

INTEGRATE PROJECT

Ranplan Group AB (RNP), is seeking to appoint a high-calibre doctoral candidate to join the Marie Skłodowska-Curie Doctoral Network 'Joint wireless communication and sensing by holographic surface transceivers' (INTEGRATE). The selected candidate will work under the supervision of Prof. Jie Zhang.

About the INTEGRATE project

As the standardization of 5G wireless networks progresses, the research community has started focusing on what 6G will be. Motivated by the need of ensuring high data-rates while at the same time saving spectrum a major technology that has been proposed for 6G is the integration of communication and sensing services in the same infrastructure. This enables wireless networks to perceive the surrounding environments triggering new services and leading to a more efficient use of resources. The INTEGRATE project focuses on the theoretical, algorithmic, and architectural foundations of integrated communication and sensing networks, developing the first open access network-level simulator for joint communication and sensing. To this end, a new implementation of wireless transceiver is proposed, which leverages the use of reconfigurable holographic surfaces and allows the integration of communication and sensing with remarkable performance while at the same time reducing the energy consumption.

Specifically, INTEGRATE will:

- 1) develop reconfigurable holographic surfaces (RHSs) capable of supporting joint communication and sensing tasks and that can be integrated in wireless transceivers with minimal cost and energy requirements;
- 2) Characterize the fundamental performance limits of integrated communication and sensing networks, developing an algorithmic framework and protocol suite to approach these limits;
- 3) Build the first open access software simulation platform for joint communication and sensing networks.

Position title: RNP-1 - Ray-tracing simulation environment for RHS-based integrated communication and sensing networks

Research project: This project aims at developing new ray-tracing modules able to account for the presence of RHSs. New software routines will be developed in order to develop a ray-tracing software capable of supporting the near-field propagation in the presence of RHSs. To this end, the main challenge is that RHSs will have to be equipped with many electromagnetic units to provide the best communication and sensing performance, which poses a complexity issue for ray-tracing simulation, especially in large-scale networks. This challenge will be addressed by the use of Bayesian methods to predict wireless channels realizations, together with a multi-resolution approach. A fine resolution will be used to model the region of greater interest, e.g., locations of metasurfaces, while a lower resolution will be applied in those regions of the network in which fewer terminals are located. electromagnetic signal for the highest possible joint communication and sensing performance.

Objectives: Develop a new ray tracing module that accounts for the presence of RHS-based transceivers in large-scale networks.

PhD enrolment: The selected applicant will be enrolled into a Ph.D. program at King's College London, while working on the project.

Location: Riddargarten 18, Floor 1, S-114 51, Stockholm, Sweden.

Working Time: Full-time

Duration: Fixed-term (3 years).

Salary: In agreement with the MSCA-DN financial regulations, including living, mobility, and family allowances.

Secondment: RNP-1 will spend a research stay of 8 months at another partner of the INTEGRATE project. The planned secondment for RNP-1 is at King's College London.

Job requirements

- An undergraduate degree and a postgraduate Master's degree (or equivalent) in information engineering, computer science, electronic or electrical engineering, mathematics, electromagnetics, or a physical sciences subject.
- Solid background on communication theory, wireless communications, and signal processing.
- Excellent mathematical skills and background (optimization theory is a plus).
- High proficiency in Matlab, or similar programming software.
- Excellent written and verbal communication, including presentation skills.
- Highly proficient English language skills.
- Excellent organizational skills, attention to details and the ability to meet deadlines.
- Ability to think logically, create solutions and make informed decisions.
- Willingness to work collaboratively in a research environment.
- Willingness to travel and work across Europe.

Duties and Responsibilities

- Undertake postgraduate research in support of the agreed doctoral research project.
- Work closely with the academic supervisors to ensure the compatibility of the individual project with the overall goals of the INTEGRATE project.
- Present and publish research in both academic and non-academic audiences.
- Attend and participate to academic and non-academic conferences, events and seminars.
- Attend and participate to all training events and supervisory meetings.
- Be seconded to other network partners as necessary to fulfil the grant obligations.
- Prepare progress reports and similar documents on research for funding bodies, as required.
- Contribute to the delivery and management of the wider program, including attending and participating in program committee meetings.
- Actively contribute to the public engagement and outreach activities of the project.

As job descriptions cannot be exhaustive, the Researcher may be required to undertake other duties, which are broadly in line with the above duties and responsibilities.

Eligibility requirements

- The applicant must be a doctoral candidate (i.e. not already in possession of a doctoral degree at the date of the recruitment).
- At the time of recruitment, the researcher must not have resided or carried out their main activity (work, studies, etc.) in the country of their recruiting organization for more than 12 months in the three years immediately prior to the recruitment date. Compulsory national service and/or short stays such as holidays are not taken into account.

Selection Process

The selection and recruitment process will be in accordance with the European Charter and Code of Conduct for the Recruitment of Researchers. The recruitment process will be open, transparent, impartial, equitable, and merit-based.

There will be no overt/covert discrimination based on race, gender, sexual orientation, religion or belief, disability or age. To this end, the following selection criteria will be considered:

- 1) Curriculum
- 2) Academic performance (diplomas, university transcripts, etc.)
- 3) Research and industrial experience
- 4) Awards and fellowships
- 5) Publications and patents
- 6) Research, leadership, and creativity potential
- 7) English knowledge
- 8) Other relevant items based on the specific candidate

The application deadline is **1st March 2025**. All applications will be analysed after the application deadline, and the shortlisted candidates will be invited to a teleconference interview. At the end of the selection process, all the applicants will be informed of the outcome of their application by return email.

Disclaimer

By applying for this position, the applicant:

- 1) give their consent to circulate their application and personal data within the members of the consortium.
- 2) declare to fulfil the eligibility requirements defined by above.
- 3) agree to spend a secondment of at most 8 months in another partner of the INTEGRATE consortium.
- 4) agree that they will comply with the planned Ph.D. enrolment.

How to Apply

Each application must include the following material:

- a) Curriculum vitae setting out the educational qualifications as well as any additional scientific achievements and publications. The CV must clearly indicate the applicant's vitae name, surname, gender, date of birth, nationality, country of residence in the last three years).
- b) Evidence of English proficiency.
- c) Copy of Bachelor's and Master's certificates.
- d) Copy of Bachelor's and Master's transcripts.
- e) Any additional material useful for the assessment of the candidate (e.g., recommendation letters, research project/statement in agreement with the requirements specified in previous text).

Applications must be submitted according to the following procedure:

- 1) Registration and submission of the application material to the INTEGRATE recruitment website (<https://www.ranplanwireless.com/gb/careers/>)
- 2) Parallel application and submission of the application material to the attention of Dr. Jie Zhang, to be sent to jobs@ranplanwireless.com.

Note: Both steps 1) and 2) are mandatory for the application to be considered.

Further Information

For more information, please contact Prof. Jie Zhang (jie.zhang@sheffield.ac.uk or jie.zhang@ranplanwireless.com).

Ranplan Wireless welcomes and encourages applications from qualified individuals regardless of sex, race, disability, sexual orientation, gender identity, marriage or civil partnership status, pregnancy or maternity, religion or belief.