

Viraj Parimi

📍 Cambridge, MA

Ph.D. Candidate MIT EECS • CSAIL (MERS)

[Learning-Guided Planning](#)

[Multi-Agent Planning](#)

[Safety](#)

[Long-Horizon Control](#)

✉ vparimi@mit.edu

📞 (412) 626-1630

🌐 [Website](#) | 📄 [Scholar](#)

🐙 [GitHub](#) | 📺 [YouTube](#)

Research Focus: Advancing safe, scalable autonomy for multi-robot systems by integrating decomposition and conflict/precedence reasoning with learning-guided planning (diffusion, VLMs, RL) to enable reliable, data-efficient closed-loop control.

🎓 Education

Massachusetts Institute of Technology (MIT)

Ph.D., Electrical Engineering and Computer Science

Advisor: Prof. Brian C. Williams

Cambridge, MA

2021–Present

Carnegie Mellon University (CMU)

M.S., Robotics | GPA: 4.08/4.00

Pittsburgh, PA

2021

IIIT-Delhi

B.Tech, Computer Science and Engineering (Honors) | GPA: 8.96/10

Delhi, India

2019

🧰 Experience

MIT CSAIL, MERS Group

Research Assistant

Cambridge, MA

2021–Present

- Exploiting planning frameworks that decompose large multi-agent problems into tractable subproblems and re-compose them through conflict resolution, precedence reasoning, and hierarchical task structures.
- Developing risk-aware algorithms that maintain global safety guarantees through dynamic risk budgeting, iterative risk reallocation, and skill chaining under uncertainty.
- Learning structured latent spaces that encode notions of safety, cooperation, and temporal consistency, enabling interpolation-based reasoning and scalable multi-agent policy adaptation.
- Featured in MIT CSAIL CAP [spotlight](#)

Motional

Autonomy Intern

Boston, MA

Summer 2023

- Prototyped lateral-contingency MPC; improved stability under injected faults in closed loop.

RISS

Research Scholar

Pittsburgh, PA

Summer 2018

- Developed a computationally scalable Bayesian sequential learning framework for time-series forecasting with up to 4 orders of magnitude speed improvement compared to other baselines.

📖 Publications

Journal Publications

[J.1] I. Isukapati, C. Igoe, E. Bronstein, **Viraj Parimi**, S. F. Smith, “Hierarchical Bayesian Framework for Bus Dwell Time Prediction”, *IEEE Transactions on Intelligent Transportation Systems (T-ITS)*, 2020

Conference Publications

[C.1] **Viraj Parimi**, B. C. Williams, “Diffusion-Guided Multi-Arm Motion Planning”, *Conference on Robot Learning (CoRL)*, 2025

- Also presented in RSS MRS 2025 – Poster

[C.2] M. Feng*, **Viraj Parimi***, B. C. Williams, “Safe Multi-Agent Navigation guided by

Goal-Conditioned Safe Reinforcement Learning”, *IEEE International Conference on Robotics and Automation (ICRA)*, 2025

- Also presented in NeurIPS IMOL 2024 and CoRL LEAP 2024 – Posters

- [C.3] J. Olkin*, **Viraj Parimi***, B. C. Williams, “Multi-Agent Vulcan: An Information-Driven Multi-Agent Path Finding Approach”, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2024 (Oral Pitch)

Workshops, Symposia & Colloquia

- [W.1] **Viraj Parimi**, B. C. Williams, “Risk-Bounded Multi-Agent Visual Navigation via Dynamic Budget Allocation”, *CoRL 2025 Safe and Robust Robot Learning for Operation in the Real World (SAFE-ROL)* and *ICAPS 2025 Workshop on Bridging the Gap Between AI Planning and Reinforcement Learning (PRL)* – Posters
- [W.2] **Viraj Parimi**, A. Gomez, H. Chen, A. Hoffman, B. C. Williams, “Diffusion-Guided Multi-Arm Decentralized Motion Planning”, *Northeast Robotics Colloquium (NERC)*, 2024 – Poster
- [W.3] **Viraj Parimi**, S. Hong, B. C. Williams, “Task-driven Risk-bounded Hierarchical Reinforcement Learning Based on Iterative Refinement”, *AAAI Spring Symposium Series (AAAI-SS)*, 2024 – Talk
- [W.4] A. Misra, **Viraj Parimi**, M. Agarwal, Z. B. Rubinstein, S. F. Smith, “Towards efficient and scalable planning: Learning search heuristics for multi-agent planning frameworks”, *CoRL 2023 Workshop on Learning Effective Abstractions for Planning (LEAP)* – Poster
- [W.5] **Viraj Parimi**, Z. B. Rubinstein, S. F. Smith, “T-HTN: Timeline-Based HTN Planning for Multiple Robots”, *ICAPS 2022 Workshop on Hierarchical Planning (HPlan)* – Poster

