# Md Saiful Islam

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## Education

**University of Rochester**
Ph.D. in Computer Science (Degree expected: May 2026)
Dissertation: Automated video analysis for movement disorder screening and progression tracking
Committee: Ehsan Hoque (chair), Christopher Kanan, Anson Kahng, Ruth Schneider

**University of Rochester**
M.Sc. in Computer Science (GPA: 4.00/4.00) 12/2022

**Bangladesh University of Engineering and Technology**
M.Sc. in Computer Science and Engineering (GPA: 4.00/4.00) 10/2020

**Bangladesh University of Engineering and Technology**
B.Sc. in Computer Science and Engineering (GPA: 3.96/4.00 – Top 2.5%) 02/2017

## Research Interests

- Digital Health
- Multimodal Machine Learning
- Large Language Models
- Computer Vision
- Wearable Devices
- Human-Centered AI

## Awards and Honors

- *Google Ph.D. Fellowship* in health research (2023 - 2026).
- *Best Engineering Poster Award*, Graduate Research Day, University of Rochester (2025).
- *Invited Trainee Presenter*, National Institute of Neurological Disorders and Stroke, National Institutes of Health (NIH) (2023).
- *Additional Undergraduate Awards*: University Merit, Dean's List, Hackathon Champion.

## Journal Publications

1. Islam, M. S.*, Adnan, T.*, Lee, S., Wasifur Rahman Chowdhury, E. M., Tithi, S. D., Noshin, K., ... & Hoque, E. (2025). *AI-Enabled Parkinson's Disease Screening Using Smile Videos.* **NEJM AI**, 2(7), AIoa2400950. [Article]
2. Adnan, T., Abdelkader, A., Liu, Z., Hossain, E., Park, S., Hoque, E.*, & Islam, M. S.* (2025). *A novel fusion architecture for detecting Parkinson's Disease using semi-supervised speech embeddings.* **npj Parkinson's Disease**, 11(1), 176. [Article]
3. Rahman, W., Abdelkader, A., Lee, S., Yang, P., Islam, M. S., Adnan, T., ... & Hoque, E. (2024). *A user-centered framework to empower people with parkinson's disease.* Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (**IMWUT**), 7(4), 1-29. [Article]
4. Islam, M. S., Rahman, W., Abdelkader, A., Lee, S., Yang, P. T., Purks, J. L., ... & Hoque, E. (2023). *Using AI to measure Parkinson's disease severity at home.* **npj Digital Medicine**, 6(1), 156. [Article]

5. Rahman, W., Hasan, M., Islam, M. S., Olubajo, T., Thaker, J., Abdelkader, A. R., ... & Hoque, E. (2023). *Auto-gait: Automatic ataxia risk assessment with computer vision from gait task videos.* Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (**IMWUT**), 7(1), 1-19. [Article]
6. Islam, M. S., Proma, A. M., Wohn, C., Berger, K., Uong, S., Kumar, V., ... & Hoque, E. (2023). *SEER: Sustainable E-commerce with Environmental-impact Rating.* **Cleaner Environmental Systems**, 8, 100104. [Article]
7. Adnan, T. T., Islam, M. S., Papon, T. I., Nath, S., & Adnan, M. A. (2022). *UACD: a local approach for identifying the most influential spreaders in twitter in a distributed environment.* **Social Network Analysis and Mining**, 12(1), 37. [Article]
8. Das, S. S. S., Shanto, S. K., Rahman, M., Islam, M. S., Rahman, A. H., Masud, M. M., & Ali, M. E. (2022). *BayesBeat: Reliable atrial fibrillation detection from noisy photoplethysmography data.* Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (**IMWUT**), 6(1), 1-21. [Article]
9. Islam, M. S., Ali, M. E., Kang, Y. B., Sellis, T., Choudhury, F. M., & Roy, S. (2022). *Keyword aware influential community search in large attributed graphs.* **Information Systems**, 104, 101914. [Article]
10. Rahman, W., Lee, S., Islam, M. S., Antony, V. N., Ratnu, H., Ali, M. R., ... & Hoque, E. (2021). *Detecting parkinson disease using a web-based speech task: Observational study.* **Journal of Medical Internet Research**, 23(10), e26305. [Article]

