Nathan Beckmann

Computer Science Department
School of Computer Science
Carnegie Mellon University

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Pittsburg PA 15213

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RESEARCH INTERESTS

I am interested in improving the energy-efficiency of computer systems. Specifically, my research addresses the data bottleneck: computers spend most of their energy accessing data, not processing it. My research designs new, data-centric systems that dramatically reduce the cost of accessing data. This research spans many topics, including computer systems, computer architecture, programming models, operating systems, storage, and performance modeling & analysis.

EDUCATION

Massachusetts Institute of Technology ..... Sep 2015
Ph.D., Electrical Engineering and Computer Science.
Thesis: Design and Analysis of Spatially-Partitioned Shared Caches.
Supervisor: Daniel Sanchez.

Massachusetts Institute of Technology ..... Sep 2010
S.M., Electrical Engineering and Computer Science.
Thesis: Distributed Naming in a Factored Operating System.
Supervisor: Anant Agarwal.

University of California, Los Angeles ..... Mar 2008
B.S. Computer Science. *Summa cum Laude.*
B.S. Mathematics of Computation. *Summa cum Laude.*

AWARDS

Sloan Research Fellowship 2024
ACM SIGMICRO Hall of Fame 2023
Best Paper nominee at ISCA 2022
Best Paper at SOSP 2021
Google Research Scholar Award 2021
Best Paper at APoCS 2020
NSF CAREER Award 2019
Google Faculty Research Award 2019
Google Faculty Research Award 2017
George M. Sprowls Doctoral Thesis Prize 2015
Best doctoral thesis in computer science at MIT.
Best Paper nominee at HPCA 2015
William A. Martin Memorial Thesis Award 2010
Best master's thesis in computer science at MIT.
UCLA Bachelor of the Year in Computer Science 2008
UCLA Rose Hills Foundation Science and Engineering Scholarship (2×) ..... 2007 & 2008

PROFESSIONAL EXPERIENCE

Carnegie Mellon University ..... Jul 2025 - Present
ASSOCIATE PROFESSOR in the School of Computer Science.

Carnegie Mellon University ..... Jul 2023 - Jul 2025
ASSOCIATE PROFESSOR WITHOUT INDEFINITE TENURE in the School of Computer Science.

Efficient Computer ..... Sep 2022 - Present
CO-FOUNDER AND CHIEF SCIENTIST; leading technical strategy of the world's most efficient general-purpose computer.

Carnegie Mellon University ..... Jan 2017 - Jul 2023
ASSISTANT PROFESSOR in the School of Computer Science.

Massachusetts Institute of Technology ..... Sep 2015 - Jan 2017
POSTDOC with Prof. Daniel Sanchez; worked on well-behaved, high-performance memory systems for parallel processors.

Massachusetts Institute of Technology ..... Sep 2012 - Sep 2015
RESEARCH ASSISTANT to Prof. Daniel Sanchez; worked on scheduling data across caches in parallel processors.

Massachusetts Institute of Technology ..... Sep 2008 - Sep 2012
RESEARCH ASSISTANT to Profs. Anant Agarwal, Frans Kaashoek, and Nickolai Zeldovich; worked on distributed operating systems (fos project).

NVidia ..... Summer 2007
SOFTWARE INTERN in the embedded division; worked on OpenGL ES 2.0 and optimizing customer applications.
Symantec Research Labs ..... Summers 2005 & 2006
RESEARCH INTERN at Symantec Research Labs; prototyped an early design of an extrusion detection system.
University of California, Los Angeles ..... Sep 2003 - Mar 2008
UNDERGRADUATE RESEARCHER with Profs. Glenn Reinman and Miodrag Potkonjak; worked on cache organization for physics simulation and statistical analysis of sensor networks.

