DONGHO HA

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I am a Ph.D. student at Yonsei University, studying computer architecture (advisor: Won Woo Ro). My research focuses on optimizing and extending parallel processing units (e.g., GPUs and Domain-Specific Accelerators) to improve performance, energy efficiency, and usability in various high-performance computing applications.

SKILLS

Expertise:
CPU, GPU, and Domain-Specific (Neural Network and Ray Tracing) Accelerator architecture

Programming Language:
C/C++, Python, Verilog HDL

Tool/API/Library:
CUDA, cuBLAS, cuTlass, TensorRT, cuFFT,
OpenCV, Vulkan, Optix, OpenPCL,
GPGPU-Sim, Accel-Sim, Vulkan-Sim

EDUCATION

Yonsei University, Seoul, Korea 2021 - 2024
PhD. in the School of Electrical and Electronic Engineering (Expected, Aug 2024)
Advisor: Won Woo Ro

University of California, Riverside, USA 2023
Junior Specialist in the Department of Electrical and Computer Engineering
Advisor: Hung-Wei Tseng

University of California, Riverside, USA 2022 - 2023
Visiting Scholar in the Department of Electrical and Computer Engineering
Advisor: Hung-Wei Tseng

Yonsei University, Seoul, Korea 2019 - 2021
M.S. in the School of Electrical and Electronic Engineering
Advisor: Won Woo Ro

Yonsei University, Seoul, Korea 2014 - 2019
B.S. in the School of Electrical and Electronic Engineering

PUBLICATIONS

International Conference Papers

- **MAD MAcce: Supporting Multiply-Add Operations for Democratizing Matrix-Multiplication Accelerator**
  Seunghwan Sung, Sujin Hur, Dongho Ha, Sungwoo Kim, Yunho Oh, and Won Woo Ro (The 56th International Symposium on Microarchitecture, MICRO 23)

- **TensorCV: Accelerating Inference-Adjacent Computation Using Tensor Processors**
  Dongho Ha, Won Woo Ro, and Hung-Wei Tseng (The 2023 International Symposium on Low Power Electronics and Design, ISLPED 23)

- **R2D2: Removing ReDunDancy Utilizing Linearity of Address Generation in GPUs**
  Dongho Ha, Yunho Oh, and Won Woo Ro (The 50th International Symposium on Computer Architecture, ISCA 23)

- **Investigation on NVIDIA Ampere GPU Architecture With Reverse Engineering**
  Sujin Hur, Seunghwan Sung, Dongho Ha, Sungwoo Kim, and Won Woo Ro (The 22th International Conference on Electronics, Information, and Communication, ICEIC 23)

- **Detecting Pattern of Warp Register Value Differences in CTA using GPU Compiler**
  Dongho Ha and Won Woo Ro (The 19th International Conference on Electronics, Information, and Communication, ICEIC 20)

Book Chapter

- **Hardware Accelerator Systems for Artificial Intelligence and Machine Learning**
  Won Jeon, Gun Ko, Jiwon Lee, Hyunwuk Lee, Dongho Ha, and Won Woo Ro (Advances in Computers, Elsevier, vol. 122: Academic Press; 2020, Chapter 6)

- **Trends of High-End Graphic Processing Unit Development**
  Dongho Ha, Hyunwuk Lee, Jiwon Lee, Hyun Jae Oh, Won Jeon, Yunho Oh, Won Woo Ro (Korean Information Science Society, 2019)

Patent

- **Method and Apparatus with Repeated Multiplication**
  Dongho Ha and Won Woo Ro (application filed in Korea, 2022, and the US, 2023)

On-Going Projects

- **Proposing Datacenter GPU Management Strategy (with SKKU)**

- **Accelerating Ray Tracing on GPUs**

- **Extending Ray Tracing Cores (with UCR and UBC)**

- **Extending Matrix Multiplication Units (with UCR and Intel)**

- **Low-Precision Neural Network Training on GPUs (with EPFL)**

PROFESSIONAL EXPERIENCE

Industry Projects

- Samsung 2021-2022
  Analysis and Development of GPU Architecture for HPC Workloads

- Samsung 2019-2020
  Development of Data Center Many-core NPU Architecture and Memory Interface

- SK Hynix 2019-2020
  Development of CPU-GPU Heterogeneous Computing Simulation Environment

- Samsung 2017-2018
  Development of Multi-GPU Based High Speed Ray-Tracing Engine

Paper Review

- **IEEE Computer Architecture Letters (CAL)** 2023
- **ACM Transactions on Architecture and Code Optimization (TACO)** 2023

Teaching Assistant, Yonsei University

- **EEE3530: Computer Architecture** 2021 Spring
- **EEE4473: Embedded System Lab.** 2020 Spring