

Shaifalee Saxena



Education

- June 2024 – **PhD**, *University of New Mexico*, Electrical and Computer Engineering, GPA: 4.22/4.00.
Ongoing
- 2014 – 2018 **B.Tech**, *Indian Institute of Space Science and Technology (IIST)*, Thiruvananthapuram, India, Aerospace Engineering, CGPA: 7/10.
- 2012 – 013 **Intermediate**, *RBSE Board, Adarsh Vidya Mandir*, Jodhpur, India, *Gold medalist, 96%*.
Specialization: Maths, Physics and Chemistry
- 2010 – 2011 **High school**, *RBSE Board, Adarsh Vidya Mandir*, Jodhpur, India, *Gold medalist, 94%*.

Research Projects

- 2025 – **Robust Deep RL for Time-Varying Control (Particle Accelerator Tuning)**, *Los Alamos National Laboratory (AOT-IC)*.
Present
- Developing hybrid learning-control methods combining deterministic actor-critic RL (DDPG) with bounded extremum seeking for robustness under drift/nonstationarity.
 - Designing a safety-aware supervisor to maintain stable behavior when operating conditions move outside the training distribution.
 - Building scalable simulation and training workflows on LANL systems for repeated training/evaluation across perturbed regimes.
- 2024 – **Multi-Task Reinforcement Learning for Robotic Manipulation (“One Policy, Many Tasks”)**,).
Present
- Training a single policy to perform multiple manipulation tasks (push, grasp, pick-and-place) with shared representations and task-conditioned behaviors.
 - Running large-scale simulation experiments (parallel rollouts, ablations, and sweeps) to improve generalization and reliability across tasks.
 - Integrating manipulation pipelines with modern robotics simulators and policy training frameworks.
- 2025 – **Vision Representation Learning for RL via Autoencoders (Latent-Space Control)**, *Los Alamos National Laboratory*.
Present
- Building an autoencoder pipeline to compress image observations (e.g., $480 \times 480 \times 3$) into compact latent states (e.g., $30 \times 30 \times 3$) for RL.
 - Training on large multi-episode datasets collected from simulation across tasks/viewpoints; using data-parallel training to increase throughput.
 - Using the learned latent space for downstream RL to reduce simulation/training time and improve scalability.

2024 – **Space Robotics: Solar Panel Deployment Failure Detection and Repair**, *University of New Mexico / LANL Collaboration*.

- Developing a vision encoder to detect deployment failure modes from observations of satellite solar panels.
- Training a control/RL policy to apply corrective forces to resolve stuck or jammed deployment mechanisms.
- Leveraging high-fidelity simulation and iterative training to evaluate robustness and recovery strategies.

Research Experience

July 2025 – **Graduate Research Assistant (GRA) at Los Alamos National Lab**, *Reinforcement learning for accelerator tuning and control*.

Adaptive Machine Learning group, AOT-IC. Supervisor: Dr. Alexander Scheinker

June 2024 – **Research Assistantship (RA): Hybrid control methods for space robotics**, *University of New Mexico*.

Supervisor: Dr. Rafael Fierro, Labs: MARHES and AgMan

2018 **Final Year Project (Research): Wave propagation based Structural health monitoring using Piezoelectric patches**, *IIST, Thiruvananthapuram, India*, [Thesis link](#).

Lamb wave propagation technique of structural health monitoring is used to detect damages in an aluminum panel using piezoelectric actuators and sensors.

- Finite element modeling (FEM) to simulate lamb wave phenomenon in plates and comparing with experimental results.
- MATLAB based algorithms to characterize the damages in a broader sense.
- LDSV (Laser Doppler Scanning Vibrometer) to review the changes in vibration pattern due to the damage in the specimen.

Publication

Nov 2025 **Saxena, Shaifalee et al.**, *Combined Extremum Seeking and Reinforcement learning for Robust Manipulation*, Southwest Robotics Symposium 2025.

Oct 2025 **Saxena, Shaifalee et al.**, *Improved Robustness of Deep Reinforcement Learning for Control of Time-Varying Systems by Bounded Extremum Seeking*, Accepted for publication in American Control Conference 2026.

