

Course “Advanced topics in automation and control engineering” a.y. 2025-2026

Course title: “Aerial Robotics”

Professor: Dr. Marco Tognon

Objectives

Aerial robots, such as multirotor UAVs, have emerged as one of the most versatile robotic platforms, enabling applications in inspection, monitoring, logistics, and physical interaction with the environment. Their increasing diffusion and complexity call for a deep understanding of modeling, estimation, control, and interaction principles that underpin their operation.

The goal of this course is to provide students with fundamental knowledge and practical skills in aerial robotics, combining theoretical foundations, algorithmic implementation, and hands-on experimentation in simulation. The course adopts a **three-pillars approach**:

1. Models and theoretical principles
2. Computational tools and simulation environments
3. Real-world inspired applications

Through lectures, guided exercises, and a final project, students will learn to model aerial robots, design estimators and controllers, generate trajectories, and study physical interaction strategies. Modern approaches integrating optimization and AI for aerial robotics will also be introduced. The course emphasizes both **analytical understanding** and **practical implementation**, aiming to equip students with skills directly transferable to research and industry.

Expected Learning Outcomes

1. Knowledge and understanding

Upon completion of the course, students will:

- understand the modeling principles of multirotor UAVs (underactuated and fully actuated);
- have basic knowledge on how to design and evaluate state estimators (Kalman filter, UKF, particle filters) for aerial platforms;
- understand the fundamentals of control for stabilization, trajectory tracking, and aggressive maneuvers;

- grasp the principles of physical interaction through admittance and impedance control;
- recognize the role of optimization and AI-based methods in modern aerial robotics.

2. Capability to apply knowledge and understanding

After lectures and exercises, students will be able to:

- create simulation models of UAVs in ROS/Gazebo and analyze their behavior under different control inputs;
- implement state estimation methods and validate them against simulation data;
- design and tune controllers for trajectory tracking and interaction tasks;
- solve practical problems such as waypoint navigation, trajectory generation, and force-based interaction;
- integrate optimization and learning-based strategies in UAV control design.

3. Autonomy

Students will gain the ability to:

- analyze an aerial robotics task and translate it into a structured control and estimation problem;
- critically compare different modeling, estimation, and control strategies;
- assess the quality of simulation results and identify possible improvements.

4. Communication skills

Through project reports and presentations, students will develop skills to:

- clearly present the problem addressed and the adopted approach;
- effectively communicate modeling and implementation choices;
- discuss results in a concise and technically rigorous way.

5. Learning skills

The course will enable students to:

- independently learn advanced methods for trajectory optimization, cooperative aerial robotics, or perception-driven flight control;
- critically read and evaluate research papers and open-source frameworks in aerial robotics.

Course Contents

Part I: Introduction

- Motivation and applications of aerial robotics.
- Simulation tools for robotics: Gazebo and Python Genomix.
- Hands-on: modeling and controlling simple robots in Gazebo.

Part II: Modeling

- Dynamics of multirotor UAVs (underactuated and fully actuated).
- Allocation matrix, force envelopes, and actuation limits.
- Exercises in Gazebo: underactuated vs. fully actuated behavior, pendulum model, and rotor velocity tests.

Part III: State Estimation

- Measurement models and observability.
- Basic concepts of Linear Kalman filter, Unscented Kalman filter, and Particle filters.
- Exercises: estimator implementation and validation with simulation data.

Part IV: Control

- Fundamentals of stabilization and trajectory tracking.
- Controllers for underactuated and fully actuated UAVs.
- Exercises: gain tuning, trajectory tracking (circles, eights, flips).

Part V: Trajectory Generation

- Basics of trajectory planning and waypoint navigation.
- Exercises: take-off, waypoint following, simple maneuvers.

Part VI: Physical Interaction

- Force-based interaction principles.
- Admittance control, impedance control, and wrench observers.
- Exercises: gain tuning, pushing tasks, interaction with objects.

Part VII: Advanced Topics

- Optimization for aerial control.
- AI-based methods for aerial physical interaction.

Prerequisites

- Linear algebra and differential calculus.
- Fundamentals of system theory and automatic control.
- Basic programming skills in Python.
- (Recommended) Familiarity with Linux and simulation environments (e.g., Gazebo, ROS).

Mix of teaching activities

Approximately 30 hours lecturing, 20 hours laboratories and exercise sessions.

Assessment method

Students will be evaluated with a written exam, with a mix of open questions and multiple choices. The maximum grade achievable with this option is 30/30. Students will also have the possibility to carry out a project (not mandatory) in groups, culminating in a demo. The project will include problem formulation, model setup, implementation, and validation through simulation. The project will result in maximum 3 additional points on the grade of the written exam. The maximum grade achievable with both the written exam and the project is 30L/30.

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PhD in Robotics

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Summary

01 Nov. 2022 **Permanent researcher (INRIA Starting Faculty Position)**, [INRIA](#), Rennes, France.

- **Leadership of research groups**: AR group of Rainbow team at Inria-Rennes (**10** members), MAV group at ASL of ETH (**8** members), at LAAS for robotic competition (**12** members)
- **Coordinator of research projects**: **3** projects on aerial manipulation, human-robot interaction and augmented reality
- **Grants**: authorship of **successful** research proposals with funding totaling **>800K USD**
- **Publications**: **1** book, **31** journals and **34** conference papers; h-index: 27, citation count: 2443 (source: [Google Scholar](#))
- **Mentorship**: **15** PhD students, **25** M.Sc. and B.Sc. theses, resulting in **>15** peer-reviewed publications
- **Dissemination**: **>20** talks at international conferences, universities and research institutions, 3 public live demonstrations

Degrees

February 2024 **University of Rennes, Robotics**, Habilitation à diriger des recherches (HDR).

July 2018 **LAAS-CNRS, INSA de Toulouse, Robotics**, PhD degree, Thesis: [pdf](#).

Apr. 2014 **University of Padua, Automation Engineering**, Master's degree, 110/110.

Sept. 2012 **University of Padua, Information Engineering**, Bachelor's degree, 110/110.

Certificates

Mar. 2020 Qualification aux fonctions de maître de conférences (French qualification as assistant professor)

Nov. 2022 Abilitazione Scientifica Nazionale (Italian qualification as associate professor)

Research experiences

01 Nov. 2022 **Permanent researcher (INRIA Starting Faculty Position)**, [INRIA](#), Rennes, France.

01 Apr. 2020 **Senior researcher**, [ETH-Z](#), *Autonomous Systems Lab*, Zürich, Switzerland.

30 Sep. 2022 Advisor: Prof. Roland Siegwart. Role: **leader of the rotary-wing group**, co-supervisor of 7 PhD students (+3 visiting), local responsible at ETH for the H2020-MSCA-ITN-2020 project "AERO-TRAIN", coordinator of the project "AEROGUIDE" funded by ETH Career Seed Grant

01 Sept. 2018 **Post-doctoral researcher**, [LAAS-CNRS](#), Toulouse, France.

31 Mar. 2020 Advisor: Dr. Antonio Franchi. Role: **Technical responsible for the LAAS team** participating in the robotic challenge MBZIRC 2020 (<https://mbzirc2020team.laas.fr/mbzirc2020>), co-supervisor of 2 PhD students (+2 visiting). In parallel I investigate problems linked to aerial physical interaction.

