

Yahia Ghallale

Applied AI / Software Engineer focused on edge inference, computer vision, and real-time perception systems

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Education

University of Brescia, BSc in Computer Engineering Sep 2023 – Oct 2026

- **Relevant Coursework:** Machine Learning, Deep Learning, Statistics, Electronics, Software Engineering, Data Structures and Algorithms

Erasmus+ BIP – Universidade da Beira Interior, Portugal Jul 2025

- Intensive program "*From Smart Sensors to Industrial Applications*" with 5 partner European universities. Hands-on labs on sensor networks, Industrial IoT, FPGA, PLC, industrial standards, and real-time monitoring in a multinational team.

Experience

Computer Vision Engineering Intern, Prospecto – Brescia, Italy Jan 2026 – Apr 2026

- Deployed a real-time crop-classification perception node on **NVIDIA Jetson Nano** (containerized **ROS 2**) using **MobileNetV3-Small**, reaching **95.9% macro-F1 at 19.4 ms/frame (~51 FPS)** via **ONNX Runtime** — enabling fully on-device in-row inference with no cloud or connectivity dependency.
- Built an internal batch-processing tool pairing **RF-DETR** detection with **BoT-SORT** tracking (**ONNX Runtime**) to auto-annotate field-recorded footage, exporting labeled video and CSV reports — removing manual frame-by-frame review of post-acquisition data.
- Fine-tuned **RF-DETR** for agricultural trunk detection on a hand-built custom dataset (**0.49 mAP@0.50:0.95, 0.52 AR@100**), establishing the object-detection baseline for the field-analysis pipeline.

Electronics Division Member, GIVI UniBS Motorsport – Brescia, Italy Mar 2024 – Mar 2025

- Developed **ESP32** firmware for real-time acquisition and **WiFi** transmission of multi-sensor telemetry (MLX90614 IR + accelerometer), streaming live track data to the team during test sessions.
- Built a **Node.js** backend for telemetry ingestion, storage, and REST API exposure, making recorded runs queryable for post-session analysis.
- Prototyped equivalent acquisition systems on **STM32** to benchmark sampling stability and power efficiency.

Projects

- **UAV Flight Anomaly Detection – Unsupervised ML on PX4 Telemetry**
 - Designed **55 per-timestep features** (motor outputs, EKF innovations, attitude, GPS health) from real PX4 flight logs and benchmarked **5 unsupervised models** (Isolation Forest, PCA-AE, LSTM-AE, OCSVM, Ensemble) on a held-out set.
 - Full pipeline with **OCSVM RBF (0.940 AUC)** as the selected model and an interactive Streamlit dashboard combining ML scoring, rule-based detectors, and per-feature contribution analysis.
- **Sentinel – Geopolitical RAG Platform**
End-to-end **Retrieval-Augmented Generation (RAG)** pipeline for geopolitical analysis: async article ingestion, semantic chunking, vector indexing in **ChromaDB**. Backend in **FastAPI** with **Redis** caching, **PostgreSQL** persistence, **Docker** deployment — delivering grounded, source-cited answers over a continuously updated news corpus.
- **AI Medical Triage Assistant**
Trained a custom **PyTorch CNN** for pneumonia detection on chest X-rays, achieving **0.941 ROC-AUC** and **94.62% recall**. Served via a **FastAPI** backend that ranks cases by predicted severity, surfacing high-risk scans first in the triage queue.

Technologies

Languages: Python, C++, C, JavaScript, TypeScript, SQL

AI / ML: PyTorch, ONNX Runtime, OpenCV, Scikit-learn, ChromaDB, SentenceTransformers

Domains: Computer Vision, Object Detection, Object Tracking, Image Classification, Real-time / Edge Inference, Model Optimization, Anomaly Detection, RAG

Robotics & Edge: ROS 2, NVIDIA Jetson, ESP32, STM32

Backend & Infrastructure: FastAPI, Next.js, Node.js, PostgreSQL, Redis, Docker, Supabase

Tools: Git, Linux