

# Jeonghyun Woo

PH.D. STUDENT · ELECTRICAL AND COMPUTER ENGINEERING · THE UNIVERSITY OF BRITISH COLUMBIA (UBC)

4025, 2332 Main Mall, Vancouver, BC, Canada V6T 1Z4

☎ (+1) 778-929-7902 | ✉ [jhwoo36@ece.ubc.ca](mailto:jhwoo36@ece.ubc.ca) | 🌐 [jeonghyunwoo0306.github.io](https://jeonghyunwoo0306.github.io) | 📄 [jeonghyunwoo0306](#) | 🔗 [LinkedIn](#) | 📖 [Google Scholar](#)

## Research Interests

Computer Architecture and Systems, Security, Memory Systems, and AI/ML, with specific emphasis on the following areas:

- **Memory Security:** Enhancing the security and reliability of memory systems by uncovering fundamental vulnerabilities such as RowHammer, Denial-of-service (DoS), and timing side channels, and developing efficient and low-overhead mitigation mechanisms. I am also interested in extending these efforts to emerging memory technologies such as CXL and processing-in-memory (PIM) architectures.
- **AI/ML Security:** Investigating security risks in machine learning systems stemming from system and hardware level vulnerabilities. My research examines threats such as side channel leakage from system level optimizations (e.g., speculative decoding) and vulnerabilities in large language models (LLMs), and develops principled defenses to address them.
- **Systems for ML:** Advancing the efficiency of machine learning inference through architectural and systems-level optimizations, including speculative decoding and adaptive batching mechanisms.

## Education

### The University of British Columbia (UBC)

PH.D. IN ELECTRICAL AND COMPUTER ENGINEERING

Vancouver, BC, Canada

Sep. 2022 - May. 2026 (Expected)

- Advisor: [Prof. Prashant Nair](#)
- **Dissertation:** Secure and Low-Overhead RowHammer Mitigations for Scalable Memory Systems
- GPA: 4.00/4.00

### Hanyang University (HYU)

M.S. IN ELECTRONICS AND COMPUTER ENGINEERING

Seoul, South Korea

Mar. 2018 - Feb. 2020

- Advisor: [Prof. Ki-Seok Chung](#)
- **Dissertation:** Row-hammering Mitigation Architecture for High Reliable DRAM
- GPA: 4.00/4.00

### Hanyang University (HYU)

B.S. IN ELECTRONIC ENGINEERING

Seoul, South Korea

Mar. 2012 - Feb. 2018

- Advisor: [Prof. Ki-Seok Chung](#)
- **Dissertation:** Implementation of an FPGA-based CNN Accelerator using SDSoC
- GPA: 3.89/4.00 (Graduating with Honors - Summa Cum Laude)

## Publications

### PREPRINTS AND IN SUBMISSION

- [P.2] **Jeonghyun Woo**, Junsu Kim, Aamer Jaleel, and Prashant J. Nair. “Loaded Dices: Solving the Non-Selection Problem for Scalable Probabilistic RowHammer Defense”. In submission at 53rd Annual International Symposium on Computer Architecture (ISCA’26). 2025.
- [P.1] Zachary Coalson, **Jeonghyun Woo**, Chris S. Lin, Joyce Qu, Yu Sun, Shiyang Chen, Lishan Yang, Gururaj Saileshwar, Prashant J. Nair, Bo Fang, and Sanghyun Hong. “PrisonBreak: Jailbreaking Large Language Models with at Most Twenty-Five Targeted Bit-flips”. In submission at the 35th USENIX Security Symposium (USENIX Security’26). 2025. [\[Arxiv\]](#)

