JAEWOO PARK

Ulsan National Institute of Science and Technology (UNIST)

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EDUCATION

Ulsan National Institute of Science and Technology (UNIST) Mar 2021 - Present
Undergraduate, Department of Computer Science and Engineering

EXPERIENCE

SAFARI Research Group, ETH Zürich Jan 2025 - Present
Research Intern *Zürich, Switzerland*

- PIM Systems and Architectures for Fully-Homomorphic-Encryption.

Intelligent Computing and Codesign Lab, UNIST Mar 2021 - July 2025
Researcher *Ulsan, Korea*

- Published papers on HW/SW Co-Design, PIM architectures and Fully-Homomorphic-Encryption.

Deargen Inc. Jul 2023 - Aug 2023
Research Intern *Seoul, Korea*

- Worked on high-performance computing and ML for computer-aided drug design.

Kurdahi's Lab, UC Irvine Dec 2022 - Mar 2023
Visiting Researcher *Irvine, CA*

- Worked on VLSI design of ReRAM based DNN accelerators.

Extragalactic Astrophysics Laboratory Aug 2021 - Feb 2022
Undergraduate Intern *Ulsan, Korea*

- Performed research about large scale cosmological simulations with data from the JWST.

PUBLICATIONS

1. Harshita Gupta, Mayank kabra, **Jaewoo Park**, Priyam Mehta, Phillip Widdowson, Tathagata Barik, Konstantinos Kanellopoulos, Nisa Bostanci, Juan Gómez-Luna, Antonio J. Peña, Mohammad Sadrosadati and Onur Mutlu, "HE-PIM: Demystifying Homomorphic Operations on a Real-world Processing-in-Memory System", (submitted).

2. Chenghao Quan, Yeongbae Shin, **Jaewoo Park** and Jongeun Lee, "DRAC: A Static Analysis for DRAM Row Activation Count Toward Efficient Processing-in-Memory Code Generation", (submitted).

3. Mayank kabra, Phillip Widdowson, Harshita Gupta **Jaewoo Park**, Priyam Mehta, Rakesh Kumar, Rakesh Nadig, Yu Liang, Mohammad Sadrosadati and Onur Mutlu, "HULK: An Efficient Algorithm for Enabling Fast Bulk Bitwise Operations on Homomorphically Encrypted Data", (submitted).

4. **Jaewoo Park**, Chenghao Quan, and Jongeun Lee, "Hyperdimensional Computing with Encrypted Parameters for High-Throughput Privacy-Preserving Inference", Proceedings of the 31st Asia and South Pacific Design Automation Conference (ASP-DAC), January, 2026.

5. Tairali Assylbekov, Minsang Yu, **Jaewoo Park**, Mingon Kim, Seungsu Kim and Jongeun Lee "SPIMA: Scalable and Cost-Efficient Sparse Matrix Multiplication via Processing in DRAM Array", Proceedings of the 44nd IEEE/ACM International Conference on Computer-Aided Design (ICCAD), October, 2025.

6. Jingyao Zhang*, **Jaewoo Park***, Jongeun Lee and Elaheh Sadredini, "SAIL: SRAM-Accelerated LLM Inference System with Lookup-Table-based GEMV", ArXiv, September, 2025.

7. Hyeonjin Jo, Chaerin Sim, **Jaewoo Park** and Jongeun Lee, "Accelerating Transformers with Fourier-Based Attention for Efficient On-Device Inference", Proceedings of the 20th International SoC Design Conference (ISOCC), October, 2023.

8. **Jaewoo Park**, Chenghao Quan, Hyungon Moon and Jongeun Lee, "Hyperdimensional Computing as a Rescue for Efficient Privacy-Preserving Machine Learning-as-a-Service", Proceedings of the 42nd IEEE/ACM International Conference on Computer-Aided Design (ICCAD), October, 2023.

9. **Jaewoo Park**, Sugil Lee and Jongeun Lee, "NTT-PIM: Row-Centric Architecture and Mapping for Efficient Number-Theoretic Transform on PIM", Proceedings of the 60th ACM/IEEE Design Automation Conference (DAC), July, 2023.

10. Faaiz Asim*, **Jaewoo Park***, Azat Azamat and Jongeun Lee, "Centered Symmetric Quantization for Hardware-Efficient Low-Bit Neural Networks", Proceedings of the 33rd British Machine Vision Conference (BMVC), November, 2022. (* for equal contribution)

11. Azat Azamat, **Jaewoo Park** and Jongeun Lee, "Squeezing Accumulators in Binary Neural Networks for Extremely Resource-Constrained Applications", Proceedings of the 41st IEEE/ACM International Conference on Computer-Aided Design (ICCAD), October, 2022.

