

# Ignacio Quintana

Mechanical Engineer

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📍 Buenos Aires, Argentina

in Ignacio Quintana

## Education

*Instituto Tecnológico de Buenos Aires*

### Mechanical Engineering

Aug. 2019 - Mar. 2025

- Almirante Garzoni Award – Highest university wide GPA in the 2024 graduating class.
- Linear academic average: 9.34/10
- Professional engineer degree - Specialized in Mechatronics
- Received COPIME Award 2025 - Granted by the Professional Council of Mechanical & Electrical Engineering to the top graduates of the country.

*Politecnico di Milano*

### Exchange Semester – Graduate courses

Sep. 2022 – Jan. 2023

- Coursework: Control and Actuating Devices for Mechanical Systems, Finite Element Simulation for Mechanical Design, Energy Systems LM, Applied Metallurgy

## Projects

*ITBA Rocketry Team*

### Aerodynamics Team

- Led the design and development of an airbrake system to actively control rocket apogee, achieving a 10% improvement in altitude precision through flight dynamics simulations using Python and the RocketPy library.
- Researched and evaluated multiple deployable braking mechanisms, performing trade-off analyses based on aerodynamic efficiency, mechanical complexity, structural integration, and mass constraints.
- Designed the final system in CATIA, creating detailed CAD models and assemblies; simulated CAM toolpaths and coordinated manufacturing using CNC milling and lathe machines available in the university workshop.
- Developed the control system for the airbrake using a microcontroller, integrating data from an IMU and a barometer through sensor fusion to accurately estimate altitude and trigger deployment at the optimal moment.
- Collaborated with structural, and avionics teams to ensure subsystem integration, compliance with volume constraints, and functional reliability.
- Paper accepted to the *8th Argentine Congress on Aeronautical Engineering (CAIA 8)*, detailing the design methodology, computational analysis, and flight results.

*Hydrogen Laboratory - Final Project*

### Development of a Fast-Response Thermocouple for Measuring Heat Flux in ICEs

- Designed and manufactured a fast-response coaxial type-J thermocouple for heat flux measurement in internal combustion engines, achieving sub-10  $\mu$ s response time.
- Implemented a finite volume simulation to process temperature measurements into heat flux estimations, enabling accurate characterization of transient thermal behavior.
- Developed and validated a dual-stage amplification system and PCB layout to condition sensor signals for high-speed data acquisition and accurate thermal analysis.
- Led calibration and testing using both static and dynamic methods, benchmarking against commercial sensors to verify accuracy, reliability, and low-cost performance.

*Discrete Control*

### Control of a double rotor helicopter model

- Designed and implemented discrete PID controllers using the Ziegler-Nichols method, validating control strategies through simulation (MATLAB/Simulink) and experimental testing on a double-rotor helicopter model.
- Developed a state-space dynamic model utilizing Lagrangian mechanics, addressing non-linearities including static friction and external torque disturbances.
- Constructed and validated a physical prototype via CAD modeling (Fusion360), 3D printing, and hardware integration of DC motors, encoders, and IMU sensors.

- Performed system characterization and parameter estimation, employing transfer function identification methods to achieve over 90% model accuracy across varying operational conditions.
- Paper accepted to the *Argentine Workshop on Information Processing and Control (RPIC)* student section, showcasing the physical model and its operation.

### Discrete Control

#### Stability and Control of a Magnetic Levitation Ball

- Formulated a discrete-time state-space model of the magnetic levitation system, analyzing the stability of its open-loop equilibrium.
- Designed and simulated linear controllers (pole placement, gain scheduling) and nonlinear controllers (feedback linearization) to stabilize the levitation point.
- Conducted comparative analysis of linear and nonlinear control strategies under varying operating conditions, highlighting trade-offs in performance and robustness.
- Implemented all simulations in MATLAB/Simulink, validating system response.
- *Gulf Coast Undergraduate Research Symposium (GCURS)*, Mechanical Engineering Division, Rice University, Oct. 2025.

## Experience

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### Volkswagen Argentina

#### Quality Engineer

Feb. 2025 – Aug. 2025

- Conduct root cause analyses of production issues, collaborating closely with laboratory teams to investigate material properties, manufacturing deviations, and failure mechanisms.
- Analyze KPIs and statistical process data to assess production stability, identify emerging trends, and implement data-driven corrective actions.
- Support continuous improvement initiatives through experimental validation of proposed changes, focusing on reducing defect rates and enhancing overall process capability.

### Vemo

#### R&D Intern - Electric Vehicle Modeling and Battery Degradation

Jan. 2024 – Jul. 2024

- Modeled and validated dynamic simulations of electric vehicles in Modelica, integrating physical parameters obtained through independent research and OEM data analysis.
- Conducted advanced statistical analysis of high-frequency telemetric data using Python to calibrate and validate vehicle consumption models, achieving simulation errors under 5% relative to experimental data.
- Developed lightweight estimators for EV consumption prediction, employing feature engineering techniques and numerical methods to reduce computational costs for low-frequency datasets.
- Engineered and validated battery degradation and energy consumption models with PyBaMM and custom Python scripts, contributing to fleet-wide health monitoring and long-term performance forecasting.
- Worked in Agile-based R&D workflows, collaborating with cross-disciplinary teams to iteratively refine modeling approaches and deliver predictive tools for fleet management decisions.

### Arthur D. Little

#### Business Analyst Intern

Mar. 2023 – Nov. 2023

- Conducted in-depth market and technology research across the energy, communications, and automotive sectors, identifying emerging trends through structured data analysis.
- Analyzed competitive landscapes and consumer behavior patterns to generate data-driven insights, supporting strategic recommendations for client decision-making.
- Developed and standardized automated documentation processes with Python scripts, increasing operational efficiency and ensuring consistency in research reporting across multiple client engagements.

## Skills

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Technical Skills | Control Systems, Microprocessors, Embedded systems, CAD, CAM, FEA.

Engineering Tools | MATLAB, Simulink, Python, C/C++, CATIA, Modelica, Abaqus, SQL, Microsoft Office Suite.

Languages | Spanish (Native), English (Fluent), French (Advanced), Italian (Intermediate)