2021-03393 - Post-Doctoral Research Visit
F/M Assistive robotics and motor neuroprostheses for mobility: shared control for wheelchair driving and reach-to-grasp assistance

Type de contrat : CDD
Niveau de diplôme exigé : Thèse ou équivalent
Fonction : Post-Doctorant

A propos du centre ou de la direction fonctionnelle

The Inria Rennes - Bretagne Atlantique Centre is one of Inria's eight centres and has more than thirty research teams. The Inria Center is a major and recognized player in the field of digital sciences. It is at the heart of a rich R&D and innovation ecosystem: highly innovative PMEs, large industrial groups, competitiveness clusters, research and higher education players, laboratories of excellence, technological research institute, etc.

Contexte et atouts du poste

People with disabilities face various individual situations and conditions, while sharing the same challenge: being as independent as possible for their everyday activities, despite any partial or total function loss, e.g. a reduced mobility. Assistive technologies are then designed to compensate for motor deficiencies and have to be adapted to a large spectrum of pathologies.

However, assistive technologies imply that the user remains able to initiate the mobility task, and that his/her remaining capacities can be sufficient to perform the given task in a secure and acceptable manner. In this context, the INTERCARNOT MOVE@HOME project between LETI/CLINATEC (Grenoble) and INRIA/RAINBOW (Rennes) aims to allow tetraplegic patients to benefit from a motor neuroprosthesis in order to provide a safe, robust and precise control of an assistive device for daily life activities, such as power wheelchair driving, and the control of a robotic exoskeleton arm.

The objective of the project is to tackle this challenge by developing software and hardware solutions for shared control between semi-invasive Brain Computer Interface (BCI) and robotic assistance for reach-to-grasp task and power wheelchair navigation.

This position will necessitate regular travels between Inria in Rennes (main location) and LETI/Clinatec in Grenoble. Travel expenses are covered within the limits of the scale in force.

Mission confiée

The goal of the post-doctoral work will be to design the shared control framework that will rely on sensor-based servoing strategies. Then, by combining the LETI/CLINATEC neuroprosthesis and the proposed shared control strategy, we will propose first a demonstration of this technology on a safe wheelchair driving application. Shared control will make it possible to leave "natural" control of the wheelchair to the patient (by cerebral control), while ensuring safe trajectories by avoiding obstacles. In a second step, a solution for secure and precise control of the reaching and grasping of objects will be proposed.

Collaboration :

The recruited person will be in close connection with scientific and clinical teams of Clinatec (Grenoble).

Bibliographie


Principales activités

Within the Inria/Rainbow team, the researcher will have to

- Validate an adapted shared control strategy for power wheelchair driving,
- Design a new shared control framework for reach-to-grasp tasks by means of innovative sensors such as a novel generation of embedded sensors for 3D or proximity sensing,
- Perform user studies.

Compétences

Technical skills:

- Interdisciplinary skills including robotics, computer vision;
- C/C++ programming;
- Familiarity with ROS;
- System integration, Electronics and Mechatronics would be a plus;

Languages :

- Excellent level in French and/or English (C1 or equivalent)

Relational skills :

- Capacity to efficiently work in a scientific environment, passion for experimental research
- Capacity to conduct independent work within a team
- The applicant should be comfortable conducting clinical studies with people with disabilities.

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)
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Social security coverage

Rémunération

Monthly gross salary amounting to 2653 euros

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