

SAPTARSHI MUKHERJEE

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EDUCATION

Swami Vivekananda Institute of Science and Technology

Kolkata, India

Bachelor of Technology (B. Tech) in Computer Science

Expected July 2027

GPA: 7.5/10.0

Relevant Coursework: Machine Learning, Deep Learning, Computer Vision, Artificial Intelligence, Data Structures & Algorithms, Probability & Statistics

RESEARCH INTERESTS

Robust Machine Learning, Computer Vision, Multimodal AI Systems, Image Forensics and Deepfake Detection, and Evaluation of AI Models under Noisy and Real-World Conditions.

RESEARCH PROJECTS

Robust Object Recognition Under Extreme Noise | [GitHub](#)

Manuscript in Preparation (experimental results completed)

Mar 2026

- Investigated robust limits of deep vision models, observing a catastrophic accuracy drop from 94.8% (clean) to 9.59% under high Gaussian noise, highlighting a $\sim 85\%$ performance degradation.
- Built a controlled noise evaluation pipeline (Gaussian, blur, low-light) and benchmarked architectures (ResNet-18, WideResNet-50, Vision Transformer), all showing $\leq 10\%$ accuracy at high noise levels.
- Designed a Denoising Autoencoder (DAE)-based pipeline, reducing reconstruction error (MSE: 0.12 $\rightarrow$ 0.032) while analyzing trade-offs between noise removal and feature preservation.

Multimodal Memory AI: Semantic Retrieval System | [GitHub](#)

Manuscript in Preparation (experimental results completed)

Mar 2026

- Developed a multimodal memory-based AI system integrating text (spaCy) and image features (MobileNet), handling multi-step queries across ~ 2 – 3 turns per session.
- Implemented a memory-driven retrieval pipeline, improving contextual query resolution accuracy by ~ 25 – 30% over stateless baseline in sequential query tests.
- Evaluated on $\sim 500+$ multimodal query interactions, achieving $\sim 80\%$ consistency in context-aware responses and identifying failure cases in ambiguous queries.

Fake Image Detection System: Deepfake & Synthetic Media Analysis | [GitHub](#)

Manuscript in Preparation (experimental results completed)

Mar 2026

- Developed a deepfake detection pipeline using spatial and frequency-domain features (FFT/DCT) on a dataset of $\sim 12\text{K}$ – 15K real and synthetic images, targeting GAN and diffusion-based manipulations.
- Achieved ~ 90 – 92% classification accuracy ($F1 \approx 0.90$, $\text{ROC-AUC} \approx 0.94$), with frequency-domain features improving detection performance by ~ 6 – 8% over pixel-only models.
- Evaluated robustness under perturbations (JPEG compression, resizing, noise), observing a ~ 12 – 15% drop in performance, highlighting generalization challenges consistent with recent research in fake image detection.

RESEARCH EXPERIENCE

Undergraduate Researcher – Machine Learning & Computer Vision (Python, PyTorch, TensorFlow, OpenCV)

Focus: Robust Vision, Multimodal AI, Image Forensics

Jun 2024 – Present

- Studied robustness of deep vision models under extreme noise, observing a $\sim 85\%$ accuracy drop (94.8% $\rightarrow$ 9.59%) and building a controlled noise evaluation pipeline.
- Developed a DAE-based vision pipeline (MSE: 0.12 $\rightarrow$ 0.032) and benchmarked CNNs/ViTs, identifying generalization gaps under noisy and shifted data.
- Built multimodal memory AI and fake image detection systems, achieving $\sim 90\%+$ detection performance and improving contextual query handling by ~ 25 – 30% .

TECHNICAL SKILLS

- **Programming:** Python
- **Deep learning & Machine learning:** Pytorch, TensorFlow, Scikit-learn
- **Computer Vision & Image Processing:** OpenCV, Noise Modeling (Gaussian, Blur, Low-light), Frequency-Domain Analysis (FFT/DCT)
- **Multimodal Systems & Retrieval:** Image-Text Integration, Semantic Search, Context-Aware Memory Systems
- **Model Development & Evaluation:** Model Training, Robustness Testing, Performance Benchmarking, Ablation Analysis
- **Data Science & Scientific Computing:** NumPy, Pandas, SciPy
- **Visualization & Experimentation:** Matplotlib, Seaborn
- **Tools & Workflow:** Git, GitHub, Jupyter Notebook, LaTeX

ACHIEVEMENTS / CERTIFICATIONS

- ***Best Class Representative Award*** - Recognized for leadership and effective student–faculty coordination
- **Professional Training and Internship in Generative AI** – Hands-on experience with large language models, prompt optimization, and AI-driven application prototyping

ACTIVITIES AND LEADERSHIP

Open Source & Developer Community Participation

Contributor

Aug 2023 – Present

- Maintain and document machine learning and computer vision projects on GitHub, including robust vision and multimodal AI systems
- Engage in technical discussions on ML/CV topics and share project insights within developer communities

Technical Learning & Research Engagement

Student Research

Jan 2024 – Present

- Study research literature in robust machine learning, computer vision, and image forensics
- Reproduced and implemented research ideas through experimental projects, including noise-resilient vision and multimodal retrieval systems