
RESEARCH INTERESTS

AI for Biomedical Discovery, Statistical Signal Processing, Imaging, Multi-omics Integration, and Disease Mechanisms.

APPOINTMENTS

Jan 2025–present **Postdoctoral Research Associate**
Department of Bioengineering
Northeastern University, Boston, MA, USA
Advisor: Prof. Lee Makowski
Grant support: NIH/NIA RF1-AG079946

EDUCATION

Jul 2019–Dec 2024 **Northeastern University, Boston, MA, USA**
Ph.D. in Electrical Engineering
Thesis: Structural Characterization of Pathological Inclusions in Human Brain Tissue with Alzheimer’s Disease.
Advisor: Prof. Lee Makowski

Aug 2017–Jun 2019 **Texas State University, San Marcos, TX, USA**
M.Sc. in Engineering (Electrical Engineering)
Thesis: A Comprehensive Solar Powered Remote Monitoring and Identification of Houston Toad Call Automatic Recognizing Device System Design.
Advisors: Prof. Damian Valles and Prof. Michael Forstner

Feb 2007–Jul 2011 **Rajshahi University of Engineering & Technology (RUET), Bangladesh**
B.Sc. in Electrical & Electronic Engineering
Thesis: Study of wavelength dependence of refractive index and material dispersion of various materials.
Advisors: Prof. S.M. Abdur Razzak and Prof. Md. Shahidul Islam

PROFESSIONAL EXPERIENCE

Jul 2019–Dec 2024 **Graduate Research and Teaching Assistant**
Northeastern University, Boston, MA, USA
Grant supports: NIH/NIA R21-AG068972; AFRL FA8750-18-S-7007

Sep 2022–Dec 2022 **Research Intern**
Harvard Medical School, Boston, MA, USA
Host: Prof. Stephen Harrison

Aug 2017–Jun 2019 **Graduate Research and Teaching Assistant**
Texas State University, San Marcos, Texas
Advisor: Prof. Damian Valles
Grant support: USFWS (F16AP00942) via TPWD

Apr 2014–Aug 2017 **Assistant Engineer**
Bangladesh Power Development Board (BPDB), Dhaka, Bangladesh

Feb 2012–Mar 2014 **Lecturer, Department of Electrical and Electronic Engineering**
Prime University, Dhaka, Bangladesh

RESEARCH COLLABORATIONS

- Nov 2025–present **Multiomics to Understand Mechanically Affected Lung Biology and Predict Emphysema Progression**
PI: **Mathew Moll, M.D.**
Brigham and Women’s Hospital (BWH), Boston, MA
Role: Ancillary Co-Principal Investigator

HONORS & AWARDS

- 2024 **Student Travel Grant Award**
American Crystallographic Association (ACA), 74th Annual Meeting, Denver, Colorado.
- 2023, 2021 **Margaret C. Etter Student Lecturer Award**
ACA, 73rd Annual Meeting, Baltimore, Maryland (2023) and 71st Annual Meeting, Virtual (2021).
- 2022–2024 **Ph.D. Network Travel Grant**
Northeastern University, for ACA (2023) and BPS, Philadelphia, Pennsylvania (2024) and San Francisco, California (2022).
- 2018–2019 **Ingram School of Engineering "Director’s List" Award**
Texas State University.
- 2018–2019 **Graduate College Scholarship**
Texas State University.
- Spring 2019 **Graduate Thesis Research Support Fellowship**
Texas State University.
- Fall 2017 **Ingram Graduate Scholarship**
Texas State University.
- 2010 **1st Place, IEEE Ethics Competition**
SPAC, IEEE Region 10, Bangladesh.
- 2007–2011 **Merit Scholarship**
Rajshahi University of Engineering & Technology (RUET), Bangladesh.

PEER-REVIEWED JOURNAL PUBLICATIONS

- [J9] **A. A. Bashit**, P. Nepal, and L. Makowski, “A Multicollinearity-Aware Signal-Processing Framework for Cross- β Identification via X-ray Scattering of Alzheimer’s Tissue,” *under review*, Nov. 2025. [Preprint: [arXiv](#)]
- [J8] P. Nepal, **A. A. Bashit**, and L. Makowski, “Characterization of sub-micrometre-sized voids in fixed human brain tissue using scanning X-ray microdiffraction,” *Journal of Applied Crystallography (IUCr)*, Oct. 2024.
- [J7] P. Nepal, **A. A. Bashit**, L. Yang, and L. Makowski, “Small-angle X-ray microdiffraction from fibrils embedded in tissue thin sections,” *Journal of Applied Crystallography (IUCr)*, Dec. 2022.
- [J6] J. Martinez-Lorenzo, J. Hudack, Y. Jing, M. Shaham, Z. Liang, **A. A. Bashit**, [5 authors], and A. Fox, “Preliminary Experimental Results of Context-Aware Teams of Multiple Autonomous Agents Operating under Constrained Communications,” *Robotics*, Sep. 2022.
- [J5] **A. A. Bashit**, P. Nepal, T. Connors, D. H. Oakley, B. T. Hyman, L. Yang, and L. Makowski, “Mapping the Spatial Distribution of Fibrillar Polymorphs in Human Brain Tissue,” *Frontiers in Neuroscience*, May 2022.

