Job Title:	Research Engineer
Department/Division/Faculty:	Imperial Global Singapore – IN-CYPHER
Campus location:	CREATE Tower, 1 CREATE Way Singapore
Job Family/Level:	Academic and Research $5,000 to $9,000 Monthly dependent of experience
Responsible to:	Professor Anil Anthony Bharath, IN-CYPHER Programme Co-Director
Key Working Relationships (internal):	IN-CYPHER researchers, Collaborators within Imperial College London, Collaborators within Nanyang Technological University
Key Working Relationships (external):	As identified within the Singapore Healthcare, Governmental, Cybersecurity and Startup Ecosystem
Contract type:	2 years fixed term (subject to 6-month probation)

Purpose of the Posts

Imperial College London and Nanyang Technological University (NTU) are seeking Research Engineers to join the exciting new **Imperial/NTU CYber Protection for HEalthcaRe (IN-CYPHER)** research programme on the cybersecurity of connected medical devices and systems. The research programme represents a collaboration between the United Kingdom and Singapore and will be based at the newly established Imperial Global Singapore (IGS).

We are particularly looking for **IC Design Research Engineers** with the following backgrounds:

- Digital IC Design
- Analog IC Design

As an **IC Design Research Engineer**, you will design and innovate secure circuits and systems for next-generation low-power IoMT devices and sensors, focusing on hardware security, and smart computing and connectivity platforms.

IN-CYPHER is comprised of four interacting themes, spanning the design of intelligent medical devices through to the use of their data in informing personalised healthcare. Allied to other programmes in Singapore and the UK, it represents a unique opportunity to be at the forefront of research and development into securing the vital information that flows between implantable, wearable and connected medical devices, including those currently in use, and those yet to be developed. The four themes of IN-CYPHER are:

Theme 1 Protecting Implantable Devices
Implantable and wearable medical devices – including both sensors and active devices – operate under strong design constraints. Our research in this area seeks to embed secure design from first principles, and at the most fundamental levels (silicon or substrate) of device design; we also recognise the need to consider the challenge of post-quantum cryptographically secure techniques in the immediate future.

Theme 2 Securing Connected Wearables & Healthcare Systems

Increasingly, medical devices incorporate some form of connectivity, and many of these devices are necessarily designed to be in use for between one and two decades. There is a constant risk of exploit of zero-day vulnerabilities, and therefore a requirement to detect breaches in extremely intricate complex networks and data flow pipelines. We seek solutions to this challenge that embed security at hardware level.

Theme 3 Algorithms for Privacy, Security and Provenance
To control active medical devices – such as closed-loop drug-delivery systems – information moves from sensors and devices along different communications channels; data provenance and integrity are important. Moreover, the use of data-driven algorithms potentially exposes protected patient characteristics, presenting specific technical challenges not only within operational use, but also to product development cycles.

Theme 4 Clinical Innovation & Translation
One area of personalised medicine resides in the use of data for closed-loop drug delivery, including insulin delivery. With key researchers and teams from both Lee Kong Chian School of Medicine and Imperial College Healthcare NHS Trust, we seek to develop threat models that are suitable for emerging approaches to personalised medicine, and particularly where data-driven techniques might offer improvements to patient outcomes.

Given the span of the IN-CYPHER programme, we are seeking motivated research engineers to join the IN-CYPHER programme. Unique in its scope, we are developing technologies that span embedded systems, and the protocols used to control and communicate sensitive patient information, all the way up to interventional devices and systems for personalised healthcare.

The collaborating Departments include senior academics from the Department of Metabolism, Digestion and Reproduction and the Department of Bioengineering at Imperial – the largest Biomedical Engineering Department in the UK – and senior researchers from the School of Computer Science and Engineering (SCSE), School of Electrical and Electronic Engineering and the Lee Kong Chian School of Medicine at Nanyang Technological University. Candidates will be employed by Imperial Global Singapore, a research division of Imperial College London, consistently ranked within the top 10 of the QS University Rankings. Candidates must be resident and based in Singapore, but there will be opportunities for research visits to Imperial's London-based locations.

Informal enquiries are greatly welcome. You are encouraged to send an e-mail to Dr Viktor Schlegel, Deputy Programme Director v.schlegel@imperial.ac.uk, together with an indication of the Theme(s) under which you will be most interested in working.

Questions about the recruitment process, should go to Paige Noyce, Associate Director p.noyce@imperial.ac.uk.

Key Responsibilities

Main Duties

- Proactively support the research and development activities of Research Fellows
- Identify and develop techniques, paradigms, algorithms and required libraries and frameworks to solve electrical engineering problems
- Maintain highly organised and accurate record of work
- Maintain and promote the highest standards of scientific integrity
- Actively participate in all aspects of the research programme of IN-CYPHER
- Report activities both internally and externally
- Present findings to colleagues and at national/international conferences
- Proactively support publications in high quality refereed journals and conferences

- Translate research prototypes to robust and usable artefacts, possibly by collaborating with scientific, clinical and translation partners
- Attend relevant workshops as necessary
- Develop contacts and research collaborations within IGS, Imperial, NTU and the wider community
- Promote the positive reputation of IGS, IN-CYPHER Programme
- Maintain high-quality documentation of your work in a way that it can be directly as part of other documents, such as reports, academic publications or grant applications
- Participate in group research meetings and internal seminars
- Contribute to the smooth running of IN-CYPHER and other programmes under IGS
- Assist in the supervision of undergraduate interns, postgraduate research students and research assistants as required
- Comply with IGS' and CREATE practices and to attend courses on safety when appropriate
- Any other duties as may be deemed reasonable by scientific and operations managers of IGS, IN-CYPHER and scientific investigators of the relevant Themes.

