

Bashima Islam

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Research Description

My mission is to enable individuals, caregivers, and clinicians to understand and act on continuous multimodal sensor data that captures everyday human behavior. I build **ubiquitous AI systems** that learn from motion, audio, physiological, and ambient signals to generate insights that support **behavioral well-being**. My work spans key layers of the intelligence stack for real-world sensing, including multimodal representation learning, natural-language interaction, and resource-constrained inference on edge devices. I develop **signal-processing informed neural architectures** and **sensor-grounded language models** that reason about the physical and physiological processes underlying behavior, alongside **edge machine learning** methods designed for computation, energy, memory, time, and privacy constraints. These integrated efforts support applications such as *infant development, sleep and self-regulation*, and the dynamics of attention and emotional clarity during *mindfulness practice*.

Professional Experience

- August '22 – Present ■ Assistant Professor, Department of Electrical and Computer Engineering, **Worcester Polytechnic Institute**.
- August '22 ■ Affiliated Assistant Professor, Department of Computer Science and Department of Data Science, **Worcester Polytechnic Institute**.
- June '21 – July '22 ■ Affiliated Assistant Professor, Department of Electrical and Computer Engineering, **Worcester Polytechnic Institute**.
- June '21 – June '22 ■ Visiting Postdoctoral Research Associate, Beckman Institute, **University of Illinois Urbana-Champaign**.
– Advisor: *Dr. Romit Roy Chowdhury* and *Dr. Nancy McElwain*
- Aug '16 – May '21 ■ Graduate Research Assistant, Department of Computer Science, **University of North Carolina at Chapel Hill**.
– Advisor: *Dr. Shahriar Nirjon*
- May '20 – Aug '20 ■ Summer Research Intern, **Samsung Research America, CA**.
– Mentors: *Dr. Md Mahbubur Rahman*, *Dr. Tousif Ahmed*, and *Dr. Jilong Kuang*
- Jun '17 – Aug '17 ■ Summer Research Intern, **Nokia Bell Labs, NJ**.
– Mentors: *Dr. Mostafa Uddin*, *Dr. Sarit Mukherjee*, and *Dr. TV Lakshman*
- Feb '15 – Jun '16 ■ Quantitative Software Developer, **Stochastic Logic Ltd**, Bangladesh.
– Supervisor: *Dr. Arif Dowla*

Education

- 2021 ■ **Ph.D. in Computer Science, University of North Carolina at Chapel Hill**
Advisor: *Dr. Shahriar Nirjon*
Dissertation Title: *Scheduling Tasks on Intermittently-Powered Real-Time Systems*.
Dissertation Committee: *Dr. Kevin Jeffay*, *Dr. Donald E. Porter*, *Dr. Xiaofan (Fred) Jiang*, *Dr. Parasara Sridhar Duggirala*, and *Dr. Shahriar Nirjon*
- 2016 ■ **B.Sc. in Computer Science & Engineering, Bangladesh University of Engineering & Technology**
Thesis Title: *High Performance Approximate Computing by Adaptive Relaxed Synchronization*.
Thesis Advisor: *Dr. Rifat Shahriar*
Awards: *Dean's List Award*, *University Merit*, and *Technical Board Scholarship*.

Awards and Achievements

- 2022 ■ **Forbes 30 under 30 (Science)**, 2022.
- 2021 ■ **Samsung Best Paper Award**(health category), Samsung Research America, 2021.
- 2020 ■ **Rising Stars in EECS 2020** at University of California, Berkeley.
■ **Finalist, Gaetano Borriello Outstanding Student Award**, UbiComp 2020.

Awards and Achievements (continued)

- **Best Presentation Judge's Award**, UbiComp 2020.
- **CRA-WP Career Mentoring Workshop**, 2020.
- 2018 ■ **Best Presentation Award**, Vehicular Networking Conference 2018.
- **Best App Runner-Up Award**, Vehicular Networking Conference 2018.
- **Grace Hopper Conference Scholarship**, UNC CS.
- 2018-19 ■ **Computing Research Association (CRA) grants for CRA-W grad cohort.**
- 2017 ■ **N2Women Young Researcher Fellowship Award**, MobiSys 2017.
- **Best Summer Intern Presentation Award**, Nokia Bell Labs.
- 2016 ■ **Best Demo Runner-Up Award**, SenSys 2016.
- 2016-18 ■ **Travel Grant**, SenSys, MobiSys, CPS Week, MMSys.
- 2015 ■ **Dean's List Award & University Scholarship**: Academic Honor by Bangladesh University of Engineering & Technology (BUET), Bangladesh.
- 2014 ■ **Popular Poster Award**, Workshop on Women Empowerment through ICT 2014.
- 2013 ■ **World Finalist and National Champion**, Microsoft Imagine Cup, Russia.
- **Best Demo Award**, WDIECS 2013.
- 2011 ■ **Technical Board Scholarship**, by BUET, Bangladesh.

Awarded Grants

The grants awarded on which I am PI or co-PI co-I total \$981,351. These grants are listed below.