REFEREED JOURNAL PUBLICATIONS

FairyWREN: A Sustainable Cache for Emerging Write-Read-Erase Flash Interfaces ... ACM Transactions on Storage 2025
Sara McAllister, Yucong "Sherry" Wang, Benjamin Berg, Daniel Berger, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger

Monza: An Energy-Minimal, General-Purpose Dataflow SoC for the Internet of Things ..... IEEE Micro 2024
Nathan Beckmann, Brandon Lucia, Graham Gobieski, Tony Nowatzki, Thomas Jackson, Guénolé Lallement, Keyi Zhang, Amolak Nagi, Atharv Sathe, Harsh Desai

UDIR: Towards a Unified Compiler Framework for Reconfigurable Dataflow Architectures ..... IEEE CAL 2023
Nikhil Agarwal, Mitchell Fream, Souradip Ghosh, Brian Schwedock, *Nathan Beckmann*

Kobold: Simplified Cache Coherence for Cache-Attached Accelerators ..... IEEE CAL 2023
Jennifer Brana, Brian C. Schwedock, Yatin A. Manerkar, *Nathan Beckmann*

Kangaroo: Theory and Practice of Caching Billions of Tiny Objects on Flash ... ACM Transactions on Storage 2022
Sara McAllister, Benjamin Berg, Julian Tutuncu-Macias, Juncheng Yang, Sathya Gunasekar, Jimmy Lu, Daniel S. Berger, *Nathan Beckmann*, Gregory R. Ganger

Practical Bounds on Offline Caching with Variable Object Sizes ..... *(Journal of SIGMETRICS)* POMACS 2018
Daniel Berger, *Nathan Beckmann*, Mor Harchol-Balter *Acceptance Rate: 16%*

Cache Calculus: Modeling Caches through Differential Equations ..... IEEE CAL 2016
Nathan Beckmann, Daniel Sanchez

REFEREED CONFERENCE PUBLICATIONS

Scaling the IO wall with Declarative IO ..... OSDI 2026
Sara McAllister, Sanjith Athlur, Theo Gregersen, Timothy Kim, Yiwei Chen, Sarvesh Tandon, Lucy Wang, Daniel S. Berger, Saurabh Kadekodi, Arif Merchant, Benjamin Berg, *Nathan Beckmann*, Rashmi Vinayak, George Amvrosiadis, Gregory S. Ganger *Acceptance Rate: 20%*

NUPEA: Optimizing Critical Loads on Spatial Dataflow Architectures via Non-Uniform Processing-Element Access ..... ISCA 2025
Souradip Ghosh, Graham Gobieski, Keyi Zhang, Brandon Lucia, Nathan Beckmann, Tony Nowatzki *Acceptance Rate: 23%*

Ripple: Asynchronous Programming for Spatial Dataflow Architectures ..... PLDI 2025
Souradip Ghosh, Yufei Shi, Brandon Lucia, *Nathan Beckmann* *Acceptance Rate: 28%*

The TYR Dataflow Architecture: Improving Locality by Taming Parallelism ..... MICRO 2024
Nikhil Agarwal, Mitchell Fream, Souradip Ghosh, Brian Schwedock, *Nathan Beckmann* *Acceptance Rate: 23%*

Leviathan: A Unified System for General-Purpose Near-Data Computing ..... MICRO 2024
Brian Schwedock, *Nathan Beckmann* *Acceptance Rate: 23%*

A Call for Research on Storage Emissions ..... HotCarbon 2024
Sara McAllister, Fiodar Kazhamiaka, Daniel S. Berger, Rodrigo Fonseca, Kali Frost, Aaron Ogus, Maneesh Sah, Ricardo Bianchini, George Amvrosiadis, *Nathan Beckmann*, Gregory R. Ganger *Acceptance Rate: 46%*

FairyWREN: A Sustainable Cache for Emerging Write-Read-Erase Flash Interfaces ..... OSDI 2024
Sara McAllister, Yucong Wang, Benjamin Berg, Daniel Berger, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger *Acceptance Rate: 17%*

Baleen: ML Admission & Prefetching for Flash Caches ..... FAST 2024
Daniel Lin-Kit Wong, Hao Wu, Carson Molder, Sathya Gunasekar, Jimmy Lu, Snehal Khandkar, Abhinav Sharma, Daniel S. Berger, *Nathan Beckmann*, Gregory R. Ganger *Acceptance Rate: 18%*

Pipestitch: An energy-minimal dataflow architecture with lightweight threads ..... MICRO 2023
Nathan Serafin, Souradip Ghosh, Harsh Desai, *Nathan Beckmann*, Brandon Lucia *Acceptance Rate: 24%*

Affinity Alloc: Taming Not-So-Near Data Computing ..... MICRO 2023
Zhengwrong Wang, Christopher Liu, *Nathan Beckmann*, Tony Nowatzki *Acceptance Rate: 24%*

