JIAN MENG

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Education

Cornell University **Aug. 2023 – Present**
Ph.D. in Electrical Engineering *Advisors: **Jae-sun Seo**, Mohamed Abdelfattah, Noah Snavely*

Arizona State University **Sep. 2019 – May 2023**
Ph.D. in Electrical Engineering *Advisors: **Jae-sun Seo**, Deliang Fan, Yu Cao*

Portland State University **Sep. 2015 – May 2019**
Bachelor of Science in Electrical Engineering *Advisor: Christof Teuscher*

Research Interests

Machine Learning: Energy-efficient foundation model training; Deep neural network compression.
Computer Vision: Hardware efficient 3D rendering; Generative Codec Avatar.
AI Hardware: Neuromorphic hardware accelerator design; In-memory Computing.

Research Experience

Meta Reality Lab **May 2024 – August 2024**
Research Scientist, Photorealistic Telepresence *Pittsburgh, PA*

- Research focus: Energy-efficient Codec Avatar model design for next generation of VR/AR.

Meta Reality Lab **May 2023 – August 2023**
Research Scientist *Pittsburgh, PA*

- Codec Avatar quality enhancement and noise reduction with low-precision generative models.
- Developed an end-to-end compress-and-deploy toolkit for AR/VR devices.
- Hardware-aware high quality and energy-efficient algorithm design for commercial VR/AR product.
- Compress and deploy the model to Meta Quest devices with eliminated noise and high-quality rendering.

Texas Instrument, Kilby Lab **June 2021 – August 2021**
System Engineer *Dallas, TX*

- End-to-end PyTorch-based hardware compiler for deploying low-precision neural networks to the in-memory-computing-based neural engine.

Publications

Under review

- Ahmed Hasssan, **Jian Meng**, Yuanbo Xiangli, and Jae-sun Seo, "DCSH-SG: 3D Gaussian Splatting with Direction Cosine Spherical Harmonics and Scale Gradient-based Gaussian Pruning," ICCV, 2025. (under review)

Deep Learning Algorithms | **Energy-efficient AI**

- **Jian Meng**, Ahmed Hasssan, Li Yang, Deliang Fan, Jinwoo Shin, and Jae-sun Seo, "Closest Neighbors are Harmful for Lightweight Masked Auto-encoders," CVPR, 2025.

- **Jian Meng**, Yuecheng Li, Chenghui Li, Syed Shakib Sarwar, Dilin Wang, and Jae-sun Seo, "POCA: Post-training Quantization with Temporal Alignment for Codec Avatars," ECCV, 2024. **(Collaborated with Meta Reality Lab)**

- **Jian Meng***, Ahmed Hasssan*, and Jae-sun Seo, "Spiking Neural Network with Learnable Threshold for Event-Based Classification and Object Detection," IJCNN, 2024.

- **Jian Meng**, Li Yang, Kyungmin Lee, Jinwoo Shin, Deliang Fan, and Jae-sun Seo, "Slimmed Asymmetrical Contrastive Learning and Cross Distillation for Lightweight Model Training," NeurIPS, 2023.

- **Jian Meng**, Li Yang, Jae-sun Seo, and Deliang Fan, "Get More at Once: Alternating Sparse Training with Gradient Correction," NeurIPS, 2022.

- **Jian Meng**, Li Yang, Jinwoo Shin, Deliang Fan, and Jae-sun Seo, "Contrastive Dual Gating: Learning Sparse Features With Contrastive Learning," CVPR, 2022.

- Ahmed Hasssan, **Jian Meng**, Yu Cao, and Jae-sun Seo, "Spatial-temporal Data Compression of Dynamic Vision Sensor Output with High Pixel-level Saliency using Low-precision Sparse Autoencoder," Asilomar, 2022.

- Deepak Kadetotad, **Jian Meng**, Visar Berisha, Chaitali Chakrabarti, and Jae-sun Seo, "Compressing LSTM Networks with Hierarchical Coarse-Grain Sparsity," INTERSPEECH, 2020.

Hardware-Algorithm Co-Design | **Hardware-aware AI**

- **Jian Meng**, Yuan Liao, Anupreetham, Ahmed Hasssan, Shixing Yu, Han-sok Suh, Xiaofeng Hu, and Jae-sun Seo, "Torch2Chip: An End-to-end Customizable Deep Neural Network Compression and Deployment Toolkit for Prototype Hardware Accelerator Design," MLSys, 2024

- Yuzong Chen, **Jian Meng**, Jae-sun Seo, and Mohamed Abdelfattah, "BBS: Bi-directional Bit-level Sparsity for Deep Learning Acceleration," IEEE Micro, 2024.