- 2025 ■ **Title**: Mindfulness Training and Respiration Biosignal Feedback, **Source**: National Institute of Health (NIH) SBIR Phase II, **Role**: Co-Investigator, **Amount**: \$170,000 (total \$918,000), **PI List**: Mat Polowitz (PI), John David Creswell (co-PI), Bashima Islam (Co-I).
- 2024 ■ **Title**: Development of a Versatile and Optimized Audio Embedding for On-Device Human and Non-Human Speech Tasks in Smart Home Devices, **Source**: Wadsworth Acoustic Laboratory, **Role**: Principal Investigator, **Amount**: \$9,000, **PI List**: Bashima Islam (PI).
- **Title**: Mindfulness Training and Respiration Biosignal Feedback, **Source**: National Institute of Health (NIH) SBIR Phase I, **Role**: Co-Investigator, **Amount**: \$82,000 (total \$290,000), **PI List**: Mat Polowitz (PI), John David Creswell (co-PI), Bashima Islam (Co-I).
- **Title**: Automated Assessments of Infants' States of Consciousness and Household Chaos Using a Multimodal Wearable Device and Deep Learning Models, **Source**: National Institute of Health (NIH) – RO1, **Role**: Co-Investigator, **Amount**: \$533,000 (total \$2,700,000), **PI List**: Nancy McElwain (PI), Mark Hasegawa-Johnson (PI), Bashima Islam (Co-I).
- 2023 ■ **Title**: CRII: CSR: Opportunistic Computation Offloading for Battery-Free Computing Devices, **Source**: National Science Foundation (NSF), **Role**: Principal Investigator (Sole), **Amount**: \$174,975. **PI List**: Bashima Islam (PI).
- **Title**: Validation of a Virtual Still Face Procedure and Deep Learning Algorithms to Assess Infant Emotion Regulation and Infant-Caregiver Interactions “in the Wild”, **Source**: National Institute of Health (NIH) National Institute of Drug Abuse (NIDA) – RO1, **Role**: Co-Investigator, **Amount**: \$157,917 (total \$2,700,000), **PI List**: Nancy McElwain (PI), Mark Hasegawa-Johnson (PI), Bashima Islam (Co-I).

Research Publications

Peer-Reviewed Journals and Conference Publications

- 1 Subrata Biswas, Mohammad Nur Hossain Khan and **Bashima Islam**: RAVEN: Representational Alignment of Audio, Video, Embedded Sensors and Natural Language, in: Empirical Methods in Natural Language Processing (EMNLP), 2025 (Main Conference). Acceptance Rate: 17.35%, 2025, URL: https://bashlab.github.io/raven_project/.

- 2 Mohammad Nur Hossain Khan, David creswell, Jordan Albert, Patrick O'Connell, Shawn Fallon, Mathew Polowitz, Xuhai orson Xu and **Bashima Islam**: Mindfulness Meditation and Respiration: Accelerometer-Based Respiration Rate and Mindfulness Progress Estimation to Enhance App Engagement and Mindfulness Skills, in: Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (**IMWUT/Ubicomp**), Acceptance Rate: 23%, 2025, URL: https://bashlab.github.io/meditite_project/.
- 3 Subrata Biswas, Mohammad Nur Hossain Khan and **Bashima Islam**: QuaDS: Quantized Distillation Framework for Efficient Speech Language Understanding, in: IEEE **Interspeech** Conference, 2025.
- 4 Subrata Biswas, Mohammad Nur Hossain Khan, Alex Colwell, Jack Adiletta and **Bashima Islam**: LOCUS: Localization with Channel Uncertainty and Sporadic Energy, in: 22nd International Conference on Embedded Wireless Systems and Networks (**EWSN**), Acceptance Rate: 26.19%, 2025, URL: https://bashlab.github.io/locus_project/.
- 5 Jack Adiletta, Mohammad Nur Hossain Khan, Shiwei Fang and **Bashima Islam**: EfficientMic: Adaptive Acoustic Sensing with a Single Microphone for Smart Infrastructure, in: 12th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (**BuildSys**), Acceptance Rate: 22.13%, 2025, URL: <https://jta2021.wixsite.com/efficientmic>.
- 6 Naisargi Mehta, **Bashima Islam** and Edward A. Clancy: Machine learning-based estimation of EMG baseline noise standard deviation without rest trials, in: Journal of Electromyography and Kinesiology, Impact Factor: 2.3, 2025, p. 103097.
- 7 Jack Adiletta, **Bashima Islam** and Ulkuhan Guler: FATE: A Fourier Accelerated Tensor Engine for Neural Networks, in: IEEE International Midwest Symposium on Circuits and Systems **MWSCAS**, IEEE, 2025, URL: https://bashlab.github.io/fate_project/.
- 8 Md Farhan Tasnim Oshim, Nigel Doering, **Bashima Islam**, Tsui-Wei Weng and Tauhidur Rahman: Anti-Sensing: Defense Against Unauthorized Radar-Based Human Vital Sign Sensing with Physically Realizable Wearable Oscillators, in: 2025 IEEE International Conference on Robotics and Automation (ICRA), 2025, pp. 1990–1996.
- 9 Kiriaki J Rajotte, **Bashima Islam**, Xinming Huang, David D McManus and Edward A Clancy: ECG Statement Classification and Lead Reconstruction using CNN-based Models, in: IEEE Journal of Biomedical and Health Informatics, Impact Factor: 7.24, 2025.
- 10 Kiriaki J Rajotte, **Bashima Islam**, David McManus, Xinming Huang and Edward A Clancy: Comparing Quantization Methods for On-Edge ECG Interpretation using Multi-Task CNN, in: IEEE-EMBS International Conference on Body Sensor Networks (**BSN**), 2025.
- 11 **Bashima Islam**, Nancy L McElwain, Jialu Li, Maria I Davila, Yannan Hu, Kexin Hu, Jordan M Bodway, Ashutosh Dhekne, Romit Roy Choudhury and Mark Hasegawa-Johnson: Preliminary Technical Validation of LittleBeats™: A Multimodal Sensing Platform to Capture Cardiac Physiology, Motion, and Vocalizations, in: **Sensors**, vol. 24, Impact Factor: 3.4, 2024, p. 901.
- 12 Mohammad Nur Hossain Khan, Nancy L McElwain, Mark Hasegawa-Johnson and **Bashima Islam**: InfantMotion2Vec: Unlabeled Data-Driven Infant Pose Estimation Using a Single Chest IMU, in: 2024 IEEE 20th International Conference on Body Sensor Networks (**BSN**), Acceptance Rate: 20.6%, IEEE, 2024, pp. 1–4, URL: <https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=10780750>.
- 13 Mohammad Nur Hossain Khan, Jialu Li, Nancy L McElwain, Mark Hasegawa-Johnson and **Bashima Islam**: Sound Tagging in Infant-centric Home Soundscapes, in: 2024 IEEE/ACM Conference on Connected Health: Applications, Systems and Engineering Technologies (**CHASE**), Acceptance Rate: 22%, IEEE, 2024, pp. 142–146, URL: <https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=10614412>.
- 14 Saad Ahmed, Eren Yildiz, Shashank Holla, Noor Mohammed, **Bashima Islam**, Kasim Sinan Yildirim, Jeremy Gummeson, Sunghoon Ivan Lee and Josiah Hester: Bootstrapping Health Wearables Powered by Intra-Body Power Transfer, in: IEEE-EMBS International Conference on Body Sensor Networks (**BSN**), Acceptance Rate: 20.6%, IEEE, 2024, pp. 1–4, URL: <https://ieeexplore.ieee.org/document/10780616>.
- 15 Saad Ahmed, **Bashima Islam**, Kasim Sinan Yildirim, Marco Zimmerling, Przemysław Pawełczak, Muhammad Hamad Alizai, Brandon Lucia, Luca Mottola, Jacob Sorber and Josiah Hester: The Internet of Batteryless Things, in: Communications of the ACM (**CACM**), vol. 67, Impact Factor: 11.1, 2024, pp. 64–73.

