Dylan M. Asmar

Education

Stanford University Sep 2025
Doctor of Philosophy, Aeronautics and Astronautics *Stanford, CA*
Advisor: Mykel J. Kochenderfer
Areas of research: Decision making under uncertainty, human-AI collaboration, optimization

Massachusetts Institute of Technology May 2013
Master of Science, Aeronautics and Astronautics *Cambridge, MA*
Advisors: Jonathan How and Mykel J. Kochenderfer

United States Air Force Academy May 2011
Bachelor of Science, Mathematics and Astronautical Engineering *USAFA, CO*
Honors: Distinguished Graduate, Academic Distinction, Military Distinction, Academy Scholar

Work Experience

Technical Staff Sep 2025 – Present
Group 103 Tactical Autonomy, MIT Lincoln Laboratory *Lexington, MA*
- Conducting research on multi-agent autonomy at scale, with a focus on the engineering challenges of decentralized planning, coordination under uncertainty, and emergent behavior in large heterogeneous agent populations engaged in complex joint tasks.
- Contributing to a GPS-denied tactical navigation program investigating relative localization architectures for teams of agents operating with a single ultra-wideband (UWB) ranging sensor per entity; responsibilities span simulation development, algorithm evaluation, and analysis support.
- Performed analysis quantifying the value of coordination as a function of agent mass and scale, informing design trade-offs for large-scale autonomous systems operating under resource and communication constraints.

Autonomy and Simulation Subject Matter Expert/F-22 Operational Test and Evaluation Pilot Oct 2021 – Present
232nd Combat Training Squadron, Nevada Air National Guard *Nellis AFB, NV*
- Serve as the unit's primary autonomy advisor, providing technical consultation on the integration and evaluation of autonomous and AI-enabled systems.
- Mentored operations analysts and flight test engineers in the application of advanced data tools for operational test and evaluation, bridging tactical operational experience with engineering rigor.
- Led operations analysis teams integrating tactical knowledge with engineering analysis to ensure accuracy and relevance of evaluations in the advancement of aircraft tactics and capabilities.
- Collaborated with the 59th and 422nd Test and Evaluation Squadrons as a modeling, simulation, and analysis expert to improve the application of simulations and simulation data in operational test.
- Provided strategic acquisition insights by leveraging experience across operational and engineering domains.

Hugh H. Skilling Stanford Graduate Fellow/Ph.D. Candidate Sep 2021 – Aug 2025
Stanford Intelligent Systems Laboratory, Stanford University *Stanford, CA*
- Mentored a diverse group of undergraduate and master's students, fostering their academic growth and research competencies through collaborative projects.
- Served on the department's student advisory committee, advocating for student interests and promoting constructive changes to the curriculum and academic policies.
- Conducted advanced research on decision making under uncertainty, with a focus on integrating human expertise and artificial intelligence systems.
- Collaborated with cross-disciplinary teams and external partners to advance robotics research, with a particular emphasis on enhancing human-robot interaction.

Data Science Test Director/F-22 Operational Test and Evaluation Pilot Aug 2019 – Oct 2021

59th Test and Evaluation Squadron, United States Air Force *Nellis AFB, NV*

- Led a data science team to modernize the use of data analytics within operational test and guided infrastructure development in support of data initiatives in alignment with the DoD Data Strategy.
- Orchestrated the first-ever integration of F-22 and F-35 flight data to verify software updates. Using pre-existing data in lieu of designated test runs, we efficiently validated the functionality of Mode 5 responses, facilitating the rapid deployment of Mode 5 capability to operational F-22 squadrons.
- Developed an innovative method to improve the F-22 flight software and enhance its defensive capabilities. Collaborating closely with industry partners, we successfully integrated this solution into the software within a few months, addressing a longstanding issue and providing a timely resolution.
- Collaborated with and advised multiple working groups to help develop solutions to reliably test and validate safety critical autonomy systems.

