Offer #2025-09112

Post-Doctoral Research Visit F/M AI-powered control of exoskeletons with multimodal models

Contract type : Fixed-term contract

Level of qualifications required : PhD or equivalent

Fonction : Post-Doctoral Research Visit

Context

Context and funding:

The position is funded by the EUROBIN project, an European Network of Excellence project that regroups several partners at the European Level.

In this project, the HUCEBOT team is involved in the personal robotics challenge to design AI-powered controllers for robots for improved assistance. Foundation models and AI-based models that leverage human predictions, contextual visual information and natural language instructions are at the core of the current team approaches. Previous work has been applied to humanoids and mobile robots, whereas in this position we want to explore the application of active exoskeletons.

About the team:

The candidate will join the Human Centered Robotics team (HUCEBOT) in the Inria Center of the University of Lorraine in Nancy, France.

The team HUCEBOT develops control, learning, and interaction skills of human-centered robots, such as humanoid, mobile manipulators and exoskeletons. The team develops learning and control algorithms for teleoperated / supervised / autonomous robots, involved in complex manipulation tasks in man-made environments. It also develops prediction and control techniques for wearable exoskeletons designed to assist humans at work. The team has excellent robotics facilities, including several humanoid robots (Talos, iCub, G1), manipulators, drones, passive and active exoskeletons, wearable sensors, force plates etc. Its laboratory has a 3D printing facility and a mechatronic workshop for prototyping and maintenance.

The team consists of many research scientists, postdocs, PhD and has the support of 1 software and 1 mechatronics engineer. The team is international - English and French speaking. French is not required, although free French classes are available

in the institute for non-French speakers.

About the laboratory and Nancy:

The Inria Center of the University of Lorraine, is co-located with the Loria laboratory, in the Science and Technology Campus of the University of Lorraine (Nancy, France), next to the Botanical Gardens, at 20 minutes by public transportation or bike from the Nancy train station and City Center. Several student residences and facilities are at walking distance. Nancy is a University town, with a high quality of life and a vibrant student and expat community.

Assignment

The position is about equipping an exoskeleton with microphones and cameras to enable vocal commands. The postdoc will work on an active exoskeleton prototype. He/she will select adequate hardware (sensors and electronics) to enable audio processing and audio-to-text processing embedded on the exoskeleton, as well as visual processing to retrieve contextual information, using AI systems. He/she will conduct experiments with the sensorized exoskeleton to process audio signal, detect commands in natural language, and retrieve contextual information.

The sensors will be mounted on one of the team exoskeletons and tests will be done in laboratory conditions. On the software side, the sensors will have to be visible on a ROS2node. The candidate will collaborate with the team to re-use existing audio-to-text models (e.g., Whisper) and visual language models (VLMs).

The postdoc will be in charge of sensor integration and conducting validating experiments.

The postdoc will develop and explore multimodal models that combine language and images with robot actions, targeted at assisting the human during their gestures.

A presentation of the ongoing work at the EUROBIN meetings is required.

Main activities

- Review state of the art in audio and image sensing devices that can be embedded on wearables
- Selecting, testing and mounting the sensors in one of the exoskeletons of the team
- Write software to read from the sensor
- Integrate sensor readings with audio-to-text and VLM
- Write hardware/software report
- Develop adequate multimodal AI models (VLM, LLM, VLA..) that leverage the sensors and assist the exoskeleton controller, taking care of prediction time, computation resources, etc.
- Collaborate with the team to integrate the sensors in the current experiments and developments

Skills

- Technical skills:
  - Very good programming skills.
  - Excellent skills with electronics / mechatronics, sensors.
  - Love working with real robots.
  - Experience with exoskeletons.
  - Interest for foundation models for speech and image processing
- Soft skills:
  - Excellent communication skills at work, and ability to report progress
  - Proactivity.
  - Not afraid of challenging projects.
  - Rigour and intellectual honesty
  - Curiosity and desire to learn
  - Practical mindset and ability to develop robust and reliable solutions
  - Autonomy and organizational skills
  - Love working in a multi-cultural environment
  - Team player

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 (after 6 months of employment) 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

2788 € gross/month

General Information

- **Theme/Domain :** Robotics and Smart environments
  Software engineering (BAP E)
- **Town/city :** Villers lès Nancy
- **Inria Center :** Centre Inria de l'Université de Lorraine
- **Starting date :** 2025-11-01
- **Duration of contract :** 12 months
- **Deadline to apply :** 2025-08-03

Contacts

- **Inria Team :** LARSEN
- **Recruiter :**
  Ivaldi Serena / serena.ivaldi@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

PhD in Computer Science, Engineering or AI, with experimental experience in robotics and exoskeletons.
Excellent communication in English, French is a plus.

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.