Yizhen Zhang

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Educations

M.S. in Computer Science - Columbia University | GPA: 3.81/4 **Jan 2023 – May 2024**

Courses: Operating System, Cloud Computing, Database System, Compiler, Data Structure, Algorithm.

B.S. in Mathematics - Dickinson College | GPA: 3.91/4 **May 2022**

Courses: Linear Algebra, Calculus I, II, III, Abstract Algebra, Differential Equation, Real Analysis, Topology.

Experiences

Software Engineer **Jan 2024 – Present**

Columbia University, A2R Lab *New York, NY*

- Implemented **1000+ line open-source** robotic motion algorithms, focusing on **CUDA GPU parallel** optimization.
- Developed CUDA kernels for box-constraint solvers in C++, increasing the precision of simulation constraints.
- Drafted and optimized ADMM algorithms in CUDA, accelerating convergence in distributed optimization simulations.

Software Engineer Intern **May 2023 – Jul 2023**

STEP Technology *Shenzhen, China*

- Coded C/C++ OS middleware using **Boost** and **CMake** on **Linux Ubuntu**, supporting UDP/TCP protocols.
- Developed C++ SOME/IP network APIs, achieved **90% uptime**, and tested in **Docker-based Linux** system.
- Created a **multi-threaded** network connection tool with message queues, achieving **2x** faster transmission rates.
- Optimized **Ethernet SOME/IP AUTOSTAR** serialization, ensuring byte alignment on x86/AMD64 architectures.
- Implemented Doctest C++ tests for middleware, reaching 96% LCOV coverage, reducing bugs by 10%, and managing versions with **GitLab**.

Projects

AWS Full-stack Pet Adoption Web | *Python, JS, Docker, Kubernetes* | *GitHub* **Oct 2023 – Dec 2023**

- Designed front-end using **JavaScript**, HTML and CSS, hosted on **S3**, and integrated AWS Cognito for authentication.
- Connected front-end and back-end via API Gateway and **Lambda,** incorporating web-scraping with PetFinder API.
- Optimized database latency by 30% with 3 **microservices** on **EC2**/Beanstalk, enabling **Kubernetes** memory alerts.

Syllabus AI App | *Python Flask, JavaScript, Kafka* | *Demo* **Oct 2023**

- Revolutionized syllabus design with AI, automating syllabus creation through LLM using BERT.
- Built a robust backend using **Python Flask** and SQLite, supporting the frontend with **JavaScript**, HTML, and CSS.
- Optimized with **caching**, leveraging **Kafka** for fast data streaming, improving app speed and efficiency.

Linux OS Kernel Hacking | *C, Linux Kernel 5.10* | *GitHub* **Jan 2023 – May 2023**

- Developed kernel module for secure retrieval of open file descriptors and a key-value store for data caching and IPC.
- Coded a round-robin **scheduling algorithm** for multi-core task management, prioritization, and queueing.
- Managed **physical page** retrieval on the Copy-On-Write mechanism, ensuring secure read and write operation.
- Designed a file system with inode/block allocation and VFS API, supporting shell commands and creation of file links.

HTTP Server | *C, Socket, TCP/IP, HTTP* | *Link* **Oct 2022**

- Coded a Linux-based web backend with **C sockets** for TCP/IP, supporting HTTP GET for text/image file transfers.
- Boosted response time by 0.5s for 1,000 clients using **thread** pools, **message queues**, and semaphores for concurrency.
- Utilized **bash scripting** for client access simulation, achieving **99%** uptime through performance testing.

Skills

Languages	C, C++, Ocaml, Bash, Shell, Python, JavaScript, HTML, CSS, Java.
C/C++ Skills	Sockets, POSIX, Boost.Asio, CMake, STL, multi-threading, Cuda/GPU, Doctest.
OS & Network	Virtual Memory, Scheduling Algorithm, File System, Process Control, HTTP, TCP/UDP, SOME/IP.
Tools	AWS, Docker, Kubernetes, Kafka, SSH, Gdb, Git, GitHub/GitLab, CI/CD.

Awards & Publications

- 4th place (total 108 participants) in EdgeHacks Winter | **Project: AI Psychologist Web** **Jan 2024**
- 3rd place (total 78 participants) in Columbia University ClimateHack | **Project: LLM Syllabus Generator** **Oct 2023**
- Yizhen Zhang, Zejun Bai. *Prediction of movies popularity in supervised learning techniques.* ACE (2023) Vol.29. **Oct 2023**
- Yizhen Zhang. *Deep learning in automatic music generation.* ACE(2023) Vol.5: 87-92. **May 2023**