- Wangxin He, **Jian Meng**, Sujan Kumar Gonugondla, Shimeng Yu, Naresh R. Shanbhag, and Jae-sun Seo, "PRIVE: Efficient RRAM Programming with Chip Verification for RRAM In-Memory Computing Acceleration," DATE 2023.

- **Jian Meng**, Injune Yeo, Wonbo Shim, Li Yang, Deliang Fan, Shimeng Yu, and Jae-sun Seo "Sparse and Robust RRAM-based Efficient In-memory Computing for DNN Inference", IRPS, 2022.

- **Jian Meng**, Wonbo Shim, Li Yang, Injune Yeo, Deliang Fan, Shimeng Yu, and Jae-sun Seo, "Temperature-Resilient RRAM-based In-Memory Computing for DNN Inference," IEEE MICRO, vol. 42, no. 1, 2022.

- Wonbo Shim, **Jian Meng**, Xiaochen Peng, Jae-sun Seo, and Shimeng Yu, "Impact of Multilevel Retention Characteristics on RRAM based DNN Inference Engine," IRPS, 2021.
- Sai Cherupally, **Jian Meng**, Adnan Siraj Rakin, Shihui Yin, Injune Yeo, Shimeng Yu, Deliang Fan, and Jae-Sun Seo, "Improving DNN hardware accuracy by in-memory computing noise injection," IEEE Design & Test, vol. 39, no. 4, 2021.

- Fan Zhang, Li Yang, **Jian Meng**, Jae-sun Seo, Yu Cao, and Deliang Fan, "XMA: A Crossbar-aware Multi-task Adaption Framework via Shift-based Mask Learning Method," DAC, 2022.

- Fan Zhang, Li Yang, **Jian Meng**, Jae-sun Seo, Yu Cao and Deliang Fan, "XST: A Crossbar Column-wise Sparse Training for Efficient Continual Learning," DATE, 2022. **(Best Interactive Presentation(IP) Award)**.

- Arnab Mazumder, **Jian Meng**, Hasib-Al Rashid, Utteja Kallakuri, Xin Zhang, Jae-sun Seo, and Tinoosh Mohsenin, "A Survey on the Optimization of Neural Network Accelerators for Micro-AI On-Device Inference," IEEE Journal on Emerging and Selected Topics in Circuits and Systems (JETCAS), 2021

- Han-sok Suh, **Jian Meng**, Ty Nguyen, Shreyas K. Venkataramanaiah, Vijay Kumar, Yu Cao, and Jae-sun Seo, "Algorithm-Hardware Co-Optimization for Energy-Efficient Drone Detection on FPGA," FPT, 2021.

- **Jian Meng**, Li Yang, Xiaochen Peng, Shimeng Yu, Deliang Fan, and Jae-sun Seo, "Structured Pruning of RRAM Crossbars for Efficient In-Memory Computing Acceleration of Deep Neural Networks," IEEE TCAS-II, 2021.

- Jyotishman Saikia, Shihui Yin, Bo Zhang, Jian Meng, Mingoo Seok and Jae-sun Seo, "Modeling and Optimization of SRAM-based In-Memory Computing Hardware Design," DATE, 2021.

Neuromorphic Accelerator | **AI Hardware**

- Vasundhara Damodaran, Ziyu Liu, **Jian Meng**, Jae-sun Seo, and Arindam Sanyal, "SRAM In-Memory Computing Macro With Delta-Sigma Modulator Based Variable-Resolution Activation", IEEE Solid-State Circuits Letters (SSC-L), 2023.

- Vasundhara Damodaran, Ziyu Liu, **Jian Meng**, Jae-sun Seo, and Arindam Sanyal, "A Delta-Sigma Based SRAM Compute-in-Memory Macro for Human Activity Recognition," IEEE BioCAS, 2023.

- Sahra Afshari, Sritharini Radhakrishnan, Jing Xie, Mirembe Musisi-Nkambwe, **Jian Meng**, Wangxin He, Jae-sun Seo, and Ivan Sanchez Esqueda, "Dot-Product Computation and Logistic Regression with 2D Hexagonal-Boron Nitride (h-BN) Memristor Arrays," 2D Materials, vol. 10, no. 3, 2023.

