Samuel Thomas

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Education

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

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, Eliott 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**, Eliott Dinfotan, Hammad Izhar, Gal Sela, Fadi Kidess, Tali Moreshet, Maurice Herlihy, R. Iris Bahar
redacted for anonymity
HPCA 2025

Invited Talks

(12) **Samuel Thomas**
Invited Talk: Rethinking Secure NVM in the Age of CXL
EMERALD 2024

Presentations and Posters

(13) **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

(14) Chia Jen Cheng, **Samuel Thomas**, Tali Moreshet, Maurice Herlihy, R. Iris Bahar
Analyzing Secure Non-volatile Main Memory
YArch 2023

(15) **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

(16) **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

(17) **Samuel Thomas**, Tamara Lehman, R. Iris Bahar, Joseph Izraelevitz
Partial Recovery of Secure Non-Volatile Main Memories
Boston Area Architecture Workshop (BARC) 2021

Teaching

Certificate

Harriet W. Sheridan Center for Teaching and Learning *2023*
Sheridan Teaching Seminar

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 recently joined Iris Bahar's group at the Colorado School of Mines, and I'm currently onboarding him with our secure memory architecture as we figure out which project makes sense for him to work on. 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. **Eliott 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.

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.

Professional Service

Academic Community

- **Reviewer for Artifact Evaluation**, ISCA *2023*
- **Reviewer for Aritfact Evaluation**, IISWC *2024*
- **External Reviewer**, Stabilization, Safety, and Security of Distributed Systems (SSS) *2024*

University

- **TGIF** *organization czar* *2022 - 2024*
- **Visit Weekend** *volunteer* *2023, 2024*
- **Graduate Student Orientation** *organization czar* *2022*

References

Available upon request.