Md Nasim Afroj Taj

266 Colonnade Dr, Apt 32, Charlottesville, VA 22903
+1 (434) 760-7369 vgg6fu@virginia.edu mdnasimafrojtaj MNA Taj nasimtaj.com

Summary

- Second-year PhD student in Electrical Engineering at the University of Virginia.
- Graduate Research Assistant at Energy Science Nanotechnology and Imagination Lab, UVA.
- 2 years of Research experience in Thermoelectric & Thermomagnetic Devices, 2D Materials, Modeling (1 Journal).
- 3 years of Research experience in Optoelectronics, Nanophotonics & Plasmonics (1 Journal).

Education

University of Virginia (UVA) **Aug. 2023 - Present**
Doctor of Philosophy (Ph.D.) in Electrical and Computer Engineering (ECE); ***CGPA: 4.0/4.0*** *Charlottesville, VA, USA*

Bangladesh University of Engineering and Technology (BUET) **May 2022**
Bachelor of Science (B.Sc.) in Electrical and Electronic Engineering (EEE); ***CGPA: 3.6/4.0*** *Dhaka, Bangladesh*

Technical Skills

Material Synthesis: Ball Milling, Hot Press, Annealing.
Structural Property Assessment: X-ray Diffraction (XRD), Laser Flash Analysis, Density Measurements.
Electronic and Thermal Property Assessment: QD Versalab (Heat Capacity, Resistivity, Thermal Conductivity, Seebeck Coefficient, Nernst Coefficient, Figure of Merit, Cooling Curve Measurement), Four-probe and Van der Pauw Configuration (Resistivity), Carrier Concentration and Mobility (Hall Effect).
Software: LabVIEW, MATLAB, Simulink, Python, ANSYS Lumerical FDTD Solutions, Cadence Tools & Spice.
Hardware: PCB Design, Embedded Circuits Design, FPGA, PLC, & Arduino.
Programming Languages: C, C++, Verilog HDL, System Verilog, Assembly, Python, & HTML5.
Proficiency: LaTeX, MS Word, MS Excel, MS PowerPoint, Windows OS, & Mail Merging.
Soft Skills: Technical Drawing, Critical Thinking, Communication, Presentation & Technical Writing.

Experience

Graduate Research Assistant **Aug. 2023 - Present**
Energy Science Nanotechnology & Imagination Lab (E-Snail), UVA *Charlottesville, VA, USA*

- Material Synthesis & Characterization for Potential Thermoelectric Cooling Applications.
- Designing and Performing Measurements for the structural and thermoelectric properties of metals, semi-metals, Transition metal dichalcogenides (TMDs), and semiconductors. (Bi_xSb_{100-x}, $PdTe_2$, $CoTa_3S_6$, $CrTa_3S_6$, VTa_3S_6, $AgCrP_2S_6$, $FeRh$, Cu_xNi_{100-x}, $GaGeTe$, Cr_2Te_3)
- Undertook several collaborative projects for material characterization and measurements. ($CoTiO_3$, $MnTiO_3$, $NiTiO_3$, $CoNiTiO_3$, $GeTe$, $SrTi$, $SrTiRu$)
- Mentored and trained undergraduate students in hands-on lab work, including characterization and data analysis, while also teaching and familiarizing two high school students with the exciting developments in our lab's scientific focus.

Undergraduate Student Researcher **April 2020 - May 2022**
Nano-Photonics Research Group, EEE, BUET *Dhaka, Bangladesh*

- Thesis Title: Wavelength-dependent Beam-steered Dual-mode Lasers
- Research Area: Plasmonic Nanolaser, Nanophotonics
- Developed a compact device for dynamic and static control of dual-mode plasmonic nanolaser steering & optimized the device for robust and efficient performance across various applications.

Lecturer (EEE-PT) **Feb. 2023 – July 2023**
Department of TMDM, Bangladesh University of Textiles (BUTEX) *Dhaka, Bangladesh*

- Instructing courses related to Fundamentals of EEE and Utility Machinery& hands-on laboratory courses.
- Administering exams and evaluating student performance.

Lecturer (EEE) **Oct. 2022 – Feb. 2023**
Department of EEE, Canadian University of Bangladesh (CUB) *Dhaka, Bangladesh*

- Instructed courses including Digital Electronics, Microprocessor and Interfacing, Communication Systems and Signals, Power Station, Mechanical Engineering, and Electrical Machines I.
- Conducted laboratory sessions for Digital Electronics, Microprocessor and Interfacing, and Engineering Drawing.
- Administering exams and evaluating student performance.
- Partook in official Departmental works.

