

Aryaman Gupta

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RESEARCH OBJECTIVE

My research focuses on developing safe autonomous systems through failure-guided, closed-loop learning, and delivering safety guarantees via lightweight, context-aware guardrails at runtime. Building on my prior work in unsupervised LLM-driven robot failure analysis and safety monitoring for high-speed perception-driven systems, I now aim to create advanced safety-reasoning models that generalize across embodiments and enhance the robustness and scalability of large embodied robot foundation models and vision-language-action (VLAs) models.

EDUCATION

- **Stanford University** Stanford, CA
Ph.D. in Aeronautics and Astronautics; Advisor: Somil Bansal; GPA: 4.04/4.0 *Jan 2025 – Present*
- **Stanford University** Stanford, CA
M.S. in Aeronautics and Astronautics; GPA: 4.04/4.0 *Jan 2025 – Present*
- **Indian Institute of Technology (BHU)** Varanasi, India
B.Tech. in Electronics Engineering; Advisor: Om Jee Pandey; GPA: 9.42/10.00 *Nov 2020 – May 2024*

PUBLICATIONS

- [1] **Aryaman Gupta***, Kaustav Chakraborty*, Somil Bansal, “Detecting and Mitigating System-Level Anomalies of Vision-Based Controllers”, *ICRA ’24*
- [2] A.M. Ali, **Aryaman Gupta**, H.A. Hashim, “Deep Reinforcement Learning for Sim-to-Real Policy Transfer of VTOL-UAVs Offshore Docking Operations”, *Applied Soft Computing Journal*
- [3] Neha Sharma, **Aryaman Gupta**, Sivala Deepak, Om Jee Pandey, “Node Fault Prediction Assisted Small-World IoT Networks Using ML Frameworks”, *IEEE ANTS’24* [Best Paper Award]

*Equal Contribution

PREPRINTS

- [1] **Aryaman Gupta***, Yusuf Umut Ciftci*, Somil Bansal, “Unsupervised Discovery of Failure Taxonomies from Deployment Logs”
- [2] Kaustav Chakraborty, **Aryaman Gupta**, Somil Bansal, “Enhancing Safety and Robustness of Vision-Based Controllers via Reachability Analysis”

EXPERIENCE

- **Safe and Intelligent Autonomy Lab** Stanford, CA
Graduate Student | Prof. Somil Bansal *Aug 2024 - Present*
 - **Research Area:** Safe and robust generalist robot policies through failure-guided closed-loop learning.
 - Developed multimodal LLM-based unsupervised methods to identify and interpret robot failure modes from deployment data, enabling continual policy improvement and enhanced runtime safety monitoring.
 - Worked on safeguarding high-speed systems, such as F1-Tenth cars and drones operating under visuomotor policies, solely through perception inputs (LiDAR/camera) and no privileged information.
- **University of Southern California** Los Angeles, CA
Research Internship | Prof. Somil Bansal *May 2023 - Aug 2024*
 - **Goal:** Provide safety guarantees on vision-based controllers leveraging knowledge of their failures.
 - Mined failure modes of an aircraft taxiing system by computing Neural Reachable Tubes (NRTs).
 - Developed a runtime vision-based failure monitor and fallback mechanisms, reducing failures by 42%.
 - Fine-tuned policy on augmented failure dataset, reducing failures by 20% and prediction error by 10%.
 - Applied Conformal Prediction for probabilistic safety guarantees enabling deployment under uncertainty.

RELEVANT COURSEWORK

- **Graduate Courses**

- CS-224N (Natural Language Processing)
- AA-276 (Principles of Safety-Critical Autonomy)
- AA-228V (Validation of Safety-Critical Systems)
- AA-242A (Classical Dynamics)
- AA-228 (Decision Making Under Uncertainty)
- AA-203 (Optimal and Learning-Based Control)
- ENGR-205 (Introduction to Control Design)

- **Undergraduate Courses**

- MA-101 (Real Analysis)
- MA-102 (Linear Algebra)
- MA-202 (Probability and Statistics)
- CSO-102 (Data Structures and Algorithms)
- CSO-332 (Ubiquitous Computing)
- CSO-458 (Soft Computing)

SKILLS AND INTERESTS

- **Languages and Libraries:** Python, C++, MATLAB, Julia, JAX, Hugging Face, PyTorch, TensorFlow, Keras, scikit-learn, OpenCV, OpenAI Gym, X-Plane, CARLA
- **Technologies and Tools:** ROS, ROS2, Flightmare, AutowareAI, Open3D, Linux, Git, Docker, L^AT_EX

COMMUNITY SERVICES AND INVOLVEMENTS

- Reviewer – IROS (2026), CoRL (2025), RA-L (2025, 2026), T-RO (2025)
- Working Group Member – Stanford Center for AI Safety
- Technical Lead – RoboReG, a student-led robotics research group at IIT BHU

STUDENT MENTORSHIP

- Joyce Yang (Cornell BS CS), Tito Rosas (UCLA BS ME)