## Conference Publications

1. Azad, A., Islam, M. S., Hoque, E., & Rahman, M. S. (2025, August). *Beyond Accuracy: Enhancing Parkinson's Diagnosis with Uncertainty Quantification of Machine Learning Models.* In **International Conference on AI in Healthcare** (pp. 33-46). [Article] [Best Paper Nomination]
2. Islam, M. S., Rahman, M. M., Bin Morshed, M., Lin, D. J., Li, Y., Zhou, H., ... & Kuang, J. (2025, April). *BallistoBud: Heart Rate Variability Monitoring using Earbud Accelerometry for Stress Assessment.* In Proceedings of the **CHI** Conference on Human Factors in Computing Systems (pp. 1-21). [Article]
3. Li, Y., Rahman, M. M., Morshed, M. B., Islam, M. S., Zhou, H., Wang, W., ... & Kuang, J. (2025, April). *Optimizing Biomarkers from Earbud Ballistocardiogram: Calibration and Calibration-Free Algorithms for Accelerometer Axis Selection and Fusion.* In 2025 IEEE International Conference on Acoustics, Speech and Signal Processing (**ICASSP**) (pp. 1-5). [Article]
4. Zhou, H., Rahman, M. M., Morshed, M. B., Li, Y., Islam, M. S., Zhang, L., ... & Kuang, J. (2025, April). *Know Your Heart Better: Multimodal Cardiac Output Monitoring using Earbuds.* In 2025 IEEE International Conference on Acoustics, Speech and Signal Processing (**ICASSP**) (pp. 1-5). [Article]
5. Islam, M. S., Adnan, T., Freyberg, J., Lee, S., Abdelkader, A., Pawlik, M., ... & Hoque, E. (2025, April). *Accessible, at-home detection of Parkinson's disease via multi-task video analysis.* In Proceedings of the **AAAI** Conference on Artificial Intelligence (Vol. 39, No. 27, pp. 28125-28133). [Article]
6. Islam, M. S., Lee, S., Abdelkader, A., Park, S., & Hoque, E. (2023, September). *PARK: Parkinson's analysis with remote kinetic-tasks.* In 2023 11th International Conference on Affective Computing and Intelligent Interaction (**ACII**) Workshops and Demos (pp. 1-3). [Article]

7. Proma, A. M., Islam, M. S., Ciko, S., Baten, R. A., & Hoque, E. (2022). *NADBenchmarks–a compilation of Benchmark Datasets for Machine Learning Tasks related to Natural Disasters.* In **AAAI 2022 Fall Symposium**: the Role of AI in Responding to Climate Challenges. [Article]
8. Islam, M. S., Proma, A., Zhou, Y., Akter, S. N., Wohn, C., & Hoque, E. (2022). *KnowUREnvironment: an automated knowledge graph for climate change and environmental issues.* In **AAAI 2022 Fall Symposium**: the Role of AI in Responding to Climate Challenges. [Article]
9. Bhattacharjee, A., Hasan, T., Ahmad, W. U., Samin, K., Islam, M. S., Iqbal, A., ... & Shahriyar, R. (2021). *BanglaBERT: Language Model Pretraining and Benchmarks for Low-Resource Language Understanding Evaluation in Bangla.* In Findings of the Association for Computational Linguistics: **NAACL** 2022, pages 1318–1327, Seattle, United States. [Article]
10. Hasan, M. K., Spann, J., Hasan, M., Islam, M. S., Haut, K., Mihalcea, R., & Hoque, E. (2021, November). *Hitting your MARQ: Multimodal ARgument quality assessment in long debate video.* In Proceedings of the 2021 Conference on Empirical Methods in Natural Language Processing (**EMNLP**) (pp. 6387-6397). [Article]
11. Hasan, T., Bhattacharjee, A., Islam, M. S., Samin, K., Li, Y. F., Kang, Y. B., ... & Shahriyar, R. (2021). *XL-sum: Large-scale multilingual abstractive summarization for 44 languages.* In Findings of the Association for Computational Linguistics: **ACL-IJCNLP** 2021, pages 4693–4703, Online. [Article]
12. Islam, M. R. U., Islam, M. S., Ahmed, Z., Iqbal, A., & Shahriyar, R. (2019, July). *Automatic detection of NoSQL injection using supervised learning.* In 2019 IEEE 43rd Annual Computer Software and Applications Conference (**COMPSAC**) (Vol. 1, pp. 760-769). [Article]

