Trisha Bora East Lansing, MI
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Education

Michigan State University (MSU) — PhD, Electrical & Computer Engineering Jan 2025–Aug 2029 (exp)
Research: Integrated photonics for RF/mmWave & wireless communications; AI/ML-enabled photonic links; photonic–electronic co-simulation.
Graduate Topics: Computational EM (FEM, FDTD, MoM); Detection & Estimation Theory.
Virginia Tech — MS, Electrical & Computer Engineering (GPA 3.78/4.0) Aug 2022–May 2024
Thesis: Multi-layered Dual-band Dual-polarized Reflectarray Design toward rim-located reconfigurable reflectarrays (metasurface/reflectarray synthesis; CST/HFSS validation).
Coursework: EM Waves I/II; Electromagnetic Metamaterials; Advanced Fiber Optics & Applications; Advanced ML; Data Analytics.
Purdue University — MS (non-degree), Electrical & Computer Engineering (GPA 3.43/4.0) Jan 2022–May 2022
Coursework: Linear Algebra & Applications; Electric Hybrid Vehicles; Advanced Electromechanical Systems.
NIT Durgapur — BTech, Electrical Engineering (GPA 8.54/10) 2016–2020

Experience

Graduate Research Assistant, Michigan State University Jan 2025–Present
Designing photonic ICs for RF/mmWave links; MATLAB/Python–Lumerical co-simulation, link budgets & sensitivity for ring/MZI front-ends.
Exploring AI/ML for bandwidth/linearity/SNR optimization.

Graduate Teaching Assistant (Electro-optics), Michigan State University Aug 2025–Present
Supported electro-optics/ECE labs; student mentoring on optical alignment, simulation workflows, data analysis.

Junior Research Fellow (ISRO Collaboration), IIT Roorkee Jul 2024–Nov 2024
Designed ridge- and gap-waveguide mmWave slotted antenna arrays; full-wave EM optimization for aperture efficiency & bandwidth under fabrication limits.

Graduate Research Assistant, Virginia Tech Bradley Dept. of ECE May 2023–Jan 2024
Antennas & metasurfaces/reflectarrays; analytical + MoM/CEM models supporting multilayer dual-band designs (MS thesis).

Graduate Teaching Assistant, Virginia Tech Jan 2024–May 2024
Teaching support for ECE courses (Electromagnetics/Applied Theory); lab experiments, assignments, grading.

Graduate Teaching Assistant, Virginia Tech Aug 2022–May 2023
TA for Electromagnetics (ECE 3105) & Applied Electric Theory (ECE 2054); student support & problem sessions.

Assistant Manager (PI Electrical Maintenance), Tata Metaliks Ltd. (Tata Steel Group) Oct 2020–Oct 2021
Preventive/predictive electrical maintenance; dashboards for breaker health; data-mining of maintenance logs for targeted interventions.

Engineer Intern, Tata Metaliks Jun 2019–Jul 2019 — **Vocational Trainee**, Indian Oil Corp. Ltd. Jul 2018
Research Assistant Intern, IISc Bangalore Jun 2018 — **Trainee**
Highlights: DI annealing furnace PLC automation; power systems exposure; ML-based face detection in MATLAB.

Projects & Research

PhD Research (MSU, 2025–)
Researching **integrated photonics for wireless and communication systems**, like RF/mmWave and optical link architectures.
Exploring applications of **AI/ML** for performance optimization and system integration. Investigating potential directions in **quantum photonics**.
Developing co-simulation workflows (MATLAB/Python ↔ Lumerical/INTERCONNECT) for system-level modeling and validation.

MS Thesis — Metasurface/Reflectarray (Virginia Tech, 2024)
Multi-layered dual-band dual-polarized reflectarray metasurface for reconfigurable systems.
Transmission-line aperture modeling, reactive impedance extraction; MoM/CST/HFSS validation.
Multi-band polarization agility; aperture efficiency validated against analytical models.

3D Stripline FEM Simulation (2025)
PEC-bounded stripline modeled in FEM; compared baseline vs embedded high-ε_r dielectric.
Analyzed E_z, impedance, and S-parameters for field confinement.

Non-linear Kalman Filter (2025)
Implemented EKF (Steven Kay Ex. 13.4) for vehicle tracking; tuned process/measurement noise.
Reduced trajectory estimation error vs linear baseline.

Fiber Fabry–Perot Cavity (2023)
Designed/simulated cavity in COMSOL/MATLAB; optimized reflectivity and cavity length.
Improved Q factor; explored sensing and antenna-integrated optics use cases.

Graphene Aperture Meta-lens (2023)
Graphene metasurface for tunable THz focusing; analyzed exceptional points & leaky-wave phenomena for dynamic imaging.

One-shot Affordance Detection (2022)
Constructed a Y-network with three CNN models for affordance detection in real-world objects.
Trained and tested with limited samples, demonstrating robust detection under few-shot conditions.

Hybrid EV / PMAC Drive / Battery Modeling (2022)
Analyzed performance of a parallel hybrid gas/electric vehicle where electric machine propels at low speeds and boosts acceleration.
Simulated PMAC motor drive using sine-triangle modulation with third-harmonic injection.
Built advanced battery model for round-trip efficiency and range prediction in EV applications.

FEA on Square Core Inductor (2022)
Performed Python-based FEA of square-core inductors; investigated electromagnetic effects on machines.
Gained deeper understanding of electromechanical system performance under varying loading conditions.

Publications

Bora, T., *Aperiodic Multilayered Dual Band Metasurface Design Using an Analytical Approach*, **IEEE BlackSeaCom**, 2024 (accepted).
Bora, T., *Multi-layered dual-band dual-polarized reflectarray design toward rim-located reconfigurabable reflectarrays for interference mitigation in reflector antennas*, MS Thesis, Virginia Tech, 2024.
Bora, T., Chatterjee, P., Ghosh, S., "Fuzzy Logic-based Control of Variable Wind Energy System," **IEEE ICRAIE**, 2020.

Certifications

Photonic Integrated Circuits Design (AIM Photonics Foundry, RIT) ; MSU Graduate School RCR Program (CITI) ; AWS Certified Cloud Practitioner – Foundations ; Intro to Web Development (UC Davis)

Skills

Programming: Python, MATLAB, C/C++ ; **Modeling/EDA:** Lumerical/INTERCONNECT, CST, COMSOL, ADS ; **AI/ML & Estimation:** CNNs, classical ML, EKF/nonlinear filtering, data analytics ; **Domains:** Integrated photonics, RF/mmWave, antennas, metasurfaces, metamaterials, computational EM