Book Chapters

- [B.1] **Viraj Parimi**, A. Pal, S. Ruj, P. Kumaraguru, T. Chakraborty, “On the Vulnerability of Community Structure in Complex Networks”, *Principles of Social Networking: The New Horizon and Emerging Challenges*, Springer Singapore, 2021

Miscellaneous

- [M.1] **Viraj Parimi**, I. Isukapati, S. F. Smith, “A Computationally Scalable Bayesian Sequential Learning Framework for Time-Series Forecasting”, *arXiv*, 2021
- [M.2] A. Lakshman, **Viraj Parimi**, S. F. Smith, I. Isukapati, “Evaluating Accuracy of DSRC GPS for Pedestrian Localization in Urban Environments”, *RISS Working Papers Journal*, 2018

* denotes equal contribution.

Research in Progress

Any-STAP3L

2025–Present

Status: Ongoing

Anytime simultaneous task assignment & path planning with precedence constraints using large-neighborhood search.

Contrastive Representations for Risk-Aware Planning

2025–Present

Status: Ongoing

Learn risk-aware contrastive representations and plan via interpolation/search in latent space to speed up long-horizon navigation/manipulation.

Conflict-Directed RAO*

2025–Present

Status: Ongoing

Combine conflict-directed refinement with risk-aware AO* for discrete-continuous tasks under chance constraints, enabling budgeted risk allocation and concise explanations.

RB-MAPF-RT: Real-Time Risk-Bounded Multi-Robot Navigation <i>Status:</i> Ongoing	2025–Present
Anytime replanning and dynamic risk reallocation for multi-robot navigation.	
Iterative Skill Refinement optimizing Risk-Reward Tradeoff <i>Status:</i> Ongoing	2025–Present
Hierarchical skills with iterative refinement and dynamic risk budgeting; extension of the AAAI-SS24 study.	
Collaborative VLM-Guided Planning <i>Status:</i> Ongoing	2025–Present
Use VLM scene/goal semantics to shape costs and constraints for MAPF, resolve ambiguous goals with intent recognition.	

Teaching & Mentoring

Teaching

MIT Principles of Autonomy and Decision Making (Graduate Teaching Fellow)	Fall 2022
Responsibilities: general infrastructure; recitations; assignments; project design; grading.	
IIIT-Delhi Advanced Programming (Head Teaching Assistant)	Fall 2017
Responsibilities: general infrastructure; assignment design; project advising; grading.	

Research Mentorship

• Yusuf Syed (Imperial College Undergrad → MIT MEng)	2025
• Shreya Chaudhary (MIT Undergrad → MIT MEng)	2025
• Hanna Chen (MIT Undergrad)	Fall and Summer 2025
• Haohua Howard Chen (Imperial College Undergrad)	Summer 2024
• Lucian Covarrubias (MIT Undergrad)	Spring 2022

Academic Service

Journal Reviewing

• IEEE Transactions on Aerospace and Electronic Systems (TAES)	2025
• Artificial Intelligence Journal (AIJ)	2022–2023

Conference Reviewing

• AAAI Conference on Artificial Intelligence	2026
• Conference on Robot Learning (CoRL)	2025
• International Conference on Automated Planning and Scheduling (ICAPS)	2025
• IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)	2024–2025

Workshop Reviewing

• Workshop on Generalization in Planning (GenPlan) at AAAI	2025
• Workshop on Resource-Rational Robot Learning at CoRL	2025
• Workshop on Learning Effective Abstractions for Planning (LEAP) at CoRL	2024

Awards and Honors

Qualcomm Fellowship India — Finalist	2022
Robotics Institute Summer Scholar	2018
FICCI Scholarship	2018
Secured 99.7 th percentile among 1.5 million students in JEE Mains Examination	2015

🔗 Software and Data

Diffusion-Guided Multi-Arm Planner (Apache-2.0) – [GitHub](#)

Safe Multi-Agent Navigation (Apache-2.0) – [GitLab](#)

Multi-Agent Vulcan (MIT License) – [GitLab](#)

Timeline-Based HTN Planner – [Github](#)