UNIVERSITY OF SURREY

Research Role Profile

Job Title:	Research Fellow A: Research Fellow in Advanced Signal Processing for Future Communications Systems

Responsible to:	Head of research group, or principal investigator

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 fieldwork, interviews, laboratory experimentation, critical evaluation and interpretation, computer-based data analysis and evaluation or library research.
Using initiative and creativity to identify areas for research develop new research methods and extend the research portfolio. Analysing and interpreting results of own research. Write up results and prepare 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 of 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 to update knowledge and develop skills, and translate knowledge of advances in the area into 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.

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Person Specification
The post holder must have: A doctoral degree in a relevant discipline (although individuals who have almost completed a doctoral degree may be appointed). Consideration may also be given to individuals who do not hold a doctoral degree but have required skills based on a number of years' experience in specified / relevant fields 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.

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
To be available to participate in fieldwork as required by the specified research project

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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Research Role Profile

Addendum to Profile

Job Title:	**Research Fellow A in Advanced Signal Processing for Future 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:

The post holder will undertake research into novel physical layer (PHY) signal processing techniques for future wireless systems.

The research will focus on the design, analysis and evaluation of advanced transceiver processing algorithms. Topics include MIMO, non-orthogonal multiple access (NOMA), low-complexity non-linear detection, channel coding, and PHY design for non-terrestrial networks (NTN). The role combines theoretical analysis with simulation-based and, where appropriate, experimental validation.

The successful candidate will publish in leading journals and conferences, contribute to grant proposals and intellectual property, and help supervise PhD students.

Main Responsibilities/Activities

The post holder will undertake research within the Wireless Systems Lab at the Institute for Communication Systems (ICS), working closely with the Principal Investigator, other researchers, and academic and industrial collaborators.

More specifically, the post holder will be expected to:

1. Conduct original and high-quality research in physical layer (PHY) signal processing and advanced transceiver design for next-generation wireless communication systems.
2. Develop innovative signal processing algorithms and communication techniques, including, but not limited to, MIMO and massive MIMO processing, advanced multiple-access techniques, non-linear detection, and channel decoding.
3. Formulate and investigate challenging research problems, developing theoretical and algorithmic solutions that improve communication performance, computational complexity, energy efficiency, or other relevant system-level metrics.
4. Perform mathematical analysis, algorithm design, and rigorous performance evaluation, investigating fundamental trade-offs between performance, complexity, and practical implementation requirements.
5. Investigate the application of advanced PHY techniques to emerging communication scenarios, including non-terrestrial networks (NTN), LEO satellite systems, and direct-to-device communications, as relevant to the research projects.
6. Develop and maintain simulation environments using appropriate programming tools, such as MATLAB, Python, or C/C++, and undertake experimental validation where applicable.

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7. Disseminate research findings through publications in leading international journals and conferences, and presentations to academic and industrial audiences.
8. Contribute to the identification of new research opportunities, preparation of research proposals, and development of potentially patentable intellectual property.
9. Collaborate with academic researchers, industrial partners, and other project stakeholders, contributing to the achievement of research objectives and project deliverables.
10. Support the supervision of PhD and MSc students and contribute to other academic activities where appropriate.
11. Organise and manage assigned research activities, maintain appropriate research documentation, and report progress to the Principal Investigator and relevant project partners.

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Person Specification

Essential Criteria

- A PhD (awarded or near completion) in Electrical/Electronic Engineering, Telecommunications, Wireless Communications, Signal Processing, or a closely related discipline.
- A strong research track record in wireless communications, signal processing, or related areas, demonstrated through high-quality publications in internationally recognised journals and conferences, appropriate to career stage.
- Strong theoretical and mathematical foundations in relevant areas, such as digital communications, signal processing, estimation and detection theory, optimisation, information theory, and linear algebra.
- Demonstrated ability to develop, analyse, and evaluate novel algorithms or communication techniques, with particular emphasis on rigorous research methodology and scientific originality.
- Strong knowledge of physical layer communication principles and experience in at least one relevant research area, such as MIMO or massive MIMO systems, advanced receiver design, non-linear detection, multiple-access techniques, channel coding and decoding, or related PHY signal processing methods.
- Ability to investigate and characterise performance–complexity trade-offs and assess the practical feasibility of proposed algorithms.
- Strong programming and simulation skills, using MATLAB, Python, C/C++, or equivalent tools for algorithm development and performance evaluation.
- Ability to conduct research independently, demonstrate initiative in addressing challenging technical problems, and contribute effectively to collaborative research activities.
- Excellent written and verbal communication skills, including the ability to present technical results clearly and prepare high-quality scientific publications.

Desirable Criteria

- Advanced research experience in one or more of the following: MIMO and massive MIMO detection, non-linear receiver algorithms, iterative detection and decoding, modern channel coding, advanced multiple-access techniques, or low-complexity transceiver architectures.
- Research experience in non-terrestrial networks (NTN), including LEO satellite systems or direct-to-device communications.
- Experience developing computationally efficient algorithms and evaluating their implementation complexity, scalability, or suitability for practical communication systems.
- Experience with experimental PHY validation, software-defined radio platforms (e.g., USRPs), or over-the-air experimentation.
- Familiarity with FPGA development and high-level synthesis (HLS) tools, such as Xilinx Vivado, Vitis HLS, or equivalent platforms.
- Experience in advanced mathematical optimisation techniques and their application to the design of computationally efficient signal processing algorithms for wireless communication systems.

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- Evidence of research innovation with potential for practical application, including patents, invention disclosures, or technology transfer.
- Experience contributing to research proposals, externally funded projects, or collaborations with academic and industrial partners.
- Familiarity with relevant standardisation activities, including 3GPP, O-RAN Alliance, or IEEE.
- Experience supporting or co-supervising postgraduate research students**.**