

# SAMUEL THOMAS

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## EDUCATION

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### Brown University

2020 - 2025

Ph.D. in Computer Science

*Dissertation:* Proposal: A Study of Performance and Trust in Secure Memory

*Advisor:* R. Iris Bahar

### Davidson College

2016 - 2020

B.S. in Computer Science, B.A. in Political Science

*Dissertation:* Using Layering and Partitioning Techniques to Increase NUMA-Locality and Performance in Concurrent Data Structures

*Advisor:* Hammurabi Mendes

*Distinction:* High Honors in Computer Science, Cum Laude

## RESEARCH

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### INTERESTS

Security, architecture, emerging technologies, hardware-software co-design, concurrent programming, and sustainable computing.

### PUBLICATIONS

#### Refereed Conference Papers

- (1) **Samuel Thomas**, Kidus Workneh, Jac McCarty, Joseph Izraelevitz, Tamara Lehman, R. Iris Bahar  
A Midsummer Night's Tree: Efficient and High Performance Secure SCM  
ASPLOS 2024 *Acceptance Rate: 39 papers accepted out of 340 submitted (fall).*
- (2) **Samuel Thomas**, Roxana Hayne, Jonad Pulaj, Hammurabi Mendes  
Using Skip Graphs for Increased NUMA Locality  
2020 IEEE SBAC-PAD
- (3) **Samuel Thomas**, Hammurabi Mendes  
Brief Announcement: Layering Data Structures Over Skip Graphs for Increased NUMA Locality  
PODC '19

#### Refereed Workshop Papers

- (4) **Samuel Thomas**, Hammad Izhar, Elliott Dinfotan, Tali Moreshet, Maurice Herlihy, R. Iris Bahar  
Rethinking Metadata Caches in Secure NVMs  
NVMW 2024
- (5) **Samuel Thomas**, Kidus Workneh, Jac McCarty, Joseph Izraelevitz, Tamara Lehman, R. Iris Bahar  
Using a Fast Subtree for Efficient Secure NVMs  
NVMW 2024
- (6) Chia Jen Cheng, **Samuel Thomas**, Tali Moreshet, Maurice Herlihy, R. Iris Bahar  
Analyzing Secure Non-volatile Main Memory  
YArch 2023

- (7) **Samuel Thomas**, Jiwon Choe, Ofir Gordon, Erez Petrank, Tali Moreshet, Maurice Herlihy, R. Iris Bahar  
CRAP: Collecting Resources Across different Processing levels  
NOPE 2022

### Journal Papers

- (8) **Samuel Thomas**, Kidus Workneh, Ange-Thierry Ishimwe, Zack McKevitt, Phaedra Curlin, R. Iris Bahar, Joseph Izraelevitz, Tamara Lehman  
Baobab Merkle Tree for Efficient Secure Memory  
IEEE Computer Architecture Letters (2024) *Acceptance Rate: Approximately 20%*.
- (9) **Samuel Thomas**, Roxana Hayne, Jonad Pulaj, Hammurabi Mendes  
Using Skip Graphs for Increased NUMA Locality  
Journal of Parallel and Distributed Computing

### Other Papers

- (10) **Samuel Thomas**, Jiwon Choe, Ofir Gordon, Erez Petrank, Tali Moreshet, Maurice Herlihy, R. Iris Bahar  
Towards Hardware Accelerated Garbage Collection with Near-Memory Processing  
IEEE HPEC 2022

### Under Submission

- (11) **Samuel Thomas**, Tamara Lehman, R. Iris Bahar  
\*redacted for anonymity\*  
ASPLOS 2025
- (12) **Samuel Thomas**, Elliott Dinfotan, Hammad Izhar, Gal Sela, Fadi Kidess, Tali Moreshet, Maurice Herlihy, R. Iris Bahar  
\*redacted for anonymity\*  
HOST 2025

