

# ANDREW HANZHUO ZHANG

🏠 Homepage 📄 Google Scholar 🆔 ORCID 🌐 [linkedin.com/in/a663e-36z1120](https://www.linkedin.com/in/a663e-36z1120) 🐙 [github.com/a663E-36z1120](https://github.com/a663E-36z1120)  
✉ [andrewhz.1120@outlook.com](mailto:andrewhz.1120@outlook.com) 📞 +1 (647)-818-1672 📍 Toronto, ON 🇨🇦 Canadian 🗣 English & Mandarin

## 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**<sup>†</sup>, Alex He-Mo<sup>†</sup>, Richard Fei Yin<sup>†</sup>, 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<sup>†</sup>, Haotian Cui<sup>†</sup>, **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).

<sup>†</sup>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**  
Teaching Assistant

Sep 2025 - Present  
Toronto, ON, Canada

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



**University Health Network**  
Researcher

Jun 2025 - Sep 2025  
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**  
Research Intern

May 2024 - Sep 2024  
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**  
Co-op ML Research Engineer

May 2023 - May 2024  
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 2x.
- 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**  
Student Researcher

Sep 2022 - Sep 2023  
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**  
Co-op Software Engineer

May 2022 - Sep 2022  
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 \(Schaekermann et al., 2020\)](#).
- Adapted 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
<b>CSC236H: Intro. Theory of Computation</b> Marking teaching assistant for term tests and assignments.	<a href="#">Francois Pitt</a>	Teaching Assistant	Fall 2025
<b>ESC499Y: Engineering Science Thesis</b> Mentored engineering science student <a href="#">Kai Li</a> for his thesis on generative modeling of wearable device signals.	<a href="#">Anna Goldenberg</a>	Research Mentor	Fall 2025 - Winter 2026
<b>NeurotechUofT</b> Led the signal processing team and organized EEG signal processing workshops	N/A (Student-run)	Signal Processing Team Lead	Fall 2021 - Fall 2023




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

 <i>Speculative Decoding - High Throughput LLM Inference on Training Hardware</i>	Nov 2024
WangLab, Vector Intitute & University Health Network	Toronto, ON, Canada
 <i>Insights into the Functions and Nature of Consciousness through Generalizing Global Workspace Theory to Artificial Neural Networks</i>	Oct 2024
Department of Cognitive Science, University of Toronto	Toronto, ON, Canada
 <i>A Deep Learning Approach for Sleep Staging on a Flexible Wireless Dual-sensor Wearable System without EEG</i>	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.