

Saif Mahmud

Homepage : saif-mahmud.github.io
LinkedIn : linkedin.com/in/saifmdhrubo

Email : sm2446@cornell.edu

Mobile : +1 646 897 9974

[Google Scholar](#)

SUMMARY

Ph.D. candidate at Cornell building wearable ML systems for fine-grained human behavior understanding from acoustic, inertial, and egocentric vision sensors. 15 publications (7 first/co-first author) at top-tier venues including IMWUT/UbiComp, MobiCom, and UIST; 1 US patent; Best Paper Honorable Mention at UbiComp/ISWC 2024. Most recently Research Scientist Intern on the founding team at BehaviorAI (Summer 2026), working on real-time and foundation models for full-body and hand pose tracking. Seeking research internships for Summer 2027 and full-time research scientist / applied scientist roles after Ph.D. graduation (December 2027).

EDUCATION

Cornell University

Aug 2022 – Dec 2027 (Expected)

Doctor of Philosophy (Ph.D.), Computing and Information Science

Ithaca, NY, USA

Committee Members: Prof. Cheng Zhang (advisor), Prof. Tanzeem Choudhury, Prof. Deborah Estrin

Cornell University

Aug 2022 – Dec 2025

Master of Science (MS), Computing and Information Science

Ithaca, NY, USA

CGPA: **3.97 / 4.00**

University of Dhaka

Jan 2016 – Dec 2019

Bachelor of Science (B.Sc.), Computer Science and Engineering

Dhaka, Bangladesh

CGPA: **3.89 / 4.00** (4th highest among 65 students)

RESEARCH EXPERIENCE

Research Scientist Intern (Founding Team)

May 2026 – Aug 2026

BehaviorAI Inc.

New York, NY, USA

- Worked on real-time models and foundation models for full-body and hand pose tracking from multimodal wearable sensor data at a top-tier VC-backed startup; contributed to the early research direction alongside the founding team.

Graduate Research Assistant

Aug 2022 – Present

Smart Computer Interfaces for Future Interactions (SciFi) Lab, Cornell University

Ithaca, NY, USA

- **PoseSonic** (IMWUT 2023; covered by Engadget, Live Science, Cornell Chronicle): First system to estimate 3D upper-body pose from active acoustic sensing on commodity smartglasses.
- **MunchSonic** (UbiComp/ISWC 2024): Fine-grained dietary action recognition through active acoustic sensing on eyeglasses, enabling continuous, privacy-preserving food-intake tracking.
- **ActSonic** (IMWUT 2025): Recognized everyday activities from inaudible acoustic waves around the body using self-supervised pretraining for cross-user generalization.
- **EchoMotion** (IMWUT 2026): Full-body pose tracking from a single smartwatch via active acoustic sensing, pushing toward minimal-form-factor wearable pose estimation.
- Filed US patent on wearable acoustic sensing architecture (App. 18/925,803); research featured across Engadget, Live Science, Hackster.io, Tech Times, and Cornell Chronicle.

- Designed self-attention and variational inference-based methods for human activity recognition (co-first-author papers at ECAI 2020 and PAKDD 2021); co-authored follow-on spatio-temporal graph models published at PAKDD 2024.
- Implemented graph convolutional networks for rehabilitation exercise evaluation using Kinect sensor data, as part of a project funded by the ICT Division, Government of Bangladesh.
- Developed self-supervised and energy-based models for person re-identification in anonymized sensor data.

SELECTED PUBLICATIONS

* denotes equal contribution. Full publication list below; latest at personal site.

