

Luca Serioli

Biomedical Engineer | Medical Devices R&D • Biomedical Data Analysis •
Medical Imaging & Digital Workflows

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 github.com/LucaXTech



Biomedical Engineer (MSc, 110/110 cum laude) with multidisciplinary experience across neurotechnology, biomedical data analysis, machine learning, medical imaging, and digital CAD/CAM workflows. At g.tec medical engineering, developed and validated EEG analysis and classification pipelines for mental workload assessment, contributing as co-first author to a scientific manuscript currently under review at *Frontiers in Neuroergonomics*. Additional research experience includes deep-learning-based vertebral landmark detection for spinal imaging and quantitative CBCT-based 3D registration workflows. Former certified dental technician with over three years of full-time experience in digital prosthetic design, 3Shape/Exocad, manufacturing constraints, and quality control. Interested in MedTech opportunities spanning R&D, biomedical data and imaging, product/application support, validation, and technical project roles.

Professional Experience

Neurotechnology Research Intern | EEG & Machine Learning, *g.tec medical engineering GmbH*

09/2025 – 01/2026 | Schiedlberg, Austria

- Developed and validated EEG analysis pipelines for mental workload assessment in N-back experiments using a compact 8-channel acquisition setup.
- Implemented signal preprocessing, spectral and ERP analysis, feature extraction, statistical evaluation, and data-quality control using Python, MATLAB, and MNE-Python.
- Built leakage-aware machine-learning pipelines and evaluated robustness across separate recording sessions and participants using within-subject TRAIN→TEST and leave-one-subject-out validation.
- Investigated workload-related EEG markers across memory-load and presentation-speed manipulations, including observation-time requirements, temporal non-stationarity, and cross-paradigm generalization.
- Achieved up to **~0.88 balanced accuracy** for the fast-vs-slow pace-driven binary contrast using short observation windows of approximately 20–30 s.
- Contributed as **co-first author** to the manuscript “*EEG markers of mental workload in N-back tasks: temporal dynamics, classification, and generalization*”, currently under review at *Frontiers in Neuroergonomics*.

Freelance Digital Dental CAD Designer, *Self-employed*

03/2024 – 08/2025 | Remote

- Designed custom dental restorations using Exocad, delivering production-ready CAD files to dental laboratories.
- Translated anatomical, functional, and manufacturing requirements into technically feasible digital designs for milling and 3D-printing workflows.
- Iterated designs based on laboratory feedback, manufacturability constraints, and case-specific technical requirements.
- Managed file versions, revisions, priorities, and delivery timelines across multiple remote cases.
- Worked independently while coordinating technical requirements with dental technicians and maintaining consistency and quality of final deliverables.

Short-Term Academic Trainee | Biomedical Sensors & Medical Imaging, *University of Aveiro - Department of Physics*

01/2024 | Aveiro, Portugal

- Participated in an intensive Erasmus+ Biomedical Engineering program focused on biomedical instrumentation, sensors, and medical imaging.
- Performed hands-on laboratory activities involving resistive and optical sensors, Arduino-based acquisition systems, and physiological measurements.
- Designed and prototyped a digital stethoscope using an optical sensing approach and Arduino-based signal acquisition.
- Participated in PET time-of-flight characterization, dosimetry, and medical-imaging laboratory activities.
- Analyzed experimental measurements and presented technical results as part of the final project activities.

Bachelor's Thesis Research Trainee | Digital Dentistry & Medical Imaging,

Department of Innovative Technologies in Medicine & Dentistry, Università “G. d’Annunzio”

01/2023 – 07/2023 | Chieti, Italy

- Processed CBCT/DICOM datasets for anatomical segmentation and 3D model generation using 3D Slicer.
- Generated STL models from radiological data and aligned them with intraoral scans using landmark-based registration workflows.
- Performed quantitative metrology and alignment assessment using Geomagic Control X, including 2D section analysis and point-to-surface distance measurements.
- Compared alternative registration approaches through statistical analysis to support the experimental work of the Bachelor's thesis.
- Worked with patient-specific digital datasets across medical imaging, 3D reconstruction, and digital dentistry workflows.

Certified Dental Technician | Digital CAD/CAM, *Laboratorio Turillazzi*

2018 – 2021 | Brescia, Italy

- Worked full-time in a high-precision digital dental laboratory, combining CAD/CAM design, manufacturing requirements, and quality control.
- Designed and produced custom dental restorations on natural teeth and implants using 3Shape and Exocad.
- Managed end-to-end case workflows from technical requirements and digital design through revision, production, quality checks, and final delivery.
- Applied manufacturability criteria, dimensional accuracy, fit, tolerances, and process consistency throughout the production workflow.
- Developed practical expertise in zirconia-based manufacturing and complex prosthetic restorations.

