

## PROFESSIONAL SUMMARY

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Ph.D. student in Electrical Engineering at Penn State, researching photonic interconnects for heterogeneous integration and packaging. My specialization resides in pulsed-laser direct write lithography, fabrication of waveguides inside glass substrate, waveguide characterization, and photonic simulation using Lumerical and COMSOL (Wave Optics). In addition, I am competent in semiconductor device physics, neuromorphic device architectures, and Sentaurus TCAD device modeling. I also worked on DFT simulation of materials in VASP and Quantum Espresso. Interested in jobs related to photonics and/or electronics.

## EDUCATION

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**The Pennsylvania State University - University Park** State College, PA

*Ph.D. in Electrical Engineering, Focus - Semiconductor Packaging/Optical Interconnects* Aug 2023 – Dec 2028

- **Thesis:** Through Light Photonic Interconnect Vias for Advanced 3D Heterogeneous Integration

**Khulna University of Engineering & Technology** Khulna, Bangladesh

*M.Sc. in Electrical and Electronic Engineering, Focus - Machine Learning* Aug 2020 – Nov 2021

- **Thesis:** Application of deep neural network for power system stability classification

**Khulna University of Engineering & Technology** Khulna, Bangladesh

*B.Sc. in Electrical and Electronic Engineering, Focus - Semiconductor Materials* Nov 2015 – Mar 2020

- **Thesis:** Electronic properties investigation of germanene over two-dimensional (2D) group-III phosphides using DFT

## SKILLS

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**Nanofabrication** - Pulsed Laser Direct Write Lithography, Photolithography; Wet and Dry Etching;

**Characterization** - Optical Microscope, Ellipsometry, Profilometer, SEM; **Measurement** - Optical testbed, Semiconductor Measurement Units.

**Photonic Simulation** - COMSOL, Lumerical; **Electronic Simulation** - Sentaurus TCAD; **Materials Simulation** - VASP, Quantum Espresso; **Programming** - Python, Bash, Matlab; **CAD Tools** - Autocad (2D), Solidworks (3D); **Data Analysis** - Spotfire, JMP.

## WORK EXPERIENCE (1.5 years)

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**The Pennsylvania State University** State College, PA

*Graduate Research Assistant, Dept. of Electrical Engineering* Jun 2024 – Date

- Modeling, Fabrication, and Characterization of Through-glass Photonic Waveguide for 3D Heterogeneous Integration of Microelectronic System and Semiconductor Packaging.
- Tools Used: Type-100 Cleanroom, Femto-second Laser, Lithography, Santaaurus TCAD, COMSOL Multiphysics

**The Pennsylvania State University** State College, PA

*Graduate Research/Teaching Assistant, Dept. of Engineering Science and Mechanics* Aug 2023 – May 2023

- Fabrication and Characterization of Flexible Organic Synaptic Transistors Using P3HT Semiconductor.
- Tools Used: Spin-coater, Keithley Semiconductor Measurement Station, Optical Microscope.

## RESEARCH PROJECTS

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- **Jun 2024 - Date: Heterogeneous Integration of Microelectronic Systems Using Through Light Vias:**
  - **Skills:** COMSOL, WOP Laser Tool, Optical Waveguide Fabrication and Characterization, Type-100/1000 Cleanroom, Lithography, Etching, 3D Heterogeneous Integration
- **Jan 2024 - May 2024: Point Defect Formation Energy Calculation of GaN Using VASP (DFT):**
  - **Skills:** VASP Suite, PyDefect Package, SLURM package, HPC System, Shell Programming.
- **Aug 2023 - Dec 2023: Soft Organic P3HT Neuromorphic Transistor Fabrication and Characterization:**
  - **Skills:** Neuromorphic Transistor Fabrication and Characterization, Spin-coating, Optical Microscopy

- **Sep 2021 - Nov 2022: Power System Stability Classification Using Deep Neural Network:**  
- **Skills:** Python programming, Machine Learning, DNN, Sci-kit learn and Keras frameworks, Matlab Simulink
- **May 2019 - Aug 2021: DFT Investigation of 2D Nanomaterials and Van der Waals Heterostructures:**  
- **Skills:** Quantum Espresso, Shell Programming, Matlab Programming, Parallel Computation

## HONORS & AWARDS

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- **Sept. 2024 - Date: SRC Research Scholar:** Working under Semiconductor Research Corporation (SRC) JUMP 2.0 Center for Heterogeneous Integration of Micro Electronic Systems (CHIMES) at Penn State, under the supervision of Prof. Madhavan Swaminathan.
- **April 2023: Best Research Award:** In Recognition of Outstanding Quality Journal Publication. Placed within the top three raising faculty members who have shown exceptional research outputs during 2022. Issued By - Faculty of Graduate Studies (FGS), Daffodil International University, Bangladesh.
- **2022: IEEE Conference Best Paper Award - Second Place:** For an outstanding presentation of the submission titled "Effect of Dataset Size and Hidden Layers on the Stability Classification of IEEE-14 Bus System Using Deep Neural Network" in 2022 International Conference on Energy and Power Engineering (ICEPE-2022) held from 24th to 26th November, 2022. Issued By – ICEPE-2022, BRAC University, Dhaka, Bangladesh.

## LEADERSHIP

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- **2024-2025:** CERS Chair, Engineering Graduate Student Council (EGSC) - Penn State - University Park
- **2023-2024:** Logistics Secretary, Bangladesh Students Association (BSA) - Penn State - University Park

## RELEVANT COURSEWORKS

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- **Academic Courseworks::** Low-dimensional Nanoelectronics, Power Semiconductor Devices, Laser & Optical Electronics, Electro-optics: Principles and Devices, Advanced Transmission Electron Microscopy, Semiconductor Packaging, Engineering Electromagnetics
- **Certified Online Courseworks::** Semiconductor Fabrication 101 Course - Purdue University, Nanotechnology: A Maker's Course - Duke University, Machine Learning Specialization - Stanford University

## PUBLICATIONS

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### Key Publications:

- Md. R. H. Mojumder, C. Yu, and S. Kim, "Soft Artificial Synapse Electronics," Research, vol. 8, p. 0582, Dec. 2024, doi: 10.34133/research.0582.
- Md. R. H. Mojumder, Md. S. Islam, and J. Park, "Germanene/2D-AIP van der Waals heterostructure: Tunable structural and electronic properties," AIP Adv., vol. 11, no. 1, p. 015126, Jan. 2021, doi: 10.1063/5.0023448.

Total Number of Citations - 515 (h-index: 12)

Total Number of Publications - 20 (Journal Articles - 15, Conferences - 5)

Detailed Publications List : Google Scholar Profile