Chief, Squadron Safety/F-22 Operational Test and Evaluation Pilot Sep 2018 – Aug 2019

422nd Test and Evaluation Squadron, United States Air Force *Nellis AFB, NV*

- Developed and evaluated the operational feasibility of tactics for new hardware and software on the F-22.
- Aided in software development by identifying deficiencies and ensuring hardware and software modifications on the F-22 were operationally advantageous.
- Built a software tool that assists pilots in identifying critical decisions during a dogfight, reducing the time pilots spend analyzing their flights and eliminating human error or bias when trying to reconstruct sections of the flight from memory.
- Investigated root causes of mishaps in the six different types of fighter aircraft as Chief of Squadron Safety, aiming to prevent future accidents across the fleets.

F-22 Pilot/Mission Commander Nov 2015 – Sep 2018

95th Fighter Squadron, United States Air Force *Tyndall AFB, FL*

- Led the planning, employment, and integration of air assets in complex multi-service/multinational training and combat missions.
- Coordinated multiple efforts including orchestrating 77 combat sorties in Operation Inherent Resolve (OIR) and leading the first ever F-22 and CV-22 integration.
- Ensured the safe execution of the F-22 aerial demonstration as the F-22 Demonstration Team Safety Officer, while representing the F-22 community and the United States Air Force at air shows across the United States.
- Responsible for in-depth understanding of wartime contingency plans and rules of engagement in a global environment.

Officer/Student Pilot May 2011 – Nov 2015

United States Air Force *Sheppard AFB, TX and Tyndall AFB, FL*

- Completed the F-22 initial qualification course—an advanced course designed to produce near-mission ready F-22 pilots—with a 99% academic record and earned the "Top Gun" award for tactical employment.
- Attended Euro-NATO Joint Jet Pilot Training (ENJJPT) involving 350 hours of academic training, 112 hours of simulator training, and 202 hours of flight training while maintaining a 100% academic record and receiving the Academic Excellence Award.

Research Assistant Aug 2011 – May 2013

Group 42 Surveillance Systems, MIT Lincoln Laboratory *Lexington, MA*

- Researched novel methods to approach airborne collision avoidance utilizing existing hardware in aircraft.
- Developed and extended the Airborne Collision Avoidance System X (ACAS X) program from two-aircraft encounters to coordination with multiple aircraft including interoperability with legacy systems.
- Reduced the probability of near-midair collisions on coordinated encounters by 68% from previous ACAS X versions and by 72% compared to the legacy Traffic Collision Avoidance Systems (TCAS).

TEACHING EXPERIENCE/MENTORSHIP

Head Teaching Assistant/Teaching Assistant Sep – Dec 2023, 2024
AA228/CS238 Decision Making Under Uncertainty, Stanford University *Stanford, CA*

- Led a team of eleven teaching assistants, coordinating efforts to provide consistent grading and prompt feedback, ensuring a high standard of learning for all students.
- Coordinated course activities and facilitated instruction for a large class of over 400 students, maintaining a smooth and effective learning environment.
- Orchestrated the structuring and execution of interactive programming projects on Bayesian networks, reinforcement learning, and partially observable Markov decision processes (POMDPs).

Course Development Assistant June – Dec 2024
AA120Q Building Trust in Autonomy, Stanford University *Stanford, CA*

- Executed a comprehensive course redesign, updating all teaching materials including programming notebooks and assignments to reflect current advancements in autonomous systems and their societal impact.
- Developed interactive learning modules to enhance student engagement with complex concepts in autonomy, focusing on the challenges of implementing trustworthy AI systems in real-world scenarios.

Head Teaching Assistant Apr – June 2024
AA222/CS361 Engineering Design Optimization, Stanford University *Stanford, CA*

- Facilitated a comprehensive curriculum on optimization techniques and their application to real-world engineering problems for a class of over 140 students.
- Led a team of four teaching assistants, coordinating the development and execution of programming projects, quizzes, and a final project spanning various optimization strategies.

Teaching Assistant Aug – Sep 2023
OSPGEN 20: Global Seminar on Engineering and Technology in India, Stanford University *India*

- Led a dynamic and diverse overseas seminar in India, guiding a group of 20 undergraduate students alongside a respected faculty member, blending cultural immersion with technical exploration in engineering and technology.
- Personally organized visits to multiple Indian Institutes of Technology (IITs) and leading science and technology companies, providing students with firsthand exposure to India's technological and industrial ecosystem.

