Gustavo Alvarado

R&D Engineer — Unmanned Aerial Systems, Embedded Systems & Computer Vision

Guayaquil, Ecuador | igoutta@protonmail.com | github.com/igoutta | linkedin.com/in/igoutta

SUMMARY

Mechatronics engineer (ESPOL) with 4 years in UAS R&D (2.5 as an engineer), building production systems for unmanned aerial vehicles: real-time computer-vision pipelines, low-latency Qt desktop applications, and embedded Linux telemetry services. Comfortable owning a system end to end — architecture, implementation, and deployment onto constrained hardware. Hands-on UAS field experience and a remote-pilot certificate endorsed by DGAC.

EXPERIENCE

Robiotec Ecuador S.A.

Oct 2022 — Present

Guayaquil, Ecuador

R&D Engineer — Drone Specialist & Software Engineer/Architect

Apr 2024 — Present

- Sole architect and developer of the operator application for a high-end, military-use surveillance camera (**Python**, **PyQt6**): full camera control through the vendor SDK driven by professional joysticks, live video client, configuration and deployment. Rebuilt the video front end on FFmpeg (**PyAV**), then reworked the backend, bringing video latency down from about **2.5 s** to about **0.5 s** on a **1080p** feed served remotely over a **satellite link**, now measured automatically from in-stream SEI timestamps.
- Took a **YOLOv8** mineral-detection system from prototype to production on **NVIDIA Jetson**: optimised and migrated the codebase to a **uv**-managed project, wrote the actuator-triggering script, and co-developed the **TensorRT** inference integration with a teammate, so detection lands inside the actuators' timing window.
- Redesigned and rewrote the onboard telemetry service running on **Raspberry Pi** under embedded GNU/Linux (**Python**, **SurrealDB**), prioritising critical parameters over a direct link to the flight controller, with a scalable local store.
- Designed the end-to-end architecture of a satellite-linked UAS control system integrating a high-end surveillance payload.
- Wrote flight-log analysis scripts (**Polars**, **Plotly**, **marimo**) that measure energy consumption per flight phase over **500k+** telemetry records, replacing a pandas/Matplotlib/Jupyter workflow.
- Adapted **ArduPilot** control loops to a new 3D-printed flight controller and a new sensor set for a fixed-wing glider, and scripted hexacopter flight logic in **Lua**.
- Rebranded an open-source UAS control suite for corporate deployment (**C++**/**Qt**, **Docker**, **Bash**) under full licence compliance, and reworked ArduPilot's Dockerfiles to build UAV Log Viewer and QGroundControl on Linux.
- Fixed and used the install script that provisions ROS, CUDA and OpenCV on a Jetson.
- Pilot in command for fixed-wing VTOL operations: in 2026, **20+** flights at sites above **3,200 m** above sea level and about **80 h** in the air, most as pilot in command and many as flight supervisor; mainly test flights, about 10% demonstrations. Route planning, calibration and mission configuration.
- Maintained the 3D-printing equipment and designed mounts and work accessories in Autodesk Fusion.

R&D Lab Assistant

Apr 2023 — Mar 2024

- Wrote the **Python** integration layer between the **MAVLink** protocol and a partner company's power-supply system.
- Built the backend of a power-monitoring system for industrial mills over **Modbus TCP** (**Node-RED**/JavaScript on Linux).
- Enabled a **93 km** unsupervised point-to-point fixed-wing VTOL mission — GNSS/GPS integration, radio-link revision and geolocation-software updates, validated in flight, payload and comms testing.
- Ran CFD simulations (Autodesk Inventor) on a tandem-wing drone airframe.
- Installed and supported Linux environments for computer-vision projects.
- Wrote the **ESP32** firmware (C++) for an aquatic drone prototype: reads **SBUS** from the RC receiver and drives the motor ESCs in real time with constant-speed control.

R&D Lab Intern

Oct 2022 — Mar 2023

- Built the backend of a satellite geolocation service consuming **Iridium SBD** messages through a webhook, persisted in **SQLite** (**Node-RED**/JavaScript).
- Shipped a **Qt5**/**Python** colour-picker front end feeding image-region selections into a computer-vision colour-recognition service.
- Configured ArduPilot flight control for electric VTOL fixed-wing and high-payload aquatic platforms.

SELECTED PROJECTS

Camera control & video client for a military-use surveillance camera

Python · PyQt6 · PyAV (FFmpeg) · vendor SDK · joystick HID · satellite video link

Complete, installable operator application for a high-end military-use surveillance camera, built solo: camera control via the vendor SDK over professional joysticks, live video client, configuration and deployment. Video latency cut from about 2.5 s to about 0.5 s on a 1080p feed delivered over a satellite link, measured automatically from in-stream SEI timestamps.

Edge AI inference service

Python · YOLOv8 · TensorRT · NVIDIA Jetson · uv

Production inference path for real-time mineral detection on NVIDIA Jetson: codebase optimisation, migration to a uv-managed project and the actuator-triggering script, with the TensorRT integration co-developed with a teammate; detection lands within the actuators' timing window.

RC controller for a boat prototype

C++ · ESP32 · SBUS · ESC motor control

Firmware that reads SBUS from an RC receiver and drives the boat's motor ESCs in real time with constant-speed control. github.com/igoutta/rc-boat-controller-esp32

Satellite geolocation backend

Node-RED · JavaScript · SQLite · Iridium SBD · Git

Position-tracking service for long-range drones built on satellite Short Burst Data with spatial querying and local persistence.

TECHNICAL SKILLS

Languages: Python, C/C++ (embedded & Qt), JavaScript, Lua, SQL, Bash
Computer Vision & Video: PyAV / FFmpeg, OpenCV, Ultralytics YOLOv8 (deployment), TensorRT, Pylon (Basler)
Data: Polars, pandas, NumPy, Plotly, Matplotlib/Seaborn, marimo, Jupyter
Applications & UI: PyQt6 / PyQt5, Qt (C++)
Embedded & Systems: GNU/Linux (Arch — primary, Ubuntu, NixOS), NVIDIA Jetson AGX Orin, Raspberry Pi, Orange Pi, ESP32 / ESP-IDF, Arduino, MAVLink, Modbus TCP, Node-RED
Data stores: SQLite, SurrealDB
Tooling & Infrastructure: Git, uv, pytest, mypy, ruff, ty, Docker, Podman, Proxmox, AI coding assistants (Claude, DeepSeek)
UAS: ArduPilot, mission planning, VTOL fixed-wing & multirotor operations
CAD & Simulation: Autodesk Fusion, Inventor, Inventor CFD, AutoCAD, MATLAB, Proteus, MPLAB X

EDUCATION & CERTIFICATIONS

B.Eng. in Mechatronics Engineering — 2023

ESPOL — Escuela Superior Politécnica del Litoral — Guayaquil, Ecuador

- Teaching assistant — Introduction to Data Science; Programming Fundamentals.
- Participant, Pyweeknd hackathon.

Remote Pilot Certificate — Multirotor, VLOS — 2025

Aeronaut Systems, endorsed by DGAC Ecuador — Guayaquil, Ecuador

LANGUAGES

Spanish: Native
English: B2 — professional proficiency; regular technical email and chat with a Chinese vendor's representative

REFERENCES

Available on request.