Selected Publications

Journals | *Optics Express, Journal of Applied Physics* **2**

[1] Md Sabbir Akhanda, Katherine A. Schlaak, Eleanor F. Scott, **Md Nasim Afroj Taj**, Sarah J. Watzman, Mona Zebarjadi; *Thermomagnetic responses of semimetals.* J. Appl. Phys. 28 June 2024; 135 (24): 240901.

[2] Mahin Ahamed, **Md. Nasim Afroj**, Shadman Shahid, and Muhammad Anisuzzaman Talukder, *Wavelength selective beam-steering in a dual-mode multi-layer plasmonic laser,* Opt. Express 32, 19895-19909 (2024).

Conference Proceedings | *IEEE Explore, AIP Conference Proceedings, JESTEC* **5**

[1] M. S. Mahmud, M. M. R. Nayan, S. Hasan and **M. N. A. Taj**, *A Deep Ensemble Model with an Efficient Feature for Multi-class Arrhythmia Classification Utilizing 12-Lead ECG Signal,* 2022 12th International Conference on Electrical and Computer Engineering (ICECE), Dhaka, Bangladesh, 2022, pp. 48-51, doi: 10.1109/ICECE57408.2022.10088465.

[2] M. D. Shahrukh Adnan Khan, Md. Hasanuzzaman, Sufia Khatun, Muhammad Jahirul Islam, Md. Pabel Sikder, Chockalingam Aravind Vaithilingam, Abid Aziz, Sadribul Hassan, Amanat Hossain, **Md. Nasim Afroj Taj**; *A techno-statistical analysis of smart living demands.* AIP Conf. Proc. 3 May 2024; 2915 (1): 020019.

[3] Khan, M. S. A., Sakib, M. H. A., Khatun, S., **Taj, M. N. A.**, Islam, M. J., Akter, T., & Rahaman, D. A. (2022). *Pre- and post-COVID-19 study of smart living and demand analysis - A part of smart city modelling.* Journal of Engineering Science and Technology, Special Issue on IEC2022, November, 255-266.

[4] Dr. Md. S. A. Khan, **Md. N. A. Taj**, K. M. KADIR, and S. Khatun, *A Comparative Analysis of Smart Education Hub in Terms of Cost-Effective Infrastructure Modelling & System Design,* 18th EURECA Conference, 2022.

More details can be found on *my portfolio*.

Selected Projects

Sense Amplifier Circuits for SRAM Cells at Low Voltages | *VLSI: Cadence Tools* **May 2024**

- Modified double-tail strong-arm latch sense amplifier with automatic offset calibration for improved low-voltage SRAM performance, reduced sensing delay, and minimized offset voltage for next-gen low-power memory systems.

Automated Car Parking System | *VLSI: Cadence Tools* **Feb. 2020**

- Designing a smart car parking system with a billing system.

A Configurable Logic Block (CLB) Using CMOS Logic Family | *VLSI: Cadence Tools* **July 2021**

- Designing a Configurable Logic Block (CLB) Using CMOS Logic Family in Cadence Virtuoso.

Real-Time Speech-to-Braille Converter for the Deaf and Blind | *Embedded System* **July 2021**

- Designing a real-time speech to braille converter using google's API and STM32 board.

Linear Controller-Based Ventilator Design for Respiratory System | *Control System* **Dec. 2020**

- Proposed a design for the ventilator and proposed a better design for this purpose.

More details can be found on *my portfolio*.

Leadership / Affiliation

IEEE **2017 - Present**
Student Member *8 years*

Association of Bangladeshi Students at University of Virginia (ABS@UVA) **2024 - 2025**
Vice President *1 years*

IEEE EDS BUET SB Chapter **2021 - 2022**
Former Vice-Chair *1 year*

Relevant Coursework

- SSD, CSD (5 courses)
- Characterization of Materials
- VLSI Design and Verification (3)
- μProcessor & Embedded System
- Digital Signal Processing
- Control System

References

Dr. Mona Zebarjadi **PI & Ph.D. Advisor, UVA**
Associate Professor, ECE; Associate Professor, MSE *m.zebarjadi@virginia.edu*

Dr. Muhammad Anisuzzaman Talukder **Undergrad Thesis Supervisor**
Professor, EEE, BUET; Director, RISE, BUET *anis@eee.buet.ac.bd*