LEONARDO AVONI

PHD CANDIDATE
FLIGHT MECHANICS & AERODYNAMICS

ABOUT

Mechanical Engineer (EPFL) and PhD Candidate (ISAE-Supaero/ENAC) specializing in aerodynamics and control. Skilled in CAD and programming (Python, Matlab), with hands-on engineering experience.

CONTACT

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Toulouse, France
Geneva, Switzerland

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LANGUAGES

- **Italian**, **French**: Mother tongue
- **English**: Fluent
- **German**: Basic

TECHNICAL SKILLS

CAD (Computer-Aided Design)
- CATIA V5, SketchUp
- Fusion 360, OnShape
- ReCap and Inventor

Hardware
- 3D Printing
- Bike maintenance
- House renovation
- Woodworking

CFD & Simulation
- ASWING
- Ansys Fluent

Programming
- Python, Matlab, Simulink
- GitHub, Overleaf, LaTeX, Markdown
- Fortran
- C, LabView

VOLUNTEERING

- Co-Leader of the International Group within the Toulouse Student Parish
- Homeless outreach with Ordre de Malte

EDUCATION

ISAE-Supaero & ENAC, France *2023 - Present*
PhD, Flight Mechanics & Aerodynamics
- Research on aeroelastic design and control of flexible wing aircraft in post-stall regime
- Developed WingLoop (Python/MATLAB–ASWING interface), presented at AIAA Aviation 2025
- Authored ASWING Extended User Manual, featured on MIT website
- PhD student representative within MEGeP (EDyF)

EPFL, Switzerland *2021 - 2023*
Master, Mechanical Engineering, GPA: 5.57/6.0
- Specialization: Fluid Mechanics
- Minor: Space Technologies

EPFL, Switzerland *2018 - 2021*
Bachelor, Mechanical Engineering
- Strong foundation mainly in mathematics, thermodynamics, mechanics, and fluid mechanics. Courses in electronics and programming were also taken

Ferney-Voltaire International School, France *2018 - 2015*
Scientific Baccalauréat; GPA: 19.27/20

EXPERIENCE

Laboratory of Intelligent Systems, EPFL, Switzerland *2023*
Engineer Intern
- CFD studies on propeller/wing interactions using Ansys Fluent with Sliding Mesh and Moving Reference Frame methods.

Fluid Mechanics Course, EPFL, Switzerland *Fall 2021 & Spring 2023*
Teaching Assistant
- Assisted students during exercise sessions.

Synova SA, Switzerland *Summer 2022*
Engineer Intern
- Investigated the impact of various assist gases on LMJ technology

Synova SA, Switzerland *Summer 2021*
Engineer Intern
- Designed novel calibration technique of Synova's 5-axis CNCs

Rocket Team EPFL, Switzerland *2019*
Member
- CAD design of camera support for the "IO" project, focused on low-cost rocket development.

MAIN PROJECTS

PhD: Flexible Aircraft Dynamics and Control (Ongoing) *2023 - Present*

PhD directed by Prof. Jean-Marc Moschetta, and Prof. Jean-Philippe Condomines. Current contributions revolve around extensions of ASWING: a fast, Fortran-written, flexible aircraft flight dynamics software from MIT

- Developed a Python interface for ASWING, enabling simulation automation.
- **WingLoop** development: a tool combining Python/Matlab-written control laws with ASWING for time-efficient closed-loop flight dynamics (AIAA Aviation 2025, DOI: 10.2514/6.2025-3425)
- Wrote the **ASWING Extended User Manual**, featured on the official MIT ASWING website
- Implemented code for Wingshape, OptiTrack, load cell and servomotor communication for wind tunnel testing use
- Working on ASWING stall implementation for aircraft deep stall analysis

Master Project: Automated Aerodynamic Characterization of Morphing VTOL *Spring 2023*

Project within the Laboratory of Intelligent Systems (LIS) of Prof. Floreano, supervised by LIS-spinoff Elythor. The project involved the developed of a Python software, called DroneDetective, for the automation of wind tunnel testing of morphing drones.

- DroneDetective coordinated data between a Robotic arm, a wind tunnel, the load cell, a MoCap system and the drone, through respective API's.
- A GUI was also built for easier operator monitoring
- Procedures for Center-of-mass coordinates extraction, aerodynamic characterization and vibration analysis were coded

Final Grade: 5.75/6.0

Supersonic Wind Tunnel (Design & Testing) *Spring 2022*

- Designed and tested a small-scale open wind tunnel for supersonic flow. An air compressor was used as high-pressure reservoir.
- Nozzle design was created according to compressible flow mechanics
- The nozzle was then SLA 3D printed, and tested. Flow observations were done with a Schlieren observation bench

Synova SA Internships *2021 - 2022*

- Improved 5-axis CNC calibration using state-of-the-art ISO-standard techniques. First, the weak points of the initial calibration techniques were identified, then an improvement plan was proposed, implemented and validated on the LCS-305 machine. The plan was designed according to he possibilities offered by Bosch CNC's
- Analyzed the influence of stabilization gases on water jet stability for Laser MicroJet® Technology. Theoretical and practical analysis were done on 3 and 5 axis machines.

The internship also included machining works for external aeronautical clients involving deep cutting.

Mon TPE/TM en 15'!, CERN, Switzerland *2018*

Project Speaker

- Presented the high school group project on modular structures

Other Projects

- Rocket Design (theoretical and practical).
- Spacecraft and space mission design.
- CAD design projects within EPFL, or for personal use
- Programming projects: Image Processing with Machine Learning, Turbulence Analysis.

OTHER SKILLS

- Road Cycling, Dancing, Running.
- Experience in Climbing, Judo, and Sailing.
- Classical Guitar (Intermediate).
- Electric Guitar (Basic).
- Music Theory (Basic)