Job Description for Position: CS2

CentraleSupelec (CS), 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. Marco Di Renzo.

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 (RHS) 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 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: CS2 - Electromagnetic modeling and design of RHSs for wireless radio transceivers.

Research project: Presently, a leading 6G technology is the use of metasurfaces placed far from wireless transceivers, as a way to control and customize the wireless channel. Novel models must be derived which characterize the behavior of RHSs when placed in a network in which metasurfaces are also deployed far away from the transceivers. To this end, the so-called unit modulus constraint model must be abandoned, since it does not account for the actual reradiation properties of metasurfaces that may produce reradiated beams towards undesired directions. This project intends to characterize the performance of RHS-based transceivers in metasurface-controlled channels by considering practical models that account for the possible reradiation of waves towards other directions, as well as the performance in the presence of electromagnetic interference. To this end, Floquet's theory will be utilized and new optimization problems that account for the suppression of unwanted reradiated beams and the presence of interference will be formulated and solved, based on the newly proposed analytical frameworks.

Objectives: To develop electromagnetic-compliant models and designs for RHS-based wireless radio transceivers in metasurface-aided wireless channels.

PhD enrolment: The selected applicant will be enrolled into a Ph.D. program at CentraleSupelec – Paris-Saclay University, France, while working to the project.

Location: CentraleSupelec, Plateau de Moulon - 3 rue Joliot Curie - 91192 Gif-sur-Yvette Cedex, France.

Working Time: Full-time.

Duration: Fixed-term (3 years).

Salary: In agreement with the MSCA-DN financial regulations, including living, mobility, and family allowances (https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2021-2022/wp-2-msca-actions_horizon-2021-2022_en.pdf).

Secondment: CS2 will spend a research stay of 8 months at another partner of the INTEGRATE project. The planned secondment for CS2 is at Ranplan Group AB, Sweden.

Job requirements

1) An undergraduate degree and a postgraduate Master's degree (or equivalent) in information engineering, electronic or electrical engineering, mathematics, electromagnetics, or a physical sciences subject.
2) Solid background in communication theory, wireless communications, signal processing. Knowledge of electromagnetics, antennas, and metamaterials is a plus.
3) Excellent mathematical skills and background.
4) High proficiency in Matlab, and other programming software (e.g., Mathematica, CST, HFSS or COMSOL).
5) Excellent written and verbal communication, including presentation skills.
6) Highly proficient English language skills.
7) Excellent organizational skills, attention to details and the ability to meet deadlines.
8) Ability to think logically, create solutions and make informed decisions.
9) Willingness to work collaboratively in a research environment.
10) Willingness to travel and work across Europe.

Duties and Responsibilities

1) Undertake postgraduate research in support of the agreed doctoral research project.
2) Work closely with the academic supervisors to ensure the compatibility of the individual project with the overall goals of the INTEGRATE project.
3) Present and publish research in both academic and non-academic audiences.
4) Attend and participate to academic and non-academic conferences, events and seminars.
5) Attend and participate to all training events and supervisory meetings.
6) Be seconded to other network partners as necessary to fulfil the grant obligations.
7) Prepare progress reports and similar documents on research for funding bodies, as required.
8) Contribute to the delivery and management of the wider program, including attending and participating in program committee meetings.
9) 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 **December 6th, 2023**. All applications will be analyzed after the application deadline, and the shortlisted candidates will be invited to a teleconference interview. The selected candidates are expected to be recruited during the period **January 1st, 2024 - February 29th, 2024.** 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 fulfill 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://integrate.cnit.it/index.php/jobs).
2) Parallel application and submission of the application material to the attention of Prof. Marco Di Renzo, to be sent to msca_integrate_l2s_application@centralesupelec.fr.

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

Further Information

For more information, please contact Prof. Marco Di Renzo (marco.direnzo@centralesupelec.fr).