01 June 2015 **PhD candidate**, [LAAS-CNRS](#), Toulouse, France (thesis defended July 13th, 2018).

31 Aug. 2018 Thesis title: "*Theory and Applications for Control and Motion Planning of Aerial Robots in Physical Interaction with particular focus on Tethered Aerial Vehicles*". Advisors: Dr. Franchi, Dr. Corés.

01 Nov. 2017 **Visiting PhD student**, [ROBOTICS, VISION AND CONTROL GROUP](#), University of Seville, Seville, Spain.

30 Nov. 2017 Integration of a motion planner for dual arm manipulation on an aerial vehicle equipped with two arms.

01 Aug. 2014 **Research engineer**, [LAAS-CNRS](#), Toulouse, France.

31 May 2015 Development of control methods for aerial transportation of cable-suspended loads. Implementation of the testbed and validation of the methods.

01 Sept. 2013 **Research Internship**, [MPI FOR BIOLOGICAL CYBERNETICS](#), Tübingen, Germany.

31 June 2014 Design and experimental validation of control methods for formation control of aerial vehicles using physical cable-like links. Integration of a new aerial robot (Crazyflie) in the experimental framework of the lab.

Awards

2025 [\[C2\]](#), Winner of [2025 European Robotic Forums Best Paper Award \(AI in Robotics\)](#)

- 2024 *IROS 2024 Toshio Fukuda Young Professional Award*, for contribution in aerial robotics.. **Amount:** 1 000\$
- 2022 [*J16*], Winner of *IROS 2022 Best Paper Award on Safety, Security, and Rescue Robotics* in memory of Motohiro Kiso sponsored by IRS
- 2022 [*C10*], Winner of *2023 International Conference on Unmanned Aircraft Systems (ICUAS) Best Paper Award*
- 2022 [*J12*], finalist of *IROS 2022 Best Paper Award on Mobile Manipulation* sponsored by OMRON Sinic X
- 2019 *Prix des Sciences de l'Ingénieur*, **remarkable scientific work** in the engineering field done in 2018. The prize is given by the Académie des Sciences Inscriptions et Belles-Lettres of Toulouse (France). **Amount:** 1 000€
- 2019 *Prix GDR Robotique*, **best PhD thesis** among the ones defended in 2018 in any lab and university in France in the field of Robotics. The prize is given by the GDR Robotique which is the French national network in the robotic research
- 2019 *Prix Aerospace Valley*, **best PhD thesis** in the field of aeronautics, space, and embedded systems. The prize is given by the aeronautic and space cluster Aerospace Valley. **Amount:** 3 000€

Research projects & Grants

- Fall 2024 **MATES** (Agence Nationale de la Recherche) – **Participat**. Investigation of new shared control methods for multi-aerial robot manipulation assisted by human operators. **Amount:** 635 202 EUR.
- Fall 2028
- Fall 2023 **AirHandyBot** (Agence Nationale de la Recherche) – **Coordinator**. Investigation of new design and control methods for complex aerial manipulation of articulated objects. **Amount:** 400 000 EUR.
- Fall 2027
- Fall 2023 **AeroTouch** (Actions Exploratoires Inria) – **Coordinator**. Investigation of perception-aware control methods for sensors-based aerial physical interaction. **Amount:** 140 000 EUR
- Fall 2026
- 01 Mar. 2022 **Mixed Reality for Shared Autonomy** (Swiss Joint Research Center – Microsoft & ETH) – **Co-PI** at
- 01 Oct. 2022 ETH. See [link](#). Investigation of how mixed reality can be used to improve human-robot shared autonomy
- 01 Jan. 2021 **AEROGUIDE** (ETH Career Seed Grant – Research group: ASL of ETH) – **Coordinator**. See <https://www.aeroguide.ethz.ch/>. **Amount:** 30 000 CHF
- 01 Feb. 2022
- 01 Jan. 2021 **AERO-TRAIN** (EU project H2020-Marie Skłodowska-Curie Actions - Innovative Training Networks – Research group: ASL of ETH - PI: Prof. Siegart) – **Local leader** of ETH unit
- 01 Oct. 2022
- 01 Sep. 2018 **MBZIRC2020** (Robotic competition – Research group: RIS of LAAS - Leader: Dr. Franchi) – **Technical leader** of the LAAS team (a CNRS researcher, a postdoc (me), 6 master students, 3 Ph.D. students, 3 engineers, and 4 collaborating researchers) participating in the robotic challenge MBZIRC 2020. I co-authored the sponsorship proposal from which we obtain a grant of 100 000\$. I lead all the work packages and co-managed the budget allocation and the tight time planning to meet the strict deadline of the challenge. See <http://mbzirc2020team.laas.fr/>. **Amount:** 100 000 USD
- 28 Feb. 2020
- 01 Feb. 2019 **FlyCrane: Un système multi-robot pour le transport et la manipulation aérienne** (Regional project – Research group: RIS of LAAS - Leader: Dr. Cortés) – **Participant**. See <https://mtognon.aslethz.cyon.site/content/flycrane>
- 31 Mar 2020
- 01 June 2015 **Aeroarms** (European Project H2020 – Research group: RIS of LAAS - Leader: Dr. Franchi) – **Participant**.
- 01 Aug. 2019 Co-author of the deliverable of the work-package related to motion planning (WP6). I also presented the work done by LAAS-CNRS at several general and review meetings.
- 01 Aug. 2014 **MDrone Project** (Research group: RIS + MAC of LAAS - Leader: Dr. Seuret) – **Participant**. Design and implementation of a test-bed for the study of multi-robot aerial manipulation.
- 31 May 2015

Teaching

- Sep. 2024 **MOBROB summer school: 4h** *University of Grenoble*
- 2024 – now **Robotics 2 : 30h** *ENS Rennes*
- 13 Jun. 2022 **Aeroguide: 1.5h** *University of Twente*. Lecture entitled "AEROGUIDE: Aerial RObotic force-based human GUIDE" within the course Control for UAVs. The course was intended for master students attending the master of either Electrical Engineering or Systems and Control.
- 09 Marc. 2022 **Design of UAVs: 2h** *University of Seville*. Lecture for the PhD students (15) within the Marie-Sklodowska-Curie Innovative Training Network (ITN) - European Training Network (ETN) project AEROTRAIN.
- 01 Sept. 2019 **Automatisme: 90h** (course (Cours) 12h, exercises (TD) 6h, and practical classes (TP) 72h) *Université Toulouse III - Paul Sabatier*. Course of automatic for 3rd year bachelor students.
- 01 Dec. 2019

Supervision & mentoring

Post-doctorates: 1 at Inria – Rennes,

1. [Martin Jacquet](#) at Inria-Rennes; *Supervision period:* Septemeber 2025 - now; *Research:* Investigation of perception-aware controllers for aerial manipulations with onboard sensors only; *Advisors:* M. Tognon 100%. *Projects:* FlyHandyBot;

PhD students: 5 at Inria – Rennes. **Alumni:** 2 at LAAS-CNRS (Sep. 2018 – Mar. 2020), 7 at ASL of ETH-Zurich. (Apr. 2020 – Sep. 2022), (Sep. 2022 – Now),

