Anandsingh Chauhan

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EDUCATION

Arizona State University | GPA 4.25/4.33 — Tempe, AZ
Ph.D., Mechanical and Aerospace Engineering – Advisor: Prof. Kunal Garg — *Aug 2025 – Present*

Indian Institute of Technology Gandhinagar | GPA 9.43/10 — India
M.Tech., Electrical Engineering – Advisor: Prof. Naran Pindoriya — *2018 – 2020*

Gujarat Technological University | GPA 9.05/10 — India
B.E., Electrical Engineering — *2014 – 2018*

EXPERIENCE

Arizona State University — Tempe, AZ
Graduate Research Assistant, Safe Robotics Lab (SRG) — *Aug 2025 – Present*

- Dissertation: learning-based predictive safety for autonomous systems. Enforcing barrier constraints over predicted horizons, and diagnosing failures in learned controllers, scaling from single-agent control to distributed multi-robot teams under communication delay.

Tata Consultancy Services (TCS) Research — Mumbai, India
Researcher, Data and Decision Sciences – Mentors: Dr. Mayank Baranwal, Dr. Harshad Khadilkar — *Sept 2020 – July 2025*

- Built RL systems for safety-critical networked infrastructure under uncertainty and adversarial attack: multi-robot coordination, power grids, railway scheduling, and supply chain. Applied GNNs, attention models, and LLMs to constrained sequential decision problems with combinatorially large action spaces. NASSCOM AI Gamechangers Award, top 10 AI projects in India (2024).

S.P. Jain School of Global Management — Mumbai, India
Adjunct Faculty, B.Sc. Data Science — *Dec 2023 – July 2025*

- Taught *Introduction to Data Science* and *Introduction to Programming*; supervised undergraduate projects.

SELECTED PROJECTS

BarrierFormer: Transformer-Guided Predictive Barrier Enforcement — *CoRL 2026, main track*

- Encoded horizon-level discrete-time CBF constraints directly into policy parameters using an SQP-based safety teacher and a barrier critic over transformer-predicted rollouts, eliminating online optimization and model knowledge at inference.
- Raised safety rate to 96% across 2D and 3D, linear and nonlinear dynamics, against 65–76% for diffusion- and transformer-based baselines; matched model-based MPC on safety while cutting per-step inference latency by three orders of magnitude (5 μs vs. 8.3 ms); generalized zero-shot to larger and denser workspaces without retraining.

FIND-R: Failure Identification and Directed Repair in Neural Networks — *under review*

- Localized safety-encoding failures in GNN controllers (GCBF+, InforMARL) by probing layer-wise representations, tracing the bottleneck to an unsupervised attention mechanism and repairing it with a supervised radial-attention head, cutting false modes by 95% and 65% respectively.
- Ran end-to-end in under 9 s where SMT and CROWN formal-verification baselines exceeded a 4-hour budget.

MRTAgent: Safe Multi-Robot Task Allocation in Dynamic Warehouses — *ECAI 2024; AAMAS 2025; patents*

- Dual-agent RL framework inspired by self-play for real-time fleet task allocation, coupled with a modified LQR controller for collision-free navigation; safety enforced at the control layer while the learned policy handled assignment.

PowRL: Constraint-Safe RL for Power Grids under Adversarial Attack — *AAAI 2023; patents*

- Heuristic-guided safety filter masking the action space to a verified-feasible subset, cutting 72,000 actions to 240 on the IEEE 118-bus network without violating operational limits. Ranked 1st on L2RPN NeurIPS 2020 (Robustness) and 3rd of 90 teams in L2RPN 2023 (TU Delft / RTE).

PUBLICATIONS & PATENTS

Full record: 9 peer-reviewed publications, 1 under review, 5 patent filings across 3 inventions (2 US, 3 India).

Peer-reviewed

- **Chauhan, A.**, Garg, K. BarrierFormer: Transformer-Guided Predictive Barrier Enforcement for Safe Robot Control. *Conference on Robot Learning (CoRL) 2026*, main track.
- **Chauhan, A.**, Raghuvanshi, A., Kandar, T., Baranwal, M. PRIORITY-Q: Certifiable Event-Queue Scheduling for Real-Time Railway Resource Allocation. *ICONIP* (main track).
- Pal, A., **Chauhan, A.**, Baranwal, M. Together We Rise: Optimizing Real-Time Multi-Robot Task Allocation using Coordinated Heterogeneous Plays. *AAMAS 2025* (AAAI Track).
- Pal, A., **Chauhan, A.**, Baranwal, M., Ojha, A. Optimizing Multi-Robot Task Allocation in Dynamic Environments via Heuristic-Guided RL. *ECAI 2024* (23% acceptance). Patented: IN 202421064122; U.S. App. 19/250,377.
- Shelke, O.*, Pathakota, P.*, **Chauhan, A.***, et al. A Learning Approach for Cost-Efficient Sourcing and Routing in E-Commerce. *CODS-COMAD 2024*. [*co-first]
- **Chauhan, A.**, Baranwal, M., Basumatary, A. PowRL: A Reinforcement Learning Framework for Robust Management of Power Networks. *AAAI 2023* (19.2% acceptance). Patented: IN 202221069773; U.S. App. 18/348,952 (pub. US 2024/0186789 A1).

Under review

- Madan, H., **Chauhan, A.**, Garg, K. FIND-R: Failure Identification and Directed Repair via Representation Probing in Neural Networks.

TECHNICAL SKILLS

Languages	Python, MATLAB, SQL
Learning	PyTorch, JAX/Flax, TensorFlow, Gymnasium
Optimization	CasADi, IPOPT, sequential quadratic programming, Z3, dReal
Tools	Git, Linux, AWS, LaTeX