- 16 Keshav Bimbraw, Haichong K Zhang and **Bashima Islam**: Forearm Ultrasound based Gesture Recognition on Edge, in: IEEE-EMBS International Conference on Body Sensor Networks (**BSN**), Acceptance Rate: 20.6%, IEEE, 2024, pp. 1–4, URL: <https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=10780669&tag=1>.
- 17 Pietro Farina, Subrata Biswas, Eren Yıldız, Khakim Akhunov, Saad Ahmed, **Bashima Islam** and Kasim Sinan Yildirim: Memory-efficient Energy-adaptive Inference of Pre-Trained Models on Batteryless Embedded Systems, in: International Conference on Embedded Wireless Systems and Networks (**EWSN**), Acceptance Rate: 22.86%, 2024, URL: <https://ewsn.org/file-repository/ewsn2024/ewsn24-final16.pdf>.
- 18 Nancy L McElwain, Meghan C Fisher, Camille Nebeker, Jordan M Bodway, **Bashima Islam** and Mark Hasegawa-Johnson: Evaluating Users' Experiences of a Child Multimodal Wearable Device: Mixed Methods Approach, in: **JMIR Human Factors**, vol. 11, Impact Factor: 2.6, 2024, e49316.
- 19 Payal Mohapatra, Shamika Likhite, Subrata Biswas, **Bashima Islam** and Qi Zhu: Missingness-resilient Video-enhanced Multimodal Disfluency Detection, in: IEEE **Interspeech** Conference, Acceptance Rate: 48.12%, 2024, URL: https://www.isca-archive.org/interspeech_2024/mohapatra24_interspeech.pdf.
- 20 Zhuoran Su, Kaveh Pahlavan and **Bashima Islam**: An Empirical Study of Interference Features in Licensed and Unlicensed Bands for Intelligent Spectrum Management. In: 24th IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (**WoWMoM**), 2023.
- 21 Abu Bakar, Rishabh Goel, Jasper de Winkel, Jason Huang, Saad Ahmed, **Bashima Islam**, Przemysław Pawełczak, Kasim Sinan Yildirim and Josiah Hester: Protean: Adaptive Hardware-Accelerated Intermittent Computing, in: GetMobile: Mobile Computing and Communications, vol. 27, 2023, pp. 5–10.
- 22 Kai Chieh Chang, Mark Hasegawa-Johnson, Nancy L McElwain and **Bashima Islam**: Classification of infant sleep/wake states: cross-attention among large scale pretrained transformer networks using audio, ECG, and IMU data, in: 2023 Asia Pacific Signal and Information Processing Association Annual Summit and Conference (**APSIPA ASC**), IEEE, 2023, pp. 2370–2377.
- 23 **Bashima Islam**, Yubo Luo and Shahriar Nirjon: Amalgamated Intermittent Computing Systems. In: IEEE/ACM International Conference on Internet-of-Things Design and Implementation (**IoTDI**), Acceptance Rate: 30%, 2023.
- 24 Payal Mohapatra, Md Tamzeed Islam, **Bashima Islam** and Qi Zhu: *Efficient Stuttering Event Detection using Siamese Networks*. In: IEEE International Conference on Acoustic Speech and Signal Processing (**ICASSP**), IEEE, 2023, pp. 1–5.
- 25 Kaveh Pahlavan, **Bashima Islam**, Zhuoran Su and Edward Morgan: Characteristics of Mid-Bands Interference in Wireless Spectrum Sharing for Mobility Support in 6G, Wi-Fi 7, and Beyond, in: International Journal of Wireless Information Networks (**IJWIN**), vol. 30, Impact Factor: 2.5, 2023, pp. 283–286.
- 26 Zhuoran Su, Kaveh Pahlavan and **Bashima Islam**: An Empirical Study of Interference Features in Licensed and Unlicensed Bands for Intelligent Spectrum Management, in: 2023 IEEE 24th International Symposium on a World of Wireless, Mobile and Multimedia Networks (**WoWMoM**), IEEE, 2023, pp. 252–260.
- 27 Eren Yildiz, Saad Ahmed, **Bashima Islam**, Josiah Hester and Kasim Sinan Yildirim: *Efficient and Safe I/O Operations for Intermittent Systems*. In: European Conference on Computer Systems (**EuroSys**), Acceptance Rate: 14%, 2023, pp. 63–78.
- 28 Abu Bakar, Rishabh Goel, Jasper De Winkel, Jason Huang, Saad Ahmed, **Bashima Islam**, Przemysław Pawełczak, Kasim Sinan Yildirim and Josiah Hester: *Protean: An Energy-Efficient and Heterogeneous Platform for Adaptive and Hardware-Accelerated Battery-free Computing*. In: Proceedings of the 20th ACM Conference on Embedded Networked Sensor Systems (**SenSys**), 2022, pp. 207–221.
- 29 Rose Bohrer and **Bashima Islam**: Cyber-Physical Verification of Intermittently Powered Embedded Systems, in: IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, vol. 41, 2022, pp. 4361–4372.
- 30 **Bashima Islam**, Md Mahbubur Rahman, Tousif Ahmed, Mohsin Yusuf Ahmed, Md Mehedi Hasan, Viswam Nathan, Korosh Vatanparvar, Ebrahim Nemati, Jilong Kuang and Jun Alex Gao: BreathTrack:

detecting regular breathing phases from unannotated acoustic data captured by a smartphone, in: Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (**IMWUT/UbiComp**), vol. 5, 2021, pp. 1–22.

- 31 Tousif Ahmed, Mohsin Y Ahmed, Md Mahbubur Rahman, Ebrahim Nemati, **Bashima Islam**, Korosh Vatanparvar, Viswam Nathan, Daniel McCaffrey, Jilong Kuang and Jun Alex Gao: Automated time synchronization of cough events from multimodal sensors in mobile devices, in: Proceedings of the 2020 International Conference on Multimodal Interaction (**ICMI**), 2020, pp. 614–619.
- 32 **Bashima Islam** and Shahriar Nirjon: *Scheduling Computational and Energy Harvesting Tasks in Deadline-Aware Intermittent Systems*. In: IEEE International Conference on Real-Time and Embedded Technology and Applications Symposium (**RTAS**), IEEE, 2020.
- 33 **Bashima Islam** and Shahriar Nirjon: *Zygarde: Time-Sensitive On-Device Deep Inference and Adaptation on Intermittently-Powered Systems*. In: ACM Proceedings on Interactive, Mobile, Wearable and Ubiquitous Technologies (**IMWUT/UBICOMP**), Volume 4, Issue 3, vol. 4, ACM, 2020, pp. 1–29.
- 34 Alma Probstl, **Bashima Islam**, Shahriar Nirjon, Naehuck R Chang and Samarjit Chakraborty: *Intelligent Chargers will Make Mobile Devices Live Longer*. In: IEEE Design and Test Journal, IEEE, 2020.
- 35 Md Mahbubur Rahman, Mohsin Yusuf Ahmed, Tousif Ahmed, **Bashima Islam**, Viswam Nathan, Korosh Vatanparvar, Ebrahim Nemati, Daniel McCaffrey, Jilong Kuang and Jun Alex Gao: *BreathEasy: Assessing Respiratory Diseases Using Mobile Multimodal Sensors*. In: ACM International Conference on Multimodal Interaction (**ICMI**), ACM, 2020, pp. 41–49.
- 36 Nithya Sampath, **Bashima Islam** and Shahriar Nirjon: Differences in reliability and predictability of harvested energy from battery-less intermittently powered systems, in: Journal of Emerging Investigators. www.emerginginvestigators.org, vol. 2, 2020, p. 1.
- 37 Seulki Lee, **Bashima Islam**, Yubo Luo and Shahriar Nirjon: *Intermittent Learning: On-Device Machine Learning on Intermittently Powered System*. In: ACM Proceedings on Interactive, Mobile, Wearable and Ubiquitous Technologies (**IMWUT/UBICOMP**), Volume 3, Issue 4, **Best Presentation Judge's Award**, ACM, 2019.
- 38 Stephen Xia, Daniel de Godoy Peixoto, **Bashima Islam**, Md Tamzeed Islam, Shahriar Nirjon, Peter R Kinget and Xiaofan Jiang: Improving pedestrian safety in cities using intelligent wearable systems, in: IEEE Internet of Things Journal, vol. 6, 2019, pp. 7497–7514.
- 39 Daniel de Godoy, **Bashima Islam**, Stephen Xia, Md Tamzeed Islam, Rishikanth Chandrasekaran, Yen-Chun Chen, Shahriar Nirjon, Peter R Kinget and Xiaofan Jiang: *Paws: A Wearable Acoustic System for Pedestrian Safety*. In: IEEE/ACM International Conference on Internet-of-Things Design and Implementation (**IoTDI**), IEEE, 2018, pp. 237–248.
- 40 Md Tamzeed Islam, **Bashima Islam** and Shahriar Nirjon: *Duty-Cycle-Aware Real-Time Scheduling of Wireless Links in Low Power WANS*. In: IEEE International Conference on Distributed Computing in Sensor Systems (**DCOSS**), IEEE, 2018, pp. 53–60.
- 41 **Bashima Islam**, Md Tamzeed Islam and Shahriar Nirjon: *Glimpse.3D: A Motion-Triggered Stereo Body Camera for 3D Experience Capture and Preview*. In: ACM/IEEE International Conference on Information Processing in Sensor Networks (**IPSN**), IEEE, 2018, pp. 176–187.
- 42 **Bashima Islam**, Mostafa Uddin, Sarit Mukherjee and Shahriar Nirjon: *Rethinking Ranging of Unmodified BLE Peripherals in Smart City Infrastructure*. In: ACM Multimedia Systems Conference (**MMSys**), ACM, 2018, pp. 339–350.
- 43 Stephen Xia, Daniel de Godoy, **Bashima Islam**, Md Tamzeed Islam, Shahriar Nirjon, Peter R. Kinget and Xiaofan Jiang: *A Smartphone-Based System for Improving Pedestrian Safety*. In: IEEE Vehicular Networking Conference (**VNC**), **Runner-Up Best App Award and Best Presentation Award**, 2018.
- 44 Chong Shao, **Bashima Islam** and Shahriar Nirjon: *Marble: Mobile Augmented Reality using a Distributed BLE Beacon Infrastructure*. In: IEEE/ACM International Conference on Internet-of-Things Design and Implementation (**IoTDI**), IEEE, 2018.

