João Pedro Dudziak Fonseca

jfonseca32@gatech.edu | www.linkedin.com/in/joao-pedro-dudziak-fonseca | https://jpdf.netlify.app/ | (470) 929-6290

EDUCATION

Georgia Institute of Technology, Atlanta, GA — Graduation: *May 2026*

- BS in Mechanical Engineering, Minor in Computer Science (Computing & Intelligence), GPA: 3.89/4.00

EXPERIENCE

Undergraduate Researcher at Bhamla Lab (DARPA Funded), Atlanta, GA — *May 2025 - Present*

- Conducting experimental and computational research on self-designed squid-inspired soft nozzle propulsion systems to improve underwater vehicle efficiency beyond conventional rigid propellers ($\eta > 80\%$).
- Implementing 3D Particle Tracking Velocimetry (PTV) using high-speed imaging and laser-based flow visualization to characterize internal and jet flow fields of elastic nozzles.
- Applying machine learning techniques to analyze high-dimensional motion data from live squid experiments and inform data-driven nozzle design optimization.
- Validating Fluid-Structure Interaction (FSI) simulation models by comparing experimental flow to numerical predictions, contributing to the development of a Physics-Informed Neural Network (PINN) optimization framework.

Inverse Kinematics Approximation with Machine Learning Project, Atlanta, GA — *May 2025 – Aug 2025*

- Developed a machine learning framework for robotic inverse kinematics, achieving sub-degree joint accuracy and sub-millisecond inference for real-time, high-DOF manipulators; awarded "Best Project" among 30+ teams. Link.
- Built supervised (MLP, SVR, Gradient Boosting) and unsupervised (K-Means, autoencoders, DBSCAN) models with PyTorch and Scikit-Learn for reachability classification and direct joint-space regression on 500,000+ PyBullet-simulated samples; demonstrated order-of-magnitude improvements in precision and speed over analytical IK solvers.

Equipment Engineering Intern at Coca-Cola (2 Rotations), Atlanta, GA — *May 2023 - Aug 2023, Jan 2024 - May 2024*

- Researched and integrated palm recognition payment in vending machines, estimated to cut customer journey time by 10%. Secured a partnership for the technology, kickstarting a company worldwide project, now in market trials.
- Modeled Coke's Engineering Development Center in SolidWorks to optimize showroom layout (~2,000 sqft).
- Designed and 3D printed custom bottles with standard threading to test carbonation in dispensed product, automating current methods by using a vibrating table. Cut test-time in half; improved measurement accuracy by 2 decimal places.
- Developed the Technical Authorization Requirements (TAR) for 20k deployed Coke&Go coolers.
- Modernized quality test procedure for Rechargeable Coolers, used for validation in all existing/future Coke freezers.
- Designed attachable apparatus for coolers to diffuse light to minimize color degradation of cans.
- Computed tipping angles with added forces through manual calculations for the new line of solar-powered vending machines, validating stability and adherence to safety standards.

Aerodynamics Engineer at GT FSAE HyTech Racing, Atlanta, GA — *Sep 2022 - Present*

- Used CATIA to design suspension wishbones for the car; validated aerodynamic behavior with Fluent.
- Adjusted the angle of attack of the front-wing endplates by 3 degrees based on Formula 1 research, improving downforce by 4 kg at 120 km/h at the cost of minimal drag increase.
- Redesigned sidepods in CATIA for a lower/slimer profile, reducing drag while maintaining efficient hot air dispersion.
- Developed and validated the chassis of the car for the first time with 3D FEA in Ansys and hand-calculations to ensure structural integrity and prevent frame failure encountered by 2022's car.
- Calculated deflection of battery fixture to prevent electrical shorting. Validated factor of safety of 1.5.

Production Engineering Intern at Sorvetes Rochinha Ice Cream CO, São Paulo, Brazil — *May 2022 - Aug 2022*

- Applied process mapping to the entire production line and identified packaging as a bottleneck.
- Reduced packaging prep time by 1 hour (per 8 hour shift) by designing a mount for an automatic labelling machine.
- Took the initiative to investigate scrap on their industrial-grade popsicle machine. Identified a wrapping material problem preventing proper heat sealing in +10% of produced units.
- Integrated ISO9000 standards into the production process to ensure adherence to quality benchmarks.

SKILLS & HONORS

Robot Backpack Project: follows user using YOLO-based person and obstacle detection on Raspberry Pi.
Skills: SolidWorks, CATIA, Ansys, COMSOL, Python, Java, JavaScript, MATLAB and C/C++, PyTorch, Scikit-Learn
Languages: Portuguese (fluent), English (fluent), Spanish (fluent), French (intermediate)
Prototyping Instructor (PI) at Georgia Tech Invention Studio - 2024 — Georgia Institute of Technology
UKMT Mathematics Challenge Gold Medalist - 2020 | 2021 — United Kingdom Mathematics Trust
Leadership and People Management Techniques Course - 2021 — University of Sao Paulo (USP)