FRANCESCO BANELLI

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EDUCATION

ETH Zurich *Sept 2024 –Present*
MSc in Robotics, Systems and Control GPA: 5.83/6.0
Relevant coursework: Probabilistic AI, Deep Generative Models, Perception and Learning

Politecnico di Milano *Sept 2021 –Jul 2024*
BSc in Automation and Control Engineering GPA: 29.35/30
Graduation Grade: 110/110 cum Laude

RESEARCH AND WORK EXPERIENCE

AI Engineering Intern, Flexion Robotics - Perception Team *Mar 2026 –Present*

- Developing a learned proprioceptive state estimation module to complement an existing classical localization and mapping pipeline.
- Training generative models in NVIDIA Isaac Lab on the Unitree G1 for robot perception and state estimation and deployment on the real robot.

Research Assistant, ETH Zurich - Raffaello D'Andrea's group *Feb 2025 –Feb 2026*

- Designed high-throughput GPU-based pipeline using Dense Inverse Search (DIS) for optical flow estimation, achieving 2 kHz inference speed using JAX, 16× faster than OpenCV baseline.
- Built a synthetic data generator for PIV exceeding 10k frames/s, enabling large-scale supervised training and benchmarking; $>$ 1000× faster than PIVlab.
- Developed a reinforcement-learning-based algorithm selection policy, reducing flow estimation error by 33% vs. best baseline.

PUBLICATIONS AND SELECTED PROJECTS

Flow Gym *SoftwareX, accepted*
Francesco Banelli, Antonio Terpin, Alan Bonomi, Raffaello D'Andrea

SynthPix: A lightspeed PIV image generator *SoftwareX, accepted*
Antonio Terpin, Alan Bonomi, **Francesco Banelli**, Raffaello D'Andrea

PIV Refinement via Consensus ADMM *Under review at CDC 2026*
Alan Bonomi, **Francesco Banelli**, Antonio Terpin

Learned Acceleration Estimator *Sept 2023 –Dec 2023*

- Trained a neural estimator to predict drone accelerations from command sequences, replacing IMU sensors in the state estimation pipeline.

TECHNICAL SKILLS

Core ML: PyTorch, JAX/Flax, Reinforcement Learning, Deep Generative Models
Vision & Estimation: Optical Flow, VIO, Kalman Filters, State Observers, Sensor Fusion
Programming: Python, C/C++, MATLAB, Bash