JUAN PEDRO BOLÍVAR PUENTE

CTO · Consultant · Software Engineer

+49 179 6422022
juanpe@sinusoid.al
sinusoid.es
arximboldi

Berlin-based CTO at BRONZE and independent consultant in music and interactive systems, architecture and libre software. Author of the C++ libraries Immer, Lager and Zug; regular speaker at C++ and functional programming conferences.

Experience

Chief Technology Officer

BRONZE

2020 – present · Remote

- Built and led the engineering and product team (10+), owning process and architecture. Consultant from 2020, CTO since 2022.
- Architected the next generation of the composition software, enabling non-linear, generative and augmented music.
- Productised the stack and defined a modular architecture letting third parties embed the BRONZE Engine.
- Shipped streaming infrastructure scaling to tens of thousands of concurrent listeners.

Founder & Software Engineering Consultant

Sinusoidal Engineering

2017 – present · Remote

- Architecture, performance and modern C++ for teams in music technology, robotics, industrial software, AI and large-scale infrastructure — much of it adopting *value-oriented design* with Immer and Lager.
- **Clients:** Darkmatter, Meta, Google, Steinberg, Ableton, Ipolog, BRONZE, Magnopus, Dusty Robotics, Plum, Kapela, Audulus, Prenav, OMICRON Energy, SoundX, WAVY, zenAud.io.

Software Engineer

Ableton

2011 – 2016 · Berlin, Germany

- Worked on *Push*, a hardware music instrument, and *Live*, a leading DAW with millions of users.
- On the architecture team reviewing the architecture across 30+ developers; mentored in modern C++, Python and QML.
- Bootstrapped the *Open Source Guild*, aligning legal, business and engineering to liberate internal components.

Selected Engagements

2026 **Darkmatter** — Tech lead on Nixmac, an agent that configures macOS declaratively with Nix, over a custom LLM harness. Crypto analysis tooling on Kubernetes and ArgoCD

2025 **Plum** — Cleaned up their construction-site robotics architecture and built a C++ behaviour-tree library on top of Lager

2024 **Dusty Robotics** — Rewrote their construction plan viewer in Rust and WebGL, orders of magnitude faster, and mentored the team in software design and graphics programming

2023 **Meta — Shard Manager** — Added transients to Immer HAMTs; across millions of machines, latency fell tenfold and memory usage halved

2021 **Steinberg — Cubasis** — Oversaw the rewrite of the whole data model value-oriented, decoupling the UI and data model threads

2021 **Magnopus** — Designed the real-time data-flow architecture behind robotic film recording, with a USD visualiser, UDP multicast and an EtherCAT engine

2018–19 **Kapela** — Set up and led the development team and architecture as interim CTO, on a system for connected live electronic performances

Also Prenav, OMICRON Energy, Ableton, Audulus, Ipolog, SoundX, WAVY and zenAud.io. Full portfolio: `sinusoid.es/do`

Open Source

Immer — `sinusoid.es/immer`
Immutable and persistent data structures for C++. 2.9k stars; presented at ICFP'17; in production at Meta, Google, Amazon, etc.

Lager — `sinusoid.es/lager`
Value-oriented design for C++ with unidirectional data-flow — "Redux for C++".

Zug — `sinusoid.es/zug`
Transducers for C++: composable transformations over pull- and push-based sequences.

Past maintainer of **GNU Psychosynth** and **GNU Jump**, contributor to **GNU PDF** and **Mixxx**; **Atria** and **Aqt.Cassowary** at Ableton.

Expertise

Software Architecture · Immutability · Value-Oriented Design · Real-time · Audio · Graphics · Performance · Technical Leadership · Mentoring

Languages & Tools

C++ · Python · Rust · Clojure · Scheme · Haskell · TypeScript · QML · Nix · Kubernetes · Qt · OpenGL · WebGL · USD · WebAssembly · Emacs

Speaking & Writing

Regular speaker at **CppCon**, **Meeting C++**, **C++ on Sea**, **C++ Russia**, **C++Now**, **std::cpp** and **ICFP** — on immutable data structures, value-oriented design and transducers.

Persistence for the Masses: RRB-Vectors in a Systems Language. Proc. ACM Program. Lang. 1, ICFP 16 (2017).

Education

Ingeniero Informático, University of Granada, 2006–2011. Five-year Master's-level degree, 300 ECTS; thesis with Honours. Erasmus at Åbo Akademi, Finland.

Languages

Spanish native · **English** fluent, working language 15+ years · **German** B2.