- 45 Md Tamzeed Islam, **Bashima Islam** and Shahriar Nirjon: *SoundSifter: Mitigating Overhearing of Continuous Listening Devices*. In: ACM Proceedings Conference on Mobile Systems, Applications, and Services (**MobiSys**), ACM, 2017, pp. 29–41.
- 46 Md Shihabul Islam, Mohammad Ali, Kazi Hasan Zubaer, Saiyma Sarmin, Md Tamzeed Islam, **Bashima Islam**, ABM Alim Al Islam and Asif Mohaisin Sadri: *Trusted Worrier: A low-cost and high-accuracy user authentication system for firearm exploiting dynamic hand pressure biometrics*, in: 2017 International Conference on Networking, Systems and Security (**NSysS**), IEEE, 2017, pp. 87–95.
- 47 Ravi Srinivasan, Md Tamzeed Islam, **Bashima Islam**, Zeyu Wang, Tamim Sookoor, Omprakash Gnawali and Shahriar Nirjon: *Preventive maintenance of centralized HVAC systems: use of acoustic sensors, feature extraction, and unsupervised learning*, in: Building Simulation 2017, vol. 15, IBPSA, 2017, pp. 2518–2524.
- 48 **Bashima Islam**, Faysal Hossain and Rifat Shahriyar: *High Performance Approximate Computing by Adaptive Relaxed Synchronization*. In: IEEE International Conference on High Performance Computing and Communication (**HPCC**), IEEE, 2016.

US Patent

- 1 Nancy L McElwain, Mark A Hasegawa-Johnson, Romit Roy Choudhury, Ashutosh Dhekne and **Bashima Islam**: *Biobehavioral sensing platform for capturing infant states/health and environmental input via ecg, motion, and audio signals*, US Patent App. 19/017,115, July 2025.
- 2 Md Mahbubur Rahman, **Bashima Islam**, Tousif Ahmed, Nathan Robert Folkman, Anh Minh Dinh, Sean Bornheimer, Ebrahim Nematihosseiniabadi, Jilong Kuang and Jun Gao: *Breathing measurement and management using an electronic device*, US Patent App. 17/406,086, Feb. 2022.

Pre-Print or Under Review

- 1 Subrata Biswas, Daniel Wong, **Bashima Islam**, Sanjeel Parekh and Vladimir Tourbabin: *Hair Noise Analysis and Mitigation for Smart Glasses Audio Captures* (Under Review in **ICAASP**), 2025.
- 2 Subrata Biswas, Mohammad Nur Hossain Khan and **Bashima Islam**: *OWL: Geometry-Aware Spatial Reasoning for Audio Large Language Models* (Under Review in **ICLR**), 2025.
- 3 Sheikh Asif Imran, Mohammad Nur Hossain Khan, Subrata Biswas, Violet Colwell and **Bashima Islam**: *VOLT: Variance-Optimized Layer-wise Termination for Energy-Efficient On-Device DNN Inference* (Under Review in **SenSys**), 2025.
- 4 Ashe Neth, Sawinder Kaur, Mohammad Nur Hossain Khan, Subrata Biswas, Asif Salekin and **Bashima Islam**: *UNIT: Scalable unstructured inference-time pruning for MAC-efficient neural inference on MCUs* (Under Review in **SenSys**), 2025.

Peer-Reviewed Workshop

- 1 Sheikh Asif Imran, Mohammad Nur Hossain Khan, Subrata Biswas and **Bashima Islam**: *LLaSA: A Multimodal LLM for Human Activity Analysis Through Wearable and Smartphone Sensors*, in: Generative AI and Foundation Models for Human Sensing Workshop, UbiComp, 2025, URL: https://bashlab.github.io/llasa_project/.
- 2 Jack Adiletta, Khan Mohammad Nur Hossain, Matthew Reynolds, Shiwei Fang and **Bashima Islam**: *Dataset: A Novel Aliasing vs Non Aliasing Audio Dataset for Always-On IoT Microphone Experimentation*, in: Proceedings of the 12th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation, 2025, pp. 423–426.
- 3 Michael Rothstein, Zhuolin Liu and **Bashima Islam**: *EchoSense: Acoustic Sensing for Enclosed Structure Monitoring and Recognition*, in: IEEE MIT Undergraduate Research Technology Conference (**MIT URTC**), 2023.
- 4 Yu-Lin Wei, Rajalaxmi Rajagopalan, **Bashima Islam** and Romit Roy Choudhury: *Self-Supervised Speech Enhancement using Multi-Modal Data*, in: NeurIPS Workshop on ML for Audio, 2023.
- 5 Payal Mohapatra, Akash Pandey, **Bashima Islam** and Qi Zhu: *Speech disfluency detection with contextual representation and data distillation*, in: Proceedings of the 1st ACM international workshop on intelligent acoustic systems and applications, 2022, pp. 19–24.

