Tommaso **Bocchietti**

Mechatronics and Robotics MSc student

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"Get things done!"

Enthusiastic mechanical engineer with a strong problem-solving mindset and excellent technical skills in software development.
My hands-on experience has enabled me to develop a diverse portfolio of projects, resulting in a distinctive ability to tackle complex challenges with a structured and analytical approach. I am currently seeking opportunities in the space industry to leverage my technical expertise, grow professionally in a dynamic environment, and contribute to cutting-edge projects.

Experience

Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)

Oberpfaffenhofen, Munich (DE)

Robotics Researcher — *01.04.2025 - 19.12.2025*

- Currently developing a regrasping framework for the DLR's Hybrid Compliant Gripper (HCG).

Polimi Sailing Team

Politecnico di Milano, Milan (IT)

Mechatronic Engineer — *19.10.2023 - 20.10.2024*

- Coded from scratch high performance NMEA0183 libraries.
- Worked with STM32 microcontrollers to create interfaces for the sensors and the control algorithms.
- Selected as the overall winners of the 2024 edition of the "SuMoth" competition among 11 participating teams.

Orienteering Como

Lombardy (IT)

Mapper — *02.02.2018 - PRESENT*

- Responsible for the society's cartography.
- Drawn several new Orienteering maps using the International Symbols Specification.
- Handled many homologation iter with the official Italian Federation for this sport.
- Developed a cloud-based architecture to facilitate the access and use of the map archive to all the members of the society.

Self-Employed

Online & Como (IT)

Private teacher — *02.2018 - PRESENT*

- One-on-one tutoring and support in scientific subjects for students who are facing challenges.
- Students range in age from 14 to 19.

Politecnico di Milano in partnership with RIMAC Automobili

Politecnico di Milano, Milan (IT) & RIMAC Automobili, Zagreb (HR)

Mechanical Engineer Intern — *09.03.2023 - 01.06.2023*

- Idealized and designed an innovative personal transportation vehicle to meet the vision of RIMAC Automobili.
- Collaborated in a team of 10 students coming from different European universities.
- Selected by company engineers as the best project among the 4 participating teams.

Confedilizia Como

Como (IT)

Software developer — *04.2020 - 02.2021*

- Responsible for the development of a custom software for the management of the real estate properties.
- Full stack development of the web platform for the secure distribution of the software to the clients.

Ennova Research

ComoNExT, Como (IT)

Web Programmer — *04.06.2018 - 13.06.2018*

- Period of internship for the "Alternanza Scuola Lavoro" national project.
- Developed a dynamically generated web page using Node.js and JavaScript.

Education

Politecnico di Milano

Milan (IT)

MSc in Mechanical Engineering (Mechatronics and Robotics) — *13.09.2023 - 10.12.2025 (expected graduation)*

- Current GPA: 29.32/30
- Joined the "Polimi Sailing Team" in the "Mechatronics" department (A.Y. 2023/24)

University of Waterloo

Waterloo (CA)

MSc in Mechanical Engineering (Erasmus+ exchange)

01.01.2024 - 26.04.2024

Relevant courses taken:

- Advanced Finite Element Analysis: coded a 2D FEM solver for non-linear and plastic materials in MATLAB (A.Y. 2023/24)
- Computational Fluid Dynamics: coded a 2D CFD solver for incompressible fluid and a 1D solver for compressible fluid (A.Y. 2023/24)
- Materials for Nano and MEMS: complete a research project about Chip-Scale Atomic Clocks (A.Y. 2023/24)

Politecnico di Milano

Milan (IT)

BSc in Mechanical Engineering

14.09.2020 - 21.07.2023

- Selected for participating in the "Pro Hackin' Project 2023" (A.Y. 2022/23)
- Selected for competing at SWERC 2021 (A.Y. 2020/21)
- Third place in an internal coding competition using MATLAB (A.Y. 2020/21)

Scientific High School "Paolo Giovio"

Como (IT)

High School Diploma, Scientific

14.09.2015 - 06.2020

- Italian Physics Olympiad: admitted to regional selection (02.2019)
- Italian Informatics Olympiad: admitted to regional selection (04.2019, 04.2018)
- Italian Mathematics Olympiad: admitted to local district selection (02.2017)

