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, — *2021–Present*
Artificial Intelligence, Robotics, Dynamical Systems.

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, Systems Engineering.

Professional experience

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 at the Distributed Robotics Laboratory.

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 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 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.

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 — *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 Simulation

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