

## Research Statement

I want to create adaptive agents that can learn from interaction and operate safely in complex and unstructured environments under uncertainty with and without humans. I also want to enable humans to interact with robots easily via intermediate representations and intuitive systems.

I have worked on posterior sampling algorithms for motion planning and learning affordances for long-range decision making in deployable navigation systems.

I open sourced XPlaneROS as a testbed for research on autonomous pilots in shared autonomy settings.

## Education

2023–present **University of Washington, Computer Science and Engineering, Ph.D. Computer Science, Advisor: Dr. Byron Boots,**  
GPA: 3.74/4.0

2019-2023 **Indian Institute of Technology, Kanpur,**  
B.Tech in Electrical Engineering  
GPA - 9.1/10.0 | Minors: Computer Science

## Research Experience

- Jan2024-Mar2025 **Long Range Navigator, University of Washington**
- How do we enable robots in unstructured environments to navigate efficiently over long distances under partial observability and uncertainty?
  - Leveraged visual offline data to improve decision making capabilities of robots in offroad environments and make navigation less myopic.
  - Scaled supervision data for long range navigation by using tracking models and ego-centric videos.
- May2022-Sep2023 **Dynamic Replanning via Evaluating and Aggregating Multiple Samples, IIT Kanpur & University of Washington**
- Developed a general framework to recover different posterior sampling algorithms and study the performance of Bayesian Dynamic Motion Planning Algorithms.
  - Developed an algorithm DREAMS that creates a distribution of cost over multiple samples from the posterior to utilize uncertainty information while retaining computational benefits of posterior sampling.
- May2022-Aug2022 **DARPA RACER, University of Washington & IIT Kanpur**
- Improved the speed and performance of multi-goal A\* search for autonomous offroad vehicles to enable robust high speed autonomy under uncertainty.
  - Learned field testing procedures to evaluate real world performance ... witnessed collisions too!
- May2021-Jan2022 **XPlaneROS, Carnegie Mellon University & IIT Kanpur**
- Developed a system to enable research on AI-Pilots by bridging realistic flight simulators and ROS
  - Implemented PID controllers and control barrier functions to enable safe operation

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## Publications

### Conference Publications

- [5] *M. Schmittle\*, R. Baijal\*, N. Hatch, R. Scalise, M. Guaman Castro, S. Talia, K. Khetarpal, S. Srinivasa and B. Boots* **Long Range Navigator (LRN): Extending robot planning horizons beyond metric maps**, Conference on Robot Learning (CoRL), 2025,  
Link - <https://arxiv.org/abs/2504.13149>
- [4] ...*R. Baijal* ... **DROID: A Large-Scale In-The-Wild Robot Manipulation Dataset**, Robotics: Science and Systems (RSS), 2024,  
Link - <https://arxiv.org/abs/2403.12945>
- [3] *M. Schmittle, R. Baijal, and B. Hou, S. Srinivasa and B. Boots* **Multi-Sample Long Range Path Planning under Sensing Uncertainty for Off-Road Autonomous Driving**, IEEE International Conference on Robotics and Automation (ICRA), 2024,  
Link - <https://arxiv.org/abs/2403.11298>
- [2] *I. Navarro, J. Patrikar, J. PA Dantas, R. Baijal, I. Higgins, S. Scherer and J. Oh* **SoRTS: Learned Tree Search for Long Horizon Social Robot Navigation**, IEEE Robotics and Automation Letters, 2024,  
Link - <https://arxiv.org/abs/2309.13144>
- [1] ...*R. Baijal* ... **Open x-embodiment: Robotic learning datasets and rt-x models**, International Conference on Robotics and Automation (ICRA), 2023, **Best Conference Paper Award**  
Link - <https://arxiv.org/abs/2310.08864>

### Workshop Publications

- [2] *M. Schmittle\*, R. Baijal\*, N. Hatch, R. Scalise, M. Guaman Castro, S. Talia, K. Khetarpal, S. Srinivasa and B. Boots* **Long Range Navigator (LRN): Extending robot planning horizons beyond metric maps**, Workshop on Resilient Off-road Autonomous Robotics, RSS, 2025, **Best Paper Award**  
Link - <https://arxiv.org/abs/2504.13149>
- [1] *J. Patrikar, J. Dantas, S. Ghosh, P. Kapoor, I. Higgins, J. J. Aloor, I. Navarro, J. Sun, B. Stoler, M. Hamidi, R. Baijal, B. Moon, J. Oh and S. Scherer*, **Challenges in close-proximity safe and seamless operation of manned and unmanned aircraft in shared airspace**, International Conference on Robotics and Automation (ICRA) 2022,  
Link - <https://arxiv.org/abs/2211.06932>

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## Professional Activities

- 2023, 2024 **Pre-Application Mentorship Service, University of Washington, CSE**
  - Mentoring students from under-represented communities considering graduate school
- 2024 **PhD Admission Application Reader, University of Washington, CSE**
  - Read PhD applications for CSE at University of Washington.
- 201-2022 **Aerial Robotics Team Head, IIT Kanpur**
  - Maintained the software stack for our autonomous aerial vehicles
  - Mentored students in exploring topics in robotics

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## Open Source Code

**XPlaneROS:** ROS wrapper for XPlane-11, a high fidelity flight simulator to enable research in AI pilots

Link - [https://theairlab.org/xplane\\_ros/](https://theairlab.org/xplane_ros/)

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## Achievements

- Mar2022, IIT Kanpur **2nd Position**, in DRDO's UAV guided UGV system in Inter IIT Tech Meet 10
- Mar2021, IIT Kanpur **Bronze Medal**, in DRDO's vision based obstacle avoidance system in Inter IIT Tech Meet 9
- 2020-21 **Academic Excellence Award**, IIT Kanpur, for excellence academic performance
- 2019 **Sword of Honour**, St. Columba's School, Award to the top student for overall performance
- 2019 **Top 2%**, Joint Entrance Examination - Advanced, among 230,000 candidates
- 2019 **99.6 percentile**, Joint Entrance Examination, among 1.1 million candidates
- 2017 **Distinction, Grade 8 Plectrum Guitar**, Trinity College London

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## Relevant Classes at University of Washington

- Computer Science Probabilistic Graphical Models, Natural Language Processing, Introduction to Reinforcement Learning, Computer Graphics

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## Relevant Classes at the Indian Institute of Technology Kanpur

- ML/AI/Vision Introduction to Machine Learning, Machine Learning for Signal Processing, Advanced Topics in Machine Learning, Probabilistic Machine Learning, Image Processing, Introduction to Reinforcement Learning
- Electrical Engineering Signals, Systems and Networks, Introduction to Electronics, Microelectronics, Digital Electronics and Microprocessor Technology, Control Systems and Analysis, Communication Systems, Digital Communications and Information Theory, Digital Signal Processing, Power Systems and Electronics
- Computer Science Fundamentals of Computing, Data Structures and Algorithms, Advanced Algorithms, Randomized Algorithms, Computer Organisation, Operating Systems, Game Theory and Mechanism Design, Modern Cryptography
- Mathematics Real Analysis, Linear Algebra and Ordinary Differential Equations, Complex Analysis, Partial Differential Equations, Probability and Statistics