

# 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
  - Adviser: 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

Efficiency and Robustness in Deep Learning

- Efficient DNN Structure for Low Computational Complexity and Memory Footprint
  - Large Language Model Compression
  - Resource-efficient and Expressive Structured Matrix for Fast Matrix-Vector Multiplications
  - Layer-wise Structure Learning for Fast DNN Training/Fine-Tuning
- Data-Efficient and Robust Multi-modal Systems
  - Probabilistic Models for Data-Efficient and Robust Multi-modal Deep Learning

## PUBLICATIONS

**Changwoo Lee** and Hun-Seok Kim. *Differentiable Learning of Generalized Structured Matrices for Efficient Deep Neural Networks*, The Twelfth International Conference on Learning Representations (ICLR), 2024.

Fan, Z., Zhang, Q., Abillama, P., Shoouri, S., **Lee, C.**, Blaauw, D., Kim, H., and Sylvester, D. *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.

Chenghong Bian, Chin-Wei Hsu, **Changwoo Lee**, and Hun-Seok Kim. *Learning-Based Near-Orthogonal Superposition Code for MIMO Short Message Transmission*, IEEE Transactions on Communications (TCOM), 2023

**Changwoo Lee**, Xiao Hu, and Hun-Seok Kim *Deep Joint Source-Channel Coding with Iterative Source Error Correction*, The 26th International Conference on Artificial Intelligence and Statistics (AISTATS), 2023

Fan, Z., An, H., Zhang, Q., Xu, B., Xu, L., Tseng, C., Peng, Y., Cao, A., Liu, B., **Lee, C.**, Wang, Z., Liu, F., Wang, G., Jiang, S., Kim, H., Blaauw, D., Sylvester, D. *Audio and Image Cross-Modal Intelligence via a 10TOPS/W 22nm SoC with Back-Propagation and Dynamic Power Gating*, IEEE Symposium on VLSI Circuits (VLSI-Symposium), 2022

Dong-Hee Kim, **Changwoo Lee**, and Ki-Seok Chung. *A Confidence-Calibrated MOBA Game Winner Predictor*, IEEE Conference on Games (CoG), 2020.

**Changwoo Lee**, and Ki-Seok Chung. *GRAM: Gradient Rescaling Attention Model for Data Uncertainty Estimation in Single Image Super Resolution*, IEEE International Conference on Machine Learning and Applications (ICMLA), 2019.

## TALKS

**SPEECS Seminar**, on 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

**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

ACADEMIC EXPERIENCE	<b>University of Michigan</b> , Ann Arbor, Michigan, USA <i>Graduate Student Research Assistant</i>	Aug 2020 – Present
TEACHING EXPERIENCE	<b>TEACHING ASSISTANT</b> <ul style="list-style-type: none"> <li>▪ Embedded System, Hanyang University</li> <li>▪ VLSI Design, Hanyang University</li> <li>▪ SoC Design, Hanyang University</li> </ul>	Spring 2019 Fall 2018 Spring 2018
AWARDS & SCHOLARSHIPS	<ul style="list-style-type: none"> <li>▪ Hanyang University TA Scholarship</li> <li>▪ Hanyang Graduate School Scholarship (4 semesters)</li> <li>▪ Hanyang Brain Scholarship (2 semesters)</li> <li>▪ Undergraduate Scholarship, Korean Government, Korea Student Aid Foundation</li> <li>▪ Undergraduate Scholarship, Hanyang University (2 semesters)</li> </ul>	Spring 2019 2018-2019 2017 Fall 2016 2012-2013
SERVICE	Review Experience: IEEE Transactions on Communications, IEEE Transactions on Mobile Computing Student Volunteer at ICCV, 2019 Foreign Student Mentorship Program at Hanyang University, 2017	

[CV compiled on 2024-05-02]