A propos du centre ou de la direction fonctionnelle

Located at the heart of the main national research and higher education cluster, member of the Université Paris Saclay, a major actor in the French Investments for the Future Programme (Idex LabEx, IRT, Equipe) and partner of the main establishments present on the plateau, the centre is particularly active in three major areas: data and knowledge, safety, security and reliability; modelling, simulation and optimisation (with priority given to energy).

The 450 researchers and engineers from Inria and its partners who work in the research center’s 28 teams, the 80 research support staff members, the high-level equipment at their disposal (image walls, high-performance computing clusters, sensor networks), and the privileged relationships with prestigious industrial partners, all make Inria Saclay–Île-de-France a key research centre in the local landscape and one that is oriented towards Europe and the world.

Contexte et atouts du poste

This offer is within the framework of an Inria “DeepTech/Innovation” funding on the subject of next generation IoT networks. A large part of the research currently conducted in the Inria Saclay–Île-de-France centre aims to meet the technological needs of companies, and we maintain a constant dialogue with the socioeconomic stakeholders of the Saclay plateau.

The position is in the team TRIBE of Inria Saclay. The team TRIBE is focusing its research activities on the Internet of Things (IoT). In this area, recently, Low-Power Wide Area Networks (LPWAN) have recently gained considerable attention. The key objective of these wireless technologies is to connect low-power devices over very large areas, with low data rates. LPWANs are promising for various emerging IoT applications, complementing the traditional cellular and short-range technologies.

TRIBE team members have 20+ years of experience in research and development in IoT, wireless, sensor networks, etc. We are also active participants and contributors to Internet standardization at IETF/IRTF. TRIBE is a major contributor to the open-source project RIOT, an operating system for the Internet of Things (in action: https://riot-demo.inria.fr). We also maintain one of the sites of the open access testbed FIT IoT-LAB (Saclay cam’hàt).

The position is for two years (one year + one year renewal).

Mission confiée

Assignments:

- With the help of Cedric Adjih and Alexandre Abadie, the recruited person will be taken to develop new next-generation protocols for LPWANs. The main objectives are to:
  - Advance the state of open, standard, protocols stacks for LPWAN by providing open-source implementations; and when useful, to provide the tools to experiment them on a real testbed;
  - Incorporate open research results on next-generation protocols developed at Inria, in the TRIBE team, promote them by providing them as extensions of existing open-source implementations and contribute to the various standardization committees;
  - For experimentation of protocols, update with new tools and new devices the FIT platform in Saclay in cooperation with other FIT sites.

In addition, with Inria Department of Industrial Relations and the Application of Technology, the engineer will:

- contribute to the technology transfer activity in Inria and/or with different industrial partners from Inria.

Considered IoT protocols:

The work will proceed in several steps: initially, developing/contributing and finalizing an open-source implementation of an IoT protocol; then extending it with research results from Inria Team TRIBE; and finally, experimenting on a real testbed.

The considered IoT protocols include: SCHC [1] the IPv6 compression for IoT network with short packets [2]; the transport of firmware updates by multicast such as for LoRa [3]; or coded random access [4].

The research-based enhancements include coding, such as network coding [5], machine learning techniques [6], and other protocol-specific enhancements.

For SCHC, the team TRIBE has already contributed to an open source implementation (in-progress), OpenSCHC [7], and to several IETF Hackathons. For (network) coding, we also have contributed to the IRTF research group NWCRG with draft specifications and to implementations [8].

[1] Static Context Header Compression (SCHC) and fragmentation for LPWAN, application to UDP/IPv6, draft version 21
[2] IPv6 over Low Power Wide Area Networks (ipwan), Internet Engineering Task Force (IETF)
[3] LoRa Alliance, Firmware Updates Over the Air
[4] work in progress, Experimenting Coded Slotted Aloha
[5] IRTF research from NWCRG – Coding for efficient Network Communications Research Group (nwcrg)
[7] Open source implementation of SCHC: openschc
Principales activités

Compétences
We are looking for highly skilled developers:

- Excellent programming skills and experience in languages: C and Python
- Good knowledge of project management tools (make, git, github)
- Knowledge of development for IoT, wireless networks and/or embedded systems

Avantages
- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking (after 6 months of employment) and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Social security coverage

Rémunération
Salary in regards to professional experiences