Hao Yu (Ryan) Zhou

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EDUCATION

University of Waterloo May 2023
Completed **Bachelor of Engineering with Honors**, Major in **Mechatronics Engineering**, GPA 3.3 *Waterloo, Canada*
University of Chicago Expected March 2025
Candidate for **Master of Computer Science** in **Physical Sciences Division**, current GPA 4.0 *Chicago, Illinois*

SUMMARY

Self-motivated Software Development Engineer with 2+ years of working experience in building scalable applications and backends systems. Proficient in programming technologies such as C++, Python, Go, Node.js, React, and AWS. Strong understanding of data structures, algorithms, and software design patterns. Completed 8 Co-op terms in total across 5 different employers throughout my education at the University of Waterloo. Experienced in collaborating with cross-functional teams in delivering clean, efficient code to meet project needs.

HIGHLIGHT PROJECTS

RoboFeeder – Final Year Capstone for the University of Waterloo (link) Mar 2022 – May 2023

- Developed a vision-based robotic feeder using the Kinova Gen3 Robot arm to autonomously pick up food chunks with a fork and performs in-mouth feeding, assisting people with disabilities to feed themselves independently
- Built perception pipelines in **Python** by streaming point clouds from RGB-D camera to the backends through CV bridge; developed **data structures** to queue inputs; utilized **mutexes** in **C++** to enable parallel sensing along with the tactile inputs. Successfully implemented real-time object detection with an accuracy offset of 5 mm.

Reproductive Transparency Now (RTN) - University of Chicago TechTeam Volunteer Sept 2023 – Dec 2023

- Raising awareness for anti-abortion crisis centers that create misleading and incorrect pamphlets on abortion by automating the investigation on potential misuses of citations and claims
- Developed scripts using **Google Drive/Sheets APIs** to automatically catalog pamphlets, citations, and claims; using **NLP** and **Pandas** data frames to load texts on pamphlets and store into Google Sheets for convenient access. The script achieves a speed of 12 pamphlets per minute by the end of the project

Scalable GAS Annotation Service - Uchicago Cloud Computing Final Project Mar 2024

- Migrated pre-designed GAS annotation services onto AWS server to achieve cloud computing, allowing users to upload files to be annotated and downloading the results. Created multiple web servers on **AWS** to annotate and store essential items; developed frontend user interface with **Python Flask API**; utilized **data loaders** to expand server capacity depending on usage; implemented AWS features including **message queues**, S3 buckets, database, and security keys to achieve a scalable application that can process multiple tasks concurrently with a 1.7 speedup

WORK EXPERIENCE

Kindred AI, part of Ocado May 2022 – Aug 2022
Software Robotics Engineer Co-op *Toronto, Canada*

- Optimized robot pick-and-place operation by de-prioritizing processes on small face objects (objects with greater height and smaller base) in **Python** with **NumPy** and pose estimation; calculated object dimensions ratio through streaming data from backend APIs; programmed motion planning processes to flip small face objects to land on the larger faces for easier pickups. Deployed algorithms in production and improved overall pick-and-place success rate by 6.5%
- Implemented **front-end** components to present processed objects' dimensions on company's internal production website using query data from **BigQuery** database: wrote queries to stream objects dimensions, in JSON key-value pairs to improve streaming speed by 80%, from the database through Python **Flask API**; uploaded data onto the website through **Javascript** tables, and implemented styling features through **CSS**.

Waterloo AI Institute – University of Waterloo Jan 2022 – Apr 2022
Machine Learning Research Assistant Full-time *University of Waterloo*

- Conducted research on quantitatively evaluating the performance of different image acquisition devices in autonomous driving through **unsupervised learning** approaches. Implemented the **Faster R-CNN** and **Optical Flow** models using **NumPy** and **PyTorch** in **Jupyter Notebook** on online video datasets focusing on pedestrian detection. Calculated corresponding **IOUs** in prediction precision between models for comparison
- Applied **image processing** techniques in **NumPy** to optimize Optical Flow models by minimizing background disturbances in pedestrian motion detection by 85%; improved prediction precision by 30% while maintaining robustness on large datasets

Blackberry QNX Jan 2020 – Aug 2020
Technical Project Manager Co-op. *Kanata, Canada*

- Independently developed **Python** program that synchronizes employee off-time schedules; used **Excel VBA** and **Pandas** to stream data from .csv files and processed mismatching data through **aggregations** and **sorting algorithms**; implemented **FastAPI** to create an internal website allowing managers to upload time sheets and displaying mismatched results on a **Javascript** table in **HTML** format. Improved HR management efficiency by saving 90% time.
- Investigated on OSS compliances and software licensing regulations and protocols; gave department-wide presentations to raise awareness on proper licensing protocols.

SUMMARY OF QUALIFICATIONS

- Cultivated strong technical skills in **Python, C++, Java, Javascript, HTML, CSS, React, and Swift**
- Experienced in Machine Learning techniques with **PyTorch**, **CNN**, **Optical Flow**, **SLAM**, **GANs**, **Transformers**, **Reinforcement Learning**, **Q-learning** and **CUDA**
- Proficient in Database and Cloud platforms using **SQL, MongoDB, NoSQL, Redis, BigQuery,** and **AWS**
- Strong skills in **Flask and FastAPIs, Data Structure and Algorithms, Object-oriented Structures, and RTOS**

Awards

- Honorable Mention Award in Game Section - Uncommon Hackathon at the University of Chicago Mar 2024
- Received 8th place overall - VEX Robotics Worlds Competition for University Design Teams May 2022
- Dean’s Honors List - University of Waterloo Sep 2021