## Publications Under Review

1. Islam, M. S., Adnan, T., Abdelkader, A., Liu, Z., Ma, E., Park, S., ... & Hoque, E. *Remote AI Screening for Parkinson's Disease: A Multimodal, Cross-Setting Validation Study.* **npj Digital Medicine**.
2. Islam, M. S., Ma, E., Park, S., Adnan, T., & Hoque, E. *NeuroSift: Quality Assurance for Multimedia Data in Automated Movement Disorder Assessment.* **CHI 2026**.
3. Morshed, M. B., Islam, M. S., Zhu, L., Rahman, M. M., Hahn, J., & Desai, S. A.*EarBP: Earbuds-Based Non-invasive Blood Pressure Monitoring Using Pulse Transit Time.* **CHI 2026**.
4. Islam, M. S., Rahman, M. M., Morshed, M. B., Zhu, L., Singpuri, A., Hahn, J., & Desai, S. A.*Robust Supervised Learning for Ballistocardiogram Quality Assessment Under Limited Inter-Rater Agreement.* **ICASSP 2026**.
5. Deo, B. S., Zhu, L., Islam, M. S., Ranga, S. S. K., Morshed, M. B., Hahn, J., & Desai, S. A. *Towards Wearable Non-invasive Blood Pressure Monitoring: Detection Power Analysis of Pulse Arrival Time Across Body Sites.* **ICASSP 2026**.

## Research Skills

**Programming Languages:** Python, JAVA, C, C++, MATLAB, R.
**Machine Learning Libraries:** PyTorch, LangChain, LangGraph, Hugging Face, Scikit-learn.
**Project Management:** Grant writing, drafting and revising IRB protocols, FDA pre-submission.

## Research Experience

**Automated Video-Based Screening and Progression Tracking for Movement Disorders** 2021 – Present

*University of Rochester, New York, United States* (with collaborators from *Google DeepMind* and *University of Rochester Medical Center*).

- Developed PARK, a webcam-based telemedicine framework guiding UPDRS tasks for AI-driven Parkinson's Disease screening and progression tracking.
- Developed clinically interpretable features for facial expression, finger-tapping, gait, and speech tasks. Designed and trained lightweight ML models on these features that achieved state-of-the-art accuracy in detecting Parkinson's disease and ataxia, while providing interpretable predictions.
- Validated PARK across multiple study setups with performance approaching that of expert neurologists.
- Contributed to developing a public demo for deployment and usability testing: https://parktest.net/demo.
- Received the **Google PhD Fellowship** in recognition of my research on Parkinson's disease.

**Physiological Sensing and Digital Biomarkers** 2024 – 2025

*Samsung Research America, Mountain View, California, United States.*

- Designed algorithms for heart-rate and cuffless blood pressure monitoring using next-generation earbuds equipped with inertial measurement unit (IMU) and photoplethysmography (PPG) sensors.
- Analyzed ballistocardiogram (BCG) signals and developed ML-based models for automated signal quality assessment.
- Integrated signal-quality models into downstream applications and designed study protocols for downstream validation.

**NLP for Sustainability** 2021 – 2023

*University of Rochester, New York, United States.*

- Created *KnowUREnvironment*, a climate knowledge graph with 210K+ entities and 411K+ relations automatically extracted from literature.
- Proposed *SEER*, a sustainability focused e-commerce interface that increased eco-friendly product choices in a user study.
- *SEER* achieved high usability (SUS 79.18) and demonstrated potential for reducing carbon footprint of online shopping.

**Bangla Natural Language Processing** 2021 – 2022

*BUET, Dhaka, Bangladesh* (with collaborators from *Monash* and *Swinburne University*).

- Co-developed *XL-Sum*, the largest multilingual text summarization dataset (1M samples, 44 languages including Bangla).
- Achieved SOTA low-resource summarization with mT5 via multilingual/monolingual training.
- Co-created *BanglaBERT* and Bangla language understanding benchmark, establishing SOTA across multiple tasks.

**Influential Community Search in Social Networks** 2022
*BUET, Dhaka, Bangladesh* (with collaborators from *Swinburne University*).

- Proposed *KICQ*, a keyword-aware influential community query for large attributed graphs (e.g., social networks).
- Introduced semantic keyword matching via embeddings and a new influence measure combining cohesiveness and dominance of community members.
- Developed scalable algorithms validated with experiments on large-scale datasets and case studies.

**Continuous Cardiovascular Monitoring** 2022
*BUET, Dhaka, Bangladesh* (with collaborators from *United Arab Emirates University*).

- Co-developed *BayesBeat*, a Bayesian deep learning model for Atrial Fibrillation (AFib) detection from noisy smartwatch PPG.
- Achieved state-of-the-art accuracy with 40–200× fewer parameters, enabling deployment on smartphones and wearables.
- Provided calibrated uncertainty estimates for clinical interpretability.
- **Co-led grant proposal securing 1.5M BDT** from ICT Division, Bangladesh.