Skills

Engineering	★★★★☆	MATLAB, Simulink, ROS, Latex
3D CAD	★★★☆☆	CATIA V5, SolidWorks, Inventor
Programming	★★★★☆	C/C++, Python, PHP, MySQL, Java

Languages

Italian	Native
English	Proficient

Extracurricular Activity

Italian Orienteering Committee

Italy

IT Technician

11.2018 - PRESENT

- Organizational IT aid at major Italian Orienteering Events.
- 5 Days of Italy (07.2022)
- International MeetingOfVenice (11.2018 - PRESENT)

Orienteering Como

Lombardy (IT)

Events Organizer

01.2017 - PRESENT

- Educational and promotional outings in the role of instructor (mainly for schools or local association).
- Organizer playing key roles (controller or course-setter) in smaller events such as promotional or regional competitions.

Orienteering Como

Villa Guardia, Como (IT)

Council Members

09.2021 - PRESENT

- Member since 02.2016
- Council Member since 09.2021

Tennis Como

Como (IT)

Ball boy

2012 - 2014

- Assisted the organization of the annual ATP Challenger tournament held in Como.
- Played the role of ball boy for the years 2012, 2013, and 2014.

Honors & Awards

2024	**Merit Exemption,** Scholarship aimed at the group of top students based on GPA	*Milan (IT)*
2023	**Merit Exemption,** Scholarship aimed at the group of top students based on GPA	*Milan (IT)*
2022	**Merit Exemption,** Scholarship aimed at the group of top students based on GPA	*Milan (IT)*
2021	**Merit Exemption,** Scholarship aimed at the group of top students based on GPA	*Milan (IT)*
2021	**Best Freshman Award,** Scholarship aimed at the group of top freshmen students based on GPA	*Milan (IT)*

Presentation

Online Webinar by F.I.M.A.A COMO

Online

Presenter for <CONTRATTI A CANONE CONCORDATO>

16.02.2021

- Explained the importance of a computer based system to efficiently generate the new type of real estate contract.
- Demonstrated the app developed for Confedilizia Como as a potential solution for compliance with new laws.

Certifications

Arduino 90/100 Official Arduino certification, obtained on 17.04.2024
TOEFL 90/120 Test of English as a Foreign Language, obtained on 23.08.2023
TOEIC 975/990 Test of English for International Communication, obtained on 12.07.2023

Hobby & Personal interests

For the past 8 years, I've been practicing orienteering, a sport that demands map reading, physical effort, and fast decision-making. I've also done some bikepacking trips, covering routes like Como-London (1200km+), Como-Barcelona (1100km+) and Como-Roma (750km+).
These self-supported adventures showcase my tenacity, adaptability, and problem-solving skills in facing new situations and challenges.

Projects

Selection (not exhaustive) of some projects I've worked on that relate to my academic, professional, and personal interests.
I consider them as way to experiment, learn, and get a hands-on approach to engineering.

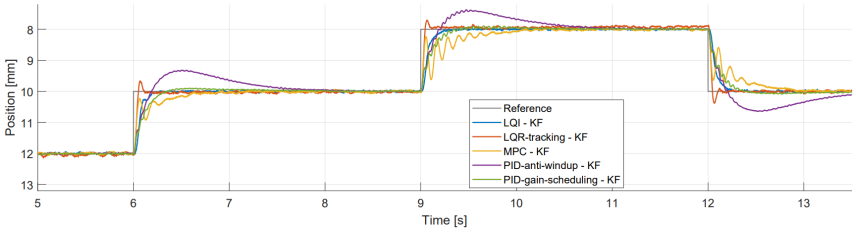
Academic Projects

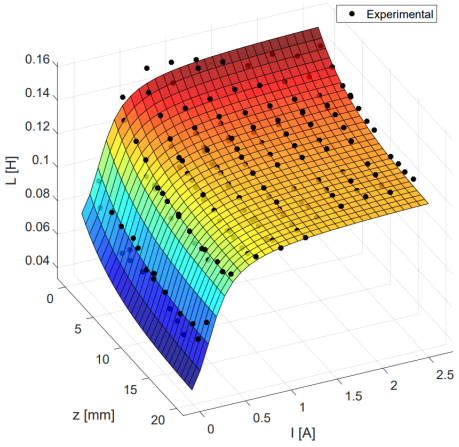
Politecnico di Milano, Milan (IT) & University of Waterloo, Waterloo (CA)

