

Arnav Samal

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Education

Present Nov 2022	National Institute of Technology (NIT) Rourkela Bachelor of Technology, Computer Science & Engineering CGPA: 9.12/10 <i>Coursework: Probability & Statistics, Computer Vision, Natural Language Processing, Machine Learning; self-studied Convex Optimization, Deep Learning (NPTEL)</i>	Rourkela, India
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Research Experience

Present July 2025	NIT Rourkela Dept. of CS <i>Undergraduate Researcher / Advisor: Dr. Prasenjit Dey</i> ➤ Developing novel architectural modifications to diffusion models for sketch-to-face synthesis to enhance geometric faithfulness and feature mapping. ➤ Integrating explainability mechanisms to ensure interpretable and controllable generation of facial features from sketch inputs.	Rourkela, India
Present May 2025	IIT Hyderabad Lab 1055 (AI & Vision-Language Group), Dept. of CS <i>Research Intern / Advisor: Prof. Vineeth N Balasubramanian, in collaboration with Microsoft Research</i> ➤ Investigating concept quality in CBMs by analyzing concept locality to diagnose concept leakage; processing 2TB+ medical imaging data and applying locality-to-concept specific metrics ➤ Early results show models attend 45% more to spurious regions than diagnostically relevant features; targeting CVPR 2026.	Hyderabad, India
May 2025 Mar 2025	KIIT University RespAI Lab, Dept. of CS [🌐] <i>Undergraduate Researcher / Mentor: Dr. Murari Mandal</i> ➤ Applied sparse autoencoders to extract and steer reasoning-specific features (uncertainty, reflection) in large language models. ➤ Maintained task performance while reducing response length, improving generation efficiency.	Remote
Aug 2024 May 2024	IIT Hyderabad Data-driven Intelligence & Learning Lab, Dept. of AI [🌐] <i>Research Intern / Advisor: Dr. Konda Reddy Mopuri</i> ➤ Conducted comparative analysis of post-hoc explainability techniques in Vision Transformers, including attention rollout and token pruning methods. ➤ Implemented and evaluated token pruning strategies for computational efficiency while maintaining classification performance.	Hyderabad, India

Selected Projects

SketchWarp <i>Paper / Source Code</i>	Mar'25 - May'25
➤ Developed a self-supervised learning framework in PyTorch for dense photo-to-sketch correspondences, enabling automatic image-to-sketch warping. ➤ Designed and implemented training and evaluation pipelines inspired by the “Learning Dense Correspondences between Photos and Sketches” paper.	Sep'24 - Nov'24
Capsule Vision Challenge 2024 Team Seq2Cure <i>Preprint / Competition Website / Source Code</i>	Sep'24 - Nov'24
➤ Developed a fine-tuned, multi-model ensemble combining CNN and Transformer architectures, leveraging techniques like weighted random sampling and focal loss to address significant class imbalance. ➤ The proposed method secured the 5th position in the international challenge, resulting in co-authorship in the official challenge summary paper.	Aug'24 - Oct'24
NeurIPS Ariel Data Challenge 2024 Team Markov's Chain <i>Competition Website / Source Code</i>	Aug'24 - Oct'24
➤ Developed a pipeline for exoplanet spectral prediction using calibrated multi-sensor time-series data, implementing spatial-temporal aggregation, phase detection via gradient analysis, and Nelder-Mead optimization. ➤ Ranked in the top 20% in the NeurIPS-Ariel Challenge, with an evaluation score of 0.5704.	1

Technical Skills

- › **Programming Languages:** Python, C++, C, SQL
- › **Libraries & Frameworks:** PyTorch, JAX, HuggingFace (Transformers, PEFT/LoRA, Datasets), NumPy, SciPy, scikit-learn, OpenCV, timm, Matplotlib, W&B
- › **Tools & Platforms:** Git, GitHub, uv, Conda, Docker, Jupyter, LaTeX, Microsoft SQL Server

Honours and Awards

Departmental Rank #9 [🔗] Ranked 9th in the Computer Science & Engineering department at NIT Rourkela based on cumulative academic performance.

ACM-IKDD Uplink 2025 Program [🔗] Selected for the competitive CS mentorship program (acceptance rate ~2%).

Research in Intelligence & Security Challenges (RISC) 2025 Program [🔗] Selected for the prestigious program at the University of Maryland.

Worldwide Rank 5 | Capsule Vision Challenge 2024 [🔗] Top-performing team (Team Seq2Cure) in the Capsule Vision Challenge organized by [CVIP 2024](#).

2nd Place | HackFest 2024 Secured 2nd place at the [hackathon](#) organized by ML4E for undergraduates.

Kaggle Expert [🔗] Earned expert status for contributions in Datasets & Notebooks.

Leadership & Extra-Curricular Activities

ML4E Society, NIT Rourkela	<i>Core Member</i>	Aug'23 – Present
›	Helped establish and grow a student-led machine learning society; conducted sessions, mentored juniors, and contributed to research discussions.	
Inquizzitive, NIT Rourkela	<i>Quizzer</i>	Sept'23 – Present
›	Active member of the quizzing society; participated in quizzes and contributed to discussions on trivia and strategy.	
Rotaract Club, NIT Rourkela	<i>Member</i>	Oct'23 – Mar'24
›	Contributed to social initiatives, helping organize and participate in community outreach and development events.	
Innovision 2K23, NIT Rourkela	<i>Event Coordinator, Organizer</i>	Sept'23 – Nov'23
›	Co-organized events for the annual technical fest, coordinating logistics and team operations.	