Tousif Ahmed

Privacy Engineer · Google
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Areas of expertise

Health & Accessibility, Health Data Science, Machine Learning, Audio Processing, Time Series Analysis, Privacy and Security, Mixed-Method Research.

Education

Ph.D. in Computer Science, Indiana University Bloomington *Aug, 2013- Feb 2019*
Dissertation: Towards the Design of Wearable Assistive Technologies to Address the *Minor: Informatics*
Privacy and Security Concerns of People with Visual Impairments

M.S. in Computer Science, Indiana University Bloomington *Aug, 2013- May, 2017*

B.Sc in Computer Science, Bangladesh University of Engineering and Technology *Jun, 07- Apr, 2012*

Professional Experience

Privacy Research Engineer, Devices & Services, Google *Mar, 2023- Present*

- Research and Engineering privacy-preserving technologies, ensuring ethical use of data, and building customers' trust in Google Devices and Services (Pixel, Fitbit, and Nest).

Senior Research Engineer, Digital Health Lab, Samsung Research America *Jul, 2019- Present*

- Developing machine learning methods for continuous & passive monitoring of breathing rate using the motion and acoustic sensors from earbuds.
- Lead research projects and develop novel algorithms using physiological sensor data and machine learning to monitor and improve patients' respiratory (e.g., Asthma, COPD) and mental health (e.g., stress, depression).
- Design and conduct user studies to collect mobile sensor data for developing & evaluating the algorithms.
- Collaborate with UI/UX designers, Software Engineers, Server Engineers, and product managers to move the research prototypes into production.
- Lead academic research collaboration with external partners and publish scholarly articles in top conferences & journals.

Research Assistant, Privacy lab, Indiana University Bloomington *Aug,13 - Jun, 19*

- Proposed a wearable-camera based solution for people with visual impairments to address their privacy and security risks by balancing bystanders privacy concerns.
- Designed and conducted more than ten user studies (surveys, in-situ studies, interviews, and wizard of oz studies) and lab experiments to understand and improve the privacy of mobile and wearable device users.

Technical Skills

Programming Languages	*Proficient:* Python, Java, C/C++, R. *Familiar:* C#, JavaScript, PHP
Frameworks & Libraries	Pandas, Scipy, Android, PyTorch, Tensorflow, Keras, scikit-learn.
Machine Learning	Tree-based Models, Clustering, CNN, DNN, LSTM/GRU.
Data Science	Time Series Analysis, Signal Processing, Motion Health Data, Audio/Image Processing.
Privacy	Federated Learning, Location Privacy, AR/VR/MR Privacy, k-Anonymity, Differential Privacy.

Honors & Awards

SRA	**Best Paper Award**, Samsung Research	*2021*
SRA	**Spot Bonus**, Digital Health Lab	*2021,22*
Austin, TX	**Best Industry Paper Award**, IEEE Percom 2020	*2020*
Santa Clara, CA	**John Karat Usable Privacy and Security Student Research Award**, Awarded for excellence in Usable Privacy and Security Research.	*2019*
Sanfrancisco, CA	**Student Scholar**, ACM's Celebration of 50 Years of the Turing Award	*2017*

Selected Publications

Peer Reviewed Journal Publications

J1. T. Akter, **Tousif Ahmed**, A. Kapadia, and M. Swaminathan. *"Shared Privacy Concerns of the Visually Impaired and Sighted Bystanders with Camera Based Assistive Technologies".* ACM Transactions on Accessible Computing (TACCESS '22). *2022.*

J2. S. Das, **Tousif Ahmed**, A. Kapadia, and S. Patil. *"Does This Photo Make Me Look Good? How Posters, Outsiders, and Friends Evaluate Social Media Photo Posts".* Proceedings of the ACM Journal: Human-Computer Interaction: Computer Supported Cooperative Work and Social Computing (CSCW '21)*, 46:1–46:32. 2021.*

J3. B. Islam, M. Rahman, **Tousif Ahmed**, M. Ahmed, M. Hasan, V. Nathan, K. Vatanparvar, E. Nemati, J. Kuang, and A. Gao. *"BreathTrack: Detecting Regular Breathing Phases from Unannotated Acoustic Data Captured by a Smartphone".* Proc. ACM Interact. Mob. Wearable Ubiquitous Technol. *ACM IMWUT, 2021.*

J4. X. Xu, E. Nemati, K. Vatanparvar, V. Nathan, **Tousif Ahmed**, M.r Rahman, D. McCaffrey, J. Kuang, and J. Gao. *"Listen2Cough: Leveraging End-to-End Deep Learning Cough Detection Model to Enhance Lung Health Assessment Using Passively Sensed Audio".* Proc. ACM Interact. Mob. Wearable Ubiquitous Technol. *ACM IMWUT, 2021.*

J5. **Tousif Ahmed**, A. Kapadia, V. Potluri, and M. Swaminathan. *"Up to a Limit? Privacy Concerns of Bystanders and Their Willingness to Share Additional Information with Visually Impaired Users of Assistive Technologies".* In Proc. of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*, 89:1–89:27. ACM IMWUT, 2018.*