1. [Valeria Braglia](#) at IRISA-Rennes; *Supervision period:* February 2025 - now; *Research:* Distributed control of multi-aerial robot systems; *Advisors:* M. Tognon 50% P. Robuffo Giordano 50%. *Projects:* MATES;
2. [Lluís Prior](#) at Inria-Rennes; *Supervision period:* November 2024 - now; *Research:* Aerial RObots with the sense of Touch; *Advisors:* M. Tognon (PhD director) 100%. *Projects:* AeroTouch;
3. [Szymon Bielenin](#) at Inria-Rennes; *Supervision period:* October 2024 - now; *Research:* Robust and Agile Transportation of Cable Suspended-Loads with Multi-Drone Systems; *Advisors:* M. Tognon (PhD director) 50%, Paolo Robuffo Giordano 50%. *Projects:* ANR - MATES;
4. [Maximilian Mehl](#) at Inria-Rennes; *Supervision period:* February 2024 - now; *Research:* Learning-based Control of an Aerial Manipulator for Complex Manipulation Tasks; *Advisors:* M. Tognon (PhD director) 70%, Paolo Robuffo Giordano 30%. *Joint publications:* C2 *Projects:* JCJC - AirHandyBot;
5. [Lorenzo Balandi](#) at Inria-Rennes; *Supervision period:* October 2023 - now; *Research:* Full-Body Design and Control of an Aerial Manipulator for Advance Physical Interaction; *Advisors:* M. Tognon 70%, Paolo Robuffo Giordano (PhD director) 30%. *Joint publications:* J4,C1, C3 *Projects:* JCJC - AirHandyBot;

Alumni

1. [Eugenio Cuniato](#) at ASL of ETH (Switzerland); *Supervision period:* June 2021 - September 2022; *Research:* Control of Aerial Manipulators for Physical Interaction; *Advisors:* M. Tognon 50%, Dr. Nicholas Lawrance 40%, Prof. R. Siegwart (PhD advisor) 10%. *Joint publications:* J8,J16,C7,C12 *Projects:* AERO-TRAIN;
2. [Mike Allenspach](#) at ASL of ETH (Switzerland); *Supervision period:* August 2020 - September 2022; *Research:* Human-aerial robot interaction for manipulation tasks; *Advisors:* M. Tognon 50%, Dr. Nicholas Lawrance 40%, Prof. R. Siegwart (PhD advisor) 10%. *Joint publications:* J17,C8,C9,C11,C15,C17,C19 *Projects:* AEROGUIDE, Mixed Reality for Shared Autonomy;
3. [Maximilian Brunner](#) at ASL of ETH (Switzerland); *Supervision period:* April 2020 - September 2022; *Research:* "Robust control of omnidirectional aerial robots"; *Advisors:* M. Tognon 50%, Prof. R. Siegwart (PhD advisor) 50%. *Joint publications:* J8,J12,J15,C12,C16,C20
4. [Christian Lanegger](#) at ASL of ETH (Switzerland); *Supervision period:* April 2020 - September 2022; *Research:* "Vision and haptic-based aerial physical interaction"; *Advisors:* M. Tognon 30%, Dr. Cesar Cadena 60%, Prof. R. Siegwart (PhD advisor) 10%. *Joint publications:* C14
5. [Weixuan Zhang](#) at ASL of ETH (Switzerland); *Supervision period:* April 2020 - June 2022; *Research:* "Model learning for control of aerial robots for physical interaction"; *Advisors:* M. Tognon 30%, Dr. Lionel Ott 60%, Prof. R. Siegwart (PhD advisor) 10%. *Joint publications:* J13,C21,C7
6. [Giuseppe Rizzi](#) at ASL of ETH (Switzerland); *Supervision period:* April 2020 - May 2022 (Giuseppe quitted the PhD program); *Research:* "Model learning for control of aerial robots for physical interaction"; *Advisors:* M. Tognon 50%, Dr. Jen Jen Chung 40%, Prof. R. Siegwart (PhD advisor) 10%. *Joint publications:* J11,J12
7. [Karen Bodie](#) at ASL of ETH (Switzerland); *Supervision period:* April 2020 - February 2022; *Research:* "Design and control of aerial manipulators"; *Advisors:* M. Tognon 40%, Prof. R. Siegwart (PhD advisor) 60%. *Joint publications:* J19,C20
8. [Dario Sanalidro](#) at LAAS-CNRS (France); *Supervision period:* September 2018 - March 2020; *Research:* "Multi-robot manipulation"; *Advisors:* M. Tognon 60%, Dr. A. Franchi (PhD advisor) 40%. *Joint publications:* J9, J14,J18,J25,C22,C24 *Projects:* FlyCrane, MBZIRC;
9. [Mahmoud Hamandi](#) at LAAS-CNRS (France); *Supervision period:* September 2018 - March 2020; *Research:* "Robust control of aerial vehicles"; *Advisors:* M. Tognon 50%, Dr. A. Franchi (PhD advisor) 50%. *Joint publications:* J21,C18,C23,C25

Visiting PhD students:

1. Khaled Wahba from University of Berlin (Germany), hosted at Inria Rennes in 2025;
2. Massimiliano Bertoni from University of Padova (Italy), hosted at Inria Rennes in 2023;
3. Salvatore Marcellini from University of Naples Federico II (Italy), hosted at Inria Rennes in 2023;
4. Tong Hui from Danish Technical University (Denmark), hosted at ETH-Zurich in 2023, *Joint publications:* C4;
5. Julien Mellet from University of Naples Federico II (Italy), hosted at ETH-Zurich in 2023;

6. Antonio Gonzalez Mergado from University of Seville (Spain), hosted at ETH-Zurich in 2022, *Joint publications:* [J5](#);
7. Michele Bolognini from University of Milan (Italy), hosted at ETH-Zurich in 2022;
8. Federico Benzi from University of Bologna (Italy), hosted at ETH-Zurich in 2022, *Joint publications:* [J15](#);
9. Liping Shi from Aarhus University (Denmark), hosted at ETH-Zurich in 2022, *Joint publications:* [C13](#);
10. Enrica Rossi from University of Padua (Italy), hosted at LAAS in 2019, *Joint publications:* [J10](#), [J26](#);
11. Gabriele Nava from Istituto Italiano di Tecnologia (Italy), hosted at LAAS in 2019, *Joint publications:* [J24](#).

Master student theses:

