Vincent Chen, Year 4 Computer Eng.

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WORK? EXPERIENCE

***2048IsYou* Developer – (side project)** **July 2023 – Present**

A 2D puzzle game I made using Godot4 and C++ (as a tribute to *2048* and *Baba Is You*).

- Developed a novel pathfinding algorithm that iteratively widens the tile-occupied region and conducts informed search based on path information from the previous iteration.
- Developed a variant of Constrained Jump Point Search (CJPS), a state-of-the-art pathfinding algorithm, that runs on four-connected grids and demonstrate significant speedup over traditional four-connected JPS.
- Found three nontrivial typos in the CJPS paper and one nontrivial typo in *Multi-agent Path Planning and Network Flow*, an influential paper with over 200 citations, and earned gratitude from the authors.
- Published a demo video that has acquired over 62k combined views.

Combinatorics Researcher – Western Canada High School **2019-2021**

- Developed a family of recursive formulas that counts permutations where the longest block of consecutive elements is restricted in length and demonstrate their equivalence to unique paths along the vertices of a convex polygon.
    - Published six representative sequences to the Online Encyclopedia of Integer Sequences (OEIS): A338526, A338838, A338849, A340106, A340107, A340108.
    - Implemented and verified the formulas in Python.
- Published a sequence related to strictly decreasing hailstone sequences: A330732.
- Discovered and contributed alternate formulations for these two sequences: A000170, A034807.

TECHNICAL SKILLS

Languages: Python (Numpy/PyTorch), C/C++, Java, GDscript, VHDL, ARM Assembly
Tools: MATLAB, VSCode, NetBeans, CodeBlocks, Eclipse, Git/Github, Unix CLI, Vim, Bash, Godot, OpenGL, GTK, Aseprite, Logism, LTSpice, ModelSim, PLECS, Quartus, MAX/SUE (Micromagic), FL Studio, MS Office, Scons, Makefiles

EDUCATION

Computer Engineering (B.A.Sc.) **2021 – Present – 2025**
Focus – Software, Digital and Analog Electronics
Cumulative GPA: 3.71
University of Toronto

COURSE EXPERIENCE

Applied Fundamentals of Deep Learning **Sept. – Dec. 2023**

- Worked in a four-member team to develop an OCR application that extracts date, location, and spending information from receipt images and achieved an overall word accuracy of 80%.
- Designed, trained, and tuned a custom deep learning model that made use of CNN, RNN, and transformer layers.

Software Design and Communication **Jan. – Apr. 2023**

- Led a three-member team to develop a maintainable and well-documented mapping software that
    - makes heavy use of unit and integration tests,
    - totals roughly 30 files and several thousand lines of C++,
    - used EZGL (a variant of OpenGL) for rendering, GTK for user interface, Git for version control,
    - renders efficiently from street and geographical data, pathfinds between intersections, and solves the Traveling Courier problem (approximately) using a plethora of optimization techniques.

Engineering Strategies & Practice II **Jan. – Apr. 2022**

- Worked in six-member team to design a wooden cabin for client, participated in three client meetings, and facilitated on-time completion and delivery of status reports, design documents, and our final presentation.

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Engineering Strategies & Practice I **Sept. – Nov. 2021**

- Worked in six-member team to design a food-delivery robot.
- Proposed innovative design ideas and implemented forklift mechanism in Lego Technic for presentation.

ACHIEVEMENTS/AWARDS

- COMC Alberta Grade 10. Bronze Medal **2019**
- Fryer, Pascal, and Cayley (CEMC math contests) School Champion **2017-2020**
- Alberta Collegiate Programming Contest Division 2, 4th place **2020**
- RCM Violin Level 8 Certificate, Level 4 Gold Medal **2018**
- Number Sense (Texas Middle School State Competition), 8th place **2017**

LANGUAGES

- English (written and spoken)
- Chinese (written and spoken)

HOBBIES AND INTERESTS

I run a YouTube channel about various Lego Technic mechanisms. It has approximately 480k views and 1.7k subscribers.

- youtube.com/channel/UCwUdx6ReULyy79pXrugZEXg

Miscellaneous pet projects:

- ||\\Song of Source Monitor Plus//|| has a music video made entirely using C++.
  - bilibili.com/video/BV1vk4y1x7BG/
  - github.com/LingLing40Hours/smp_footage
- Game Jam entries with a friend, also using Godot4.
  - battlemonk345.itch.io/slide-of-dice
  - battlemonk345.itch.io/generic-gun-shooter
  - waibibabow.itch.io/the-ultimate-fishs-guide-to-catching-fish-2024-edition
- *Go* (the board game) in Verilog HDL
  - github.com/LingLing40Hours/Go
- Strategy generators for IZE/Vasebreaker (game modes of Plants vs. Zombies)
  - github.com/LingLing40Hours/VaseBot
- Mental math trainer with adjustable difficulty
- Conversational text to numerical value converter
- Optimal sudoku solver (based on literature)

I participated in my high school string ensemble and played in the Calgary Sinfonia Orchestra as a 2nd violinist.
My music compositions and more project demos can be found at space.bilibili.com/1051333909.