

ANDREW HANZHUO ZHANG

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EDUCATION

University of Toronto

Sep 2025 - May 2027 (Expected)

MSc in Computer Science (Expected) supervised by **Prof. Anna Goldenberg**

Research Area: AI and ML methods for biomedical and clinical applications

University of Toronto

Sep 2020 - May 2025 (Expected)

HBSc (Expected) with 16 months **full-time ASIP** internship

(Expected Grade: High Distinction)

Triple Major:

Awards:

- | | | | |
|---------------------|-----------------------------|-----------------------------------|------------------|
| • Computer Science | (12.0 Credits, GPA 3.9/4.0) | • University of Toronto Scholar | (Fall 2020) |
| • Cognitive Science | (8.0 Credits, GPA 3.8/4.0) | • Trinity College 6T5 Scholarship | (Fall 2021) |
| • Physics | (8.0 Credits, GPA 3.8/4.0) | • Dean's List Scholar | (Fall 2021-2024) |

PUBLICATIONS & PRESS

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

MANUSCRIPTS

- [1] **Andrew H. Zhang**[†], Alex He-Mo[†], Richard Fei Yin[†], Chunlin Li, Yuzhi Tang, Dharmendra Gurve, Nasim Montazeri Ghahjaverestan, Maged Goubbran, Bo Wang, and Andrew S. P. Lim. “Mamba-based Deep Learning Approaches for Sleep Staging on a Wireless Multimodal Wearable System without Electroencephalography”. In: *arXiv preprint arXiv:2412.15000* (Submission to *SLEEP*) (December 2024).
- [3] Chloe X. 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: *arXiv preprint arXiv:2502.08888* (February 2025).

[†]These authors contributed equally.

RESEARCH HIGHLIGHTS

🔗 **scGPT-Spatial – Single-cell Foundation Model for Spatial Transcriptomics** [3] Sep 2023 - Feb 2025
Supervisor: **Prof. Bo Wang** University of Toronto - **Vector Institute**

- Part of the research team on continually pretraining 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 spatial data distributions.
- Designed and developed methods for embedding-based spatial cell type deconvolution and gene imputation downstream tasks.
- Developed and benchmarked auxiliary self-supervised training objective task heads to improve pretraining performance.

🧠 **Speculative Decoding for LLMs with Unstructured Sparsity** [4] May 2023 - May 2024
Supervisors: **Mr. Abhay Gupta** & **Dr. Ganesh Venkatesh** **Cerebras Systems**

- Developed experiments using LLaMa-based language models with unstructured sparsity for **Speculative Decoding** (Leviathan et al., 2023) as a part of the applied ML team's collaboration with Qualcomm [4] to deliver high throughput inference solutions.
- Investigated methods for improving token acceptance rate of speculative decoding such as sparse-dense KV cache sharing.
- 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.

💓 **Deep Learning Approaches to Wearable Sensor Sleep Staging** [2][1] Sep 2022 - Dec 2024
Supervisor: **Prof. Andrew Lim** **Sunnybrook Research Institute**

- Led research project at the **Sleep and Brain Health Laboratory** investigating deep learning approaches for accurate sleep staging using the **Sibel Health ANNE One** — a wireless wearable system that measure ECG, PPG, accelerometry, and temperatures.
- 📄 **Poster** presented at the **SLEEP 2024** conference in Houston, Texas; Abstract published in the journal *SLEEP* [2].
- Further investigation [1] of approaches using **Mamba** (Gu & Dao, 2023) achieves state-of-the-art performance.

EMPLOYMENT HISTORY

Vector Institute

• Research Intern

May 2024 - Sep 2024
Toronto, ON, Canada

- Full-time research internship at [WangLab](#) supervised by [Prof. Bo Wang](#).
- Continuation of work from the [CSC494/495](#) research course (Sep 2023 - May 2024) on scGPT-Spatial. (See [Research Experience](#))
- Further exploratory work on inference-time evolutionary multi-agent LLM reasoning with Monte-Carlo tree search.

Cerebras Systems

• Applied ML Research Engineer

May 2023 - May 2024
Toronto, ON, Canada

- Full-time 12 months [ASIP](#) co-op internship term as a part of the applied ML team.
- Focused on speculative decoding for LLaMa-based models with unstructured sparsity. (See [Research Experience](#))

Sunnybrook Research Institute

• Research Student

Sep 2022 - Sep 2023
Toronto, ON, Canada

- Part-time research position exploring deep learning approaches to wearable sensor sleep staging without EEG under the supervision of [Prof. Andrew Lim](#) at the [Sleep and Brain Health Laboratory](#). (See [Research Experience](#))

Sunnybrook Research Institute

• Software Engineer

May 2022 - Sep 2022
Toronto, ON, Canada

- Full-time 4 months [ASIP](#) co-op internship term working as a full-stack engineer working on [CrowdEEG](#) ([Schaeckermann et al., 2020](#)) at the [Sleep and Brain Health Laboratory](#). (See [Engineering Experience](#))

ENGINEERING EXPERIENCE

📺 brainblots – a Brain Signal Algorithmic Art Project

Personal Project

- Co-founded brainblots – a brain signal algorithmic art collective to provide human beings with additional dimensions of expressing ourselves beyond what evolution gave us by using the [Muse EEG headband](#).
- Deployed our project at art events across Toronto, New York City, and Boston, collecting ‘brainblots’ of hundreds of individuals. Digital artworks [exhibited at Time Square, New York City](#) in June 2022, and [curated as NFTs](#).

🔗 GPT-Neox - Open Source Contributions

Cerebras Systems

- Took initiative to upstream bug fixes and new features from Cerebras’s internal LLM pretraining test-bench forked from [EleutherAI’s](#) GPT-Neox project, such as [integration of FlashAttention-2](#) ([Dao, 2023](#)).

🔗 CrowdEEG

Sunnybrook Research Institute

- A collaborative annotation tool for medical time series that was initially a demo platform developed by [Schaeckermann et al.](#)
- My internship adapted it to become a fully functional open-source project to support clinical studies at the [Sleep and Brain Health Laboratory](#), which was eventually deployed into production at the [Augmented Intelligence Lab](#) of the University of Waterloo.

📺 Gesture Imitation Robotic Hand

Coursework & Personal Project

- A 3D-printed robotic hand that imitates hand gestures in real time with computer vision which began as coursework for [MIE438](#).
- Designed and developed the computer vision pipeline and communication protocol between Raspberry Pi and Arduino Mega. Optimized PWM motor control loops.

TEACHING & MENTORING

COG402H1: Seminar in Cog. Sci. - Cognitive Scientific Theories of Consciousness

Fall 2024

- Taught seminar session on [📺 Insights into the Functions and Nature of Consciousness through Generalizing Global Workspace Theory to Artificial Neural Networks](#).

NeurotechUofT

Summer 2021 - Fall 2023

- Led the organization at the position of **signal processing team lead**. Led EEG signal processing workshops and tutorials using the [OpenBCI Cyton board](#) and [Muse EEG headband](#) with Python.

CSC165H1: Mathematical Expression and Reasoning for Computer Science

Winter 2021

- Leader of [Recognized Study Group](#) for the course at the University of Toronto.
- Held formal proof tutorials and course content office hours for participating students.