1. Alessandro Borgherini M.S. student at University of Padua, graduated in October 2025. *Thesis:* Imitation learning of a robust policy for an aerial robotic system incorporating data aggregation by closed loop sensitivity.
2. Luigi Graziosi M.S. student at Polytechnic of Turin, graduated in September 2025. *Thesis:* Hardware Accelerators for Unmanned Aerial Vehicles MPC algorithms.
3. Igor Angelini M.S. student at University of Modena and Reggio Emilia, graduated in July 2025. *Thesis:* Dynamic control of a manipulator for aerial robots.
4. Emanuele Bua Odetti M.S. student at University of Geneva, graduated in August 2025. *Thesis:* Mechatronic Design of Aerial Robots for Agile Maneuvers and Collaborative Transportation.
5. Giulio Franchi M.S. student at Polytechnic of Milan, graduated in April 2025. *Thesis:* Full-body Design and Control of an Aerial Manipulator.
6. Valeria Braglia M.S. student at University of Reggio Emilia, graduated in December 2024. *Thesis:* Perception-Aware Cable Suspended Multi-Drone Transportation.
7. Emanuele Buzzurro M.S. student at University of Genova, graduated in August 2024. *Thesis:* MPC-based control of a cable suspended load using multiple UAV's for dynamic motion.
8. Riccardo Belletti M.S. student at University of Bologna, graduated in March 2024. *Thesis:* Distributed MPC method for collaborative aerial transportation: from design to experimental validation.
9. Stéphane Luginbühl M.S. student at ETH-Zurich, graduated in April 2023. *Thesis:* Learning-based Adaptive Impedance Control for an Aerial Manipulator for Push and Slide Operations.
10. Ismail Geles M.S. student at Graz University of Technology, graduated in April 2023. *Thesis:* Learning-based Controller for an Aerial Manipulator Opening a Door. *Joint publications:* [C7](#)
11. Ben Hallworth M.S. student at ETH-Zurich, graduated in June 2022. *Thesis:* Path-following Controller for a Tethered Aerial Robot Physically Guiding a Human. *Joint publications:* [C9](#)
12. Mathis Robert M.S. student at University of Rennes, graduated in June 2022. *Thesis:* Motion Planner for a Tethered Aerial Robot Physically Guiding a Human.
13. Alessandro Menichelli M.S. student at ETH-Zurich, graduated in June 2022. *Thesis:* Whole-Body Control For OMAV With Delta Arm.
14. Grzegorz Malczyk M.S. student at ETH-Zurich, graduated in April 2022. *Thesis:* Estimation of contact and disturbance forces and interaction force tracking with an aerial manipulator. *Joint publications:* [J8](#)
15. Marco Ruggia M.S. student at ETH-Zurich, graduated in December 2021. *Thesis:* Design and Control of an Aerial Layouting Tool. *Joint publications:* [C14](#)
16. Yash Vyas M.S. student at ETH-Zurich, graduated in August 2021. *Thesis:* Adaptive controller to physically guide humans with a tethered aerial vehicle. *Joint publications:* [J17](#), [C19](#)
17. Viktor Klemm M.S. student at ETH-Zurich, graduated in August 2021. *Thesis:* Motion planning and control for a two-wheeled jumping robot.
18. Matthias Studiger M.S. student at ETH-Zurich (Switzerland), graduated in July 2019. *Thesis:* Sampling Based Aerial Manipulation Control. *Joint publications:* [J12](#)
19. Gabriele Minini M.S. student at University of Naples Federico II (Italy), graduated in July 2019. *Thesis:* "Control and Motion Planning of Aerial Robots to Provide Blind Persons with Tethered Guidance".
20. Amr Afifi M.S. student at Sapienza University of Rome (Italy), graduated in November 2019. *Thesis:* "Pick and Place with a Fully Actuated Platform for the MBZIRC challenge".
21. Youssef Abou Dorra M.S. student at Sapienza University of Rome (Italy), graduated in November 2019. *Thesis:* "Control of a Fully Actuated Aerial Robot for the MBZIRC challenge".
22. Elena Umili M.S. student at Sapienza University of Rome (Italy), graduated in July 2019. *Thesis:* "Multi-agent Task Planning for Wall Assembly in the MBZIRC2020 Robotic Challenge". *Joint publications:* [C22](#)
23. Gabriele Petrucci M.S. student at Sapienza University of Rome (Italy), graduated in July 2019. *Thesis:* "Visual Bricks Detection and Tracking for Pick & Place Operations in the MBZIRC2020 Robotic Challenge".
24. Kapil Sawant M.S. student at Birla Institute of Technology and Science (India), graduated in October 2018. *Thesis:* "Mechanical Design and Fabrication of Omnidirectional Aerial Vehicle with Unidirectional Thrusters". *Joint publications:* [C23](#)
25. Chiara Gabellieri M.S. student at University of Pisa (Italy), graduated in June 2017. *Thesis:* "Communication-less Cooperative Transportation of a Cable-Suspended load by Means of Aerial Vehicles". *Joint publications:* [J30](#)
26. Hermes Amadeus Tello Chavez M.S. student at École Centrale de Nantes (France), graduated in October 2016. *Thesis:*

- "Motion Planning and Control for Multi-Aerial Robots Manipulation in 6D". *Joint publications:* [J27](#), [J28](#)
27. [Andrea Testa](#) M.S. student at University of Salento (Italy), graduated in March 2015. *Thesis:* "Mechanical Modeling and Control of Tethered Aerial Robots". *Joint publications:* [C32](#)
28. [Enrica Rossi](#) M.S. student at University of Padua (Italy), graduated in March 2015. *Thesis:* "Methods of Nonlinear and Optimal Control for Underactuated Tethered Aerial Robots". *Joint publications:* [C32](#)
29. [Sanket Suman Dash](#) M.S. student at ISAE-SUPAERO (France), graduated in August 2015. *Thesis:* "Automatic Takeoff and Landing of a Tethered Aerial Vehicle on a Moving Platform". *Joint publications:* [J32](#)

Student projects:

1. [2021-Focus Project](#) (Prof. R. Siegwart, [ASL of ETH-Zurich](#), Zurich, Switzerland) a group of 8 students have to design a new aerial robot for the transportation of bulky loads (<https://geranos.ethz.ch/>)
2. [2020-Focus Project](#) (Prof. R. Siegwart, [ASL of ETH-Zurich](#), Zurich, Switzerland) a group of 8 students have to design a new aerial manipulator (<https://griffin.ethz.ch/>). *Publications:* [C10](#)
3. [2018-MRS Multi-Robot Systems](#) (Prof. G. Oriolo, [Sapienza University of Rome](#) Rome, Italy)
4. [2017-CAMS](#) Control of Autonomous and Multiagent Systems (Prof. G. Oriolo, [Sapienza University of Rome](#) Rome, Italy)
5. [2016-PIE](#) (Prof. J. Cardoso, [ISAE-SUPAERO](#), Toulouse, France): a group of six students had to design and implement a tethered aerial vehicle attached to a mobile platform

Positions of responsibility

- 2025 **Program Co-chair** of the [2025 International Conference on Unmanned Aircraft Systems, ICUAS 2025](#)
- 2024-Now **Co-chair** of the [IEEE Technical committee of Aerial Robotics and UAVs](#)
- 2024-Now **Co-chair** of the Scientific Theme *Heterogeneity and Complexity* (TS3) of the [French Research Group in Robotics \(GdR Robotique\)](#).
- 2024-Now **Jury member** for PhD thesis: Simon Wasiela (2025, France); Ambar Garofano (2025, Spain).
- 2024-Now **Jury member** for awards: Prix de Thèse du GdR Robotique (2024, France).

