Zhifei Song

+1 647-571-1788 | ssgxaa@gmail.com | linkedin.com/in/sososong | github.com/soso-song | soso.dev

Highlights

- A highly adaptable and quick learner who can independently contribute to projects within a short timeframe.
- 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).
- Led 7 tech teams with over 22 unique members from NUS, UofT, and OCAD University.
- 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 *Toronto, ON*

- Applied DevOps practices by implementing and maintaining Jenkins CI/CD pipelines for IBM Wazi Sandbox, automating processes from source selection and component extraction to image creation and deployment across platforms such as Linux, Docker, OpenShift, IBM Cloud, and OpenStack. Enabling quicker and more reliable deployments within the IBM Z and Cloud Modernization Stack.
- Enhanced the IBM Z Development and Test Environment by developing API tests for server provisioning. Implemented automated end-to-end tests with Selenium, managed cases with qTest, tracked issues via Jira, and integrated Jenkins for continuous testing.
- Contributed to the product license generator to comply with new licensing requirements, expanding available options for licenses.
- Received two commendations for exceptional adaptability and expertise, demonstrating the ability to quickly learn and contribute to complex projects.
- Secured second place in the 2021 North America IBM Intern Challenge (Hackathon).

Relevant Projects

scikit-learn Contributions | *Python, Cython, NumPy, SciPy, pytest, GitHub, Agile* 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.

Pintos | *C, Perl, x86 Assembly, Docker, Pintos, GCC, GDB, 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.

UTAP | *Python, Docker, GitLab, React, Node, Express, TypeScript, SQL, 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 through manual **performance testing** 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.

Zero Knowledge Proof of Location | *Circom2, snarkjs, Solidity, JavaScript/TypeScript* May 2024

- Researched with Dr. Thierry Sans to design a novel proof-of-location protocol utilizing ZK-SNARKs, ensuring 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 distributed computing concepts.
- Received the 2023 UTSC CMS Research Symposium Certificate and became a full paper candidate for the ACNS 2025 conference.

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 algorithms such as Bubble Sort (iterative) and the Fibonacci sequence (recursive). Implemented a VGA controller, empowering the CPU with real-time graphical output capabilities.
- Authored comprehensive documentation with enhancement outline, which was adopted as a course resource.

Geodesic Paths | *C++, Eigen, libigl* December 2022

- Implemented the FlipOut algorithm for enhancing geodesic path computation on complex surfaces, employing Eigen and libigl for efficiency.
- Developed a mesh improvement algorithm to enhance mesh quality through edge flips and shell transformations, leading to improved accuracy and efficiency.

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

- Developed a self-contained 3D rendering library, incorporating components such as Camera, Lighting, Materials, Objects, and Triangle Meshes using libigl. Integrated advanced 3D capabilities including optics, illumination, reflectance, radiometry, curves, ray tracing, bounding volume hierarchy, shader pipeline, kinematics, and mass-spring systems. Optimized library performance by implementing multi-threaded rendering.

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 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.

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

- 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 sales prediction model using Scikit-Learn and integrated it into the MERN stack application 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)

- Artificial Intelligence
- Data Structure & Logic
- Computer Organization
- Engineering Large Software
- Theory of Computation
- Algo Design & Analysis
- Computability & Complexity
- Geometry Processing
- Computer Graphics

Technical Skills

Languages: C, C++, C#, Go, Haskell, Java, Python, Circom, HLSL, Verilog, Assembly, Shell scripting (sh, bash, zsh).
Frameworks: PostgreSQL, MySQL, MongoDB, Neo4j, DB2, IBM Cloudant, OpenZeppelin, Hardhat, Waffle, Ethers.js, MetaMask, snarkjs, Remix, scikit-learn, Unity3D, Unity Ads, libigl.
Tools: GitHub, Jenkins, Eclipse, VS Code, GDB, Bochs/QEMU, Quartus Prime, pytest, JUnit, qTest, Jira, Slack, Google Cloud, AWS, IBM Cloud, macOS, Ubuntu (Linux), Windows, z/OS, HiveOS, Docker, Hypervisors (VirtualBox, VMware, KVM, Hyper-V).
Methodologies/Specifications: Agile (Lean, SAFe, Scrum), Waterfall, DevOps, PEP 8, ERC Standards (ERC-20, ERC-721).