### CONFERENCE PUBLICATIONS

- [C.5] **Jeonghyun Woo**, Joyce Qu, Gururaj Saileshwar, and Prashant J. Nair. “When Mitigations Backfire: Timing Channel Attacks and Defense for PRAC-Based Rowhammer Mitigations”. In 52nd Annual International Symposium on Computer Architecture (ISCA’25). June 2025. (Acceptance Rate: 23.1%). [\[Paper\]](#) [\[Code\]](#) [\[Slides\]](#)  
[\[Artifact Evaluated: Available, Functional, Reproduced\]](#)
- [C.4] **Jeonghyun Woo**, Shaopeng (Chris) Lin, Prashant J. Nair, Aamer Jaleel, and Gururaj Saileshwar. “QPRAC: Towards Secure and Practical PRAC-based Rowhammer Mitigation using Priority Queues”. In 31st International Symposium on High-Performance Computer Architecture (HPCA’25). Mar. 2025. (Acceptance Rate: 21.0%). [\[Paper\]](#) [\[Code\]](#) [\[Slides\]](#)  
[\[Artifact Evaluated: Available, Functional, Reproduced\]](#)  
[\[Distinguished Artifact Award\]](#)
- [C.3] **Jeonghyun Woo** and Prashant J. Nair. “DAPPER: A Performance-Attack-Resilient Tracker for RowHammer Defense”. In 31st International Symposium on High-Performance Computer Architecture (HPCA’25). Mar. 2025. (Acceptance Rate: 21.0%). [\[Paper\]](#) [\[Slides\]](#)
- [C.2] **Jeonghyun Woo**, Gururaj Saileshwar, and Prashant J. Nair. “Scalable and Secure Row-Swap: Efficient and Safe Row Hammer Mitigation in Memory Systems”. In 29th International Symposium on High-Performance Computer Architecture (HPCA’23). Feb. 2023. (Acceptance Rate: 25.0%). [\[Paper\]](#) [\[Code\]](#) [\[Slides\]](#)  
[\[Artifact Evaluated: Available, Functional, Reproduced\]](#)  
[\[Best Paper Award: One of Two Best Papers in 364 Submissions\]](#)

- [C.1] Kwangrae Kim, **Jeonghyun Woo**, Junsu Kim, and Ki-Seok Chung. “**HammerFilter: Robust Protection and Low Hardware Overhead Method for RowHammer**”. In *39th International Conference on Computer Design (ICCD’21)*. Oct. 2021. (Acceptance Rate: 24.4%). [Paper] [Slides] [Video]

## WORKSHOP PUBLICATIONS AND POSTERS

- [W.3] Chris S. Lin, **Jeonghyun Woo**, Prashant J. Nair, Gururaj Saileshwar. “**CnC-PRAC: Coalesce, not Cache, Per Row Activation Counts for an Efficient in-DRAM Rowhammer Mitigation**”. *Fifth Workshop on DRAM Security (DRAMSec’25) co-located with ISCA 2025*. June 2025. [Paper]
- [W.2] Shih-Lien Lu, **Jeonghyun Woo**, Prashant J. Nair. “**Counterpoint: One-Hot Counting for PRAC-Based RowHammer Mitigation**”. *Fifth Workshop on DRAM Security (DRAMSec’25) co-located with ISCA 2025*. June 2025. [Paper]
- [W.1] Kwangrae Kim, Junsu Kim, **Jeonghyun Woo**, and Ki-Seok Chung. “**HammerFilter: Robust Protection and Low Hardware Overhead Method for Row-Hammering**”. *Work-in-Progress (WIP) poster in 58th Design Automation Conference (DAC’21)*. Dec. 2021. [Poster]

## DOMESTIC (KOREAN) CONFERENCE PUBLICATIONS

- [D.2] **Jeonghyun Woo** and Ki-Seok Chung. “**A Method to Find the Optimal Probability for Probability-driven Additional Row Refresh to Prevent DRAM Row Hammering**”. In *The Korean Institute of Communications and Information Sciences Winter Conference*. Jan. 2019.
- [D.1] Changwoo Lee\*, **Jeonghyun Woo**\*, Sang-Soo Park, and Ki-Seok Chung. “**Implementation of an FPGA-based CNN Accelerator using SDSoc**”. In *The Korean Institute of Communications and Information Sciences Fall Conference*. Nov. 2017. (\*Equal Contribution). [Code: 300+ Stars] [Outstanding Paper Award]

## Honors and Awards

2023	<b>HPCA 2023 Best Paper Award</b> → One of Two Best Papers in 364 Submissions	Canada
2025	<b>HPCA 2025 Distinguished Artifact Award</b>	USA
2025	ISCA Student Travel Grant	Japan
2023, 2025	HPCA Student Travel Grant	Canada and USA
2022-2025	Faculty of Applied Science Graduate Award, University of British Columbia (UBC) → \$24,800 CAD in Total	Canada
2018-2019	Hanyang Graduate School Scholarship → 70% of Tuition (≈ \$9,200 CAD per Year)	South Korea
2016, 2017	Hanyang Academic Excellence Award → Top 1% ranked in University (≈15,000 Students)	South Korea
2016	Hanyang Academic Excellence Award → Top 3% ranked in University (≈15,000 Students)	South Korea
2016-2017	Hanyang Alumni Association Scholarship → Full Tuition (≈\$10,000 CAD per Year)	South Korea
2016	Excellent Tutor Award in Engineering Mathematics Tutoring Program, Hanyang University (HYU)	South Korea
2012-2013	Hanyang University Scholarship → Full Tuition (≈\$10,000 CAD per Year)	South Korea

## Experience

### Systems and Architectures (STAR) Lab, The University of British Columbia (UBC)

Vancouver, BC, Canada  
Sep. 2022 - Present

GRADUATE RESEARCH ASSISTANT

- Advisor: Prof. Prashant Nair
- Conducting research on computer architecture, security, memory systems, and AI/ML.

