YIBO WEI

Education:

University of California, San Diego
Bachelor, Computer Science and Engineering Expected Graduation: **June, 2023**

Awards:

Winner of the CNS Espresso Prize for Excellence in Networking: Router Implementation and Optimization June, 2022

- Implemented a router that runs in Mininet that supports ARP, IPv4, and ICMP protocols.
- Optimized the code and achieved 802 Mbits/sec bandwidth, ranked #1 among 101 competitors.
- Debugged the code using gdb and Wireshark, and optimized the performance with the help of Callgrind.
- Experimented with various optimizations, including heavily modding the starter code to reduce dynamic memory allocation for better cache hit rate, multi-threading, and bitwise operations.

Research Experience:

Automated Detection of Potentially Vulnerable Critical Infrastructure Aug, 2022

- On-going research program with Professor Aaron Schulman of detecting potentially vulnerable critical infrastructures.
- Collected and labeled street view image data from bluetooth signals from reclosers and capacitors.
- Trained and tuned a YOLOv5 model for recloser and capacitor detection.

mRNA Poly-A Tail Sequence Detection and Counting Jan, 2022

- Designed a sliding-window algorithm to detect and count the length of poly-A tail for biological research.
- Successfully detected discontinuous poly-A tail and proven to be working well on real-world datasets.

Courseworks:

Software Perspective Computer Architecture: Optimization for Matrix Exponential Algorithm Dec, 2022

- Applied tiling to optimize for L1 cache hit rate.
- Fine tuned tiling parameters for input of different matrix size and the value of power.
- Achieved average speed up of 120 and ranked top three in the class leaderboard.

Programming Language: Compiler Design June, 2022

- Implemented a compiler for a modern programming language that supports numbers, booleans, tuples, functions and lambda expressions, etc. primarily using Haskell and x86-64 assembly. Used a C program as run-time.
- Architected both stack and heap memory allocation, and garbage collection.
- Optimized for tail-recursive functions.

Computer Networks: Transfer Layer Protocol Implementation April, 2022

- Designed a reliable transfer layer protocol for a simple communication system.
- Implemented both Stop-and-Wait and Sliding Window Protocol for reliable transmission.
- Partition long messages into smaller segments and reconstruct messages on the receiver side.

Operating Systems: Kernel Modules Implementation for UMIX March, 2022

- Implemented the following kernel modules: context switcher, scheduler, mutex, multi-threading
- Implemented four types of scheduler: FIFO, LIFO, Round Robin, and Stride Scheduling

Machine Learning: Recurrent Neural Network Image Captioning March, 2022

- Experimented with three different RNN architectures: Vanilla RNN, LSTM, and a custom architecture
- Best LSTM model achieved 67.7% BLEU-1 score
- Implemented stochastic text generation for the LSTM architecture.
- Performed hyper-parameter tuning and training for LSTM models and Vanilla RNN models.

Data Structures: Huffman Coding Tree Compression Algorithm Feb, 2021

- Designed compression algorithm and header format based on Huffman Coding Tree and implemented in C++.
- Can compress text files to approximately 10% of the original size (depending on the context)