MANIC: A 19μW @ 4MHz, 256 MOPS/mW, RISC-V Microcontroller with Embedded MRAM Main Memory and Vector-Dataflow Co-Processor in 22nm Bulk FinFET CMOS ..... ISCAS 2023
Graham Gobieski, Oguz Atli, Cagri Erbagci, Ken Mai, *Nathan Beckmann*, Brandon Lucia *Acceptance Rate: 53%*

RipTide: A programmable, energy-minimal dataflow compiler and architecture ..... MICRO 2022
Graham Gobieski, Souradip Ghosh, Marijn Heule, Todd Mowry, Tony Nowatzki, *Nathan Beckmann*, Brandon Lucia
Acceptance Rate: 22%

Brief Announcement: Spatial Locality and Granularity Change in Caching ..... SPAA 2022
Nathan Beckmann, Phillip B. Gibbons, Charles McGuffey
Acceptance Rate: 37%

täkō: A Polymorphic Cache Hierarchy for General-Purpose Optimization of Data Movement ..... ISCA 2022 *(Best Paper nominee)*
Brian Schwedock, Piratach Yoovidhya, Jennifer Seibert, *Nathan Beckmann*
Acceptance Rate: 17%

Kangaroo: Caching Billions of Tiny Objects on Flash ..... SOSP 2021 *(Best Paper)*
Sara McAllister, Benjamin Berg, Julian Tutuncu-Macias, Juncheng Yang, Sathya Gunasekar, Jimmy Lu, Daniel Berger, *Nathan Beckmann*, Gregory R. Ganger
Acceptance Rate: 16%

Brief Announcement: Block-Granularity-Aware Caching ..... SPAA 2021
Nathan Beckmann, Phillip Gibbons, Charles McGuffey
Acceptance Rate: 50%

SNAFU: An Ultra-Low-Power, Energy-Minimal CGRA-Generation Framework and Architecture ..... ISCA 2021
Graham Gobieski, Oguz Atli, Ken Mai, Brandon Lucia, *Nathan Beckmann*
Acceptance Rate: 19%

The Role of Edge Offload in Hardware-Accelerated Mobile Devices ..... HotMobile 2021
Mahadev Satyanarayanan, *Nathan Beckmann*, Grace A. Lewis, Brandon Lucia
Acceptance Rate: 36%

The CacheLib Caching Engine: Design and Experiences at Scale ..... OSDI 2020
Benjamin Berg, Daniel S. Berger, Sara McAllister, Isaac Grosof, Sathya Gunasekar, Jimmy Lu, Michael Uhlar, Jim Carrig, *Nathan Beckmann*, Mor Harchol-Balter, Gregory R. Ganger
Acceptance Rate: 18%

Jumanji: The Case for Dynamic NUCA in the Datacenter ..... MICRO 2020
Brian Schwedock, *Nathan Beckmann*
Acceptance Rate: 19%

Tvarak: Software-Managed Hardware Offload for DAX NVM Storage Redundancy ..... ISCA 2020
Rajat Kateja, *Nathan Beckmann*, Gregory R. Ganger
Acceptance Rate: 18%

Livia: Data-Centric Computing Throughout the Memory Hierarchy ..... ASPLOS 2020
Elliot Lockerman, Axel Feldmann, Mohammad Bakhshalipour, Alex Stanescu, Shashwat Gupta, Daniel Sanchez, *Nathan Beckmann*
Acceptance Rate: 18%

Writeback-Aware Caching ..... APoCS 2020 *(Best Paper)*
Nathan Beckmann, Phillip Gibbons, Bernhard Haeupler, Charles McGuffey
Acceptance Rate: 60%

MANIC: An Energy-Efficient Architecture for Ultra-Low-Power Embedded Systems ..... MICRO 2019
Graham Gobieski, Amolak Nagi, Nathan Serafin, Mehmet Meric Isgenc, *Nathan Beckmann*, Brandon Lucia
Acceptance Rate: 23%

PHI: Architectural Support for Synchronization- and Bandwidth-Efficient Commutative Scatter Updates ..... MICRO 2019
Anurag Mukkara, *Nathan Beckmann*, Daniel Sanchez
Acceptance Rate: 23%

Brief Announcement: Writeback-Aware Caching ..... SPAA 2019
Nathan Beckmann, Phillip Gibbons, Bernhard Haeupler, Charles McGuffey
Acceptance Rate: 40%