J6. Q. Ismail, **Tousif Ahmed**, K. Caine, A. Kapadia, and M. Reiter. *"To Permit or Not to Permit, That is the Usability Question: Crowdsourcing Mobile Apps Privacy Permission Settings".* In Proceedings on Privacy Enhancing Technologies (PoPETs)*, pp. 118–136. 2017.*

Peer Reviewed Conference Publications

C1. **Tousif Ahmed**, M. Rahman, E. Nemati, M. Ahmed, J. Kuang, and A. Gao. *"Remote Breathing Rate Tracking in Stationary Position Using the Motion and Acoustic Sensors of Earables".* Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*, 2023.*

C2. **Tousif Ahmed**, M. Rahman, E. Nemati, J. Kuang, and A. Gao. *"Mouth Breathing Detection Using Audio Captured Through Earbuds".* ICASSP 2023 - 2023 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2023, pp. 1–5.*

C3. M. Ahmed, **Tousif Ahmed**, M. Rahman, Z. Wang, J. Kuang, and A. Gao. *"Deep Audio Spectral Processing for Respiration Rate Estimation from Smart Commodity Earbuds".* 2022 IEEE-EMBS International Conference on Wearable and Implantable Body Sensor Networks (BSN)*, 2022, pp. 1–4.*

C4. E. Nemati, X. Xu, V. Nathan, K. Vatanparvar, **Tousif Ahmed**, M. Rahman, D. McCaffrey, and A. Kuang J.and Gao. *"Ubilung: Multi-Modal Passive-Based Lung Health Assessment".* ICASSP 2022 - 2022 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2022, pp. 551–555.*

C5. M. Rahman, **Ahmed, Tousif**, M. Ahmed, M. Dinh, E. Nemati, J. Kuang, and J. Gao. *"BreatheBuddy: Tracking Real-Time Breathing Exercises for Automated Biofeedback Using Commodity Earbuds".* Proceedings of the ACM on Mobile Human-Computer Interaction (Mobile HCI)*, 2022.*

C6. M. Rahman, X. Xu, T. Nathan V.and Ahmed, M. Ahmed, D. McCaffrey, J. Kuang, T. Cowell, J. Moore, W. Mendes, and J. Gao. *"Detecting Physiological Responses Using Multimodal Earbud Sensors".* 2022 44th Annual International Conference of the IEEE Engineering in Medicine Biology Society (EMBC)*, 2022, pp. 01–05.*

C7. S. Zhang, E. Nemati, M. Dinh, N. Folkman, **Tousif Ahmed**, M. Rahman, J. Kuang, N. Alshurafa, and A. Gao. *"Coughtrigger: Earbuds IMU Based Cough Detection Activator Using An Energy-Efficient Sensitivity-Prioritized Time Series Classifier".* ICASSP 2022 - 2022 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2022, pp. 1–5.*

C8. **Tousif Ahmed**, M. Rahman, M. Ahmed, E. Nemati, M. Dinh, N. Folkman, J. Kuang, and A. Gao. *"RRMonitor: A Resource-Aware End-to-End System for Continuous Monitoring of Respiration Rate Using Earbuds"*. 2021 43rd Annual International Conference of the IEEE Engineering in Medicine Biology Society (EMBC)*, 2021, pp. 2463–2467*.

C9. S. Zhang, E. Nemati, **Tousif Ahmed**, M. Rahman, J. Kuang, and A. Gao. *"A Novel Multi-Centroid Template Matching Algorithm and Its Application to Cough Detection"*. 2021 43rd Annual International Conference of the IEEE Engineering in Medicine Biology Society (EMBC)*, 2021, pp. 7598–7604*.

C10. T. Akter, B. Dosono, **Tousif Ahmed**, A. Kapadia, and B. Semaan. *""I am uncomfortable sharing what I can't see": Privacy Concerns of the Visually Impaired with Camera Based Assistive Applications"*. In Proceedings of 9th USENIX Security Symposium (USENIX Security '20)*, 2020*.

C11. T. Akter, **Tousif Ahmed**, A. Kapadia, and M. Swaminathan. *"Privacy Considerations of the Visually Impaired with Camera Based Assistive Technologies: Misrepresentation, Impropriety, and Fairness"*. In The 22nd International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS)*, 2020*.

C12. S. Chatterjee, M. Rahman, **Tousif Ahmed**, N. Saleheen, E. Nemati, V. Nathan, K. Vatanparvar, and J. Kuang. *"Assessing Severity of Pulmonary Obstruction from Respiration Phase-Based Wheeze-Sensing Using Mobile Sensors"*. Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (CHI'20)*, 2020, pp. 1–13*.

C13. N. Saleheen, **Tousif Ahmed**, M. Rahman, E. Nemati, V. Nathan, K. Vatanparvar, E. Blackstock, and J. Kuang. *"Lung Function Estimation from a Monosyllabic Voice Segment Captured Using Smartphones"*. 22nd International Conference on Human-Computer Interaction with Mobile Devices and Services*, 2020*.

