

## JOB DESCRIPTION

### ISLANDS – Doctoral Candidate (DC)

#### NOKIA-1: Evolving wireless networks architectures to support ISAC

Nokia Solutions and Networks GmbH & Co. KG is seeking to appoint one Doctoral Candidate (DC) to join the Marie Skłodowska-Curie Doctoral Network on “**Integrated Sensing and communications for future vehicuLAR systems a Network of Doctoral Students**” (ISLANDS).

<b>Position:</b>	Doctoral Candidate (DC)
<b>Location:</b>	Magirusstrasse 8, 70469 Stuttgart, Germany
<b>Working time:</b>	Full Time (35h/week)
<b>Duration:</b>	Fixed-Term (3 years)
<b>Living, mobility, family, and research allowances:</b>	In agreement with the MSCA Doctoral Network financial regulations <a href="https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-2-msca-actions_horizon-2023-2024_en.pdf">https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-2-msca-actions_horizon-2023-2024_en.pdf</a> (Section 1. MSCA DOCTORAL NETWORKS, page 81)

### About ISLANDS

For decades communication systems have been developed independently to radar systems, leading to a duplication of systems and devices that exploit the electromagnetic spectrum in common ways. Yet, the future wireless infrastructure will need to do more than just communications to support smart cities, intelligent mobility, infrastructure monitoring, security. It will need to perform multiple functions and will rely on high-reliability communication and sensing. The independent growth of radar and communication systems is no longer sustainable and will lead to a congestion of devices, emitters and sensors. There is a skills gap in the community to address this as communication engineers work isolated to radar engineers, and a new set of skills need to be developed. ISLANDS is a doctoral network that focuses on the theoretical and algorithmic foundations of integrated sensing and communication for the automotive sector, with the objective of developing new physical-layer and network-level solutions, to explore the fundamental limits of such technology, and to provide experimental validation and testing for the developed techniques. Specifically, ISLANDS will: 1) develop new transceiver algorithms, capable of integrating and leveraging the communication and sensing functionalities, with the purpose of achieving superior performance and energy and hardware efficiency; 2) investigate the ultimate network performance limits that the integration of communication and sensing can achieve in environments with extreme mobility; and 3) provide experimental validations of the developed techniques with proof-of-concept testbeds and realistic system-level simulators. ISLANDS will train the next generation of EU experts

and leaders with specific interdisciplinary expertise, combining sensing and communications, with the aim of reinforcing European leadership in the automotive sector of the next decades.

### The Role

The DC will focus on the design of physical (PHY) and medium access control (MAC) layers of radio access networks to integrate sensing functionalities operating in the same carrier frequency band of communication services. Aiming at adding radar functionalities to network base stations, the DC will investigate the architecture and procedures of how communications and sensing can synergize in future networks in licensed and unlicensed bands. The DC will also investigate 3GPP-compliant SLAM techniques (secondment at TAU) and/or will focus on the design of MAC layer functionalities for ISAC-enabled cell-free massive MIMO networks (secondment at CNIT).

Further information about the Ph.D. projects can be found in the following tables.

<b>Position:</b> NOKIA-1
<b>Title:</b> Evolving wireless networks architectures to support ISAC.
<b>Scientific context:</b> Wireless communication network architectures (e.g. of cellular 3GPP-based systems) of current generations to not foresee the capability to support also sensing services (e.g. based on OFDM radar). A change in architecture, procedures and processing is required to add the capability of operate with integrated sensing. Newly added sensing functionalities will need to take into account the existing designs and procedures for communication services and find the appropriate modifications, such that communication performance is not severely degraded while the new sensing services meet appropriately defined quality of service targets.
<b>Objectives:</b> Design of physical (PHY) and medium access control (MAC) layers of radio access networks to integrate sensing functionalities into communication systems by adding radar functionalities to network base stations
<b>Expected results:</b> Architecture and procedures for synergizing communications and sensing in future networks in licensed and unlicensed bands.
<b>Acquired knowledge:</b> Knowledge of radio access networks of communication systems, signal processing and scheduling for sensing
<b>Planned secondment(s):</b> Tampere University (Finland) for up to 6 months, University of Cassino and Southern Lazio (Italy) for up to 3 months. Total time planned will not exceed 6 months.
<b>Ph.D. enrolment:</b> Karlsruhe Institute of Technology (KIT)

### 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 ISLANDS.
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 programme, including attending and participating in programme committee meetings.
9. Actively contribute to the public engagement and outreach activities as described in the grant agreement. As job descriptions cannot be exhaustive, the DC may be required to undertake other duties, which are broadly in line with the above duties and responsibilities.

