Changwoo Lee

Curriculum Vitae

Contact Information

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Education

University of Michigan, Ann Arbor, Michigan, USA

- Ph.D. in Electrical and Computer Engineering — Aug 2020 – Present
  - Advisor: Prof. Hun-Seok Kim
  - Anticipated Graduation Date: 12/2025

Hanyang University, Seoul, Republic of Korea

- M.S. in Electronics and Computer Engineering — Mar 2018 – Feb 2020
- B.S. in Electronic Engineering — Mar 2012 – Feb 2018

Research Interests

Efficient Deep Learning, Structured Matrix, Hardware-friendly Model Compression, and Small Foundation Models.

Professional Experience

Graduate Student Research Assistant — Aug 2020 – Present
University of Michigan, Ann Arbor, MI, USA

- Investigating hardware-friendly, adaptive and learnable structured matrix for DNN training, fine-tuning, and inference acceleration
- Proposed generalizable and learnable structured matrix for differentiable DNN compression
- Applied latent-denoising score function estimator to improve efficiency of deep joint source-channel coding

NLP Research Intern — May 2024 – Aug 2024
Samsung Research America, Mountain View, CA, USA

- Investigated efficient fine-tuning methods for on-device foundation models

Publications

- P. Abillama, **C. Lee**, A. Bejarano-Carbo, D. Blaauw, and H. Kim. "One-Hot Multi-Level Leaky Integrate-and-Fire Spiking Neural Networks for Enhanced Accuracy-Latency Tradeoff." *IEEE Access*, 2025.
- **C. Lee**, S. Kwon, Q. Qu, and H. Kim. "BLAST: Block-Level Adaptive Structured Matrices for Efficient Deep Neural Network Inference." *Neural Information Processing Systems (NeurIPS)*, 2024. [Paper]
- Z. Fan, H. An, B. Xu, L. Xu, C.W. Tseng, Y. Peng, A. Bejarano-Carbo, P. Abillama, A. Cao, B. Liu, **C. Lee**, Z. Wang, H. Kim, D. Blaauw, and D. Sylvester. "AIMMI: Audio and Image Multi-Modal Intelligence via a Low-Power SoC With 2-MByte On-Chip MRAM for IoT Devices." *IEEE Journal of Solid-State Circuits (JSCC)*, 2024. [Paper]
- **C. Lee** and H. Kim. "Differentiable Learning of Generalized Structured Matrices for Efficient Deep Neural Networks." In *International Conference on Learning Representations (ICLR)*, 2024. [Paper]
- Z. Fan, Q. Zhang, P. Abillama, S. Shoouri, **C. Lee**, D. Blaauw, H. Kim, and D. Sylvester. "TaskFusion: An Efficient Transfer Learning Architecture with Dual Delta Sparsity for Multi-Task Natural Language Processing." In *Proceedings of the 50th Annual International Symposium on Computer Architecture (ISCA)*, 2023. [Paper]
- C. Bian, C. Hsu, **C. Lee**, and H. Kim. "Learning-Based Near-Orthogonal Superposition Code for MIMO Short Message Transmission." In *IEEE Transactions on Communications (TCOM)*, 2023. [Paper]

- **C. Lee**, X. Hu, and H. Kim "Deep Joint Source-Channel Coding with Iterative Source Error Correction." In *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2023. [Paper]
- Z. Fan, H. An, Q. Zhang, B. Xu, L. Xu, C. Tseng, Y. Peng, A. Cao, B. Liu, **C. Lee**, Z. Wang, F. Liu, G. Wang, S. Jiang, H. Kim, D. Blaauw, D. Sylvester. "Audio and Image Cross-Modal Intelligence via a 10TOPS/W 22nm SoC with Back-Propagation and Dynamic Power Gating." In *IEEE Symposium on VLSI Circuits (VLSI-Symposium)*, 2022. [Paper]
- D. Kim, **C. Lee**, and K.S. Chung. "A Confidence-Calibrated MOBA Game Winner Predictor." In *IEEE Conference on Games (CoG)*, 2020. [Paper]
- **C. Lee**, and K.S. Chung. "GRAM: Gradient Rescaling Attention Model for Data Uncertainty Estimation in Single Image Super Resolution." In *IEEE International Conference on Machine Learning and Applications (ICMLA)*, 2019. [Paper]

Talk

SPEECS Seminar on Generalized Block Low-Rank Structured Matrices. Ann Arbor, MI, USA. [Link] Mar 4 2024

Skills

Math. Matrix Decomposition, Linear Algebra, Optimization Theory, Information Theory
Deep Learning. DNN Compression, Weight/Activation Quantization, Transformers, Deep Generative Models, Diffusion Models.
Programming Languages and Frameworks. Python, PyTorch, NumPy, SciPy, Julia, MATLAB.
Relevant Courses.

- Umich EECS 501 Probability and Random Processes
- Umich EECS 551 Matrix Methods for Signal Processing, Data Analysis and Machine Learning
- Umich EECS 559 Optimization Methods in Signal Processing and Machine Learning
- Umich EECS 600 Function Space Methods in System Theory
- Umich EECS 598 Special Topics: Randomized Numerical Linear Algebra for Machine Learning
- Umich EECS 598 Special Topics: Statistical Learning Theory

Teaching Experience

- Embedded System, Hanyang University — Spring 2019
- VLSI Design, Hanyang University — Fall 2018
- SoC Design, Hanyang University — Spring 2018

Awards & Scholarships

- Hanyang University TA Scholarship — Spring 2019
- Hanyang Graduate School Scholarship (4 semesters) — 2018-2019
- Hanyang Brain Scholarship (2 semesters) — 2017
- Undergraduate Scholarship, Korean Government, Korea Student Aid Foundation — Fall 2016
- Undergraduate Scholarship, Hanyang University (2 semesters) — 2012-2013

Service

Review Experience.

- ICML 2024, AISTATS 2024, ICLR 2024, NeurIPS 2024, IEEE Transactions on Communications, IEEE Transactions on Mobile Computing

[*CV compiled on 2025-02-21*]