ANDREW HANZHUO ZHANG

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EDUCATION

University of Toronto — Sep 2025 - Jan 2027 (- Jun 2030)
MSc(-**PhD**) in Computer Science supervised by Prof. Anna Goldenberg
Research Areas: Machine Learning, Computational Biomedicine
Research Affiliations: Vector Institute, SickKids Research Institute

University of Toronto — Sep 2020 - Jun 2025
HBSc with 16 months **ASIP** co-op internship placement — Graduation with High Distinction
Triple Majors: Computer Science, Physics, Cognitive Science — Major GPA: (3.96, 3.81, 3.81)/4.00

PUBLICATIONS & MANUSCRIPTS

[1] **Andrew H. Zhang**, Chunlin Li, Yuzhi Tang, Alex He-Mo, Nasim Montazeri Ghahjaverestan, Maged Goubran, and Andrew Lim. "*A Deep Learning Model for Inferring Sleep Stage from a Flexible Wireless Dual Sensor Wearable System without EEG*". In: *SLEEP* 47 (2024), A481–A482.

[2] **Andrew H. Zhang**†, Alex He-Mo†, Richard Fei Yin†, Chunlin Li, Yuzhi Tang, Dharmendra Gurve, Veronique van der Horst, Aron S. Buchman, Nasim Montazeri Ghahjaverestan, Maged Goubran, Bo Wang, and Andrew Lim. "*Mamba-based Deep Learning Approach for Sleep Staging on a Wireless Multimodal Wearable System without Electroencephalography*". In: *arXiv; Under Review: SLEEP* (2024).

[3] Chloe Wang†, Haotian Cui†, **Andrew H. Zhang**, Ronald Xie, Hani Goodarzi, and Bo Wang. "*scGPT-spatial: Continual Pretraining of Single-Cell Foundation Model for Spatial Transcriptomics*". In: *bioRxiv; Under Review: Nature Methods* (2025).

†These authors contributed equally.

RELEVANT PRESS

[4] Julie Choi, on behalf of the **Applied ML Team**. *Cerebras Selects Qualcomm to Deliver Unprecedented Performance in AI Inference*. Cerebras Systems Press Release. March 11, 2024.

CURRENT RESEARCH

Forecasting Paediatric ICU Patient Deterioration — Sep 2025 - Present
Supervisor(s): Prof. Anna Goldenberg

· MSc thesis on machine learning methods for building a multi-modal clinical early warning system for forecasting patient deterioration in the paediatric ICU at The Hospital for Sick Children (SickKids) in Toronto.

Causal Discovery on Wearable Device Time-series — Sep 2025 - Present
Supervisor(s): Prof. Anna Goldenberg & Prof. Ricardo Silva

· Developing approaches to uncover the causal interplay between psychological stress and individual symptom trajectories of chronic diseases tracked by wearable devices in studies conducted by 4YouandMe.

Detecting Neuro-degenerative Disease from Sleep Physiology — Sep 2025 - Present
Supervisor(s): Prof. Anna Goldenberg & Prof. Andrew Lim

· Leveraging state space embeddings of a wearable device sleep staging model [2] to discern signals for neuro-degenerative diseases from ambulatory sleep recordings on the Sibel Health ANNE One wearable device.

Single-cell Foundation Model for Gene Perturbation — Jun 2025 - Present
Supervisor(s): Prof. Bo Wang

· Part of the team working on scGPT (Cui et al., 2024) architecture foundation models for single-cell gene perturbation.

University of Toronto, Vector Institute, SickKids Research Institute, University Health Network, Sunnybrook Research Institute, University College London

EMPLOYMENT HISTORY

University of Toronto — Sep 2025 - Present
Teaching Assistant — Toronto, ON, Canada

- Part-time teaching assistant as a graduate student at the department of computer science (see Teaching and Mentoring).

University Health Network — Jun 2025 - Sep 2025
Researcher — Toronto, ON, Canada

- FUll-time researcher at WangLab supervised by Prof. Bo Wang to work on scGPT (Cui et al., 2024) architecture single-cell transcriptomics foundation model for gene perturbation.

Vector Institute — May 2024 - Sep 2024
Research Intern — Toronto, ON, Canada

- Full-time research internship at WangLab supervised by Prof. Bo Wang to work on scGPT-Spatial (Wang et al., 2025) [3].
- scGPT-Spatial continual pretrainings single-cell foundation model scGPT (Cui et al., 2024) on spatial transcriptomic modalities such as Visium, Xenium, and MERFISH to address the unique complexities of these data distributions.
- Developed embedding-based methods for spatial cell-type deconvolution and gene imputation downstream tasks, improving Visium deconvolution by over 10% and spatial highly variable gene imputation by over 20% (Xenium) and 40% (MERFISH).

Cerebras Systems — May 2023 - May 2024
Co-op ML Research Engineer — Toronto, ON, Canada

- Full-time 12 months ASIP co-op internship placement as a part of the applied ML team.
- Focused on using LLaMA-based LLMs with unstructured sparsity trained on world's largest computer chip for Speculative Decoding (Leviathan et al., 2023) as a part of a collaboration with Qualcomm [4] to deliver high throughput inference solutions.
- Investigated methods for improving speculative decoding token acceptance rate that improved inference throughput up to 2×.
- Further explored single-model speculative decoding methods such as Medusa (Cai et al., 2024) and Hydra (Ankner et al., 2024) more suitable for the Cerebras CS-X inference stack.

