

Elia Costantini

Ph.D. Student in Aerospace Science and Technology

Biography

He is a doctoral candidate in Aerospace Science and Technology at the University of Bologna within the Flight Mechanics Laboratory. His research interests include performance analysis and optimization of rotary-wing aircraft; sizing of battery-powered unmanned vehicles; control system design, prototyping, and validation; development of estimation strategies. His work also focuses on innovative control strategies in cooperative transportation scenarios of UAVs.

Education

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|-------------------|---|
| 2022 - present | University of Bologna
Ph.D. in Aerospace Science and Technology

Title: " <i>Advanced Dynamics Modeling and Innovative Control Strategies for Cooperative Air Delivery Applications</i> " |
| 10/2024 - 04/2025 | University of Twente
Visiting PhD researcher at the Robotics and Mechatronics Laboratory, EEMCS Faculty

Theoretical, simulation, and experimental work on the control of a cable-suspended load manipulated by two aerial robots. Design of a robust formation control law for the two UAVs, tested in Matlab/Simulink and simulated in Gazebo Classic with PX4 Software-in-the-Loop (SITL). Experimental activities with two Holybro X500 quadrotors that allowed to validate: <ul style="list-style-type: none">• Filter for the estimation of the payload oscillation angle relying only on the on-board IMUs, without the need for any extra sensors• Cooperative formation control algorithm in both unloaded and loaded configurations |
| 2020 - 2022 | University of Bologna
Master's degree in Aerospace Engineering

Thesis: " <i>Modeling, Simulation, and Control of a Formation of Multirotor Aircraft for Transportation of Suspended Loads</i> " |
| 2017 - 2020 | University of Bologna
Bachelor's Degree in Aerospace Engineering

Thesis: " <i>Analisi dinamica e ottimizzazione delle prestazioni per velivoli multirottore</i> " |
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Awards

January 2019 **University of Bologna Merit Award**
"Bando di concorso per l'assegnazione di incentivi alle iscrizioni a corsi di studio inerenti ad aree disciplinari di particolare interesse nazionale per l'Anno Accademico 2017/2018"

Publications

2024 **Journal Publications**

Costantini, E., "Modeling, Simulation, and Control of a Formation of Multirotor Aircraft for Transportation of Suspended Loads". *Aerotec. Missili Spaz.* 103, 233–244 (2024). <https://doi.org/10.1007/s42496-023-00192-3>

Costantini, E., de Angelis, E.L., Giulietti, F., "Cooperative Drone Transportation of a Cable-Suspended Load: Dynamics and Control", *Drones* **2024**, 8, 434. <https://doi.org/10.3390/drones8090434>

Costantini E., de Angelis E. L., Giulietti F., "Cooperative Transportation using Rotorcraft: Swing State Estimation and Control". [Submitted for review to *Aerospace Science and Technology*]

2023 - 2024 **Conference Papers**

Costantini, E., de Angelis, E.L., Giulietti, F., "Cooperative Transportation of a Cable-Suspended Load Using Rotorcraft: A Minimal Swing Approach", in: *Proc. of 49th European Rotorcraft Forum*, **2023**, 1– 14.

Costantini E., de Angelis E. L., Giulietti F., "Cooperative Transportation of a Cable-Suspended Load: Dynamics and Control", *2024 International Conference on Unmanned Aircraft Systems (ICUAS)*, Chania - Crete, Greece, **2024**, pp. 224-233, <https://doi.org/10.1109/icuas60882.2024.10556923>.

Costantini E., de Angelis E. L., Giulietti F., "Cooperative Transportation Using Rotorcraft: Swing State Estimation and Control", in: *Proc. of 50th European Rotorcraft Forum*, Marseille, France, **2024**

Languages

Italian Native language

English Advanced Listening, Speaking, Reading and Writing
C1 level – Academic English Skills (AcES, 2024)