### **Person Specification**

1. An undergraduate degree and a postgraduate Master's degree (or equivalent) in electronic or electrical engineering, mathematics, electromagnetics, or a physical sciences subject.
2. Excellent mathematical skills and background.
3. High proficiency in Matlab, Python, C++, or similar programming software.
4. Solid background on wireless communications (antennas, propagation, stochastic geometry is a plus).
5. Experience with hardware and demonstrators.
6. Excellent written and verbal communication, including presentation skills.
7. Highly proficient English language skills.
8. Excellent organisational skills, attention to detail and the ability to meet deadlines.
9. Ability to think logically, create solutions and make informed decisions.
10. Willingness to work collaboratively in a research environment.
11. A strong commitment to his/her own continuous professional development.
12. Willingness to travel and work across Europe.

### **Eligibility Requirements**

All candidates must meet the following requirements to be considered for this post:

- a) Doctoral Candidates (DC) shall at the time of recruitment by the host organisation not yet have been awarded a doctoral degree. A postgraduate Master's degree (or equivalent) is required at the time of recruitment to enroll the doctoral program.
- b) At the time of recruitment by the host organisation, DCs must not have resided or carried out their main activity (work, studies, etc.) in the country of their host organisation 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.

### **How to Apply**

Applications must be submitted, to the attention of Dr. Silvio Mandelli and Dr. Thorsten Wild, according to the following procedure:

- 1) Registration and submission of the application material to the ISLANDS recruitment website (<https://www.islands-mscadoctoralnetwork.eu/jobs/>).
- 2) Application at the Nokia careers website. ([https://fa-evmr-saasfaprod1.fa.ocs.oraclecloud.com/hcmUI/CandidateExperience/en/sites/CX\\_1/job/1461?keyword=+Marie+Curie+trainee&mode=location](https://fa-evmr-saasfaprod1.fa.ocs.oraclecloud.com/hcmUI/CandidateExperience/en/sites/CX_1/job/1461?keyword=+Marie+Curie+trainee&mode=location))

*Please note that it is essential that the candidate makes a double submission of his/her application by executing both the above steps 1) and 2).*

Note 1: Informal enquires for further information about the positions can be send to Dr. Silvio Mandelli [silvio.mandelli@nokia-bell-labs.com](mailto:silvio.mandelli@nokia-bell-labs.com) and Dr. Thorsten Wild [thorsten.wild@nokia-bell-labs.com](mailto:thorsten.wild@nokia-bell-labs.com)

Note 2: By registering in the website mentioned above at point 2), the applicants agree that all members of the ISLANDS project can access their personal data and application material.

Each application must include the following material:

- a) A cover letter explaining the motivation for applying for the post.
- b) A curriculum vitae setting out the educational qualifications as well as any additional scientific achievements and publications.
- c) Evidence of English proficiency.
- d) Copy of Bachelor's and Master's certificates (if available at the time of application).
- e) Copy of Bachelor's and Master's transcripts.
- f) 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).

### **Selection Process**

The selection and recruitment processes of the DCs 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 for the recruitment of the DCs will be considered:

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

The recruitment process will adhere to the guidelines described in the Grant Agreement of the ISLANDS project. At the network's level, the recruitment will be coordinated by the Recruitment Committee of the project in order to guarantee gender- and sector-balance.

At Nokia Solutions and Networks GmbH & Co. KG, the recruitment will be coordinated by the department of Radio Systems Research Germany. More precisely, the recruitment and selection of the DCs will be executed by Dr. Silvio Mandelli and Dr. Thorsten Wild. The entire process will be overseen and approved by the Responsible of the Human Resources of Nokia Solutions and Networks GmbH & Co. KG.

The application deadline for the post is on April 7<sup>th</sup> 2024. Each application will be acknowledged electronically (e.g., by return email) and a unique ID number will be assigned to it.

The applications will be analysed 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 of May-June 2024. At the end of the selection process, all the applicants will be informed of the outcome of their application by return email.

### **Further Information**

For more information about the post NOKIA-1, please contact Dr. Silvio Mandelli [silvio.mandelli@nokia-bell-labs.com](mailto:silvio.mandelli@nokia-bell-labs.com).

### **Disclaimer**

By applying for this position, the applicants give their consent to circulate their application and personal data within the members of the consortium.

By applying for this position, the applicants declare to fulfil the eligibility requirements defined by the MSCA.

By applying for this position, the applicants agree that they will comply with the secondment plan.

By applying for this position, the applicants agree that they will comply with the planned Ph.D. enrolment.