- [J4] F. S. Saeed, **A. A. Bashit**, V. Viswanathan, and D. Valles, “An Initial Machine Learning-Based Victim’s Scream Detection Analysis for Burning Sites,” *Applied Sciences*, Sep. 2021.
- [J3] M. R. Islam, G. K. Beng, and **A. A. Bashit**, “Design and Fabrication of Segment Display Architecture for Displaying Bengali and English Numerals,” *Australian Journal of Basic and Applied Sciences (AJBAS)*, Nov. 2014.
- [J2] A. A. Mansur, **A. A. Bashit**, M. R. Islam, “Harmonic Analysis of Front-End Current of Three-Phase Single-Switch Boost Converter,” *International Journal of Applied Information Systems (IJ AIS)*, Mar. 2013.

In Preparation

- [J1] P. Nepal, **A. A. Bashit**, [4 authors], and L. Makowski, “Multi-modal tracking of Protein deposition and clearance in the progression of Alzheimer’s disease,” *in preparation*.

PEER-REVIEWED CONFERENCE PUBLICATIONS

- [C4] **A. A. Bashit** and D. Valles, “MFCC-based Houston Toad Call Detection using LSTM,” *Proceedings of the 2019 IEEE International Symposium on Measurement and Control in Robotics (ISMCR)*, Houston, Texas, USA, Sep. 2019.
- [C3] **A. A. Bashit** and D. Valles, “A Solar Powered Raspberry Pi Houston Toad Call Detection System Using Neural Network Model,” *Proceedings of the 2018 International Conference on Computational Science and Computational Intelligence (CSCI)*, Las Vegas, Nevada, USA, Dec. 2018.
- [C2] **A. A. Bashit** and D. Valles, “A Mel-Filterbank and MFCC-based Neural Network Approach to Train the Houston Toad Call Detection System Design,” *Proceedings of the 2018 IEEE 9th Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON)*, Vancouver, British Columbia, Canada, Nov. 2018.
- [C1] **A. A. Bashit** and D. Valles, “An Embedded Approach for Controlling Automatic Water Pump and Monitoring Real-Time Remote Data on Desktop, Android, and Web-based Application,” *Proceedings of the 16th International Conference on Embedded Systems, Cyber-physical Systems, and Applications (ESCS)*, Las Vegas, Nevada, USA, Aug. 2018.

CONFERENCE PRESENTATIONS

- [CT5] **A. A. Bashit**, P. Nepal, and L. Makowski, “Integrating semi-supervised learning and transformer neural networks for lesion classification in Alzheimer’s disease pathology,” *American Crystallographic Association (ACA) 74th Annual Meeting*, Denver, Colorado, USA, Jul. 2024. [Oral Presentation]
- [CT4] **A. A. Bashit**, P. Nepal, and L. Makowski, “Probing the microstructure of pathological protein deposits in Alzheimer’s disease,” *Biophysical Society (BPS) 68th Annual Meeting*, Philadelphia, Pennsylvania, USA, Feb. 2024. [Oral Presentation]
- [CT3] **A. A. Bashit**, P. Nepal, L. Makowski, and L. Yang “Mapping of pathological inclusions in human brain tissue with Alzheimer’s disease,” *American Crystallographic Association (ACA) 73rd Annual Meeting*, Baltimore, Maryland, USA, Jul. 2023. [Oral Presentation]
- [CT2] **A. A. Bashit**, P. Nepal, and L. Makowski, “Unsupervised learning approach for mapping of pathological lesions in X-ray scanning microdiffraction studies of Alzheimer’s disease,” *Biophysical Society (BPS) 66th Annual Meeting*, San Francisco, California, USA, Feb. 2022. [Oral Presentation]

- [CT1] **A. A. Bashit**, P. Nepal, and L. Makowski, “Classification of tissue variations in X-ray scanning microdiffraction from thin sections of human brain,” *American Crystallographic Association (ACA) 71st Annual Meeting*, Virtual, Aug. 2021. [Oral Presentation]

INVITED TALKS

- [T2] Discovering the Hidden Secrets: Understanding Pathological Inclusions in Alzheimer’s Brain Tissue, Systems Pharmacology, Brigham and Women’s Hospital (BWH), Sep. 2025.
- [T1] Classification of tissue in X-ray scanning microdiffraction from thin sections of human brain, Brookhaven National Laboratory (BNL), Mar. 2023.

