

PROTYAY DEY

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EDUCATION

University at Buffalo

PhD in Computer Science and Engineering, CGPA: 3.79 / 4.0

New York, US
Aug 2025 – Present

Indian Institute of Technology Ropar

MTech in Artificial Intelligence, CGPA: 9.09 / 10.0

Punjab, IN
Aug 2022 – Jun 2024

University of Engineering & Management, Jaipur

BTech in Computer Science and Engineering, CGPA: 9.27 / 10.0; Gold Medalist

Rajasthan, IN
Aug 2017 – Jun 2021

RESEARCH EXPERIENCE

Computer Vision and Machine Learning Lab, UB (SUNY)

Graduate Research Student – Generative AI, Multi-Agent Systems

New York, US
Aug 2025 – Present

- Developed **SCAPE** for decentralized SLM multi-agent reasoning, achieving up to **+16.4 points** over token-budget-matched baselines and consistent gains across **3 model families**.
- Proposed **EAD**, a label-free runtime controller for SLM multi-agent reasoning across **6 benchmarks and 14 baselines**, achieving **+7.40 percentage points overall gain**.
- Conceptualized **MAGNET**, a manifold-aware graph diffusion model for brain connectome generation across **3 cohorts**, improving conditional fidelity by up to **21%**.

Computer Vision and Pattern Recognition Lab, IIT Ropar

Junior Research Fellow – Federated Learning, Deep Learning

Punjab, IN
Apr 2025 – Jun 2025

- Architected FedRWA for disjoint-label federated learning, evaluated on **12 clients and 313 classes**.
- Achieved **18.6%** accuracy gain and **57.8%** lower client-wise variance across 3 backbones.

Image Processing, Security & Analytics Labs, IIT Ropar

Research Intern – Applied Deep Learning

Remote
Jul 2024 – Oct 2024

- Developed **SPAIR-Swin** using **high-entropy patches** and evaluated across 138 camera models.
- Improved patch-level SCMI accuracy by up to **20.36%** across 4 forensic benchmarks.

mVizn Pte. Ltd.

Machine Learning Intern – 3D Computer Vision

Remote
Jan 2024 – Mar 2024

- Increased indoor point-cloud classification by **25%** using PointNet++.
- Improved IoU for underrepresented classes by **30%–45%** through class-imbalance handling.

PUBLICATIONS & MANUSCRIPTS

- **P. Dey**, A. Roy, R. Chakraborty, V.S. Lokhande. “SCAPE: Symmetric Canonicalization, Aggregation, and Projection of Evidence for Decentralized Small Language Model Agents.” *Under Review, AAAI 2027*.
- **P. Dey**, V.S. Lokhande. “Execution-Aware Adaptation for SLM Multi-Agent Reasoning Systems.” *Under Review, EMNLP 2026*.
- **P. Dey**, A. Roy, H. Cho, W. H. Kim, V.S. Lokhande. “MAGNET: Manifold-Aware Graph Diffusion Network for Connectome Generation.” *Under Review, NeurIPS 2026*.
- **P. Dey**, A. S. Jadhav, K. Rana, R. Chakraborty, G. Sharma, P. Goyal, “Camera Model Identification with SPAIR-Swin and Entropy-Based Non-Homogeneous Patches,” [arXiv](#), 2025.
- K. Rana*, A. S. Jadhav*, **P. Dey***, V. Rath, P. Goyal, G. Sharma, “SCMI30-IITRPR: Smartphone Camera Model Identification Dataset Comprising Similar and Random Content Image Sets,” [techRxiv](#), 2024.
- **P. Dey**, A. S. Jadhav, K. Rana, “An Effective CNN-Based Approach for Synthetic Face Image Detection in Pre-Social and Post-Social Media Context,” [CVIP](#), 2023.

TECHNICAL SKILLS

Programming: Python, C++, C, SQL, $\LaTeX$, JavaScript, TypeScript

ML: PyTorch, TensorFlow, Scikit-learn, NumPy, Pandas, OpenCV

Research: Small Language Models, Agentic AI, Multi-Agent Systems, LLM Reasoning, Transformers, Diffusion Models, Generative AI, Optimization

Tools: Git, Linux, GitHub, Jupyter, VS Code, Hugging Face, vLLM