Information on Postgraduate Research Scholarship - Ref: Eng-PhD-12-25			
Faculty:	Engineering and Science	**Department:**	School of Engineering
Lead Supervisor:	Augustine O. Nwajana		
Project Title:	Substrate-Integrated Waveguide (SIW) Multi-port Microwave and Millimeter-wave Circuits and Devices		
Project Description: (maximum 500 words)	**Introduction:** Several semiconductor firms are currently developing chipsets that can operate at 60 GHz or higher. Components, such as antennas, filters, power dividers, etc. are required in microwave and mm-wave systems but cannot be conveniently integrated into the chipset because they are either too large, or their performance cannot be met by integrated components. These components are typically fabricated in planar technology (e.g., microstrip) at low frequencies; however, at frequencies higher than 30 GHz, transmission losses and radiation prevent the use of microstrip, necessitating the development of other technological solutions. Hence, the need for a platform aimed at integrating all these components using a high-performance, low-cost, and dependable technology. A promising candidate for developing this platform is substrate-integrated waveguide (SIW) technology. SIWs are integrated waveguide-like structures fabricated by using two rows of conducting cylinders or slots embedded in a dielectric-substrate that electrically connect two parallel metal plates. This revolutionary 21st-century technology replaces the side walls of a typical air-filled waveguide with two rows of metallic posts on PCB. Hence, the non-planar waveguide can be made in planar form, compatible with existing planar processing techniques. SIW structures preserve most of the advantages of conventional metallic waveguides including high quality-factor and high power-handling capability with self-consistent electrical shielding. **Aim:** To model and apply SIW technology in the development of multi-port microwave and mm-wave components for front-end wireless communication systems **Objectives:** (1) Represent SIW theoretically, (2) Validate models based on experimental data, (3) Apply the SIW model to the design of new devices, such as novel integrated filtering power divider circuits, and to evaluate their performance. **Methodology:**		

	The research will begin with a detailed review of SIW technology, examining electromagnetic propagation, substrate design, and fabrication methods. Insights from literature will guide the development of a theoretical model describing electromagnetic and structural behaviour in SIW circuits. High-fidelity simulations will then be performed using Finite Element Modelling (FEM) in Abaqus, enabling multi-physics analysis of electromagnetic field distribution, thermal behaviour, and structural response within the SIW configuration. These studies will explore how variations in material properties, via geometry, and substrate parameters influence energy confinement, losses, and mechanical stability. The extracted parameters and boundary conditions will subsequently inform circuit-level analysis within Keysight Advanced Design System (ADS), where S-parameter behaviour, impedance matching, and bandwidth performance will be optimised for multi-port SIW devices. Prototype fabrication will employ standard substrate-based microfabrication techniques, including metallisation, via formation, and patterning. The resulting devices will be characterised using microwave and high-frequency measurement systems, assessing reflection, transmission, and power-handling performance. Complementary mechanical and thermal measurements will be conducted where required to evaluate robustness and temperature-dependent behaviour. Experimental results will be used to refine both the Abaqus and ADS models, ensuring strong correlation between simulated and measured outcomes. This iterative approach integrates computational and experimental insights to advance a robust, flexible methodology for the design and validation of next-generation SIW circuits and devices. This scholarship is awarded competitively, and all applications are carefully reviewed. While we cannot guarantee an offer, we encourage strong candidates to apply.
Duration:	3 years, Full-Time Study or 6 years, Part-Time Study

Support available (subject to satisfactory performance):

A successful Home candidate will receive:

- A Full tuition fee waiver at the university Home-student rate for the specified duration of the scholarship

A successful International candidate will receive:

- A tuition fee waiver for 50% of the International-student rate for the specified duration of the scholarship.

Tuition fees are subject to annual increases.

This scholarship does not include funding for living expenses.

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**
• Master's degree (MEng/Msc/MTech) in Electrical, Electronic, Mechatronic Engineering or a closely related discipline	**D**
• Experience with any Electronic Design Automation (EDA) software (e.g., ADS, EMPro, Genesys, CST Microwave Studio, AWR Microwave Office, Sonnet Suits, HFWorks, etc.) for design simulation	**E**
• Authored or co-authored reputable journal article(s) or conference paper(s) indexed in Scopus and/or Web of Science	**E**
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 and manage time effectively	**E**
• Ability to work collaboratively across disciplines and with diverse stakeholders	**E**
• Strong written and verbal communication skills	**D**
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 15th July 2026 (offers will be withdrawn if this condition is not met)	**E**
Closing date for applications:	***midnight UTC on 20th February 2026***
For further information contact:	A.O.Nwajana@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**.	

September 2021

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

- **Scholarship Reference Number (*insert reference*)**– 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.