Brandon Yuan

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Education

University of Virginia Charlottesville, VA

Bachelor of Science in Computer Science, ***3.8 GPA*** *Aug. 2022 – May 2026*

- **Coursework:** Artificial Intelligence, Machine Learning, Software Engineering, Software Development Essentials, Compilers, Data Structures and Algorithms, Computer Systems and Organization, Discrete Mathematics and Theory, Linear Algebra, Statistics, Probability, Intro to Cybersecurity

Experience

Machine Learning Intern May 2025 - Present

Commonwealth Center for Advanced Manufacturing *Disputanta, VA*

- Implemented a computer vision pipeline to segment stainless steel microstructure images and calculate average grain sizes, improving analysis speed by **20x** and accuracy by **6x** compared to manual methods.
- Developed a 3D data visualization tool for Phase3D height maps, enabling enhanced inspection of additive manufacturing quality through point cloud rendering, pixel history, and row/column profiles.
- Built a real-time motion capture system using ZED Fusion and 3D environment reconstruction to animate a Unity-based avatar for workspace simulation and ergonomic analysis, completing the project **79%** under budget.
- Developed a full-stack ergonomic analysis software suite that computes RULA and REBA scores for joints and body posture in real time.

Webmaster May 2025 - Present

Taiwanese Student Association *Charlottesville, VA*

- Developing a dynamic website using React, TypeScript, and Node.js to centralize updates for **300+** members.
- Collaborating with the executive team to design consistent branding and align the website's visual and functional elements with TSA's digital identity.
- Creating detailed sitemaps, wireframes, and component structures during the prototyping phase to ensure an intuitive user experience and scalable architecture.

Undergraduate Teaching Assistant August 2024 - Present

University of Virginia - Computer Systems and Organization 2 *Charlottesville, VA*

- Supported **400+** students through office hours, lab guidance, and one-on-one assistance, reinforcing advanced systems concepts.
- Taught topics including virtual memory and page tables, multithreading, parallel processing, networking, and caching in lab sessions.
- Led grading for all course quizzes and assisted with evaluating exams and assignments.

Projects

Analyzing Contributing Factors in Car Crashes | *Python, sklearn, Pandas, NumPy* January - May 2025

- Analyzed Virginia traffic crash data using DBSCAN and KMeans clustering to identify high-incident crash zones, comparing performance with silhouette score, Calinski-Harabasz, and Davies-Bouldin indices.
- Engineered features and performed dimensionality reduction and encoding on categorical data (e.g., lighting, road surface) to enhance clustering effectiveness.
- Reduced dataset bias caused by the over-representation of daytime/dry-road crashes by stratifying the data into condition-specific subsets, ensuring insights remained valid under adverse-condition under-sampling.
- Placed **2nd** in ML4VA Spring 2025.

SipC Compiler | *C++, ANTLR, TIPC, Cmake, Catch2, LLVM* August - December 2024

- Developed a compiler supporting features like boolean types, arrays, for loops, and various operators.
- Achieved **99%** code coverage by designing comprehensive tests with Catch2.
- Implemented code generation using LLVM bitcode, enabling advanced optimizations and efficient execution.
- Delivered optimizations that reduced code size by up to **90%** and improved runtime performance by **400%**.

Technical Skills

Python, Java, JavaScript/TypeScript, C/C++, SQL, Node.js, React, LLVM, Pytorch, Git, TensorFlow, MongoDB, Express.js, Docker, Full Stack Development, Object Oriented Programming, Machine Learning