Zhenyan Zhu

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https://9tempest.github.io/personal-site/

EDUCATION

University of Waterloo Sep 2019 - Dec 2022

Bachelor of Mathematics, Computer Science Major Waterloo, Ontario, Canada

- **Major Average**: 90.5
- **Scholarships**: Computer Science Student Upper-Year Scholarship, University of Waterloo President's Scholarship
- **Relevant Courses**: Compiler Construction, Real-time Programming, Computer Graphics, Concurrency, Distributed Systems, Algorithms, Operating Systems, Principle of Programming Languages, Artificial Intelligence

SKILLS LIST

- **Programming Languages**: C++, C, ARM Assembly, Python, Bash, SQL, Rust, Scala, Java
- **Tools:** GDB, GCC, Docker, Linux, OpenGL, JCup, JFlex, Redboot, Pthread, ARM, Lua
- **Publishnemt:** Fusion method and device for multi-sensor data

PROFESSIONAL EXPERIENCE

Baidu - C++ Research & Development Intern - Recommender System May 2021 - Aug 2021

- Implemented blacklist filter in feed ads recommender system preventing blocked advertisements from returning to the users; **enhanced overall valid view rate by 36% and revenue by 3%** of feed-ads on Huawei media (C++)
- Programmed routine MapReduce scripts to automate the aggregation and filter of millions of customer data; Developed real-time reports with Sqlite3 and Pandas to process and visualize fluctuations of statistical data of feed ads (Python, Bash, SQL)

Momenta - C++ Research & Development Intern - Perception&Fusion Dec 2020 - Apr 2021

- Utilized C++ ROS callback routines to record rosbags under specific scenarios for training deep-learning models (C++, ROS)
- Developed Python scripts to extract vehicles' locations from collected rosbags, matching and transforming vehicles' data including positions, velocities and etc. from different cameras and radars to one uniform world space (Python, Numpy)
- Designed two deep-learning networks with Pytorch: one utilized Resnet to fuse surrounding vehicles' data in a single frame given multi-sensor data; the other composed CNN with self-attention to track vehicles' velocity and acceleration in the long run, **enhancing the accuracy of predicting surrounding vehicles' velocity by 8%** (Pytorch)
- **Designed and implemented the deep-learning inference module from scratch** that fuses pedestrians' velocities and positions precisely, replacing the old pedestrian penetration module which did not have inference capability (C++)

RESEARCH EXPERIENCE

University of Waterloo - Undergraduate Research Assistant - C-for-all May 2022 - Aug 2022

- Implemented pthread emulation in C-for-all programming language with user-level threading primitives provided by the runtime system, **significantly speeding up pthread routines in C-for-all** while preserving the original pthread routines for constructing runtime system through the **interposing technique**
- Performed deep-dive into the relationship between Pthread and thread-safe Linux syscall routines with GDB

University of Waterloo - Undergraduate Research Assistant - Libfibre Jan 2022 - Apr 2022

- Implemented a glue layer between std::thread and libfibre (a user-level threading library) in GCC that **adds user-level threading in C++**
- Researched the underlying mechanism of C++ thread and methods of modifying and building GCC

PROJECT EXPERIENCE

Real-Time OS & Train Control System May 2022 - Aug 2022

Developed a real-time microkernel from scratch in C and ARM on ts7200 embedded board (predecessor of QNX)

- Designed and developed Task primitives, event handlers, serial port and Timer device driver with a client-server pattern, providing user tasks with timing and I/O functionalities
- Implemented high-performance context switch for software and hardware interrupt with ARM assembly and developed Send-Receive-Reply messaging mechanism for inter-process communication **with 0.62ms latency per 64 bytes**
- Implemented a train control system running on the kernel, which routed trains to specific landmarks within 0.2cm error and monitored trains' reserved track segments to automate collision detection and recovery

Pokémon Fight Oct 2022 - Dec 2022

A 3D battle game implemented in C++ with OpenGL. Won the Bronze prize (third best project) in the Fall 2023 Graphics course

- Developed a tiny game engine supporting key-frame animation, particle systems, texture importing, directional light shadow mapping, Phong shading, 3D sound effects and hierarchy modelling with Lua script
- Modelled Pikachu, Snorlax and an artistic scene with Lua scripts. Implemented realistic grass with wind effect by flow map.

Joos Compiler Jan 2022 - Apr 2022

Led a group of three to develop a strong-typed and Object-oriented programming language (A large subset of Java)

- Implemented parser and scanner using JCup; developed static checker in visitor design pattern, including type checker, name resolution, and unreachable statement checker
- Designed and implemented intermediate representation and register allocation that generates i386 assembly code