MOST OF THE PROJECTS WERE DONE INDIVIDUALLY, AT THE EXPLICIT REQUEST OF THE PROFESSOR. *14.09.2020 - PRESENT*

- **Implementation of path planning algorithms**: memory-efficient graph and sample-based search algorithms (A*, Dijkstra, RRT, RRT* and RRT-Kinodynamic) for path planning in robotics. Implementation in MATLAB, validation on both 2D and 3D environments via ROS ecosystem.
- **Study on Nonreciprocal Behavior in Time-Space Modulated Beams**: analysis of diode-like behavior in time-space modulated beams by means of piezoelectric shunts. Structure simulations in Comsol Multiphysics, experimental data analysis with MATLAB.
- **Topology Optimization of Hub Carrier**: mass minimization of a hub carrier structure, with constraints on the compliance and the manufacturability. Analysis with Altair HyperWorks suite.
- **Modeling and Control of a MagLev system**: analysis of the dynamics of a magnetic levitation system, parameter identification and control/filters design (PID, LQR and MPC, coupled with KF and EKF). Simulation in MATLAB/Simulink and hardware deployment on *RTDAC/PCI I/O* board from INTECO.
- **Topology Optimization of 2D structures**: implementation of optimization routines based on the CONLIN algorithm. Validation on both discrete and continuous problems.
- **Structural Health Monitoring (SHM) as a multivariate outlier detection problem**: analysis of a tie-rods element subjected to both damage and environmental variability, by means of statistical indices as Mahalanobis Squared Distance (MSD) and Principal Component Analysis (PCA).
- **Drag Coefficient Analysis of a Model Rocket Using Ansys Fluent**: simulation of the flow around a model rocket to determine the drag coefficient and comparison with theoretical model.
- **Development of a 2D CFD solver in C/C++ for the solution of the Navier-Stokes equations for incompressible flows**: implementation of the SCGS and SIMPLE algorithms, with validation on the lid-driven cavity flow.
- **Implementation of a nonlinear Finite Element Analysis (FEA) solver**: implementation of the plasticity theory based on the radial return algorithm on top of a linear FEA solver.
- **Chip Scale Atomic Clocks (CSAC)**: analysis of the physics behind their operation and current state of the art, with a focus on MEMS/NEMS technology.
- **Laser/Material Interaction**: thermal analysis of the laser cutting process, with a focus on the vaporization and melt mechanisms.
- **Analysis of the electronic density for a given molecule**: visualization of the electronic density field of a molecule using MATLAB.

$$\begin{cases} \dot{z} = v \\ \dot{v} = m^{-1}\left(\frac{1}{2}\frac{\partial L_1}{\partial z} I_1^2 + \frac{1}{2}\frac{\partial L_2}{\partial z} I_2^2 - \frac{1}{2} C_d A \rho \dot{z}|\dot{z}| + mg\right) \\ \dot{I}_1 = \left(\frac{1}{2}\frac{\partial^2 L_1}{\partial I_1^2} I_1^2 + 2\frac{\partial L_1}{\partial I_1} I_1 + L_1\right)^{-1}\left(-\frac{1}{2}\frac{\partial^2 L_1}{\partial I_1 \partial z}\dot{z} I_1^2 - \frac{\partial L_1}{\partial z}\dot{z} I_1 - R_1 I_1 + V_1\right) \\ \dot{I}_2 = \left(\frac{1}{2}\frac{\partial^2 L_2}{\partial I_2^2} I_2^2 + 2\frac{\partial L_2}{\partial I_2} I_2 + L_2\right)^{-1}\left(-\frac{1}{2}\frac{\partial^2 L_2}{\partial I_2 \partial z}\dot{z} I_2^2 - \frac{\partial L_2}{\partial z}\dot{z} I_2 - R_2 I_2 + V_2\right) \end{cases}$$





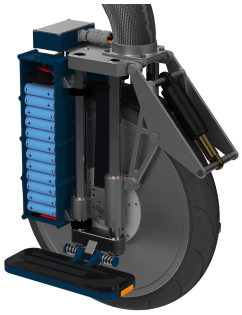
Extrapolated results from the MagLev project: system's equations of motion (top-left), inductance parameter identification (right) and system's response to a multistep input under different controllers (bottom-left). Accuracy of simulations allowed designing stable controllers in the full operability range of the system (3-22[mm]).

