FURTHER PARTICULARS

Job Title: Research Associate (EPSRC UPFRONT) : Reference 1492802.

Department: Electronic & Electrical Engineering

Reports to: Professor Kai-Kit Wong

Grade: The post is Grade 7, salary range £33,353 - £40,313 per annum, including London Allowance which is currently £2,919 per annum.

Appointment at Grade 7 is dependent upon having been awarded a PhD; if this is not the case initial appointment will be at research assistant Grade 6B (salary £29,193 - £30,783 per annum) with payment at Grade 7 being backdated to the date of final submission of the PhD thesis (including corrections).

Period of Appointment: 12 months in the first instance from February 2016.

Main Purpose
This project will develop multi-antenna full-duplex technology to achieve highly efficient spectrum usage in HetNets (heterogeneous networks). Full-duplex radios are much more than just doubling the capacity as perceived in current literature. The implications of full-duplex communications are transformative. Full duplex, which permits simultaneous transmission and reception, is an enabling technology for emerging wireless communications techniques such as relaying (or more generally user-level cooperation), physical-layer security and RF energy harvesting etc. In addition, due to effectively doubling the bandwidth from full-duplexing, there are other obvious benefits. The end-to-end (e2e) latency will be immediately reduced; user fairness is more easily maintained; hidden terminal problems can be detected and thus alleviated. The potential advantages of full-duplexing motivate a fundamental rethinking of the ways wireless networks are designed and optimised.

The main research focus is on developing novel physical-layer and medium-access control schemes to mitigate interference and explore the potential of full-duplex radios in heterogeneous networks (HetNets). The main tasks will be to establish the model of full-duplex operation in HetNets, develop practical precoding optimisation and resource allocation algorithms to tackle various interference sources caused by full-duplex operation, and conduct performance analysis and simulation using Matlab, and publish the results in international journals and conference proceedings.
This project UPFRONT will take a holistic approach to optimise the essential components for full-duplex HetNets, from RF antenna design to signal processing and network optimisation. Industrial partners will be engaged throughout the project to ensure industrial relevance of their work.

**Duties and Responsibilities**

**Specific, technical**

- To perform literature survey and conduct research on full-duplexing techniques for wireless communications.
- To develop a 4G or 5G based reference baseband model for a wireless communication system using Matlab.
- To understand various mathematical analysis techniques (particularly statistical theory and random matrix theory) used to analyse the MIMO wireless networks and HetNets.
- To propose novel models and performance metrics for full-duplex MIMO systems.
- To develop new algorithms for the resource allocation of full-duplex MIMO HetNets.
- To evaluate the performance of the proposed algorithms using Matlab simulations and mathematical analyses.
- To disseminate results arising out of the project.
- To engage in training programmes in the University (e.g. through Staff Development) which are consistent with your needs and aspirations and those of the project team and the host department.
- To carry out other specific duties as may be reasonably requested by the project leader and that are commensurate with the nature and grade of the post.

**General, technical:**

- To formulate detailed plans for the project based on broad guidance from the project team.
- To feed back to the project team on progress, to make recommendations for next steps and to prepare interim and final project reports.
- To collaborate with co-workers in other Higher Education Institutions, industry and other relevant bodies.
- To support the project team by enhancing relationships with existing collaborators and by assisting the establishment of relationships with new collaborators.
- To write research papers suitable for publication in high quality academic journals and for presentation at specialist scientific conferences.
- To attend and contribute to scientific conferences.
- To identify and pursue opportunities for the commercialisation of research.
- To contribute to the overall activities of the research team and department as required. To contribute to the induction and direction of other research staff and students as requested.
- The postholder will carry out any other duties as are within the scope, spirit and purpose of the job as requested by the line manager or Head of Department. As duties and responsibilities change, the job description will be reviewed and amended in consultation with the postholder.
- The postholder will actively follow UCL policies including Equal Opportunities and Race Equality policies.
- The postholder will maintain an awareness and observation of Fire and Health & Safety Regulations.
Person Specification for the Post of Research Associate

Knowledge – including Qualifications

- Strong (first or upper second class) undergraduate degree in Electronic Engineering or Computer Science (essential).
- PhD degree in Electronic Engineering or a related field, or be about to obtain one. (essential).
- Knowledge of general research techniques (essential).
- Knowledge of wireless communications and MIMO (essential).
- Knowledge of resource allocation in wireless systems (essential).
- Knowledge of statistics (essential).
- Knowledge and strong background in one or more of the following areas (essential):
  - wireless communications;
  - full-duplex radios, MIMO antennas;
  - information theory;
  - random matrix theory,
  - optimisation theory.
- Familiarity with game theory and mechanism (desirable).

Skills

- Strong mathematical skills (essential)
- Strong programming skills in Matlab (essential).
- Ability to present complex information effectively to a range of audiences (essential).
- Effective written and verbal communication skills (essential).
- A good publication record in the field (essential).

Experience

- Substantial experience of working in a research environment (essential).
- Substantial experience of working with wireless communications (essential).

Personal Qualities

- Commitment to high quality research (essential).
- The candidate should be able to manage their own time efficiently and take responsibility for working to deadlines (essential).
- Ability to work collaboratively as part of a team with co-operative contributions to common objectives (essential).
HOW TO APPLY

Interested applicants are encouraged to make Informal enquiries about the post to Dr Kai-Kit Wong (kai-kit.wong@ucl.ac.uk).

Further particulars and details of how to apply are available at www.ee.ucl.ac.uk/vacancies

All applications should be submitted via UCL online recruitment system at the following link:

http://www.ucl.ac.uk/hr/jobs/

Job Reference: 1492802

If you experience any problems please contact Vicky Coombes at v.coombes@ucl.ac.uk quoting reference 1492802

UCL Taking Action for Equality

Information about the Communications and Information Systems Group may be found at:

http://www.ee.ucl.ac.uk/research/comminfosys/

Information about the department may be found at:

http://www.ee.ucl.ac.uk/

Further information regarding UCL may be found at:

http://www.ucl.ac.uk/