

## Post-doctoral fellowship

*La Rochelle University is recruiting a post-doctoral fellow on a 30-month fixed-term contract.*

### **Employer description**

#### ***What about joining a daring and innovative university?***

La Rochelle University was founded in 1993 as a result of a proactive initiative by the local authorities, led by Michel Crépeau, to set itself apart from the competition.

Thirty years later, in an ever-changing university landscape, it continues to assert an original proposition, based on a strong identity and bold projects, in a human-scale establishment located in an exceptional setting.

Internationally recognized for its research and exchange programs, as well as for the quality of its teaching, La Rochelle University's 8,700 students include around 1,000 foreign students of more than 90 different nationalities, and employs nearly 1,000 staff (teachers, research professors and administrative and support staff).

Anchored in a coastal region, La Rochelle University has turned this singularity into a veritable signature, in the service of a new model. Its research is focused on the theme of Urban, Sustainable and Intelligent Coastlines (LUDI).

Website : [click here](#)

### **Research structure description**

The project will be carried out in collaboration between the Centre d'Etudes Biologiques de Chizé (CEBC) and the Computer Science, Image, Interaction Laboratory (L3i).

Founded in 1993, the Computer Science, Image, Interaction Laboratory (L3i - EA 2118) is the research laboratory in the Digital Sciences department of La Rochelle University. It has 98 members working in the fields of Computer Science, Image, and Interaction. In particular, the Image and Content team has been interested in analyzing image and video content since the laboratory's creation and has recently focused on developing AI approaches for analyzing the behavior of marine animals in order to better understand the evolution of their environment.

The Centre d'Etudes Biologiques de Chizé (CNRS UMR 7372 - La Rochelle Université) is a nationally and internationally recognized scientific research center of excellence. The CEBC focuses on the biology, ecology, demography and evolution of wild vertebrate individuals and populations from a conservation perspective. In particular, the Marine Predators research group is world-renowned for the quality of its research on marine

birds and mammals, especially in Antarctic and sub-Antarctic areas. Since the creation of this research group, the CEBC has been a major player in French Austral and Southern territories, and has developed high-quality long-term research programs many of which rely on the use of biologging technology (sensors attached to animals).

### **Research project**

This project aims at gaining a better understanding of the effects of global change on the ecology of marine birds and mammals using artificial intelligence. Recent development of bio-logging tools (small devices attached to free-ranging animals that collect behavioural and environmental data) enabled us to collect large amounts of complex multimodal data. In particular, small animal-mounted cameras provide image data on the surrounding environment in addition to behaviour of equipped animals. However, the images acquired by these 'bio-loggers' pose new analytical challenges and require the development and implementation of methods for efficiently and accurately extracting, analysing and interpreting this complex and voluminous data. Indeed, underwater images are inherently challenging to analyze. The data collected are affected by the non-homogenous effects of light absorption and scattering in the water (blurriness, contrast, disappearance of specific colours, etc.), which could lead to misinterpretation of objects. In addition, images are collected from animals moving freely within the water column, thus can suffer from loss of quality due to ever-changing backgrounds, shifts in focus, and rapid changes in illumination, colour, water turbidity and noise. Consequently, analysis of animal-borne underwater images can be very human-intensive and time-consuming to analyse which hinders scientific progress, especially for time-sensitive ecological matters, in a context of rapid climate change.

In addition, numerous marine animals cannot be recaptured to recover attached biologgers and the data it contains. Consequently, the data needs to be processed on-board the biologgers and summarised to relevant metrics in small enough data packages to be transmitted via satellite. Given that biologgers have limited battery size and need to remain small to limit their impacts on animals, video processing models will have to optimize the on-board processing mechanisms.

Consequently, the successful candidate will work on:

- 1- developing innovative methods for easy processing and analysis of video data obtained by biologging devices using machine learning-based video and image processing methods.
- 2- testing different types of models on biologging hardware with the objective of implementing image video processing directly on-board biologgers for near-real time transmission via satellite when animals are at sea, given the restrictions inherent to small size biologgers, limited energy supply and limited message size for data transmission.
- 3- Propose some frugal AI approaches which will be able to generalize on few samples, in order to learn new concepts / classes with few samples (like in the case of test-time adaptation, in-context learning or incremental learning methods).

The data used in this project will be from video-recording underwater cameras deployed on 40 Adélie penguins on the Antarctic continent, along with location and depth sensors, as well as high-resolution tri-axial accelerometers and magnetometers. This dataset will potentially be supplemented by videos recorded on seals, in different ecosystems. Training datasets have already been manually implemented and will be ready to use at the start of the project.

