Offer #2022-05085

Embedded AI and Real-Time Communication in Maritime Applications

Contract type : Fixed-term contract

Level of qualifications required : Graduate degree or equivalent

Fonction : Temporary scientific engineer

Level of experience : Recently graduated

Context

As part of a partnership between the Inria AIO team (http://aio.inria.fr/) and startup Falco (https://wefalco.com/), we are hiring a research engineer for a 24 month period, starting before 1-Oct-2022.

This is an ideal position for anyone with embedded skills (halfway between computer sciences and electronics), and who likes to set up a complete solution, from the sensor to the cloud.

Your objective will be to set up a predictive maintenance solution for ships. This involves equipping the ship's key equipment (engines, etc.) with low-power wireless sensors capable of detecting anomalies, wirelessly networking these sensors around a gateway onboard the ship, and analyzing the data.

The big "plus" of this position is that you will participate in the development of a whole new class of solutions for the maritime world. During your contract, you will participate in the deployment of your solutions on one of more ships.

As this position is created as part of a collaboration between Inria and Falco, you will participate in two teams. On the one hand, the Inria AIO team (http://aio.inria.fr/) is a team of a dozen people at the forefront of IoT technology. AIO develops wireless networks based on TSCH protocols (Time Synchronized Channel Hopping), standardizes these networks within the IETF, maintains the reference implementations and deploys them. The team has deployed over 1,000 sensors on 3 continents (for an overview, see https://youtu.be/dxBPa5MDj-I). On the other hand, Falco (https://wefalco.com/) a startup of about fifteen people, a spin-off of the AIO team, which develops solutions for the maritime world around IoT technologies.

Inria and Falco are both based in Paris, 20 minutes by metro from each other. Your main office will be at Inria, with regular visits to Falco, on the order of one day per week. If you wish, you can participate in the deployment of your solutions on one or more ships.

Assignment

You will join a multidisciplinary team, where you can, depending on your goals and skills, participate in the entire "chain": electronic and mechatronic design, prototyping, embedded programming, UX/UI, web and data science.

This project is super interesting, and combines a research part (development of data analysis algorithms), a prototyping part (firmware implementation, creation of objects) and an experimental part (deploying the technology).

The team follows an Agile methodology, with the concept of a Minimal Viable Product (MVP) becoming more and more complete with each iteration. The prototyping is done directly at Inria, https://youtu.be/bhiUHl7lM_E shows some of our prototyping equipment.

Main activities

The proposed work is calibrated for a total project duration of 24 months. It is structured around 4 work packages (WP). We use the Mx notation to indicate the month; M1 being the first month of the project, M24 the last. Obviously, the proposed schedule is given as an indication only; we will adapt it according to your skills and preferences.

M1-M6. WP1. State of the art and technological foundation. Study of the state of the art in embedded, with a focus on data analysis, AI, and embedded AI. Taxonomy of different low-power hardware accelerators. Studies of the architectures used to train the AI □□model used.

M7-M12. WP2. Predictive maintenance. Development of a solution coupling TSCH networks with

embedded AI. Prototypes of wireless sensors, connected wirelessly to a gateway, then from there to servers on the Internet. Study of AI algorithm placement without the continuum between sensor and cloud.

M13-M18. WP3. Real-time TSCH and real-time monitoring of a system. Development of a TSCH network solution, where sensors measure values □□on several devices. The aim is to be able to detect malfunctions which, if not detected, could have catastrophic consequences.

M19-M24. WP4. Deployment and testing in real environment. Deployment of prototypes made in WP2 and WP3 on a ship. Verification of proper functioning in operation. Work with the crew on the integration of this new data into the information system and the processes on board.

Skills

We are looking for someone who has a general expertise in embedded, covering several aspects in the sensor-cloud continuum: good knowledge in programming, ideally in embedded systems, a basic understanding of electronics (understand a schematic), used to having a hands-on approach.

If you are the type of person who has been playing with Arduino or Raspberry Pi boards in your spare time to build a system to automatically water your plants, contact us!

Having experience in electronics is a real asset, for example in the design, manufacture and use of printed circuits.

English is used as the main language between the team members. Speaking French is not a requirement.

Benefits package

- 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 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

General Information

- **Theme/Domain :** Networks and Telecommunications
  System & Networks (BAP E)
- **Town/city :** Paris
- **Inria Center :** Centre Inria de Paris
- **Starting date :** 2022-09-01
- **Duration of contract :** 2 years
- **Deadline to apply :** 2022-09-30

Contacts

- **Inria Team :** AIO
- **Recruiter :**
  Watteyne Thomas / thomas.watteyne@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.

The keys to success

Feeling comfortable in a dynamic scientific environment, enjoying learning and listening are essential qualities to succeed in this mission. Passionate about innovation, with expertise in embedded.

> **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

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.