Research Mentor June – Aug 2023
CS Leadership, Inclusion, Networks, Xenacious, and Support (LINXS), Stanford University *Stanford, CA*

- Provided mentorship and guidance to a UC Merced undergraduate computer science student in researching breast cancer screening through modeling the process as a sequential decision-making problem under uncertainty.
- The LINXS Program is a funded summer residential program that brings innovative undergraduates who are currently attending Historically Black Colleges and Universities and Hispanic Serving Institutions to an immersive academic research and graduate school preparation experience.

Research Mentor June – Aug 2023
Summer Undergraduate Research Fellowship (SURF), Stanford University *Stanford, CA*

- Mentored and guided students in researching radar interference mitigation through modeling the process as a sequential decision-making problem under uncertainty.
- The SURF program is a funded summer residential program that brings motivated undergraduate students to Stanford Engineering and aims to build community and create a cohort of future graduate student engineers who can promote diversity of thought and experience within the engineering and science student body.

Mathematics Tutor Sep 2019 – Mar 2020
Yup Technologies *Las Vegas, NV*

- Tutored students in mathematical disciplines including early math, algebra, geometry, trigonometry, statistics and probability, and calculus.
- Achieved a 99% success rate of identifying where the student lacks understanding and ensuring comprehension by the end of the lesson.

ACCEPTED PUBLICATIONS

Physics-Informed Gaussian Processes for Efficient Envelope Expansion
D. Isaiah Harp, Joshua Ott, **Dylan M. Asmar**, John Alora, and Mykel J. Kochenderfer
AIAA Journal of Aerospace Information Systems, 2026

Gut Microbiome Profile and Inflammatory Response in Pelvic Organ Prolapse: A Pilot Study
Ashley E. Hilton, **Dylan M. Asmar**, David J. Orlicky, Jaime S. Arruda, Lauren G. Rascoff, Juana A. Hutchinson-Colas, Ivana Yang, Marsha K. Guess, Joshua Johnson, and Kathleen A. Connell
International Urogynecology Journal, 2026

Optimizing Task Completion Time Updates Using POMDPs
Duncan Eddy, Esen Yel, Emma Passmore, Niles Egan, Grayson Armour, **Dylan M. Asmar**, and Mykel J. Kochenderfer
American Control Conference (ACC), 2026

Efficient Multiagent Planning via Shared Action Suggestions
Dylan M. Asmar and Mykel J. Kochenderfer
AAAI Conference on Artificial Intelligence (AAAI), 2026

More than Marketing? On the Information Value of AI Benchmarks for Practitioners
Amelia Hardy, Anka Reuel, Kiana Jafari Meimandi, Lisa Soder, Allie Griffith, **Dylan M. Asmar**, Sanmi Koyejo, Michael Bernstein, and Mykel J. Kochenderfer
ACM Conference on Intelligent User Interfaces (ACM IUI), 2025

LeRAAT: LLM-Enabled Real-Time Aviation Advisory Tool
Marc R. Schlichting, Vale Rasmussen, Heba Alazzeh, Houjun Liu, Kiana Jafari Meimandi, Amelia F. Hardy, **Dylan M. Asmar**, and Mykel J. Kochenderfer
European Conference on Artificial Intelligence (ECAI), 2025

Large-Scale Multi-Robot Assembly Planning for Autonomous Manufacturing
Kyle Brown, **Dylan M. Asmar**, Mac Schwager, and Mykel J. Kochenderfer
Robotics and Autonomous Systems, 2025

Collaborative Multiagent Decision Making via Action Suggestions
Dylan M. Asmar
Ph.D. Dissertation, Stanford University, 2025

A Data-Based Architecture for Flight Test without Test Points
D. Isaiah Harp, Joshua Ott, John Alora, and **Dylan M. Asmar**
Society of Experimental Test Pilots Annual Symposium, 2024

Optimal Control of Mechanical Ventilators with Learned Respiratory Dynamics
Isaac Ronald Ward, **Dylan M. Asmar**, Mansur Arief, Jana Krystofova Mike, and Mykel J. Kochenderfer
IEEE International Symposium on Computer-Based Medical Systems (CBMS), 2024