8. Saif Mahmud, Jiwan Kim, Tianhong Catherine Yu, Qikang Liang, Vineet Parikh, François Guimbretière, Cheng Zhang. “EchoMotion: Towards Full-Body Pose Tracking with a Single Smartwatch Using Active Acoustic Sensing”, in **Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, IMWUT/UbiComp 2026**, ACM, September 2026
7. Saif Mahmud, Vineet Parikh, Qikang Liang, Ke Li, Ruidong Zhang, Ashwin Ajit, Vipin Gunda, Devansh Agarwal, François Guimbretière, Cheng Zhang. “ActSonic: Recognizing Everyday Activities from Inaudible Acoustic Waves Around the Body”, in **Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, IMWUT/UbiComp 2025**, ACM, December 2024
6. Saif Mahmud, Devansh Agarwal, Ashwin Ajit, Qikang Liang, Thalia Viranda, François Guimbretière, Cheng Zhang. “MunchSonic: Tracking Fine-grained Dietary Actions through Active Acoustic Sensing on Eyeglasses”, in the **ACM International Symposium on Wearable Computing, UbiComp/ISWC 2024**, ACM, October 2024
5. Vineet Parikh, Saif Mahmud, Devansh Agarwal, Ke Li, François Guimbretière, Cheng Zhang. “EchoGuide: Active Acoustic Guidance for LLM-Based Eating Event Analysis from Egocentric Videos”, in the **ACM International Symposium on Wearable Computing, UbiComp/ISWC 2024**, ACM, October 2024
🏆 **Best Paper Honorable Mention Award**
4. Saif Mahmud, Ke Li, Guilin Hu, Hao Chen, Richard Jin, Ruidong Zhang, François Guimbretière, Cheng Zhang. “PoseSonic: 3D Upper Body Pose Estimation Through Egocentric Acoustic Sensing on Smartglasses”, in **Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, IMWUT/UbiComp 2023**, ACM, September 2023
3. M. Tanjid Hasan Tonmoy*, Saif Mahmud*, A K M Mahbubur Rahman, M Ashraful Amin, Amin Ahsan Ali. “Hierarchical Self Attention Based Autoencoder for Open-Set Human Activity Recognition”, in **Proceedings of the 25th Pacific-Asia Conference on Knowledge Discovery and Data Mining, PAKDD 2021**, Springer, May 2021
2. Saif Mahmud*, M. Tanjid Hasan Tonmoy*, Kishor Kumar Bhaumik, A K M Mahbubur Rahman, M Ashraful Amin, Mohammad Shoyaib, Muhammad Asif Hossain Khan, Amin Ahsan Ali. “Human Activity Recognition from Wearable Sensor Data Using Self-Attention”, in **Proceedings of the 24th European Conference on Artificial Intelligence, ECAI 2020**, IOS Press, September 2020
1. Jiacheng Liu*, Saif Mahmud*, Siyuan Liang, Chi-Jung Lee, Ruidong Zhang, Cheng Zhang. “SonicFit: Cross-User Full-Body Pose Tracking for Fitness Exercises Using Active Acoustic and Inertial Sensing with a Single Commercial Smartwatch”, *Under Review*

ADDITIONAL PUBLICATIONS

7. Tianhong Catherine Yu, Guilin Hu, Ruidong Zhang, Hyunchul Lim, Saif Mahmud, Chi-Jung Lee, Ke Li, Devansh Agarwal, Shuyang Nie, Jinseok Oh, François Guimbretière, Cheng Zhang. “Ring-a-Pose: A Ring for Continuous Hand Pose Tracking”, in **Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, IMWUT/UbiComp 2025**, ACM, December 2024
6. Ke Li, Devansh Agarwal, Ruidong Zhang, Vipin Gunda, Tianjun Mo, Saif Mahmud, Boao Chen, François Guimbretière, Cheng Zhang. “SonicID: User Identification on Smart Glasses with Acoustic Sensing”, in **Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, IMWUT/UbiComp 2025**, ACM, December 2024
5. Ke Li, Ruidong Zhang, Boao Chen, Siyuan Chen, Sicheng Yin, Saif Mahmud, François Guimbretière, Cheng Zhang. “GazeTrak: Exploring Acoustic-based Eye Tracking on a Glass”, in the **30th Annual International Conference On Mobile Computing And Networking, MobiCom 2024**, ACM, November 2024
4. Tianhong Catherine Yu, Mary Zhang, Peter He, Chi-Jung Lee, Cassidy Cheesman, Saif Mahmud, Ruidong Zhang, François Guimbretière, Cheng Zhang. “SeamPose: Repurposing Seams as Capacitive Sensors in a Shirt for Upper-Body Pose Tracking”, in the **ACM Symposium on User Interface Software and Technology, UIST 2024**, ACM, October 2024
3. Kishor Kumar Bhaumik, Fahim Faisal Niloy, Saif Mahmud, Simon S. Woo. “STLGRU: Spatio-Temporal Lightweight Graph GRU for Traffic Flow Prediction”, in **Proceedings of the 28th Pacific-Asia Conference on Knowledge Discovery and Data Mining, PAKDD 2024**, Springer, May 2024
2. Md Nazmul Haque, M. Tanjid Hasan Tonmoy, Saif Mahmud, Amin Ahsan Ali, Muhammad Asif Hossain Khan, and Mohammad Shoyaib. “GRU-based Attention Mechanism for Human Activity Recognition” In **International Conference on Advances in Science, Engineering and Robotics Technology, ICASERT 2019**, IEEE, May 2019
1. Ke Li, Chi-Jung Lee, Tan Gemicioglu, Ruidong Zhang, Jiacheng Liu, Saif Mahmud, Devansh Agarwal, François Guimbretière, Cheng Zhang. “SonicGlasses: Smart Glasses Platform for Multi-Task Human Activity Tracking with Acoustic Sensing”, *Under Review*

PATENTS

1. Saif Mahmud, Vineet A Parikh, Ruidong Zhang, François Guimbretière, Cheng Zhang, “Wearable Devices with Wireless Transmitter-receiver Pairs for Acoustic Sensing of User Characteristics”, **US Patent App.** 18/925,803

