FACULTY RECRUITMENT PROFILE

Assistant Professor

IRISA laboratory (UMR 6074) / CIDRE research team

Title: Assistant Professor in Computer Science/Engineering: security at the software/hardware interface

Position: Assistant Professor in Computer Science/Engineering*,* at CentraleSupélec, in the CIDRE team of the Rennes campus / IRISA Laboratory (UMR CNRS 6074*),* "CDI de droit public", level Assistant Professor. This is a tenured position under a public-law permanent contract opened to both junior and senior postdocs or assistant professors.

CNU Section: For information, the position corresponds to CNU sections 27 – Computer Science, or 61 – Computer Engineering, Automation and Signal Processing.

Domain / Job profile: Assistant professor in Computer Science/Engineering (security at the software/hardware interface), Rennes campus of CentraleSupélec, CIDRE Inria project team, IRISA laboratory (UMR 6074).

Keywords: Cybersecurity, software/hardware security, computer architecture

CentraleSupélec is a public scientific, cultural and professional institution (EPSCP in French) under the authority of the Ministry of Higher Education and Scientific Research and the Ministry of the Economy, Industry and Digital Technology. Its main missions are the training of high-level scientific general engineers, research in engineering and systems sciences, and executive education.

The Rennes Campus Faculty is an academic department at CentraleSupélec whose educational scope covers the fields of Computer Science/Engineering, Electronics and Control for the 3-year CentraleSupélec Engineering Program. The department also manages Specialized Masters in Cybersecurity for CentraleSupélec.

The IRISA Laboratory is a joint venture resulting from the collaboration between eight institutions, in alphabetical order: CentraleSupélec, CNRS, ENS Rennes, IMT Atlantique, Inria, INSA Rennes, Université Bretagne Sud, Université de Rennes 1. IRISA is today one of the largest French research laboratories (more than 850 people) in the field of computer science and information technologies. Structured into seven scientific departments, the laboratory is a research center of excellence with scientific priorities such as bioinformatics, systems security, new software architectures, virtual reality, big data analysis and artificial intelligence. CIDRE is a research group of IRISA focusing on the security of information systems.

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Context related to the environment of the position:

This position is aligned with a strategy to expand cybersecurity activities on the Rennes campus of CentraleSupélec. Rennes, and Brittany in general, is one of the major centers in the domain of cybersecurity in France and Europe. Rennes has a rich and dynamic ecosystem in this domain, including players like the Ministry of the Armed Forces (General Directorate of Armament -DGA-, Cyber Defense Command), major industrial groups (Orange, Airbus, Thales, etc.) as well as increasing numbers of SMEs and startups, representing a total of more than 2,600 jobs and 70 companies in the field of cybersecurity. This ecosystem is currently experiencing a strong expansion: for example, the Ministry of the Armed Forces has forecast the creation of 1,800 more jobs between 2018 and 2025 in this field in Rennes.

The different cybersecurity actors are federated within the *Cybersecurity Excellence Center* (Pôle d'Excellence Cyber). In terms of research and teaching, the academic partners and the Brittany region have proposed the creation of C-Cube, a multidisciplinary cybersecurity competence center based in a dedicated building, which will concentrate the different research and teaching activities in cybersecurity in the same place. Academic partners also participate in the Graduate Research School EUR Cyberschool.

Cybersecurity has been one of the distinctive assets of the Rennes campus of CentraleSupélec for the past twenty years. It is the main research focus of the CIDRE research team from IRISA laboratory (UMR 6074). This topic is strongly present throughout our courses in the *InfoSec* track, the *Cyber* specialization of the CentraleSupélec engineering curriculum and the "*mastère spécialisé*" (continuing education) in CyberSecurity, co-accredited with IMT Atlantique.

CentraleSupélec wants to reinforce and diversify its research activities in cybersecurity and extend its teaching offer in this domain at its campus in Rennes. The objective is to develop a new line of research on the security of software/hardware interfaces. This is a collaborative effort between members of the CIDRE research team, whose research work focuses on software security, and members of the SCEE research team of the IETR laboratory (UMR6164), whose expertise includes hardware design and computer systems architectures. Ultimately, it will enable to cover a broader spectrum of threats, from the security of high-level applications to the security of the hardware architectures in which they are run.