### INVITED TALKS

- (13) **Samuel Thomas**  
Invited Talk: Towards a Practical Secure Memory for Modern Deployment  
Stanford Architecture Reading Group, 2024
- (14) **Samuel Thomas**  
Invited Talk: Towards a Practical Secure Memory for Modern Deployment  
Williams College Computer Science Colloquium, 2024
- (15) **Samuel Thomas**  
Invited Talk: Rethinking Secure NVM in the Age of CXL  
EMERALD 2024

### PRESENTATIONS AND POSTERS

- (16) **Samuel Thomas**, Kidus Workneh, Jac McCarty, Joseph Izraelevitz, Tamara Lehman, R. Iris Bahar  
Poster/Presentation: A Midsummer Night's Tree: Efficient and High Performance Secure SCM  
ASPLOS 2024
- (17) Chia Jen Cheng, **Samuel Thomas**, Tali Moreshet, Maurice Herlihy, R. Iris Bahar  
Analyzing Secure Non-volatile Main Memory  
YArch 2023

- (18) **Samuel Thomas**, Jiwon Choe, Ofir Gordon, Erez Petrank, Tali Moreshet, Maurice Herlihy, R. Iris Bahar  
A Performance Study of Near-Memory Processing Under Garbage Collection  
Boston Area Architecture Workshop (BARC) 2022
- (19) **Samuel Thomas**, Tamara Lehman, R. Iris Bahar, Joseph Izraelevitz  
“Instant On” Secure Recovery of Non-Volatile Main Memory Systems  
New England Hardware Security Day 2021
- (20) **Samuel Thomas**, Tamara Lehman, R. Iris Bahar, Joseph Izraelevitz  
Partial Recovery of Secure Non-Volatile Main Memories  
Boston Area Architecture Workshop (BARC) 2021

## TEACHING

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### CERTIFICATE

**Harriet W. Sheridan Center for Teaching and Learning**  
Sheridan Teaching Seminar

*2023*

### ADJUNCT APPOINTMENT

**Computer Organization, CSCI341A**, Colorado School of Mines.

*July - August 2023*

- Newly developed summer architecture course (10 students).
- Teaching evaluation (out of 5.0): mean 4.86 ( $\sigma = .7$ ); median 5.0.

### GRADUATE TEACHING ASSISTANT

**Mathematical Models to Predict, Prepare, and Prevent**, ICERM

*June - August 2024*

- Shared supervising of the collaborative research of 24 undergraduate student participants.
- Assisting students in preparation of final presentations.
- Contributing to submission to sports analytics research submissions concerning ranking performance in rodeo and the English soccer.

**Computer Architecture, CSCI1952y**, Brown University.

*January - May 2024*

- Co-design newly developed course (16 students).
- Developed simulator based programming assignments covering caches, ISA extensions, and secure processors.
- Teaching evaluation (out of 5.0): mean 4.83 ( $\sigma = .45$ ); median 5.0.

**Multiprocessor Synchronization, CSCI1760**, Brown University.

*September - December 2023*

- Held office hours for students, graded assignments and exams, and proctored exams.
- Teaching evaluation (out of 5.0): mean 4.5 ( $\sigma = .63$ ); median 5.0.

**Theory of Computation, CSCI1010**, Brown University.

*September - December 2021*

- Presented guest lectures.
- Held office hours for students, graded assignments and exams, and proctored exams.
- Teaching evaluation (out of 5.0): mean 4.5 ( $\sigma = .71$ ); median 4.5.

## GRADUATE RESEARCH MENTORSHIP

1. **Kidus Workneh, University of Colorado, Boulder (Ph.D.)** (*mentored from January 2022 - May 2023*): Kidus joined the group at CU Boulder shortly after I started at Brown. He worked on my repository for secure non-volatile memory systems, and made significant contribution in extending my implementation to model the state-of-the-art. During the summer of 2022, I moved to Boulder, CO to work closer with him. We remain close colleagues, and he's expected to graduate in 2027.
2. **Hunter Thompson, Colorado School of Mines (Masters)** (*mentored from January - December 2023*): Hunter was one of the first graduate students to join Iris Bahar's lab at the Colorado School of Mines, and he worked on building on top of my secure memory simulator to extend the capacity of the metadata cache. I had the opportunity to work with Hunter in-person during the summer of 2023, as I was teaching adjunct at Mines that summer. Hunter recently took a position in industry.
3. **Will Buziak, Colorado School of Mines (Masters)** (*mentored from August 2024 - current*): Will joined Iris Bahar's group at the Colorado School of Mines in the fall of 2024, is working on modifying the physical memory protection tables in RISC-V to extend to granular secure memory. He is currently extending gem5's RISC-V processor to incorporate my secure memory infrastructure. He hopes to continue on for a Ph.D.

