# Leonardo Leggeri

your.email@example.com | +39 3473783448| github.com/leoleg2004

## Profile & Core Competencies

I have strong programming skills in **MATLAB, Java, C++, and C**. Extensive hands-on experience in the automation field, specifically in designing and implementing advanced control systems including **PID, LQR, and MPC** for various complex dynamic systems.

## Education

**Bachelor's Degree in Software Engineering** *2025/2026*

*University of Bergamo* **Grade:** 94/110

**Thesis:** *6-DOF Dynamic Modeling and Equations of Motion for an F-16 Aircraft with MIMO Analysis and Real-Time FCS, C++ Simulator*

**High School Diploma in Applied Sciences** *2022/2023*

*Liceo Scientifico delle Scienze Applicate "Maironi da Ponte", Ponte San Pietro* **Grade:** 75/100

## Academic Projects

**6-DOF F-16 Flight Simulator – Automation & Control** *2025/2026*

- Developed a non-linear 6-DOF dynamic model for an F-16 aircraft in MATLAB/Simulink.
- Implemented MIMO control analysis for longitudinal and lateral-directional stability.
- Synthesized an optimal state feedback controller (LQR) evaluating specific trim points.
- Studied and implemented advanced Model Predictive Control (MPC) architectures.

**6-DOF F-16 Flight Simulator – Real-Time & Middleware** *2025/2026*

- Analyzed Hard Real-Time computation paradigms in Linux (PREEMPT_RT patch).
- Implemented Rate Monotonic (RM) scheduling policies for avionics simulation tasks.
- Developed a distributed avionic ecosystem using eProsima Fast DDS middleware.
- Designed C++ applications for single-core and multi-core data telemetry exchange.
- **Repository:** Fly-By-Wire-project (C++ Real-Time codebase)

## Other Relevant Engineering Projects

**Control of a Spring-Mass System** *MATLAB*

- Implemented state-space controllers for a dynamic spring-mass system. **Repository:** Massa_Molla_Matlab

**MPC for an Inverted Pendulum** *MATLAB*

- Designed a predictive controller for stabilizing an inverted pendulum. **Repository:** Pendolo_MPC

**Twin-Tank Hydraulic System Control** *MATLAB/Simulink*

- Designed decoupled MIMO controllers and implemented LQR/MPC algorithms for a coupled twin-tank system. **Repository:** Pompa_controllo_matlab

**Three-Room Heat Control via MPC** *MATLAB*

- Developed a Model Predictive Control strategy for regulating temperatures across interacting thermal zones. **Repository:** Progetto_MPC_Calore_Tre_Camere

**Elevator Industrial Automation** *Automation*

- Designed control logic and automation strategies for an industrial elevator system. **Repository:** Ascensore_Automazione_Industriale

## Technical Skills

- **Programming & Scripting:** C/C++, Java (OOP), MATLAB/Simulink, R, Python, LaTeX, SQL, XML
- **Control Systems & Automation:** State-Space & MIMO Analysis, LQR, MPC, PID Tuning, Digital Control, Lyapunov Stability, State Observers, System Decoupling, Quadratic Programming
- **Electronics & Embedded Systems:** Analog/Digital Electronics, CMOS, A/D Converters, Hard Real-Time Systems, Fast DDS Middleware, OS Architecture
- **Software Engineering & IT:** Agile/SCRUM methodologies, UML, Git, Relational DBMS (Transactions, Query Optimization), TCP/IP Networking
- **Languages:** Italian (Native), English (Fluent / B2)

## Motivation

I am highly motivated to pursue the Master's degree in **Mechatronic for Spacecraft Technologies** at **Politecnico di Torino**. My background in automation engineering, particularly my thesis on the dynamic modeling and control of an F-16 aircraft, has provided me with a solid foundation in complex mechatronic systems, flight dynamics, and real-time simulation. I am eager to apply and expand these skills in the aerospace domain, contributing to the development of advanced spacecraft technologies.