POSTERS

- [P2] P. Nepal, **A. A. Bashit**, T. R. Stewart, B. T. Hyman, and L. Makowski, “Mapping of the molecular architecture of pathological protein deposits in Alzheimer’s disease,” *Biophysical Society (BPS) 69th Annual Meeting*, Los Angeles, California, USA, Feb. 2025.
- [P1] P. Nepal, **A. A. Bashit**, and L. Makowski, “Small-angle X-ray microdiffraction from fixed human brain tissue exhibits power-law behavior that provides insights into the structural organization of neuropathological lesions,” *Biophysical Society (BPS) 68th Annual Meeting*, Philadelphia, Pennsylvania, USA, Feb. 2024.

IN THE NEWS

- 2026 **Northeastern BioE GSC Mentorship Hub**, “Featured as Workshop Instructor for the Technical Skills Series: Applied Machine Learning and Python Data Automation”
- 2021 **Newswise**, “Understanding Alzheimer’s Progression with Improvements to Imaging, Image Processing, Machine Learning”
- 2019 **SmugMug**, “Drone demonstrations at Air Force Pitch Day”

TEACHING

- Apr 2026 **Guest Lecturer**, Bioengineering, Northeastern University, Boston, MA.
BIOE 5410: Molecular Bioengineering (Host: **Prof. Lee Makowski**) – Delivered a guest lecture on machine learning for drug discovery to an audience of 52 undergraduate, M.S., and Ph.D. students.
- Sep 2020–Dec 2020 **Teaching Assistant**, Northeastern University, Boston, MA.
EECE 2323: Fundamentals of Digital Design and Computer Organization – Led recitation lectures and designed/conducted laboratory experiments for a class of approximately 40 undergraduate students.
- Aug 2017–Dec 2017 **Graduate Instructional Assistant**, Texas State University, San Marcos, TX.
MFGE 4392/4394: Microelectronics Manufacturing I/II – Supervised cleanroom laboratories on full CMOS-compatible semiconductor device fabrication (wafer preparation through final test) for a class of approximately 20 undergraduate students.

Feb 2012–Mar 2014 **Lecturer**, Prime University, Dhaka, Bangladesh.

Delivered classroom lectures, designed and graded exams, supervised labs, and held office hours for classes of approximately 20–80 undergraduate students.

- EEE 157: Electrical Circuit II (Fall 2012)
- EEE 210: Electronic Circuit Simulation Lab (Spring 2012)
- EEE 235: Energy Conversion I (Summer 2012)
- EEE 325: Energy Conversion II (Summer 2012, Spring 2013)
- EEE 326: Energy Conversion II Lab (Spring 2013)
- EEE 407: Microprocessor Systems and Interfacing (Spring 2012)
- EEE 425: Power System I (Summer 2012, Spring 2013)
- EEE 431: Power System II (Fall 2012)
- EEE 473: Power System Protection (Fall 2012)

MENTORSHIP

Mentored 7 students across B.S., M.S., and Ph.D. degree programs in Bioengineering, Bioinformatics, and Electrical Engineering.

- 2026 Tom Pu, PhD candidate in Department of Bioengineering (NEU, 2027)
- 2026 Helena Zheng, BS in Bioengineering and Biochemistry (NEU, 2026)
- 2026 Ganesan Murugan, MS Department of Bioinformatics (NEU, 2026)
- 2025–2026 Durga Gomathi Arumuganainar, MS Department of Bioinformatics (NEU, 2026)
- 2024 Wendao Li, BS+MS Department of Bioengineering (NEU, 2026)
- 2023 Devyn Stringfellow, BS in Bioengineering and Biochemistry (NEU, 2026)
- 2020–2021 Fairuz Samiha Saeed, MS Department of Electrical Engineering (TXSTATE, 2021)

PROFESSIONAL MEMBERSHIPS & SERVICE

Mar 2026, Apr 2026 **Workshop Instructor**, Technical Skills Series, Department of Bioengineering, Northeastern University, Boston, MA.

Designed curriculum, presentation materials, and hands-on training sessions for M.S. and Ph.D. students in Biology, Bioengineering, Biochemistry, and related fields.

- Python for Data Analysis & Automation (15 participants)
- Applied Machine Learning for Biomedical Data (11 participants)

- 2021, 2023, 2024 **Graduate Student Member**, American Crystallographic Association (ACA).
- 2022, 2024 **Graduate Student Member**, Biophysical Society (BPS).
- 2018–2019 **Graduate Student Member**, IEEE, Texas State University.
- 2009–2011 **Student Coordinator**, IEEE RUET Student Branch.
- 2009 **Trainer**, Workshop on PIC and AVR microcontrollers at RUET, Bangladesh.