PROJECTS

Revolutionizing Secure Computing with Homomorphic Encryption　　　　　May 2023 - Present

- Hyperdimensional Computing algorithms for Efficient Privacy-Preserving Machine Learning.
- Introducing quantization for faster encrypted inference.
- Re-purposing homomoprhic addition for homomoprhic bulk-bitwise computing.

In-Memory Processing for Machine Learning and Beyond　　　　　May 2022 - Present

- Novel DRAM-based Processing-In-Memory architecture for FHE applications.
- Near-bank DRAM architecture and mapping for Sparse Matrix Multiplication.
- Developing static analysis methods for Near-bank Processing-In-Memory architectures.

Accelerating Molecular Dynamics Simulations with CUDA　　　　　Jul 2023 - Aug 2023

- Implementing 3D-RISM theory of molecular solvation with CUDA.
- Integrating custom CUDA routines with AMBER for drug discovery.

Mixed signal VLSI design of ReRAM based DNN Accelerators　　　　　May 2022 - May 2023

- Full custom VLSI design of ReRAM based accelerators using the sky130 technology.
- Verilog-A modeling and characterization of analog ReRAM programming.

HW/SW Co-Design of Ultra Low Resource Convolutional Neural Networks　　　　　Apr 2021 - May 2022

- Quantization methods for sub-4-bit aware CNN training.
- In depth analysis of ultra-low bit quantization on commodity GPU/CPU hardware.
- Novel accumulator architecture and quantization methods for BNN accelerators.
- Optimized pytorch CUDA extension for BNN training and inference.

Redshift Frontier using the James Webb Space Telescope　　　　　Aug 2021 - Feb 2022

- Cosmological simulations using large scale clusters.
- Bayesian inference of high redshift galaxy images from JWST telescope.

PATENTS

1. **Homomoprhic Encryption Operation Method and Device**, Jaewoo Park, Jongeun Lee, Hyungon Moon and Chenghao Quan. December 2023. KR Patent No. 10-2023-0179015, Applied.

2. **Memory Device and an Operation Method Thereof**, Jaewoo Park, Sugil Lee and Jongeun Lee. August 2023. KR Patent No. 10-2023-0110569, Registered.

3. **Apparatus Operating Method for Realizing Quantization Method of Neural Network model and Apparatus of Thereof**, Jaewoo Park, Faaiz Asim and Jongeun Lee. July 2023. KR Patent No. 10-2021-0163588, Applied.

4. **Quantization Method of Neural Network model and Apparatus of Thereof**, Jaewoo Park, Faaiz Asim and Jongeun Lee. July 2023. KR Patent No. 10-2021-0155942, Applied.

TEACHING

Teaching Assistant of Seminar in Computer Architecture   Fall 2025
ETH Zürich

Teaching Assistant of Computer Architecture   Fall 2025
ETH Zürich

Instructor of UNIST EEE326: Tensor Processor Design   Spring 2025, Fall 2024, Spring 2022
Course for master and undergraduate students to make a working example of a DNN accelerator in HLS.

Teaching Assistant of LG Electronics DX Intensive Course   Fall 2021
Teaching LG employees about hands-on examples of natural language models and digital signal processing.

HONORS AND AWARDS

DAC Young Student Fellow Program   Jul 2023
Travel Grant Award

Competition of Computational Relativity and Gravitational Waves   Jan 2022
Winner, hosted by National Institute for Mathematical Sciences & Korea Astronomy and Space Science Institute

UNIST-POSTECH-KAIST Data Science Competition   Dec 2021
Silver Medal

International Olympiad on Astronomy and Astrophysics   Oct 2020
Honorable Mention, National Team of South Korea

Regeneron International Science and Engineering Fair   May 2020
Finalist, National Team of South Korea

SERVICES

Conference Reviewer   2026
IEEE International Symposium on Circuits and Systems (ISCAS)

Conference Reviewer   2026
ACM Architectural Support for Programming Languages and Operating Systems (ASPLOS)

Conference Reviewer   2025
IEEE/ACM International Conference on Computer-Aided Design (ICCAD)

Associate Editor   2024
IEEE Embedded Systems Letters (ESL)

Journal Reviewer   2024
ACM Transactions on Design Automation of Electronic Systems (TODAES)

Conference Reviewer   2024
IEEE International Symposium on Circuits and Systems (ISCAS)

Journal Reviewer   2023
Elsevier Expert Systems with Applications (ESWA)

SKILLS

Programming Languages	C, Fotran (F90), Python, Haskell, Verilog, HLS, Chisel
Libraries	Lattigo, SEAL, numpy, pytorch, IntelMPI, CUDA
Tools	Design Compiler, Virtuoso, SPICE
Languages	Korean (native), English (fluent)
Research Interests	PIM, CGRA, FHE