[Paper Link](#)

Dec 2018 **Saxena, Shaifalee et al.**, *Enhanced online damage detection using frequency mixed and time reversed guided waves in doubly curved shells*, 2nd International Conference on Structural Integrity (ICONS), IIT Madras, 2018 - [Paper Link](#).

Second Best Paper Award

Invited Talks

Apr 2023 **Cybosium organised by IEEE**, India's first-ever IEEE RAS Technical Education Program. Title: Unmanned Aerial Systems (UAS) Autonomy

Professional Experience

09/06/2021 – **Airbus Group Pvt Ltd, India**, *Senior Engineer - Control system*.

- 05/15/2024
- Develop Electronic Flight Control System (EFCS) packages for Airbus training simulators.
 - Implement malfunctions triggering logics by comprehending the control laws of the aircraft.
 - Conduct validation activities, encompassing thorough testing of control and stability performances.
 - Verify the fundamental functionality of the aircraft on simulator across different flight phases.
 - Offer technical support by resolving in-service queries related to stability and control logics.

06/01/2018 - **Tata Advanced Systems Ltd, India, Senior Executive - Flight dynamics and control**
08/28/2021 *system.*

1. Autopilot development for Medium Altitude Long Endurance aircraft.
 - o Created a non-linear 6-DOF model using standard equation of motion and aerodynamics.
 - o Developed Total Energy Control System (TECS) for simultaneous control.
 - o Formulated Extended Kalman Filter (EKF) for Autopilot system for estimation.
 - o Tested the control strategy for robustness in MIL and SIL environments.
 - o Optimized Flight performance, range and endurance of the aircraft for various flight conditions.
2. Morphing wing aircraft
 - o Developed Deep Stall Landing algorithm to land the plane in narrow space.
 - o Implemented System identification for UAVs.
 - o Developed flight plan to estimate static and dynamic derivatives.
3. Small UAV (Fixed wing)
 - o Designed and tuned PID controller to improve the stability characteristics of the aircraft.
 - o Improved Fly-By-Gimbal functionality to follow the target specified by target tracking function.
 - o Analyzed flight data using Frequency domain analysis mainly, FFT, CWT and PSD.
4. Swarm of quad-copters for disaster relief
 - o Formulated swarm optimization algorithm for followers to follow the swarm lead.
 - o Developed algorithms for obstacle detection and avoidance using Lidar sensor.

Skills

Controls & Modeling:.

System identification; nonlinear dynamics and modeling (6-DOF aircraft, vehicle models); discrete/continuous-time systems; frequency-domain analysis (FFT, PSD); filtering; classical control (PID/loop-shaping); modern control (state-space, state feedback); state estimation/observers (EKF, UKF); modeling & simulation workflows

Reinforcement Learning & ML:.

Deep reinforcement learning (actor-critic, DDPG); hybrid learning-control methods; representation learning (autoencoders); multi-task learning for manipulation; data-driven policy evaluation

Robotics/Simulation Software:.

ROS 2; Gazebo; MuJoCo; MATLAB/Simulink; SCADE; ADAMS; ANSYS

Hardware & Sensors:.

UR5e manipulator; Quadcopter, RGB cameras; gimbals; Arduino; Raspberry Pi; ultrasonic sensors; LiDAR

Scores, Awards, and Honors

2023 & 2022 **SPOT award, Airbus, India.**

2019 & 2021 **Best performer and team award, Tata Advanced Systems Ltd.**
For developing navigation and guidance algorithm.

2018 **2nd Best Paper award in ICONS-2018 conference at IIT-Madras.**

2014 **JEE-Advance, AIR -3700 (GEN).**
In top 0.5% students among 1 million students

2014 **State Board Topper Merit List.**
Gold medalist among 5 Lacs students

2013 **Priyadarshini Award.**
Scholarship of 1 Lakh INR by state government for Gold medal in general category (Girls)

2010 **National Talent Search Examination, NTSE.**
Rank Holder in NTSE in India, Scholarship from government of India.