Editorial service

- 2023 – now **Associate editor** of [IEEE Transactions on Robotics](#)
- 2023 – 2024 **Associate editor** of [Robotics: Science and Systems](#)
- 2019 – 2022 **Associate editor** of [IEEE International Conference on Robotics and Automation](#)
- 2019 – 2020 **Associate editor** of [IEEE/RSJ International Conference on Intelligent Robots and Systems](#)
- 2015 – now **Reviewer** for:
- *Journals:* [IEEE Transactions on Robotics](#), [International Journal of Robotics Research](#), [IEEE Robotics and Automation Letters](#), [IEEE Transactions on Automation Science and Engineering](#), [Control Engineering Practice](#), [ASME Journal of Mechanisms and Robotics](#), [International Journal of Control](#), [Automatica](#), [IEEE/ASME Transactions on Mechatronics](#), [IEEE Transactions on Automatic Control](#), [IEEE Transactions on Haptics](#), [Journal of Intelligent & Robotic Systems](#),
 - *Conferences:* [International Conference on Robotics and Automation \(ICRA\)](#), [IEEE/RSJ International Conference on Intelligent Robots and Systems \(IROS\)](#), [American Control Conference \(ACC\)](#), [European Control Conference \(ECC\)](#), [IFAC World Congress](#), [IEEE International Symposium on Safety, Security, and Rescue Robotics \(SSRR\)](#).
 - *Research projects:* Idex d'Université Côte d'Azur (2025, France); External reviewer for a ERC grant (2022), DEFRA research programme (2023, Defence-related Research Action, Belgium); Agency for Science, Technology and Research (A*STAR) (2023, Singapore).
 - *PhD Thesis:* Ambar Garofano Soldado (2024, University of Seville), Simone D' Angelo (2024, University of Naples, Italy).

Dissemination of scientific knowledge

General Public:

- Nov., 2024 **Expoprotection** "Les drones en 2035, quelles perspectives d'applications pour la sécurité des entreprises et des salariés ?", Paris, France.

International Workshops:

- May, 2025 **ICUAS 2025 workshop on “Embodied-AI for Aerial Robots: What do we need for full autonomy?”**, Charlotte, USA.
- May, 2020 **ICRA 2020 workshop on “Shared Autonomy: Learning and Control”**, Paris, France.
- May, 2018 **ICRA 2018 workshop on “Aerial Robotic Inspection and Maintenance: Research Challenges, Field Experience and Industry Needs”**, Brisbane, Australia, (2 talks).

National Workshops (France):

- 30 Aug. 2018 **2RM, Journée Technique: Drones et Manipulation**, Compiègne, France, “*Physical interaction of aerial robots, from interaction with an object to collaboration with a worker*”, Collaborators: D. Sidobre and A. Franchi.
- 10 July 2018 **GIS Micro-drones, 5th Drone Garden Workshop**, Toulouse, France, “*Motion planning for Task-Constrained Aerial Manipulation: Application to Pipe Inspection*”.
- 27 Apr. 2018 **Journée GDR-Robotique**, Nantes, France, “*Control and Design of Aerial Robots for Physical Inspection and Cooperative Manipulation*”, Collaborator: A. Franchi.
- June 2016 **GT-UAV**, Marseille, France, “*Planning and Control Methods for Tethered Aerial Vehicles*”.

Scientific Seminars at Research Institutions:

- 03 Mar. 2025 **LAAS-CNRS**, Toulouse, France, “*Advancements in aerial physical interaction: design control and collaborations*”.
- 20 Dec. 2024 **Polytechnic of Milan**, Milan, Italy, “*Advancements in aerial physical interaction: design control and collaborations*”.
- 13 Dec. 2024 **IDSIA USI-SUPSI Istituto Dalle Molle di studi sull'intelligenza artificiale**, Lugano, Switzerland, “*Advancements in aerial physical interaction: design control and collaborations*”.
- 12 Dec. 2024 **University of Strasbourg**, Strasbourg, France, “*Advancements in aerial physical interaction: design control and collaborations*”.
- 02 Dec. 2024 **Laboratoire des Sciences du Numérique de Nantes (LS2N) CNRS**, Nantes, France, “*Advancements in aerial physical interaction: design control and collaborations*”.
- 04 Sep. 2024 **Inria Centre at the University Grenoble Alpes**, Grenoble, France, “*Advancements in aerial physical interaction: design control and collaborations*”.
- 02 Sep. 2024 **Polytechnic of Turin**, Turin, Italy, “*Advancements in aerial physical interaction: design control and collaborations*”.
- 24 June 2024 **Norwegian University of Science and Technology**, Trondheim, Norway, “*Advancements in aerial physical interaction: design control and collaborations*”.
- 09 May 2024 **University of Tokyo**, Tokyo, Japan, “*Advancements in aerial physical interaction: design control and collaborations*”.
- 26 Oct. 2023 **Technical University of Denmark**, Copenhagen, Denmark, “*Aerial Physical Interaction? YES WE CAN!! Past and recent results toward new directions and opportunities*”.
- 22 Oct. 2019 **University of Zurich**, Zurich, Switzerland, “*Aerial physical interaction by means of cables and articulated arms*”.
- 21 Oct. 2019 **ETH**, Zurich, Switzerland, “*Aerial physical interaction by means of cables and articulated arms*”.
- 19 Sep. 2019 **University of Bologna**, Bologna, Italy, “*Aerial physical interaction by means of cables and articulated arms*”.
- 14 Mar. 2019 **LIRMM**, Montpellier, France, “*New aerial robots with passive or active links for true physical interaction*”.
- 04 Feb. 2019 **INRIA Sophia-Antipolis**, Nice, France, “*New aerial robots with passive or active links for true physical interaction*”.
- 14 Dec. 2018 **Gipsa-Lab**, Grenoble, France, “*New aerial robots with passive or active links for true physical interaction*”.
- 09 Nov. 2018 **Institute of Motion Science (IMS), Axe Marseille Université**, Marseilles, France, “*New aerial robots with passive or active links for true physical interaction*”.
- 30 Jan. 2018 **Irisa/Inria Rennes**, Rennes, France, “*Aerial Physical Interaction by Means of Cables and Robotic Arms: the role of Differential Flatness*”.

- 27 Nov. 2017 **University of Seville**, Seville, Spain, “*Aerial Physical Interaction by Means of Cables and Robotic Arms: the role of Differential Flatness*”.
- 20 July 2017 **Nice-Sophia-Antipolis**, Nice, France, “*Aerial Physical Interaction by Means of Cables or Bars: Modeling and Control of Tethered Aerial Vehicles*”.
- 17 July 2017 **University of Padua**, Padua, Italy, “*Aerial Physical Interaction by Means of Cables or Bars: Modeling and Control of Tethered Aerial Vehicles*”.

Public live demonstrations of research project:

- 2018 My PhD defense
- 2018 LAAS RTDays
- 2016 1st AEROARMS review meeting

Media appearance

- 24 Jul. 2025 Télécom Paris n217, “[When machines feel and cooperate: engineering human–cyberphysical synergy](#)”, by C. Pacchierotti and M. Tognon.
- 17 Jun. 2024 Orange Hello Future, “[Construction, maintenance: drones that physically interact with their environment](#)”.
- 14 May 2024 Les Echos, “[Quand les robots auront des ailes](#)”, by Jacques Henno.
- Nov. 2024 SCIENCE & UNIVERS, “ROBOTIQUE: Penser une nouvelle génération de drones de labeur”, by Marc Brialon.
- Apr. 2025 Face au Risque, “[Les drones, un moyen d'assurer la sécurité des salariés?](#)”, by Camille Hostin.

Publications

Thesis

- T1 **M. Tognon**. “Theory and Applications for Control and Motion Planning of Aerial Robots in Physical Interaction with particular focus on Tethered Aerial Vehicles”. *PhD thesis*, 2018, [pdf](#).

Books

- B1 **M. Tognon**, A. Franchi. “Theory and Applications for Control of Aerial Robots in Physical Interaction Through Tethers”. *Springer STAR*, 2020, [pdf](#).

