



# Arnav Samal

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## Education

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

<b>Present</b> <b>July 2025</b>	<b>NIT Rourkela   Dept. of CS</b> <i>Undergraduate Researcher   Advisor: Dr. Prasenjit Dey</i> <ul style="list-style-type: none"><li>➤ Developing novel architectural modifications to diffusion models for sketch-to-face synthesis to enhance geometric faithfulness and feature mapping.</li><li>➤ Integrating explainability mechanisms to ensure interpretable and controllable generation of facial features from sketch inputs.</li></ul>	<b>Rourkela, India</b>
<b>Present</b> <b>May 2025</b>	<b>IIT Hyderabad   Lab 1055 (AI &amp; Vision-Language Group), Dept. of CS</b> <i>Research Intern   Advisor: Prof. Vineeth N Balasubramanian, in collaboration with Microsoft Research</i> <ul style="list-style-type: none"><li>➤ 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</li><li>➤ Early results show models attend 45% more to spurious regions than diagnostically relevant features; targeting CVPR 2026.</li></ul>	<b>Hyderabad, India</b>
<b>May 2025</b> <b>Mar 2025</b>	<b>KIIT University   RespAI Lab, Dept. of CS</b>  <i>Undergraduate Researcher   Mentor: Dr. Murari Mandal</i> <ul style="list-style-type: none"><li>➤ Applied sparse autoencoders to extract and steer reasoning-specific features (uncertainty, reflection) in large language models.</li><li>➤ Maintained task performance while reducing response length, improving generation efficiency.</li></ul>	<b>Remote</b>
<b>Aug 2024</b> <b>May 2024</b>	<b>IIT Hyderabad   Data-driven Intelligence &amp; Learning Lab, Dept. of AI</b>  <i>Research Intern   Advisor: Dr. Konda Reddy Mopuri</i> <ul style="list-style-type: none"><li>➤ Conducted comparative analysis of post-hoc explainability techniques in Vision Transformers, including attention rollout and token pruning methods.</li><li>➤ Implemented and evaluated token pruning strategies for computational efficiency while maintaining classification performance.</li></ul>	<b>Hyderabad, India</b>

## Selected Projects

<b>SketchWarp</b> <a href="#">Paper</a> / <a href="#">Source Code</a> <ul style="list-style-type: none"><li>➤ Developed a self-supervised learning framework in PyTorch for dense photo-to-sketch correspondences, enabling automatic image-to-sketch warping.</li><li>➤ Designed and implemented training and evaluation pipelines inspired by the “<i>Learning Dense Correspondences between Photos and Sketches</i>” paper.</li></ul>	<b>Mar’25 - May’25</b>
<b>Capsule Vision Challenge 2024   Team Seq2Cure</b> <a href="#">Preprint</a> / <a href="#">Competition Website</a> / <a href="#">Source Code</a> <ul style="list-style-type: none"><li>➤ 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.</li><li>➤ The proposed method secured the 5th position in the international challenge, resulting in co-authorship in the official challenge summary paper.</li></ul>	<b>Sep’24 - Nov’24</b>
<b>NeurIPS Ariel Data Challenge 2024   Team Markov’s Chain</b> <a href="#">Competition Website</a> / <a href="#">Source Code</a> <ul style="list-style-type: none"><li>➤ 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.</li><li>➤ Ranked in the top 20% in the NeurIPS-Ariel Challenge, with an evaluation score of 0.5704.</li></ul>	<b>Aug’24 - Oct’24</b>

## Technical Skills

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- > **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

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**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

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**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 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

- > Co-organized events for the annual technical fest, coordinating logistics and team operations.