

Mario Coppola

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SKILLS

Scientific

Distributed systems • Machine learning • Sensor fusion • Relative localization • Control systems

Programming

Python • C++ • C • MatLab

Languages

English (Native) • Italian (Native) • Dutch (Advanced) • Spanish (Intermediate)

EDUCATION

PhD ROBOTICS AND AI

DELFT UNIVERSITY OF TECHNOLOGY

2016-2020 | Delft, Netherlands

Thesis: *Automatic verifiable design of robot swarms.*

MSc AEROSPACE ENGINEERING

DELFT UNIVERSITY OF TECHNOLOGY

2013-2016 | Delft, Netherlands

Honors student, specialized in Control and Simulation. Thesis: *On-board relative localization for collision avoidance in micro air vehicle teams.*

EXCHANGE MINOR ROBOTICS

NANYANG TECHNOLOGICAL UNIVERSITY

Fall semester 2012 | Singapore

Courses on robotics and embedded systems.

BSc AEROSPACE ENGINEERING

DELFT UNIVERSITY OF TECHNOLOGY

2010-2013 | Delft, Netherlands

Thesis: *Design of a controllable system for the guided atmosphere-assisted deceleration of a human-rated precursor vehicle to Mars.*

Supervised by NASA Langley Research Center.

INTERNATIONAL BACCALAUREATE

INTERNATIONAL SCHOOL EINDHOVEN

2008-2010 | Eindhoven, Netherlands

ADDITIONAL ACTIVITIES

2019	TU Delft PhD council representative
2019	Multi-Robot Systems Summer School at Czech Technical University, Prague
2018	Lecturer at BEST Summer School
2017	International Graduate Summer School in Aeronautics and Astronautics at Beihang University, Beijing

WORK EXPERIENCE

PhD CANDIDATE | DELFT UNIVERSITY OF TECHNOLOGY

Sep. 2016 – Sep. 2020 | Delft, Netherlands

- Research topic: *Automatic verifiable design of robot swarms*, with joint supervision by the Micro Air Vehicle Laboratory (MAVLab) and the Space Systems Engineering group.

Main achievements:

- A framework to automatically design, optimize, and verify the behavior of distributed robotic systems with limited on-board sensors.
- Distributed algorithms that enable teams of agents to self-organize and achieve collective goals from the combination of local objectives.
- A novel on-board state estimation technology that allows several tiny drones to localize each other and fly in tight areas.

RESEARCHER (INTERN) | MAX PLANCK INSTITUTE

Feb. 2015 – Jun. 2015 | Tübingen, Germany

- Intern within the Autonomous Robotics and Human-Machine Systems group at the Institute for Biological Cybernetics.
- I developed a **reinforcement learning** scheme to teach drones how to perform efficient evasive maneuvers in crowded areas.

R&D SCIENTIST (INTERN) | HONEYWELL AEROSPACE

Jul. 2014 – Jan. 2015 | Brno, Czech Republic

- Project 1: **Software developer** for next generation flight-decks featuring multi-modal pilot interaction.
- Project 2: Review of the benefits and limitations of COTS model-based design tools for flight software development.
- From Feb. 2015 to Dec. 2015 I continued as a remote part-time consultant aiding with the preparation of R&D proposals.

TEACHING ASSISTANT | DELFT UNIVERSITY OF TECHNOLOGY

Aug. 2013 – Jul. 2014, Aug. 2015 – Jan. 2016 | Delft, Netherlands

- Assisted with teaching classes, supervising, and grading for various BSc Aerospace Engineering courses.

SELECTED AWARDS

2017	System Design Award at the 2017 International Micro Air Vehicle (IMAV) competition and conference
2017	Excellent Student Award at the International Graduate Summer School in Aeronautics and Astronautics of Beihang University, Beijing
2014	Third place at BestGraduates International Competition (assessment panel by ASML, Shell, Philips, TNO, DSM, Fugro, and Friesland Campina)

PUBLICATIONS

For more information please visit my academic profiles:



Google Scholar profile scholar.google.com/citations?user=le_9D_cAAAAJ



ORCID profile www.orcid.org/0000-0003-4694-2960

- [1] Shushuai Li, **Mario Coppola**, Christophe De Wagter, and Guido C. H. E. de Croon. An autonomous swarm of micro flying robots with range-based relative localization. *arXiv preprint arXiv:2003.05853*, Mar. 2020.
- [2] **Mario Coppola**, Kimberly N. McGuire, Christophe De Wagter, and Guido C. H. E. de Croon. A survey on swarming with micro air vehicles: Fundamental challenges and constraints. *Frontiers in Robotics and AI*, 7:18, Feb. 2020.
- [3] **Mario Coppola**, Jian Guo, Eberhard Gill, and Guido C. H. E. de Croon. The PageRank algorithm as a method to optimize swarm behavior through local analysis. *Swarm Intelligence*, 13(3):277–319, Aug. 2019.
- [4] Steven van der Helm, **Mario Coppola**, Kimberly N. McGuire, and Guido C. H. E. de Croon. On-board range-based relative localization for micro air vehicles in indoor leader–follower flight. *Autonomous Robots*, 44(3):415–441, Mar. 2019.
- [5] **Mario Coppola**, Jian Guo, Eberhard Gill, and Guido C. H. E. de Croon. Provable self-organizing pattern formation by a swarm of robots with limited knowledge. *Swarm Intelligence*, 13(1):59–94, Feb. 2019.
- [6] **Mario Coppola** and Guido C. H. E. de Croon. Optimization of swarm behavior assisted by an automatic local proof for a pattern formation task. In Marco Dorigo, Mauro Birattari, Christian Blum, Anders L. Christensen, Andreagiovanni Reina, and Vito Trianni, editors, *Swarm Intelligence*, pages 123–134, Cham, Oct. 2018.
- [7] **Mario Coppola**, Kimberly N. McGuire, Kirk Y. W. Scheper, and Guido C. H. E. de Croon. On-board communication-based relative localization for collision avoidance in Micro Air Vehicle teams. *Autonomous Robots*, 42(8):1787–1805, May 2018.
- [8] Kimberly N. McGuire, **Mario Coppola**, Christophe De Wagter, and Guido C. H. E. de Croon. Towards autonomous navigation of multiple pocket-drones in real-world environments. In *2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pages 244–249, Sep. 2017.