Swadesh Swain

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Education

Indian Institute of Technology Roorkee, Roorkee, Uttarakhand — GPA: 7.5/10.0
Bachelor of Technology in Electronics and Communication Engineering — *Oct 2022 – Jun 2026*

Puna International School, Ahmedabad, Gujarat — GPA: 96.4/100%
Higher Secondary Education — *Apr 2020 – Jun 2022*

Rachana School, Ahmedabad, Gujarat — GPA: 95.6/100%
Secondary Education — *Apr 2007 – Mar 2020*

Work and Research Experience

Virginia Tech | *Research Intern* — July 2025 – Present
- Conducting research to bench-mark circuit tracing interpretability methods in modern LLMs
- Advisor: **Dr. Nagendra Aneja**, Associate Professor - Bradley Department of Electrical and Computer Engineering, Virginia Tech

AuraML | *Research Intern* — June 2025 – Present
- Implementing text-to-3D scene generation frameworks with Graph Diffusion Models
- Created a text to 3D warehouse generator and editor accessible by an extension through Isaac-Sim for industrial simulation applications
- Advisory Lead: **Arjun Gupta**, CTO - AuraML

Ernst and Young | *Generative AI Intern* — May 2025 – July 2025
- Implemented BEAT flow optimization pipeline for business working pipelines using Graph Diffusion networks
- Advisory Lead: **Rajat Gupta**, Senior Manager, Data Science – Ernst and Young

Robotics Research Centre, IIIT Hyderabad | *Undergraduate Researcher* — April 2025 – July 2025
- Conducted research to develop generalized skill-based models in Reinforcement Learning using Diffusion Models and Sparse MoE-frameworks for VLA tasks
- Developing Multi-Task RL frameworks
- Advisor: **KM Krishna**, Professor and Lab Head, Robotics Research Centre – IIIT Hyderabad

Koita Centre for Digital Health, IIT Bombay | *Machine Learning Engineer* — May 2024 – Oct 2024
- Implementing pipelines for RAG assisted content generation, OCR correction and content assisted Image reconstruction for medical applications as part of the Digital Health Team
- Project Chair Professor: **Ganesh Ramakrishnan**, Koita Centre for Digital Health – IIT Bombay; Supervisor: **Kundeshwar Pundalik**, Sr. Generative AI Engineer

KonectU | *Generative AI Engineer* — May 2024 – Oct 2024
- Implemented foundational RAG assisted LAM model to autonomously cater a student's application process as part of the early-stage team in this startup, implemented proof of concept models
- Supervisor: **Kundeshwar Pundalik**, , Co-Founder and CTO, KonectU

C.A.N.D.L.E Research Lab, IIT Roorkee | **BOSCH** | *Undergraduate Researcher* — Dec 2023 – Present
- Conducting research in collaboration with BOSCH on Geometric manipulation of latent manifolds of Diffusion Models for Editing, Conditioning, and Interpretability
- Synthetic Data Generation using Latent Space Conditioning of Diffusion Models pretrained on fixed length data to arbitrary length data, and Interpretability in Generative Vision Models
- Previous research experience includes in Multi-Modal model compression, Neural Architectural Search, Approximate computing, Image Processing and Compression techniques
- Advisor: **Sparsh Mittal**, Associate Professor, C.A.N.D.LE Research Lab – IIT Roorkee

Publications

Revisiting CroPA: A Reproducibility Study and Enhancements for Cross-Prompt Adversarial Transferability in Vision-Language Models
TMLR 2025 | *MLRC 2025* | ★ Best Paper Award | Open Review | arXiv | Code — June 2025

- Reproducing *"An Image is Worth 1000 Lies: Adversarial Transferability Across Prompts on Vision-Language Models"s*, analyzing it's limitations in an attempt to further enhance Cross Prompt Attacks for VLMs
- Introduced a novel initialization technique based on providing better attributes to initial noise using Diffusion Models, Improved Cross-Model Transferability and ASR performance

Riemann Sum Optimization for Accurate Integrated Gradients Computation
NeurIPS 2024, Interpretable AI Workshop | arXiv | Code Dec 2024

- Developed **RiemannOpt**, a framework to optimize sample point selection for Riemann Sum approximations in Integrated Gradients methods
- Reduced computational costs by up to 4x while maintaining similar performance to baseline methods

Synthetic Signal Generation with Diffusion Models
Under Preparation June 2025

- Devising a resource-efficient data generation pipeline for synthetic data generation of vibrational accelerometer signals of ball bearings
- Introduced a lightweight diffusion architectures achieving 99.7% discriminator confidence against real data, trained with only 100 samples per-class of real-data

Projects and Research Work

IEEE Signal Processing Cup, ICASSP 2025 | *Team Member* | Project Report Sep 2024 – Feb 2025

- A team research project aimed at finding optimal methods for advanced Deepfake detection in images, submitted to the IEEE Signal Processing Cup, ICASSP 2025
- Advisor: **Vinod Pankajakshan**, Associate Professor, Vision and Image Processing Lab – IIT Roorkee

Deep RL-enabled Fortnite Agent Oct 2024 – May 2024

- A team project ongoing under Data Science Group, to develop an agent to play the highly complex game "Fortnite", using multi-linear ICVF via temporal difference learning and DreamerV3 as world model
- NVIDIA's COSMOS used as the embedding model to embed video streams for training

Reproducing UPoP | Code Dec 2023 – Feb 2024

- Reproduced results for paper titled UPop: Unified and Progressive Pruning for Compressing Vision-Language Transformers, ICML 2023, for DeiT model, under the BYOP Reproducibility Track 2024
- Conducted Extensive ablation study and introduced enhancements for optimizations
- Achieved 90% model compression with a mere 5.5% accuracy drop

LLM-AI-Generated-Text-Classification | Code Dec 2023 – Jan 2024

- Open research project with Vision and Language Group, focused on identifying AI generated text and enhancing robustness against artificial content

Leadership & Activities

Data Science Group, IIT Roorkee | *Joint Secretary* Sep 2024 – Present

- Worked on open-source projects and research in the domain of Computer Vision, Diffusion Models, VLMs, Robustness and Explainability
- Managed and organized lectures, workshops, hackathons spanning the field of Data Science and AI
- Our team publishes research at several A* conferences such as NeurIPS, CVPR, ICLR, with most works lead solely by undergraduate authors

International Relations Cell | *Joint Secretary* Sep 2023 – May 2025

- Created database of research and contacts for various programs and scholarships abroad available for IIT Roorkee students
- Organizing various talk/interview events with partnerships from universities and students from abroad

Selected Awards and Honors

HOD Appreciation Letter for Highest Increase in SGPA in a single semester
Nominated as Institute Representative for NVIDIA AI Summit, Mumbai, India, 2024
All India Rank 1423 out of 1M+ candidates in JEE Advanced 2022
All India Rank 1697 out of 1M+ candidates in JEE Mains 2022

Skills

Languages: Fluent in English, Hindi, and Gujarati. Conversation in Oriya
Programming Languages and APIs: Python, Java, C/C++, Verilog, RISC-V Assembly, Assembly, OpenCV, TensorFlow, TensorFlow Lite, PyTorch