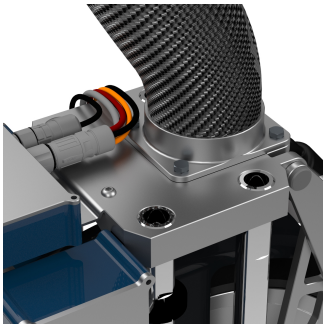
Personal Transportation Vehicle (Sidewalk vehicle)

Politecnico di Milano, Milan (IT) & RIMAC Automobili, Zagreb (HR)

PRO HACKIN' PROJECT 2023, IN PARTNERSHIP WITH RIMAC AUTOMOBILI

09.03.2023 - 01.06.2023





Idealize and Design a Personal Transportation Vehicle (Sidewalk vehicle).
Team-based project with students from 4 top European universities, featuring feedback sessions after each hackathon by company engineers. Selected as winning team.

- Hackathon 1: visions, user personas and functions & requirements
- Hackathon 2: functional decomposition, morphological matrix and concepts development
- Hackathon 3: CAD design, FEM simulations, FMEA and cost analysis.

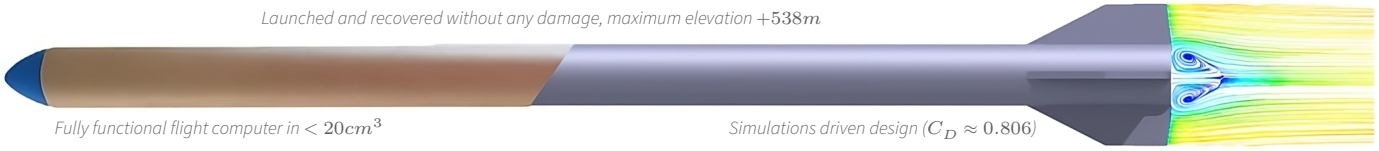
Model Rocket with On-Board Flight Computer

Personal Workshop, Como (IT)

PERSONAL PROJECT TO CELEBRATE BSC

12.07.2023 - 21.07.2023

Launched and recovered without any damage, maximum elevation $+538m$



Fully functional flight computer in $< 20cm^3$

Simulations driven design ($C_D \approx 0.806$)

Designing, optimization and building of a $63cm$ model rocket.

Final design was achieved after a couple of iterations between CAD model and CFD simulations. Built mostly from cheap materials (cardboard & wood) and 3D printed parts (PLA based). Essential characteristics:

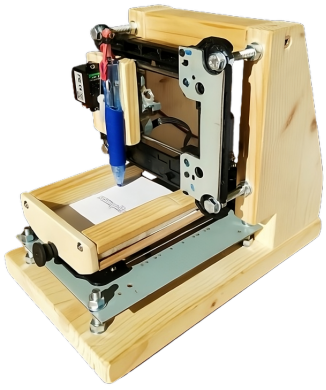
- Flight time $\approx 60s$, maximum speed reached $+120m/s$, maximum acceleration $+10g$.
- Recovery system based on parachute, fully functional and reliable.
- On board flight computer with barometric, temperature and acceleration sensors capable of logging data.

Selection of other minor projects

Personal Workshop, Como (IT)

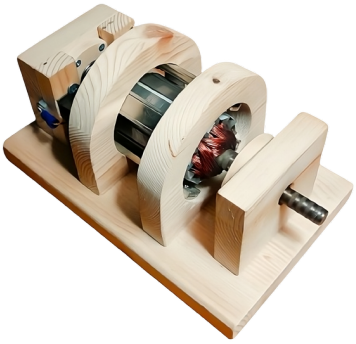
DONE FOR FUN OR FOR EDUCATIONAL PURPOSES

2021 - PRESENT



CNC plotter to go from any digital image to its physical representation.

- Arduino based plotter with custom software.
- Canny edge detection algorithm.
- Recycled components from old DVD drives and wood.



DC electric motor model to explain its working principle to my peer students.

- Recycled components from an old lawn mower and wood.
- Controllable in speed via a custom electrical circuit (diodes bridge and potentiometer).

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