

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

Minor in Management

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 – Model-Based Embedded and Robotics Systems (MERS)

Research Assistant

Advisor: Prof. Brian C. Williams (Featured in MIT CSAIL CAP spotlight)

Cambridge, MA

2021–Present

- Designed multi-agent planners that decompose large coordination problems into tractable subproblems and re-compose them via conflict/precedence reasoning and hierarchical task structure, enabling scalable execution across multiple robots.
- Developed risk-aware planning methods with dynamic risk budgeting and iterative reallocation to maintain global safety guarantees under uncertainty for multi-robot navigation.
- Learning structured latent spaces encoding safety, cooperation, and temporal consistency, enabling interpolation-based reasoning and long-horizon decision-making.

Motional

Autonomy Intern

Boston, MA

Summer 2023

- Prototyped a lateral-contingency MPC controller and demonstrated improved closed-loop stability under injected faults and unexpected driving scenarios.

Carnegie Mellon University – Robotics Institute

Research Assistant

Advisor: Prof. Stephen F. Smith, Intelligent Coordination and Logistics Lab

Pittsburgh, PA

2019–2021

- Built a robust multi-agent planning framework combining timeline-based planning with hierarchical task planning; deployed on a mission-operations testbed simulating deep-space habitats.

Carnegie Mellon University – Robotics Institute Summer Scholars (RISS)

Research Scholar

Advisor: Prof. Stephen F. Smith

Pittsburgh, PA

Summer 2018

- Developed a computationally scalable Bayesian sequential learning framework for time-series forecasting, achieving up to 10,000× faster inference than baseline approaches.

IIIT-Delhi Department of CSE

Undergraduate Research Assistant

Advisors: Prof. T. Chakraborty (LCS2 Lab), Prof. P. Kumaraguru (Precog Lab)

Delhi, India

2017–2019

- Analyzed robustness of community structure in complex networks by modeling how perturbing high-influence nodes/edges degrades community stability.

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

2025–Present

Status: Ongoing

Anytime replanning and dynamic risk reallocation for multi-robot navigation.

Iterative Skill Refinement optimizing Risk-Reward Tradeoff

2025–Present

Status: Ongoing

Hierarchical skills with iterative refinement and dynamic risk budgeting; extension of the AAAI-SS24 study.

Collaborative VLM-Guided Planning

2025–Present

Status: Ongoing

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](#)