



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	Rourkela, India
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Research Experience

Present July 2025	NIT Rourkela Dept. of CS <i>Undergraduate Researcher Advisor: Dr. Prasenjit Dey</i> Working on sketch-to-face generation with explainability for transparent and interpretable image synthesis.	Rourkela, India
Present May 2025	IIT Hyderabad Lab 1055 (AI & Vision-Language Group), Dept. of CS <i>Research Intern Advisor: Prof. Vineeth N Balasubramanian</i> Working on concept bottleneck models (CBMs) in vision and language for improved ante-hoc interpretability in medical imaging tasks.	Hyderabad, India
May 2025 Mar 2025	KIIT University RespAI Lab, Dept. of CS  <i>Undergraduate Researcher Mentor: Dr. Murari Mandal</i> Investigated mechanistic interpretability for reasoning in large language models using sparse autoencoders to identify and steer interpretable features that influence reasoning performance.	Remote
Mar 2025 Dec 2024	NIT Rourkela CoNLP Lab, Dept. of CS <i>Undergraduate Researcher Mentor: Dr. Tapas Kumar Mishra</i> Focused on anisotropy in transformer models, examined its effects on model behavior and performance, and studying approaches to mitigate representation degradation.	Rourkela, India
Aug 2024 May 2024	IIT Hyderabad Data-driven Intelligence & Learning Lab, Dept. of AI  <i>Research Intern Advisor: Dr. Konda Reddy Mopuri</i> Worked on explainability in vision transformers, specifically post-hoc explanation techniques and token pruning methods to enhance interpretability.	Hyderabad, India

Projects

SketchWarp Paper / Source Code	Mar'25 - May'25
<ul style="list-style-type: none">> 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 “<i>Learning Dense Correspondences between Photos and Sketches</i>” paper.	
Capsule Vision Challenge 2024 Team Seq2Cure Preprint / Competition Website / Source Code	Sep'24 - Nov'24
<ul style="list-style-type: none">> 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.	
NeurIPS Ariel Data Challenge 2024 Team Markov's Chain Competition Website / Source Code	Aug'24 - Oct'24
<ul style="list-style-type: none">> 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.	

[Paper](#) / [Blog](#) / [Source Code](#)

- > Analyzed patch importance in Vision Transformers using attention scores of the [CLS] token across MHSA mechanisms in all blocks, visualizing the distribution of top-k patch tokens.
- > Implemented Attention Rollout to propagate attention through layers, creating interpretable visualizations of information flow and enhancing understanding of self-attention mechanisms.

Technical Skills

- > **Programming Languages:** Python, C++, C, SQL
- > **Libraries & Frameworks:** PyTorch, JAX, HuggingFace Transformers, scikit-learn, SciPy, NumPy, Matplotlib, Flask
- > **Tools & Platforms:** Git, GitHub, 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 *Core Member* 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 *Quizzer* Sept'23 – Present

- > Active member of the quizzing society; participated in quizzes and contributed to team prep and discussions on trivia and strategy.

Rotaract Club, NIT Rourkela *Member* Oct'23 – Mar'24

- > Contributed to social initiatives, helping organize and participate in community outreach and development events.

Innovision 2K23, NIT Rourkela *Event Coordinator, Organizer* Sept'23 – Nov'23

- > Assisted in planning and executing events at the annual technical fest; worked closely with teams to ensure smooth coordination.