Anirudh Nakra

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Education

University of Maryland, College Park (UMD) — Aug. 2021 – Present
MS-PhD, Electrical and Computer Engineering — ***GPA: 4.0/4.0***
Advisor: Prof Min Wu

Delhi Technological University, Delhi, India (DTU) — Aug. 2017 – May 2021
BTech, Electronics and Communication Engineering — ***GPA: 8.93/10*** *(Top 5%)*

Research Publications

1. Zachary Lazri, **Anirudh Nakra**, Ivan Brugere, Danial Dervovic, Antigoni Polychroniadou, Furong Huang, Dana Dachman-Soled, Min Wu, "MAFE: Multi-Agent Fair Environments for Decision-Making Systems", arXiv preprint arXiv:2502.18534 (2025), *Accepted at* ***ICML 2026*** *(∼27% Acceptance Rate).*
2. Mudi Zhang, **Anirudh Nakra**, Min Wu., "PhysioGMC: Generalizable Multi-modal Coordination for Physiological Signals", *Accepted at* ***IJCAI 2026*** *(∼18% Acceptance Rate).*
3. **Anirudh Nakra**, Nayeeb Rashid, Chau-Wai Wong, Min Wu, "Exposing Vulnerabilities in Counterfeit Prevention Systems Utilizing Physically Unclonable Surface Feature", arXiv preprint arXiv:2512.09150 (2025), *Under revision.*
4. **Anirudh Nakra**, Min Wu, "Understanding Semantic Perturbations on In-Processing Generative AI Watermarks", arXiv preprint arXiv:2603.27513 (2026) *Under review at ML Conference.*
5. Yangfan Deng, **Anirudh Nakra**, Min Wu., "Position: 3D Gaussian Splatting Watermarking Should Be Scenario-Driven and Threat-Model Explicit", arXiv preprint arXiv:2602.02602 (2026) *Under review at ML Conference.*
6. **Anirudh Nakra**, Chau-Wai Wong, Min Wu., "SoK: Fighting Counterfeits with Cyber-Physical Synergy Based on Physically-Unclonable Identifiers of Paper Surface", arXiv preprint arXiv:2408.02221 (2024), *Under revision*
7. Runze Liu, Prasun Datta*, **Anirudh Nakra***, Chau-Wai Wong, Min Wu, "Surface-Based Authentication System for Integrated Circuit Chips", arXiv preprint arXiv:2412.15186 (2024), *Under review at IEEE Journal.*
8. Prasun Datta, Nayeeb Rashid, **Anirudh Nakra**, Chau-Wai Wong, Min Wu, "Indoor Light Surface Authentication via Digital Twin", *Under preparation.*
9. Xin Tian, Mudi Zhang, Zachary Lazri, **Anirudh Nakra**, Min Wu, Sushant Ranadive "Never-Miss-A-Beat: A Causal-CVAE Based Physiological Digital Twin Framework for Cardiovascular Health", *Under review at IEEE Journal.*
10. **Anirudh Nakra**, Abhijeet Vats, Asok De "Design of High Bandwidth Circularly Polarised Antipodal Vivaldi Array for 5G Application", 2021 2nd IEEE International Conference for Emerging Technology.

Industry Experience

Graduate Intern on Signal Processing Algorithms — May 2022 – Aug 2022
Hughes Network Systems — *Germantown, MD*

- Optimized the transmit modulator module of the return channel subsystem in next-gen ASIC.
- Designed an efficient polyphase filtering system for a 30 % reduction in MIPS.
- Deployed the transmit module on a FPGA ensuring runs under 10ns (50 % faster than before)
- Reduced demodulation noise to within 0.5 % margin of theoretical limit under phase & time offsets

Research Experience

Research Assistant, Computer Vision and Security Nov 2023 – Present
Media and Security Team, UMD *College Park, MD*

- Performed a comprehensive security analysis of paper-surface-based anti-counterfeiting systems using physically unclonable functions (PUFs) and identified key vulnerabilities
- Proposed and demonstrated the effectiveness of physical denial-of-service attacks, which reduced authentication accuracy by up to 75%
- Developed a digital attack with a 92% success rate in forging norm maps, highlighting the need for robust cryptographic defenses in anti-counterfeiting systems

Research Assistant, Health Sensing Sept 2022 – Present
Media and Security Team, UMD *College Park, MD*

- Gathered and analyzed Electrocardiogram (ECG) and Photoplethysmogram (PPG) data of 47 patients to form a large-scale real-world clinical database using Python and MATLAB
- Compared the effectiveness of principled and deep learning approaches for ECG inference from PPG
- Assisted in the experimentation of explainable ECG inference algorithms using causality principles

Additional Technical Projects

Using Explanations for Uncovering Spurious Correlations | *Python, PyTorch, Captum* May 2023

- Investigated different explainability techniques such as LIME, Integrated Gradient, Attention on DistilBERT for uncovering spurious correlations in text classification
- Created a framework to disentangle genuine impactful tokens versus spurious tokens based on inverse frequency analysis and cross dataset consistency

Underwater SLAM Detection | *MATLAB, Python, OpenCV, C++* May 2022

- Headed the image processing efforts for color correction and contrast enhancement in underwater data.
- Adopted the use of fundamental and deep learning techniques such as U-Nets and WaterGAN.
- Improved the accuracy of the SLAM trajectory by upto 25 % w.r.t ground truth with upto 12 % more keypoints being detected.

Image Inpainting for Object Removal | *Python, Tensorflow, OpenCV* May 2022

- Formulated and implemented an end-to-end object extraction and inpainting system
- Adopted deep learning techniques such as YOLO and Mask-RCNN for extraction.
- Used both deep learning and statistical graphics based techniques such as deep image priors, Fourier convolutions, exemplar Matching for inpainting.

Technical Skills

Languages and Frameworks	Python, MATLAB, C++, C
Frameworks/Libraries	Tensorflow, PyTorch, OpenCV

Teaching & Mentorship Experience

ENEE439D: Design Experience in Machine Learning	Spring 2022, Spring 2023, Spring 2024, Spring 2025
DATA603: Principles of Machine Learning	Fall 2021
Mentorship Trainee, Center for the Improvement of Mentored Experiences in Research (CIMER)	2023–2024

Honors and Awards

3 Minute Thesis (3MT) UMD campus winner (*Pre-candidacy*)	UMD, 2024
Graduate Leaders in Academic Engineering Mentoring (GLEAM) Fellow	UMD, 2023
First Class (Distinction) and Rank 1 Scholarship, Delhi Technological University (DTU)	DTU, 2021
Department High Achiever (*Awarded to the top 3 students out of 180*)	DTU, 2019-2021
Merit Certificate in Mathematics	Ministry of Education, Govt. of India, 2017