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 Physics

EXPERIENCE

Intelligent Computing and Codesign Lab, UNIST Dec 2020 - Present
Researcher *Ulsan, Korea*

- Published papers on DNN quantization, Domain-Specific-Architectures and Processing-In-Memory.

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

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

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

In-Memory Processing for Fully Homomorphic Encryption May 2022 - Nov 2022

- Novel DRAM Processing-In-Memory architecture for FHE applications.
- Row-locality aware computation mapping of NTT.

Optimizing accumulators in Neural Network Accelerators Oct 2021 - May 2022

- 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.

Ultra-low-bit quantization of Convolutional Neural Networks Apr 2021 - Apr 2022

- Quantization methods for sub-4-bit quantization aware DNN training.
- In depth analysis of ultra-low bit quantization on commodity GPU/CPU hardware.

PUBLICATIONS

1. **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)
2. 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)

3. 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

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, HPC, CGRA, FHE