- 6 **Bashima Islam**: PhD Forum Abstract: Scheduling Tasks on Intermittently Powered Systems, in: 2020 19th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN), 2020, pp. 379–380.
- 7 **Bashima Islam**, Yubo Luo, Seulki Lee and Shahriar Nirjon: WiP: On-device training from sensor data on batteryless platforms, in: Proceedings of the 18th International Conference on Information Processing in Sensor Networks (IPSN), 2019, pp. 325–326.
- 8 **Bashima Islam**, Md Tamzeed Islam and Shahriar Nirjon: *LoRaIn: Making a Case for LoRa in Indoor Localization*. Work in Progress Paper. In: IEEE International Conference on Pervasive Computing and Communications, (PerCom), 2019, pp. 423–426.
- 9 **Bashima Islam**, Yubo Luo, Seulki Lee and Shahriar Nirjon: *Time-Aware Deep Intelligence on Batteryless Systems*. Work in Progress Paper. In: Proceedings of IEEE Real-Time and Embedded Technology and Application Symposium (RTAS), 2019, p. 5.
- 10 Md Tamzeed Islam, **Bashima Islam** and Mohammed Eunus Ali: *A System for Identifying and Visualizing Influential Communities*. In: Workshop on Social Data Analytics and Management, (VLDB), 2016.

Peer-Reviewed Posters and Demos

- 1 Musa Guler, Hikmet Bisen, Pranav Khurana and **Bashima Islam**: *Poster: LYNX: An Open-Source Platform for In-Ear Multimodal Sensing*. In: MIT Undergraduate Research Technology Conference (MIT URTC) 2025.
- 2 Argha Dhar, Arna Roy, Subrata Biswas and **Bashima Islam**: *Poster: Studying the Security Threats of Partially Processed Deep Neural Inference Data in an IoT Device*. In: ACM Conference on Embedded Networked Sensor Systems (SenSys) 2022.
- 3 **Bashima Islam**, Yubo Luo and Shahriar Nirjon: *Poster Abstract: On-Device Training from Sensor Data on Batteryless Platforms*. In: ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN) 2019.
- 4 **Bashima Islam**, Md Tamzeed Islam and Shahriar Nirjon: *Demo Abstract: A Motion-Triggered Stereo Camera for 3D Experience Capture*, in: 2018 17th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN) 2018, pp. 134–135.
- 5 Rishikanth Chandrasekaran, Daniel de Godoy, Stephen Xia, **Bashima Islam**, Md Tamzeed Islam, Shahriar Nirjon, Peter R. Kinget and Xiaofan Jiang: *Demo Abstract: SEUS: A Wearable Multi-Channel Acoustic Headset Platform to Improve Pedestrian Safety*. In: ACM Conference on Embedded Network Sensor Systems (Sensys). 2016, **Best Demo Runner Up**.
- 6 Tanzila Choudhury, **Bashima Islam** and A. B. M. Alim Al Islam: *Poster Abstract: Super-savior: A System to Aid Combating Harassment and Violence Against Women*. In: Proceedings of Workshop on Women Empowerment through ICT: Higher Studies, Research and Career (WE-ICT). 2014, **Popular Poster Award**.
- 7 **Bashima Islam**, Md Tamzeed Islam, Zaheen Mustakin, MM Haque and Hasan Shahid Ferdous: *Demo Abstract: Happy Watch: A Portable Health Monitoring System*. In: Workshop on Design and Implementation of Emerging & Computing Systems (WDIECS). 2013, **Best Demonstration Award**.

Teaching Experience

Department of Electrical and Computer Engineering, Worcester Polytechnic Institute

- 2026  **Instructor**, Introduction to AI Accelerator (ECE 341X).
- 2025–2026  **Instructor**, On-Device Deep Learning (ECE/CS/DS 556).
- 2023–2025  **Instructor**, Discrete-Time Signal Processing (ECE 2312).
- 2023  **Instructor**, On-Device Deep Learning (ECE 579/ CS 525/ DS 595).

Department of Computer Science, University of North Carolina at Chapel Hill

- Fall 2020  **Guest Lecturer**, Mobile Sensing and Inference Systems (COMP 790).
– Topic: *Motion-Triggered Stereo Body Camera for 3D Experience Capture and Preview*.

Teaching Experience (continued)

- Spring 2019 ■ Teaching Assistant, Mobile Computing Systems (COMP 433).
Fall 2019 ■ Teaching Assistant, Embedded Intelligent Systems (COMP 790).

Mentorship Experience

PhD Students

- Fall '22–Present ■ **Subrata Biswas**, ECE, WPI.
– Toward Robust and Efficient Reasoning in Perceptually Grounded Multi-modal Large Language Models
– Received Peter B. Meyers Award
- **Mohammad Nur Hossain Khan**, ECE, WPI.
– Understanding Behavioral Development from Multi-Modal Ubiquitous Systems
- Fall '23–Present ■ **Sheikh Asif Imran Khan (Shouborno)**, ECE, WPI.
– Interpretable and Efficient AI for Sensor-Rich Mobile and Embedded Systems
- Fall '25–Present ■ **Bibhus Luitel**, ECE, WPI.
– Time-series Multi-Modal Sensor Data Analysis for AI Models