SELECTED PRESS COVERAGE

- **Cornell Chronicle, 2024** AI-powered ‘sonar’ on smartglasses tracks gaze and facial expressions
- **Cornell Chronicle, 2023** Glasses use sonar, AI to interpret upper body poses in 3D
- **Engadget, 2023** These sonar-equipped glasses could pave the way for better VR body tracking
- **Hackster.io, 2023** Spec-tacular Body Pose Estimation
- **Live Science, 2023** Smart glasses could boost privacy by swapping cameras for this 100-year-old technology
- **Tech Times, 2023** PoseSonic: Sonar, AI Powers Glasses to Track Upper Body Movements in 3D

AWARDS & ACHIEVEMENTS

- Best Paper Honorable Mention Award at UbiComp/ISWC 2024.
- Cornell Bowers CIS DEI Travel Award (\$1,500) for attending the Tapia Conference 2024.
- Cornell Graduate School Travel Grant (\$700) for attending UbiComp/ISWC 2023.
- University merit scholarship awarded by the Government of Bangladesh for outstanding academic performance at the undergraduate level (Top 5%).
- Government scholarship in the talent pool and full tuition waiver as a student at the University of Dhaka for securing 5th position (Top 1%) in the Merit List of the Higher Secondary Certificate Examination, 2015, under the Board of Intermediate and Secondary Education, Jessore, Bangladesh.
- Government scholarship in the talent pool for securing the 16th merit position (Top 1%) in the Junior School Certificate Examination, 2010, and for the results of the Secondary School Certificate Examination, 2013.
- Champion and Runner-up several times at the National Science, Mathematics, Chemistry, and Astrophysics Olympiads from 2009 to 2014.
- Champion at DUITs-ROBI National IT Fest 2018 in the *Apps in Life* category of the Software Development Competition.

ACADEMIC SERVICE

Technical Program Committee (TPC) Member UbiComp/ISWC 2026 Paper Reviewing

- **ACM UbiComp/IMWUT** 2023 (Special Recognition for Outstanding Review), 2024, 2025, 2026
- **ACM UbiComp/ISWC** 2023
- **ACM CHI** 2024, 2025, 2026
- **ACM UIST** 2025, 2026
- **ACM Transactions on Internet of Things** 2023

STUDENTS MENTORED

Vineet Parikh, Masters, Computer Science, Cornell (Currently Software Engineer, ML at Amazon)
Guilin Hu, Undergraduate, Computer Science, Cornell (Currently Ph.D. at University of Washington)
Kenny Liang, Undergraduate and Masters, Computer Science, Cornell (Currently Software Engineer at Amazon)

TEACHING EXPERIENCE

INFO 4320/5321: Introduction to Rapid Prototyping and Physical Computing <i>Cornell University, Graduate Teaching Assistant, Instructor: Prof. Cheng Zhang</i>	Fall 2023
INFO 2950: Introduction to Data Science <i>Cornell University, Graduate Teaching Assistant, Instructor: Prof. David Mimno & Prof. Allison Koenecke</i>	Fall 2022

INDUSTRY EXPERIENCE

Tiger IT Bangladesh Ltd.

Jun 2020 – Aug 2022

Software Engineer, Machine Learning R&D

Dhaka, Bangladesh

- Prototyped motion representation models for face reenactment and deployed them on AWS EC2 instances for the messaging platform CommChat's video conferencing feature, reducing bandwidth usage during calls.
- Applied Convolutional Neural Network (CNN) approaches on remote photoplethysmography (rPPG) data for facial spoof detection in the National ID authentication service.

Therap Services

Feb 2020 – Jun 2020

Associate Software Engineer, Machine Learning

Dhaka, Bangladesh

- Developed a fall detection and face recognition system specifically designed for individuals with intellectual and developmental disabilities.

TECHNICAL SKILLS

- **Programming Languages** Python, C, C++, Java, x86 Assembly
- **Machine Learning & Sensing** Deep Learning, Transformers & Self-Attention, Self-Supervised Learning, Multimodal Learning, Computer Vision, Audio & Acoustic Signal Processing, Sensor Fusion (acoustic + IMU), Time-Series Modeling, Real-Time / On-Device Inference
- **Research Methods** Experimental design, IRB-approved user studies, statistical analysis, Human-Computer Interaction (HCI)
- **Libraries** scikit-learn, PyTorch, PyTorch-Lightning, TensorFlow, Keras, Pandas, NumPy, OpenCV, Matplotlib, Seaborn
- **Back-end Engineering** Flask, FastAPI, MySQL, MongoDB
- **Rapid Prototyping** Autodesk Fusion 360, 3D Printing, Laser Cutting
- **Miscellaneous** Git, Docker, MATLAB, L^AT_EX

REFERENCES

Available upon request