Ruoyi Xie

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EDUCATION

University of Toronto Sep 2020 - May 2024

- CGPA: 3.6/4.0 -5x Dean's Honor list
- Bachelor of Applied Science in Engineering Science (Major in Electrical and Computer Engineering)

Relevant course: Computer System Programming, Operating System, Artificial Intelligence, Computer Security, Software Engineering, Algorithms and Data Structures, Computer Organization, Deep Learning

SKILLS

- **Programming**: C++, C, Python, PyTorch, Pandas, Tensorflow, Linux, MATLAB, SQL, Git, Docker, ARM Assembly, Verilog

PROFESSIONAL EXPERIENCE

University of Toronto and AMD Xilinx Aug 2022 - Present

Machine Learning Engineer (C/C++)

CGRA-ME: Efficient Machine Learning Acceleration on CGRAs

- Pioneered an innovative integration of **AI Engine** within a Coarse Grain Reconfigurable Architecture (CGRA) to amplify performance and computational efficiency.
- Devised a high-level programming abstraction layer in **C/C++** for seamless integration of AI Engine with CGRA, streamlining development and facilitating swift prototyping of novel functionalities.
- Engineered and modeled multi-processor environment within CGRA-ME, optimizing dataflow, pipelining, and parallelism for efficient AI workload acceleration.

University of Toronto and AMD May 2022 - Aug 2022

Software Engineer (C++)

Electromagnetic Modeling of Future 3D Integrated Circuits and GPUs

https://ieeexplore.ieee.org/document/9947115

- Co-authored a **published paper** as the second author at the Electrical Performance of Electronic Packaging and Systems conference. Recognized with **"The Best Benchmark Paper Award"** for crafting a high-performance electromagnetic solver tailored for contemporary electrical interconnects and electronic packages.
- Engineered a **C++** program to execute contact detection and mesh conformity in 2D, delivering a **1200% speed improvement** compared to the previous 3D method. Successfully parsed and meshed complex IC packages containing 51K 2D footprints and 10M triangle surfaces within 27.4 minutes.
- Demonstrated expertise in IC package testing, identifying and meshing contact surfaces between vias and planes to ensure comprehensive conformity.

PROJECT EXPERIENCE

BioFuncNet: Predicting Protein Functions from RNA Sequences (Python) Jul 2023 - Present

Machine Learning Engineer (UofT Machine Intelligence Student Team)

- Proficiently managed raw datasets from ProteinNet, GO, Uniprot, leveraging **Pandas** for data loading and cleaning.
- Constructed a Graph Neural Network using **PyTorch**, effectively capturing spatial and relational information among protein residues.
- Enhanced neural network architectures through advanced optimization algorithms and regularization techniques, resulting in elevated model performance and accuracy.

User-Level Threads (C) Mar 2023

- Develop a user-level cooperative threading library that **creates, manages,** and **synchronizes** threads, enabling efficient **context switching**, **yielding, cancellation, joining,** and orderly exiting while leveraging ucontext.h for effective implementation.
- Demonstrated proficiency in C programming, memory management, and system-level programming, earning a strong grasp of embedded system concepts.

Virtual Memory Simulator (C) Apr 2023

- Designed and implemented a Virtual Memory Simulator that focuses on sophisticated **page table** management strategies and **process forking** techniques.
- Developed two distinct fork strategies, one involving the creation of a new page table with comprehensive page table entry copying, and another featuring an advanced copy-on-write optimization approach.
- Applied the Sv39 multi-level page table design to accurately replicate memory management unit (MMU) operations within the simulation.