Job Description for Position: CNIT2

The *Consorzio Nazionale Interuniversitario per le Telecomunicazioni (CNIT), Laboratory of the University of Cassino and Southern Lazio, Italy*, 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).

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: CNIT2 - Algorithmic design for RHS-based integrated communication and sensing networks.

Research project: this project is focused on developing novel algorithms to approach the ultimate performance limits of integrated communication and sensing networks, while ensuring the computational complexity remains limited. To this end, the approach will be to employ the optimization frameworks of alternating optimization, sequential optimization, and fractional programming, which enable to decompose non-convex optimization problems which have exponential complexity in the number of optimization variables, into a series of simpler problems, with polynomial complexity. Moreover, the frameworks of transfer learning and reinforcement learning will be employed to predict the optimized radio resource allocation from previous observations and based on theoretical models. This allows updating the optimized radio resource allocation in each channel coherence block, without the need of actually solving the optimization problem anew, thus enabling online radio resource allocation.

Objectives: Develop radio resource allocation algorithms to approach the fundamental performance limits of RHS-based integrated communication and sensing networks, with affordable computational complexity, and performance close to the theoretical bounds.

Location: CNIT Laboratory based at the University of Cassino and Southern Lazio, Cassino (FR), Italy and Politecnico di Torino, Turin, Italy.

PhD enrolment: The selected applicant will be enrolled into a Ph.D. program to conduct the planned research activities.

Working Time: Full-time.

Duration: Fixed-term (3 years).

Salary: in agreement with European salaries for doctoral positions, plus additional benefits.

Secondment: CNIT2 will spend a research stay of 8 months at another partner of the INTEGRATE project. The planned secondment for CNIT2 is at NEC Laboratories Europe GmbH.

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.

In order to apply, use the application form at https://integrate.cnit.it/index.php/jobs
For further information, send an email to Prof. Alessio Zappone (alessio.zappone@unicas.it).