Selected Projects

Deep Learning for Vertebral Landmark Detection in Spinal Imaging,

Research Project — Università “G. d’Annunzio” in collaboration with Cyber Surgery (Spain)

01/2025 – 09/2025

- Developed and validated a deep-learning pipeline for automatic thoracic vertebral landmark localization on digitally reconstructed radiographs (DRRs) generated from CT volumes.
- Compared YOLO-Pose and HRNet-W18 architectures within a leakage-controlled, patient-level evaluation framework and developed a global-to-local detection/refinement workflow.
- Improved mean localization error from approximately **13.2 px (YOLO-Pose)** to **4.6 px (HRNet-W18)**, with a median error of approximately **1.9 px** and **PCK@5 $\approx$ 0.87**.
- Applied Python, PyTorch, OpenCV, YOLO-Pose, and HRNet to dataset preparation, model training, validation, and quantitative performance analysis.

Computational Modelling of a Self-Expanding Shape-Memory Alloy Stent,

Academic Project – Computational Biomechanical Modelling Università degli Studi “G. d’Annunzio” – 2025

- Modelled the thermo-mechanical behaviour of a self-expanding Nitinol (NiTi) vascular stent using COMSOL Multiphysics.
- Simulated stent crimping and thermally driven deployment, incorporating the reversible martensite–austenite phase transformation characteristic of shape-memory alloys.
- Evaluated stress distribution, radial pressure after deployment, and the influence of initial geometry and final temperature on device behaviour.
- Applied finite-element and multiphysics modelling principles to investigate design-dependent mechanical performance of an implantable medical device.

MAGI — Multi-LLM Evaluation & Reliability Framework, Independent Engineering Project - 2026

- Built a modular Python framework orchestrating OpenAI, Anthropic, Gemini, and Groq models through specialized analysis, critique, auditing, and synthesis roles.
- Developed a reproducible evaluation pipeline with protocol-locked datasets, deterministic answer permutation, objective scoring, provider rotation, and selective recovery from API failures.
- Implemented reliability reporting separating reasoning errors from technical failures and tracking accuracy, coverage, cost, and latency across providers.
- Conducted multi-provider baseline experiments, identified benchmark ceiling effects, and applied protocol-preserving stop criteria to avoid overstating performance improvements.

GitHub: github.com/LucaXTech/magi-multimodel

Education

MSc in Biomedical Engineering — Materials and Technologies for Biomedicine, Università degli Studi “G. d’Annunzio”

2023 – 2026 | Chieti-Pescara, Italy

Final grade: **110/110 cum laude**

Experimental thesis: *EEG-based Classification of Mental Workload in N-back Tasks* ([Link](#)) [GitHub repository](#)

Research focused on EEG signal processing, spectral and ERP analysis, machine-learning classification, and robustness/generalization across recording sessions and participants.

BSc in Biomedical Engineering, Università degli Studi “G. d’Annunzio”

2020 – 2023 | Chieti-Pescara, Italy

Experimental thesis: *Digital Innovations for Extended Reality: Congruence Analysis Between Intraoral Scans and 3D CBCT-Derived Models*

Focused on CBCT/DICOM processing, anatomical segmentation, 3D reconstruction, multimodal registration, and quantitative accuracy assessment.

Technical Skills

Programming & Data Analysis: Python (NumPy, pandas, SciPy, scikit-learn, Matplotlib), MATLAB, Jupyter Notebook, Google Colab, Git, Visual Studio Code

Biomedical Signal Processing & EEG: EEG preprocessing, spectral analysis, bandpower and workload indices, ERP analysis, feature extraction, data quality control, statistical analysis, within-subject and cross-subject validation

Machine Learning & AI: Supervised classification, feature engineering, model comparison, leakage-aware validation, robustness and generalization analysis, PyTorch, YOLO-Pose, HRNet, multi-LLM evaluation and reliability benchmarking

Medical Imaging & Computer Vision: DICOM, CBCT, DRR and STL workflows; anatomical segmentation, 3D reconstruction, multimodal registration, landmark detection, quantitative accuracy assessment; 3D Slicer, OpenCV, Geomagic Control X

CAD/CAM & Digital Manufacturing: Exocad, 3Shape, patient-specific dental design, CAD/CAM workflows, design for manufacturability, milling and 3D-printing constraints, quality control

Modelling, Simulation & Prototyping: COMSOL Multiphysics, finite-element and thermo-mechanical modelling, MATLAB/Simulink, PID and fuzzy-control simulation, Arduino-based prototyping and sensor acquisition

Publication

Serioli L.[†], Spaltro G.[†], Sieghartsleitner S., Grünwald J., Guger C., Merla A. "EEG markers of mental workload in N-back tasks: temporal dynamics, classification, and generalization."

Manuscript currently under review at **Frontiers in Neuroergonomics**, 2026.

[†] Shared first authorship.

Languages

Italian: Native

English: Professional working proficiency