Intelligence Beyond the Edge: Inference on Intermittent Embedded Systems ..... ASPLOS 2019
Graham Gobieski, Brandon Lucia, *Nathan Beckmann*
Acceptance Rate: 21%

Improving the Locality of Graph Processing through Hardware-Accelerated Traversal Scheduling ... MICRO 2018
Anurag Mukkara, *Nathan Beckmann*, Maleen Abeydeera, Xiaosong Ma, Daniel Sanchez
Acceptance Rate: 21%

Intermittent Deep Neural Network Inference ..... SysML 2018
Graham Gobieski, *Nathan Beckmann*, Brandon Lucia
Acceptance Rate: 57%

LHD: Improving Cache Hit Rate by Maximizing Hit Density ..... NSDI 2018
Nathan Beckmann, Haoxian Chen, Asaf Cidon
Acceptance Rate: 15%

Nexus: A New Approach to Replication in Distributed Shared Caches ..... PACT 2017
Po-An Tsai, *Nathan Beckmann*, Daniel Sanchez
Acceptance Rate: 23%

Jenga: Software-Defined Cache Hierarchies ..... ISCA 2017
Po-An Tsai, *Nathan Beckmann*, Daniel Sanchez
Acceptance Rate: 17%

Maximizing Cache Performance Under Uncertainty ..... HPCA 2017
Nathan Beckmann, Daniel Sanchez
Acceptance Rate: 22%

Whirlpool: Improving Cache Management with Application-Level Data Classification ..... ASPLOS 2016
Anurag Mukkara, *Nathan Beckmann*, Daniel Sanchez
Acceptance Rate: 22%

Modeling Cache Performance Beyond LRU ..... HPCA 2016
Nathan Beckmann, Daniel Sanchez
Acceptance Rate: 22%
Technical report: MIT CSAIL, April 2015.

Rubik: Fast Analytical Power Management for Latency-Critical Systems ..... MICRO 2015
Harshad Kasture, Davide Bartolini, *Nathan Beckmann*, Daniel Sanchez
Acceptance Rate: 22%

Talus: A Simple Way to Remove Cliffs in Cache Performance ..... HPCA 2015 (Best Paper nominee)
Nathan Beckmann, Daniel Sanchez *Acceptance Rate: 22%*

CDCS: Scaling Non-Uniform Cache Architectures with Computation and Data Co-Scheduling ..... HPCA 2015
Nathan Beckmann, Po-An Tsai, Daniel Sanchez *Acceptance Rate: 22%*

Jigsaw: Scalable Software-Defined Caches ..... PACT 2013
Nathan Beckmann, Daniel Sanchez *Acceptance Rate: 17%*

The Case for Elastic Operating System Services in fos ..... DAC 2012
Lamia Youseff, *Nathan Beckmann*, Harshad Kasture, Charles Gruenwald III, David Wentzlaff, Anant Agarwal
Acceptance Rate: 23%

An Operating System for Multicore and Clouds: Mechanisms and Implementation ..... SOCC 2010
David Wentzlaff, Charles Gruenwald III, *Nathan Beckmann*, Kevin Modzelewski, Adam Belay, Lamia Youseff, Jason Miller, Anant Agarwal *Acceptance Rate: 19%*
Technical report: MIT CSAIL, Feb 2010.

ATAC: Improving Performance and Programmability with On-Chip Optical Networks ..... ISCAS 2010
James Psota, Jason Miller, George Kurian, Henry Hoffmann, *Nathan Beckmann*, Jonathan Eastep, Anant Agarwal
Acceptance Rate: 45%

Graphite: A Distributed Parallel Simulator for Multicores ..... HPCA 2010
Jason Miller, Harshad Kasture, George Kurian, Charles Gruenwald III, *Nathan Beckmann*, Christopher Celio, Jonathan Eastep, Anant Agarwal *Acceptance Rate: 18%*
Technical report: MIT CSAIL, November 2009.