Sunnybrook Research Institute — Sep 2022 - Sep 2023
Student Researcher — Toronto, ON, Canada

- Part-time student researcher at the Sleep and Brain Health Laboratory supervised by Prof. Andrew Lim.
- Led research project investigating deep learning approaches for ambulatory sleep staging using the Sibel Health ANNE One — a wireless wearable system measuring ECG, PPG, accelerometry, and temperatures.
- Poster presented at the SLEEP 2024 conference in Houston, Texas; Abstract published in the journal *SLEEP* [1].
- Further extension [2] using Mamba (Gu & Dao, 2023) achieves state-of-the-art sleep staging performance among models of comparable wearable devices.

Sunnybrook Research Institute — May 2022 - Sep 2022
Co-op Software Engineer — Toronto, ON, Canada

- Full-time 4 months ASIP co-op internship placement as a full-stack software engineer developing the medical time-series annotation platform CrowdEEG (Schaekermann et al., 2020).
- Adapated CrowdEEG from its initial demo platform into a fully functional open-source project to support clinical studies at the Sleep and Brain Health Laboratory; oversaw its deployment into production at the Augmented Intelligence Lab at the University of Waterloo.

TEACHING & MENTORING

Course/Organization	Instructor	Role	Term
CSC236H: Intro. Theory of Computation	Francois Pitt	Teaching Assistant	Fall 2025
Marking teaching assistant for term tests and assignments.			
ESC499Y: Engineering Science Thesis	Anna Goldenberg	Research Mentor	Fall 2025 - Winter 2026
Mentored engineering science student Kai Li for his thesis on generative modeling of wearable device signals.			
NeurotechUofT	N/A (Student-run)	Signal Processing Team Lead	Fall 2021 - Fall 2023
Led the signal processing team and organized EEG signal processing workshops			

AWARDS & HONOURS

Title	Institution	Term
Dean's List Scholar	University of Toronto, Faculty of Arts & Science	Fall 2021, 2022, 2023, 2024
6T5 Scholarship	University of Toronto, Trinity College	Fall 2021
University of Toronto Scholar	University of Toronto	Fall 2020

ADVANCED COURSES

Course Code	Title	Instructor/Supervisor	Term
Graduate - Computer Science			
CSC2541H	Topics in ML: AI for Drug Discovery	Chris J. Maddison	Winter 2026
ECE1660H	Risk-Aware & Stochastic Control Theory w/ Learning	Margaret Chapman	Winter 2026
CSC2541H	Topics in ML: Introduction to Causality	Rahul G. Krishnan	Fall 2025
CSC2631H	Mobile & Digital Health	Alex Mariakakis	Fall 2025
Undergraduate - Computer Science			
CSC412H/2506H	Probablistic Learning & Reasoning	Denys Linkov	Winter 2025
CSC486H/2502H	Knowledge Representation & Reasoning	Bahar Aameri	Fall 2024
CSC494H/495H	Research: Single-cell Foundation Model	Bo Wang	Fall 2023, Winter 2024
CSC413H/2516H	Neural Networks & Deep Learning	Bo Wang & Jimmy L. Ba	Winter 2023
Undergraduate - Cognitive Science			
PHL342H	Minds & Machines	Sara Aronowitz	Winter 2025
COG402H	Cognitive Scientific Theories of Consciousness	John Vervaeke	Fall 2024
BME445H	Neural Bioelectricity	Berj Bardakjian	Fall 2022
Undergraduate - Physics			
PHY405H	Electronics Lab	Ziqing Hong	Winter 2025
PHY478H	Research: Wearable Device Bio-signal Modeling	Andrew Lim & Paul Kushner	Fall 2023
PHY408H	Time Series Analysis	Dylan Jones	Winter 2023
MIE438H	Microprocessors & Embedded Microcontrollers	Alireza A. Bazargani	Winter 2023

PRESENTATIONS & TALKS

Speculative Decoding - High Throughput LLM Inference on Training Hardware — Nov 2024
WangLab, Vector Intitute & University Health Network — Toronto, ON, Canada

Insights into the Functions and Nature of Consciousness through Generalizing Global Workspace Theory to Artificial Neural Networks — Oct 2024
Department of Cognitive Science, University of Toronto — Toronto, ON, Canada

A Deep Learning Approach for Sleep Staging on a Flexible Wireless Dual-sensor Wearable System without EEG — Jun 2024
SLEEP 2024 Conference — Houston, TX, USA

ENGINEERING PORTFOLIO

Project Luminous Flow

· Real-time fluid simulation rendered on a LED matrix display by a custom-built graphics engine at over 70 FPS.

Gesture Imitation Robotic Hand

· A 3D-printed robotic hand that imitates your hand gestures with computer vision in real-time.

brainblots

· Co-founded brainblots – an EEG algorithmic art initiative that enables us to express ourselves through our brainwaves with the Muse EEG headband.

· Artwork displayed at time square, New York City in June 2022.