UNIVERSITY OF SURREY Job Description and Role Purpose Addendum

Job Title:	Research Fellow A

Responsible to:	Dr Gabriele Gradoni

Responsible for:	Not applicable

Job Summary and Purpose:
To undertake research in accordance with the specified research project(s) under the supervision of the principal investigator.

Main Responsibilities/Activities
To undertake a range of research activities within a specified research area, assuming responsibility for specific areas of projects and making use of new research techniques and methods, in consultation with the research award holder or supervisor. This may include laboratory experiments, computer-based simulations, library research, critical evaluation and interpretation. Using initiative and creativity to identify areas for development of new research methods and extend the research portfolio. Analysing and interpreting results of own research. Writing up results and preparing papers for submission to appropriate journals and conferences, and other outputs as required and/or appropriate. Attend appropriate conferences for the purpose of disseminating research results and personal development. The post holder may also contribute to writing bids for research grants and will contribute to collaborative decision making with colleagues in areas of research. Continually update technical knowledge and skills, and translate knowledge of advances in the area into the research activity. To plan and manage own research activity in collaboration with others. To carry out administrative tasks associated with specified research funding, for example risk assessment of research activities, organisation of project meetings and documentation. Implementation of procedures required to ensure accurate and timely formal reporting and financial control. To contribute to teaching in the Faculty by carrying out student supervision and/or demonstrating within the post holder's area of expertise and under the direct guidance of a member of departmental academic staff, as appropriate. The post holder may occasionally be required to supervise more junior research staff.

Person Specification
The post holder must have: A PhD degree (or equivalent) or close to completing a PhD degree in Electronic Engineering, Physics or other areas related to RF/Microwave Engineering. Postdoctoral research or industrial experience would be an advantage. The post holder will have authority over some aspects of project work and must be capable of providing academic judgement, offering original and creative thoughts and be able to interpret and analyse results.

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Relationships and Contacts
Direct responsibility to the principal investigator or academic supervisor. The post holder may be asked to serve on a relevant Faculty committee. There may be additional reporting and liaison responsibilities to external funding bodies or sponsors. The post holder may work on original research tasks with colleagues in other institutions.

Special Requirements
N/A

All staff are expected to:

- Positively support equality of opportunity and equity of treatment to colleagues and students in accordance with the University of Surrey Equal Opportunities policy.

- Help maintain a safe working environment by:

  - Attending training in Health and Safety requirements as necessary, both on appointment and as changes in duties and techniques demand

  - Following local codes of safe working practices and the University of Surrey Health and Safety Policy

- Undertake such other duties within the scope of the post as may be requested by your Manager

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Addendum to Profile

Job Title:	Research Fellow in Quantum Computational Electromagnetics for Future Wireless Communications Systems

Job Summary and Purpose:

This information sheet should be read in conjunction with the accompanying generic Research Role Profile and will be used for shortlisting processes. More specifically the post holder will be expected to:

Work on the exciting collaborative project, "Towards Quantum-assisted Reconfigurable Indoor Wireless Environments," jointly funded by the NSF-EPSRC The post holder will be part of a group that focuses on advanced electromagnetic modelling for smart environments assisted (including reconfigurable intelligent surfaces) by quantum optimization algorithms.

The research objective of this project is to investigate new fundamental communication models and schemes, which dynamically program and customize indoor wireless propagation environments for enhanced wireless communication. This objective is attained by integrating the physics of wave-chaotic dynamics, the mathematics of random matrix theory, the engineering of reconfigurable electromagnetic surfaces (RIS), and the computing power of adiabatic quantum annealer. The research team includes Prof. Zhen Peng in the University of Illinois at Urbana-Champaign, US and Prof. Gabriele Gradoni in the University of Surrey, UK.

Main Responsibilities/Activities

- Devise innovative electromagnetic models of the RIS operating inside cavities, develop the basic knowledge of universal gate and adiabatic quantum computing, learn the derivation of quantum circuits from electromagnetic problems and the implementation of quantum circuits in dedicated software platform (including IBM Qiskit and D-WAVE) to address dynamic environment optimization.
- Find novel mathematical solutions to modern wave and quantum engineering problems, as defined by the research team.
- Travel to UK and US collaborators and visit their premises to conduct research in line with and related to the project for substantial periods of time.
- Learn how to write grant proposals, take part in drafting follow up/related proposals on quantum computational electromagnetics applications, and liaise with a multidisciplinary network of academic and industrial partners.
- Set, define and work towards achieving targets, disseminate results and document work performed.

Person Specification
The post holder must have: • A PhD degree (or equivalent) or close to completing a PhD degree in Electronic Engineering, Physics, mathematics, or other areas related to Electromagnetics Engineering and Quantum Physics. Postdoctoral research or industrial experience would be an advantage. • Very strong expertise in electromagnetics modelling for wireless communication systems. • Recent and strong research experience in the development of advanced quantum and optimization algorithms. • Very good understanding of the theoretical and design aspects of state-of-the-art RIS, MIMO systems, and indoor propagation. • Very good understanding of random matrix theory and chaos theory applied to wave problems. • Excellent track record of publications in highly ranked journals and conferences in at least one of the above fields.