OpenWSN: Implementing the Internet of (Important) Things

open Research Engineer position

This document is an informal addition to the official offer at
http://www.inria.fr/en/institute/recruitment/offers/experienced-and-specialist-engineers-research-and-development/(view)/details.html?id=PNGFK026203F3VBQB6G68LOE1&LOV5=4510&ContractType=7549&LG=EN&Resultsperpage=20&nPostingID=9696&nPostingTargetID=15778&option=52&sort=DESC&nDepartmentID=10

Key facts

- Position type: open Research Engineer position
- Location: Inria Paris-Rocquencourt, France
- Supervisor: Thomas Watteyne, PhD
  http://eecs.berkeley.edu/~watteyne/
  thomas.watteyne@inria.fr
- Keywords: OpenWSN, Low-power wireless, IoT, Embedded
- Inria Project: Eva
- HR Contact: Morgane Claeys-Cahin
  morgane.claeys-cahin@inria.fr
- Application deadline: The position is available now. Evaluation of applications will begin immediately and continue until the position is filled. Candidates are encouraged to apply now.
- Duration: 24 months
- Expected start date: As soon as possible.

Working at Inria

Established in 1967, Inria is the only public research body fully dedicated to computational sciences. 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 the fruits of their work to innovative companies. Inria researchers have published over 4,500 articles in 2013 and are behind over 270 active patents and 110 start-ups. 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 Inria Paris-Rocquencourt research center is located next to the famous Chateau de Versailles gardens, right outside of Paris. Thanks to its top-quality researchers and numerous international guests,

the Paris-Rocquencourt research center plays a leading role in international research, in particular around 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[1].

EVA is a leading research team in low-power wireless communications. The research team, lead by 3 faculty members (Pascale Minet, Paul Muhlethaler, Thomas Watteyne), 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. Grounded in real-world use cases and experimentation, EVA co-chairs the IETF 6TiSCH standardization working group and co-leads Berkeley's OpenWSN project. The team is associated with Prof. Glaser's (UC Berkeley) and Prof. Kerkez (U. Michigan) through the REALMS associate research team.

The OpenWSN project

The OpenWSN project is an open-source implementation of a fully standards-based protocol stack for low-power wireless mesh networks, rooted in the new IEEE802.15.4e Time Synchronized Channel Hopping standard. Its goal is to provide an easy-to-use IoT experience, while implementing cutting-edge technology. IEEE802.15.4e, coupled with Internet of Things standards, such as 6LoWPAN, RPL and CoAP, enables ultra-low-power and highly reliable mesh networks which are fully integrated into the Internet. The resulting protocol stack is quickly becoming a cornerstone to the Industrial IoT revolution. The OpenWSN protocol stack is ported to 11 popular low-power wireless platforms (MSP430 and Cortex-M3 based), and features the OpenSim simulator/emulator. The project, co-lead by Inria and UC Berkeley, promotes and contributes to standards-based protocols for the Internet of Things, in particular through the work at the IETF 6TiSCH working group.

- For more information: http://www.openwsn.com

[1] http://business.lesechos.fr/directions-ressources-humaines/02180452763-l-inria-l-entreprise-la-plus-soucieuse-de-ses-salaries-111361.php

Description of the work

The goal of your work is threefold:

- Support the standardization work at IETF 6TiSCH by implementing the latest (draft) standards published. This, in turn, enables research to be conducted around these standards.
- Increase the quality of the code base. As a purely academic project, OpenWSN has received numerous contributions from different people. Making the coding style more homogeneous and conduct some professional testing on the code will increase the quality of the code. This is particularly important to establish collaborations with industrial partners.
- Simplify the use of OpenWSN by developing a number of tools so non-technical people can build OpenWSN networks and use 6TiSCH standards.

Skills and expertise

We are looking for an advanced engineer ready to make a significant contribution to the field of low-power wireless mesh networking:

- Engineer and/or Masters and/or PhD degree, followed by 2-7 years of experience
- strong "hard" skills
  - very good programming skills and experience (C/Python/Java, etc.), ideally including web development (server-side, JavaScript, PHP, html, etc.)
  - good embedded programming experience (micro-controllers such as MSP430, Cortex-M) ideally involving low-power wireless devices
  - general understanding of embedded debugging (oscilloscope, logic analyzer, JTAG, etc.)
  - general understanding of software quality and project management tools (Git, GitHub, Travis-CI, Jenkins, etc)
  - ideally, experience with IoT-related projects such as OpenWSN, RIOT, Contiki or TinyOS
  - ideally, experience with network simulation (ns-3, omnet++, etc.)
- strong "soft" skills
  - we are looking for the "tinkerer" kind. If you have built an Arduino-based fan which tracks you are you move about, a plant which tweets when you need to water it, tell us about it!
  - ideally, some open-source project experience, including source code and project management tools (Git, GitHub, Travis-CI, etc)

Environment

You will work in an extremely stimulating environment, within the EVA team, but also in constant collaboration with other international research teams, through open-source projects, and by interacting with standardization bodies.

You will play an important role in the EVA team. You will be instrumental in implementing the newly defined scientific objectives of the team, in which experimentation plays a key role. You will be able to

interact closely with the IETF standardization process, in particular in the 6TiSCH working group, co-chaired by Thomas Watteyne. This will give you an opportunity to experience the standardization process first-hand and contribute to defining tomorrow's standards and products.

Benefits

Located at the heart of Europe, Paris is a unique place to work and live in. Inria offers a unique balance between working in a leading research center and living in one of the most beautiful and bustling cities in the world. A real communication hub, Paris is a gateway to France and Western Europe, and working in the Inria Paris-Rocquencourt research center is real asset to your career.

- Competitive salary
- Medical coverage
- approx. 45 days of annual vacation
- ultra-convenient daily dedicated Inria shuttle bus to/from central Paris (free)
- Inria covers part of your commute expenses (metro, bus, etc.)
- When needed, Inria will help you apply for Scientific Resident card and a visa
- on-site restaurant (Inria pays for part of you expenses)
- on-site gym, tennis courts, soccer field, etc.
- optional French classes (free)

How to apply

If you have questions about the scientific contents of the position, we encourage you to contact thomas.watteyne@inria.fr before applying. For administrative/practical questions, e-mail morgane.claeys-cahin@inria.fr.

You must apply online through the Inria Web site. We do NOT accept applications by e-mail. Evaluation of applications will begin immediately and continue until the position is filled. Candidates are encouraged to apply now.

Note well

- Speaking French is *not* a requirement. Professional proficiency in English is, however, important.
- In the interests of protecting its scientific and technological assets, Inria is a restricted-access establishment. Consequently, it observes special regulations for welcoming foreign visitors from outside of the Schengen area. The final acceptance of each candidate thus depends on applying this security and defense procedure.