Journal papers

- J1 A. Gonzalez-Morgado, J. Soueidan, G. Heredia, A. Ollero, P. Fraisse, **M. Tognon**, M. Cagnetti. “A Nonlinear MPC for Physical Human-Aerial Robot Interaction in Collaborative Transportation Tasks”. In: *IEEE Robotics and Automation Letters*, 2025, [pdf](#).
- J2 Y. Vyas, M. Bottin, **M. Tognon**, S. Cocuzza. “Design and comparative analysis of force balanced 2 degree of freedom planar robot manipulator concepts”. In: *Journal of Mechanisms and Robotics*, 2025, [pdf](#).
- J3 A. González-Morgado, E. Cuniato, G. Heredia, A. Ollero, R. Siegwart, **M. Tognon**. “How to Shake Trees With Aerial Manipulators? A Theoretical and Experimental Study”. In: *IEEE Robotics and Automation Letters*, vol 10, no. 8, pp. 8067-8074, 2025, [pdf](#), [video](#).
- J4 L. Balandi, P. R. Giordano, **M. Tognon**. “QP-Based Inner-Loop Control for Constraint-Safe and Robust Trajectory Tracking for Aerial Robots”. In: *IEEE Robotics and Automation Letters*, vol 10, no. 7, pp. 6640-6647, 2025, [pdf](#).
- J5 A. González-Morgado, E. Cuniato, **M. Tognon**, G. Heredia, R. Siegwart, A. Ollero. “Controlled Shaking of Trees With an Aerial Manipulator”. In: *IEEE/ASME Transactions on Mechatronics*, vol 30, no. 2, pp. 1026-1037, 2024, [pdf](#), [video](#).
- J6 S. Bamert, R. Cathomen, N. Gorlo, G. Käppeli, M. Müller, T. Reinhart, H. Stadler, H. Shen, E. Cuniato, **M. Tognon**, R. Siegwart. “Geranos: a Novel Tilted-Rotors Aerial Robot for the Transportation of Poles”. In: *IEEE Robotics & Automation Magazine*, 2023, [pdf](#), [video](#).
- J7 V. Klemm, Y. de Viragh, D. Rohr, R. Siegwart, and **M. Tognon**. “Non-Smooth Trajectory Optimization for Wheeled Balancing Robots with Contact Switches and Impacts”. In: *IEEE Transactions on Robotics, Special Issue on Impact Aware Robotics*, vol 41, pp. 497-517, 2023, [pdf](#), [video](#).

- J8 G. Malczyk, M. Brunner, E. Cuniato, **M. Tognon** and R. Siegwart. "Multi-directional Interaction Force Control with an Aerial Manipulator under External Disturbances". In: *Autonomous Robots*, 2023, [pdf](#), [video](#).
- J9 C. Gabellieri, **M. Tognon**, D. Sanalidro, A. Franchi. "Equilibria, Stability, and Sensitivity for the Aerial Suspended Beam Robotic System subject to Model Uncertainty". In: *IEEE Transaction on Robotics*, 2023, [pdf](#), [video](#).
- J10 E. Rossi, **M. Tognon**, L. Ballotta, R. Carli, J. Cortés, A. Franchi, L. Schenato. "Coordinated multi-robot trajectory tracking control over sampled communication". In: *Automatica*, vol 151, pp. 110941, 2023, [pdf](#).
- J11 G. Rizzi, J. J. Chung, A. Gawel, L. Ott, **M. Tognon**, R. Siegwart. "Robust Sampling-Based Control of Mobile Manipulators for Interaction With Articulated Objects". In: *IEEE Transactions on Robotics*, 2023, [pdf](#), [video](#).
- J12 M. Brunner, G. Rizzi, M. Studiger, R. Siegwart, **M. Tognon**. "A Planning-and-Control Framework for Aerial Manipulation of Articulated Objects". In: *IEEE Robotics and Automation Letters*, 2022, [pdf](#), [video](#).
- J13 W. Zhang, L. Ott, **M. Tognon**, R. Siegwart. "Learning Variable Impedance Control for Aerial Sliding on Uneven Heterogeneous Surfaces by Proprioceptive and Tactile Sensing". In: *IEEE Robotics and Automation Letters*, 2022, [pdf](#).
- J14 A. E. Jiménez-Cano, D. Sanalidro, **M. Tognon**, A. Franchi, J. Cortés. "Precise Cable-Suspended Pick-and-Place with an Aerial Multi-robot System". In: *Journal of Intelligent & Robotic Systems*, 2022, [pdf](#).
- J15 F. Benzi, M. Brunner, **M. Tognon**, C. Secchi, R. Siegwart. "Adaptive Tank-based Control for Aerial Physical Interaction with Uncertain Dynamic Environments Using Energy-Task Estimation". In: *IEEE Robotics and Automation Letters*, 2022, [pdf](#), [video](#).
- J16 E. Cuniato, N. Lawrance, **M. Tognon**, R. Siegwart. "Power-based Safety Layer for Aerial Vehicles in Physical Interaction using Lyapunov Exponents". In: *IEEE Robotics and Automation Letters*, 2022, [pdf](#), [video](#).
- J17 M. Allenspach, Y. Vyas, M. Rubio, R. Siegwart, **M. Tognon**. "Human-State-Aware Controller for a Tethered Aerial Robot Guiding a Human by Physical Interaction". In: *IEEE Robotics and Automation Letters*, vol 7, no. 2, pp. 2827-2834, 2022, [pdf](#), [video](#).
- J18 D. Sanalidro, **M. Tognon**, A. Jimenez-Cano, J. Cortes, A. Franchi. "Indirect Force Control of a Cable-suspended Aerial Multi-Robot Manipulator". In: *IEEE Robotics and Automation Letters*, vol 7, no. 3, pp. 2377-3766, 2022, [pdf](#), [video](#).
- J19 K. Bodie, **M. Tognon**, R. Siegwart. "Dynamic End Effector Tracking with an Omnidirectional Parallel Aerial Manipulator". In: *IEEE Robotics and Automation Letters*, vol 6, no. 4, pp. 8165-8172, 2021, [pdf](#), [video](#).
- J20 A. Ollero, **M. Tognon**, A. Suarez, D. Lee and A. Franchi. "Past, Present, and Future of Aerial Robotic Manipulators". In: *IEEE Transactions on Robotics*, 2021, [pdf](#).
- J21 M. Hamandi, F. Usai, Q. Sablé, N. Staub, **M. Tognon** and A. Franchi. "Design of Multirotor Aerial Vehicles: a Taxonomy Based on Input Allocation". In: *International Journal of Robotics Research*, 2021, [pdf](#).
- J22 **M. Tognon**, R. Alami and B. Siciliano. "Physical Human-Robot Interaction with a Tethered Aerial Vehicle: Application to a Force-based Human Guiding Problem". In: *IEEE Transactions on Robotics*, vol 37, no. 3, pp. 723-734, 2020, [pdf](#), [video](#).
- J23 D. Sanalidro, H. J. Savino, **M. Tognon**, J. Cortés and A. Franchi. "Full-pose Manipulation Control of a Cable-suspended load with Multiple UAVs under Uncertainties". In: *IEEE Robotics and Automation Letters*, vol 5, no. 2, pp. 2185-2191, 2020, [pdf](#), [video](#).
- J24 G. Nava, Q. Sablé, **M. Tognon**, D. Pucci and A. Franchi. "Direct Force Feedback Control and Online Multi-task Optimization for Aerial Manipulators". In: *IEEE Robotics and Automation Letters*, vol 5, no. 2, pp. 331-338, 2019, [pdf](#), [video](#).
- J25 C. Gabellieri, **M. Tognon**, D. Sanalidro, L. Pallottino and A. Franchi. "A Study on Force-based Collaboration in Swarms". In: *Swarm Intelligence*, Springer, vol 14, no. 1, pp. 57-82, 2019, [pdf](#).
- J26 E. Rossi, **M. Tognon**, R. Carli, L. Schenato, J. Cortés and A. Franchi. "Cooperative Aerial Load Transportation via Sampled Communication". In: *IEEE Control Systems Letters (L-CSS)*, vol 4, no. 2, pp. 277-282, 2019, [pdf](#).
- J27 **M. Tognon**, H. A. Tello Chávez, E. Gasparin, Q. Sablé, D. Bicego, A. Mallet, M. Lany, G. Santi, B. Revaz, J. Cortés and A. Franchi. "Truly Redundant Aerial Manipulator System with Application to Push-and-Slide Inspection in Industrial Plants". In: *IEEE Robotics and Automation Letters*, vol 4, no. 2, pp. 1846-1851, 2019, [pdf](#), [video](#).

