

Bhrij Patel

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RESEARCH INTERESTS

- Alignment, Personalization, and Planning for LLM-based agents
- LLM-based Evaluators and Feedback, particularly for Prompt Optimization
- Tool-learning and RAG for Function-Calling Agents
- Sample Efficient Reinforcement Learning with Sparse Rewards

EDUCATION

University of Maryland, College Park - Co-Advisors: Dinesh Manocha, Amrit Singh Bedi (UCF) Ph.D. in Computer Science (Expected: May 2027)

Master's in Computer Science (May 2024)

Duke University, Durham, NC - Advisors: Cynthia Rudin

Bachelor of Science in Computer Science & Mathematics, Minor in Creative Writing (May 2022)

WORK EXPERIENCE

AG2

Nov. 2025 - Present

Research Intern, Remote, Mentor: Huazheng Wang

- Working on LLM-based multi-agent frameworks

Qualcomm, Efficient Agentic AI Team

June 2025 - Oct. 2025

Machine Learning Research Intern, Netherlands, Mentors: Bence Major, Davide Belli

- Worked on a research paper for publication revolving around on-device tool-based agents

Emergence AI

Feb. 2025 – May 2025

AI Research Intern, Remote, Mentors: Aditya Vempaty, Ashish Jagmohan

- Proposed in-context learning of API functionality from demonstrations for tool-based tasks
- Investigated self-improvement methods with LLM-generated feedback functionality and parameters
- Highlighted the importance of robust error/exception handling for learning APIs

GAMMA Lab - University of Maryland, College Park

Aug. 2022 - Present

Graduate Research Assistant, Mentors: Dinesh Manocha, Amrit Singh Bedi

- Exploring the reliability of reference-free LLM judges for prompt optimization
- Investigating memory-augmented LLM agents for personalized embodied agents
- Researching sample-efficient RL training with sparse rewards

Interpretable Machine Learning Lab - Duke University

Jan. 2019 - Mar. 2022

Undergraduate Research Assistant, Mentor: Cynthia Rudin

- Worked on generating hi-res portraits from low-res images with unsupervised representation learning
- Analyzed criminal history data from Broward County, FL, (1.5e5 records), and from Kentucky (3.2e6)

Rein.ai - Remote

Mar. 2020-May 2020

Data Science Intern, Mentor: Mohammed Shameer Iqbal

- Set up automated web extraction of truck accident records from 1975-2018 with Python and SQL
- Cleaned and integrated trucking data into the database for the development of risk models

PUBLICATIONS

- *Dynamic Tool Dependency Retrieval for Efficient Function Calling*
Bhrij Patel*, Davide Belli*, Amir Jalalirad, Maximilian Arnold, Aleskandr Ermolov, Bence Major
[Workshop, Oral] New Frontiers in Information Retrieval @ Association for the Advancement of Artificial Intelligence (AAAI), 2026
- *Learning API Functionality from In-Context Demonstrations for Tool-based Agents*
Bhrij Patel, Ashish Jagmohan[†], Aditya Vempaty[†]
Findings of Empirical Methods in Natural Language Processing (EMNLP), 2025
- *Confidence-Controlled Exploration: Efficient Sparse-Reward Policy Learning for Robot Navigation*
Bhrij Patel, Kasun Weerakoon, Wesley A. Suttle, Alec Koppel, Brian M. Sadler, Tianyi Zhou, Dinesh Manocha, Amrit Singh Bedi
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2025
- *Towards Global Optimality for Practical Average Reward Reinforcement Learning without Mixing Time Oracles*
Bhrij Patel, Wesley A. Suttle, Alec Koppel, Vaneet Aggarwal, Brian M. Sadler, Dinesh Manocha, Amrit Singh Bedi
International Conference of Machine Learning (ICML), 2024
- *Beyond Exponentially Fast Mixing in Average-Reward Reinforcement Learning via Multi-Level Monte Carlo Actor-Critic*
Wesley A. Suttle*, Amrit Singh Bedi*, **Bhrij Patel**, Brian M. Sadler, Alec Koppel, Dinesh Manocha
International Conference of Machine Learning (ICML), 2023
- *Interpretable, Fair and Accurate Machine Learning for Criminal Recidivism Prediction*
Caroline Wang*, Bin Han*, **Bhrij Patel**, Cynthia Rudin
Journal of Quantitative Criminology (JoQC), 2022

*Denotes Equal Contribution, [†]Denotes Equal Advising

PREPRINTS

- *AIME: AI System Optimization via Multiple LLM Evaluators.*
Bhrij Patel, Souradip Chakraborty, Wesley A. Suttle, Mengdi Wang, Amrit Singh Bedi[†], Dinesh Manocha[†]
arXiv, preprint (2024)
- *Multi-LLM QA with Embodied Exploration*
Bhrij Patel, Vishnu Sashank Dorbala, Amrit Singh Bedi, Dinesh Manocha
arXiv, preprint (2024)
- *Right Place, Right Time! Dynamizing Topological Graphs for Embodied Navigation*
Vishnu Sashank Dorbala*, **Bhrij Patel***, Amrit Singh Bedi, Dinesh Manocha
arXiv, preprint (2025)

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AWARDS

- **2022 University of Maryland, College Park Dean's Fellowship Award**
- **2021 Duke DataFest: Judges' Pick Award**
- **2021 NC State Datathon: 3rd Place Team**
- **2020 COMAP Mathematical Contest in Modeling: Meritorious Winner**
- **2019 Duke University Datathon: Runner-Up Team**

PRESENTATIONS

- *In Pursuit of Interpretable, Fair and Accurate Machine Learning for Criminal Recidivism Prediction*
Caroline Wang, Bin Han, **Bhrij Patel**, Feroze Mohideen
Duke CS Showcase 2020
- *Comparing Black-box and Interpretable ML models for Criminal Recidivism Prediction*
Bhrij Patel
Duke CS+ 2019

TEACHING

- Teaching Assistant, CMSC 335: Web Application Development with JavaScript, University of Maryland, College Park (Jan 2024-May 2025)
- Teaching Assistant, CMSC 131: Introduction to Object Oriented Programming, University of Maryland, College Park (Aug-Dec 2023)
- Teaching Assistant, CS 671: Graduate Machine Learning, Duke University (Aug-Dec 2021)
- Teaching Assistant, CS 371: Undergraduate Data Science, Duke University (Jan-May 2021)
- Teaching Assistant, CS 371: Undergraduate Machine Learning, Duke University (Aug-Dec 2020)
- Math Help Room Tutor, Linear Algebra, Duke University (Aug 2019-May 2020)