### The University of British Columbia (UBC)

Vancouver, BC, Canada  
Sep. 2022 - Apr. 2025

GRADUATE TEACHING ASSISTANT

- Computer Architecture (CPEN 411): Fall 2022, Fall 2023, and Fall 2024
- Digital Systems and Microcomputers (CPEN 312): Spring 2025

### Architecture Research Group (ARG), NVIDIA Research

Westford, MA, USA  
May. 2024 - Aug. 2024

RESEARCH INTERN

- Manager: Dr. David Nellans and Mentor: Dr. Aamer Jaleel
- Explored secure and low-overhead Per Row Activation Counting (PRAC)-based RowHammer mitigations.

### Vertical Systems Research (VSR), Micron Technology

Folsom, CA, USA  
May. 2023 - Aug. 2023

SYSTEMS RESEARCH ENGINEERING INTERN

- Manager: Ameen Akel and Mentor: Dr. Chun-Yi Liu
- Explored RowHammer solutions for future High-Bandwidth Memory (HBM).

### Systems Platform Research Group, University of Illinois Urbana-Champaign (UIUC)

Champaign, IL, USA  
Aug. 2020 - Jan. 2021

GRADUATE RESEARCH ASSISTANT

- Advisor: Prof. Jian Huang
- Investigated integration of Non-Volatile Memory (NVM) into programmable switches and GPUs.

## Embedded System on Chip (ESoC) Lab, Hanyang University (HYU)

GRADUATE RESEARCH ASSISTANT

- Advisor: Prof. Ki-Seok Chung
- Proposed reliable and low-overhead mechanisms for RowHammer mitigation and retention-aware refresh in highly scaled DRAMs.
- Implemented an FPGA-based Foveated Rendering decoder using Verilog for an industry-funded project with LG Display.

Seoul, South Korea

Mar. 2018 - Feb. 2020

## Hanyang University (HYU)

GRADUATE TEACHING ASSISTANT

- VLSI Engineering (ELE 3081): Fall 2019
- SoC Design (ITE 4003): Spring 2018

Seoul, South Korea

Mar. 2018 - Dec. 2019

# Teaching and Mentoring Experience

## TEACHING EXPERIENCE

### Computer Architecture (CPEN 411)

TEACHING ASSISTANT

University of British Columbia (UBC)

2022 - 2024

- Led labs/tutorials, implemented auto graders for assignments, held office hours, and graded exams and assignments.

### Digital Systems and Microcomputers (CPEN 312)

TEACHING ASSISTANT

University of British Columbia (UBC)

Jan. 2025 - Apr. 2025

- Led labs, held office hours, and graded exams and assignments.

### VLSI Engineering (ELE 3081)

TEACHING ASSISTANT

Hanyang University (HYU)

Sep. 2019 - Dec. 2019

- Led labs, held office hours, and graded exams and assignments.

### SoC Design (ITE 4003)

TEACHING ASSISTANT

Hanyang University (HYU)

Mar. 2018 - Jun. 2018

- Developed lab assignments on Altera FPGA boards, led labs, and graded exams and assignments.

## MENTORING EXPERIENCE

### Junsu Kim

PH.D. STUDENT

University of British Columbia (UBC)

Jan. 2020 - Current

- Mentored undergraduate research on RowHammer security, first presented as a Work-in-Progress poster at **DAC'21** and later published at **ICCD'21**.
- Currently mentoring Ph.D. research on efficient LLM inference.

### Kwangrae Kim

PH.D. STUDENT

Hanyang University (HYU)

Jan. 2019 - Dec. 2021

- Guided Ph.D. research on RowHammer security, initially presented as a Work-in-Progress poster at **DAC'21** and subsequently published at **ICCD'21**.

