

SERGIO PEÑA

Acoustics & Vibration Engineer · Creative Coder

// Noise · Audio · Data · DSP · Simulations

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// summary

Acoustics and vibration specialist with 9+ years optimizing noise, vibration, and audio performance across consumer electronics, aerospace, defense, and environmental noise. Blend hands-on lab expertise, advanced DSP, data analytics, and predictive modeling (COMSOL, SEA / FEA / BEM) to deliver quieter, higher-fidelity systems. Automate measurement and analysis pipelines in MATLAB and Python, and leverage agentic AI development workflows to build the lab tools that don't yet exist, turning multi-day manual work into hours and translating insights into design wins.

// at_a_glance

- ~ **9+ years** across consumer electronics · aerospace · defense · environmental noise — Apple · Boeing · Northrop Grumman · Amazon Lab126 · Google · Meta WATT
- ~ **Current** — Meta Reality Labs WATT: Ray-Ban smart-glasses acoustic tuning, full-stack lab tooling, 360° spatial-audio measurement CLI
- ~ **Open-source acoustic craft** — GeoNoise (ISO 9613-2 / CNOSSOS-EU propagation, WebGPU) · ImpedanceTuber (ISO 10534-2 modernization) · vibration-pdm (edge ML for noise/vibration PdM)
- ~ **Methodology** — agentic AI development workflows for lab tooling: measurement utilities, automation harnesses, and validation pipelines that close gaps and save hours per test cycle

// core_skills

- acoustics_vib** Acoustic & vibration testing · eNoise / mic coexistence · Environmental noise monitoring · Psychoacoustics · NVH · ISO / IEC / ITU standards
- simulation** COMSOL Multiphysics · Wave6 / VA One · SEA / FEA / BEM · ISO 9613-2 propagation · Ray tracing · Multiphysics
- dsp** Digital signal processing · FFT / spectral analysis · Beamforming & AEC · Filter design · Audio quality metrics & test (POLQA, PESQ, 3QUEST)
- software** Python · MATLAB · PyTorch · ML for data analysis · JMP Pro · Lab automation · Git
- hardware_lab** B&K / G.R.A.S. mics · Laser Doppler Vibrometry · LMS Test.Lab · SoundCheck · HEAD acoustics ACQUA · Tektronix scopes · Chroma EE load · Arduino · Raspberry Pi · SparkFun
- live_audio** FOH mixing · system rigging · Dante networking · live recording & mixing

// professional_experience

Meta — Sunnyvale, CA

Nov 2025 – Present

Acoustic Engineer (Contract, LTTS) — Reality Labs Audio Experience, Wearables Audio Tuning Team (WATT) — Ray-Ban smart-glasses tuning

- Drove speech-quality KPI assessment for shippable Ray-Ban tunings using HEAD acoustics ACQUA (POLQA, PESQ, 3QUEST)
- Refactored the 360° spatial-audio measurement CLI (turntable, stimulus, mic array): eliminated manual user inputs to remove operator error and added a full paper trail of test conditions
- Built a mic-health validation tool that pre-screens channels and catches frame drops and dead mics
- Architecting a full-stack device control center (React + FastAPI) with a visual workflow editor for codeless test automation
- Shipped a fleet portal and database covering 19 product families (QR scanning, analytics, Brother label printing)

Apple — Cupertino, CA

Feb 2025 – Nov 2025

Electronic Noise / Mic Co-Existence Engineer (Contract, CPrime)

- Owned eNoise spec compliance for next-generation Apple devices (iPhone 17 Pro, M5 MacBook Pro line) — held the acceptance bar against the team's hard acoustic criteria, gating launch readiness
- Drove cross-functional root-cause and remediation with mechanical, electrical, and product-development partners when units failed spec
- Architected automated acoustic test suites for spec compliance
- Built BASH / Python / MATLAB / JMP scripts for measurement processing

Northrop Grumman — Sunnyvale, CA

Mar 2024 – Feb 2025

Principal Acoustic Engineer

- Led acoustics / DSP efforts for Marine Systems
- Applied SEA models to reduce SSN(X) equipment noise
- Analyzed CVN-80 rotational vibration data; developed test viability strategy presented to leadership and Navy

Google — Mountain View, CA

Jan 2024 – Mar 2024

Audio Systems Acoustic Test Engineer (Contract, YOH)

- Executed anechoic playback-quality testing and UX listening studies for Pixel 9
- Accelerated lab throughput by reorganizing inventories
- Assisted display team with root-cause analysis of early-field failures

Apple — Cupertino, CA

Jan 2023 – Dec 2023

Electronic Noise Engineer (Contract, CPrime)