Model Predictive Optimized Path Integral Strategies
Dylan M. Asmar, Ransalu Senanayake, Shawn Manuel, and Mykel J. Kochenderfer
IEEE International Conference on Robotics and Automation (ICRA), 2023

Collaborative Decision Making Using Action Suggestions
Dylan M. Asmar and Mykel J. Kochenderfer
Advances in Neural Information Processing Systems (NeurIPS), 2022

Vertical State Estimation for Aircraft Collision Avoidance with Quantized Measurements
Dylan M. Asmar, Mykel J. Kochenderfer, and James P. Chryssanthacopoulos
AIAA Journal of Guidance, Control, and Dynamics, 2013

Optimized Airborne Collision Avoidance in Mixed Equipage Environments
Dylan M. Asmar and Mykel J. Kochenderfer
Massachusetts Institute of Technology, Lincoln Laboratory, Project Report ATC-408, 2013

Airborne Collision Avoidance in Mixed Equipage Environments
Dylan M. Asmar
Master's Thesis, Massachusetts Institute of Technology, 2013

Nonlinear Programming Approach to Filter Tuning
Dylan M. Asmar and Gregory Eslinger
Massachusetts Institute of Technology, Space Systems Laboratory, Technical Report, 2012

UNDER REVIEW/WORKSHOPS/PREPRINTS

Aircraft Collision Avoidance Systems: Technological Challenges and Solutions on the Path to Regulatory Acceptance
Sydney M. Katz, Robert J. Moss, **Dylan M. Asmar**, Wesley A. Olson, James K. Kuchar, and Mykel J. Kochenderfer
Under Review, 2025

Learning to Trust: Bayesian Adaptation to Varying Suggester Reliability in Sequential Decision Making
Dylan M. Asmar and Mykel J. Kochenderfer
Preprint, 2025

Microbiome Profile and Inflammatory Response in Women with Pelvic Organ Prolapse
Ashley E. Hilton, **Dylan M. Asmar**, Lina M. Loza, Joshua Johnson, David J. Orlicky, Jaime S. Arruda, Lauren G. Rascoff, Juana A. Hutchinson-Colas, Marsha K. Guess, and Kathleen A. Connell
Oral presentation at AUGS PFD Week, Washington D.C., 2024

Physics Informed Gaussian Processes for Safe Envelope Expansion
Joshua Ott, D. Isaiah Harp, John Alora, **Dylan M. Asmar**, and Mykel J. Kochenderfer
Structural Priors as Inductive Biases for Learning Robot Dynamics Workshop, Robotics: Science and Systems (RSS), 2024

Extracellular Matrix Remodeling in Uterosacral Ligaments: A Pilot Study Utilizing Raman Spectroscopy
Ashley E. Hilton, **Dylan M. Asmar**, Lea Savard, Juana A. Hutchinson-Colas, David J. Orlicky, Jaime S. Arruda, Lauren G. Rascoff, Marsha K. Guess, Joshua Johnson, Virginia L. Ferguson, and Kathleen A. Connell
International Urogynecology Association, Singapore, 2024

Incorporating Human Path Preferences in Robot Navigation with Minimal Interventions
Oriana Peltzer, **Dylan M. Asmar**, Mac Schwager, and Mykel J. Kochenderfer
Preprint, 2023

TALKS/PRESENTATIONS

Partially Observable Markov Decision Processes Oct 2025
Decision Making Under Uncertainty Technical Education Course, MIT Lincoln Laboratory

From Algorithms to Intuition: A Review of Algorithmic, LLM, and Human Decision Making Jul 2024
Defence Data Research Centre Future of Decision-Making Workshop, University of Exeter

Improving Collaboration between Humans and Autonomous Agents using Action Suggestions June 2024
Autonomous Decision and Control Lab, University of Colorado Boulder

Second Order and Direct Methods Apr 2024
AA222/CS361 Guest Lecture, Stanford University

From Promise to Pragmatism: Plotting AI's Path Through Potential and Pitfalls Mar 2024
411th Flight Test Squadron

Operational AI Primer Mar 2024
Boeing Autonomy Community

Operational AI Primer Jan 2024
Air Combat Command Weapons and Tactics Conference

What is Out of Distribution? Feb 2023
Center for AI Safety Social, Stanford University

