

Maxime Popoff

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EDUCATION

PhD in Computer Science	2021-2024
<i>Real-Time Audio DSP Compilation on FPGA.</i>	
INSA Lyon, Inria Lyon, CITI Lab, EMERAUDE project team, France.	
Supervisors : Prof. Tanguy Risset, Dr. Romain Michon.	
Engineering Degree in Electronics and Computer Systems	2014-2017
<i>Specialization in Embedded Systems Electronics.</i>	
Grenoble INP - ESISAR, France.	
Bachelor in Engineering Science	2015
Grenoble INP - ESISAR, France.	
University Diploma of Technology	2012-2014
<i>Electrical Engineering and Industrial Computing</i>	
IUT Belfort, France.	

PROFESSIONAL EXPERIENCE

ETH Zürich Zürich, Switzerland	Feb 2026 - May 2026
<i>Research Consultant</i>	
Centre for Immersive Wave Experimentation	
Implementation of a 128×128 virtual acoustic rendering algorithm on a CPU	
Polyphonic Lyon, France	2025
<i>Founder</i>	
Innovative FPGA based audio platform for multichannel audio DSPs.	
Startup initiative aiming to transfer and industrialize technologies developed as part of my doctoral research.	
Stanford University Stanford, CA, US.	Apr - Jul 2023
<i>Visiting research student</i>	
Academic supervisor : Chris Chafe.	
Laboratory : Center for Computer Research in Music and Acoustics (CCRMA). See Research section for details	
Inria Lyon, France.	Nov 2020 - Sept 2021
<i>Research Engineer</i>	
Embedded electronics and programming - Low-latency audio signal processing on FPGA.	
CITI Laboratory, EMERAUDE project team (Programmable Embedded Audio Systems).	
CEA Grenoble Grenoble, France.	Mar 2018 - Mar 2020
<i>Research Engineer</i>	
Embedded programming : image analysis (patent), energy harvesting, sensor integration.	

APIX Analytics | Grenoble, France.

Nov 2017 - Feb 2018

Embedded Electronics Engineer

Embedded programming and electronic board design.

Ministry of Defense | Paris, France.

Feb 2017 - Jul 2017

Embedded Electronics Engineer

End-of-studies internship

SODIMAS | Valence, France.

Jan 2016 - Jul 2016

Embedded Electronics Engineer

Industrial project

ISEM Audio | Belfort, France.

Feb 2014 - Apr 2014

Electronics Technician

Technician internship

TEACHING

Tutorials/Lab Instructor (Lab : 52h, Tutorial : 14h) *Computer Architecture*

- Digital circuit and computer architecture. Information encoding, combinational and sequential logic, instruction set, processor architecture, compilation.
- Taught groups of approximately 25 third-year students at INSA Lyon.
- Course coordinator : Prof. Tanguy Risset.

Telecommunications Department, INSA Lyon, France.

Academic years 2021-2022, 2022-2023, 2023-2024

Tutorials/Lab Instructor (Lab : 52h, Tutorial : 4h) *C Language and Fundamentals of Programming*

- Programming in C : basic notions (compilation, types, variables, control flow, functions), dynamic allocation, advanced data structures (trees and heaps), tools for programming, notions of embedded programming.
- Taught groups of approximately 25 third-year students at INSA Lyon.
- Course coordinator : Prof. Tanguy Risset.

Telecommunications Department, INSA Lyon, France.

Academic years 2021-2022, 2022-2023, 2023-2024

Lab Instructor (20h) *Signal Processing for Sound*

- Three-week open project on programming an embedded system for real-time audio signal processing applications. Audio software architecture, audio signal processing in C++, embedded systems programming (C++).
- Support for groups of 3-4 fourth-year students at INSA Lyon.
- Course coordinator : Prof. Tanguy Risset.

Telecommunications Department, INSA Lyon, France.

Academic year 2023-2024

OTHER TEACHING ACTIVITIES

- **PAW Conference, 2023.**

Co-instructor for a 2-day hands-on session on using the Syfala (Faust-to-FPGA) toolchain with Inria tools (Grid5000).

Approx. 10 participants

- **Stanford, CCRMA (Center for Computer Research in Music and Acoustics), 2023.**

Co-instructor of a workshop presenting the use of the Syfala (Faust-to-FPGA) toolchain.

Participants : faculty members and researchers of the laboratory.

- **PAW Conference, 2022.**

Instructor of an introductory workshop on FPGA programming with the Faust language.

Approx. 10 participants

RESEARCH

PhD in Computer Science | INSA Lyon, France.

Sept 2021-2024

Supervisors : Prof. Tanguy Risset, Dr. Romain Michon.

Topic : Compilation of Real-Time Audio DSP on FPGA.

CITI Laboratory, EMERAUDE project team

Abstract Field-Programmable Gate Arrays (FPGAs) are powerful embedded platforms that offer unique performance in terms of throughput, computational power, and a large number of inputs/outputs, making them highly suited to real-time audio processing. However, programming them presents significant challenges. High-Level Synthesis (HLS) bypasses complex hardware description languages (HDLs) traditionally used for FPGA programming, streamlining the compilation process and enabling high-level audio DSP specifications to be directly converted into FPGA bitstreams. Still, this approach remains difficult to generalize for various audio programs. This thesis presents the principles of real-time audio DSP implementation on FPGAs using HLS tools. It introduces a general methodology for generating optimized C++ code for audio DSP with HLS and presents the first “audio DSP compiler” specifically targeting FPGAs. This compilation flow leverages the use of FAUST, a high-level functional programming language designed for sound synthesis and audio processing, to program FPGAs. Two major technological breakthroughs are presented : achieving ultra-low latency for real-time audio DSP (on the microsecond scale) and the ability to easily deploy massive multichannel systems, opening new research perspectives, particularly in the fields of audio spatialization and active acoustic control applications.

