

Research Interests

Computer Architecture Hardware Acceleration Energy-Efficient System
Near-Data Processing Reconfigurable Architecture VLSI Design

Education

Aug 2025 **Bachelor in Electrical and Electronic Engineering, Yonsei University**, Seoul, South Korea
GPA: 3.83/4.0, Major GPA: 3.92/4.0

Research Experience

Sep 2024 – **Undergraduate Research Assistant**

Present Yonsei University, Department of System Semiconductor Engineering

Advisor: Professor Jaeyong Chung

Lab: Hardware-AI Convergence (HAI) Laboratory

Project: RISC-V Processor Development with Flexible Co-processor Integration

- Designed RISC-V processor with custom ISA framework for senior undergraduate digital design curriculum
- Developed standardized interface protocol for seamless integration of accelerators with modular architecture
- Developing Chisel-based reconfigurable computing array for OpenGeMM acceleration

Aug 2023 – **Undergraduate Research Assistant**

Aug 2024 Yonsei University, Department of Electrical and Electronic Engineering

Advisor: Professor Woo-Young Choi

Lab: High-Speed Circuits & System Laboratory

Project: Photonic AI Accelerator using Silicon Micro Ring Modulator Weight Banks

- Developed FPGA-based digital control systems for Silicon Micro Ring Modulators, leading core digital circuit implementation within research team
- Designed matrix-based algorithm to solve thermal crosstalk, improving control accuracy from 70% to 90% in neural network implementations on IRIS and MNIST datasets
- Designed PIC device models and AI training simulations using Python/MATLAB for system optimization

Publications

Oral Presentation

July 2024 **Kim, Y.-J**, Ji, Y.-J., & Choi, W.-Y. (2024, July). *A simple and efficient thermal crosstalk cancellation technique for photonic weight banks in optic neural networks*. Paper presented at the OSK Summer Annual Meeting, Optics and Photonics Congress 2024, ICC Jeju, Korea

In Progress

2025 **Kim, Y.-J**, & Chung, J. *Dimension-Adaptive Reconfigurable Computing Array for Efficient GeMM Acceleration*

Work Experience

Sep 2024 – **Intern, Samsung Memory Division**, Hwaseong, Gyeonggi-do, South Korea

Present **Department:** Controller Development

Team: Signal Processing Task Group, Algorithm Part

Advisor: Hyunseung Han

Project: AI Storage Solution: Near-Data Processing for SSD-Based Information Retrieval

- Implemented FPGA-based IVF+PQ hardware IP with HLS (High-Level Synthesis), demonstrating potential for 20x acceleration compared to CPU-based solutions
- Modeled hardware accelerator for metadata filtering with prefetching mechanism and scheduling algorithm for multiple Graph IPs to process over one billion data points

Teaching Experience

- Spring 2024 **Teaching Mentor, Introductory Digital Lab**, College of Engineering, Yonsei University
- Guided undergraduate students through FPGA fundamentals to AMBA and HDMI protocols
 - Assisted students in implementing game projects using Sprite movements and FSM on FPGA
- Spring 2022 **Peer Mentor, C++ Algorithm Study Group**, YCC (Yonsei Computer Club)
- Led weekly algorithm study sessions focusing on computational problem-solving and algorithm design
- Spring 2019 **Teaching Mentor, Engineering Chemistry I**, College of Engineering, Yonsei University
- Instructed undergraduate students on the comprehensive curriculum of Engineering Chemistry I
 - Outstanding Mentor Award from students, resulting in activity-based scholarship award

Honors and Awards

IPESK Next Generation Engineer Award

November 2024

Selected as a next-generation engineer by the Institute for Promotion of Engineering and Science of Korea

Semiconductor Track Merit-Based & Academic Excellence Fellowship

Spring 2024, Fall 2023, Spring 2023 \$300 per semester

Spring 2023 - Fall 2024, \$300 monthly stipend for two years

Awarded by Samsung Display and LG Display

Merit-based Scholarship

Coverage of one-third of tuition fees: Fall 2023, Fall 2022, Spring 2019

Coverage of two-third of tuition fees: Spring 2024

Awarded by Yonsei University

Academic Honors

Spring 2019, Fall 2022

GBED Activity-based Scholarship

Fall 2019, \$500

Awarded by Yonsei University

Extracurricular Activities

- Spring 2022 – **Club Group-Leader**, Mentors Club (Yonsei Exchange Students Club)
- Fall 2023
- Provided academic and social support to enhance exchange students' experiences
 - Recognized as one of the club's top-performing members for exceptional student assistance
- May 2022 – **Volunteer**, International Clinic, Yonsei Dawoom Hospital, Pyeongtaek, South Korea
- Aug 2022
- Assisted U.S. military families during medical visits, ensuring their comfort and understanding of the healthcare process
 - Supported foreign children with settling in Korean society by addressing their challenges and providing Korean language lessons
- Aug 2020 – **Firefighter**, Rescue and EMS Team, GongJu Fire Department, GongJu-Si, South Korea
- April 2022
- Served as a primary responder specializing in rescue operations and providing critical medical support
 - Assumed a leadership role within the rescue team for six months responding to over 300 emergency calls

Technical Skills

HW Design Verilog, Xilinx HLS, Synopsys Tools (DC, Verdi, Hspice), Virtuoso Cadence, Chisel(Learning)

Programming C/C++, Python, MATLAB

Miscellaneous Linux, Shell Script, L^AT_EX

Languages

Korean Native

English Fluent (TOEFL: 102)

Additional References

Professor Youngcheol Chae

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Lab: Yonsei Mixed-Signal IC Laboratory

Professor Tae Wook Kim

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Lab: Circuits and Systems Design Lab

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Controller Development, Samsung Memory Division

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Controller Development, Samsung Memory Division

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Additional references are available upon request