Demystifying Machine Decision Making Feb 2021
United States Air Force Warfare Center Weapons and Tactics Talk

F-22 Tactics Against Modern Air Threats May 2019
MIT Lincoln Laboratory Air Vehicle Survivability Workshop

Efficiency of Orbit Transfers Aug 2010
Pi Mu Epsilon National Meeting

The Mathematics of Brass Instruments Aug 2008
Pi Mu Epsilon National Meeting

ACADEMIC SERVICE

Peer Reviewer

- Foundations and Trends in Robotics 2026
- International Journal of Robotics Research (IJRR) 2025-Present
- Journal of Aerospace Information Systems (JAIS) 2016-Present
- Journal of Artificial Intelligence Research (JAIR) 2016-Present
- IEEE Robotics and Automation Letters (RA-L) 2021-Present
- IEEE Transactions on Robotics (T-RO) 2021-Present
- IEEE International Conference on Robotics and Automation (ICRA) 2021-Present
- IEEE International Conference on Intelligent Robots and Systems (IROS) 2021-Present
- International Conference on Learning Representations (ICLR) 2023-Present
- Neural Information Processing Systems (NeurIPS) 2025-Present

Conference Service

- Organizer, NeurIPS 2026 Workshop on Human-AI Coevolution, Neural Information Processing Systems (NeurIPS), 2026
- Session Chair, Futures of UAS & Counter-UAS Technology Workshop, MIT Lincoln Laboratory, 2026
- Organizer, ICLR 2025 Workshop on Human-AI Coevolution, International Conference on Learning Representations (ICLR), 2025

Department Service

Student Advisory Committee, Department of Aeronautics and Astronautics 2021-2025

- Advocate for student interests and promote constructive changes to the curriculum and academic policies.
- Key projects include conducting and analyzing the annual student survey, providing course assistant training, updating the course assistant resources and application process, and refining requirements for the M.S. curriculum.

Faculty Search Student Committee, Department of Aeronautics and Astronautics 2024

- Conducted interviews and evaluations for nine faculty candidates.
- Provided comprehensive written assessments and rankings based on research expertise, teaching abilities, mentorship potential, and their capacity to connect with a diverse student body.

AWARDS/RECOGNITIONS

- 2025 – Top Reviewer Recognition, Neural Information Processing Systems (NeurIPS)
- 2025 – AIAA Award for Outstanding Course Assistant, Stanford University
- 2021 – Hugh H. Skilling Stanford Graduate Fellowship, Stanford University
- 2019 – United States Air Force Achievement Medal
- 2018 – Top Graduate, USAF Squadron Officer School
- 2018 – Distinguished Graduate, USAF Squadron Officer School
- 2018 – United States Air Force Commendation Medal
- 2018 – United States Air Force Air Medal
- 2017 – Innovator of the Year, 95th Fighter Squadron
- 2017 – Company Grade Officer of the Year, 95th Fighter Squadron
- 2016 – Wingman of the Year, Air Combat Command
- 2015 – Top Gun Award for Tactical Employment, F-22 Basic Qualification Course

- 2014 – Academic Excellence Award, Euro-NATO Joint Jet Pilot Training
- 2011 – Outstanding Cadet in Astronautical Engineering, United States Air Force Academy
- 2011 – Distinguished Graduate, United States Air Force Academy

OTHER TRAINING

- 2026 – MIT Lincoln Laboratory Leadership and Team Development Course
- 2023 – SSI Scuba Skills Update
- 2018 – Air Combat Command Aviation Mishap Investigation Course
- 2018 – Air Combat Command Flight Safety Program Management Course
- 2018 – USAF Squadron Officer School
- 2015 – F-22 Initial Qualification Course
- 2015 – Introduction to Fighter Fundamentals
- 2014 – Water Survival Training
- 2014 – Combat Survival Training
- 2014 – Emergency Parachute Training
- 2014 – Euro-NATO Joint Jet Pilot Training
- 2014 – Initial Centrifuge Primary Acceleration Training
- 2013 – Initial Flight Training
- 2012 – SSI Open Water Diver
- 2011 – Basic Freefall Parachuting Course