Md Zesun Ahmed Mia

Curriculum Vitae

Curiosity drives me to seek new questions and create new knowledge. I believe progress in science comes from collaboration, open-mindedness, and the courage to explore beyond boundaries.

Education

08/2022–08/2026 (Expected) **Ph.D. in Electrical Engineering**, *Pennsylvania State University*, State College, PA, USA, *CGPA: 4.00/4.00*
Advisor: Dr. Abhronil Sengupta

08/2019–08/2021 **M.S. in Electrical Engineering**, *Pennsylvania State University*, State College, PA, USA, *CGPA: 4.00/4.00*
Thesis: Neuromorphic Computing for Lifelong Learning

02/2015–04/2019 **B.Sc. in Electrical and Electronic Engineering**, *Bangladesh University of Engineering & Technology (BUET)*, Dhaka, Bangladesh, *CGPA: 3.81/4.00*

Appointments and Experience

05/2024–Present **Graduate Technical Intern**, *Intel Corporation*, Hillsboro, OR
- Thin film process and device integration for advanced memory and logic.
- Developed ML and neuromorphic hardware for edge AI.

08/2022–Present **Graduate Research Assistant**, *Penn State*, State College, PA
- Research in neuromorphic computing, ML hardware, and device-circuit co-design.
- Led projects on spintronic/ferroelectric devices and SNNs.

08/2024–Present **Graduate Teaching Assistant**, *Penn State*, State College, PA
- Taught and supported Cadence Virtuoso, schematic/layout design, and lab courses.

02/2021–08/2022 **Lecturer**, *University of Liberal Arts Bangladesh*, Dhaka, Bangladesh
- Taught Digital Circuit Design, Device Physics, Power Electronics.

02/2020–02/2021 **Lecturer**, *BUET*, Dhaka, Bangladesh, part-time
- Supervised labs (Digital Circuit Design, Power Electronics).

09/2020–07/2021 **R&D Engineer**, *SEMWAVES Ltd.*, London, UK, part-time
- Designed 50 KW solar-hydro hybrid system (Bangladesh).

Teaching Experience

Graduate Teaching Assistant — Penn State, 2024–Present. Courses: Cadence Virtuoso, Schematic/Layout Design, Lab Supervision.

Lecturer — University of Liberal Arts Bangladesh, 2021–2022. Courses: Digital Circuit Design, Device Physics, Power Electronics.

Lecturer — BUET, 2020–2021. Labs: Digital Circuit Design, Power Electronics.

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Mentoring	Supervised undergraduate research and lab projects in device fabrication and circuit design.

Research Interests

Neuromorphic Computing	Brain-inspired hardware, SNNs, algorithm-device co-design
Machine Learning Hardware	ML accelerators, in-memory computing, edge AI
Emerging Devices	Spintronics, FeFET, NVM, ferroelectric devices
Semiconductor Process Integration	Device fabrication, process-device-circuit co-design
AI for Semiconductor	ML for process/device optimization, yield prediction

Technical Skills

Research	Neuromorphic Computing, ML, Device Physics, Circuits, Process Integration
Teaching	Course Design, Lecturing, Mentoring, Lab Supervision
Programming	Python, MATLAB, C++, Verilog, Shell
Modern Coding & AI Tools	Advanced use of generative AI tools (Cursor, Copilot, VSCode, Cline) for research, teaching, and code development. Skilled in prompt engineering and integrating AI assistants into academic workflows.
Writing	Scientific Writing, Grant Proposals, Peer Review
EDA/Simulation	Cadence Virtuoso, Spectre, HSPICE, TCAD, COMSOL, MATLAB, Python, ModelSim, Synopsys (Design Compiler, PrimeTime, VCS)
Data Analysis	Pandas, NumPy, JMP, Jupyter, Data Visualization, Statistical Analysis
Device/Process Characterization	AFM, SEM, Probe Station, Electrical Testing, Hall, XRD, TEM, reliability testing, parameter extraction
Collaboration	Git, Slack, Microsoft Office, Google Workspace

Research Projects and Grants

Astromorphic Transformer	Lead Student Researcher, 2023–Present. Developed a neuromorphic algorithmic framework for transformer models with astrocytic memory, enabling biologically inspired sequence learning.
Spintronic Device-Based Memory	Lead Student Researcher, 2022–Present. Fabrication and characterization of spintronic memory arrays.

