Internship proposal for a Master 2, duration 6 months: Eco-acoustic and Ecosystem Connectivity in Corridors
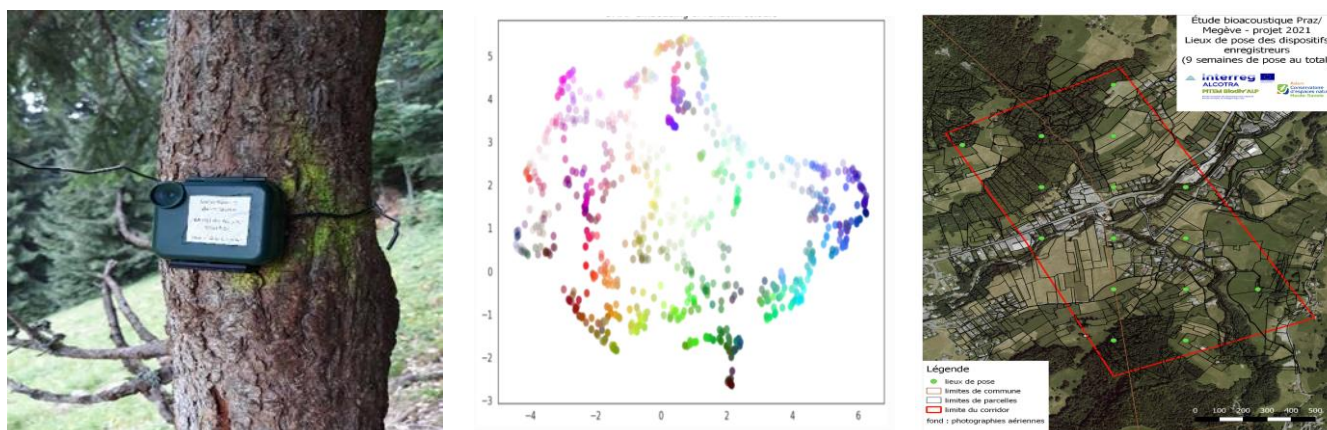
Location: Lab. ENES (https://www.eneslab.com/), Equipe de Neuro-Ethologie Sensorielle ENES/CRNL, University of Lyon/Saint-Etienne, CNRS UMR5292, INSERM UMR_S 1028, 23 rue Michelon, 42023 Saint-Etienne cedex 2,

Keywords: Acoustic classification, bioacoustics monitoring, biodiversity, soundscape, ethology, ecology.

Aime: In a context of global change and increasing anthropogenic pressures, the restoration of ecological corridors is one of the major strategies for the management, restoration and conservation of ecosystems. To measure the abrupt variations in composition and functioning of these ecosystems, the development of efficient, non-invasive, and inexpensive monitoring methods is an imperative challenge. It is through the lens of eco-acoustics that this project wishes to address this issue and contribute to the monitoring and preservation of biodiversity in ecological corridors. The recent development of audio recording systems makes it possible to analyze soundscapes over long periods of time, to inventory the acoustic signals emitted by animal species and to characterize biodiversity through acoustic indices.

This project aims to study the acoustic biodiversity in the ecological continuities constituting the ecological corridors, and more specifically to implement tools to analyze the structural and functional connectivity of soundscapes.

Methodology: In spring 2021, and 2022 we deployed about 30 passive acoustic recorders in two corridors in Haute Savoie. These acoustic recorders are installed according to a precise spatial and temporal sampling allowing to map acoustically the studied corridors. The audio recordings will be analyzed using tools developed in the laboratory. The overall acoustic diversity of the landscape will be quantified in the different beacons via several acoustic indices: this method will allow a cartographic representation of the spatial distribution of sound biodiversity in the corridors. New discrimination and classification methods using AI network deep learning will also be used to identical clusters among the different hours and biotopes. The links and correlations between the global indices and the number of clusters will also be tested. Indeed, within the laboratory, we are developing a platform for automatic analysis of soundscapes. The student recruited will be in charge of implementing algorithms for comparison analysis and similarity analysis of soundscapes. Propagation analysis will also be considered to quantify the connectivity of acoustic signals in the soundscape.

Expected results: implementation of structural and functional connectivity index of acoustic landscapes. Characterize acoustic landscapes using deep learning and monitoring of different bird communities. Integration of connectivity tools in the acoustic platform. Participation in a publication.

Supervisors and host laboratories:
-Sèbe Frédéric : Equipe de Neuro-Ethologie Sensorielle, ENES/CRNL, CNRS UMR 5292, University of Saint-Étienne, 23 rue du Dr Michelon, 42023 Saint-Étienne Cedex 2, France
Collaboration with
-Emonet Rémi : Laboratoire Hubert Curien 18 Rue Professeur Benoît Lauras 42000 Saint-Étienne, France
-Birck Carole : Service Scientifique et Technique Chargée de mission CEN74-ASTERS 84 Route du Viéran, PAE de Pré-Mairy, 74370 Pringy, France

Required profile:
The successful applicant must have:
- Formation in a relevant subject area, such as (but not limited to) applied mathematics, computer science, machine learning.
- A working knowledge of AI and machine learning algorithms, including their implementation for audio analysis, such as speech recognition or natural language processing.
- Strong computer programming skills, (R, Python, MATLAB and object-oriented programming.)
- English language proficiency, both written and oral.
- The ability to work independently, with a proactive approach with creativity.

Practical information:
Duration: 6 month, from january 2022 to june 2022.
Hosting laboratories:
-Laboratoire ENES-CRNL UMR 5292, University of Saint-Etienne, 23 rue du Dr Michelon, 42023 Saint-Etienne Cedex 2, France
- Laboratoire Hubert Curien 18 Rue Professeur Benoît Lauras 42000 Saint-Étienne, France.
- Possibility of working near Grenoble University
Remuneration: ~ about 530 € per mouth
Application: send your CV and a cover letter before 25th of October , 2021 by email to
Sèbe Frédéric, frederic.sebe@univ-st-etienne.fr

This project is part of the simple Biodiv'Connect project, integrated into the PITEM Biodivalp (Interreg-ALCOTRA France-Italy).