Looking for MSCA postdoctoral fellows to work on the project: « Hybrid Approaches for Deep Learning-Based Structural Health Monitoring»

Université Clermont Auvergne is looking for applications from candidates interested in submitting a project to the MSCA PF 2025 call for proposals (**DL : 09/09/26**).

Candidates will also have the unique opportunity to participate in the first MSCA-PF Master Class (**apply before 13/03/2026**, see below)

1. **About the research project**

Supervisors Pierre Beaurepaire and David Clair

Structural health monitoring relies on sensor data, which can be interpreted either through model-based methods that compare measured responses with predictions from a physical structural model (see e.g. Rocchetta *et al.*, 2018), or through data-driven methods that analyze patterns and anomalies in the sensor data using statistical or machine learning techniques (see e.g. Manzini *et al.* 2022).

In this work, the focus will be on hybrid approaches that combine physical models and data analysis, particularly by leveraging the structure's vibration characteristics to extract relevant features from the sensor data before further processing

The study will focus on bridges instrumented with accelerometers, capturing vibrations induced by vehicles crossing the structure to assess its dynamic response (Raedersdorff *et al.*, 2024). Since the bridge is monitored under real-world traffic conditions, we have little control over the 'experimental' parameters, such as vehicle weight, speed, or spacing, which are largely unknown and cannot be prescribed. These uncontrolled and variable conditions highlight the need for hybrid approaches, where vibration-based features extracted from the sensor data are combined with structural models to reliably interpret the bridge's response.

References

Manzini, N. *et al.*(2022). An Automated Machine Learning-Based Approach for Structural Novelty Detection Based on SHM. In: Pellegrino, C., Faleschini, F., Zanini, M.A., Matos, J.C., Casas, J.R., Strauss, A. (eds) Proceedings of the 1st Conference of the European Association on Quality Control of Bridges and Structures. EUROSTRUCT 2021. Lecture Notes in Civil Engineering, vol 200. Springer, Cham. https://doi.org/10.1007/978-3-030-91877-4_134

Raedersdorff, J., Chateauneuf, A., Clair, D., & Bouchaïr, A. (2024). Field assessment of a vibration-based damage identification procedure. In J. S. Jensen, D. M. Frangopol, & J. W. Schmidt (Eds.), *Bridge Maintenance, Safety, Management, Digitalization and Sustainability* (1st ed.). CRC Press/Balkema. https://doi.org/10.1201/9781003483755

Rocchetta, R., Broggi, M., Huchet, Q., & Patelli, E. (2018). On-line Bayesian model updating for structural health monitoring. Mechanical Systems and Signal Processing, 103, 174–195. https://doi.org/10.1016/j.ymssp.2017.10.015

[1] https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/list-3rd-country-participation_horizon-euratom_en.pdf

2. About the host institution and the unit

Université Clermont Auvergne (UCA) is a multidisciplinary higher education institution located in Clermont-Ferrand, France. The university is composed of 20 faculties, 5 doctoral schools and 39 research laboratories working in the fields of fundamental and engineering sciences, life and health sciences as well as law, human and social sciences.

With 40 000 students, including almost 5 500 (14%) international ones and 3.800 staff, it plays a key role in the territorial structuration and the building of a European level region.

On March 2019, UCA has received a grant the "HR Excellence in Research" label for its European Strategy Human Resources for Researchers, also called HRS4R (Human Resources Strategy for Researchers).

The quality of foreign students' hosting at UCA has also been recognized with the award of the French label « Bienvenue en France » (Welcome in France) in March 2020.

The postdoctoral fellow will be hosted at the Institut Pascal, an institute of engineering and applied science, working with the Mechanics, Materials, and Structures team. The team includes about 50 permanent staff and 50 non-permanent members (PhD students, post-docs, etc.). A 3,200 square-meter experimental facility is available and might be used for experimental validation of the methods developed during the project.

3. Eligibility

Types of grants

There are 2 types of postdoctoral fellowships:

- **European Postdoctoral Fellowships (EF)**. Fellowship of 12 to 24 months taking place in an EU Member State or a HE Associated Country[1].
- **Global postdoctoral fellowships (GF)**. Fellowship of 24 to 36 months in two phases:
  - An outgoing phase of 12 to 24 months taking place in a Third Country
  - A return phase of 12 months taking place in an EU Member State or HE Associated Country

Applicants must:

- be in possession of a doctoral degree or have successfully defended their doctoral thesis at the date of the call deadline (9th September 2026)
- have a maximum of 8-year experience in research from the date of award of the doctoral degree at the date of the call deadline
- not have resided or carried out their main activity (work, studies, etc.) in France for European Fellowship or in the country hosting the outgoing phase for Global Fellowship for more than 12 months in the 3 years at the date of the call deadline
- be nationals or long-term residents of the EU Member State or Associated Country (<u>for GF only, there is no nationality restriction for EF</u>).

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[1] https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/list-3rd-country-participation_horizon-euratom_en.pdf

4. Application to the Master Class

For the second year, a Master Class will be organised in Clermont-Ferrand during the week of the 8ᵗʰ of June 2026. The aim is to host candidates for the MSCA PF grant for 3 days so that they can visit the town, the lab and work together with their supervisors on the project proposal, with the mentoring of european support services from UCA, CNRS, INSERM and INRAE.

If you are interested in pursuing this project, please send your CV and a short motivation letter (maximum 1 page) detailing your research area, motivation for the project, project ideas, and other relevant information to Pierre Beaurepaire and David Clair (pierre.beaurepaire@sigma-clermont.fr, david.clair@uca.fr) by February 28th.

The application will need to be prepared collaboratively between the candidate and the host institution. Ensure that your schedule allows sufficient time to work on it during the summer months.

Once the candidate and their supervisor have agreed, expressions of interest must be completed and sent to cap-europe@uca.fr before the 13th of March 2026.

More information on CAP Europe website here.