Other Duties

- Undertake any necessary training and/or development
- Undertake appropriate administration tasks
- Attend relevant meetings
- Observe and comply with all IGS policies and regulations, including the key policies and procedures on:
  - Confidentiality,
  - Conflict of Interest
  - Business Continuity
  - Data Protection
  - Equal Opportunities
  - Ethics related to scientific conduct and to considerations of patient data, where appropriate
  - External Interests
  - Financial Regulations
  - Health and Safety
  - Use of Information Technology
  - Policies regarding smoking and e-cigarettes
  - Undertake specific safety responsibilities relevant to individual roles, as set out by IGS

Positions are based in Singapore at Imperial Global Singapore at the National Research Foundations Campus for Research Excellence and Technological Enterprise (CREATE) located on the campus of the National University of Singapore

Job descriptions cannot be exhaustive and the post holder may be required to undertake other duties, which are broadly in line with the above key responsibilities.

Imperial Global Singapore is committed to equality and values diversity. IGS adheres to Imperial Values and Behaviours framework.

Person Specification	

Requirements Candidates/post holders will be expected to demonstrate the following	**Essential (E)/ Desirable (D)**
Education	
A good relevant undergraduate degree (e.g. Computer Science, Electronical Engineering or similar) with demonstrable experience in IC design will be considered.	E
Relevant Master's Degree or equivalent Research or Industry experience	D
Experience	
Practical experience within IC design within a production or research environment.	E
• Practical experience in any of the following tools/techniques/areas: • Experience in RTL coding, RTL and gate-level debug (e.g., VCS, ModelSim, Vivado, Vitis, Quartus, etc.) • Experience in SPICE simulation tool (e.g., Cadence Virtuoso, Cadence spectre, Synopsys Custom Compiler, Calibre, etc.) • Understanding of DFT, timing and power requirements • Familiar with Linux environment and scripting • PCB design	E
Experience in analysis, interpretation and visualisation of scientific data	E
Experience of: • engineering in a research environment, • strongly interdisciplinary research	D
Knowledge	
Knowledge of research methods and statistical procedures	E
Knowledge of data presentation and analysis as relevant to one of the 4 Themes	E
Knowledge of different methods to develop and analyse computational models	E
Knowledge and experience in ASIC design flow including layout	E
Knowledge on hardware security and biomedical circuits	D
Skills & Abilities	
Ability to conduct a detailed review of recent literature	E
Ability to develop and apply new concepts	D
A creative approach to problem-solving	E
Excellent verbal communication skills and the ability to effectively collaborate	E
Excellent written communication skills and the ability to write for scientific publication to achieve impact	E
Ability to direct the work of a small research team and motivate others to produce a high standard of work	E
Ability to organise own work with minimal supervision	E
Ability to prioritise own work in response to deadlines	E

A skill-set aligned with one or more of the requirements of the 4 Themes of IN-CYPHER	E
Ability to work collaboratively, as part of a large, distributed team, potentially across different time-zones	E
Other	
Willingness to work as part of a team and to be open-minded and cooperative	E
A flexible attitude towards work	E
Discipline and regard for confidentiality and security at all times	E
Willingness to undertake any necessary training for the role	E
Willingness to travel both within the Singapore and to the United Kingdom, and other destinations as required to conduct and disseminate research	D
Willingness to work out of normal working hours (including weekends) if the requirements of the project demand.	D

Imperial Global Singapore is committed to equality of opportunity and to eliminating discrimination. All employees are expected to:

1) Champion a positive approach to change and opportunity
2) Encourage inclusive participation and eliminate discrimination
3) Communicate regularly and effectively within and across teams
4) Consider the thoughts and expectations of others
5) Deliver positive outcomes
6) Develop and grow skills and expertise
7) Work in a planned and managed way

Employees are also required to comply with all IGS policies and regulations, paying special attention to:

- Confidentiality
- Conflict of Interest
- Data Protection
- Equal Opportunities
- Financial Regulations
- Health and Safety
- Information Technology
- Smoking
- Private Engagements and Register of Interests
- The regulations of CREATE Tower and of Singapore

They must also undertake specific training and assume responsibility for safety relevant to specific roles, as set out on the College Website Health and Safety Structure and Responsibilities page.

IGS observes the San-Francisco Declaration on Research Assessment (DORA), which means that in hiring and promotion decisions, we evaluate applicants on the quality of their work, not the journal impact factor where it is published.

IGS believes that the use of animals in research is vital to improve human and animal health and welfare. Animals may only be used in research programmes where their use is shown to be necessary for developing new treatments and making medical advances. IGS is committed to ensuring that, in cases where this research is deemed essential, animals in are treated with full respect, and that any and all staff involved with this work show due consideration at every level. For further details, applicants are directed to:
http://www.imperial.ac.uk/research-and-innovation/about-imperial-research/research-integrity/animal-research/