Jiwon Lee

Ph.D. in Computer Architecture | Suwon, South Korea
jiwon24.lee@gmail.com | jiwon.lee@yonsei.ac.kr
Website | LinkedIn | Google Scholar | ORCID

I completed my Ph.D. at Yonsei University under the supervision of Professor Won Woo Ro, with a dissertation titled 'High-Performance Address Translation Mechanisms for Graphics Processing Units.' My research interests span a broad range of topics within computer architecture and systems, including (but not limited to) designing efficient CPU and GPU microarchitectures, virtual memory frameworks, scalable memory management methods. To broaden my experience, I am currently working as an engineer at Samsung Electronics.

PROFESSIONAL EXPERIENCE

Staff Engineer	Samsung Electronic Memory Division, Korea	Aug. 2024 - Present
Graduate Research Assistant	Yonsei University, Korea Embedded Systems and Computer Architecture Lab (eSCaL) Advisor: Won Woo Ro	Mar. 2014 - Aug. 2018

EDUCATION

Doctor of Philosophy	School of Electrical and Electronic Engineering, Yonsei University Dissertation: High-Performance Address Translation Mechanisms for Graphics Processing Units (Advisor: Won Woo Ro)	Mar. 2018 - Aug. 2024
Bachelor's Degree	School of Electrical and Electronic Engineering, Yonsei University	Mar. 2014 - Feb. 2018

PUBLICATIONS

Heliostat: Harnessing Ray Tracing Accelerators for Page Table Walks
Yuan Feng, Yuke Li, **Jiwon Lee**, Won Woo Ro, and Hyeran Jeon
(To appear) IEEE/ACM International Symposium on Computer Architecture (ISCA), 2025.

COSMOS: An LLC Contention Slowdown Model for Heterogeneous Multi-core Systems
Yongju Lee, Jaewon Kwon, Cheolhwan Kim, Enhyuk Jang, **Jiwon Lee**, Hyunwuk Lee, and Won Woo Ro
(To appear) IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), 2025.

HashScape: Leveraging Virtual Address Dynamics for Efficient Hashed Page Tables
Won Hur, **Jiwon Lee**, Jaewon Kwon, Minjae Kim, and Won Woo Ro
IEEE Transactions on Computers (TC), 2025.

Marching Page Walks: Batching and Concurrent Page Table Walks for Enhancing GPU Throughput
Jiwon Lee*, Gun Ko, Myung Kuk Yoon, Ipoom Jeong, Yunho Oh, and Won Woo Ro
IEEE International Symposium on High-Performance Computer Architecture (HPCA), 2025.

REC: Enhancing Fine-Grained Cache Coherence Protocol in Multi-GPU Systems
Gun Ko, **Jiwon Lee**, Hongju Kal, Hyunwuk Lee, and Won Woo Ro
Journal of Systems Architecture (JSA), Vol. 160, 103339, Mar. 2025.

Geneva: A Dynamic Confluence of Speculative Execution and In-Order Commitment Windows
Yanghee Lee, **Jiwon Lee**, Jaewon Kwon, Yongju Lee, and Won Woo Ro
IEEE/ACM Design Automation Conference (DAC), 2024.

SnakeByte: A TLB Design with Adaptive and Recursive Page Merging in GPUs
Jiwon Lee*, Ju Min Lee, Yunho Oh, William J. Song, and Won Woo Ro
IEEE International Symposium on High-Performance Computer Architecture (HPCA), 2023.

Early-Adaptor: An Adaptive Framework for Proactive UVM Memory Management
Seokjin Go, Hyunwuk Lee, Junsung Kim, **Jiwon Lee**, Myung Kuk Yoon, and Won Woo Ro
IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), 2023.

Analysis on Memory Access Patterns of Server-Class Workloads in Page- and Cache Line- Granularity
Kyeonghoon Lim, Minjae Kim, **Jiwon Lee**, and Won Woo Ro
International Conference on Electronics, Information, and Communication (ICEIC), 2023.

Performance Analysis of Criticality-Aware Out-of-Order Cores for Exploiting MLP
Yanghee Lee, **Jiwon Lee**, and Won Woo Ro
International Technical Conference on Circuits/Systems, Computers and Communications (ITC-CSCC), 2023.

Adaptive Data Prefetcher with Probability Learning in LLC
Jusin Kim, **Jiwon Lee**, and Won Woo Ro
International Technical Conference on Circuits/Systems, Computers and Communications (ITC-CSCC), 2023.

Reconstructing Out-of-Order Issue Queue
Ipoom Jeong, **Jiwon Lee**, Myung Kuk Yoon, and Won Woo Ro
IEEE/ACM International Symposium on Microarchitecture (MICRO), 2022.

