

Luca Morando, Ph.D.

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EDUCATION

Ph.D. in Bioengineering and Robotics, *University of Genoa-NYU* | Genoa-New York, Italy-USA Nov 2019 - Sept 2023

- Graduation: Recognized of International Ph.D. award.

M.S. in Robotics Engineering, *University of Genoa-UTC* | Genoa-Compiegne, Italy-France Sep 2017 - Sep 2019

- Graduation: Double degree Italy France 109/110
- *Award*: Recognized of the International ERASMUS Scholarship to study abroad in Europe.
- *Main Selected CourseWork*: Advanced linear and non linear Control Theory, AI, Manipulators Dynamics, UAV Dynamics, Computer Vision for Autonomous Systems.

Bachelor in Biomedical Engineering, *University of Genoa* | Genoa, Italy Sep 2014 - Sep 2017

- *Main Selected CourseWork*: Control-Theory, Signal Processing and Telecommunication, Bio-Imaging Analysis, Linear Algebra, Geometry and Physics.

EXPERIENCE

New York University, *Postdoctoral Associate in Agile Robotics and Perception Lab (ARPL)* | Full Time (New York City, USA) - (Berkeley, U.C. Berkeley, California, USA) Nov 2023 - Current

- Author, Proposer and awarded with Prof. Giuseppe Loianno from U.C. Berkeley of the possibility to develop soaring algorithms for the DARPA Albatross Project
- Successfully developed autonomous navigation, planning and control for Fixed Wing Aircraft in a joint collaboration with TII in Abu Dhabi
- Multi-Layered, multi agents Human Robot Interaction using Mixed Reality in constrained environments.
- Participating in a Joint Project with the NYU Future Reality lab, headed by Prof. Ken Perlin for the development of Human Robot shared Virtual Reality Experience.
- Developing of Neural Network Physics inspired algorithms for system dynamics prediction.
- Heading the engineering team of the lab, solving electronics, software and hardware related problems in the construction of autonomous drones.
- Supervised multiple Master Students during their master thesis project from various universities worldwide (NYU, EPFL, Università degli studi di Padova)
- Adjunct Professor in NYU in the undergrad class "Robot Localization and Planning" and the Master class "Robot Localization and Navigation."

New York University, *Visiting Ph.D. student* | Full time (New York City, USA) Nov 2021 - Oct 2023

- Research new paradigms of shared and spatial human robot interaction algorithm in constrained environments.

University of Genoa-JP Droni, *Ph.D. student* | Full time (Genoa, Italy) Nov 2019 - Nov 2021

- Joint collaboration with the local drone company, JP Droni, settled in Genoa.
- Development of vision based autonomous drone solutions for inspection of photovoltaic power plants without GPS. Test on the field conducted successfully.
- Research on linear and non linear optimization algorithm for efficient positioning of recharging stations for drones in critical sites.

Université de Technologie de Compiegne (UTC - Sorbonne), *Master Degree Thesis (Heudyasic LAB, CNRS)* | France Jan 2019 - Nov 2019

- Development of a Deep Deterministic Policy Gradient Descend Reinforcement learning based algorithm for the autonomous vision tracking and landing of small aerial vehicle on a mobile ground target.

Italian Institute of Technology, *Bachelor Degree Project (student)* | Italy Jan 2017 - Feb 2017

- Design and development of a damping based robotic application for rehabilitation and human proprio-perception study.

SKILLS

Languages	C/C++, C#, Python, Matlab, Javascript, HTML, WebApp, embedded C, Catkin, CMake, Matlab, Git, Bash, LaTeX, Vim, PCL, I2C
Robotics	ROS 1/2, RViz, V-Rep, Gazebo, MoveIt, MuJoCo, Arduino, Sensor Fusion, PLC
Software	Linux, MacOS, Unity, Tensorflow, Pytorch, Docker, OpenCV, Solidworks, Adobe, Fusion360
Certifications	Robotics and Autonomous System Doctorate, UniGe, NYU – (2023) Robotics Engineering, University of Genoa – (2023), Deep Learning, Stanford Class Coursera 2021, Machine Learning Coursera 2021.

Research

DARPA Albatross Project |Postdoctoral Research, *U.C. Berkeley, ARPL*

Nov 2024 - Ongoing

- Development of a fully capable and autonomous soaring fixed wing platform able to leverage static and dynamic soaring.
- Development of the onboard autonomy for long range navigation and Energy Harvesting.
- Project in collaboration with STR and University of Michigan.

Human-Drone Unified Spatial Collaboration and Interaction through Mixed Reality|Postdoctoral Research, *New York University, ARPL-FRL*

Nov 2023 - Ongoing

- Development of WebXR internet socket based spatial application to make multiple users enable to share the same spatial and virtual environment
- Advanced Computer Graphics Techniques based on OpenGL provide an intuitive and gesture based interaction to control and teleoperate a small aerial vehicle
- Developments of advanced Trajectory planning and prediction algorithms for safe flight of a small UAV in a constrained and human populated environment
- Collaboration with NYU Courant Future Reality Lab directed by Professor Kenneth Perlin (Oscar prize winner)

Human-Drone Intuitive control and mapping through Mixed Reality in GPS denied constrained environments |Postdoctoral Research, *New York University, ARPL*

Nov 2021 - Ongoing

- Development of Mixed Reality based application in Unity to facilitate the human drone interaction in constrained, GPS denied and challenging environments for inspection and search and rescue purposes
- Development of an Octomap based framework for multi agent (human + drone) mapping with enhanced visualization techniques in MR for co-localization purposes
- Developments of advanced Control based algorithms for drone continuous control and interaction with the respect of the safety of the flying agent with respect the environment

Trajectory Planning and Control of Fixed Wing Aerial Vehicles |Postdoctoral Research, *New York University, TII*

June 2023 - Ongoing

- Development of innovative mathematical formulation for Planning and Control of autonomous aerial Fixed Wing in challenging environments (GPS Denied, Desert area)
- Development of Linear sequential optimization algorithms for Trajectory planning using Bernstein polynomials respecting the dynamics constraints of the physical platform
- Project in collaboration with the Technology Innovation Institute in Abu Dhabi, UAE

NIST UAS 4.0 Indoor Challenge |Visiting Ph.D. Student, *New York University, ARPL*

December 2022 - June 2023

- Development of a complete autonomous and self localized small aerial platform for Indoor navigation purposes in critical scenarios
- The team headed by me reached the 6th place at national level in the final NIST competition, disputed in Salina Kansas, across multiple teams coming from various US universities and Start-up

Publications**Wind-Aware Optimal Trajectory Planning for Efficient Gliding of Fixed-Wing Aerial****Systems.** – *L. Morando, N. Bobbili, L. Masci and G. Loianno, IEEE International Conference on Robotics and Automation, ICRA 2026 (Original Paper Submitted)*

Vienna, Austria, 2026

- Developed an optimization-based planner using Bernstein trajectories for optimal gliding capability.
- Leveraged system capabilities at the planning level to generate trajectories that achieve optimal gliding airspeed in the presence of wind gusts and obstacles.

Flying Together: Human-Guided Immersive Shared Control for Aerial Robot Teams in**Unknown Environments.** – *L. DeBel Air, L. Morando, K. Wang, Y. Zhou, B. Jarvis, C.**Toumeh, K. Perlin, D. Floreano and G. Loianno, IEEE International Conference on Robotics and Automation, ICRA 2026 (Original Paper Submitted)*

Vienna, Austria, 2026

- Collaborative work with Dario Floreano's Lab at EPFL and Ken Perlin's Lab at NYU Courant.
- Developed a dynamic and user intention-aware assistive planner built on the Variable Admittance Controller from previous work.
- Created an OpenXR web-based, cross-platform, and multi-user Mixed Reality interface for assistive robot control and shared perception.
- Implemented an Olfati-Saber algorithm for human-guided multi-robot shared control.

Nonlinear Model Predictive Control for Trajectory Tracking of Differentially Flat**Fixed-Wing Aerial Systems.** – *P. Rao, N. Bobbili, L. Morando, L. Masci and G. Loianno, IEEE International Conference on Robotics and Automation, ICRA 2026 (Original Paper Submitted)*

Vienna, Austria, 2026

- Developed an NMPC framework for navigation and control of fixed-wing aerial systems.
- Conducted real-world experiments with both kinematic NMPC and full-dynamics NMPC, including aerodynamic system identification.
- Demonstrated that NMPC for Bernstein trajectory tracking achieves improved tracking performance and robustness to wind disturbances compared to differential flatness-based control.

