Hyokeun Lee
Ph.D.
Assistant Professor
Department of Electrical and Computer Engineering
Ajou University, South Korea

✉ hyokeunlee@ajou.ac.kr
G harrylee365@gmail.com
☞ Google Scholar
⌂ relacslab.github.io
in www.linkedin.com/in/hyokeunlee/

RESEARCH INTERESTS

- Disaggregated systems, memory security, memory reliability, non-volatile memory, computer architecture

EDUCATION

•Seoul National University, Seoul, South Korea *Sep. 2016-Aug. 2021*

Ph.D. Electrical and Computer Engineering

– Advisor: Dr. Hyuk-Jae Lee; Co-advisor: Dr. Hyun Kim
– Dissertation: Mitigating Disturbance Errors and Enhancing RMW Performance for PCM

•Seoul National University, Seoul, South Korea *Sep. 2011 - Aug. 2016*

B.S. Electrical and Computer Engineering

WORK EXPERIENCE

•Department of Electrical and Computer Engineering, Ajou University *Mar. 2024 - Present*

Assistant Professor Gyeonggi, South Korea

•Secure and Advanced Computer Architecture Group, North Carolina State University *Feb. 2023 - Jan. 2024*

Postdoctoral researcher Raleigh
– Mentor: Dr. Amro Awad

•Inter-university Research Center, Seoul National University *Sep. 2021 - Feb. 2023*

Postdoctoral researcher Seoul, South Korea
– Mentor: Dr. Hyuk-Jae Lee
– I also served the mandatory military service as a Technical Research Personnel.

PUBLICATIONS

#: co-first author; *: corresponding author(s)

•Conference

– Jihoon Jang, Hyokeun Lee*, Hyun Kim*, "*EDeN: Enabling Low-Power CNN Inference on Edge Devices Using Prefetcher-Assisted NVM Systems*," ACM/IEEE International Symposium on Lower Power Electronics and Design (ISLPED), Aug. 2024.

– Debpratim Adak, Hyokeun Lee, Ben Feinberg, Gwendolyn Voskuilen, Clayton Hughes, Huiyang Zhou, Amro Awad, "*SEFsim: A Statistically-Guided Fast DRAM Simulator*," IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), May. 2024 (Poster).

– Rahaf Abdullah, Hyokeun Lee, Huiyang Zhou, Amro Awad, "*Salus: Efficient Security Support for CXL-Expanded GPU Memory*," International Symposium on High-Performance Computer Architecture (HPCA), Mar. 2024.

– Faiz Alam#, Hyokeun Lee#, Abhishek Bhattacharjee, Amro Awad, "*CryptoMMU: Enabling Scalable and Secure Access Control of Third-Party Accelerators*," IEEE/ACM International Symposium on Microarchitecture (MICRO), Oct-Nov. 2023 (**Best Paper Candidate**).

– Hyokeun Lee, Kwanseok Choi, Hyuk-Jae Lee, Jaewoong Sim, "*SDM: Sharing-enabled Disaggregated Memory System with Cache Coherent Compute Express Link*," International Conference on Parallel Architectures and Compilation Techniques (PACT), Oct. 2023.

– Shubham Nema, Shiva Kaushik Chunduru, Charan Kodigal, Gwendolyn Voskuilen, Scott Hmmert, Hyokeun Lee, Amro Awad, Clayton Hughes, "*ERAS: A Flexible and Scalable Framework for Seamless Integration of RTL models with Structural Simulation Toolkit*," IEEE International Symposium on Workload Characterization (IISWC), Oct. 2023 (Poster).

– Hyokeun Lee, Hyungsuk Kim, Seokbo Shim, Seungyong Lee, Dosun Hong, Hyuk-Jae Lee, Hyun Kim, "*PCMCsim: An Accurate Phase-Change Memory Controller Simulator and its Performance Analysis*," IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), May. 2022.

