SEJAL BHALLA

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RESEARCH INTERESTS

Ubiquitous Computing, Applied Sensing and Machine Learning, Mobile Health, Input and Interactions, Acoustic and Speech Analysis

EDUCATION

University of Toronto | Toronto, Canada — 2021 - Present
Ph.D., Computer Science | Advisors: Alex Mariakakis, Eyal de Lara

Indraprastha Institute of Information Technology Delhi | Delhi, India — 2017 - 2021
BTech, Computer Science & Engineering

EXPERIENCE

Sunnybrook Health Sciences Centre — Sep 2024 – Present
Research Trainee | Toronto, Canada
Analysing large-scale data from a study conducted by the Department of Respirology to evaluate the performance of a new tool for lung function assessment.

Google — May 2024 – Jul 2024
Student Researcher | Remote / Seattle, USA
Built a microgesture recognition system using smartwatch sensor data (IMU and audio).

Google — Aug 2023 – Apr 2024
Student Researcher | Remote / Seattle, USA
Explored interaction techniques for AR.

SmaSH Lab, HCII, Carnegie Mellon University — Sep 2020 – Aug 2021
Visiting Student Researcher | Remote / Pittsburgh, USA
Built a privacy-preserving activity recognition system by leveraging domain adaptation techniques to train privacy-sensitive sensors using minimal training data.

IBM Research — May 2020 – Jul 2020
Research Intern | Remote / Bengaluru, India
Built an AI solution based on the principles of Natural Language Processing to automate the process of business lead generation.

Weave Lab & HMI Lab, IIIT Delhi — Dec 2018 – May 2021
Student Researcher | Delhi, India
Designed and developed intelligent systems to enrich human-computer interaction, specifically through (1) unobtrusive detection of facial expressions using earables, and (2) classification of human attention types using EEG data and deep learning.

PEER-REVIEWED PUBLICATIONS

12. **Sejal Bhalla**, Larry Kieu, Eyal de Lara, Alex Mariakakis. Learning Physiological Speech Representations. *Under review at Interspeech 2026*.

11. Kenneth Christofferson, **Sejal Bhalla**, Michelle Lin, Joseph Cafazzo, Alex Mariakakis. In-ear Acoustic Pulse Wave Analysis for Blood Pressure Estimation. *Under review at npj Digital Medicine*.

10. **Sejal Bhalla**, Cady Xu, Karan Ahuja, Alex Mariakakis, Ishan Chatterjee. Enabling Microgesture Recognition on COTS Smartwatches. In Proceedings of the 52nd Graphics Interface Conference (GI '26). *To Appear*.

9. **Sejal Bhalla**, Eyal de Lara, Alex Mariakakis. Utilizing Speech as a Biosignal for Monitoring Respiratory Health and Beyond. In Companion of the 2025 ACM International Joint Conference on Pervasive and Ubiquitous Computing Proceedings. (UbiComp '25). https://doi.org/10.1145/3714394.3750551. Best Doctoral Colloquium Contribution Award.

8. **Sejal Bhalla**, Deshang Kong, Salaar Liaqat, Daniyal Liaqat, Robert Wu, Andrea Gershon, Eyal de Lara, Alex Mariakakis. Speech and Physiology in COPD: Association between Wearable Device Data and Daily Lung Condition. Nature Scientific Reports, 2025. https://doi.org/10.1038/s41598-025-14171-0.

7. **Sejal Bhalla**, Tien Han, Andrea Gershon, Robert Wu, Eyal de Lara, Alex Mariakakis. Phoneme-Aware Acoustic Analysis of Natural Speech for Lung Function Assessment. 2025 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP '25). https://doi.org/10.1109/ICASSP49660.2025.10888421.

6. Kenneth Christofferson, **Sejal Bhalla**, Joseph Cafazzo, Alex Mariakakis. On the Production and Measurement of Cardiac Sounds in the Ear Canal. In Companion of the 2024 on ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp '24). https://doi.org/10.1145/3675094.3680526. Best Paper Award.

5. **Sejal Bhalla**, Salaar Liaqat, Robert Wu, Andrea Gershon, Eyal de Lara, Alex Mariakakis. PulmoListener: Continuous Acoustic Monitoring of Chronic Obstructive Pulmonary Disease in The Wild. In Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT '23). https://doi.org/10.1145/3610889.

