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Zheqi Shen

Summary

Recent graduate with a Ph.D. in computer science seeking an engineer or researcher position, believing that a good solution comes from both algorithmic and systemic efforts.
My research focuses on designing efficient parallel algorithms for large-scale problems, with good performance in both theory and practice.
Additionally, I am experienced in programming and have hands-on knowledge of filesystem and OS development. I run a homelab with variant servers, customizing cooling schemes and the management panel, to develop personal projects.

Education

– July, 2025 (expected) **PhD, Computer Science & Engineering**
University of California, Riverside (UCR), CA | Advised by Yan Gu
- Research on the topic of efficient parallel algorithms and scalable systems

2016–2020 **Bachelor of Engineering, Computer Science**
ShanghaiTech University (ShanghaiTech), China
- Practices in high-performance I/O and distributed program optimization

Skills and Knowledge

Languages **C++ (proficient, 16-year coding experience since middle school)**, Python, C, x86_64 Assembly, Matlab, JavaScript, Rust, SQL, Verilog (for FPGA)
- Developed parallel linker, toy distributed OS kernel, network stack, userspace filesystem, etc

Parallel Algorithms Design, analyze, and implement **parallel algorithms and data structure**
- The first work-optimal parallel LIS algorithm and the efficient parallel vEB tree
- Research on lock-free parallel ANN algorithms, scaling to 96 cores with $58\times$ self-speedup
- Experience in debugging and profiling parallel programs, optimizing cache behavior and memory footprint

Systems **Operating system, network, storage**
- Hands-on practices in OS kernel programming, RDMA config, IPMI monitoring, and tiered storage
- Built up a homelab with virtualized servers connected via an L3 switch and IB FDR network

Experience

UCR | Parallel Algorithm Lab

Sept. 2020 – Present **Research Assistant**, *with Professor Yan Gu*
- Developed high-performance approximate nearest neighbor search (ANNS) systems, improving build scalability in multi-threading by 1.6x over SOTA, achieving 3.5x faster filtered search throughput. The new algorithms were wrapped into a C++ template library with a fully modularized design.
- Designed and implemented efficient parallel algorithms at large scales and novel data structures, reducing cache misses by up to 73.5% and saving memory bandwidth by 66.4%.
- Designed new methods to parallelize iterative algorithms and metrics to analyze parallel programs.

University of Maryland | ParAlg Lab

Summer 2022 **Visiting Student Research**, *with Professor Laxman Dhulipala*
- Developed functional updates and snapshots for graph-based ANN algorithms and implemented the adaption to the graph container built on the cache-efficient tree embedding.
- Used vTune to locate the performance bottleneck and optimized the uarch front-end dataflow.

ShanghaiTech | Laboratory of I/O System and Data Science

Sept. 2018 – Jun. 2020 **Undergraduate Student Researcher**, *with Professor Shu Yin*

- Designed a middleware between applications and the storage to customize the cache/prefetch strategy with awareness of the data arrangement in the sideband, reducing the I/O load and the tail latency.

Achievements and Awards

2025 **Dissertation Completion Fellowship Awards** (four nominations in the dept.), *UCR*

2020 **Dean's Distinguished Fellowship Award**, *UCR*

2019 **Outstanding Student Awards**, *ShanghaiTech*

2018 **Silver Prize**, *ASC Student Supercomputer Challenge*

- Accelerated the distributed computing software, RELION, with $528\times$ speedup by porting the hotspot to GPUs, reducing the communication overhead, and parallelizing critical for-loops.
- Tuned the code of CFL3D based on the profiling, achieving 25.6% performance improvement
- Customized the servers' frequency and fan strategy to achieve the best performance under the constrained power budget; developed an agent to monitor the sensor data and dynamically distribute the power according to the running application and the characters of the workload.

