2018-00223 - Post Doc - 6TiSCH Benchmarking

Type de contrat : CDD de la fonction publique
Niveau de diplôme exigé : Bac + 5 ou équivalent
Fonction : Post-Doctorant
Niveau d’expérience souhaité : De 3 à 5 ans

Contexte et atouts du poste

Established in 1967, Inria is the only public research body fully dedicated to computational science. Combining computer sciences with mathematics, Inria’s 3,500 researchers strive to invent the digital technologies of the future. Educated at leading international universities, they creatively integrate basic research with applied research and dedicate themselves to solving real problems, collaborating with the main players in public and private research in France and abroad and transferring results innovative companies. Inria researchers have published over 4,500 articles in 2013 and are behind over 270 active patents and 110 start-up companies. In 2013, Inria’s budget was 235 million euros, 25% of which represented its own resources. The 180 project teams are distributed in eight research centers located throughout France.

The brand new Inria-Paris research center is located in the heart of Paris. Thanks to its top-quality researchers and numerous international guests, the Inria-Paris research center plays a leading role in international research, with a strong focus on networking and communication systems. The 41 research teams of the center are continuously pushing the boundaries in developing new concepts and techniques.

In 2015, Glassdoor ranked Inria the #1 company in France for the wellbeing of its employees.

EVA (https://team.inria.fr/eva/) is a leading research team in low-power wireless communications. The research team is designing Tomorrow’s Internet of (Important) Things. The team pushes the limits of low-power wireless mesh networking by applying them to critical applications such as industrial control loops, with harsh reliability, scalability, security and energy constraints. EVA co-chairs the IETF 6TiSCH standardization working group and co-leads Berkeley’s OpenWSN project. EVA is also heavily involved in real-world applications, and oversees over 1,000 sensors deployed on 3 continents for smart agriculture, smart city and environmental monitoring applications. The team is associated with Prof. Glaser’s (UC Berkeley), Prof. Kerkez’ (U. Michigan) and Prof. Krishnamachari’s (USC) teams.

Some pointers about the projects the EVA team is involved in:

- Team Homepage: https://team.inria.fr/eva/
- Thomas Watteyne’s homepage: www.thomasswatteyne.com
- IETF 6TiSCH working group: https://tools.ietf.org/wg/6tisch/
- open-source 6TiSCH implementation: www.openwsn.org
- Back-end system: http://solsystem.io/
- Smart Agriculture deployment in Argentina: http://www.savethepeaches.com/
- Environmental deployment in California: http://snownow.io/
- Smart city deployment in the French Riviera: http://smartmarina.org/

Mission confiée

This position is part of the ADT 6TiSCH project, funded directly by Inria. 6TiSCH is also the name of a...
working group at the IETF (https://tools.ietf.org/wg/6tisch/charters), which is standardizing a key technology for the Industrial IoT. 6TiSCH is a low-power wireless protocol stack in which nodes are synchronized and use channel hopping. A 6TiSCH network delivers wire-like reliability (>99.999% end-to-end) and over a decade of battery lifetime (with <50µA average current draw). The standardization activities are 80% done, and the pull from open-source/academic communities and commercial/industrial entities is huge.

The overall goal of this project is to lower the barrier to adoption for the industry to be able to move to 6TiSCH, away from wired solutions. This Grand Challenge translates into the following 4 Scientific Objectives:

- Benchmark 6TiSCH by testing it on real use cases and publish results in a reproducible manner.
- Design an architecture and create proof-of-concept implementation of how to integrate 6TiSCH with legacy wired solutions.
- Maintain a reference implementation which is proven to be compliant and interoperable.
- Participate in the 6TiSCH Alliance and IETF 6TiSCH standardization group by collecting requirements and reporting results.

**Principales activités**
[see full description at https://tinyurl.com/adt-6tisch](https://tinyurl.com/adt-6tisch)

Specific tasks include:

- Get familiar with the OpenWSN (www.openwsn.org) open-source 6TiSCH implementation, and learn how to run a simulation and experiment. Inria-EVA is co-leading the OpenWSN project, so you’ll find plenty of people to help you get started.
- Get familiar with the 6TiSCH simulator (https://bitbucket.org/6tisch/simulator/), which is Python-based. Inria-EVA co-leads this project, so you’ll find plenty of people to help you get started.
- Create a set of scenarios and network requirements that correspond to real use cases. For that, you will be talking to end users, possibly visit deployment sites, on top of finding documented requirements.
- Evaluate the performance of 6TiSCH in these environmental, possible both in simulation and experimentally. For the experimental work, you can use the IoT-lab testbed (https://www.iotlab.info/), a massive 2728-node testbed operated in part by Inria.

**Compétences**

We are looking for an advanced engineer or a postdoctoral researcher ready to make a significant contribution to the field of standards-based low-power wireless mesh networking IoT technology:

- The position is open to both Engineers (i.e. you have an Engineer and/or Masters degree) and Postdoctoral researchers (i.e. you have a PhD degree) in Computer Science, Telecommunications, Electrical Engineering or related field.
- We ask for min. 2 years of expertise in low-power wireless networks (mesh networks, WSNs, etc.)
- strong "hard" skills
  - very good programming skills and experience (C/Python/Java, etc.), ideally including web development (server-side, JavaScript, PHP, html, etc.)
  - general understanding of software quality and project management tools (Git, GitHub, Travis-CI, Jenkins, etc)
  - some embedded programming experience (micro-controllers such as MSP430, Cortex-M) ideally involving low-power wireless devices
  - ideally, experience with IoT-related standards such as IEEE802.15.4, IEEE802.15.4e, IETF 6TiSCH, 6LoWPAN, RPL, CoAP, etc.
  - ideally, experience with IoT-related projects such as OpenWSN, RIOT, Contiki, TinyOS
  - ideally, experience with IoT-related testbeds such as FIT/IoT-lab

favorable, tel que défini dans l’arrêté du 03 juillet 2012, relatif à la PPST. Un avis ministériel défavorable pour un poste affecté dans une ZRR aurait pour conséquence l’annulation du recrutement.

**Politique de recrutement :**
Dans le cadre de sa politique diversité, tous les postes Inria sont accessibles aux personnes en situation de handicap.
for postdocs, a strong publication track-record and proven expertise in the general topic of IoT
- strong “soft” skills
- we are looking for the “technical leader” type. If you have participated in open-source projects, have lead a software development team, tell us about it!
- ideally, some open-source project experience, including source code and project management tools (Git, GitHub, Travis-CI, etc)

Speaking French is not a requirement. Professional proficiency in English is, however, important.

Avantages sociaux
- Subsidised catering service
- Partially-reimbursed public transport

Rémunération
Salary based on experience