Academic profile:

Teaching activities will be carried out over a broad spectrum covering the courses offered as part of CentraleSupélec Engineering program, the more specialized InfoSec and Cyber specializations, as well as the Master programs and "*mastère spécialisé*" (continuing education) in Cybersecurity:

- Engineering and Master degrees: preparing and giving lectures, guided tutorials and laboratory work, supervising projects and internship students
- Continuing education: develop and teach tutorials or specialized courses on specific subjects

Teaching subjects include competencies in computer science, computer architecture and cybersecurity. The candidate should be able to teach in one or more of the following areas:

- Computer architecture and microarchitecture security
- Processor architecture, microarchitecture, and implementation/emulation in FPGA
- System security (OS, hypervisor, firmware)
- Software and hardware reverse engineering
- Embedded systems: hardware, BSP and embedded OS, as well as associated toolchains (Yocto, buildroot, cross-compilation toolchains)
- Low-level software development (C and/or, Rust) and binary code analysis

Teaching can be entirely conducted in English, but the candidate will be encouraged to acquire knowledge of French to facilitate interaction with students.

Research profile:

The candidate will have a proven publication track record in the domain of cybersecurity, specifically in one or more of the following areas:

- Hardware security mechanisms (isolation, enclaves, security supervision), prototyping on FPGA
- Low-level software security (OS, hypervisor, firmware)
- Protection mechanisms against malicious devices (for instance for DMA attacks)
- Software attacks (injection, side-channels) against the microarchitecture, and software/hardware countermeasures
- Software and hardware reverse-engineering

The research activities will be carried out in the CIDRE[1] research team of the IRISA[2] laboratory, in collaboration with members of the SCEE[3] research team of the IETR[4] laboratory.

CIDRE is a joint research team from CentraleSupélec, Inria, the University of Rennes 1 and the CNRS, and it is part of IRISA laboratory (Institut de Recherche en Informatique et Systèmes Aléatoires, UMR 6074).

SCEE is a joint research team from CentraleSupélec and the University of Rennes 1 and it is part of IETR laboratory (Institut d'Électronique et des Technologies du NuméRique, CNRS UMR 6164).

The candidate will develop an ambitious research project of the highest international level aligned with societal concerns. She/he will participate and lead research projects with national and international academic partners, as well as with industrial partners for common research and valorization projects.

Candidate profile:

- The candidate must hold a thesis in the field of Computer Science/Engineering with significant scientific contributions in computer systems security.
- The candidate must be author or co-author of publications in international journals (the publication requirement will depend on the curriculum vitae and the number of years of experience).
- The candidate is expected to have a taste for teaching, research and teamwork.
- The candidate is expected to engage in the supervision of research work in line with the themes of the laboratory.

Recruitment interview:

For the candidates selected for the audition, the audition will take place in three stages:

- A presentation of the candidate's background and integration project
- An illustration of a 5-minute lecture, given in English, on a problem, whose subject is identical for all candidates, will be specified on the invitation
- An exchange with the members of the committee

The duration of the three parts of the audition will be specified in the invitation letter.

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[1] CIDRE: https://team.inria.fr/cidre/
[2] IRISA: http://www.irisa.fr/en
[3] SCEE: http://www-scee.rennes.supelec.fr/wp/
[4] IETR: https://www.ietr.fr/?lang=en

Candidatures:

File in pdf format, including

- A cover letter
- A detailed CV (teaching experience, research, mobility, publications, etc.)
- An integration project
- A copy of the identity card or passport
- A copy of the doctoral degree
- And any documents that attest previous experience

must be sent by email only to the two contacts below before April 30, 2021 at the latest:

- Lorraine Maret, human resources: lorraine.maret@centralesupelec.fr
- Elodie Ledoux, human resources: elodie.ledoux@centralesupelec.fr

Applicants are encouraged to contact Guillaume Hiet (guillaume.hiet@centralesupelec.fr), Ruben Salvador (ruben.salvador@centralesupelec.fr) and Amor Nafkha (amor.nafkha@centralesupelec.fr) beforehand to discuss about their teaching and research projects.

Applicants can also contact Valérie Viet Triem Tong (valerie.viettriemtong@centralesupelec.fr), leader of the CIDRE research team, and Stéphanie Delaune (stephanie.delaune@irisa.fr), leader of the cybersecurite research axis of IRISA.

Scientific contacts:

Valérie Viet Triem Tong, leader of the CIDRE research team: valerie.viettriemtong@centralesupelec.fr

Christophe Bidan Director of the Rennes campus of CentraleSupélec: christophe.bidan@centralesupelec.fr