

Makram Chahine | AI & Robotics

doctoral student - MIT EECS

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Education

Massachusetts Institute of Technology

PhD in Electrical Engineering and Computer Science,
Artificial Intelligence, Robotics, Dynamical Systems.

Cambridge MA, USA

2021–Present

Georgia Institute of Technology

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

Atlanta GA, USA

2018–2019

École Centrale Paris

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

Paris, France

2015–2019

Professional experience

Harvard University

Research Associate

Developing aerial robotics solutions in the context of Project CETI in Prof. Robert J. Wood's Lab. Marine missions involve sperm whale monitoring and sensor deployment around the island of Dominica.

Boston MA, USA

Sep 2024–Present

Massachusetts Institute of Technology

Graduate Research Assistant

Exploring topics at the intersection of machine learning, control theory, and robotics with Prof. Daniela Rus at the Distributed Robotics Laboratory.

Cambridge MA, USA

Sep 2021–Present

Stanford University

Visiting Student Researcher

Designing guidance based diffusion planners for multi-agent cooperation at the Multi-agent Systems Lab under the supervision of Prof. Mac Schwager.

Stanford, CA, USA

Jan 2024

MIT-IBM Watson AI Lab

Graduate Research Intern

Deploying Large Language Models as game-theoretic objective designers and planners for multi-agent systems.

Cambridge, MA, USA

Jun 2023–Aug 2023

Parrot Drones

Control and Estimation Engineer

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

Paris, France

Mar 2020–Aug 2021

Georgia Institute of Technology

Graduate Research Assistant

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

Atlanta GA, USA

Aug 2018–Dec 2019

European Space Agency

GNC & Systems Engineer Intern

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.

Noordwijk, Netherlands

Feb–Aug 2018

Publications

The Curious Case of In-Training Compression of State Space Models

M. Chahine, P. Nazari, D. Rus, T.K. Rusch, 2026
International Conference on Representation Learning, ([Under review](#))

Improving Efficiency of Sampling-based Motion Planning via Message-Passing Monte Carlo

M. Chahine, T.K. Rusch, Z.J. Patterson, D. Rus, 2025
Conference on Robot Learning, ([link](#))

Decentralized Vision-Based Autonomous Aerial Wildlife Monitoring

M. Chahine, W. Yang, A. Maalouf, J. Siriska, N. Jadhav, D.M. Vogt, S. Gil, R.J. Wood, D. Rus 2025
International Symposium on Experimental Research, ([link](#))

Flex: End-to-End Text-Instructed Visual Navigation with Foundation Models

M. Chahine, A. Quach, A. Maalouf, T-H. Wang, D. Rus, 2024
arXiv preprint arXiv:2410.13002, ([link](#))

Gaussian splatting to real world flight navigation transfer with liquid networks

A. Quach, M. Chahine*, A. Amini, R. Hasani, D. Rus,* 2024
Conference on Robot Learning, ([link](#))

Follow Anything: Open-Set Detection, Tracking, and Following in Real-Time

A. Maalouf, N. Jadhav, K.M. Jatavallabhula, M. Chahine, D. Vogt, R. Wood, A. Torralba, D. Rus, 2024
IEEE Robotics and Automation Letters, ([link](#))

Towards Cooperative Flight Control Using Visual-Attention

L. Yin, M. Chahine, T-H. Wang, T. Seyde, C. Liu, M. Lechner, R. Hasani, and D. Rus, 2023
IEEE International Conference on Intelligent Robots and Systems, ([link](#))

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, ([link](#))

Learning stability attention in vision-based end-to-end driving policies

T-H. Wang, W. Xiao, M. Chahine, A. Amini, R. Hasani, and D. Rus, 2023
Learning for Dynamics & Control Conference, ([link](#))

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](#))

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](#))

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](#))

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](#))

Differentiable control barrier functions for vision-based end-to-end autonomous driving

W. Xiao, T-H. Wang, M. Chahine, A. Amini, R. Hasani, and D. Rus, 2022
arXiv preprint arXiv:2203.02401, ([link](#))

A Hybrid Thermodynamic Control Protocol for Semistability and Consensus

W. M. Haddad and M. Chahine, 2021
IEEE Transactions on Automatic Control, ([link](#))

Students mentored

Ishaan Vohra

Undergraduate Research Opportunities Program in EECS at MIT
Generative Simulation for Visuo-Motor Policy Generalization

Sep 2025 – May 2026

Arthur De Los Santos

Undergraduate Research Opportunities Program in EECS at MIT
Temporal Logic Planning for Multistep Vision-Language Navigation

Sep 2025 – May 2026

William Yang

Undergraduate Research Opportunities Program & M. Eng. in EECS at MIT
Decentralized Multi-Agent Wildlife Monitoring
Graph Neural Networks for Scalable Robot Interaction Prediction

Sep 2024 – May 2026

Kartikesh Mishra

M. Eng. in EECS at MIT
Foundation Model Features for Vision-Language Navigation

Jan 2025 – May 2025

Alex Quach

M. Eng. in EECS at MIT
Sim-to-real Flight Policy Transfer via Gaussian Simulation

Jun 2023 – May 2024

Patrick D. Kao

M. Eng. in EECS at MIT
Visuo-motor Navigation with Liquid Neural Networks

Sep 2021 – May 2022

Nikhil M. Singhal

M. Eng. in EECS at MIT
Efficient Connectivity Maintenance For Distributed Robotic Systems

Sep 2021 – May 2022