Hardware-based Public-key Cryptography with Public Physically Unclonable Functions .. Information Hiding 2009
Nathan Beckmann, Miodrag Potkonjak

REFEREED WORKSHOP PUBLICATIONS

Harmony: Co-Optimizing Parallelism and Locality to Bound Performance ..... YArch @ ASPLOS 2025
Jennifer Brana, *Nathan Beckmann*

Towards Understanding the Carbon Impact in End-to-end Sensing Pipelines ..... HotEthics @ ASPLOS 2024
Harsh Desai, Sara McAllister, *Nathan Beckmann*, Brandon Lucia

UDIR: Towards a Unified Compiler Framework for Reconfigurable Dataflow Architectures WDDSA @ MICRO 2023
Nikhil Agarwal, Mitchell Fream, Souradip Ghosh, Brian Schwedock, *Nathan Beckmann*

Dataflow Blocks: Modular Time-Multiplexing for CGRAs ..... YArch @ ASPLOS 2023
Xuesi Chen, Nishanth Subramanian, Karthik Ramanathan, *Nathan Beckmann*, Brandon Lucia

Kobold: Simplified Cache Coherence for Cache-Attached Accelerators ..... WDDSA @ MICRO 2022
Jennifer Brana, Brian C. Schwedock, Yatin A. Manerkar, *Nathan Beckmann*

Cache-Guided Scheduling: Exploiting Caches to Maximize Locality in Graph Processing ..... AGP @ ISCA 2017
Anurag Mukkara, *Nathan Beckmann*, Daniel Sanchez

A Unified Operating System for Clouds and Manycore: fos ..... CAOS @ HiPEAC 2010
David Wentzlaff, Charles Gruenwald III, *Nathan Beckmann*, Kevin Modzelewski, Adam Belay, Lamia Youseff, Jason Miller, Anant Agarwal
Technical report: MIT CSAIL, November 2009.

ADDITIONAL TECHNICAL REPORTS

Spatial Locality and Granularity Change in Caching ..... arXiv 2022
Nathan Beckmann, Phillip B. Gibbons, Charles McGuffey

PIKA: A Network Service for Multikernel Operating Systems ..... MIT CSAIL, Jan 2014
Nathan Beckmann, Charles Gruenwald III, Charles Johnson, Harshad Kasture, Fillipo Sironi, Anant Agarwal, Frans Kaashoek, Nickolai Zeldovich

Efficient Cache Coherence on Manycore Optical Networks ..... MIT CSAIL, Feb 2010
George Kurian, *Nathan Beckmann*, Jason Miller, James Psota, Anant Agarwal

Core Count vs Cache Size for Manycore Architectures in the Cloud ..... MIT CSAIL, Feb 2010
David Wentzlaff, *Nathan Beckmann*, Jason Miller, Anant Agarwal

ATAC: A Manycore Processor with On-Chip Optical Network ..... MIT CSAIL, May 2009
Jason Miller, James Psota, George Kurian, *Nathan Beckmann*, Jonathan Eastep, Jifeng Liu, Mark Beals, Jurgen Michel, Lionel Kimerling, Anant Agarwal

POSTERS

Decade-Long On-Device AI with a AA Battery ..... TinyML Summit, Apr 2024
Nathan Beckmann, Brandon Lucia, Graham Gobieski, Harsh Desai, Thomas Jackson, Guénolé Lallement, Amolak Nagi, Tony Nowatzki, Atharv Sathe, Keyi Zhang

Improving Datacenter Efficiency through Partitioning-Aware Scheduling ..... PACT, Sep 2017
Harshad Kasture, Xu Ji, Nosayba El-Sayed, *Nathan Beckmann*, Xiaosong Ma, Daniel Sanchez
Improving Cache Hit Rate by Maximizing Hit Density ..... Parallel Data Lab (PDL) Visit Day, CMU, May 2017
Haoxian Chen, *Nathan Beckmann*, Asaf Cidon
CDCS: Computation and Data Co-Scheduling ..... Cloud Workshop, MIT, 2014
Po-An Tsai, *Nathan Beckmann*, Daniel Sanchez
Best student poster.
Jigsaw: Software-defined Caches ..... MIT CSAIL Industry Affiliate Program, 2013
Nathan Beckmann, Daniel Sanchez
Scalable Applications on a Factored Operating System ..... ASPLOS 2012
Chris Johnson, Charles Gruenwald III, *Nathan Beckmann*, Harshad Kasture, David Wentzlaff, Larry Stewart, Adam Belay, James Ward, Lamia Youseff, Anant Agarwal
Applications on a Factored Operating System ..... EuroSys 2012
Charles Gruenwald III, *Nathan Beckmann*, Harshad Kasture, Chris Johnson, Barry Kasindorf, Larry Stewart, Anant Agarwal
Distributed Parallel Network Stack for Multicore ..... NSDI 2011
Charles Gruenwald III, *Nathan Beckmann*, David Wentzlaff, Harshad Kasture, James Ward, Anant Agarwal

