UNIVERSITY OF SURREY

Research Role Profile

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

Responsible to:	Head of research group, or principal investigator

Responsible for:	Responsibility for staff within own research group

Job Summary and Purpose
To plan and deliver research in accordance with the specified research project. To contribute to securing funding for own research projects and for projects for those staff under their direct supervision.

Main Responsibilities/Activities
To contribute to the development of the research of the Faculty, by planning and carrying out research activity within a specified area, often in collaboration with colleagues. To take a significant role in planning, co-ordinating and implementing research programmes and, where appropriate, commercial and consultancy activities. To take lead responsibility for a small research project or identified parts of a large project. This may include planning fieldwork, data analysis and evaluation and laboratory experimentation. To make decisions about research programmes and methodologies, often in collaboration with colleagues, and to resolve the problems of meeting research objectives and deadlines. To develop new concepts and ideas to extend intellectual understanding. Assess, interpret and evaluate the outcomes of research, and develop ideas for the application of research outcomes. To take a role in the regular publication of results in appropriate journals, in giving presentations at national and/or international conferences, and in other outputs as required and/or appropriate. To develop innovative research proposals (as a self-contained item or as part of a broader programme), identifying sources of funding, submitting funding bids, and gaining positive reviews for these. Promoting own area of research. Continually to update knowledge and develop skills. To extend, transform and apply knowledge acquired from scholarship to research and appropriate external activities. To carry out management and administrative tasks associated with specified research funding, including managing and developing staff within their projects; risk assessment of project activities; organisation of project meetings and documentation; management of resources, preparation of annual reports, and management or monitoring of research budgets. To oversee and implement procedures required to ensure accurate and timely formal reporting and financial control. To undertake liaison with external organisations including equipment manufacturers, steering committees, associated academic facilities and commercial users.

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To contribute to teaching within the Faculty by carrying out student supervision, demonstrating or lecturing duties within the post holder's area of expertise. May be required to contribute to the supervision of research students.

Person Specification

The post holder must have:

Normally a doctoral degree in a relevant discipline, together with appropriate experience of working in a similar area of work.

The post holder will need to demonstrate a high level of competence and independent standing in research by being nationally recognised within their area of discipline, publishing regularly in recognised appropriate journals and attracting research funding for their own work or for other staff within the research group.

Relationships and Contacts

The post holder may have a key responsibility to the principal investigator, with prime responsibility for reporting and liaison with external funding bodies or sponsors. As a senior member of the project team, the post holder will also supervise the activities of research and technician staff within the particular research group

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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Addendum to Profile

Job Title:	Research Fellow B 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 a leading scientific role in the development of novel signal processing algorithms and computationally efficient architectures for future wireless communication systems, with particular emphasis on physical-layer (PHY) processing, advanced mathematical optimisation and high-performance receiver design.

The research will focus on developing fundamentally new approaches to computationally demanding communication tasks, including signal detection, MIMO processing, channel decoding and related optimisation problems. Particular emphasis will be placed on mathematical innovation, algorithmic efficiency and algorithm–architecture co-design, with the objective of achieving substantial improvements in communication performance, computational complexity, processing latency, energy efficiency and implementation feasibility.

The successful candidate will take scientific ownership of significant research activities, identifying and addressing challenging research problems, developing original algorithms and methodologies, and providing technical leadership in the evaluation and implementation of proposed solutions. The role will involve close collaboration with researchers specialising in digital, analogue and emerging computing architectures, as well as with academic and industrial partners.

Beyond delivering the objectives of existing research projects, the post holder will play a key role in expanding the group's research activities by initiating new research directions, developing competitive funding proposals, establishing collaborations and contributing to the mentoring and scientific development of junior researchers.

The position offers an opportunity for an ambitious researcher to develop an increasingly independent research portfolio, contribute to the strategic growth of the Wireless Systems Lab within the Institute for Communication Systems (ICS), and establish an internationally recognised research profile in advanced signal processing for future communication systems.

