JUAN PEDRO BOLÍVAR PUENTE

Building software systems and teams

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Berlin-based engineer and manager, interested above all in making systems and organisations that work for human beings. CTO at BRONZE, where I built the engineering and product team. Nine years as an independent consultant dropped into other companies' engineering teams to improve what and how they build. Author of the C++ libraries Immer, Lager and Zug, regular speaker at international C++ and functional programming conferences, and still writing code every week.

Experience

Chief Technology Officer

BRONZE

2020 – present · Remote

- Joined as a consultant in 2020, CTO since 2022. Built the engineering and product team from nothing to 10+ contractors.
- Managed and scaled the product organisations, including engineers, designers and external agencies.
- Ran one-to-ones, feedback and growth for the team.
- Productised the tech stack and development process, favouring automation, CI/CD, and infrastructure-as-code.
- Architected the next generation of the composition and arrangement software, enabling non-linear, generative and augmented music, and productised the inherited prototypes into a stack that meets performance and scalability standards.
- Shipped streaming infrastructure scaling to tens of thousands of concurrent listeners of non-linear music.
- Fully remote and asynchronous throughout, across time zones.

Founder & Software Engineering Consultant

Sinusoidal Engineering

2017 – present · Remote

- Nine years of engagements in music technology, robotics, industrial software, AI and large-scale infrastructure. Most of them combine hands-on architecture and programming with mentoring and process improvements.
- **Clients:** Darkmatter, Meta, Google, Steinberg, Ableton, Ipolog, BRONZE, Magnopus, Dusty Robotics, Plum, Kapela, Audulus, Prenav, OMICRON Energy, SoundX, WAVY, zenAud.io.

Interim CTO & Development Lead

Kapela — via Sinusoidal Engineering

2018 – 2019 · Remote

- Set up and led the development team, defined the technical product strategy and owned the architecture for a system for connected live electronic performances. C++, Rust, QML, Clojure and Nix.

Software Engineer

Ableton

2011 – 2016 · Berlin, Germany

- Worked on *Push*, a hardware music instrument, *Live*, a leading DAW with millions of users, and research teams imagining future products.
- Bootstrapped the *Open Source Guild*, bringing legal, business and engineering to agreement on releasing internal components, and setting up the necessary processes and know-how for doing so.
- On the architecture team across 30+ developers: the work was helping others arrive at good decisions, not signing off on them. Mentored developers in modern C++, Python and QML.

How I Work

Encourage ownership and autonomous work through lean processes. Enable excellence rather than impose uniformity. Foster diversity of people and ideas, and allow everyone's unique skills to shine.

Hands-off when things run smoothly, hands-on when they do not: removing blockers and process inefficiencies, and automating to keep them gone.

Still practising: declarative architecture, value-oriented design and functional programming, applied pragmatically and with the user in mind.

Open Source

Author and maintainer of three widely used C++ libraries.

Immer

2016 – present · `sinusoid.es/immer`

Postmodern immutable and persistent data structures for C++. 2.9k stars; ICFP'17; in production at Meta, Google, Amazon, etc.

Lager

2017 – present · `sinusoid.es/lager`

Value-oriented design for C++ with unidirectional data-flow — "Redux for C++".

Zug

2019 – present · `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. Co-founder of *Hacklab Colina Roja*, Granada.

Leadership

Team Building · Hiring & Interviewing · Mentoring & Coaching · Feedback · Remote & Async · Technical Strategy

Selected Engagements

Consulting and contracting through my practice **Sinusoidal Engineering**.

