

Yongkang Cheng

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EDUCATION

University of Toronto (St. George Campus), Toronto, ON Sep 2023 - May 2028 (expected)
Bachelor of Applied Science in Computer Engineering + PEY Co-op
Relevant Courses: Applied Fundamentals of Deep Learning, Software Design and Communication

TECHNICAL SKILLS

- **Programming:** Python, C/C++, JavaScript/TypeScript, Java, Verilog, Assembly
 - **Frameworks:** PyTorch, React, FastAPI, LangChain
 - **Tools:** Linux, SQL/NoSQL, Nginx, Docker, Git, SSH
 - **Hardware:** Arduino, Raspberry Pi, FPGA, LTSpice, Quartus, ModelSim
 - **Data and Visualization:** NumPy, Pandas, Matplotlib
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EXPERIENCE

Frontend Manager, Voluntrack.org (Non-Profit) | *React, Figma, MS Project* May 2024 - Present

- Led a 4-person team to redesign the web interface using React.js, improving user engagement by 20%.
- Designed UI in Figma and managed tasks with GitHub Projects and MS Project.
- Integrated Firebase for secure volunteer data storage and real-time search, allowing fuzzy search and filtering.

Project Lead, Handwritten Text Recognition (University of Toronto) Jun 2024 - Aug 2024

- Led a remote team to develop a PyTorch-based CRNN model for handwritten text recognition.
- Achieved 87% word-level and 95% character-level accuracy on the test set with 10,000+ samples.
- Deployed connected-pixel algorithms for word positioning and word segmentation, processing 1024×1024 images in less than 4 seconds.

Project Manager, Wellness Room Expansion (University of Toronto) Jan 2024 - Apr 2024

- Led a cross-functional team of 6 students to redesign and prototype a wellness room, endorsed by the client.
- Streamlined task management using Microsoft Project, tracking over 100+ tasks to completion on schedule.
- Incorporating client feedback, generated 100+ initial ideas and finalized 3 proposed designs.
- Designed and visualized proposals using Rhino and Blender 3D models, reducing client feedback iterations and improving decision-making efficiency.
- Conducted research on noise isolation, light intensity, and light temperature to deliver optimal design solutions.

PROJECTS

Fourier Epicycle Drawing Visualization System May 2025

- Built an interactive Python/Pygame app to draw strokes and visualize their Fourier decomposition as animated epicycles in just 3 hours using the MCP (Model Context Protocol) technique.
- Implemented stroke preprocessing (merging, equidistant resampling) for accurate analysis.
- Animated rotating circles (epicycles) to demonstrate Fourier series reconstruction of closed curves.
- Developed modular utilities for stroke processing, Fourier transform, and Matplotlib-based plots.
- Designed extensible architecture for saving/loading, real-time adjustment, and multi-color support.
- Produced educational outputs and visualizations for teaching and presentations.

FPGA Polyphonic Synthesizer (DE1-SoC) Mar 2025

- Implemented a 20-voice digital synthesizer in C for a Nios-V soft-core, streaming **8 kHz Q15 audio** through the on-chip Audio FIFO with $<1\%$ CPU overhead.
- Replaced all floating-point math with **32-bit phase accumulators** and fixed-point kernels for sine, square, triangle, and sawtooth waves, enabling real-time mixing and envelope processing.
- Designed an **ADSR envelope engine** driven by slide-switch “knobs” and pushbuttons; state changes are visualized on a double-buffered 320×240 VGA UI.
- Integrated PS/2 keyboard interrupts for sub- μ s latency note-on/off events; on-screen piano keys light up in sync with hardware playback.
- Built modular drawing primitives (Bresenham, bitmap blits) to render live waveforms and icons; architecture supports future effects or MIDI input with minimal refactor.

City Mapify – Interactive City Mapping Application (University of Toronto) Jan 2025 - Apr 2025

- Developed a high-performance mapping engine in C++ to process OpenStreetMap data and render city maps.
- Designed efficient spatial data structures (quadtrees) for dynamic querying and smooth zoom-based rendering.
- Implemented advanced pathfinding algorithms (Dijkstra, A*) for route planning and delivery optimization.
- Integrated real-time features like day/night mode, weather data, and AI-powered route descriptions.
- Enhanced performance with multithreading (OpenMP) and RESTful API integration (libcurl).

Diary with AI Feedback Sep 2023 – On Going

- Designed and implemented a journaling program integrated with OpenAI's GPT API, generating insightful feedback and suggestions for over 570 diary entries.
- Developed a diary sorting algorithm to retrieve contextually similar past entries, enhancing user experience and maintaining API costs below 0.2\$ per call.
- Optimized data-sorting pipelines and API request processes, reducing average diary load time from 10s to 0.5s, enabling seamless daily use.

Verilog Pac-Man Game (University of Toronto) Nov 2024

- Created a Pac-Man-style FPGA game using Verilog supporting PS/2 keyboard input and VGA output.
- Debugged signal synchronization issues and state-machine logic, boosting overall stability and playability.
- Automated image conversion using Python + OpenCV for seamless integration of game graphics.
- Prototyped the game using Pygame, ensuring accurate emulation of the FPGA version for agile development.

WillPower | Time Management & Monitoring Jan 2025 - Present

- Built a modular system with Raspberry Pi capturing images and sending them to a Windows host for local storage and analysis.
- Deployed Nginx, FastAPI, and libcurl for data transfer, facilitating real-time user monitoring and minimal downtime.
- Currently exploring Azure Face APIs and transfer learning for user-behavior analysis on a dataset of over 20,000 images.

Self-Clone Chatbot with Diary Database Oct 2024 - Present

- Built a self-hosted AI-powered chatbot that replicates personal interaction styles, deployed using React.js, FastAPI, and Nginx on a Raspberry Pi.
- Integrated OpenAI API and a NoSQL database for real-time Q&A functionality with personal diary data.
- Ensured secure and seamless remote access by implementing TLS encryption, DDNS, and optimizing for daily traffic from personal networks.

AWARDS & ACCOMPLISHMENTS

University of Toronto Excellence Award (UTEA) Apr 2025

- Awarded UTEA for top academic performance and research potential.
- Completed a 14-week full-time research project with faculty supervision.
- Received \$7,500 scholarship for research excellence and inclusion.

ECE Awards & Dean's List Scholar (UofT) Sep 2024

- Recognized for outstanding academic performance (GPA 3.92/4.0).

American Computer Science League (ACSL) - Bronze Prize Jan 2021

- Placed in top 10% overall, with top-20% scores in the 4th round, after 60 hours of training.