

# JIWON CHOE

(+1)713-906-2530  $\diamond$  [jiwon\\_choe@brown.edu](mailto:jiwon_choe@brown.edu)

115 Waterman St. Providence, RI 02912, United States

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

## RESEARCH INTERESTS

---

My dissertation work focuses on the software-hardware co-design of general-purpose concurrent data structures that efficiently utilize NDP architecture. The *NDP-aware* concurrent data structures – provided as packaged software libraries – can lower barriers of NDP adoption by hiding the complexities of utilizing new NDP hardware from the programmer. Yet, this is a challenging problem, for the NDP-aware data structures must be carefully designed in order to preserve the high concurrency, correctness guarantees, and at times high on-chip cache locality provided by existing data structures which are highly optimized for conventional architectures. At the same time, they must still take full advantage of the features and work around the challenges introduced by the new architecture.

## EDUCATION

---

**Brown University**, Providence, RI, USA 08/2016 - present

**Ph.D. Candidate in Computer Science** (Expected graduation date: 12/2021)

**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 the near-data compute units in order to increase throughput and reduce energy consumption.

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

**Attacking Memory-Hard `script` 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 `script`, 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

---

2020 **Sigma Xi**, Brown University  
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  
Filled in for lectures; made problem sets and held several review sessions to help students prepare for exams; made and graded exam problems.

**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

---

01/2020 **Attacking Memory-Hard script with Near-Data-Processing**  
*2020 Boston Area Architecture Workshop*

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)*

## TRAINING & DEVELOPMENT

---

### **Teaching Certificate Program: Reflective Teaching** (Fall 2019)

*Brown University Sheridan Center for Teaching & Learning*

Completed four seminar modules designed to develop and refine fundamental teaching and assessment strategies and communication skills based on how students learn, as well as a teaching observation in a real classroom environment to receive constructive feedback on my teaching.

## SERVICES

---

### **Mentoring**

- Research Mentoring for Undergraduate & Master's Students (Summer 2017 – present)
- Brown CS 1st Year Ph.D. Student Mentoring (Fall 2018 – Fall 2019)

### **Conference Volunteering**

- Student Volunteer at ASPLOS 2019

### **Department Services**

- Student Volunteer for Brown CS Ph.D. Admissions Committee (01/2020)
- Organizer for Brown CS New Graduate Student Orientation (Summer 2017)

### **Leadership Roles**

- Vice President for Rhode Island Central Korean Church Young Adult Ministry (01/2018 – 12/2018)
- President for Brown Korean Graduate Student Association (01/2017 – 12/2017)
- Treasurer for Rice IEEE Student Chapter (08/2012 – 05/2013)

### **Miscellaneous**

- Volunteer Writer for *techNeedle*, a Korean online media for tech-related news (03/2014 – 04/2015)