Jaein Lim, Ph.D.

Autonomy | Motion Planning | Multi-Agent Systems | Agentic AI for Mission Planning

U.S. Citizen | Active Top Secret (TS) clearance

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Professional Summary

Autonomy engineer and researcher with a Ph.D. in aerospace engineering and technical leadership experience spanning multi-agent planning, context-aware AI agents for mission planning, and autonomy software integration. Combines algorithm development with vehicle interfaces, simulation and verification pipelines, and flight-test validation of planning algorithms within autonomy stacks.

Professional Experience

The Charles Stark Draper Laboratory — Cambridge, MA
Senior Member of Technical Staff, Autonomy and Real-time Planning — Sept 2022 – Present

- **Agentic AI for Mission Planning:** Lead an internal R&D program developing a context-aware AI agent for mission planning from operator intent and vehicle capabilities. Develop a vLLM-based agent and its harness, integrating graph-based retrieval-augmented generation (graph-RAG), Model Context Protocol (MCP) tools, and vehicle-specific APIs.
- **Decentralized UAV Deconfliction:** Developed MAPLE (Multi-Agent Asynchronous Planning with Lazy Evaluation) for asynchronous collision avoidance without a centralized decision maker. Validated the algorithm and its integration with the autonomy stack through flight tests and demonstrations.
- **Technical Leadership and Proposals:** Led path-deconfliction algorithm development for CBRN Sensor Integration on Robotic Platforms (CSIRP). Co-wrote technical proposal content, including the deconfliction approach, for Draper's CSIRP award ($26M including all options).
- **Obstacle Avoidance and Integration:** Maintained the CSIRP UAV obstacle-avoidance stack and developed interfaces to external vendors' vehicle platforms.
- **Simulation and Testing:** Built a Docker-based test environment for obstacle avoidance and multi-agent teaming using AirSim, ArduPilot software-in-the-loop (SITL), and a vendor-provided vehicle simulator.
- **Flight Software Verification:** Developed a continuous integration (CI) build process for flight-controller firmware and a processor-in-the-loop (PIL) testing pipeline. The project team demonstrated hover and flight on a Group 3 VTOL UAV.
- **Undersea Autonomy:** Developed and implemented subsystem fault-handling logic for Draper's unmanned undersea vehicle (UUV) autonomy software.

Technical Skills

Software: C++, Python, Git, Docker, MATLAB/Simulink, ROS 2
AI Agents: Mission planning, harness engineering, vLLM, graph-RAG, MCP
Build and Testing: GitLab CI, AirSim, ArduPilot SITL, PX4 SITL and HITL
Methods: Motion planning, multi-agent pathfinding, decentralized coordination, lazy and incremental search, trajectory optimization, optimal control

Education

Georgia Institute of Technology Atlanta, GA

- **Ph.D., Aerospace Engineering** Aug 2022
  Dynamics and Control Systems Laboratory
  Advisor: Prof. Panagiotis Tsiotras
  Research: motion planning, multi-agent pathfinding, and heuristic search.
- **M.S., Aerospace Engineering** May 2020
  Research: quadrotor trajectory optimization and optimal control.
- **B.S., Aerospace Engineering** May 2017
  Highest Honor | GPA: 3.92/4.00

Research Advising

Draper Scholar Advisor Current

- Advise MIT Draper Scholar Ben Rossano on multi-robot coordination; coauthor work on task allocation under uncertainty and exploration with limited communication.

Research Experience

Georgia Institute of Technology Atlanta, GA
Graduate Research Assistant, Dynamics and Control Systems Laboratory 2018 – 2022

- Developed lazy incremental search algorithms that reuse prior search results and limit expensive edge evaluations, with bounded-suboptimal variants.
- Developed CBS-Budget, a complete, bounded-suboptimal multi-agent pathfinding solver, and hierarchical cooperative planning algorithms for distributed robot teams.
- Developed semantic-geometric planning methods and integrated a planner into a ground-robot autonomy stack in collaboration with the Army Research Laboratory and UC San Diego.
- Implemented a min-max differential dynamic programming controller in ROS/C++ on a quadrotor and tested its response to disturbances in indoor flight tests.

Teaching Experience

Georgia Institute of Technology Atlanta, GA
Graduate Teaching Assistant, Vertically Integrated Project 2021 – 2022

- Mentored a multidisciplinary student team developing an autonomous navigation stack for a 1/10-scale robotic car with onboard computing, stereo vision, inertial sensing, and LiDAR.
- Built a ROS planning stack and user interface using Open Motion Planning Library planners for replanning in dynamic environments.

Georgia Institute of Technology Atlanta, GA
Graduate Teaching Assistant, School of Aerospace Engineering Aug 2017 – May 2018

- Taught undergraduate dynamics and control laboratories covering system modeling and the design and evaluation of PID and LQR controllers in MATLAB/Simulink.

Publications

Journal Articles

1. **Lim, J.**, and Tsiotras, P. "CBS-Budget (CBSB): A Complete and Bounded Suboptimal Search for Multi-Agent Path Finding." *Artificial Intelligence*, vol. 346, article 104349, 2025. DOI.

2. **Lim, J.**, Ghanei, M., Lawson, R. C., Srinivasa, S., and Tsiotras, P. "Lazy Incremental Search for Efficient Replanning with Bounded Suboptimality Guarantees." *The International Journal of Robotics Research*, vol. 43, no. 8, pp. 1175–1207, 2024. DOI.

3. Sun, W., Pan, Y., **Lim, J.**, Theodorou, E., and Tsiotras, P. "Min-Max Differential Dynamic Programming: Continuous and Discrete Time Formulations." *Journal of Guidance, Control, and Dynamics*, vol. 41, no. 12, pp. 2568–2580, 2018. DOI.

Conference Papers (Published and Accepted)

4. Rossano, B., **Lim, J.**, and How, J. P. "Uncertainty-Aware Multi-Robot Task Allocation With Strongly Coupled Inter-Robot Rewards." *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2026, accepted. arXiv:2509.22469.

5. Larsson, D. T., Asgharivaskasi, A., **Lim, J.**, Atanasov, N., and Tsiotras, P. "Information-theoretic Abstraction of Semantic Octree Models for Integrated Perception and Planning." *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 6937–6943, 2023. DOI.

6. **Lim, J.**, Srinivasa, S., and Tsiotras, P. "Lazy Lifelong Planning for Efficient Replanning in Graphs with Expensive Edge Evaluation." *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 8778–8783, 2022.

7. **Lim, J.**, Salzman, O., and Tsiotras, P. "Class-Ordered LPA*: An Incremental-Search Algorithm for Weighted Colored Graphs." *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 6907–6913, 2021.

8. **Lim, J.**, and Tsiotras, P. "A Generalized A* Algorithm for Finding Globally Optimal Paths in Weighted Colored Graphs." *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 7503–7509, 2021.

9. **Lim, J.**, and Tsiotras, P. "MAMS-A*: Multi-Agent Multi-Scale A*." *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 5583–5589, 2020.

Preprints

10. Rossano, B., **Lim, J.**, and How, J. P. "Communication-Constrained Multi-Robot Exploration With Adaptive Communication Windows." *arXiv preprint*, 2026. arXiv:2609.12502.