**Automated Detection of NoSQL Injection** 2019
*BUET, Dhaka, Bangladesh.*

- Developed the first supervised dataset for NoSQL injection detection.
- Designed ML-based tool achieving 0.93 $F_2$-score in detecting NoSQL injection attacks.
- Outperformed existing tools like `Sqreen` by 36% and proved database-agnostic across `MongoDB` and `CouchDB`.

## Teaching Experience

**Graduate Teaching Assistant** Aug 2021 – Dec 2022
*University of Rochester, New York, United States.*

Responsibilities: Assisting instruction through class support, supporting 50+ undergraduate and graduate students via holding regular office hours, occasional lecturing, preparing, and grading homework and exams.

Courses: (2XX – undergraduate level; 4XX – graduate level)

- CSC280/480: Computer Models and Limitations (Fall 2021, Spring 2022)
- CSC281: Introduction to Cryptography (Fall 2022)

**Assistant Professor** Nov 2020 – Jan 2021
*Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh.*

Responsibilities: Lecturing, curriculum development, conducting research with undergraduate students, mentoring and supporting students, designing lab assessments and hands-on learning materials, preparing, and grading exams.

Courses Instructed: (undergraduate level)

- CSE215: Database
- CSE216: Database Sessional

**Lecturer** Feb 2017 – Nov 2020
*BUET, Dhaka, Bangladesh.*

Responsibilities: Lecturing, designing lab assessments and hands-on learning materials, preparing, and grading exams.

Courses Instructed: (undergraduate level)

- CSE102: Structured Programming Language Sessional
- CSE110: Computer Programming Laboratory
- CSE204: Data Structures and Algorithms Sessional
- CSE215: Database
- CSE216: Database Sessional
- CSE218: Numerical Methods
- CSE313: Operating System
- CSE314: Operating System Sessional
- CSE321: Computer Networks
- CSE404: Computer Networks Sessional
- CSE403: Digital System Design
- CSE404: Digital System Design Sessional
- CSE462: Algorithm Engineering Sessional,
- CSE464: Computational Geometry Sessional

**AI Trainer** Nov 2018 – Mar 2019
*Hiperdyne Corporation, Japan.*

Delivered theoretical and hands-on training on machine learning and deep learning with Python to 25+ fresh graduates entering the Japanese AI industry.

## Professional Memberships

- Association for the Advancement in Affective Computing (AAAC)
- Association for the Advancement of Artificial Intelligence (AAAI)
- Association for Computational Linguistics (ACL)
- Association for Computing Machinery (ACM)
- Institute of Electrical and Electronics Engineers (IEEE)
- The Special Interest Group on Computer-Human Interaction (SIGCHI)

## Academic and Volunteer Services

- **Reviewer:** IMWUT (February 2025, May 2025), CHI (2024, 2026), ML4H 2024, Journal of Parkinson's Disease (February 2025), and ACL Rolling Review (6 cycles).
- **Program committee:** AAAI 2025 (AI for Social Impact Track)
- **Student volunteer:** Ubicomp 2023, CHIL 2023
- **Organizing committee member:** 5th and 6th International Conference on Networking, Systems and Security (NSysS) 2018, 2019.
- **Co-Coach:** ACM-ICPC World Finals 2018

- **External judge:** ICPC Asia Kolkata-Kanpur Onsite Regional Contest 2018.
- **Supervisor:** Bangladesh site, Asia-Pacific Informatics Olympiad (APIO 2018).
- **Chief Judge:** Bangladesh Olympiad in Informatics 2018.

## Mentorship

I have closely mentored over 15 undergraduate students from BUET and the University of Rochester. Collectively, these mentees have co-authored 10+ publications with me, and 5 have successfully transitioned to PhD programs in the U.S. Notable mentees include:

- Abdelrahman Abdelkader*, University of Rochester
- Asif Azad*, Bangladesh University of Engineering and Technology
- Caleb Wohn*, University of Rochester
- Dillanie Sumanthiran¶, University of Rochester
- Evelyn Ma*,¶, University of Rochester
- Kazi Noshin*,¶,†, Bangladesh University of Engineering and Technology
- Md Rafid Ul Islam*,†, Bangladesh University of Engineering and Technology
- Sangwu Lee*, University of Rochester
- Sooyong Park*,†, University of Rochester
- Sutapa Dey Tithi*,¶,†, Bangladesh University of Engineering and Technology
- Varun Kumar*, University of Rochester
- Yilin Zhou*, University of Rochester
- Zarif Ul Alam*,†, Bangladesh University of Engineering and Technology

* Co-authored publications (including works under review)
¶ Underrepresented minority in Computer Science
† Currently pursuing a Ph.D. in Computer Science

## References

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