Kargi Chauhan

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Education

University Of California, Santa Cruz — Santa Cruz, CA
MS in Natural Language Processing — December 2026
Research Area: Neuro-symbolic AI, RL, Autonomous Vehicles | Advisor: Dr. Leilani Gilpin

University Of Arizona — Tucson, AZ
BS in Information and Data Science, GPA - 3.9/4.0 — May 2024

Experience

ML Research Assistant, AIEA Lab — June 2025 - Present
- Training verifiable RL agents (PPO/A2C) on synthetic environments using PyTorch and Gymnasium, optimizing network architectures and GAE parameters to achieve 13.4-point average reward improvement.
- Built an AV simulation infrastructure on Nautilus GPU clusters, deployed CARLA with automated traffic generation, and created robust benchmarking system for eval harness.
- Researching formal verification techniques to detect sensor spoofing and enhance robust perception in safety-critical autonomous driving scenarios with GAIA-2 for Video Generation.

ML Research Fellow, University of Edinburgh — March 2025 – Sep 2025
- Developed a hybrid neural-symbolic reasoning pipeline combining Logic Tensor Networks (LTNs) with SMT-based program synthesis, interpretable rule extraction from visual scenes perceptual grounding of logical predicates.
- Implemented formal symbolic verification using CLEVR with Z3 solvers for consistency of synthesized rules.

Machine Learning Engineer, Stealth Startup — May 2024 – July 2025
- Trained LLaMA 7B/13B models using PyTorch with QLoRA for 4-bit quantized training on A100s.
- Applied reward modeling and DPO for preference alignment with human intent, improving task accuracy by 24%.
- Containerized LLMs with Docker and deployed on AWS EC2, enabling reliable batch inference and reducing environment inconsistencies.
- Designed CI/CD pipelines via GitHub Actions with KV caching and logging for 40% latency reduction.

Machine Learning Intern, NASA JPL — Feb 2024 – May 2024
- Developed advanced attitude estimation and lighting systems for a CubeSat satellite using singular vision sensors.
- Trained a ResNet-based model on synthetic multi-modal data with over 100M samples, achieving 97% accuracy.
- Implemented a modular pose estimation software to track NASA's R5 CubeSat camera orientation and integrated simulations for NASA *Pose Estimation Challenge*

Software Engineer Intern, Mines Lab — Feb 2023 – Apr 2023
- Designed a VR application replicating the St.Xavier Mine using Unity and C#, for interactive scene management.
- Built interactive systems with event triggers, state transitions, and navigation to enhance user responsiveness.
- Enhanced 3D pathfinding in virtual mine by customizing A* and Dijkstra, reducing execution time by 23%.

Software Engineer Intern, Tech Core — Jun 2022 – Aug 2022
- Developed RESTful APIs using Node.js in a microservices architecture to streamline service communication.
- Built GraphQL APIs and optimized Elasticsearch queries in MongoDB, improving data retrieval speed.
- Implemented caching strategies using Redis to reduce load on frequently accessed endpoints, improving throughput.

Selected Publications

K. Chauhan, Lelani Gilpin, "*VFSI: Validity First Spatial Intelligence for constraint guided traffic diffusion*", NeurIPS 2025, (Accepted)

K. Chauhan, V. Pendyala, "*Large Language Models and XAI*" Springer Nature (Releasing Oct 12 2025)

N. Upreti , **K. Chauhan**, V.Belle "*Neural-Symbolic Visual Reasoning via LTNs, SMT, and Symbolic Program Synthesis*", (In Progress)

K. Chauhan, A. Raj, J. Thangavelautham, "*Enabling Deep Space Using Inspectors Accompanying Small Spacecraft System of System Architecture*", ISSC, NASA JPL 2024. *Paper*

Technical Skills

Programming Languages: Python, Java, Go, C#, Swift, JavaScript, SQL, Clojure

Frameworks, Tools, DevOps: PyTorch, NumPy, Node.js, React, GraphQL, Unity, REST APIs, Microservices, CI/CD, MongoDB, Kubernetes, Docker