ML Accelerator for Edge AI — Lead Student Researcher, 2024–Present. Designed and benchmarked a low-power ML accelerator for edge devices, achieving >10x energy efficiency over CPU. Developed RTL, verified on ASIC prototype, and working towards publishing results in EDA conferences.

RMAAT: Bio-Inspired Long-Context Sequence Processing — Lead Student Researcher, 2023–Present. Developed RMAAT, a bio-inspired approach for efficient long-context sequence processing in transformers. See publication: [OpenReview].

Publications

[1] Md Zesun Ahmed Mia, Malyaban Bal, and Abhronil Sengupta. "Delving deeper into astromorphic transformers". In: *IEEE Transactions on Cognitive and Developmental Systems* (2025).

[2] M.Z.A. Mia et al. "Impact of Doping and Defects on Thermal Transport of Monolayer GaN Nanoribbons: A Molecular Dynamics Simulation Study". In: *ICECE 2024*. Accepted, to appear. 2024. URL: https://icece.buet.ac.bd/.

[3] Md Zesun Ahmed Mia and Kazi Toukir Ahmed. "Ultra Low Cost, Low Power, High Speed Electronic Braille Device for Visually Impaired People". In: *2024 International Conference on Advances in Computing, Communication, Electrical, and Smart Systems (iCACCESS)*. IEEE. 2024, pp. 1–6.

[4] Md Zesun Ahmed Mia, Malyaban Bal, and Abhronil Sengupta. *RMAAT: A Bio-Inspired Approach for Efficient Long-Context Sequence Processing in Transformers*. 2024. URL: https://openreview.net/forum?id=ikSrEv8FId.

[5] Tao Zhang et al. "Self-sensitizable neuromorphic device based on adaptive hydrogen gradient". In: *Matter* 7.5 (2024), pp. 1799–1816.

[6] KM Ashraful Hoque Fahim et al. "Study of 3-nm Cylindrical GAAFETs with Variations in High-k Dielectric Gate-oxide Materials". In: *2022 IEEE Symposium on Industrial Electronics & Applications (ISIEA)*. IEEE. 2022, pp. 1–5.

[7] Md Moinul Islam et al. "DCNN-LSTM based audio classification combining multiple feature engineering and data augmentation techniques". In: *Intelligent Computing & Optimization: Proceedings of the 4th International Conference on Intelligent Computing and Optimization 2021 (ICO2021) 3*. Springer. 2022, pp. 227–236.

[8] Md Zesun Ahmed Mia et al. "Irfd: A feature engineering based ensemble classification for detecting electricity fraud in traditional meters". In: *2021 24th International Conference on Computer and Information Technology (ICCIT)*. IEEE. 2021, pp. 1–6.

Recognitions

- Arthur Waynick Graduate Scholarship (2024)
- Milton and Albertha Langdon Memorial Fellowship (2023)
- Melvin P. Bloom Memorial Fellowship (2022)

Professional Affiliations

- Reviewer, Design Automation Conference (DAC) 2025, IEEE MWSCAS 2025, IACCESS 2024
- Student Member, IEEE (2015-Present)

- Executive Member, EDS, IEEE Bangladesh Section (2021-2022)

Outreach and Leadership

STEM Outreach Organized and led STEM outreach events for high school students.

Mentoring Mentored undergraduate students in research and career development.

References

Dr. Abhronil Sengupta Associate Professor, Penn State University, Email: sengupta@psu.edu

Dr. Samia Subrina Professor, BUET, Email: samiasubrina@eee.buet.ac.bd