- Investigated eNoise across MacBook, iPad, and Mac Mini
- Executed Laser Doppler Vibrometry and acoustic-camera testing for failure analysis
- Led eNoise efforts on the 2023 M3 MacBook Pro architecture
- Pioneered autoencoder-based 1D measurement anomaly detection

Amazon Lab126 — Sunnyvale, CA

Oct 2020 – Dec 2022

Audio Software QA Engineer

- Evaluated wake-word, AEC, VoIP, and playback quality for Alexa devices
- Developed sequential Bayesian testing to reduce test time by 30–60%
- Automated SoundCheck suites via Python / MATLAB
- Developed vision-based convolutional neural network model for robust barge-in detection

Acoustic Engineer

- Verified subsystem noise requirements for the 777X
- Built MATLAB ray-tracing tools predicting ramp noise
- Modeled complex wave diffraction in VA-One for ramp-noise prediction
- Delivered field-data apps built in MATLAB to engineers

Vibro-Acoustic Consultants — San Francisco, CA

Apr 2016 – Jun 2017

Acoustic / Vibration Engineer

- Managed environmental noise and vibration compliance for academic, medical, and residential projects
- Deployed and maintained in-house remote monitoring stations for continuous data acquisition
- Monitored noise in animal research facilities to maintain welfare-driven thresholds
- Oversaw continuous noise monitoring during VA Hospital expansion, minimizing patient disturbance

// creative_coding_projects

Off-the-clock builds. More at sergiopena.audio.

GeoNoise SHIPPED

Open-source environmental noise modeling — geonoise.app

ISO 9613-2 and CNOSSOS-EU compliant propagation engine. Coherent two-ray phasor model on WebGPU / WGSL compute shaders, supporting real-time dynamic scenarios (moving sources and receivers) beyond what static batch-prediction tools deliver. TypeScript monorepo, shipped v0.11.x.

ImpedanceTuber PARKED · PENDING VALIDATION DATA

Modern web ISO 10534-2 impedance-tube measurement system

Modernization of a 2005 BERSALFA MATLAB GUI. FastAPI Python physics engine + Next.js frontend. 75 documented physics equations (ISO vs. MATLAB vs. Python audit), H1 / H2 / Hv estimators, viscothermal corrections, switching-technique calibration, A-F quality grading.

vibration-pdm RESEARCH · PRE-TRAINING

Edge ML for noise / vibration predictive maintenance

Research project exploring how raw acoustic and vibration sensor streams can drive fault detection and condition monitoring directly on industrial equipment in the field, without cloud round-trips. Currently in pre-training and architecture research.

acoustics-rag WORKING · PERSONAL USE

On-demand reference over an acoustics / engineering textbook corpus

Personal retrieval-augmented reference tool for noise / vibration consulting. Local-LLM backend over a curated engineering-textbook corpus, queryable through a Telegram interface. Get standards-grounded reference answers from the field. Daily-driver.

SonoTag DEMO

Reimplementation of FLAM (Wu et al., ICML 2025)

Frame-wise language-audio foundation-model audio tagging. React + Vite frontend over a FastAPI inference service. Live microphone capture, spectrogram inspection, and frequency-range analysis. Demo-only.

// education

M.Sc. COMSOL Multiphysics — Structural Mechanics & Acoustics 99/100

Universidad de Málaga · 2024–2025

60 ECTS — Multiphysics FEA, structural mechanics, acoustics, CFD, MEMS, optimization, MATLAB LiveLink. Thesis: transient thermoviscous acoustics and FFT-based impedance extraction in actively occluded micro-perforated panels (advisors: R. Pico, UPV; B. Ivorra, UCM).

Graduate Studies, Aerospace Science & Technology

Universitat Politècnica de Catalunya · 2017–2018

60 ECTS coursework complete (supersonic shocks, flight dynamics, astrodynamics, space systems, ECLSS); thesis deferred for Boeing 777X position.

B.Eng. Acoustics & Audio Engineering

Universidad Tecnológica de Chile · 2010–2014

Acoustics: architectural design, environmental noise, vibration control, isolation, underwater, ultrasound. Audio: electroacoustics, DSP, loudspeaker design (Thiele-Small), live sound, recording, C++.

// continuing_education

MITx (Deep Learning · Material Mechanics · Probability) · IBM (Python · PyTorch) · LMU Munich (FEM in Python) · AltaSim (Acoustic COMSOL) · MathWorks (ML · DSP · Statistics) · Audinate (Dante Networking) · Listen, Inc. (SoundCheck — Beginner & Advanced, 2026)

// languages

Native English · Native Spanish · Novice Russian