

Hybrid Control for the locomotion of a Quadruped Robot on heterogeneous Terrain

Fully funded CIFRE PhD at IMRA / i3S (Université Côte d'Azur-CNRS)

This project is part of the ANR industrial chair UMAI

Keywords: Quadruped Robot, Control, Machine Learning

Project Overview

IMRA Europe is looking for a CIFRE PhD candidate in the Department of Computer Science, who is working in collaboration with Cote d'Azur University / i3S. The main objective is to develop, evaluate, and implement robust control and navigation strategies for the Unitree Go2 quadruped robot. The project aims to combine classical control approaches based on physical models with modern machine learning techniques to enable the robot to navigate stably, autonomously, and adaptively over complex and uneven terrain.

We are a research institute developing cutting-edge technology using AI mainly in automotive domain. Our stakeholder, AISIN Corporation, is a large car parts and system supplier targeting system development using AI and various sensor data for intelligent applications.

Environment

IMRA Europe (www.imra.eu) is a private research laboratory created in 1986 in Sophia Antipolis (France). The R&D activities of the Department of Computer Science are focused on system development for automotive industry, such as vision system (object detection/recognition on various sensor data), motor control, factory data analysis using AI.

The i3S lab is the largest information and communication science laboratory in the French Riviera. Affiliated to the INS2I CNRS Institute, it has around 300 people, with 100 professors or associate professors belonging to the laboratory, as well as 20 CNRS and 13 INRIA researchers. The host team will be the SIS team, which conducts research in the fields of signal and image processing, multimedia data compression, communication networks, computer vision, robotics and autonomous systems, and optimal experimental design.

The main activities of the project are listed as follows:

- **System Modeling & Model-Based Control:** Perform physical modeling and implement baseline control algorithms for lab-tested robust walking.
- **RL Policy Training in Simulation:** Develop and train reinforcement learning locomotion policies across physics simulators.
- **Sim-to-Real Deployment:** Benchmark and transfer trained RL strategies onto the physical Unitree quadruped to handle terrain variations and disturbances.
- **Hybrid Control Integration:** Combine model-based controllers with RL to balance stability with adaptive behaviors.
- **Vision-Based Navigation:** Incorporate visual features to enable autonomous, vision-driven navigation and motion control.

Qualifications:

The candidate is expected to have a solid background in Control, Applied Mathematics, and Robotics, as well as strong skills in software development for control and robotics (Linux, Python, MATLAB, C/C++, ROS).

- Experience deep learning (deep neural network) and its development.
- Track record of scientific publications and conference presentations.

- Excellent communication and collaboration skills.

Application Materials

- Cover Letter (briefly outline your research experience and interests)
- Curriculum Vitae (CV)
- Last available grades

Job profile

Full-time, fixed-term contract (3 years) followed by CIFRE framework.

Start date: Earliest convenience from **December 2026** (Sophia Antipolis).

How to Apply

Please submit your application materials as a single PDF file to [nakano@imra-europe.com] and [bojan.mavkov@univ-cotedazur.fr]