

Makram Chahine | AI & Robotics

doctoral student - MIT EECS

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Education

Massachusetts Institute of Technology

Cambridge MA, USA

PhD in Electrical Engineering and Computer Science,
Artificial Intelligence, Robotics, Game Theory.

2021–Present

Georgia Institute of Technology

Atlanta GA, USA

Master's of Science in Aerospace Engineering,
Control Theory, Mathematics, Decision and Planning for Autonomy.

2018–2019

École Centrale Paris

Paris, France

Diplôme d'Ingénieur des Arts et Manufactures (Master's level),
Applied Mathematics, Algorithms and Programming, Systems Engineering.

2015–2019

Lycée Thiers

Marseille, France

Classes préparatoires aux Grandes Écoles,

2013–2015

Advanced undergraduate courses in Mathematics and Physics in preparation for the national Grandes Écoles entry exams.

Professional experience

Massachusetts Institute of Technology

Cambridge MA, USA

Graduate Research Assistant

Sep 2021–Present

Exploring ideas at the intersection of machine learning, control theory, multi-agent robotics, and game theory with Prof. Daniela Rus at the Distributed Robotics Laboratory (DRL).

Parrot Drones

Paris, France

Control and Estimation Engineer

Mar 2020–Aug 2021

Enhancing control and sensor/vision fusion estimation algorithms for the upcoming generation of utility drones. Expanding on the modeling of vision, sensor and mechanical faults in simulated and real flight environments.

Georgia Institute of Technology

Atlanta GA, USA

Graduate Research Assistant

Aug 2018–Dec 2019

Developing novel hybrid control architectures for multiagent systems consensus within Prof. Wassim M. Haddad's CASCADES laboratory. (Center for Advanced Studies in Controls and Dynamics in Engineering and Science).

Georgia Institute of Technology

Atlanta GA, USA

Graduate Teaching Assistant

Aug 2019–Dec 2019

Accompanying 48 students in the third year 'Control System Analysis and Design' class, holding office hours, grading homework/exams and periodically conducting lectures.

European Space Agency

Noordwijk, Netherlands

GNC & Systems Engineer Intern

Feb–Aug 2018

Validating the performance of the Guidance, Navigation and Control software for the two autonomous satellites flying in tandem on the Proba-3 mission through Monte Carlo simulations at the European Space Research and Technology Centre.

Louis Dreyfus Company

Johannesburg, South Africa

Analytics Intern

Jul–Dec 2017

Optimizing delivery and procurement operations, analyzing sales data, advising on strategy, as well as managing farmers' projects for LDC's grain operations across three mills employing over 500 people across South Africa.

Publications

- Robust Flight Navigation Out-of-Distribution with Liquid Neural Networks**
M. Chahine, R. Hasani, P. D. Kao, A. Ray, R. Shubert, M. Lechner, A. Amini, and D. Rus, 2023
Science Robotics (Vol 8, 2023), ([link](#))
- Learning Stability Attention in Vision-based End-to-end Driving Policies**
W. Xiao, T-H. Wang, M. Chahine, A. Amini, R. Hasani, and D. Rus, 2023
Learning for Dynamics & Control Conference, ([link](#))
- BarrierNet: Differentiable Control Barrier Functions for Learning of Safe Robot Control**
W. Xiao, T-H. Wang, R. Hasani, M. Chahine, A. Amini, X. Li, and D. Rus, 2023
IEEE Transactions on Robotics, ([link](#))
- Liquid Structural State-Space Models**
R. Hasani, M. Lechner, T-H. Wang, M. Chahine, A. Amini, and D. Rus, 2023
International Conference on Learning Representations, ([link](#))
- Intention Communication and Hypothesis Likelihood in Game-Theoretic Motion Planning**
M. Chahine, R. Firoozi, W. Xiao, M. Schwager, and D. Rus, 2023
IEEE Robotics and Automation Letters, ([link](#))
- A Hybrid Thermodynamic Control Protocol for Semistability and Consensus**
W. M. Haddad and M. Chahine, 2021
IEEE Transactions on Automatic Control, ([link](#))
- Condensed Matter Physics, and Hybrid Consensus Protocols for Network Systems**
W. M. Haddad and M. Chahine, 2020
American Control Conference, ([link](#))

Work under submission

- Local Non-Cooperative Games with Principled Player Selection for Scalable Motion Planning**
M. Chahine, R. Firoozi, W. Xiao, M. Schwager, and D. Rus, 2023
IEEE International Conference on Intelligent Robots and Systems
- Cooperative Flight Control Using Visual-Attention–Air-Guardian**
L. Yin, T-H. Wang, M. Chahine, T. Seyde, M. Lechner, R. Hasani, and D. Rus, 2023
IEEE International Conference on Intelligent Robots and Systems

Invited talks

- SIAM Conference on Control and Its Applications**
Society for Industrial and Applied Mathematics Jul 2023
BarrierNet: Differentiable Control Barrier Functions for Learning of Safe Robot Control

Student mentoring

- Alex Quach**
M. Eng. in EECS at MIT Jun 2023 – May 2024
"Multimodal leaning for end-to-end drone collaborative flight"
- Patrick D. Kao**
M. Eng. in EECS at MIT Sep 2021 – May 2022
"Decision-making with Continuous Depth Models"
- Nikhil M. Singhal**
M. Eng. in EECS at MIT Sep 2021 – May 2022
"Efficient Connectivity Maintenance For Distributed Robotic Systems"