

# Hyungseok Kim

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## EDUCATION

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M.S.	2027	Electrical and Electronic Engineering (Expected)	Yonsei University
B.S./B.A	2025	Electrical and Electronic Engineering/Economics (Double Major)	Yonsei University

## RESEARCH INTERESTS

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Quantum Compilers, Quantum Error Correction, Quantum Optimal Control, Quantum Algorithms

## PUBLICATIONS — CONFERENCE PROCEEDINGS

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1. Changheon Lee, Hyungseok Kim, Seungwoo Choi, Youngmin Kim, and Won Woo Ro (2026). “d’ArQ: A QOC Framework with Causality-Aware Grouping and Basis Selection,” *2026 IEEE International Symposium on High Performance Computer Architecture (HPCA)*.
  2. Enhyeok Jang, Hyungseok Kim, Yongju Lee, Jaewon Kwon, Yipeng Huang, and Won Woo Ro (2026). “Toward Scalable Gate-Level Parallelism on Trapped-Ion Processors with Racetrack Electrodes,” *2026 IEEE International Symposium on High Performance Computer Architecture (HPCA)*.
  3. Hyungseok Kim, Enhyeok Jang, Seungwoo Choi, Youngmin Kim, and Won Woo Ro (2025). “QR-Map: A Map-Based Approach to Quantum Circuit Abstraction for Qubit Reuse Optimization,” *The 52nd Annual International Symposium on Computer Architecture (ISCA ’25)*.  
- Merit Academic Paper Award from Yonsei University Graduate School
  4. Enhyeok Jang, Youngmin Kim, Hyungseok Kim, Seungwoo Choi, Yipeng Huang, and Won Woo Ro (2025). “Qubit Movement-Optimized Program Generation on Zoned Neutral Atom Processors,” *The 23rd ACM/IEEE International Symposium on Code Generation and Optimization (CGO ’25)*.
  5. Enhyeok Jang, Dongho Ha, Seungwoo Choi, Youngmin Kim, Jaewon Kwon, Yongju Lee, Sungwoo Ahn, Hyungseok Kim, and Won Woo Ro (2024). “Recompiling QAOA Circuits on Various Rotational Directions,” *International Conference on Parallel Architectures and Compilation Techniques (PACT ’24)*.

## PUBLICATIONS — JOURNAL ARTICLES

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1. Youngmin Kim, Enhyeok Jang, Hyungseok Kim, Seungwoo Choi, Changheon Lee, Donghwi Kim, Woomin Kyoung, Kyujin Shin, and Won Woo Ro (2025). “Distribution-Adaptive Dynamic Shot Optimization for Variational Quantum Algorithms,” *Physical Review Research*, 7(4), 043253.

## WORKSHOP PAPERS

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“Native Gate-Aware QAOA Ansatz”

- The 1st International Workshop on Quantum Data and Machine Learning: Systems, Theory and Hardware (QDML ’25) In conjunction with ICDE ’25 May 2025

“A Dead Gate Elimination for Quantum Programs”

- The 1st HPC/AI Integration with Quantum Computing Workshop (HAIQ ’25) In conjunction with HPCA ’25 Mar. 2025

## PROJECTS

- Optimizing GPU-SSD Integrated System Architecture for Large-Scale Artificial Intelligence Learning  
- Client: Samsung Electronics DS Division Oct. 2025 -
- Research on Quantum Pulse Latency Reduction Through Quantum Optimal Control Framework  
- Client: National Research Foundation of Korea (NRF) Jan. 2025 - Dec. 2025
- Developing a High-Speed Quantum Circuit Simulator that Supports Verification and Testing of Hyperscale Quantum Algorithms  
- Client: Hyundai NGV Jul. 2024 - Oct. 2024

## SCHOLARSHIPS AND AWARDS

### *Fellowships & Scholarships*

- BK (Brain Korea) 21 Research Fellowship 2025 - 2026
- Graduate Student Research Assistant (GSRA) 2025

### *Honors & Awards*

- Merit Academic Paper Award Jan. 2026
- Student-Designed Major Competition 2<sup>nd</sup> prize (with \$360) Nov. 2024
- Academic Honors Feb. 2024
- Micro-Learning Video Contest 4<sup>th</sup> prize (with \$380) Feb. 2023
- Academic Honors Aug. 2022

## WORK AND TEACHING EXPERIENCES

### *Teaching Assistant Experience*

- EEE 4473: Embedded System Lab. (Undergraduate) Spring 2025
- EEE 4610: Electrical and Electronic Engineering Capstone Design (Undergraduate) Spring 2025

### *Paper Review Support*

- The 53rd International Symposium on Computer Architecture (ISCA '26) Jan. 2026
- The 52nd International Symposium on Computer Architecture (ISCA '25) Jan. 2025

## SELECTED COURSEWORK

### **Yonsei University**

- *Quantum Computing*: Quantum Computer and Simulation 1, Quantum Machine Learning, Quantum Computing, Quantum Data Science
- *Computer Architecture*: Computer Architecture, Communication Networks, Operating Systems, Microprocessors, Multicore and GPU Programming, Compiler Design and Optimization
- *Machine Learning*: Intelligent Control, Special Topics in Pattern Recognition
- *Digital System Design*: Digital Microelectronics, System IC Design, Semiconductor Memory Design
- *Financial Engineering/DSGE Modeling*: Financial Econometrics, Dynamic Analysis of Macroeconomy, Quantitative Macroeconomics, AI Assisted Financial Engineering

## SKILL SET

**Technical Qualifications** - Adobe Certified Professional (ACP) in Digital Video Using Adobe Premiere Pro, General Computer User, Level- I (Highest)

**Programming Languages** – C/C++ (OpenMP, CUDA), Python, JavaScript, MATLAB, Assembly Languages (RISC-V, ARM) / **Other Languages** – Verilog, LaTeX, Markdown, HTML, YAML, CSS, Git

## LANGUAGES

Korean (Native), English (Advanced), Spanish (Intermediate), Japanese (Elementary)