# AVI GABRIELE

**MECHATRONICS AND ROBOTICS ENGINEER**

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**Portfolio** - avigabriele.github.io **GitHub** - avigabry02 **LinkedIn** - gabriele-avi


## ABOUT ME

Highly motivated Mechatronics Engineering graduate with a strong passion for robotics, control systems, and state estimation. A proactive self-starter with proven academic achievements, strong teamwork and communication skills, and hands-on experience gained through Formula Student projects. Currently seeking an internship in a stimulating international environment where I can contribute effectively while further developing my technical and soft skills.

## EDUCATION

**TECHNISCHE UNIVERSITÄT BERLIN** Berlin, Germany
Erasmus exchange student - Robotics *Oct. 2025 - in progress*

**POLITECNICO DI MILANO** Milan, Italy
Master of Science - Mechatronics and Robotics *Sept. 2024 - in progress*
GPA - 3.9/4.0

**UNIVERSITA' DI TRENTO** Trento, Italy
Bachelor's Degree - Mechanical Engineering *Sept. 2021 - Sept. 2024*
GPA - 3.5/4.0

## WORK EXPERIENCE

**Formula Student Team, Dynamis Milano** *May 2025 - in progress.*

- *Torque Vectoring Control* - Selected to improve state-estimation and dynamic models to enhance yaw-rate tracking and torque-vectoring performance in the Formula Student EV.

**Formula Student Team, Eagle Trento** *Oct. 2023 - July 2024*

- *Design and optimization of the ARB support* - Topology optimization achieved a 70% mass reduction (from 0.4 to 0.2 mass fraction), validated across six load cases with all stresses remaining below the 270 MPa proof strength.
- *Interface Design for EV Service Kart* - Designed a compact, modular interface for the EV battery kart, integrating an LCD for real-time status and enhanced serviceability (DFM/CAD).

## PROJECTS

**Robotics project - Active Acoustic Sensing for Contact-Rich Manipulation** *Oct. 2025 - in progress*

- Developing a custom three-fingered parallel gripper for active acoustic sensing, focused on classifying object state and external contacts.
- Designing bone conduction actuators in gripper fingers to measure acoustic resonance; deriving transfer functions to isolate object response, with early spectral analysis revealing distinct FRF peaks for property differentiation.

**Robotics project - RRR Manipulator (Puma) Kinematics and Control** *Oct. - Nov. 2025*

- Kinematic modeling and implementation of joint-space and operational-space control for a 3-DOF Puma robot. Achieved circular trajectory tracking with error < 0.01 m and torque constraint adherence, respected for all the joints.

**State Estimation project - Batch Estimation and Sensor Fusion** *Oct. - Nov. 2025*

- Implemented Sparse Batch Linear-Gaussian Estimation solving H x* = b' via Weighted Least Squares, fusing odometry and laser measurements.
- Achieved drastic H reduction (12709×12709 to 12×12) for computational tractability; sparse solutions at delta = 10 provided statistically consistent uncertainty bounds, unlike the over-optimistic delta = 1 case.

**Data Analisys Project - Modal Extraction** *Apr. - June 2025*

- Comprehensive modal analysis performed (FEM/Abaqus and experimental impact hammer test) on a perforated plate. Extracted 6 natural frequencies using SDOF/MDOF techniques and low damping ratios. Numerical/experimental validation with MAC = 99% confirmed accuracy.

## TECHNICAL SKILLS

**Program languages:** C++, python **Frameworks:** nTopology, Matlab, Simulink, PumaSim **Libraries:** Keras, Tensorflow
**Technical modelling:** Inventor, Fusion360, AutoCAD **Other:** Office suite, UltimakerCura, Arduino

## LANGUAGES

**English:** Fluent **Italian:** Native **German:** Beginner