ENRIQUE GARCIA
Mechanical Engineering

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STATUS: B.S. Mechanical Engineering, Washington University in St. Louis (2027)   CITIZENSHIP: U.S.

ENGINEERING EXPERIENCE

WashU Vertical Takeoff and Landing (VTOL)

Lead Avionics Engineer • Vertical Flight Society DBVF   Sep 2025 -- Present

- Led development of avionics/control architecture for WashU's first autonomous VTOL prototype.
- Integrated Pixhawk 6C, IMU, GPS, telemetry, and custom power distribution; produced wiring diagrams.
- Supported HIL simulations and flight tests, logging data, debugging failures, and improving stability.
- Worked with mech. team on instrumentation layout, grounding, and EMI mitigation during testing.

STACK: PX4 • Python • HIL • Power Systems

Multiplatform Interactive Robotics (MIRO)

Research Intern   May 2025 -- Aug 2025

- Designed an EMG acquisition circuit and Teensy 4.0 sensor-fusion platform logging data at 1 kHz.
- Implemented ArUco-based visual tracking and an EKF in MATLAB to fuse IMU data for 3D motion.
- Performed sensor calibration, including magnetometer alignment and hard/soft iron compensation.
- Contributed to a study on multimodal signal integration presented at IEEE Body Sensor Networks (2025).

STACK: Teensy • Arduino (C++) • MATLAB • Python

WashU Design Build Fly (DBF)

Aerodynamics & Payload Engineer   Sep 2024 -- Present

- Designed and analyzed NACA-series wings with XFLR5/ANSYS CFX to meet mission constraints.
- Performed 2.5g load analyses and structural optimization using SolidWorks and hand calculations.
- Supported fixed-wing flight testing to compare measured performance against aerodynamic predictions.
- Prepared internal guides for new team members on aero modeling and MATLAB post-flight processing.

STACK: ANSYS • XFLR5 • MATLAB • SolidWorks

TECHNICAL SKILLS

LANGUAGES
Python, C++, MATLAB, C, JS, LaTeX

HARDWARE
Pixhawk 6C, Teensy 4.x, IMUs, GPS, Raspberry Pi

SOFTWARE & TOOLS
SolidWorks, ANSYS, Simulink, PX4, Git

METHODS
FEA, CFD, PID Control, EKF, Flight Data Analysis

SELECTED PROJECTS

Sentinel — Target Tracking   PROJECT

INDIVIDUAL PROJECT   Winter 2025

Developing a high-performance computer vision pipeline using C++ and OpenCV to detect fast-moving aerial targets against complex backgrounds. The system estimates 3D trajectories and computes optimal intercept vectors via proportional navigation for future integration with autonomous UAV flight controllers.

C++ • OpenCV • Kalman Filtering

Hyperion — 6-DOF Sim Engine   PROJECT

INDIVIDUAL PROJECT   2025

Architected a custom C++20 physics engine for hardware-in-the-loop (HIL) flight software validation. Achieved a deterministic 10 kHz physics loop utilizing Runge-Kutta 4 integration, quaternion-based rigid-body dynamics, and multithreaded architecture to ensure low-latency UDP telemetry streaming.

C++20 • RK4 • UDP Telemetry • Physics Engine

Multi-Sensor Navigation   PROJECT

INDIVIDUAL PROJECT   2025

Engineered a standalone navigation unit on a Teensy microcontroller to enhance state estimation. Wrote a custom Extended Kalman Filter (EKF) from scratch to fuse noisy accelerometer, gyroscope, and GPS data, significantly reducing position drift and increasing attitude solution reliability during dynamic maneuvering.

C++ • Teensy • EKF

WebTunnel CFD Demo   PROJECT

INDIVIDUAL PROJECT   2025

Built a lightweight 2D fluid simulation engine running directly in the browser using vanilla JavaScript and WebGL shaders. This project visualizes real-time vorticity and pressure distribution over user-drawn airfoils, demonstrating the capability of web-based solvers to handle interactive computational fluid dynamics workloads.

JavaScript • WebGL • Physics Engine