## Tasks

The successful candidate will be in charge of implementing image processing algorithms (e.g. image enhancement processes such as Water-Net, UWCNN, or Retinex with optimisation for low-light conditions etc...; image segmentation processes such as Segmentation of Underwater IMagery (SUIM)-Net, Mask R-CNN, ResNet, Region Proposal Network (RPN), or dynamic instance segmentation for example) followed by detection and recognition models of objects of interests (using models such as Infrared Shape Network (ISNet), YOLO with improvements using FPN and PANet, Improved CNN with FPN for example). Accuracy of models will have to be tested and best models selected for future analyses.

In addition, the successful candidate will be in charge of testing different selected models, preferentially lightweight, onto different biologging hardwares for onboard processing in collaboration with biologging companies to determine the best ways to implement video-image analyses on board-biologgers, given the trade-off between size and battery supply, and accuracy of transmitted data.

Moreover, the candidate will have to propose some methods able to learn with few samples, as each biologer has its own specificity and one model could not be learned for all tasks. In this way, the candidate should be able to propose some new ideas related to in-context learning / test-time adaptation or incremental learning in this specific case.

Finally, the candidate will collaborate with people from CEBC (Dr Akiko Kato and Dr Tiphaine Jeanniard du Dot) and L3i (Dr Mickael Coustaty), and he/she will work in collaboration with Dr Marianna Chimienti (Bangor University, UK) and Dr Marine Gonse (LUDI). He/She will also interact and coordinate work with biologging engineers and companies for the on-board processing aspects of this project. Finally, he/she will also be in charge of supervising interns involved in the project and disseminate the results of this work in scientific peer review journal(s), conference/symposiums and to a general audience.

## Requirements

Applicants must hold a PhD in a field related to Computer Science, AI or Machine Learning, with applications to image or video analysis / processing. Some knowledge in frugal AI, incremental learning and on-board processing will be a plus. Applicants must show that they can perform independent research and lead a project within an interdisciplinary research consortium.

Skills required:

- Video and image processing experience
- Strong programming language knowledge: Python, Matlab, etc.
- Languages: English (read, written, spoken).
- Interest in environmental research.
- Rigour and autonomy
- Ability to work in a team and to collaborate, in particular in an interdisciplinary setting
- Will to promote an inclusive and caring environment
- Organizational skills, rigor and method, ability to meet deadlines
- Ability to dialogue/communicate with and towards diverse audience
- Ability to listen and take requests into account
- Ability to adapt
- Sense of responsibility and initiative

Operational skills:

- Project management
- Plan activities, taking into account priorities and deadlines
- Produce synthetic notes
- Write reports, articles or other documents in English (French is a bonus)
- Perform public outreach activities

Knowledge of the professional environment is recommended in terms of:

- Project management methods
- Characteristics of the establishment
- Organization and operation of higher education and public research in a French university
- Management and communication techniques

### **Position information**

**Category:** A+

**Laboratory :** CEBC & L3i

**Position:** 30-month full-time position

**Salary:** Starting from 2100 € monthly (net) for full-time work

**Experience :** Candidates must hold a PhD diplôme at the time of the application. The recruitment is open to candidates with disabilities.

### **Benefits**

- 75% contribution to the cost of public transport to and from work
- Sustainable mobility package for the use of a cycle/carpool for home-work journeys
- Partnering with KLAXIT (<https://www.klaxit.com/entreprises>)
- Health insurance participation of €15/month
- Collective catering on university campus
- Teleworking possible for up to 2 days a week, depending on departmental needs and organization
- Support for staff in their professional development and preparation for civil service entrance examinations
- Sport, leisure and cultural activities for all employees

### **Contact information for recruitment process**

Sabrina Gerard-Shine [sabrina.gerard-shine@univ-lr.fr](mailto:sabrina.gerard-shine@univ-lr.fr)

*Human Resources and Relations Department*

*Human Resources Development Support Department*

### **Contact information for position details**

Dr Akiko Kato ([akiko.kato@cebc.cnrs.fr](mailto:akiko.kato@cebc.cnrs.fr))

and Mickaël Coustaty ([mickael.coustaty@univ-lr.fr](mailto:mickael.coustaty@univ-lr.fr))

### **How to apply?**

Your application must include:

- cover letter
- detailed curriculum vitae
- copy of highest diploma

This application must be submitted by email at:

- [tiphaine.jeanniard-du-dot@cebc.cnrs.fr](mailto:tiphaine.jeanniard-du-dot@cebc.cnrs.fr)
- [akiko.kato@cebc.cnrs.fr](mailto:akiko.kato@cebc.cnrs.fr)
- [m.chimienti@bangor.ac.uk](mailto:m.chimienti@bangor.ac.uk)
- [mickael.coustaty@univ-lr.fr](mailto:mickael.coustaty@univ-lr.fr)

*INCOMPLETE APPLICATIONS OR THOSE SENT BY E-MAIL WILL NOT BE CONSIDERED.*

**Application deadline:** June 13th, 2025

**Start date :** September 2025