- Bo Zhang, Jyotishman Saikia, **Jian Meng**, Dewei Wang, Soonwan Kwon, Sungmeen Myung, Hyunsoo Kim, Sang Joon Kim, Jae-Sun Seo, and Mingoo Seok, "MACC-SRAM: A Multistep Accumulation Capacitor-Coupling In-Memory Computing SRAM Macro for Deep Convolutional Neural Networks", IEEE Journal of Solid-State Circuits (JSSC), 2023.

- Shreyas Venkataramanaiah, **Jian Meng**, Han-Sok Suh, Injune Yeo, Jyotishman Saikia, Sai Kiran Cherupally, Yichi Zhang, Zhiru Zhang, and Jae-sun Seo, "A 28nm 8-bit Floating-Point Tensor Core based CNN Training Processor with Dynamic Activation/Weight Sparsification", IEEE Journal of Solid-State Circuits (JSSC), vol. 58, no. 7, 2023.

- Gokul Krishnan, Zhenyu Wang, Injune Yeo, Li Yang, **Jian Meng**, Maximilian Liehr, Rajiv V Joshi, Nathaniel C Cady, Deliang Fan, Jae-Sun Seo, and Yu Cao, "Hybrid RRAM/SRAM in-memory computing for robust DNN acceleration," IEEE TCAD, vol. 41, no. 11, 2022.

- Bo Zhang, Jyotishman Saikia, **Jian Meng**, Dewei Wang, Soonwan Kwon, Sungmeen Myung, Hyunsoo Kim, Sang Joon Kim, Jae-sun Seo, and Mingoo Seok "A 177 TOPS/W, Capacitor-based In-Memory Computing SRAM Macro with Stepwise-Charging/Discharging DACs and Sparsity-Optimized Bitcells for 4-Bit Deep Convolutional Neural Networks," IEEE CICC, 2022.

- **Jian Meng**, Shreyas Kolala Venkataramanaiah, Chuteng Zhou, Patrick Hansen, Paul Whatmough and Jae-sun Seo, "FixyFPGA: Efficient FPGA Accelerator for Deep Neural Networks with High Element-Wise Sparsity and without External Memory Access," FPL, 2021. **(Collaborated with ARM Research)**

Patent

- Jae-sun Seo, **Jian Meng**, Li Yang, Deliang Fan, "System and method for learning sparse features for self-supervised learning with contrastive dual gating." U.S. Patent Application No. 18/494,330.
- Jae-sun Seo, **Jian Meng**, Li Yang, Deliang Fan, "Method and system for a temperature-resilient neural network training model", US Patent App. 18/463,778.
- SK Cherupally, **Jian Meng**, Shihui Yin, Deliang Fan, Hardware noise-aware training for improving accuracy of in-memory computing-based deep neural network hardware, US Patent App. 17/714,677.

Awards

Travel Grant of MLSys 2024
Finallist of 2023 Qualcomm Innovation Fellowship
Best IP (Interactive Presentations) Paper Award, DATE, 2022
Dean's List, Winter 2017, Spring 2017, Fall 2017, Portland State University

Teaching Experience

Teaching Assistant **Jan. 2024 - May 2024**
ECE 6790: Neuromorphic Computing Hardware Design *Cornell University*

Teaching Assistant **Jan. 2022 - May 2022**
EEE 598: Neuromorphic Computing Hardware Design *Arizona State University*

Teaching Assistant **Jan. 2019 - Jun. 2019**
ECE 510 (Mathematical Foundation of Machine Learning) *Portland State University*

Teaching Assistant **Sep. 2018 - Jun. 2019**
ECE 221/2/3: Circuit Analysis *Portland State University*

Professional Services

Reviewer: CVPR, NeurIPS, ICLR, ICCV, MLSys
Reviewer: IEEE Transactions on Biomedical Circuits and Systems (BioCAS)
Reviewer: Transactions on Reconfigurable Technology and Systems (TRET)
Reviewer: IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)
Reviewer: IEEE Transactions on Circuits and Systems II: Express Briefs (TCAS-II)

Skills

Python, PyTorch, CUDA, TensorFlow, C, MatLab, SystemVerilog