Yichen Liu

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EDUCATION

University of Waterloo   Waterloo, Ontario
Bachelor of Computer Science (Honours, Co-op)   *Sep. 2024 - Apr. 2029*

- **94.2% CAV** and **3.98/4.0 GPA** with advanced level CS courses

EXPERIENCE

Software Engineering Intern   May 2025 - August 2025
Micromart

- Developed end-to-end tests using **Cypress**, improving test reliability and coverage for a **React-based** web platform.
- Optimized CI/CD performance in CircleCI with caching, reducing build and test times by up to **40%**.
- Implemented a fraud prevention system using **Stripe** to close a payment loophole with removed payment methods
- Improved payment reliability using an incremental pre-authorization validation and pre-authorization strategy to void for failed transactions, saving the company over **$1000 per week**.

Software Developer   March 2025 - August 2025
WATONOMOUS

- Developed ROS-bridge **WebSocket interface** between VR and ROS, supporting low-latency teleoperation.
- Implemented a **pairing token system** to authenticate websocket connection requests
- Designed a system to map **VR-captured** hand data into corresponding robot **joint positions** for tele-operation

Undergraduate Research Assistant   Sept 2025 - Current
Vision and Image Processing Lab

- projected LiDAR change maps into 2D space to change masks for supervising **3D Gaussian Splatting** updates.
- Implemented a 2D mask majority-vote algorithm for change classification of 3D Gaussian Splatting scenes
- Implemented approximate-nearest-neighbour with distance-threshold filtering to isolate object-level changes between LiDAR point clouds.

Hackathon Organizer - Tech Team   Sept 2025 - Current
GeeseHacks 2026

- Developed a full-stack hackathon portal with an integrated event schedule and participant dashboard in **Next.js**
- Designed and implemented a scalable database schema to manage participant information and application data
- Developed **Next.js** API endpoints to update and manage applicant data, utilizing **Zod** for schema validation and **pg-promise** for database queries.

PROJECTS

Synthetic Image Classification Dataset Generation from Video | *Python, PyTorch, COLMAP, Blender*

- Utilized COLMAP to generate 3D meshes from frames extracted from video
- Performed instance segmentation with pre-trained Mask R-CNN in PyTorch to generate image masks
- Automated mesh rendering through Blender's API to generate training images for image classification

Self-Driving Robot | *C++, CMake, Docker, ROS2, Foxglove*

- Developed and optimized **ROS2** nodes in **C++**, utilizing publisher-subscriber architecture over DDS protocol
- Implemented real-time object detection and world modelling using a costmap with raw LiDAR data
- Used **A* search algorithm** to plan around obstacles and construct the shortest path to a destination
- Implemented a **pure pursuit** algorithm to control robot movement for precise path following

Personal Portfolio | | *HTML, CSS, Javascript, React, Tailwind, Three.js, Spotify API*

- Developed a front-end web application with **React** and **Tailwind CSS** receiving **100+ visitors**
- Utilized **Spotify API** and **OAuth** to fetch data for a widget that displays the currently playing song
- Wrote a dynamic carousel component used to display multiple elements

TECHNICAL SKILLS

Languages: Python, JavaScript, TypeScript, HTML, CSS, C, C++, C#, SQL,
Frameworks: React, Node.js, Next.js, Express.js, Django, Tailwind CSS, PostgreSQL, Jest, Three.js, Sequelize
Developer Tools: Git, Github, VS Code, Eclipse, Linux, Vercel, Figma, Postman, AWS, Docker, Jenkins, Azure, CircleCI
Libraries: pandas, NumPy, Scikit-Learn, statsmodels, Matplotlib,