Master's Students

- Spring 2025 ■ **Jack Adiletta**, Electrical Engineering, WPI.
– Thesis: FATE: A Fourier Accelerated Tensor Engine
– Current: Affiliate Researcher, Worcester Polytechnic Institute
- **Robbie Oleynick**, Electrical and Computer Engineering, WPI.
– Thesis: Suggestive Audio Balance Tool
– Current: PACE Engineer at Bose
- Spring 2024 ■ **Joshua Hollyer**, Electrical and Computer Engineering, WPI.
– Thesis: Adaptive Microphone: Variable Sample Rate ADC Implementation
– Current: Hardware Engineer at Acacia
- **Zhuolin Liu**, Electrical and Computer Engineering, WPI.
– Thesis: Beyond the Spectrum: Custom MFCC Processing For Acoustic Health Monitoring
– Current: Aerospace Software Engineer, Honeywell
- **Michael Rothstein**, Electrical and Computer Engineering, WPI.
– Thesis: Data Driven Mel Filter Bank Design for Environmental Sound Analysis

Undergraduate Students

- 2025–Present ■ **Evan Smith**, Electrical and Computer Engineering, WPI.
– Stochastic Masked Partial Progressive Binarization
- **Nhan Viet Thien (Marlin) Tran**, Electrical and Computer Engineering, WPI.
– Breathing Biomarker Detection through Multi-Modal Earable Platform
- 2022–Present ■ **Violet Colwell**, Electrical and Computer Engineering, WPI.
– Distributed DNN Inference on Ultra-Low Power MCUs
- 2023–2025 ■ **Ashe Neth**, Computer Science, WPI.
– Scalable Unstructured Inference-Time Pruning for MAC-Efficient Neural Inference on MCUs
– Current: Ph.D. Student at Washington University in St. Louis
- 2024–2025 ■ **Arnav Sacheti**, Electrical and Computer Engineering, WPI.
– Wireless Passive Localization through IoT Mesh
– Current: Silicon Engineer, SpaceX
- 2021–Present ■ Advised or co-advised 16 Major Qualifying Projects or MQPs (a total of 46 students), Worcester Polytechnic Institute.
- 2021–2022 ■ Advised 2 undergraduate students on independent research which resulted in a publication, Dept. of Computer Science & Engineering, Khulna University of Engineering and Technology.

Mentorship Experience (continued)

High School Student

- 2025–Present  **Abhiraam Venigalla**, Massachusetts Academy of Math and Science.
 - Mentoring Abhiraam in designing and developing a hand-held AI-powered CO monitoring and automated ventilation system.
- Summer 2025  **Musa Guler**, Algonquin Regional Highschool.
 - Mentored Musa during the summer before her senior year of high school.
 - Developed an Open-Source Multi-Modal Earable Platform
 - Presented his work in MIT URTC Conference.
-  **Hikmet Bisen**, Harmony School of Endeavor.
 - Mentored Hikmet during the summer before her senior year of high school.
 - Developed an Open-Source Multi-Modal Earable Platform
 - Presented his work in MIT URTC Conference.
-  **Pranav Khurana**, Westford Academy Highschool.
 - Mentored Pranav during the summer before her senior year of high school.
 - Developed an Open-Source Multi-Modal Earable Platform
 - Presented his work in MIT URTC Conference.
- Summer 2019  **Nithya Sampath**, North Carolina School of Science and Mathematics.
 - Current: Undergraduate Student, Department of Electrical and Computer Engineering, Carnegie Mellon University.
 - Mentored Nithya during the summer before her senior year of high school and introduce her to the research in computer science.
 - Her research under my supervision resulted in a publication at Journal of Emerging Investigators.

Professional Services and Leadership Experience

- 2023  **Publication Chair.**
 - The ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN), 2023
- 2021–2023  **Program Chair.**
 - Conference for Wearable Computing (ISWC), 2023
 - Workshop on Energy Harvesting & Energy-Neutral Sensing Systems (Co-located with SenSys), 2022
 - Workshop on Intelligent Acoustic Systems and Application (Co-located with MobiSys), 2022
- 2022–2023  **General Chair.**
 - SigComm N2Women Workshop, 2023
 - ENSSys, 2022–2023.
- 2019–2025  **Technical Program Committee Member.**
 - ACM SenSys, 2024–2025
 - EuroSys, 2024–2025
 - MobiCom, 2023–2025
 - EWSN, 2023
 - ICDCS, 2023
 - IoTDI, 2023
 - DigiBiom Workshop, 2023
 - IMWUT/ISWC, 2022
 - ENSsys, 2021, 2022
 - CPS-IoTBench, 2022
 - LPIoT, 2021
 - ACM SenSys (Poster and Demo), 2019
- 2021–2023  **Guest Editor.**
 - Wearable Computing vol. II, Frontier in Computer Science

Professional Services and Leadership Experience (continued)