- Hyeong Gi Seong, Hyokeun Lee, Hyun Kim, Hyuk-Jae Lee, "*Analysis of Hardware Prefetchers Suitable for CNN Applications*," IEEE/IEIE International Conference on Consumer Electronics-Asia (ICCE-Asia), Nov. 2021.
- Hyokeun Lee, Seungyong Lee, Moonsoo Kim, Hyun Kim, Hyuk-Jae Lee, "*IMDB: A Low-Cost In-Module Disturbance Barrier for Mitigating Write Disturbance Errors in Phase-Change Memory*," Design Automation Conference (DAC, *work-in-progress session*), July. 2020.
- Hyokeun Lee, Donghyeon Lee, Hyuk-Jae Lee, "*A Predictive Initialization of Hidden State Parameters in a Hidden Markov Model for Hand Gesture Recognition*," IEEE/IEIE International Conference on Consumer Electronics-Asia (ICCE-Asia), June. 2018.

•**Journal**
- Minseok Seo, Jungi Hyun, Seongho Jeong, Xuan Truong Nguyen, Hyuk-Jae Lee, Hyokeun Lee*, "*OASIS: Outlier-Aware KV Cache Clustering for Scaling LLM Inference in CXL Memory Systems*," IEEE Computer Architecture Letters, 2025 *(Accepted)*
- Hyokeun Lee, Seungyong Lee, Byeongki Song, Moonsoo Kim, Seokbo Shim, Hyuk-Jae Lee, Hyun Kim, "*An In-Module Disturbance Barrier for Mitigating Write Disturbance in Phase-Change Memory*," IEEE Transactions on Computers, April. 2023.
- Hyokeun Lee, Hyuk-Jae Lee, Hyun Kim, "*A Read Disturbance Tolerant Phase Change Memory System for CNN Inference Workloads*," Journal of Semiconductor Technology and Science, Aug. 2022.
- Moonsoo Kim, Hyokeun Lee, Hyun Kim, Hyuk-Jae Lee, "*WL-WD: Wear-Leveling Solution to Mitigate Write Disturbance Errors for Phase-Change Memory*," IEEE Access, Feb. 2022.
- Seungyong Lee, Hyokeun Lee, Hyuk-Jae Lee, Hyun Kim, "*Evaluation of Various Workloads in Filebench Suitable for Phase-change Memory*," IEIE Transactions on Smart Processing & Computing, April. 2021.
- Hyokeun Lee, Hyunmin Jung, Hyuk-Jae Lee, Hyun Kim, "*Bit-width Reduction in Write Counters for Wear Leveling in a Phase-change Memory System*," IEIE Transactions on Smart Processing & Computing, Oct. 2020.
- Jinwoo Park, Hyokeun Lee, Boyeal Kim, Dong-Goo Kang, Seung Oh Jin, Hyun Kim, Hyuk-Jae Lee, "*A Low-Cost and High-Throughput FPGA Implementation of the Retinex Algorithm for Real-Time Video Enhancement*," IEEE Transactions on Very Large Scale Integration Systems, Jan. 2020.
- Hyokeun Lee, Moonsoo Kim, Hyunchul Kim, Hyun Kim, Hyuk-Jae Lee, "*Integration and Boost of a Read-Modify-Write Module in Phase Change Memory System*," IEEE Transactions on Computers, Dec. 2019.
- Sunwoong Kim, Hyunmin Jung, Woojae Shin, Hyokeun Lee, Hyuk-Jae Lee, "*HAD-TWL: Hot Address Detection-based Wear Leveling for Phase-Change Memory Systems with Low Latency*," IEEE Computer Architecture Letters, July. 2019.

•**Patents**
- "*Mitigating Write Disturbance Errors of Phase-Change Memory Module*," US Patent, No. 11462266, Oct. 2022. (Granted)
- "*Semiconductor Memory Device Performing Command Merging and Operating Method Thereof*," US Patent, No. 11055025, July. 2021. (Granted)
- "*Semiconductor Device for Managing Cold Addresses of Nonvolatile Memory Device*," US Patent, No. 10877698, Dec. 2020. (Granted)
- "*Semiconductor Device for Managing Wear Leveling Operation of a Nonvolatile Memory Device*," US Patent, No. 10713159, July. 2020. (Granted)

•**Submitted (current research status)**
- Younghoon Ko, Hyemin Park, Hyuk-Jae Lee, Hyokeun Lee*, IEEE/ACM International Symposium on Microarchitecture (MICRO), 2025, *under review as double-blind*

