Offer #2024-07085

PhD Position F/M Vehicle-and-mobile phone computing sharing as part of the edge-to-cloud continuum

Contract type : Fixed-term contract

Level of qualifications required : Graduate degree or equivalent

Fonction : PhD Position

About the research centre or Inria department

The Inria Saclay-Île-de-France Research Centre was established in 2008. It has developed as part of the Saclay site in partnership with Paris-Saclay University and with the Institut Polytechnique de Paris since 2021.

The centre has 39 project teams , 27 of which operate jointly with Paris-Saclay University and the Institut Polytechnique de Paris. Its activities occupy over 600 scientists and research and innovation support staff, including 54 different nationalities.

Context

The ANR FITNESS project, part of the PEPR Network of the Future, funds this Ph.D. program.

Assignment

Context

Intelligent Transport System is open to new applications and services (e.g., infotainment, video streaming, etc.) leveraging vehicle and consumer interaction opportunities. Among such opportunities is the possibility of using computation and/or connectivity resources offered by nearby intelligent vehicles to execute tasks from third-party devices (mobile phones), thus extending the existing Edge-Cloud ecosystem.

Unfortunately, one of the issues making such resource sharing a challenging task is the vehicles and devices heterogeneity in behaviors and resources (e.g., diverse mobility routines, urban traffic, heterogeneous space-time interaction between users and nearby vehicles, etc.). In particular, a direct consequence of hosting or using resources in cars in a distributed way is their exposure and sensitivity to uncertainties of behaviors in users' mobility and vehicle connectivity brought by traffic conditions. It is, therefore, essential to integrate mobility into the provided solutions besides dealing with resources, capabilities, and sharing.

Objective

The objective of this Ph.D. is first to learn and understand (i) the needs of devices around vehicles, (ii) the resources that vehicles around devices offer, and (iii) how the crowd of devices (or a crowd of vehicles) on the resource-sharing zone evolves in space and time? Second, we are assessing the feasibility of deactivating some of the resources at the edge, including base station antennas and some of the edge node computing servers, to optimize resource utilization, reduce energy consumption, and enhance overall operational efficiency. This strategic adjustment aligns with our goal of achieving a more sustainable and cost-effective infrastructure while maintaining the desired level of service and performance.

Main activities

- Read and synthesize literature work,
- Propose novel approaches, technical solutions
- Design, test, and simulate proposed solutions using simulation tools and, if possible, experimental platforms.
- Write research papers and reports
- Present the research works

Skills

Technical skills and level required:

- Candidates must have a Master of Science or equivalent degree in Computer Science or Electrical Engineering.
- Strong background in statistical analysis and tools, mobile networking, and communication networks.
- Strong knowledge of machine learning algorithms and AI; Past experience in implementing and applying ML/AI algorithms is very welcome.
- Candidates should be able to perform good critical analyses of obtained results and be creative in proposing solutions.
- Excellent programming skills (e.g., Python, C, C++) and Data Visualisation Tools (Pandas, etc)
- Good English skills, both in written and oral form

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
- Social security coverage

Remuneration

1st et 2nd year : 2100€ gross/month

3rd année : 2190€ gross/month

General Information

- **Theme/Domain :** Networks and Telecommunications
  System & Networks (BAP E)
- **Town/city :** Palaiseau
- **Inria Center :** Centre Inria de Saclay
- **Starting date :** 2024-05-01
- **Duration of contract :** 3 years
- **Deadline to apply :** 2024-06-30

Contacts

- **Inria Team :** TRIBE
- **PhD Supervisor :**
  Achir Nadjib / Nadjib.Achir@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

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.