PhD Position F/M Open PhD grant available at Inria Grenoble on “AI-driven safe motion planning & driving decision-making for autonomous driving”

Contract type: Fixed-term contract  
Renewable contract: Yes  
Level of qualifications required: Graduate degree or equivalent

About the research centre or Inria department

The Centre Inria de l’Université de Grenoble groups together almost 600 people in 22 research teams and 7 research support departments.

Staff is present on three campuses in Grenoble, in close collaboration with other research and higher education institutions (Université Grenoble Alpes, CNRS, CEA, INRAE, …), but also with key economic players in the area.

The Centre Inria de l’Université Grenoble Alpe is active in the fields of high-performance computing, verification and embedded systems, modeling of the environment at multiple levels, and data science and artificial intelligence. The center is a top-level scientific institute with an extensive network of international collaborations in Europe and the rest of the world.

Context

Assignment

The autonomous driving task involves four main interconnected components: environment perception, tracking, motion planning & driving decision-making. Motion planning & driving decision-making are challenging and critical tasks that involve performing safe navigation in intricate and dense traffic scenarios when subjected to several uncertainties from perceptive sensors such as occlusions and limited field of view. Additionally, the intentions of surrounding traffic participants are also uncertain, making the task a complex problem.

Motion planning can be categorized in two types based on the effect of the planned trajectories on the predicted dynamic agents in the environment: Uni-directional planning, where the ego-vehicle planning considers the predictions of the dynamic agents, while those predictions are independent of the planned future trajectories of the ego-vehicle [1]. And bi-directional planning, where a two-way association is considered between ego-vehicle planning and the predictions of dynamic agents in the environment [2,3].


Main activities
The primary goal of this PhD thesis is to develop an AI-based framework for Trajectory Planning for autonomous driving. This framework leverages data from perception and tracking modules, and interactions with other agents to understand the evolving scene. Its aim is to define safe, optimal trajectories, avoiding obstacles and adhering to traffic rules, without relying on explicit motion models. The focus lies in creating an effective learning strategy to uncover patterns and dependencies in the training data, for both uni-directional and bi-directional planning, addressing challenges such as social interactions among agents, environment topology, and multi-modal trajectory predictions.

**Skills**

- Engineer with R&D experience or Candidate having a Master in Computer Science, Robotics or closely related fields.
- Good theoretical and practical background in Robotics and Computer Science
- Good theoretical and practical background *in one of the following domains*: Robotics, Multi-sensors Perception, Scene Understanding, Parallel computing, Deep Learning and/or Decision-making for safe navigation.
- Good skills in C/C++.

The following qualifications would be an advantage:

- Experience using the Robotics library ROS
- Familiarity with CUDA and Boost libraries, or FPGAs
- Good skills in Linux, system management, python.
- Theoretical knowledge of Bayesian models
- Experience on Deep Learning
- Ability to work as a teammate with other researchers
- Reasonable French and/or English skills (written and spoken)

**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 under conditions

**Remuneration**

- 1st and 2nd year: 2082 euros gross salary / month
- 3rd year: 2190 euros gross salary / month

**General Information**

- **Theme/Domain**: Robotics and Smart environments
- **Software Experimental platforms (BAP E)**
- **Town/city**: Montbonnot
- **Inria Center**: Centre Inria de Lyon
- **Starting date**: 2024-01-01
- **Duration of contract**: 3 years
- **Deadline to apply**: 2023-11-10

**Contacts**

- **Inria Team**: CHROMA
- **PhD Supervisor**: 
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

Applications must be submitted online via the Inria website. Processing of applications submitted via other channels is not guaranteed.

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.