SHUONING ZHANG

email: zsn2022@mail.ustc.edu.cn

EDUCATION

B.Sc in Applied Mathematics, Minor in Computer Science
University of Science and Technology of China (USTC), Anhui, China *(Sep 2022 – Present)*

- **Overall GPA**: 3.93/4.3(Ranked 2/18 in Applied Mathematics; 20/188 overall)
- **Selected awards**: Outstanding Student Scholarship, Grade 2(2024), The Chinese Mathematics Competitions, 1st prize in Anhui Province(2024), Zhang Zongzhi Sci-Tech Scholarship(2023)

RESEARCH INTERESTS

Network optimization and flow algorithms, Stochastic Programming, Operations Research

PUBLICATIONS

Qian Lv, Yuxiao Zhang, **Shuoning Zhang**, Ruoxing Li, Ke Meng, Bowen Zhang, Fuguang Huang, Xiaoliang Chen, Zuqing Zhu,
"On the TPE Design to Efficiently Accelerate Hitless Reconfiguration of OCS-Based DCNs," *IEEE Journal on Selected Areas in Communications, vol. 43, no. 5, pp. 1780–1792, May 2025*

Xiaoliang Chen, Wenbang Zheng, **Shuoning Zhang**, Xiaoyan Dong, Ke Meng, Zuqing Zhu,
"DRL-TPE: Learning to Optimize TPE of Optical Interconnects to Accelerate Hitless Reconfigurations," *in Proceedings of the Optical Fiber Communications Conference (OFC),* Los Angeles, USA, paper M4H.5, Mar.2025

RESEARCH EXPERIENCE

Undergraduate Researcher Prof Zuqing Zhu's Research Group, USTC Mar 2023-Present

- Addressed the hitless reconfiguration problem in optical circuit-switched (OCS) data center networks, which aims to minimize service disruption during topology reconfiguration while ensuring network throughput.
- Developed a MATLAB simulation platform to model ultra-scale optical network environments and evaluate algorithmic performance across diverse operational scenarios.
- Designed and analyzed optimization algorithms for the problem, proving NP-hardness for a key subproblem and proposing an efficient heuristic with substantial performance gains.
- Extended this work by developing a graph-based deep reinforcement learning (DRL) framework for dynamic reconfiguration, and implemented part of it in PyTorch, focusing on training and evaluation modules integrated with the network simulator.

Undergraduate Researcher Prof Yong-Hong Kuo's Research Group, HKU Jul 2025-Sep 2025

- Studied the resilience problem in transportation networks under stochastic disruptions, aiming to balance preparedness investment and recovery efficiency within a two-stage stochastic programming framework.
- Formulated a mixed-integer two-stage stochastic model following established resilience optimization frameworks to represent preparedness and recovery decisions in metro systems.
- Developed a optimization-based scenario-reduction algorithm and subgradient algorithm to efficiently reduce hundreds of disruption scenarios while preserving decision quality.
- Implemented the full Python optimization framework integrating Gurobi for model formulation, scenario generation, and parallelized evaluation.
- Applied the proposed method to the Hong Kong MTR case study, demonstrating that the reduction-based approach achieved good resilience performance with a significant decrease in computation time.

ACADEMIC PROJECT

Ultra-Large-Scale Optical Fiber Networks: Protection and Restoration Techniques
National Undergraduate Training Program for Innovation and Entrepreneurship, USTC | Advisor: Prof. Zuqing Zhu

- Lead a innovation project on protection and restoration mechanisms in ultra-large-scale optical fiber networks.
- Designed and implemented algorithms for path protection and restoration with millisecond-level single-path computation and millisecond-level batch processing.
- Developed heuristic and domain-partition optimization methods, reducing restoration time while maintaining high protection success rates.

SELECTED COURSES

- **Mathematics**: Operations Research(94) , Optimization algorithm(93), Complex Variable (98), Combinatorics(93) ,Wavelet Analysis(95), Probability Theory (98), Linear Algebra B1/B2(95/90)
- **Computer Science**: Foundations of Algorithms (96), Data structure(96), Computer Programming A(93)

TEACHING ASSISTANT

Algebraic Structure (Spring 2024) Instructor: Prof. Hongli Xu Mar.2025-Jul.2025

• Created and maintained the course website, graded assignments, and conducted tutorial sessions for problems.

SKILLS

- **Operations Research**: Mixed-integer programming, stochastic and robust optimization, scenario reduction
- **Algorithm Design**: Heuristic and Mathematical programming, heuristic and metaheuristic optimization,
- **Programming & Simulation**: Python (Gurobi, PyTorch), C++, MATLAB