Zhuoran Song

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Education

- **Shanghai Jiao Tong University (SJTU)** — **Shanghai, China**
  PhD: Computer Science, Advanced Computer Architecture — *2016.9–2021.10*
  Advisor: Prof. Xiaoyao Liang
- **Huazhong University of Science and Technology (HUST)** — **Wuhan, China**
  Bachelor: Computer Science and Engineering, IoT Engineering — *2012.9–2016.6*

Research Interests

- Micro-architecture and software collaborative design for DNN acceleration
- GPGPU architecture
- Processing-in-memory

Publications

- **Zhuoran Song**, Heng Lu, Gang Li, Li Jiang, Naifeng Jing and Xiaoyao Liang. PRADA: Point Cloud Recognition Acceleration via Dynamic Approximation. Accepted by Design, Automation and Test in Europe Conference (DATE 2023, CCF-B). Best Paper Award.
- **Zhuoran Song**, Heng Lu, Naifeng Jing and Xiaoyao Liang. Real-Time Video Recognition via Decoder-Assisted Neural Network Acceleration Framework. Accepted by IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD 2022, CCF-A).
- Heng Lu, **Zhuoran Song***, Xing Li, Naifeng Jing and Xiaoyao Liang. GCNTrain: A Unified and Efficient Accelerator for Graph Convolutional Neural Networks Training. Accepted by 40th IEEE International Conference on Computer Design (ICCD 2022, CCF-B).
- Gang Li, Weixiang Xu, **Zhuoran Song**, Naifeng Jing, Jian Chen and Xiaoyao Liang. Ristretto: An Atomized Processing Architecture for Sparsity-Condensed Stream Flow in CNN. Accepted by 55th ACM/IEEE International Symposium on Microarchitecture (MICRO 2022, CCF-A).
- Xing Li, Rachata Ausavarungnirun, Xiao Liu, Xueyuan Liu, Xuan Zhang, Heng Lu, **Zhuoran Song**, Naifeng Jing and Xiaoyao Liang. Gzippo: Highly-compact Processing-In-Memory Graph Accelerator Alleviating Sparsity and Redundancy. Accepted by 2022 IEEE/ACM International Conference on Computer-Aided Design (ICCAD 2022, CCF-B).
- **Zhuoran Song**, Naifeng Jing and Xiaoyao Liang. E2-VOR: An End-to-End En/Decoder Architecture for Efficient Video Object Recognition. Accepted by Transactions on Design Automation of Electronic Systems (TODAES 2022, CCF-B).
- **Zhuoran Song**, Zhongkai Yu, Naifeng Jing and Xiaoyao Liang. E2SR: An End-to-End Video CODEC Assisted System for Super Resolution Acceleration. Accepted by Design Automation Conference (DAC 2022, CCF-A).
- Tao Yang, Dongyue Li, Fei Ma, **Zhuoran Song**, Yilong Zhao, Jiaxi Zhang, Fangxin Liu and Li Jiang. PASGCN: An ReRAM-Based PIM Design for GCN with Adaptively Sparsified Graphs. Accepted by IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD 2022, CCF-A).
- Tao Yang, Dongyue Li, **Zhuoran Song**, Yilong Zhao, Fangxin Liu, Zongwu Wang, Zhezhi He and Li Jiang. DTQAtten: Leveraging Dynamic Token-based Quantization for Efficient Attention Architecture. Accepted by ACM/IEEE Design Automation Test in Europe Conference and

Exhibition (DATE 2022, CCF-B). Best Paper Nomination.

- Feiyang Wu, **Zhuoran Song**, Jing Ke, Li Jiang, Naifeng Jing and Xiaoyao Liang. PIPArch: Programmable Image Processing Architecture Using Sliding Array. Accepted by 2021 IEEE Intl Conf on Parallel Distributed Processing with Applications, Big Data Cloud Computing, Sustainable Computing Communications, Social Computing Networking (ISPA 2022, CCF-C).
- **Zhuoran Song***, Dongyue Li*, Zhezhi He, Xiaoyao Liang and Li Jiang. ReRAM-Sharing: Fine-Grained Weight Sharing for ReRAM-Based Deep Neural Network Accelerator. Accepted by IEEE International Symposium on Circuits and Systems (ISCAS 2021).
- **Zhuoran Song**, Feiyang Wu, Xueyuan Liu, Naifeng Jing and Xiaoyao Liang. VR-DANN: Real-Time Video Recognition via Decoder-Assisted Neural Network Acceleration. Accepted by IEEE/ACM International Symposium on Microarchitecture (MICRO 2020).
- **Zhuoran Song**, Bangqi Fu, Feiyang Wu, Zhaoming Jiang, Li Jiang, Naifeng Jing and Xiaoyao Liang. DRQ: Dynamic Region-Based Quantization for Deep Neural Network Acceleration. Accepted by IEEE/ACM International Symposium on Computer Architecture (ISCA 2020).
- **Zhuoran Song**, Jianfei Wang, Tianjian Li, Li Jiang, Jing Ke, Xiaoyao Liang and Naifeng Jing. GPNPU: Enabling Efficient Hardware-Based Direct Convolution with Multi-Precision Support in GPU Tensor Cores. Accepted by Design Automation Conference (DAC 2020).
- **Zhuoran Song**, Lerong Chen, Tianjian Li, Naifeng Jing, Xiaoyao Liang, Yanan Sun and Li Jiang. ITT-RNA: Imperfection Tolerable Training for RRAM-Crossbar based Deep Neural-network Accelerator. Accepted by IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD 2020).
- Zhaoming Jiang, **Zhuoran Song**, Naifeng Jing and Xiaoyao Liang. PRArch: Pattern-Based Reconfigurable Architecture for Deep Neural Network Acceleration. Accepted by IEEE International Conference on High Performance Computing and Communications (HPCC 2020).
- **Zhuoran Song**, Dongyu Ru, Ru Wang, Hongru Huang, Zhenghao Peng, Jing Ke, Xiaoyao Liang, and Li Jiang. Approximate Random Dropout for DNN training acceleration in GPGPU. Accepted by ACM/IEEE Design Automation Test in Europe Conference and Exhibition (DATE 2019).
- Li Jiang*, **Zhuoran Song***, Song H, et al. Energy-Efficient and Quality-Assured Approximate Computing Framework Using a Co-Training Method[J]. ACM Transactions on Design Automation of Electronic Systems (TODAES), 2019, 24(6): 1-25.
- **Zhuoran Song**, Yilong Zhao, Yanan Sun, Xiaoyao Liang and Li Jiang. ESNreram: An Energy-Efficient Sparse Neural Network Based on Resistive Random-Access Memory. Accepted by ACM/IEEE Accepted by Great Lakes Symposium on VLSI (GLSVLSI), 2020.
- Haiyue Song, Li Jiang, Chengwen Xu, **Zhuoran Song**, Naifeng Jing, Xiaoyao Liang and Qiang Xu. Invocation-driven Neural Approximate Computing with a Multiclass-Classifier and Multiple Approximators. Accepted by ACM/IEEE International Conference on Computer-Aided Design, ICCAD 2018.

Honors and Awards

- DATE Best Paper Award in 2023
- ACM ChinaSys Doctoral Dissertation Award
- Shanghai CCF Outstanding Dissertation Award
- SJTU Outstanding Graduate Award
- Zhang Liangqi Scholarship
- Academic Excellence Scholarship
- The National Scholarship
- HUST Merit students