2018 **Fourth Prize, Fan Favorite Prize**, *ISC Student Cluster Competition*

- Profiled and optimized Nektar++, rewriting the main loops for better parallelism and cache behaviors
- Tuned the MPI configurations and the packet size to improve the communication efficiency

2018 **Third Prize**, *Robomaster Robotics Competition*

- Programmed on SoC and developed the electric control of the continuous dodging function

2017 **Outstanding Student Scholarship**, *ShanghaiTech*

Publications

Manuscripts

2025 **ANNlib: A Development Framework for Efficiently Building ANN Systems**
Zheqi Shen, Jingbo Su, Yan Gu, and Yihan Sun. (under final preparation)

In Conference Proceedings

2025 **Pkd-tree: Parallel *k*d-tree with Batch Updates**
Ziyang Men, *Zheqi Shen*, Yan Gu, and Yihan Sun. (SIGMOD'25)

2024 **BYO: A Unified Framework for Benchmarking Large-Scale Graph Containers**
Brian Wheatman, Xiaojun Dong, *Zheqi Shen*, Laxman Dhulipala, Jakub Łacki, Prashant Pandey, and Helen Xu. (VLDB'24)

2024 **ParANN: Scalable and Deterministic Parallel Graph-Based Algorithms for Approximate Nearest Neighbor Search**
Magdalen Dobson, *Zheqi Shen*, Guy E. Blelloch, Laxman Dhulipala, Yan Gu, Harsha Vardhan Simhadri, and Yihan Sun. (PPoPP'24)

2023 **Parallel longest increasing subsequence and van Emde boas trees**
Yan Gu, Ziyang Men, *Zheqi Shen*, Yihan Sun, and Zijin Wan. (SPAA'23)

2022 **Many sequential iterative algorithms can be parallel and (nearly) work-efficient**
Zheqi Shen, Zijin Wan, Yan Gu, and Yihan Sun. (SPAA'22)

Talks

2024 **Techniques and Challenges Towards Better Approximate Nearest Neighbor Search**
PhD Seminar at UCR

2024 **Approximate Nearest Neighbor Search (ANNS): Techniques and Challenges**
Invited lecture at ShanghaiTech

2023 **Techniques and Challenges Towards Better Approximate Nearest Neighbor Search**
Guest lecture at UCR

2023 **Approximate Nearest Neighbor Search (ANNS): Techniques and Open Problems**
Tutorial at SPAA'23, 20-mins overview and the introduction to the bucketing-based method

2022 **Many sequential iterative algorithms can be parallel and (nearly) work-efficient**
Conference talk at SPAA'22

Community Involvement

2021–2024 **Organizer**, *UCR Programming Contest (UCRPC)*
- Set up the website and organize the activities on-site
- Designed and tested contest problems

2019 **Team Leader**, *GeekPie_HPC Association at ShanghaiTech*
- Held lectures biweekly with 20+ participants on average
- Advised the new teammates and trained for the contests

2016–2018 **Student Assistant**, *Teaching Affairs Office at ShanghaiTech*
- Developed the orientation website for first-year students (used for three years)
- Participated in developing the IT asset management system

Professional Services

Junior PC Member

2025 Symposium on Parallelism in Algorithms and Architectures (SPAA)

External Reviewer

2025 ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP)
2025 Journal of Parallel and Distributed Computing (JPDC)
2024 IEEE International Conference on High Performance Computing (HiPC)
2024 International Conference on Parallel Processing (ICPP)
2024 Symposium on Algorithm Engineering and Experiments (ALENEX)
2023 ACM Transactions on Parallel Computing (TOPC)
2023 ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)
2023 European Symposium on Algorithms (ESA)
2022 International European Conference on Parallel and Distributed Computing (Euro-Par)

Artifact Committee Member

2025 PPoPP Artifact Evaluation Committee
2025 ACM SIGMOD Availability and Reproducibility Committee
2025 ALENEX 2025 Artifact Evaluation
2024 ACM SIGMOD Availability and Reproducibility Committee (shepherd)

Teaching Experience

Winter 2023 Algorithm Engineering (UCR CS142)
Fall 2022 Design and Analysis of Algorithms (UCR CS218)
Spring 2022 Design and Analysis of Algorithms (UCR CS218)
Winter 2022 Algorithm Engineering (UCR CS142)
Fall 2021 Design and Analysis of Algorithms (UCR CS218)
Spring 2019 Computer Architecture I (ShanghaiTech CS110)
Fall 2018 Foundational of Algorithm (ShanghaiTech CS140)