

Marcelo Correia

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Summary

AI engineer with hands-on project experience in agentic LLM systems (LangChain, LangGraph, LangSmith) and 8 years of mechanical engineering in the automotive industry (Stellantis, Renault). Built a maintenance copilot with RAG, agents and an LLM-as-judge safety gate, evaluated on correctness, retrieval and safety.

Skills

Languages: Portuguese (Native), English (Fluent, C1), Spanish (Intermediate)

Programming: Python, SQL, Bash

ML/DL Frameworks: PyTorch, Hugging Face Transformers, Scikit-learn, Pandas, NumPy

LLM & Agentic Tools: LangChain, LangGraph, LangSmith, ChromaDB, Pinecone

Techniques: Retrieval-Augmented Generation (RAG), AI Agents & Tool Use, Embeddings, Reranking, Prompt Engineering, LLM Evaluation, Tracing & Observability, Cost & Safety Controls, Fine-tuning, Transfer Learning, Computer Vision

MLOps/Tools: FastAPI, Streamlit, Gradio, REST APIs, pytest, GitHub Actions CI, ruff, SQLite, Git

Mechanical & Manufacturing Engineering: Industrialisation, Equipment Commissioning & Line Acceptance, Technical Specifications (CDC) & EN Standards, LEAN & MTM, Cycle-Time Analysis, CNC Programming, Excel Engineering Models, 3D Metrology, SolidWorks, AutoCAD, Project & Supplier Management

AI & Machine Learning Projects

The Factory Floor: Industrial Maintenance Copilot, GitHub 2026

- AI maintenance assistant for factory technicians: ask about an electric motor or variable-frequency drive, optionally attaching a photo of the defect, and get a diagnostic answer grounded in official Siemens documentation, with safety precautions first and the machine's repair history taken into account
- LangGraph agent routes each question to the right tool: semantic retrieval with reranking over 11 official manuals (3,679 pages, 12,301 chunks), a 368-entry fault-code index, each machine's maintenance history (simulated fleet of 20 assets, 77 events), and a computer-vision defect classifier (frozen ResNet18 features + logistic regression) feeding the agent's reasoning
- Evaluated on 37 scenarios against a single-call baseline: **75.7% root-cause accuracy; 86.5% retrieval hit-rate@5** with reranking (MRR 0.61 to 0.70); exact fault-code lookup returned the defining manual page for **100%** of fault-code queries vs. 18% for semantic search
- **LLM-as-judge safety gate** with a deterministic cross-check: safety-ordering failures fell from **91%** (baseline) to 33% with the agent and **6%** after the gate
- Built with production concerns in mind: decoupled service layer serving a FastAPI API and a Streamlit UI, SQLite audit trail with operator PIN authentication, per-request cost metering and daily spending caps
- **LangSmith tracing and observability** across 1,620 runs (0% exceptions, P50 latency 1.71 s); **183 automated tests** under GitHub Actions CI

Automated Customer Reviews: NLP Pipeline (Team project), GitHub 2026

- Pipeline turning 129,000 Amazon reviews into product insights: sentiment classification with fine-tuned DistilBERT and RoBERTa, product clustering with sentence embeddings + KMeans, and BART-generated comparative summaries, shipped as a Gradio app with separate consumer and seller views
- **82.97% Macro F1** vs. 49% for a zero-shot baseline (which scored 0% recall on the neutral class); diagnosed and fixed a silent embedding-truncation bug via chunked mean pooling

Fine-Grained Image Classification: Oxford-IIIT Pets (Team project), GitHub 2026

- As technical lead: fine-grained classification of 37 visually similar pet breeds: benchmarked a from-scratch CNN against transfer learning with ResNet18, ConvNeXt-Tiny and ViT-B/16; debugged shared-transform leakage between train and validation sets
- **94% test accuracy** with the best model (ConvNeXt-Tiny)

Experience

Project / Lead Equipment Engineer, Stellantis, Mangualde, PT June 2023 – Present
Via Expleo Group (2024 – Present); via ISQ & CTAG (2023 – 2024)

- Lead the industrialisation of production equipment for new vehicle programmes: technical specifications (CDC) to EN standards, supplier evaluation and follow-up, and delivery from concept to line acceptance
- Procure production equipment and coordinate suppliers and plant stakeholders (maintenance, production and quality) through installation and commissioning; analyse line performance and cycle-time data to justify investments
- Built an Excel tracking tool covering every purchase order placed, used to follow up and update the status of each order

Process Engineer, Turning & Grinding, Renault Cacia, Aveiro, PT May 2018 – Aug 2020
Renault (2018 – 2020); via SEGULA Technologies (2022 – 2023) Sept 2022 – June 2023

- Built a dynamic Excel model that calculates cutting parameters for the grinding and turning centres, turning the machining calculation rules into a reusable algorithmic tool
- Owned two production lines for the JT4 and DB35 programmes and, later, grinding and turning equipment for gearbox differentials; used 3D metrology data to control part quality and drive process changes
- Wrote specifications (CDC) to make machines flexible across lines and ran technical reviews with CNC machining-centre suppliers

Earlier Engineering Roles Jan 2021 – Sept 2022

- **Project Engineer**, Finsa, Nelas (Dec 2021 – Sept 2022): bought and industrialised machines and full production lines; assessed investment proposals
- **Process Engineer**, Aquinos Group, Oliveirinha (Oct – Dec 2021): used LEAN and MTM time-study data to rebalance production lines and cycle times
- **Serial Manufacturing Engineer**, Eberspächer Group, Tondela (Jan – Oct 2021): owned two Renault production lines, tracking KPIs and implementing engineering changes end to end, including 3D design of modified machine components

Education

Ironhack, AI Engineering Bootcamp, 24 weeks (312 hours) Mar 2026 – Sept 2026

- Part-time programme taught in English, progressing from Python and classical machine learning to deep learning, transformers and LLM applications. Delivered five hands-on projects across ML, computer vision, NLP and agentic RAG systems, four of them in teams

Instituto Superior de Engenharia de Coimbra, Postgraduate Diploma in 2019 – 2020
Computer-Aided Industrial Manufacturing

- In partnership with Win Solutions & HAAS Automation

Instituto Superior de Engenharia de Coimbra, BSc in Mechanical Engineering 2012 – 2017