# Guanwen Zhang

Email: guanwen.zhang@mail.mcgill.ca
Mobile: +1 438-864-2298

## Education

- **McGill University** — Montreal, QC
  *Bachelor of Arts - Computer Science and Statistics; GPA: 3.72/4.00* — *August 2022 - May 2026*
  ***Courses:*** *Applied Regression, Machine Learning, Operating Systems, Data Structures and Algorithms, Probability, Mathematical Analysis*

## Research Experience

- **Research On Analysis Of The Impact Of Youtube On Pushing Content** — Montreal, QC
  *Student Researcher — Advisor: Prof. Joseph Vybihal* — *December 2024 - May 2025*
  - **Experimental Design**: Designed and ran an experiment on YouTube's recommendation algorithm using paired left and right leaning accounts watching Israel and Palestine videos to test for rabbit hole and echo chamber effects in real viewing conditions.
  - **Data pipeline**: Implemented Python data pipeline with OAuth2, YouTube Data API, automatic transcript extraction, text cleaning, and keyword frequency analysis to generate weekly JSON datasets of 90 videos per account without polluting recommendation histories.
  - **Text clustering**: Used pretrained GoogleNews word2vec embeddings and K-means to place video subtitles in a 300 dimensional semantic space and automatically group content as left leaning, right leaning, or neutral.
  - **Bias metrics**: Created R visualisations and custom lean proportion and own side versus opposite side indicators to track weekly recommendation bias, revealing growing ideological skew and persistently low neutral-content exposure.
  - **Main findings**: YouTube's recommendation algorithm increases initial political leanings even in a relatively short time period. Consistent with echo chamber dynamics, and proposed using small phrase semantics to detect subtler differences in stance.

## Projects

- **Template Matching and Cache Optimization**:
  ***Algorithm*** – Implemented a template matching routine in MIPS using the sum of absolute differences to locate an 8x8 Waldo template in a grayscale image, visualized by the MARS bitmap display.
  ***Optimization*** – Rewrote the naive nested loops into a low cache usage version using loop reordering, loop unrolling, and template row registers to reduce memory accesses and cache misses across different cache organizations.

- **Java Pathfinding Game for Post-Apocalypse Maps**:
  ***Map engine*** –Implemented a Java map engine and graphical interface for 2D grids, simulating deserts, mountains, facilities, subway stations, and zombie ruins, with support for BFS/DFS traversal from any starting grid point.
  ***Safety constraint*** –Developed a constrained LARAC algorithm using separate distance and damage maps to calculate a composite cost for finding routes that minimize travel distance while maintaining character health and utilizing subway grid points, with support for custom Manhattan distance travel costs.

- **Mini Operating System in C (Shell, Scheduling, Paging, Concurrency)**:
  ***Shell Simulation*** –Made an Unix-style shell in C with variables, file system commands, script execution, and exec/source support, then extended it to run multiple script processes through PCBs and a ready queue.
  ***Scheduling*** –Designed a scheduler infrastructure with functions like FCFS, SJF, RR, RR30, and aging, handling context switches between concurrent scripts and background exec jobs while keeping output for tests.
  ***Memory Control*** –Implemented demand paging with shared read-only code pages, frame store partitioning, page tables for each process, and exact LRU replacement, plus synchronized queue (pthread) using mutex and semaphores to support workloads without race conditions .

## Volunteer Experience

- **Research participation at "The Prometheus Lab"(McGill)** — Montreal, QC
  *Provided relevant experimental data to the laboratory's algorithm research.* — *January 2025 - May 2025*

## Technical Skills

- **Python, R, C/C++, JavaScript, Ocaml, Bash, JAVA**: