Seonjin Na

Postdoctoral Fellow at Georgia Tech
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Research Interests

GPU/NPU Architecture, Hardware-based Security for Accelerators, Systems for Machine Learning

Employment

Georgia Institute of Technology *June. 2023 - present*
Postdoctoral Fellow, School of Computer Science
Supervisor: Hyesoon Kim

Microsoft Research Asia *Mar. 2019 - June. 2019*
Research Intern
Supervisors: Lintao Zhang & Yunxin Liu

Education

KAIST *Mar. 2018 - Feb. 2023*
Doctor of Philosophy, School of Computing
Advisor: Jaehyuk Huh

KAIST *Mar. 2016 - Feb. 2018*
Master of Science, School of Computing
Advisor: Jaehyuk Huh

Sogang University *Mar. 2012 - Feb. 2016*
Bachelor of Science, Computer Science
Summa Cum Laude

Publications

[1] **Seonjin Na**, Geonhwa Jeong, Byunghoon Ahn, Jeffrey Young, Tushar Krishina, Hyesoon Kim, Understanding Performance Implications of LLM Inference on CPUs, *IEEE International Symposium on Workload Characterization* (**IISWC**), Sep 2024.

[2] Euijun Chung, **Seonjin Na**, Hyesoon Kim, Allegro: GPU Simulation Acceleration for Machine Learning Workloads, *MLArchSys Workshop in the 51th International Symposium on Computer Architecture* (**MLArchsys Workshop in ISCA**), June 2024.

[3] Yuan Feng, **Seonjin Na**, Hyesoon Kim, and Hyeran Jeon, Barre Chord: Efficient Virtual Memory Translation for Multi-Chip-Module GPUs, *the 51th International Symposium on Computer Architecture* (**ISCA**), June 2024.

[4] **Seonjin Na**, Jungwo Kim, Sunho Lee, and Jaehyuk Huh, Supporting Secure Multi-GPU Computing with Dynamic and Batched Metadata Management, *the 30th IEEE International Symposium on High-Performance Computer Architecture* (**HPCA**), March 2024.

[5] Jungwoo Kim, **Seonjin Na**, Sanghyeon Lee, Sunho Lee, and Jaehyuk Huh, Improving Data Reuse in NPU On-chip Memory with Interleaved Gradient Order for DNN Training, *the 56th IEEE/ACM International Symposium on Microarchitecture* (**MICRO**), October 2023.

[6] Sunho Lee, **Seonjin Na**, Jungwoo Kim, Jongse Park, and Jaehyuk Huh, Tunable Memory Protection for Secure Neural Processing Units, *the 40th IEEE International Conference on Computer Design* (**ICCD**), October 2022.

[7] Sunho Lee, Jungwoo Kim, **Seonjin Na**, Jongse Park, and Jaehyuk Huh, TNPU: Supporting Trusted Execution with Tree-less Integrity Protection for Neural Processing Unit, *the 28th IEEE International Symposium on High-Performance Computer Architecture* (**HPCA**), Feburary 2022.

[8] **Seonjin Na**, Sunho Lee, Yeonjae Kim, Jongse Park, and Jaehyuk Huh, Common Counters: Compressed Encryption Counters for Secure GPU Memory, *the 27th IEEE International Symposium on High-Performance Computer Architecture* (**HPCA**), Feburary 2021.

Patents

[1] **Dynamic One-time Pad Table Management for Secure Multi-GPU Communication**
Jaehyuk Huh, **Seonjin Na**, Jungwoo Kim, Sunho Lee
Korea Patent; Pending

[2] **Improving the Utilization of NPU On-chip Memory with Computation Rearrangement for DNN Training**
Jaehyuk Huh, Jungwoo Kim, **Seonjin Na**, Sanghyeon Lee, Sunho Lee
Korea Patent; Pending

[3] **Apparatus and Method for Providing Secure Execution Environment for NPU**
Jaehyuk Huh, Sunho Lee, **Seonjin Na**
US Patent (With Samsung Electronics); Pending

[4] **Hardware-based Security Architecture for Trusted Neural Processing Unit**
Jaehyuk Huh, Sunho Lee, **Seonjin Na**
Korean Patent (With Samsung Electronics); Filing Date: 2021/07/23

[5] **Efficient Encryption Method and Apparatus for Hardware-based Secure GPU Memory**
Jaehyuk Huh, **Seonjin Na**, Sunho Lee, Yeonjae Kim, and Jongse Park
Korea Patent; Filing Date: 2020/11/23; Issued Date: 2022/02/16

Awards and Honors

Best Paper Award *2022*
· TNPU: Supporting Trusted Execution with Tree-less Integrity Protection for Neural Processing Unit, 3th place

National Scholarship *Mar. 2016 - 2023 Feb*
· KAIST

Smumma Cum Laude *Feb. 2016*
· Sogang University

Gold Prize *Nov. 2015*
· The 2015 ACM-ICPC Asia Daejeon Regional Contest 4th place

Honorable Mention *Nov. 2013*
· The 2013 ACM-ICPC Asia Daejeon Regional Contest 13th place

Academic Scholarship, 8 semesters *Mar. 2012 - Sep. 2015*
· Sogang University

Academic Services

Reviewer
· ACM Transactions on Computer Systems (TOCS) 2024
· ACM Transactions on Architecture and Code Optimization (TACO) 2024
· High Performance Computing, Networking, Storage, and Analysis (SC) 2024
· IEEE Transactions on Dependable and Secure Computing (TDSC) 2023

· IEEE Computer Architecture Letter (CAL) 2023

Program Committee

· IEEE International Parallel & Distributed Processing Symposium (IPDPS) 2025
· High Performance Computing, Networking, Storage, and Analysis (SC) 2024

Travel Grant Chair

· Architectural Support for Programming Languages and Operating Systems (ASPLOS) 2025

Artifact Evaluation Committee

· EuroSys 2025, ASPLOS 2025, MICRO 2024, ISCA 2024, USENIX ATC 2024, USENIX OSDI 2024

Web Chair

· IEEE Computer Society TCuARCH
· Vortex Workshop at IEEE/ACM International Symposium on Microarchitecture (MICRO) 2024

Teaching Experience

KAIST

· CS510 Computer Architecture: Spring 2020
· CS230 System Programming: Fall 2016, Spring 2017, Fall 2018, Fall 2020
· CS311 Computer Organization: Fall 2019

Sogang University

· Introduction to C Programming: Winter 2014

SKILLS

· **Programming Languages**: C/C++, Go, CUDA, Python, Java
· **Library/Frameworks**: NVBit, Pytorch, Tensorflow
· **Simulators**: GPGPU-Sim, MGPU-Sim, Sparseloop, Gem5, Gem5-gpu, Scale-Sim, SST, ChampSim, Macsim