Analysis of DRAM-based Network of DRAM Swap Space Adopting Latency Hiding Technique
Hyoseong Choi, **Jiwon Lee**, Jeonghoon Choi, and Won Woo Ro
International Technical Conference on Circuits/Systems, Computers and Communications (ITC-CSCC), 2022.

PIMCaffe: Functional Evaluation of a Machine Learning Framework for In-Memory Neural Processing Unit
Won Jeon, **Jiwon Lee**, Dongseok Kang, Hongju Kal, and Won Woo Ro
IEEE Access, Vol. 9, pp. 96629-96640, Jul. 2021.

Chapter Six - Deep learning with GPUs
Won Jeon, Gun Ko, **Jiwon Lee**, Hyunwuk Lee, Dongho Ha, and Won Woo Ro
Advances in Computers, Vol. 122, pp. 167-215, 2021.

PATENTS

Computing device and method of operating the same
Won Woo Ro, Minjae Kim, Kyeonghoon Lim, and **Jiwon Lee**
KR 10-2023-0193178

Memory management apparatus and method for UVM
Won Woo Ro, Seokjin Go, Junsung Kim, Hyunwuk Lee, and **Jiwon Lee**
KR 10-2023-0076606

Memory management unit and method of walking page table
Won Woo Ro, **Jiwon Lee**, Ipoom Jeong, Hongju Kal, Gun Ko, and Hyunwuk Lee
KR 10-2022-0175909, US 18/502,058, CN 202311700848.0

Swap memory device providing data and data block, method of operating the same, and method of operating electronic device including the same
Won Woo Ro, Hyoseong Choi, **Jiwon Lee**, and Jeonghoon Choi
KR 10-2022-0145399, US 18/350,148, CN 202311408257.6

Neural network processing method
Won Woo Ro, Hongju Kal, Cheonjun Park, Hyunwuk Lee, Ipoom Jeong, and **Jiwon Lee**
KR 10-2022-0041848

Controller, computing system including the same, and method of creating and searching page table entry for the same
Seongil O, Won Woo Ro, William Jinho Song, and **Jiwon Lee**
KR 10-2021-0054195, US 17/526,391, CN 202210082121.X

ON-GOING RESEARCH – PROJECT NAMES ONLY

Memory Management of Large-Scale Memory Space (Under Review)
Efficient Address Translation Methods for GPUs (Under Review)
Accelerating Sparse Matrix Computations
Exploring Use Cases of CXL Memory Devices
Application of IOMMU Specifications
Identifying Bottlenecks in Serverless Environments
Analysis on Different Sparse Matrix Formats
Improving Unified Virtual Memory in GPUs

PROJECTS

Development of High Performance Multi-GPU Memory System Mar. 2021 - Feb. 2024
Research project at Yonsei University joint with National Research Foundation of Korea

Development and Application of DRAM-based Memory Hierarchies Sept. 2020 - Aug. 2023
Research project at Yonsei University joint with Samsung Electronics

Programmable Neural Network Processors June 2018 - May 2022
Research project at Yonsei University joint with Samsung Research Funding and Incubation Center for Future Technology

PIM Core Technology and System Development for Data-intensive Applications Mar. 2018 - Mar. 2020
Research project at Yonsei University joint with Samsung Electronics

Development of Reconfigurable Artificial Neural Network Accelerator and Instruction Set Architecture Mar. 2018 - Feb. 2019
Research project at Yonsei University joint with Korea Electronics Technology Institute

ACADEMIC ACTIVITIES

External Review Committee
ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), Summer Cycle 2026

Reviewer
ACM Transactions on Architecture and Code Optimization (TACO), 2025

Mentorship
Embedded Systems and Computer Architecture Lab, Yonsei University
Industry-Academic Mentoring Program, Nov. 2024 - Present
Intelligence System and Parallel Computer Architecture Lab Ewha Womans University
Industry-Academic Mentoring Program, Jan. 2025 - Present

Teaching Assistant
EEE6611, System Design and Applications Lab, Yonsei University, Fall 2019
EEE4473, Embedded System Lab, Yonsei University, Spring 2019
EEE3535, Operating Systems, Yonsei University, Fall 2018

SCHOLARSHIPS AND AWARDS

Memory Division Graduate Fellowship Sept. 2023 - Aug. 2024
Samsung Electronics

Excellent Graduate Researcher Scholarship Feb. 2023
Yonsei University

National Scholarship for Science and Engineering Mar. 2014 - Feb. 2018
Korea Student Aid Foundation (KOSAF)

Academic Excellence Award Spring 2014
Yonsei University

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