2018-00602 - Social Navigation of autonomous vehicles in shared spaces

**Type de contrat:** CDD de la fonction publique  
**Niveau de diplôme exigé:** Bac + 5 ou équivalent  
**Fonction:** Doctorant

**A propos du centre ou de la direction fonctionnelle**

Grenoble Rhône-Alpes Research Center groups together a few less than 800 people in 35 research teams and 9 research support departments.

Staff is localized on 5 campuses in Grenoble and Lyon, in close collaboration with labs, research and higher education institutions in Grenoble and Lyon, but also with the economic players in these areas.

Present in the fields of software, high-performance computing, Internet of things, image and data, but also simulation in oceanography and biology, it participates at the best level of international scientific achievements and collaborations in both Europe and the rest of the world.

**Contexte et atouts du poste**

Within the framework of a partnership (you can choose between)

- collaboration between 2 Inria teams: Chroma (Grenoble https://team.inria.fr/chroma/en/), Choral (Sophia antipolis)
- public with French National Research Agency (ANR). In the scope of the Hianic project (https://project.inria.fr/hianic/)

The PhD student will be co-directed by Anne Spalanzani (Chroma team in Grenoble), and Philippe Martinet (Lagadic Team in Sophia Antipolis). He is expected to spend 18 months in both sites (to be negotiated).

Contacts: Anne.Spalanzani@inria.fr, Philippe.Martinet@inria.fr

**Mission confiée**

Classical autonomous vehicles navigation relies on geometric and kinematics constraints. This is adapted to simple, structured and predictable environments. When encountering an obstacle, these vehicles either stop or a collision is avoided by handling control back to drivers. Outdoor mobile robot applications are becoming progressively more demanding. It is to focus on **safe and predictable interaction** between cybercars and other road users in complex and human populated urban environments. A **social and cognitive dimension** is required in the intelligent vehicles so that these latter will follow **socially adapted behaviors** that will be understood and predicted by passengers and pedestrians, will communicate their intentions to move or stop, will be safer. This must be understood that vehicles will not simply stop during uncertain situations but will be proactive and negotiate their paths and velocities, byconveying their course and direction of travel to surrounding road users.

The goal of the PhD is to propose social navigations functions which can be used to control an autonomous and intelligent car where vehicles and pedestrians are evolving in a shared space. The trajectories of the autonomous vehicle are expected to be safe and socially compliant and the decisions of the vehicle will be based on the estimated intentions of all agents of the scene. The idea is to associate a risk level to each intention by estimating its coherence with the traffic and social rules, but also with the passenger's perception of their field of travel.

**Principales activités**

- State of the art on social navigation, proactive behavior, risk-based navigation, sensor based navigation, leader following, navigation among crowds.
- Implementation of state-of-the art navigation strategies among people and tests of their limitation in simulation using ROS

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**Informations générales**

- **Thème/Domaine** : Robotique et environnements intelligents  
- **Calcul Scientifique (BAP E)**  
- **Ville** : Montbonnot  
- **Centre Inria** : Cri Grenoble - Rhône-Alpes  
- **Date de prise de fonction souhaitée** : 01-09-2018  
- **Durée de contrat** : 3 ans  
- **Date limite pour postuler** : 15-08-2018

**Contacts**

- **Equipe Inria** : CHROMA  
- **Recruteur** : Spalanzani Anne / anne.spalanzani@inria.fr

**L'essentiel pour réussir**

The ideal candidate has a strong background in planning, control and robotics. The candidate must be a proficient user of C/C++ and ROS. Scientific curiosity, large autonomy and ability to work independently are also expected.

**Conditions pour postuler**

**Sécurité défense** :

Ce poste est susceptible d’être affecté dans une zone à régime restrictif (ZRR), telle que définie dans le décret n°2011-1425 relatif à la protection du potentiel scientifique et technique de la nation (PPST). L’autorisation d’accès à une zone est délivrée par le chef d’établissement, après avis ministériel favorable, tel que défini dans l’arrêté du 03 juillet 2012, relatif à la PPST. Un avis ministériel défavorable pour un poste affecté dans une ZRR aurait pour conséquence l’annulation du recrutement.

**Politique de recrutement** :

Dans le cadre de sa politique diversité, tous les postes Inria sont accessibles aux personnes en situation de handicap.

Attention: Les candidatures doivent être déposées en ligne sur le site Inria. Le traitement des candidatures adressées par d’autres canaux n’est pas garanti.
- Development and evaluation of a social proactive behavior in indoor environment, tests on a wheeled robot (wheelchair, pepper, ...).
- Development and evaluation of a social proactive behavior in outdoor environment, tests on the zoe car.

Compétences

Interested candidates must send to anne.spalanzani@inria.fr and Philippe.Martinet@inria.fr the following material:

- a motivation letter with any relevant information for proving a good match with the description of the activities and expected profile of the candidates
- a detailed CV
- name of at least two referees
- results in Master1 and Master2

Avantages sociaux

- Subsidised catering service
- Partially-reimbursed public transport
- Social security
- Paid leave
- Flexible working hours
- Sports facilities