# Talks

Nov. 2025 **Towards Secure and Scalable Memory Systems: From RowHammer Attacks to Hardware-Induced LLM Jailbreaks**, CASYS Seminar @ KAIST

Remote

June 2025 **When Mitigations Backfire: Timing Channel Attacks and Defense for PRAC-Based RH Mitigations**, ISCA'25

Tokyo, Japan

Mar. 2025 **QPRAC: Towards Secure and Practical PRAC-based Rowhammer Mitigation using Priority Queues**, HPCA'25

Las Vegas, USA

Mar. 2025 **DAPPER: A Performance-Attack-Resilient Tracker for RowHammer Defense**, HPCA'25

Las Vegas, USA

Aug. 2024 **Towards Secure and Low-Overhead PRAC-Based RowHammer Mitigations**, End-of-Intern Talk at NVIDIA

Westford, USA

Aug. 2023 **RowHammer Mitigations for Future High-Bandwidth Memory**, End-of-Intern Talk at MICRON

Folsom, USA

Feb. 2023 **Scalable and Secure Row-Swap: Efficient and Safe Row Hammer Mitigation in Memory Systems**, HPCA'23

Montreal, Canada

Nov. 2017 **Implementation of an FPGA-based CNN Accelerator using SDSoC**, KICS'17 Fall Conference

Daegu, South Korea

# Academic Service

## Program Committee Member

- 2026 IEEE International Symposium on High-Performance Computer Architecture (HPCA 2026)

## Artifact Evaluation Committee Member

- 2025 IEEE International Symposium on Workload Characterization (IISWC 2025)

## Invited Reviewer

- IEEE Transactions on Very Large Scale Integration (VLSI) Systems (TVLSI) 2025

## Student Volunteer

- SPICE Workshop Co-Located with MICRO 2025

- 2024 IEEE International Symposium on Workload Characterization (IISWC 2024)
- 2023 International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2023)

## Academic Projects

### Investigating the Potential of Data Compression for Optimized LLC Replacement

*Advanced Computer Architecture*

THE UNIVERSITY OF BRITISH COLUMBIA (UBC), INSTRUCTOR: PROF. MIESZKO LIS

*Jan. 2023 - Apr. 2023*

- Conducted a comprehensive evaluation of existing LLC replacement methods to assess their effectiveness and limitations.
- Demonstrated 72.7% of cache lines are compressible by 10B or more, showing the potential of using compression for better replacement policies.
- Proposed a preliminary compression-assisted replacement method to optimize performance while minimizing storage overhead.

### Revisiting Address Translation on Intel Optane DC PMEM using Big-Memory Applications

*Graduate Operating Systems*

THE UNIVERSITY OF BRITISH COLUMBIA (UBC), INSTRUCTOR: PROF. MARGO SELTZER

*Sep. 2022 - Dec. 2022*

- Quantified address translation overhead in Optane DC PMEM systems using graph processing, HPC, and genomics workloads.
- Showed significant overhead with 4KB pages and demonstrated huge pages reduce overhead for applications sized tens of GB.

### Implementing Forward Operation of a Modified LeNet-5 in CUDA

*Applied Parallel Programming*

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN (UIUC)

*Nov. 2020 - Dec. 2020*

- Implemented five optimized forward-pass of convolutional layers using CUDA by leveraging shared memory, constant memory, and loop unrolling.
- Performed performance analysis with GPU performance profiling tools Nsight-Systems and Nsight-Compute.
- Source Code: [https://github.com/jeonghyunwoo0306/ece408PJ\\_Fa2020](https://github.com/jeonghyunwoo0306/ece408PJ_Fa2020)

### 32-Bit 5-Stage Pipelined MIPS Processor

*Computer Architecture*

HANYANG UNIVERSITY (HYU)

*Apr. 2016 - Jun. 2016*

- Implemented a 32-bit 5-stage pipelined MIPS processor using Verilog.
- Performed an FPGA demonstration on Xilinx ZedBoard.

### 8-Bit LCD Password Timer

*Microprocessor*

HANYANG UNIVERSITY (HYU)

*Nov. 2013 - Dec. 2013*

- Implemented an 8-bit LCD password timer using Assembly Language.

## Skills

**Programming Languages** C/C++, Python, Perl, CUDA, Verilog, Bash Script, Assembly Language, Go

**Simulators** Ramulator, ChampSim, Gem5, DRAMSim2, GPGPU-Sim, MGPUSim

**Tools** Pin, SimPoint, Xilinx Vivado, Xilinx SDSoc, Intel Quartus

## Relevant Coursework

- Advanced Computer Architecture, UBC
- Graduate Operating Systems, UBC
- Applied Parallel Programming, UIUC
- SoC Design, HYU
- Embedded System Design, HYU
- VLSI Engineering, HYU
- Computer Architecture, HYU
- Operating Systems, HYU
- Microprocessor, HYU
- Data Structures, HYU
- Digital Logic Design, HYU