PROJECT FUNDING GRANTS

•**Development of Secure, High-Performance, and High-Connectivity Chiplet-SoC Architecture**

Sponsor: MOTIE, South Korea　　　　　　　　　　　　　　　　　　　　　　April. 2025 - Dec. 2027
- Role: *PI* as lead organization; Funded (own/total): ₩250M / ₩500M
- Development of secure chiplet architecture
- Reformulation of LLM data structures and development of supporting architectures for chiplet

•**Development of Flash Memory-based AI Processing Unit for On-Device AI**

Sponsor: IITP, South Korea　　　　　　　　　　　　　　　　　　　　　　　April. 2025 - Dec. 2029
- Role: *PI* as joint research organization; Funded (own/total): ₩380M / ₩7,220M
- Development of data filtering architecture for efficient LLM near-storage processing

PROFESSIONAL ACTIVITIES

•**2025**
- Artifact Eval. Chair, IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)
- Reviewer, IEEE Computer Architecture Letters
- Reviewer, IEEE Transactions on Dependable and Secure Computing
- Program Committee, IEEE International Parallel & Distributed Processing Symposium (IPDPS)

- **2024**
  - Reviewer, IEEE Transactions on Computers
  - Reviewer, ACM Transactions on Architecture and Code Optimization
  - Reviewer, Springer The Journal of Supercomputing
  - Program Committee, The 42nd IEEE International Conference on Computer Design (ICCD)
  - Program Committee, Great Lakes Symposium on VLSI (GLSVLSI)
  - Reviewer, International Conference on Electronics, Information, and Communication (ICEIC)

- **2023**
  - Program Committee, The 41st IEEE International Conference on Computer Design (ICCD)
  - Reviewer, IEEE Conference on Artificial Intelligence Circuits and Systems (AICAS)
  - Reviewer, IEIE Transactions on Smart Processing and Computing

- **2022**
  - Program Committee, The 40th IEEE International Conference on Computer Design (ICCD)
  - Reviewer, Elsevier Microelectronics Journal
  - Reviewer, IEEE Conference on Artificial Intelligence Circuits and Systems (AICAS)

- **2021**
  - Reviewer, Material Research Bulletin, Journal, Elsevier
  - Technical Program Committee, IEEE /IEIE International Conference on Consumer Electronics Asia (ICCE-ASIA)
  - Reviewer, IEIE Transactions on Smart Processing and Computing

AWARDS

- Best Paper Runner-Up, MICRO 2023.
- First Prize in Haedong Best Paper Award (Academic Research Work), South Korea, Nov. 2021.

INVITED TALKS

- "*Towards Large-Scale Computing Systems via Resource Disaggregation*," Seoul National University of Science and Technology, South Korea, Dec. 2024
- "*Disaggregation and its Security for Large-Scale Computing Systems*," Korea University, South Korea, Aug. 2023.
- "*CXL-enabled Sharing in a Multi-Host Disaggregated Memory System*," Seoul National University GoGE Workshop: Future Generation Security Computing Systems, Aug. 2023.
- "*Introduction to Computer Architecture Simulators and Use of Gem5*," North Carolina State University (ECE 096), United States, Mar. 2023.
- "*Bitwidth Reduction of Write Counters of Wear Leveling in a Phase-Change Memory System*," KSPC, South Korea, Sep. 2022.
- "*Introduction to Computer Architecture Simulators and Examples*," University of Seoul, South Korea, Jun. 2022.

TEACHING LECTURES

- **VLSI System Design**
  - Forth year undergraduate class
  - Teaching years: 2024, 2025

- **Digital System Design**
  - Third year undergraduate class
  - Teaching years: 2024, 2025

- **Computer Organization and Architecture**
  - Third year undergraduate class
  - Teaching years: 2024, 2025

TECHNICAL SKILLS

Programming: C++, C, Verilog, Python
Architecture Simulators: NVMain, PCMCsim, DRAMsim3, McSimA+, MacSim, gem5, SST
Commercial Software: ModelSim, Vivado, Quartus
Hardware Interface (Transaction Level): AXI-Lite/-Full/-Stream, CXL, PCIe, I2C, JEDEC DDRx
Languages: English (Professional working proficiency), Korean (Native), Chinese (Bilingual)