



**Offer #2021-03803**

## **Post-Doctoral Research Visit F/M Blockchain based secure routing in wireless IoT based Critical Infrastructures (M/F)**

**Contract type :** Fixed-term contract

**Level of qualifications required :** PhD or equivalent

**Fonction :** Post-Doctoral Research Visit

### **About the research centre or Inria department**

The Inria Lille - Nord Europe Research Centre was founded in 2008 and employs a staff of 320, including 280 scientists working in fourteen research teams. Recognised for its outstanding contribution to the socio-economic development of the Hauts-De-France région, the Inria Lille - Nord Europe Research Centre undertakes research in the field of computer science in collaboration with a range of academic, institutional and industrial partners.

The strategy of the Centre is to develop an internationally renowned centre of excellence with a significant impact on the City of Lille and its surrounding area. It works to achieve this by pursuing a range of ambitious research projects in such fields of computer science as the intelligence of data and adaptive software systems. Building on the synergies between research and industry, Inria is a major contributor to skills and technology transfer in the field of computer science.

### **Context**

In the digital era, Critical Infrastructures (CIs) are operating under the premise of robust and reliable ICT components, complex ICT infrastructures and emerging technologies (e.g., IoT, Cloud Computing, Big Data) and are transforming into Critical Information Infrastructures (CIIs) that can offer a high degree of flexibility, scalability, and efficiency in the communication and coordination of advanced services and processes. The increased usage of information technology in modern CIIs means that they are becoming more vulnerable to the activities of hackers and other perpetrators of cyber-related crime (cyber criminals). Several recent studies have shown that the landscape of cyber threats is changing continuously and the nature of attacks of this sort are evolving, involving a great degree of persistence and (technical) sophistication.

This post-doctoral research project, within the Inria Fun team (<http://team.inria.fr/fun/>) falls in the context of the H2020 CyberSane project 2019-2022 (<https://www.cybersane-project.eu>).

CyberSANE's aim is to enhance the security and resilience of Critical Information Infrastructures (CIIs) by providing a dynamic collaborative, warning and response system (CyberSANE system) guiding the security officers and operators (e.g. Incident Response professionals) on how to recognize, identify, dynamically analyze, forecast, treat and respond to their advanced persistent threat and handle their daily cyber incidents utilizing and combining both structured data (e.g. logs and network traffic) and unstructured data (e.g. data coming from social networks and dark web). The main goal of CyberSANE is to introduce a holistic and privacy-aware approach in handling security incidents, addressing the complexity of these nets consisting of cyber assets hosted in cross-border, heterogeneous Critical Information Infrastructures (CIIs).

### **Assignment**

In this Cybersane context, the FUN team is in charge of securing the wireless communications between IoT hardware constrained devices. To achieve so, it will interact with different components of the CyberSane System and rely to dynamically adapt detection techniques to potential threats and isolate malicious or suspicious nodes.

To carry out this project, a post doctoral position is available within the Inria FUN.

Based on the secure routing protocol and the malicious nodes identification investigated by the PhD student, the goal of this position will be to focus on the isolation of these malicious nodes and to some recovery mechanisms.

### **Main activities**

The post-doctoral fellow will be in charge of

- Investigate the use of blockchains and cryptographic keys to secure a wireless routing
- Design bypassing mechanisms to evict some malicious nodes from routing paths in the CyberSane System in the context of the CyberSane project
- Implement and test the designed solutions on real hardware platform
- Assist the PhD working in the project
- Participate to the CyberSane project (meeting, deliverables, etc.)

## Skills

We are looking for a candidate that owns a PhD in computer science, who is creative in proposing solutions, capable of critical analysis of results and leading research activities.

We demand the candidate :

- 1) to be curious and interested in new technologies
- 2) to have excellent skills in scripting and programming (e.g., python, C/C++, Java, ROS) as well as previous experience with simulation and experimentation tools;
- 3) to have a strong background in mobile networks and forwarding protocols;
- 4) to be fluent in spoken and written English with strong communication and presentation skills;
- 5) to be autonomous, open minded, team working, sense of organization and rigor ;
- 6) Experience with mobility modeling, resource management for wireless networks are considered a plus.

## Benefits package

You will join a dynamic team of international scientific experts in the field of IoT (<http://team.inria.fr/fun/>).

You will participate in the design of innovative protocols within the framework of a large-scale European project with recognised cybersecurity players.

You will work in a stimulating and pleasant working environment (transport participation (50%), on-site catering, teleworking, leave and special leave of absence (45 days), videoconference equipment, technical experimentation laboratory, etc.).

You will be able to benefit from quality training courses adapted to your needs and preferences, whether technical, methodological or linguistic.

In addition to improving your technical skills, Inria offers you the opportunity to develop your entrepreneurial skills by taking part in awareness-raising events and training courses on the creation of start-ups (start-up horizon, intellectual property training, hackAthon ... <https://www.inria.fr/fr/inria-startup-studio>).

For international candidates, our administrative services will help you through the various administrative procedures (visa, residence permit, social security, housing, bank...).

## Remuneration

Gross monthly salary (before taxes) : 2 653 €

## General Information

- **Theme/Domain** : Networks and Telecommunications System & Networks (BAP E)
- **Town/city** : Villeneuve d'Ascq
- **Inria Center** : [Centre Inria de l'Université de Lille](#)
- **Starting date** : 2021-10-01
- **Duration of contract** : 12 months
- **Deadline to apply** : 2021-09-05

## Contacts

- **Inria Team** : [FUN](#)
- **Recruiter** : Mitton Nathalie / [Nathalie.Mitton@inria.fr](mailto:Nathalie.Mitton@inria.fr)

## About Inria

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

**Warning** : you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is

not guaranteed.

## Instruction to apply

CV, application letter, list of publications, one or more letters of recommendation and a short research statement.

### **Defence Security :**

This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

### **Recruitment Policy :**

As part of its diversity policy, all Inria positions are accessible to people with disabilities.