Offer #2025-09155

Post-Doctoral Research Visit F/M Robust Whole-Body Motion Generation for Agile and High-Force Loco-Manipulation Tasks in Realistic Environments

Contract type : Fixed-term contract

Level of qualifications required : PhD or equivalent

Fonction : Post-Doctoral Research Visit

Context

This postdoctoral position is part of the French ANR JCJC project **MeRLin** (https://members.loria.fr/EMingoHoffman/merlin-2024-2028/), which focuses on controlling loco-manipulation actions involving significant interaction forces. Typical scenarios include carrying or pushing heavy loads or navigating harsh environments using multiple contact modalities, all of which are performed with humanoid bipedal robots.

While such systems have recently gained traction in the automotive sector, their full capabilities remain underutilized. The goal of this position is to develop and demonstrate advanced whole-body motion strategies suitable for more demanding applications, such as construction sites, search and rescue operations, or disaster response scenarios.

Assignment

The objective is to design motion policies that leverage the robot's entire body and multiple contact modalities to exert and withstand high interaction forces. The work will involve both model-based and learning-based approaches, with a strong focus on integrating them into a unified control framework. These methods will be implemented and validated on the **G1 humanoid robot**, available in our laboratory.

Main activities

- Develop a theoretical and practical framework using model- and/or learning-based methods for whole-body motion control capable of achieving tasks requiring high levels of interaction forces;
- Design and implement experiments using the G1 robot involving locomotion and manipulation;
- Validate the developed methodologies and algorithms in simulation (IsaacSim, MuJoCo) ;
- Conduct experiments with laboratory assets to test the effectiveness of the proposed approaches;
- Document research findings in academic papers and present them at conferences and workshops;
- Collaborate with other researchers and engineers to integrate the developed algorithms into practical robotic systems;
- Explore potential applications of the developed methodologies and algorithms in industrial automation and service robotics domains.

Skills

Languages : English

Relational skills : proactivity and team working

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
  Scientific computing (BAP E)
- **Town/city :** Villers lès Nancy

- **Inria Center :** Centre Inria de l'Université de Lorraine
- **Starting date :** 2025-10-01
- **Duration of contract :** 2 years
- **Deadline to apply :** 2025-08-15

Contacts

- **Inria Team :** LARSEN
- **Recruiter :**
  Mingo Hoffman Enrico / enrico.mingo-hoffman@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

- Experience with reinforcement learning, imitation learning, and optimal control methods;
- Programming capabilities in languages such as C++ and Python;
- Experience with ROS 2 software development and integration;
- Experience with IsaacSim and MuJoCo simulation environments;
- Experience with AI frameworks and tools (e.g., PyTorch, Jax).

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.