2026 **WAVY** — Built their streaming infrastructure on the BRONZE Engine, scaling to thousands of concurrent multi-channel streams

2026 **Darkmatter** — Tech lead on Nixmac, an agent configuring macOS declaratively with Nix and Git, over a custom harness spanning several LLM backends. Set up and improve agent-enhanced development process. Crypto analysis tooling deployed on Kubernetes with ArgoCD. Rust, TypeScript and Nix

2025 **Plum** — Helped their team productise the robotics architecture behind construction-site automation, and its USD-based control and monitoring tools. Built a C++ behaviour-tree library that integrates with Lager

2024 **Dusty Robotics** — Mentored the team in software design and graphics programming, and rewrote the viewer for the building plans their robots print onto construction-site floors in Rust and WebGL, orders of magnitude faster

2023 **Meta — Shard Manager** — Mentored the team on immutable data structures and added transients to Immer's HAMTs; across millions of machines, average latency fell by an order of magnitude and memory usage halved

2021 **Steinberg — Cubasis** — Coached the team through a rewrite of their entire data model, decoupling the UI and data model threads

2021 **Magnopus** — Mentored the team on value-oriented design. Designed the real-time data-flow architecture behind robotic film recording, with a USD visualiser, UDP multicast and an EtherCAT engine

2019–20 **Prenav** — Mentored the team in value-oriented design and modern C++ while rearchitecting their structural inspection software on unidirectional data-flow

2019 **OMICRON Energy** — Brought their C++ team up to date with modern practice, alongside application-wide refactors and a new data model for the MPD-800 measurement software

2017 **Ableton — Live** — Ported Live's core to embedded Linux and tuned it on the board, the groundwork for the standalone Push 3

Also Audulus, Google, Ipolog, SoundX and zenAud.io. Full portfolio: `sinusoid.es/do`

Speaking & Writing

Regular speaker at **CppCon**, **Meeting C++**, **C++ on Sea**, **C++ Russia**, **C++Now**, **std::cpp**, **ICFP** and **EmBO++**.

2025–26 **Persistence²** — CppCon, Meeting C++

2019–26 **Squaring the Circle** — C++ Russia, C++ on Sea, Meeting C++, std::cpp

2018–19 **The Most Valuable Values** — CppCon, Meeting C++, std::cpp

2016–19 **Postmodern Immutable Data Structures** — CppCon, ICFP, C++Now, C++ on Sea, C++ Russia, Meeting C++

2015–19 **Transducers: from Clojure to C++** — CppCon, EmBO++, interviewed on CppCast

Persistence for the Masses: RRB-Vectors in a Systems Language. Proc. ACM Program. Lang. 1, ICFP, Article 16 (2017). `doi.org/10.1145/3110260`

Teaching

Teacher — Advanced Python

Instituto de Astrofísica de Andalucía

2011 · Granada, Spain

A 25-hour course for the institute's researchers and developers: object-oriented and functional programming, metaprogramming, C interfacing, test automation, GTK and Django. Materials at `sinusoid.es/python-avanzado`.

Research & Teaching Intern

Dept. of Computer Science and AI, University of Granada

2009 – 2011 · Granada, Spain

Teaching Innovation Project with the Computer Vision Group; assisted in "Methodology of Computer Programming". Lead developer of Moodle modules with interactive algorithm visualisations, released as libre software.

Engineering

Software Architecture · Value-Oriented Design · Immutability · Functional Programming · Real-time · Performance · Developer Experience · Audio · Graphics

Languages & Tools

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

Education

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

Spoken Languages

Spanish
English
German



Native · Fluent, working language 15+ years · telc Deutsch B2.

Awards

2008 **First prize** — Spanish Libre Software Contest (Psychosynth)

2006 **Gold medal** — Iberoamerican Contest in Informatics

2006 **First place** — Spanish Olympiad in Informatics

2006 **Bronze medal** — Spanish Olympiad in Mathematics

Interests

Massage practitioner, trained in wellness massage, sports massage and myofascial trigger point therapy.
Medios Seminare, Berlin, 2026.

DJ and electronic musician, as *INTERNET.MP3* (`@internet_mp3`) and earlier *Arximboldi* (`@magnicida`).

Amateur **powerlifter** and **painter**.