## UNDERGRADUATE RESEARCH MENTORSHIP

1. **Jac McCarty, Bryn Mawr College** (*mentored from January - August 2022*): Mentored through the Google exploreCSR program, and continued working on hot-region tracking integrity trees as REU student. Won best exploreCSR presentation at Brown in April of 2022. Graduated from Bryn Mawr in 2024.
2. **Chia Jen (John) Cheng, Boston University** (*mentored from June 2022 - May 2023*): Mentored when working as a research assistant and through independent study. Presented work on adaptable integrity trees at YArch 2023, co-located with ASPLOS. Graduated from Boston University in 2023 to pursue his Ph.D. at Carnegie Mellon.
3. **Adam Richling, University of Colorado, Boulder** (*mentored from August 2023 - May 2024*): Mentored while working as SPUR research fellow in summer of 2023 and during independent study for 23-24 school year. Presented work on metadata cache replacement policies at SPUR workshop in August 2023. Graduated from CU Boulder in 2024.
4. **Neil Ramaswamy, Brown University** (*mentored from December 2022 - May 2023*): Mentored while working on independent study on adaptable integrity trees and non-tree integrity. Graduated from Brown in 2023.
5. **Aidan Nowakowski, Boston University** (*mentored from June - August 2023*): Mentored while working as research assistant on extending adaptable Huffman algorithms.
6. **Elliott Dinfotan, Boston University** (*mentored from June 2023 - May 2024*): Mentored while working as research assistant and during independent study on extending adaptable Huffman algorithms and adaptable integrity trees. Contributed to workshop paper at NVMW 2024.
7. **Hammad Izhar, Brown University** (*mentored from June 2023 - May 2024*): Mentored while working on adaptive Huffman algorithms and correctness of persistent data structures. Graduated from Brown in 2024 to pursue his Ph.D. at Harvard.
8. **Suhana Zeutzius, University of Colorado, Boulder** (*mentored from September 2023 - May 2024*): Mentored during independent study while working on learned placement and replacement in metadata caches. Graduated from CU Boulder in 2024.
9. **Fadi Kidess, Boston University** (*mentored from June 2024 - current*): Mentored during summer research position while working on optimizations to adaptive Huffman algorithms. Contributed to work that will lead to new theoretical projects and collaborations concerning the data structure. Intends to submit work to YArch '25. Graduated from Boston University in 2025, and plans on pursuing a Ph.D.

10. **Connor Bremner, Colorado School of Mines** (*mentored from June 2024 - current*): Mentored during summer research position while working on a protocol for extending metadata cache capacity for secure memory using the last-level cache. Intended submission of work to *YArch '25* and to *PACT '25*. Graduated from Colorado School of Mines in 2025, and plans on pursuing a Ph.D.

## PROFESSIONAL SERVICE

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### ACADEMIC COMMUNITY

<b>PC Member</b> , YArch	<i>2025</i>
<b>External Reviewer</b> , Stabilization, Safety, and Security of Distributed Systems (SSS)	<i>2024</i>
<b>Reviewer for Aritfact Evaluation</b> , IISWC	<i>2024</i>
<b>Reviewer for Artifact Evaluation</b> , ISCA	<i>2023</i>

### UNIVERSITY

<b>TGIF</b> <i>organization czar</i>	<i>2022 - 2024</i>
<b>Visit Weekend</b> <i>volunteer</i>	<i>2023, 2024</i>
<b>Graduate Student Orientation</b> <i>organization czar</i>	<i>2022</i>

## REFERENCES

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Available upon request.