

JIWON CHOE

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<https://jiwon-choe.github.io>

RESEARCH INTERESTS

My Ph.D. research focuses on the hardware and software co-design of concurrent data structures and data-intensive algorithms with emerging memory technologies, such as near-data-processing, in-memory computing, and byte-addressable non-volatile memory. This is a challenging problem, for new data structures and algorithms must preserve the high concurrency and strong correctness guarantees of existing data structures and algorithms, but at the same time take full advantage of the interesting features and work around the limitations introduced by the new memory technologies.

EDUCATION

Brown University, Providence, RI, USA

08/2016 - present

Ph.D. Candidate in **Computer Science**

Sc.M. in Computer Science (05/2018)

Advisors: Professors Iris Bahar & Maurice Herlihy

Rice University, Houston, TX, USA

08/2009 - 05/2013

B.S.E.E. in Electrical Engineering, *cum laude*

B.A. in Computer Science, *cum laude*

PUBLICATIONS

Jiwon Choe, Amy Huang, Tali Moreshet, Maurice Herlihy, R. Iris Bahar.

Concurrent Data Structures with Near-Data-Processing: an Architecture-Aware Implementation. In *31st ACM Symposium on Parallelism in Algorithms and Architectures (SPAA 2019)*.

<https://dl.acm.org/citation.cfm?id=3323191>

This empirical evaluation of NDP-based concurrent data structures provides insight into memory access patterns of data structures and identifies the minimal hardware support needed in order to increase throughput and reduce energy consumption.

Jiwon Choe, Tali Moreshet, R. Iris Bahar, Maurice Herlihy.

Attacking Memory-Hard `scrypt` with Near-Data-Processing (extended abstract). In *The International Symposium on Memory Systems (MEMSYS 2019)*.

<https://dl.acm.org/citation.cfm?id=3357570>

Memory-hard cryptographic functions exploit the non-trivial memory access costs of DRAM to hinder brute-force security attacks. This preliminary investigation focuses on `scrypt`, a widely used memory-hard key-derivation function, to look into how compute-capable memory may impact the security of such memory-hard functions.

OPEN SOURCE TOOLS

Brown-SMCSim: `gem5` full-system simulator for near-data-processing

<https://github.com/jiwon-choe/Brown-SMCSim>

A `gem5` full-system simulator that includes the architecture support and full software stack for near-data-processing. Extended from Azarkhish *et al.*'s SMCSim project. Used for evaluation in SPAA '19 and MEMSYS '19 papers.

WORK EXPERIENCE

Software Engineer at **Oracle**, Santa Clara, CA 07/2013 - 12/2015
Single Server Management – Hardware Management Pack
Developed cross-platform, cross-OS software for monitoring and maintaining the status of various hardware components on Oracle servers.

HONORS & AWARDS

2019 **Best Student Presentation Award**
The International Symposium on Memory Systems (MEMSYS 2019)
2018 **Cadence Women in Tech Scholarship**
\$5,000 award for women with strong academic record and leadership/passion in technology
2013 **Tau Beta Pi**, School of Engineering, Rice University
2012 **Eta Kappa Nu**, ECE Department, Rice University

TEACHING EXPERIENCE

ENGN 1630: Digital Electronics Systems Design Brown University
Graduate Teaching Assistant Fall 2019
Responsibilities include teaching lectures when professor is away on travel, making problem sets & exams, grading.
ELEC 220: Fundamentals of Computer Engineering Rice University
Lab Assistant Spring 2011
Helped organize and proceed labs on: digital logic circuits and assembly language.
ELEC 241: Fundamentals of Electrical Engineering I Rice University
Course Assistant Fall 2011
Held weekly help sessions for problem sets on: time and frequency domain signal analysis, analog and digital signal processing, and signal transmission.
ELEC 242: Fundamentals of Electrical Engineering II Rice University
Course Assistant Spring 2012
Held weekly help sessions for problem sets on: basic electronic devices, circuits, and electromechanical systems.

CONFERENCE & WORKSHOP PRESENTATIONS

10/2019 **Hybrid Skiplists: Combining the Best of Near-Data-Processing and Lock-Free Algorithms**
Student Research Competition (at MICRO-52)
Career Workshop for Women and Minorities in Computer Architecture (at MICRO-52)
10/2019 **Attacking Memory-Hard script with Near-Data-Processing**
The International Symposium on Memory Systems (MEMSYS 2019)
Received the Best Student Presentation Award
06/2019 **Concurrent Data Structures with Near-Data-Processing: an Architecture-Aware Implementation**
31st ACM Symposium on Parallelism in Algorithms and Architectures (SPAA 2019)
01/2019 **Hardware-Software Coordination for High-Performance Concurrent Data Structures with Near-Data-Processing**
2019 Boston Area Architecture Workshop
01/2018 **Managing Concurrent Data Structures with Processing-In-Memory**
2018 Boston Area Architecture Workshop
10/2017 **Managing Concurrent Data Structures with Processing-In-Memory**
Career Workshop for Women and Minorities in Computer Architecture (at MICRO-50)

SERVICES

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| 2018-current | 1st year PhD student mentoring for Brown CS Department |
| 2019 | Student Volunteer for ASPLOS 2019 |
| 2018 | Vice President for Rhode Island Central Korean Church Young Adult Ministry |
| 2017 | Organizer for Brown CS New Graduate Student Orientation |
| 2014-2015 | Volunteer Writer for techNeedle (Korean online media for tech-related news) |
| 2012-2013 | Treasurer for Rice IEEE Student Chapter |