

SEONJIN NA

Postdoctoral Fellow

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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)*, February 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)*, February 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	<i>2022</i>
· TNPU: Supporting Trusted Execution with Tree-less Integrity Protection for Neural Processing Unit, 3th place	
National Scholarship	<i>Mar. 2016 - 2023 Feb</i>
· KAIST	
Summa Cum Laude	<i>Feb. 2016</i>
· Sogang University	
Gold Prize	<i>Nov. 2015</i>
· The 2015 ACM-ICPC Asia Daejeon Regional Contest 4th place	
Honorable Mention	<i>Nov. 2013</i>
· The 2013 ACM-ICPC Asia Daejeon Regional Contest 13th place	
Academic Scholarship, 8 semesters	<i>Mar. 2012 - Sep. 2015</i>
· 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