperspectral Imaging (HSI) is a non-invasive and quick imaging technique that offers valuable diagnostic insights. In recent years, medical HSI has shown promising outcomes across various medical fields, such as oncology, digital and computational pathology, ophthalmology, dermatology, and gastroenterology. It captures spatial and spectral information, making it possible to identify and characterize different tissues through their unique spectral signatures. By taking images across multiple spectral bands at the same time, HSI can detect abnormal tissue characteristics that traditional imaging methods might miss. Therefore, HSI can complement and enhance the diagnostic capabilities of other imaging methods. In this project, our aim is to create a non-invasive, mechanically informed approach, calibrating HSI on X-ray tomography data. This will enable us to assess bone tissue quality in detail and identify potential biomarkers for osteoporosis-related fractures. This project builds on our preliminary generative AI method (GenAI) [1]. It leverages GenAI's capabilities to enhance tissue analysis in HSI data, facilitating the early identification of bone fracture risks or symptoms not visible in the initial stages of diseases such as osteoporosis. This enables timely intervention and treatment. We expect the new algorithm to achieve a significant result on the new bone HSI dataset, improving bone fracture prediction. This project is a collaborative effort between the School of Computing & Mathematical Sciences (CMS) and the School of Engineering (SoE) to utilise expertise and facilities between two schools.		

	[1] Sigger, N., Vien, QT., Nguyen, S.V. et al. Unveiling the potential of diffusion model-based framework with transformer for hyperspectral image classification. Sci Rep 14, 8438 (2024). https://doi.org/10.1038/s41598-024-58125-4
Duration:	3 years, Full-Time Study or 6 years, Part-Time Study

Bursary available (subject to satisfactory performance):

Year 1: £20,780 (FT) (plus London Weighting £2,000) 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 £5,006 (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:	
• Previous experience of undertaking research (e.g. undergraduate or taught master's dissertation)	**E**
• Experience in image processing, computer vision, machine learning including deep learning for X-ray computed tomography and/or other imaging modalities	**E**
• Strong programming skills in python and/or matlab coding	**E**
• Having experience in writing research papers	**D**
• Able to manage workload	**E**
• Collaborating with interdisciplinary teams	**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**
• Willing to travel to conduct experiments between University campuses	**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 ***1st December 2025***	**E**
Closing date for applications:	***midnight UTC on 31st October 2025***
For further information contact:	***Dr Tuan Nguyen (tuan.nguyen@greenwich.ac.uk)*** ***Prof Gianluca Tozzi (g.tozzi@greenwich.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 (**FES-PhD-2324-04**)**– 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.