- J28 **M. Tognon**, E. Cataldi, H. Tello Chavez, G. Antonelli, J. Cortés, and A. Franchi. "Control-Aware Motion Planning for Task-Constrained Aerial Manipulation". In: *IEEE Robotics and Automation Letters, Special Issue on Aerial Manipulation*, vol 3, no. 3, pp. 2478-2484, 2018, [pdf](#).
- J29 **M. Tognon**, C. Gabellieri, L. Pallottino, and A. Franchi. "Aerial Co-Manipulation with Cables: The Role of Internal Force for Equilibria, Stability, and Passivity". In: *IEEE Robotics and Automation Letters, Special Issue on Aerial Manipulation*, vol 3, no. 3, pp. 2577-2583, 2018, [pdf](#).
- J30 **M. Tognon** and A. Franchi. "Omnidirectional Aerial Vehicles with Unidirectional Thrusters: Theory, Optimal Design, and Control". In: *IEEE Robotics and Automation Letters*, vol 3, no. 3, pp. 2277-2282, 2018, [pdf](#).
- J31 **M. Tognon** and A. Franchi. "Dynamics, Control, and Estimation for Aerial Robots Tethered by Cables or Bars". In: *IEEE Transactions on Robotics*, vol 33, no. 4, pp. 834-845, 2017, [pdf](#).
- J32 **M. Tognon**, S. S. Dash, and A. Franchi. "Observer-based Control of Position and Tension for an Aerial Robot Tethered to a Moving Platform". In: *IEEE Robotics and Automation Letters*, vol 1, no. 2, pp. 732-737, 2016, [pdf](#), [video](#).

Conference papers

- C1 L. Balandi, P. Robuffo Giordano, **M. Tognon**. "Enhancing IMU Accuracy in MRAVs: A Theoretical and Experimental Approach to Vibration Damping". In *International Conference on Unmanned Aircraft Systems (ICUAS) 2025*, Charlotte, USA, 2025, [pdf](#).
- C2 M. Mehl, A. Dalla Libera, R. Carli, **M. Tognon**. "Model-Based Reinforcement Learning for Robust End-to-End UAV Control from Simulation to Real System Application". In *European Robotics Forum 2025*, Stuttgart, Germany, 2025, [pdf](#).
- C3 L. Balandi, P. Robuffo Giordano, **M. Tognon**. "Acceleration-based Inner-loop Control and MPC for Aerial Robots: Advantages and Drawbacks". In *European Robotics Forum 2025*, Stuttgart, Germany, 2025, [pdf](#).
- C4 T. Hui, E. Cuniato, M. Pantic, **M. Tognon**, M. Fumagalli, R. Siegwart. "Passive Aligning Physical Interaction of Fully-Actuated Aerial Vehicles for Pushing Tasks". In *2024 IEEE International Conference on Robotics and Automation (ICRA)*, Yokohama, Japan, 2024, [pdf](#).
- C5 Y. Vyas, **M. Tognon**, S. Cocuzza. "Force-balanced 2 Degree of Freedom Robot Manipulator based on Four Bar Linkages". In *2024 European Robotics Forum*, Rimini, Italy, 2024, [pdf](#).
- C6 C. Gabellieri, **M. Tognon**, D. Sanalitro, A. Franchi. "Force-based Pose Regulation of a Cable-Suspended Load Using UAVs with Force Bias". In *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2023)*, Detroit, UAS, 2023, [pdf](#).
- C7 E. Cuniato, I. Geles, W. Zhang, O. Andersson, **M. Tognon**, R. Siegwart. "Learning to Open Doors with an Aerial Manipulator". In *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2023)*, Detroit, UAS, 2023, [pdf](#), [video](#).
- C8 M. Allenspach, S. Laasch, N. Lawrance, **M. Tognon**, R. Siegwart. "Mixed Reality Human-Robot Interface to Generate and Visualize 6DoF Trajectories: Application to Omnidirectional Aerial Vehicles". In *2023 International Conference on Unmanned Aircraft Systems (ICUAS)*, Warsaw, Poland, 2023, [pdf](#), [video](#).
- C9 B. Hallworth, M. Allenspach, R. Siegwart, **M. Tognon**. "State-Aware Path-Following with Humans Through Force-based Communication via Tethered Physical Aerial Human-Robot Interaction". In *2023 International Conference on Unmanned Aircraft Systems (ICUAS)*, Warsaw, Poland, 2023, [pdf](#).
- C10 M. Rubio, J. Näf, F. Bühlmann, P. Brigger, M. Hüscher, M. Inauen, N. Ospelt, D. Gisler, **M. Tognon**, R. Siegwart. "Design of PrisMAV: An Omnidirectional Aerial Manipulator based on a 3-PUU Parallel Mechanism". In *2023 International Conference on Unmanned Aircraft Systems (ICUAS)*, Warsaw, Poland, 2023, [pdf](#).
- C11 M. Allenspach, T. Kötter, R. Bähnemann, **M. Tognon**, R. Siegwart. "Design and Evaluation of a Mixed Reality-based Human-Robot Interface for Teleoperation of Omnidirectional Aerial Vehicles". In *2023 International Conference on Unmanned Aircraft Systems (ICUAS)*, Warsaw, Poland, 2023, [pdf](#).
- C12 E. Cuniato, C. Geckeler, M. Brunner, D. Strübin, E. Bähler, F. Ospelt, **M. Tognon**, S. Mintchev, and R. Siegwart. "Design and Control of a Micro Overactuated Aerial Robot with an Origami Delta Manipulator". In *2023 IEEE International Conference on Robotics and Automation (ICRA)*, London, England, 2023, [pdf](#), [video](#).