Human-drone collaboration via mixed-reality for efficient navigation and interaction in constrained environments: a comprehensive user case study. – L. Morando, X. Zhou, F. Atashzar, G. Loianno, *Springer Autonomous Robots* (Journal Paper Accepted) USA, 2026

- Developed a shared perception and control framework between human operators and quadrotors to elevate the robot as a "human companion" in complex interaction tasks.
- Conducted comprehensive comparison of spatial-based Mixed Reality interaction versus force-based control methods.
- Validated results and interaction quality through the largest user study of its kind in this domain.

Trajectory Planning and Control for Differentially Flatness Fixed Wing Aerial Systems. – L. Morando*, S. Salunkhe*, N. Bobbili, L. Masci, C. De Souza, H. Nguyen and G. Loianno, Atlanta, USA, 2025
IEEE International Conference on Robotics and Automation (Paper Accepted)

- Planning and Control of differentially flat fixed wing aerial vehicles through dynamically aware trajectories
- A continuous replanning technique is introduced at the trajectory level for continuous linearization of non linear dynamic constraints in a convex quadratic programming optimization
- Tested in real world flight in the NYC constrained airspace

Intuitive Human-Drone Collaborative Navigation in Unknown Environments through Mixed Reality. – S. Salunkhe*, P. Nedunghat*, L. Morando, N. Bobbili, G. Loianno, Charlotte, USA, 2025
International Conference of Unmanned Aerial Systems (Paper Accepted)

- Multilayer Virtual-Physical Spatial Human Drone interaction in constrained environments through Mixed Reality.
- Innovative solutions for safe human drone interaction leveraging a JPS planner and continuous trajectory optimization for drone navigation through a cluttered environment with intuitive gesture
- A human case study has been conducted to validate the reduction of the user mental strain compared classical teleoperation technique through NASA TLX

Spatial Assisted Human-Drone Collaborative Navigation and Interaction through Immersive Mixed Reality. – L. Morando, G. Loianno, *IEEE International Conference on Robotics and Automation* (Paper Accepted) Yokohama, Japan, 2024

- Multilayer Virtual-Physical Spatial Human Drone interaction in constrained environments through Mixed Reality
- Innovative solutions for safe human drone interaction leveraging Obstacles force field and the coupling between a Variable Admittance control and a planner for robot trajectory generation and correction for collision avoidance

Thermal and visual tracking of photovoltaic plants for autonomous UAV inspection – L. Morando, C. Recchiuto, J. Callà, P. Scuteri, A. Sgorbissa, *MDPI Drones* (Journal Paper Accepted) 2023

- Development of a Machine Learning and vision based visual servoing algorithm for autonomous inspection of large Photovoltaic Power Plants using aerial quadrotors.

Social Drone Sharing to Increase UAV Patrolling Autonomy in Pre-and Post-Emergency Scenarios – I. Bisio, L. Morando, C. Recchiuto, A. Sgorbissa, *Frontiers In Robotics and AI* (Journal Paper Accepted) 2022

- Development of an on cloud based solution for autonomous drone path planning and optimal charging station placement and allocation respecting time constraints between multiple targets located in large areas
- The on cloud application provide multi user accessibility to the drone status and planned mission

Social drone sharing to increase the uav patrolling autonomy in emergency scenarios – L. Morando, C. Recchiuto, A. Sgorbissa, *IEEE International Conference on Robot and Human Interactive Communication* (Paper Accepted) Naples, Italy, 2020

- Optimization based algorithm for multi-robot based inspections on large areas subject to energy efficiency constraints

Optimization based approach for UAV Patrolling Energy Autonomy Extension in Emergency Scenarios – L. Morando, C. Recchiuto, A. Sgorbissa, *I-RIM Second Italian Conference on Robotics and Intelligent Machines* (Paper Accepted) Rome, Italy, 2020

- Development of a linear multi-constrained optimization algorithm for optimal placing of UAV charging stations on a large inspection area.

Sport

NYC Marathon - New York City, US Nov 2024

- Classified to participate via Time Qualification by ranking in the top 20% of athletes worldwide.
- Finished the Marathon in 2h35 as 4th Italian and 251st overall (out of more than 60k participants).

NYC Half Marathon - New York City, US Nov 2023

- Completed the race in 1:13:32.

Italian Triathlon Championship - *Emilia Romagna, Italy*

June 2018

- Ranked among the top 70 triathletes in Italy.
- Developed an optimized red color detection algorithm, reducing processing time by 30% and improving efficiency.