- 2020
 - **Associate Editor.**
 - International Journal of Wireless Information Network
 - IEEE Sensors (Guest)
 - **Session Chair.**
 - BuildSys, 2020
 - ENSys, 2020.
- 2017–2021
 - **Primary Reviewer.**
 - IEEE Sensors, 2022
 - IEEE Transaction of Mobile Computing, 2022
 - IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, 2022
 - IEEE transaction of Embedded Computing, 2022
 - CHI, 2022
 - IEEE PerCom, 2021
 - IEEE Access, 2021, 2022
 - IMWUT, 2020, 2021, 2022
 - IEEE Internet of Things Journal, 2020, 2021
 - CHASE, 2020
 - Transactions on Network Science & Engineering, 2018
 - MobiSys Women's Workshop, 2017
- 2022–2023
 - **Faculty Advisor**
 - WPI Women in Electrical and Computer Engineering (WECE)
 - WPI Summer K-12 Outreach Program (Frontier)
- 2019
 - **Mentor**
 - MobiSys 2021 Mentoring Program
 - North Carolina School of Science and Mathematics – Mentoring Program
 - **Panelist**
 - SenSys 2022 N2women
 - MobiSys 2022 N2women
- 2018–2019
 - **President**, Computer Science Student Association (CSSA) at UNC.
 - **Organizer and Instructor**, TARHEEL Hackathon (for Middle School and High School Girls).
 - Held hands-on embedded system development sessions for Middle School and High School female students (age range: 11 – 16).
- 2017
 - **Organizer**, The 2nd MobiSys Women's Workshop.
- 2017–Present
 - **Career Event Officer & General Secretary** (2018–2019), Graduate Women in Computer Science at UNC.
- 2012–2016
 - **Trainer & Organizer**, BUET System Analysis, Design & Development Group.
- 2013–2014
 - **Microsoft Student Partner**, Microsoft Student Partners Bangladesh.
- 2011–2012
 - **General Secretary**, Viqarunnisa Noon Science Club.

Selected Talks

Invited University and Media Talks

- December 2025
 - *Query-Guided Representation Alignment for Question Answering over Audio, Video, Embedded Sensors, and Natural Language*, Guest Speaker, Columbia University.
- June 2025
 - *Query-Guided Representation Alignment for Question Answering over Audio, Video, Embedded Sensors, and Natural Language*, Guest Speaker, Amazon Lab 126.
- April 2025
 - *Let the LLM Talk the Talk After You Walk the Walk*, Guest Speaker, Columbia University.
- May 2023
 - *Understanding Behavioral Development from Multi-Modal Ubiquitous Systems*, National Institute of Health (NIH) Brain Behavior Quantification and Synchronization (BBQS) Program Workshop.
- December 2022
 - *The Road to 2050*, Franklin Institute (Franklin Museum).
 - Century Lives podcast from the Stanford Center on Longevity.

Selected Talks (continued)

- November 2022 ■ *Sustainable Intelligent Everyday Objects*, Guest Speaker, University of Colorado Boulder Colloquium Series.
- October 2022 ■ Engineering & Technology club's speaker series at American High School in Fremont, California.
- October 2021 ■ *Mobile and Ubiquitous Computing*, Guest Speaker, Syracuse University.
- September 2021 ■ *Sustainable Intelligent Everyday Objects*, Guest Speaker, Worcester Polytechnic Institute.
- April 2021 ■ *Computing on the Extreme Edge Devices*, Notre Dame University (CS).
- March 2021 ■ *Computing on the Extreme Edge Devices*, University of Utah (CS).
- *Computing on the Extreme Edge Devices*, University of Texas Austin (ECE).
- *Computing on the Extreme Edge Devices*, Worcester Polytechnic Institute (ECE).
- *Computing on the Extreme Edge Devices*, Vanderbilt University (EECS).
- *Computing on the Extreme Edge Devices*, New Jersey Institute of Technology (CS).
- *Computing on the Extreme Edge Devices*, Auburn University (CSSE).
- February 2021 ■ *Computing on the Extreme Edge Devices*, Northwestern University (CS).
- *Computing on the Extreme Edge Devices*, Syracuse University (EECS).
- January 2021 ■ *Computing on the Extreme Edge Devices*, Carnegie Mellon University (ECE).
- December 2020 ■ *Computing on the Extreme Edge Devices*, Portland State University (CS).
- October 2020 ■ *Computing on the Extreme Edge Devices*, Georgia Institute of Technology.
- Feb 2020 ■ *Introduction to Embedded Intelligence*, Chancellor's Science Scholars Program, University of North Carolina at Chapel Hill.

Invited Industry Talks

- Aug 2020 ■ *Tracking Breathing Biomarkers Using Smartphone Acoustic Sensor*, Digital Health Lab, Samsung Research America.
- Aug 2017 ■ *Passive Ranging of Unmodified BLE Peripherals*, Nokia Bell Labs. **Best Presentation Award.**

Conference Talks

- March 2021 ■ *Sustainable and Intelligent Everyday Objects for Health Monitoring*, the International Conference on Networking, Systems and Security, (NSysS) 2021.
- Dec 2021 ■ *BreathTrack: Tracking Breathing Biomarkers Using Smartphone Acoustic Sensor*, ACM Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (UBICOMP), 2021.
- September 2021 ■ *Sustainable and Intelligent Everyday Objects for Health Monitoring*, the International Conference on Networking, Systems and Security, (NSysS) 2021.
- Sep 2020 ■ *Zygarde: Time-Sensitive On-Device Deep Inference and Adaptation on Intermittently-Powered Systems*, the ACM international joint conference on pervasive and ubiquitous computing (UBICOMP) 2020.
- Apr 2020 ■ *Scheduling Computational and Energy Harvesting Tasks in Deadline-Aware Intermittent Systems*, IEEE Real-Time and Embedded Technology and Application Symposium (RTAS), CPS-IoT Week 2020.
- *Scheduling Tasks on Intermittently Powered Systems*, PhD Forum in ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN), CPS-IoT Week 2020.
- Apr 2019 ■ *Time-Aware Deep Intelligence on Batteryless Systems*, IEEE Real-Time and Embedded Technology and Application Symposium (RTAS), CPS-IoT Week 2019.
- Jun 2018 ■ *Rethinking Ranging of Unmodified BLE Peripherals in Smart City Infrastructure*, ACM Multimedia Systems Conference (MMSyS) 2018.
- Apr 2018 ■ *Glimpse.3D: a motion-triggered stereo body camera for 3D experience capture and preview*, ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN), CPS-IoT Week 2018.

References

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