JAEWOO PARK

Ulsan National Institute of Science and Technology (UNIST)
hecate64@unist.ac.kr ◇ linkedin.com/in/saewoopark ◇ hecate64.github.io

EDUCATION

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

EXPERIENCE

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

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

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 Researcher *Ulsan, Korea*

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

PROJECTS

Revolutionizing Secure Computing with Homomorphic Encryption May 2023 - Present

- Hyperdimensional Computing algorithm for Efficient Privacy-Preserving Machine Learning.

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

- Novel DRAM-based Processing-In-Memory architecture for FHE applications.
- Developing automated Design Space Exploration tools for Processing-In-Memory systems.

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.

PUBLICATIONS

1. **Jaewoo Park**, Chenghao Quan, Hyungon Moon and Jongeun Lee, "Hyperdimensional Computing as a Rescue for Efficient Privacy-Preserving Machine Learning-as-a-Service". (submitted)
2. **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. (accepted)

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

4. 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.

TEACHING

Instructor of EEE326: Tensor Processor Design 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

Journal Reviewer 2023
Elsvier Expert Systems with Applications (ESWA)

SKILLS

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