Zhifei Song

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Highlights

- A highly adaptable and quick learner who can independently contribute to projects within a short timeframe.
- Led 7 tech teams with over 22 unique members from NUS, UofT, and OCAD University.
- Presenter/Speaker at the 2023 CMS Research Symposium, Applied Research in Action 2023, and Level UP 2023.
- 3.91 average GPA in the last 2 years (3rd & 4th year), including 18 CS courses (3 graduate-level courses).
- North America 2021 IBM Intern Challenge (Hackathon) 2nd Place.

Education

University of Toronto November 2023

Honours Bachelor of Science (H.B.Sc.) in Computer Science, with Distinction *Toronto, ON*

Specialist (Co-operative) Program, Software Engineering Stream

Experience

IBM May 2021 – August 2022

Software Engineer Intern (Java) *Toronto, ON*

- Enhanced the IBM Z Development and Test Environment by designing and implementing automated end-to-end (E2E) and API tests using Selenium and qTest.
- Contributed to the development of the CI/CD pipeline for the IBM Wazi Sandbox component on OpenShift, aiding in faster and more reliable deployments within the IBM Z and Cloud Modernization Stack.
- Re-engineered the License Generator's front-end and back-end systems to comply with new licensing requirements, expanding user options and improving overall user experience.
- Received two commendations for exceptional adaptability and expertise, demonstrating a strong ability to quickly learn and contribute to complex projects.

Projects

Pintos | *C, Perl, x86 Assembly, Docker, Pintos, GCC, GDB/GNU, Bochs/QEMU* August 2023

- Directed a team of 3 to overhaul a multi-threaded OS, enhancing threading, user programs, virtual memory, and file systems, securing a 97% project score.
- Developed and optimized a multitasking operating system by implementing advanced scheduling algorithms, system calls for process and file management, virtual memory with demand paging and swap management, and an efficient file system with inode-based structure and caching techniques, significantly enhancing system performance and security.

JScene Rendering Engine | *C++, JavaScript, libigl* August 2020

- Developed a 3D rendering library in JavaScript and C++ with features like Camera, Lighting, and Meshes, focusing on performance and advanced 3D functionalities such as ray tracing and multi-threaded rendering.
- Included an STL parser for 3D object compatibility and extended the library with libigl for complex operations like mesh handling and kinematics.

illucid | *C#, HLSL, Unity3D, Gravity Sketch, Blender* April 2023

- Led game design and development as a core developer, employing a milestone-driven approach. Collaborated closely with other developers and artists (music, environment, character, VFX) to gather internal feedback and ensure the project stayed aligned with key objectives.
- Conducted playtests with experts from Gameloft, Ubisoft, Snowman Games, and Uken Games.

scikit-learn Contributions | *Python, Cython, scikit-learn, NumPy, SciPy, pytest, GitHub* May 2021

- Led a team of 6 members in the scikit-learn community, contributing 2 new features and an in-depth analysis of 3 potential bugs to guide future development. Utilized Agile methodologies (Jira, Scrum) to enhance algorithm optimization and data handling.

16-bit MIPS CPU | *Python, Assembly, Verilog, FPGA(Quartus Prime), MIPS Architecture* April 2019

- Designed and developed a 16-bit MIPS CPU on FPGA, utilizing RISC architecture principles to achieve optimized instruction efficiency. Created a custom Python assembler to streamline assembly-to-binary code conversion.

- Engineered an instruction set (33 operations) covering arithmetic, logic, memory access, and control flow operations, enabling the execution of complex computational tasks, including recursive algorithms such as Bubble Sort and the Fibonacci sequence. Implemented a VGA controller, empowering the CPU with real-time graphical output capabilities.
- Authored comprehensive documentation with enhancement outline, adopted as a future course resource.