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Main Responsibilities/Activities

- The post holder will undertake and lead high-quality research in physical layer (PHY) signal processing and advanced wireless communication systems within the Wireless Systems Lab at the Institute for Communication Systems (ICS).
- The successful candidate will be expected to take scientific ownership of research activities, contribute to the strategic development of the group's research portfolio, and progressively establish their own research initiatives, supported by the Principal Investigator.
- More specifically, the post holder will be expected to:
- Lead and conduct original, high-quality research in physical layer signal processing and advanced transceiver design for next-generation wireless communication systems.
- Identify and formulate novel research challenges, develop innovative theoretical and algorithmic solutions, and establish new research directions in areas including MIMO and massive MIMO, advanced receiver processing, non-linear detection, channel decoding, and emerging wireless communication technologies.
- Take scientific and technical responsibility for substantial research activities and work packages within externally funded projects, ensuring the quality, originality, and timely delivery of research outcomes.
- Lead the development, mathematical analysis, implementation, and rigorous evaluation of advanced PHY algorithms, with particular emphasis on performance, computational complexity, energy efficiency, and practical implementation feasibility.
- Initiate and develop new research ideas and longer-term research directions that complement and extend the existing expertise and strategic priorities of the research group.
- Play a leading role in identifying funding opportunities, developing competitive research proposals, and establishing new externally funded research activities, including opportunities to act as Principal Investigator or Co-Investigator, subject to institutional eligibility.
- Establish and maintain collaborations with academic and industrial partners, contributing to the development of joint research initiatives and funding opportunities.
- Lead the preparation of high-quality scientific publications in internationally recognised journals and conferences, and actively promote the visibility and impact of the group's research.
- Contribute to the supervision and mentoring of PhD students, junior researchers, and research assistants, supporting their scientific development and research activities.

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- Investigate opportunities for practical exploitation of research outcomes, including hardware-oriented implementation, experimental validation, intellectual property generation, and technology transfer.

- Contribute to the scientific coordination and management of research projects, including technical planning, research milestones, deliverables, reporting, and engagement with project partners.

- Contribute to the longer-term scientific development of the research group while progressively building an independent research profile and portfolio of research initiatives.

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Person Specification

The post holder must have:

Essential Criteria

- A PhD in Electrical/Electronic Engineering, Telecommunications, Wireless Communications, Signal Processing, or a closely related discipline, together with substantial relevant postdoctoral or equivalent research experience.
- A strong and sustained research track record in wireless communications, signal processing, or related areas, demonstrated through high-quality publications in internationally recognised journals and conferences.
- Excellent 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 independently formulate challenging research problems, develop novel theoretical or algorithmic solutions, and deliver high-quality scientific outcomes.
- Advanced expertise in physical layer communication systems, with significant research experience in one or more relevant areas, such as MIMO and massive MIMO systems, advanced receiver design, non-linear detection, multiple-access techniques, channel coding and decoding, or related PHY signal processing methods.
- Demonstrated ability to lead research activities, take scientific ownership of complex technical problems, and coordinate research tasks or workstreams involving other researchers or collaborators.
- Evidence of research initiative and the ability to identify promising research directions, develop original research ideas, and contribute to the establishment of new research activities.
- Experience contributing substantially to the development of research proposals, identification of funding opportunities, or preparation of applications for externally funded research.
- Strong programming and simulation skills, using MATLAB, Python, C/C++, or equivalent tools for algorithm development, performance evaluation, and validation.
- Demonstrated ability to analyse performance–complexity trade-offs and assess the practical feasibility of advanced signal processing algorithms.
- Experience collaborating effectively with academic or industrial research partners, with the ability to communicate and coordinate complex scientific activities.
- Excellent scientific communication skills, including demonstrated ability to lead the preparation of high-quality research publications, present research findings, and communicate technical concepts to specialist audiences.
- Ability to work independently, demonstrate scientific leadership, and contribute positively to the mentoring and development of junior researchers and postgraduate students.

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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.
- Evidence of developing independent research initiatives, establishing new research collaborations, or initiating novel research directions.
- Experience leading or making substantial contributions to successful research funding applications, including applications to UKRI, European, industrial, or other competitive funding programmes.
- Experience coordinating research activities within externally funded projects, including technical leadership, project deliverables, and engagement with research partners.
- Experience supervising or co-supervising PhD students, mentoring junior researchers, or supporting the scientific development of research teams.
- Evidence of research innovation with potential for practical application, including patents, invention disclosures, or technology transfer.