

Changwoo Lee

Curriculum Vitae

CONTACT INFORMATION

1301 Beal Avenue, Ann Arbor, MI, 48109, USA
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Website: <https://changwoolee.github.io/>

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 Year: 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

- **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]

	<ul style="list-style-type: none"> • C. Lee, and K.S. Chung. “GRAM: Gradient Rescaling Attention Model for Data Uncertainty Estimation in Single Image Super Resolution.” In <i>IEEE International Conference on Machine Learning and Applications (ICMLA)</i>, 2019. [Paper]
PREPRINT	<ul style="list-style-type: none"> • C. Lee, S. Kwon, Q. Qu, and H. Kim. “BLAST: Block-Level Adaptive Structured Matrices for Efficient Deep Neural Network Inference.” Submitted to <i>Neural Information Processing Systems (NeurIPS)</i>, 2024.
TALK	SPEECS Seminar on Generalized Block Low-Rank Structured Matrices. Ann Arbor, MI, USA. [Link] Mar 4 2024
SKILLS	<p>Math. Matrix Decomposition, Linear Algebra, Optimization Theory, Information Theory</p> <p>Deep Learning. DNN Compression, Weight/Activation Quantization, Transformers, Deep Generative Models, Diffusion Models.</p> <p>Programming Languages and Frameworks. Python, PyTorch, NumPy, SciPy, Julia, MATLAB.</p> <p>Relevant Courses.</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Embedded System, Hanyang University Spring 2019 • VLSI Design, Hanyang University Fall 2018 • SoC Design, Hanyang University Spring 2018
AWARDS & SCHOLARSHIPS	<ul style="list-style-type: none"> • 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	<p>Review Experience.</p> <ul style="list-style-type: none"> • NeurIPS 2024, IEEE Transactions on Communications, IEEE Transactions on Mobile Computing <p>Student Volunteer at ICCV, 2019</p>

[CV compiled on 2024-08-30]