

Master internship : Development of a DIY 3D-Printed Ambisonic Microphone for Autonomous Field Recording

Starting February 2026

Employer: CNRS (France)

Location: LMFA, Acoustics Team, École Centrale de Lyon

Duration: 6 months (starting from February 2026)

Type: Full-time, paid internship

Collaboration: CITI Lab and Émeraude Team

Context

This internship is part of the project, **3DREAM** between the **LMFA Acoustics Team**, emeraude team of CITI lab to develop an open-source, DIY ambisonic microphone. The goal is to create a **low-cost, waterproof, and field-ready** prototype for autonomous recording in challenging environments (e.g., bio-acoustics, eco-acoustics application).

The intern will focus on **hardware prototyping**, working alongside another intern responsible for FPGA-based real-time processing. The project builds on the **SMALL library** and aims to provide a robust, open-source solution for researchers and makers.

Mission

Your tasks will include:

- **DIY Prototyping**
 - Designing the microphone enclosure in **OpenSCAD** (consistent with the SMALL library).
 - 3D printing, assembling, and soldering up to 32 MEMS microphones.

- Ensuring **waterproofing** and mechanical robustness for outdoor use.
 - **Acoustic Characterization**
 - Measuring the **directional response** of the ambisonic microphone in controlled environments (i.e. anechoic chamber).
 - Validating frequency response and ambisonic encoding performance.
 - **Collaboration & Integration**
 - Working with the FPGA intern to test real-time ambisonic encoding and SD card recording.
 - **Documentation & Open-Source Contribution**
 - Sharing designs, test results, and integration to the SMALL library (i.e. git repo).
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Profile

We are looking for a candidate with: - **Strong prototyping skills**: 3D printing, soldering, CAD (OpenSCAD). - **Background in acoustics/signal processing**: Understanding of microphone characterization and spatial audio. - **DIY mindset**: Ability to iterate quickly and solve practical challenges.

What We Offer

- Hands-on experience in **open hardware**, **acoustic measurement**, and **field-ready design**.
 - Access to LMFA's acoustic labs and collaboration with leading research teams.
 - Opportunity to contribute to open-source projects and publish results.
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Application

Send your CV, cover letter, and examples of past projects (GitHub, photos, reports) to: pierre.lecomte@ec-lyon.fr