Makram Chahine | ML & Robotics doctoral student - MIT EECS

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Education

Massachusetts Institute of Technology — **Cambridge MA, USA**
PhD in Electrical Engineering and Computer Science, — *2021–Present*
Machine Learning, Dynamical Systems, Robotics.

Georgia Institute of Technology — **Atlanta GA, USA**
Master's of Science in Aerospace Engineering, — *2018–2019*
Control Theory, Mathematics, Decision and Planning for Autonomy.

École Centrale Paris — **Paris, France**
Diplôme d'Ingénieur des Arts et Manufactures (Master's level), — *2015–2019*
Applied Mathematics, Algorithms and Programming, Optimization.

Professional experience

Massachusetts Institute of Technology — **Cambridge MA, USA**
Graduate Teaching Assistant — *Feb 2026–Present*
Accompanying Prof. Paris Smaragdis in conducting the graduate course on Machine Learning for Signal Processing.

Harvard University — **Boston MA, USA**
Research Associate — *Sep 2024–Present*
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.

Massachusetts Institute of Technology — **Cambridge MA, USA**
Graduate Research Assistant — *Sep 2021–Present*
Exploring topics at the intersection of machine learning, control theory, and robotics with Prof. Daniela Rus.

Stanford University — **Stanford, CA, USA**
Visiting Student Researcher — *Jan 2024*
Desiging guidance based diffusion planners for multi-agent cooperation at the Multi-agent Systems Lab under the supervision of Prof. Mac Schwager.

MIT-IBM Watson AI Lab — **Cambridge, MA, USA**
Graduate Research Intern — *Jun 2023–Aug 2023*
Deploying Large Language Models as game-theoretic objective designers and planners for multi-agent systems.

Parrot Drones — **Paris, France**
Control and Estimation Engineer — *Mar 2020–Aug 2021*
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.

Georgia Institute of Technology — **Atlanta GA, USA**
Graduate Research Assistant — *Aug 2018–Dec 2019*
Developing novel hybrid control architectures for multi-agent systems consensus with Prof. Wassim M. Haddad.

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.

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 Learning (to appear), (link)

Neural Low-Discrepancy Sequences
M.E. Van Huffel, N. Kirk, M. Chahine, D. Rus, T.K. Rusch, *2025*
Preprint, (link)

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*
Preprint, (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*
Preprint, (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)

Invited talks

Robot Learning Seminar
Montreal Institute for Learning Algorithms (Mila) *Feb 2026*
From Whales to Hankel Singular Values: The Symbiosis of Control Theory and Foundation Models

Monte-Carlo Methods Conference
Illinois Institute of Technology *Jul 2025*
Improving Efficiency of Sampling-based Motion Planning via Message-Passing Monte Carlo

Multi-agent Systems Lab
Stanford University *Jan 2024*
Robust Flight Navigation Out-of-Distribution with Liquid Neural Networks

Robotics and Perception Group
University of Zurich *Sep 2023*
Robust Flight Navigation Out-of-Distribution with Liquid Neural Networks

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

Ishaan Vohra
Undergraduate Research Opportunities Program in EECS at MIT *Sep 2025 – May 2026*
Generative Simulation for Visuo-Motor Policy Generalization

Arthur De Los Santos
Undergraduate Research Opportunities Program in EECS at MIT *Sep 2025 – May 2026*
Temporal Logic Planning for Multistep Vision-Language Navigation

William Yang
Undergraduate Research Opportunities Program & M. Eng. in EECS at MIT *Sep 2024 – May 2026*
Decentralized Multi-Agent Wildlife Monitoring
Graph Neural Networks for Scalable Robot Interaction Prediction

Kartikesh Mishra
M. Eng. in EECS at MIT *Jan 2025 – May 2025*
Foundation Model Features for Vision-Language Navigation

Alex Quach
M. Eng. in EECS at MIT *Jun 2023 – May 2024*
Sim-to-real Flight Policy Transfer via Gaussian Splatting

Patrick D. Kao
M. Eng. in EECS at MIT *Sep 2021 – May 2022*
Visuo-motor Navigation with Liquid Neural Networks

Nikhil M. Singhal
M. Eng. in EECS at MIT *Sep 2021 – May 2022*
Efficient Connectivity Maintenance For Distributed Robotic Systems