Pallabi Ghosh

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PROFESSIONAL SUMMARY

- Applied AI researcher with 6+ years of experience designing, developing, and deploying deep learning solutions across computer vision, generative AI, and large-scale data science.
- Expertise in advanced AI models including Large Language Models (LLMs), Vision-Language Models (VLMs), Vision Transformers (ViTs), and Diffusion Models.
- Postdoctoral Research Associate at Mayo Clinic, Arizona, specializing in AI-driven healthcare applications such as medical imaging and anomaly detection.
- Ph.D. in Computer Engineering, University of Florida, with research spanning computer vision and GAN-based frameworks for counterfeit electronics detection and biometric systems.
- Experienced in building deep learning frameworks using Python, Tensorflow, Keras and Pytorch, and handling of large-scale datasets on GPU platforms and using Git workflows.
- Strong record of publications, patents, and mentorship, demonstrating technical leadership and communication excellence.

CORE COMPETENCIES

Deep Learning || Computer Vision || Generative AI (GANs, LLM, Diffusion Models) || Biometrics || Hardware Security || Python/ML Frameworks|| Anomaly Detection

TECHNICAL EXPERIENCE

- **Programming Languages**: Python, Matlab, SQL, C, C++, Bash
- **Libraries and Frameworks**: Pytorch, Tensorflow, Keras, OpenCV, scikit-image, Pillow, pydicom, SimpleITK, MONAI, TorchXRayVision, Numpy, Matplotlib, Pandas.
- **Distributions/ Systems:** Anaconda, Kubernetes, Databrick, SageMaker, HPC (SLURM, CUDA, MPI), NVIDIA DGX A100
- **Domain Knowledge:** Biometric, Pattern Recognition, Machine Learning, Compiler Design, Digital Image Processing, Data Structures, Algorithms, High Performance Parallel Programming, Introduction to Hardware Security.
- **Data Science Skills**: Deep learning, Statistics, Machine Learning, Computer Vision, LLM, Generative AI, model evaluation

EDUCATION

Ph.D., Electrical and Computer Engineering **2019 – 2024**
University of Florida, USA. GPA: 3.89/4.0

M.S., Computer Science and Engineering **2017 – 2019**
Indian Institute of Technology, Kharagpur, India. GPA: 9.16/10

B.Tech., Information Technology **2011 – 2015**
Indian Institute of Technology, Kharagpur, India. GPA: 8.61/10

PROFESSIONAL EXPERIENCE

Research Associate **2025**
Mayo Clinic Arizona, Phoenix, AZ

- Used CLIP based medical image feature extractor to extract features from chest X-Rays and built regression deep learning models (CNN and Vision Transformer backbones) for outlier detection and bone age estimation with uncertainty quantification.
- Applied pre-processing pipeline for 3D brain image segmentation using FreeSurfer framework for anomaly detection using patch diffusion models.
- Designed and implemented 3D breast arterial calcification (BAC) detection models by extending 2D SCUNet architecture in PyTorch.
- Developed pre-processing pipelines for digital mammograms and tomosynthesis images, including denoising, normalization.

Graduate Research Assistant **2019 - 2024**
University of Florida (FINS Lab), Gainesville, FL

- Designed bias-independent kinship feature extraction techniques for family-based image analysis.
- Built kinship-aware image generation frameworks to study how synthetic kinship images impacts the security of commercial face recognition systems.
- Defined and evaluated adversarial enrollment and query threat models to assess vulnerabilities in biometric authentication systems.
- Developed a Hierarchical Bloom Filter (HBF) approach that is more resilient to attacks than classical Bloom Filters while preserving soft-biometric privacy, supporting secure and scalable authentication design.
- Created a GAN based data augmentation framework to generate synthetic counterfeit Integrated Circuit images to expand rare defect samples.

Data Scientist Summer Intern **2022, 2023**
Intuit, Mountain View, CA

- Integrated GPT-3 into an entity extraction pipeline for Credit Karma; led to a patented personalized recommendation system.
- Designed a pipeline that first performs topic segmentation on long, unstructured text, then applies entity extraction to yield topic-labeled entities in machine-readable form.
- Carried out statistical analysis of LLM-based customer insights for QuickBooks, applying large-scale data analysis and model deployment.

Junior Research Fellow **2016 - 2019**
Indian Institute of Technology, Kharagpur (SEAL Lab), India

- Developed algorithms for automated counterfeit integrated circuit (IC) and printed circuit board (PCB) detection.
- Designed image processing and feature extraction pipelines for IR and optical imaging of IC packages.
- Leveraged deep CNNs and data augmentation to handle limited counterfeit datasets, improving anomaly detection accuracy.
- Got hands on experience on using different microscopes, SEM and IR imaging tools to collect and create counterfeit IC dataset.

Programmer Analyst Trainee **2015 - 2016**
Cognizant Technology Solutions, Kolkata, India

- Had hands on experience with Linux and different coding systems like shell, C, COBOL.
- Contributed to the maintenance and development of enterprise software solutions as part of the programming analyst team.

SELECTED AWARDS AND RECOGNITIONS

- 2nd Runner Up: Best paper in Applied Research Competition, Cyber Security Awareness Week, 2017
- Awarded Junior Research Fellowship in the 2016-2019 academic years in Indian Institute of Technology, Kharagpur, India and extended throughout M.S. degree course.
- Awarded Tuition Fee Waiver Scholarship in the 2011-2015 academic years for Merit rank in Engineering Entrance Examination and extended throughout B. Tech degree course.

SELECTED PUBLICATIONS (GOOGLE SCHOLAR)

Patent and Disclosure:

- ***P. Ghosh***, Sparsh Gupta, "Topic Focused Related Entity Extraction", 2023. Intuit. Patent # 11,809,477
- O. P. Dizon-Paradis, R. Wilson, D. S. Koblah, D. E. Capecci, M. Zhu, ***P. Ghosh***, R. Acharya, D. J. Forte, and D. L. Woodard, "Hands-on introduction to ai in hardware security: IC reverse engineering using image processing, computer vision, and machine learning," 12 2023. University of Florida Disclosure T19288

Book Chapter:

- H. Lu, D. E. Capecci, ***P. Ghosh***, D. Forte, and D. L. Woodard, "Computer Vision for Hardware Security", Springer Nature, DOI: 10.1007/978-3-030-64448-2_18.

Journals:

- S. Shomaji, ***P. Ghosh***, F. Ganji, D. L. Woodard, D. Forte, "An Analysis of Enrollment and Query Attacks on Hierarchical Bloom Filter-based Biometric Systems", IEEE Transactions on Information Forensics and Security, DOI: 10.1109/TIFS.2021.3128821 (IF 8.0).
- ***P. Ghosh***, R. S. Chakraborty, "Recycled and Remarked Counterfeit Integrated Circuit Detection by Image Processing based Package Texture and Indent Analysis", IEEE Transactions on Industrial Informatics, DOI: 10.1109/TII.2018.2860953 (IF 9.9).

Conferences:

- ***P. Ghosh***, S. Shomaji, M. Zhu, D. L Woodard, D. Forte, "Kin-Wolf: Kinship-established Wolfs in Indirect Synthetic Attack", IEEE International Joint Conference on Biometrics Special Session 2024, 10.1109/IJCB62174.2024.10744495
- ***P. Ghosh***, S. Shomaji, D. L Woodard, D. Forte, "KinfaceNet: A New Deep Transfer Learning based Kinship Feature Extraction Framework", IEEE International Joint Conference on Biometrics (IJCB 2023), doi: 10.1109/IJCB57857.2023.10448711