4. **Sejal Bhalla**, Dhruv Verma, S.V. Sai Santosh, Saumya Yadav, Aman Parnami, Jainendra Shukla. AttentioNet: Monitoring Student Attention Type in Learning with EEG-Based Measurement System. In Proceedings of the 11th International Conference on Affective Computing and Intelligent Interaction (ACII '23). https://doi.org/10.1109/ACII59096.2023.10388212.

3. **Sejal Bhalla**, Mayank Goel, Rushil Khurana. 2021. IMU2Doppler: Cross-Modal Domain Adaptation for Doppler-based Activity Recognition Using IMU Data. In Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT '21). https://doi.org/10.1145/3494994.

2. **Sejal Bhalla**, Dhruv Verma, Dhruv Sahnan, Jainendra Shukla, Aman Parnami. 2021. ExpressEar: Sensing Fine-Grained Facial Expressions with Earables. In Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT '21). https://doi.org/10.1145/3478085.

1. **Sejal Bhalla**, Dikshant Sagar, Jatin Garg, Prarthana Kansal, Rajiv Ratn Shah, Yi Yu. PAI-BPR: Personalised Outfit Recommendation Scheme with Attribute-wise Interpretability. In IEEE International Conference on Multimedia Big Data (Big MM '20). https://doi.org/10.1109/BigMM50055.2020.00039.

AWARDS AND HONORS

Wolfond Scholarship in Wireless Information Technology ($10,000 CAD across 2 years)	2026, 2025
Best Doctoral Colloquium Contribution Award (ACM UbiComp/ISWC)	2025
Google PhD Fellowship Nominee (Nominated by University of Toronto)	2025
Data Sciences Institute Doctoral Fellowship ($75,000 CAD across 3 years)	2025
University of Toronto Departmental Fellowship ($1,355 CAD)	2023
Special Recognition for Outstanding Review, ACM IMWUT	2022
Alberta Machine Intelligence Institute AI Week Talent Bursary ($1,500 CAD)	2022
University of Toronto Program-Level Fellowship ($1,000 CAD)	2025, 24, 23, 22, 21
GHCI Student Scholarship	2020
IBM Blue Scholar	2020

INVITED TALKS

Northwestern University CS (Host: Nivedita Arora), Decoding Ubiquitous Signals: Repurposing Speech as a Biosignal.	2025
Google Product & Engineering, Enabling Microgesture Recognition on COTS Smartwatches	2024
Google AR, Enabling Microgesture Recognition on COTS Smartwatches	2024
AGE-WELL & APPTA Policy Rounds, Remote Patient Monitoring in the Wild	2024

ACADEMIC SERVICE

Feature Editor, ACM XRDS Magazine	2025 - Present
Reviewer, ACM CHI	2024
Reviewer, ACM IMWUT/ISWC	2025, 2024, 2023, 2022
Reviewer, IEEE BSN	2025, 2024
Reviewer, ACM ISS	2022
Student Volunteer, ACM UbiComp	2022, 2021
Student Volunteer, ACM IUI	2022

TEACHING EXPERIENCE

Teaching Assistant, University of Toronto | **Data Science II**	2025, 2026
Teaching Assistant, University of Toronto | **Mobile and Digital Health**	2025
Teaching Assistant, University of Toronto | **Topics in Ubiquitous Computing**	2024, 2023
Teaching Assistant, University of Toronto | **Design of Interactive Computational Media**	2023
Teaching Assistant, University of Toronto | **Introduction to Computer Programming**	2022, 2021

VOLUNTEERING AND OUTREACH

Mentor, UofT DCS Women Mentorship Event	2025
Mentor, ML4H Mentorship Program	2024
Mentor, WISE Industry Mentorship Program	2024 - Present
Mentor, Toronto Graduate Application Assistance Program	2023
Mentor, Girls SySTEM Mentorship Program	2023
Speaker and Panellist, Pursue STEM Workshop	2022

STUDENTS ADVISED

Larry Kieu, Undergraduate, Computer Science | University of Toronto	2025 - Present
Maryam Taj, Undergraduate, Computer Science | University of Toronto	2024 - Present
Zhizheng Zhang, Ph.D., Computer Science | University of Oxford	2024 - Present
Benson Chou, Undergraduate, Computer Science | University of Toronto	2024 - Present
Tien Han, Undergraduate, Computer Science | University of Toronto	2023 - 2024
Deshang Kong, Undergraduate, Computer Science (Currently Masters at HKUST) | University of Toronto	2023 - 2024