Zero Knowledge Proof of Location | *Circom2, snarkjs, Solidity, JavaScript, TS, LaTeX* May 2023 – May 2024

- Collaborated with Dr. Thierry Sans to design a novel proof-of-location protocol utilizing ZK-SNARKs that ensure security and user privacy. Demonstrated practicality through implementation and stress testing, showing significant performance improvements over existing works in terms of both time and space complexity.
- Analyzed over 60 scholarly papers to refine understanding of Zero-Knowledge Proofs, Proof of Location, and Decentralization concepts.
- Received the 2023 UTSC CMS Research Symposium Certificate and became a full paper candidate for the ACSAC 2024 conference.

UTAP | *React, Node, Express, TypeScript, GitLab, Python, SQL, Docker, Cypress, Mocha, Chai, Axios* August 2023

- Collaborated with Dr. Bogdan Simion on the UTM TA Application System (UTAP), improving user experience, workflow efficiency, and system performance for the TA hiring, midterm (duties) review, and hours allocation processes. This work benefited applicants, faculty, and coordinators.
- Revamped TA scheduling system using CSP and COP solvers, resolving long-standing, intermittent inefficiencies to boost accuracy for the Fall 2023 admissions cycle.
- Executed full-stack development tasks (API integration, bug fixing, feature enhancements) and enhanced testing capabilities by expanding automated mock data generation, implementing midterm review dataset generation, and deploying Cypress for E2E validation.

B2ST Startup | *React, Node, Express, MongoDB, Docker, Twilio, scikit-learn, Stripe* | *Jest, Sentry, Sumo Logic, GitHub Actions, Heroku* December 2022

- Initiated a B2B SMS marketing automation SaaS startup, Co-led an international team in the DCSIL, Engaged with industry leaders at Shopify, Stripe, and TD Bank to gather insights for strategic project enhancements.
- Developed a MERN stack sales prediction model using Scikit-Learn to provide efficient promotions for the business, resulting in reduced operational costs and increased customer loyalty.
- Designed microservices architecture featuring 3 backend services: Machine Learning, SMS notifications, and account service with subscription management.
- Strictly followed DevOps practices using GitHub Actions and Sentry, resulting in a code quality rating of A from Code Climate.

Relevant Coursework (4.0/4.0 GPA)

- All Calculus Courses
- Database and Web Applications
- Programming on the Web
- Engineering Large Software Systems
- Artificial Intelligence
- Computer Graphics
- Research on P2P
- Computer Organization
- Blockchains and DApps
- Theory of Computation
- Algo Design & Analysis
- Computability and Complexity
- Video Game Design
- UofT UTAP Project
- Innovation Lab
- Business Software
- Geometry Processing
- Computability and Logic

Technical Skills

Languages: C, C++, C#, Go, Haskell, Java, JavaScript, TypeScript, PHP, Python, SQL, Solidity, Circom, HLSL, Verilog, Assembly, HTML/CSS, LaTeX, Markdown, Shell, Sh, Bash, Zsh.
Developer Tools: Docker, GitHub, Jenkins, Eclipse, VS Code, Selenium, GDB/GNU Debugger, pytest, JUnit, qTest, Jira, ESLint, Bochs/QEMU, pgAdmin, Quartus Prime, Postman, Remix, OpenZeppelin, Angular, IBM ZD&T, Figma, Blender, Gravity Sketch, Procreate, Unity3D, Unity Ads, Slack.
Tech Stacks: ReactJS, Node.js, Express.js, Flask, Gin, PostgreSQL, MySQL, MongoDB, Neo4j, DB2, IBM Cloudant, Cypress, Chai, Mocha, Hardhat, Waffle, Ethers.js, MetaMask, snarkjs, MUI(Material UI), scikit-learn, Google Cloud, AWS, IBM Cloud, Heroku, Netlify, Cloudflare, DigitalOcean, Linode, Sentry, Sumo Logic, Twilio, Stripe, libigl, Ubuntu, Unix, Linux, macOS, Windows, z/OS, Pintos, HiveOS, Hypervisor(VirtualBox, VMware, KVM, Hyper-V), Cloudinary, WordPress.
Software Development Frameworks and Standards: Agile(Lean, SAFe, Scrum), Waterfall, DevOps, MVC Architecture, Microservices Architecture, PEP 8, ERC Standards (ERC-20, ERC-721).