C14. **Tousif Ahmed**, M. Ahmed, M. Rahman, E. Nemati, B. Islam, K. Vatanparvar, V. Nathan, D. McCaffrey, J. Kuang, and A. Gao. *"Automated Time Synchronization of Cough Events from Multimodal Sensors in Mobile Devices"*. Proceedings of the 2020 International Conference on Multimodal Interaction*, 2020, pp. 614–619*.

C15. Y. Rashidi, **Tousif Ahmed**, F. Patel, E. Fath, A. Kapadia, C. Nippert-Eng, and N. Su. *"You don't want to be the next meme: College Students' Workarounds to Manage Privacy in the Era of Pervasive Photography"*. Proceedings of the USENIX Symposium on Usable Privacy and Security (SOUPS)*, 2018*.

C16. **Tousif Ahmed**, P. Shaffer, K. Connelly, D. Crandall, and A. Kapadia. *"Addressing Physical Safety, Security, and Privacy for People with Visual Impairments"*. In Proceedings of the 12th Symposium on Usable Privacy and Security (SOUPS)*, 2016, pp. 341–354*.

C17. Q. Ismail, **Tousif Ahmed**, A. Kapadia, and M. Reiter. *"Crowdsourced Exploration of Security Configurations"*. In Proceedings of The ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)*, 2015, pp. 467–476*.

C18. **Tousif Ahmed**, R. Hoyle, K. Connelly, D. Crandall, and A. Kapadia. *"Privacy Concerns and Behaviors of People with Visual Impairments"*. In ACM SIGCHI Conference on Human Factors in Computing (CHI)*, 2015, pp. 3523–3532*.

Patent Applications

P1. **Tousif Ahmed**, M. Rahman, Y. Jin, E. Nemati, M. Ahmed, N. Rahsid, J. Kuang, and J. Gao. Passive and Continuous Breathing Rate Estimation Using Earbuds. *Submitted for Publication, 2023*.

P2. M. Rahman, B. Islam, **Tousif Ahmed**, N. Folkman, M. Dinh, S. Bornheimer, E. Nematihosseinabadi, J. Kuang, and J. Gao. Breathing measurement and management using an electronic device. *US Patent App. 17/406,086, 2022*.

P3. **Tousif Ahmed**, M. Rahman, N. Folkman, M. Dinh, S. Bornheimer, E. Nematihosseinabadi, J. Kuang, and J. Gao. Timely Detection and Respose to Context-Specific Health Events. *Submitted for Publication, 2022*.

P4. M. Rahman, **Tousif Ahmed**, M. Ahmed, V. Nathan, E. Nematihosseinabadi, K. Vatanparvar, J. Kuang, and J. Gao. Adaptive respiratory condition assessment. *US Patent App. 17/072,341, 2021*.

P5. K. Vatanparvar, **Tousif Ahmed**, E. Nathan V.and Nematihosseinabadi, M. Rahman, J. Kuang, and J. Gao. System and method for passive subject specific monitoring. *US Patent App. 16/999,027, 2021*.

Talks & Presentations

UC Santa Cruz	**HCI Semniar Talk**, Towards the Design of Wearable Assistive Technologies to Address the Privacy and Security Concerns of People with Visual Impairments.	*2022*
RIT	**Invited Talk**, Towards the Design of Wearable Assistive Technologies to Address the Privacy and Security Concerns of People with Visual Impairments.	*2019*
Ubicomp	**Conference Presentation**, Up to a Limit? Privacy Concerns of Bystanders andTheir Willingness to Share Additional Information with Visually Impaired Users of Assistive Technologies	*2018*
INFO-I407	**Guest Lecture**, Towards the design of Accessible privacy	*2017-2018*
SOUPS	**Conference Presentation**, Addressing the Physical Safety, Security, and Privacy Concerns of People with Visual Impairments	*2016*
BLUES Lab, UC Berkeley	**Invited Talk**, Privacy Concerns and Behaviors of People with Visual Impairments	*2015*

Mentoring

Samsung	**Yincheng Jin**, PhD at SUNY Buffalo	*2023-24*
Samsung	**Zihan Wang**, MS at Stanford University	*2021-22*
Samsung	**Bashima Islam**, PhD Student at UNC Chapel Hill (Now Asst. Professor at WPI)	*2021*
IU	**Sanchari Das**, PhD Student at Indiana University	*2016-18*
IU	**Taslima Akter**, PhD Student at Indiana University	*2016-19*

Academic Services

Program Committee	CHI 2021, 24 (Associate Chair in Privacy Subcommittee), ASSETS 2019-2022
Workshop Organizing	Inclusive Privacy and Security Workshop in SOUPS 2019, 2020, 2021
External Reviewer	IMWUT 2019-2022, CSCW 2020,CHI 2016-2019, PETS 2018, DIS 2018, TEI 2018, CSCW 2018, SOUPS 2016-18.
Security Reading Group	Organize weekly seminars for discussing research papers and emerging research trends in security and privacy.