# 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

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

## PUBLICATIONS — CONFERENCE PROCEEDINGS

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)*, Forthcoming.

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)*, Forthcoming.

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)*.

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

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*, Forthcoming.

## WORKSHOP PAPERS

"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*                                                   Jun. 2024 - Oct. 2024

## SCHOLARSHIPS AND AWARDS

*Fellowships & Scholarships*
- BK (Brain Korea) 21 Research Fellowship                                        2025 - 2026
- Graduate Student Research Assistant (GSRA)                                    2025

*Honors & Awards*

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| Student-Designed Major Competition | $2^{nd}$ prize (with $360) | Nov. | 2024 |
| Academic Honors | | Feb. | 2024 |
| Micro-Learning Video Contest | $4^{th}$ 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 52nd International Symposium on Computer Architecture (ISCA '25)   Jan. 2025

*Event Staff*
- The 58th IEEE/ACM International Symposium on Microarchitecture (MICRO '25)   Oct. 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 (Listening & Reading), Japanese (Reading)