- C13 L. Shi, M. Pantic, O. Andersson, **M. Tognon**, R. Siegwart, R. H. Jacobsen. "Reactive Motion Planning for Rope Manipulation and Collision Avoidance using Aerial Robots". In *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2022)*, Kyoto, Japan, 2022, [pdf](#).
- C14 C. Lanegger, M. Ruggia, **M. Tognon**, L. Ott, R. Siegwart. "Aerial Layouting: Design and Control of a Compliant and Actuated End-Effector for Precise In-flight Marking on Ceilings". In *Robotics: Science and System XVIII*, New York City, USA, 2022, [pdf](#), [video](#).
- C15 R. Szász, M. Allenspach, M. Han, **M. Tognon**, R. K. Katzschnmann. "Modeling and Control of an Omnidirectional Micro Aerial Vehicle Equipped with a Soft Robotic Arm". In *2022 IEEE 5th International Conference on Soft Robotics (RoboSoft)*, Edinburgh, Scotland, 2022.
- C16 M. Brunner, L. Giacomini, R. Siegwart, and **M. Tognon**. "Energy Tank-Based Policies for Robust Aerial Physical Interaction with Moving Objects". In *2022 IEEE Int. Conf. on Robotics and Automation*, Philadelphia (PA), USA, 2022, [pdf](#), [video](#).
- C17 M. Allenspach, N. Lawrance, **M. Tognon**, and R. Siegwart. "Towards 6DoF Bilateral Teleoperation of an Omnidirectional Aerial Vehicle for Aerial Physical Interaction". In *2022 IEEE Int. Conf. on Robotics and Automation*, Philadelphia (PA), USA, 2022, [pdf](#), [video](#).
- C18 M. Hamandi, Q. Sable, **M. Tognon**, and A. Franchi. "Understanding the omnidirectional capability of a generic multi-rotor aerial vehicle". In *Aerial Robotic Systems Physically Interacting with the Environment (AIRPHARO)*, Biograd na Moru, Croatia, 2021, [pdf](#).
- C19 Y. Vyas, M. Allenspach, C. Lanegger, R. Siegwart, and **M. Tognon**. "Modelling and Estimation of Human Walking Gait for Physical Human-Robot Interaction". In *Aerial Robotic Systems Physically Interacting with the Environment (AIRPHARO)*, Biograd na Moru, Croatia, 2021, [pdf](#). Presented by me.
- C20 L. Peric, M. Brunner, K. Bodie, **M. Tognon**, and R. Siegwart. "Direct Force and Pose NMPC with Multiple Interaction Modes for Aerial Push-and-Slide Operations". In *2021 IEEE Int. Conf. on Robotics and Automation*, Xi'an, China, 2021, [pdf](#), [video](#).
- C21 W. Zhang, **M. Tognon**, L. Ott, R. Siegwart and J. Nieto. "Active Model Learning using Informative Trajectories for Improved Closed-Loop Control on Real Robots". In *2021 IEEE Int. Conf. on Robotics and Automation*, Xi'an, China, 2021, [pdf](#), [video](#).
- C22 E. Umili, **M. Tognon**, D. Sanalitra, G. Oriolo, and A. Franchi. "Communication-based and Communication-less approaches for Robust Cooperative Planning in Construction with a Team of UAVs". In *2020 International Conference on Unmanned Aircraft Systems (ICUAS)*, Athens, Greece, 2020, [pdf](#), [video](#).
- C23 M. Hamandi, k. Sawant, **M. Tognon**, and A. Franchi. "Omni-Plus-Seven (O_+^7): An Omnidirectional Aerial Prototype with Minimal Uni-directional Thrusters". In *2020 International Conference on Unmanned Aircraft Systems (ICUAS)*, Athens, Greece, 2020, [pdf](#), [video](#).
- C24 A. Petitti, D. Sanalitra, **M. Tognon**, A. Milella, J. Cortés, and A. Franchi. "Inertial Estimation and Energy-Efficient Control of a Cable-suspended Load with a Team of UAVs". In *2020 International Conference on Unmanned Aircraft Systems (ICUAS)*, Athens, Greece, 2020, [pdf](#).
- C25 M. Hamandi, **M. Tognon**, and A. Franchi. "Direct Acceleration Feedback Control of Quadrotor Aerial Vehicles". In *2020 IEEE Int. Conf. on Robotics and Automation*, Paris, France, 2020, [pdf](#), [video](#).
- C26 C. Gabellieri, **M. Tognon**, L. Pallottino and A. Franchi. "A Study on Force-based Collaboration in Flying Swarms". In *11th Int. Conf. on Swarm Intelligence ANTS 2018*, Rome, Italy, 2018, [pdf](#).
- C27 **M. Tognon** and A. Franchi. "Landing and Take-off on/from Sloped and Non-planar Surfaces with more than 50 Degrees of Inclination". In *9th International Micro Air Vehicles Conference*, Toulouse, France, 2017, pp. 97-102, [pdf](#).
- C28 Sanchez-Lopez, J.-L., V. Arellano-Quintana, **M. Tognon**, P. Campoy, and A. Franchi. "Visual Marker based Multi-Sensor Fusion State Estimation". In *20th IFAC World Congress*, Toulouse, France, 2017, pp. 16003-16008, [pdf](#), [video](#).
- C29 **M. Tognon** and A. Franchi. "Position Tracking Control for an Aerial Robot Passively Tethered to an Independently Moving Platform". In *20th IFAC World Congress*, Toulouse, France, 2017, pp. 1069-1074, [pdf](#).
- C30 **M. Tognon**, B. Yüksel, G. Buondonno, and A. Franchi. "Dynamic Decentralized Control for Protocentric Aerial Manipulators". In *2017 IEEE Int. Conf. on Robotics and Automation*, Singapore, 2017, pp. 6375-6380, [pdf](#), [video](#).

- C31 **M. Tognon**, A. Testa, E. Rossi, and A. Franchi . “Takeoff and Landing on Slopes via Inclined Hovering with a Tethered Aerial Robot”. In *2016 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems*, Daejeon, South Korea, 2016, pp. 1702-1707, [pdf](#), [video](#).
- C32 **M. Tognon** and A. Franchi. “Nonlinear Observer for the Control of Bi-Tethered Multi Aerial Robots”. In *In: 2015 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems*, Hamburg, Germany, 2015, pp. 1852-1857, [pdf](#), [video](#).
- C33 **M. Tognon** and A. Franchi. “Control of Motion and Internal Stresses for a Chain of Two Underactuated Aerial Robots”. In *14th European Control Conference*, Linz, Austria, 2015, pp. 1614-1619, [pdf](#).
- C34 **M. Tognon** and A. Franchi. “Nonlinear Observer-based Tracking Control of Link Stress and Elevation for a Tethered Aerial Robot using Inertial-only Measurements”. In *2015 IEEE Int. Conf. on Robotics and Automation*, Seattle, WA, 2015, pp. pp. 3994-3999, [pdf](#), [video](#).

Workshop organization

- W1 **M. Tognon**, GdR-TS3 & GICAT co-chairs, . “Advancing Multi-Robot Systems: A Joint GdR-TS3 & GICAT Workshop”. In: *National activity*, Rennes, France, June 2025.
- W2 A. Ollero, P. Pounds, G. Loianno, H. J. Kim, **M. Tognon**, M. Greef. “Bioinspired, soft and other novel design paradigms for aerial robotics”. In: *2024 IEEE International Conference on Robotics and Automation (ICRA)*, Yokohama, Japan, May 2024, [Website](#)