Research stay, Stanford University | Stanford, CA, US.

Apr - Jul 2023

Academic supervisor : Chris Chafe.

Topic : Pushing the Limits of Audio Spatialization with Emerging Architectures.

Laboratory : Center for Computer Research in Music and Acoustics (CCRMA)

Summary During this three-month stay, I worked on extending the multichannel capabilities of the FPGA-based audio platforms developed in the context of my PhD. The objective was to push the limits of large-scale audio spatialization using emerging hardware architectures. Access to specialized expertise and advanced infrastructure at CCRMA provided ideal conditions for exploring high-channel-count systems and investigating new real-time audio processing strategies.

This work was updated in November 2025, allowing me to interface the Polyphonic platform with their WFS speaker bar and resulting in a more efficient and user-friendly interface.

FUNDING AND SCHOLARSHIPS

- ICCARE Awardee

Awarded by the ICCARE consortium “Maturation - Pre-maturation”.

For the Polyphonic project : *Platform for the creation of multichannel audio systems.*

\$100k awarded to the host institution (Inria) - 2025

- Visiting student research grant

Awarded by the France-Stanford Center for Interdisciplinary Studies.

Topic : *Pushing the Limits of Audio Spatialization with Emerging Architectures.*

\$10k - 2023

OTHER INFORMATION

Research Areas

- Embedded systems, real-time systems for audio DSPs.
- Hardware programming : FPGAs, High-Level Synthesis (HLS).
- Embedded architectures.
- Electronic systems and components.

Programming Skills

- C, C++, VHDL.
- Embedded programming : microcontrollers (Arduino, Teensy, ESP32, STM32), FPGA/SoC (Xilinx/Intel).
- Tcl, L^AT_EX, Git.

Languages

- French (native language).
- English (fluent; thesis written and defended in English).

LIST OF PUBLICATIONS

INTERNATIONAL CONFERENCE PAPERS

› Enabling Affordable and Scalable Audio Spatialization With Multichannel Audio Expansion Boards for FPGA

M. Popoff, R. Michon, T. Risset,

SMC - Sound and Music Computing 2024, oral presentation and poster,

In press. URL : hal.science/hal-04714557

› Programming FPGA Platforms for Real-Time Audio Signal Processing in C++

P. Cochard, M. Popoff, R. Michon, T. Risset,

SMC - Sound and Music Computing 2024, oral presentation and poster,

In press. URL : hal.science/hal-04714563

› Audio DSP to FPGA Compilation

M. Popoff, R. Michon, T. Risset, P. Cochard, S. Letz, Y. Orlarey, F. de Dinechin,

IEEE ASAP 2023, oral presentation and poster,

DOI : [10.1109/ASAP57973.2023.00018](https://doi.org/10.1109/ASAP57973.2023.00018)

› A Programmable Linux-Based FPGA Platform for Audio DSP

P. Cochard, M. Popoff, A. Fraboulet, T. Risset, S. Letz, R. Michon,

SMC - Sound and Music Computing 2023, oral presentation and poster,

DOI : [10.5281/zenodo.8338281](https://doi.org/10.5281/zenodo.8338281)

- **Making Frugal Spatial Audio Systems Using Field-Programmable Gate Arrays**
R. Michon, J. Bizien, **M. Popoff**, T. Risset,
NIME - New Interfaces for Musical Expression Conference 2023,
DOI : [10.5281/zenodo.11189100](https://doi.org/10.5281/zenodo.11189100)
- **Feedback Acoustic Noise Control with Faust on FPGA : Application to Noise Reduction in Headphones**
L. Alexandre, P. Lecomte, M. Galland, **Maxime Popoff**,
IFC - International Faust Conference 2022,
DOI : [10.5281/zenodo.6799613](https://doi.org/10.5281/zenodo.6799613)
- **Towards an FPGA-Based Compilation Flow for Ultra-Low Latency Audio Signal Processing**
M. Popoff, R. Michon, T. Risset, Y. Orlarey, S. Letz,
SMC - Sound and Music Computing 2022, oral presentation and poster,
DOI : [10.5281/zenodo.6573619](https://doi.org/10.5281/zenodo.6573619)

RESEARCH REPORTS

- **Audio DSP to FPGA Compilation : The Syfala Toolchain Approach**
M. Popoff, R. Michon, T. Risset, P. Cochard, S. Letz, Y. Orlarey, F. de Dinechin,
Univ Lyon, INSA Lyon, Inria, CITI, Grame, Emeraude.
2023
RR-9507, URL : inria.hal.science/hal-04099135

PATENTS

- **System for Acquiring a Depth Map of a Scene**
CEA Grenoble ; Inventors : **M. Popoff**, R. Pelisson,
2020, EP3882855, URL : data.inpi.fr/brevets/EP3882855