

FRANCISCO BERNARDO PhD • MA • MSc • ENG

Senior Software Engineer | Computational Engineering | C++ / Python | Developer Experience and Tooling

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SUMMARY

- Senior software engineer with 8 years in industry and 10+ years in R&D building production-grade tools and performance-critical systems.
- Strengths: software architecture, APIs, data models, compilers and developer tooling, numerical algorithms and design-automation pipelines.
- Comfortable working close to hardware constraints (MCU/FPGA, signal processing, electronics) while owning the software stack end-to-end.

CORE SKILLS

- Architecture and product-grade delivery: API design, packaging, documentation, maintainability, stakeholder alignment.
- Tooling and compilers: parsers/IR/code generation, developer experience, CLI/SDK, build systems (CI/CD).
- Numerical / computational engineering: simulation pipelines, geometry processing, HPC workflows.
- Hardware-adjacent development: embedded C/C++, FPGA/SystemVerilog, mixed-signal prototyping and debugging
- Complex user interface architecture, frontend engineering, and user-centred design and evaluation.

EXPERIENCE

Oct 2024 - Present

Research Associate – Embedded DSP / Mixed-Signal Systems Imperial College London (UK)

Dyson School of Design Engineering

- Designed and implemented ultra-low-latency embedded data acquisition system and DSP pipelines across an STM32H750 MCU (C++) and Altera DE-10 FPGA (SystemVerilog/Quartus), including high-speed ADC/DAC integration and evaluation.
- Developed a method for integration of virtual-analog models within analog circuits via digital impedance synthesis; modelling and tooling code in python/C++/SystemVerilog, case studies with reference analog audio circuits.
- Contributed to open-source virtual-analog modelling (Wave Digital Filters) libraries (Python/C++) and communicated results through papers and talks.

Sep 2021 - Sep 2024

Research Fellow – Computational Design & Optimisation Tooling University College London (UK)

Computer Science Department

- Built computational design automation tooling for acoustic metamaterials: parameterised geometry workflows, FEM and wave-scattering analysis and simulation orchestration, and optimisation loops (python, pytorch, scikit-learn, Fortran90, SALOME, ElmerFEM, HPC Sun Grid Engine).
- Designed, prototyped and evaluated ultrasonic phased arrays and waveguides; combined CAD, simulation, embedded prototyping (Python, C++, Verilog), free-field acoustic measurement.
- Delivered prototypes with industry partners (Meta Reality Labs, Sony R&D, Ultraleap), supervised MSc/PhD students, assisted teaching and delivered labs/seminars in Algorithms and Data Structures to CS undergraduates (Python).

**Postdoctoral Fellow – Domain-specific Language Compiler & Developer Tooling
University of Sussex (UK)**

Jan 2019 - Aug 2021

Experimental Music Technology Lab

- Co-authored a compiler toolchain for domain-specific languages (parser/grammar, IR, code generation) and a high-performance runtime engine for browser client-side DSP/ML; published work recognised with a Best Paper award.
- Led architecture, full-stack engineering, deployment and documentation for sema.codes, a web-based IDE/tooling ecosystem with the embedded toolchain (C++, WebAssembly, Emscripten, Javascript, Svelte, NodeJS, Nginx, AWS).
- Designed developer-facing workflows, documentation and video tutorials; mentored interns and contributed to open-source DSP libraries.

**Doctoral Researcher – Machine Learning API, Toolkit & Developer Experience Design
Goldsmiths, University of London (UK)**

Feb 2015 - Aug 2019

Computing Department

- Designed and built a developer-focused machine-learning API and developer toolkit for multimodal sensor data (C++ core with web tooling via Emscripten); emphasised algorithm and API design, documentation and usability.
- Built C++ middleware/prototypes for millimetre-wave radar-on-a-chip (Google ATAP Soli), including data visualisation and ML components; work featured at Google I/O.

**Frontend Software Engineer, Cegid Primavera
(Portugal)**

Jan 2011 - Apr 2013

Business Analytics SaaS / OLAP

- Developed modular dashboard components for analytics and data warehousing (C#.NET, SQL Server/Analysis Services, WCF).
- Delivered an iOS executive KPI app and contributed to UI architecture for business intelligence workflows.

**Senior Software Engineer & Project Manager, Ubisign, Lda
(Portugal)**

May 2007 - Jan 2011

Digital Signage SaaS

- Led transition from desktop product to cloud SaaS; designed and implemented management/orchestration applications and backend services (C#.NET, SQL Server/Analysis Services, WCF, NUnit).
- Built a high-performance multimedia system and video plugins, with WPF.NET and DirectShow C++ interop; delivered real-time media pipelines used in production deployments across hundreds of public screens.
- Introduced engineering best practices for complex UI architecture and codebases.

EDUCATION

- PhD, Computer Science – Goldsmiths, University of London (2020)
- MA, Management – Catholic University of Portugal (2013)
- MSc, Mobile Systems – University of Minho (2009)
- BSc (5-year), Computer Science and Systems Engineering – University of Minho (2006)

SELECTED RECOGNITION

- Best Paper Award – Web Audio Conference (2019)
- Google ATAP Soli Alpha Developer prototypes featured at Google I/O (2016)
- European Commission – Seal of Excellence (multiple awards, 2021-2026)

TECHNICAL STACK (SELECTED)

- Languages: Python, C/C++, C#, JavaScript/TypeScript, SQL, SystemVerilog/Verilog, Fortran, Rust
- Tooling/Platforms: Linux, Quartus, Git, CI/CD, CMake/make, AWS, Nginx, NodeJS, TDD
- Simulation/Design: COMSOL multiphysics, SALOME, ElmerFEM, LTspice, CAD/PCB prototyping tools