OTHER WRITING

The Case for a Programmable Memory Hierarchy ..... SIGARCH blog, 5 Apr 2021

TALKS

Energy is Everything: General-Purpose Computing at 1 TOPS/W ..... UCLA, 25 Feb 2025
Computers Can Be General-Purpose and Energy-Efficient Too ..... NTNU, 31 Jan 2024
Re-Thinking the Hardware-Software Interface for Data-Centric Systems ..... Georgia Tech, 20 May 2022
Re-Thinking the Hardware-Software Interface for Data-Centric Systems ..... MIT, 16 May 2022
Re-Thinking the Hardware-Software Interface for Data-Centric Systems ..... Stanford, 10 May 2022
Re-Thinking the Hardware-Software Interface for Data-Centric Systems ..... Cornell, 4 May 2022
Re-Thinking the Hardware-Software Interface for Data-Centric Systems ..... U. Washington, 27 Apr 2022
LHD: Improving Cache Hit Rate by Maximizing Hit Density ..... PMHO @ PPoPP, 2 Apr 2022
Making Data Access Faster and Cheaper via Ubiquitous Flash Caching ..... PDL Summer Seminar, 10 Jun 2021
Making Data Access Faster and Cheaper via Ubiquitous Flash Caching ..... Google, 6 Apr 2021
Overview of Caching Research at the Parallel Data Lab ..... Cache@Scale, 4 Mar 2021
Practical Bounds on Offline Caching with Variable Object Sizes ..... PMHO @ PPoPP, 28 Feb 2021
Tvarak: Software-Managed Hardware Offload for DAX NVM Storage Redundancy ..... ISCA, 2 Jun 2020
The Case for a Richer Memory Interface ..... Memory Systems Panel @ ISCA, 2 Jun 2020
Pushing the Limits of Online and Offline Caching ..... U. Rochester, 2 Dec 2019
Teaching An Old Cache New Tricks: Learning Better Caching Policies Online ML for Systems @ ISCA, 23 Jun 2019
Intelligence Beyond the Edge: Inference on Intermittent Embedded Systems ..... Stanford, 1 May 2019
Teaching An Old Cache New Tricks: Learning Better Caching Policies Online ..... Google, 19 Sep 2018
LHD: Improving Cache Hit Rate by Maximizing Hit Density ..... PDL Retreat, Bedford Springs, 24 Oct 2017
Maximizing Cache Performance Under Uncertainty ..... HPCA, Austin, 6 Feb 2017
Whirlpool: Improving Dynamic Cache Management with Static Data Classification . ASPLOS, Atlanta, 4 Apr 2016
Hardware and Software Techniques to Scale the Memory Wall ..... Berkeley, 28 Mar 2016
Hardware and Software Techniques to Scale the Memory Wall ..... NYU, 23 Mar 2016
Hardware and Software Techniques to Scale the Memory Wall ..... CMU, 17 Mar 2016
Modeling Cache Performance Beyond LRU ..... HPCA, Barcelona, 14 Mar 2016
Hardware and Software Techniques to Scale the Memory Wall ..... Toronto, 8 Mar 2016
Hardware and Software Techniques to Scale the Memory Wall ..... Stanford, 2 Mar 2016
Talus: A Simple Way to Remove Cliffs in Cache Performance ..... HPCA, San Francisco, 9 Feb 2015
Jigsaw: Scalable Software-Defined Caches ..... PACT, Edinburgh, 11 Sep 2013

PATENTS

Generation framework for ultra-low-power CGRAs ..... US Patent App 17572925, Aug 2022
Brandon Lucia, *Nathan Beckmann*, Graham Gobieski
Vector dataflow architecture for embedded systems ..... US Patent App 17500017, Apr 2022
Brandon Lucia, *Nathan Beckmann*, Graham Gobieski
Authentication of financial transactions via wireless link ..... US Patent 9177311, Nov 2015
Miodrag Potkonjak, *Nathan Beckmann*
Autonomous, non-interactive, context-based services for cellular phone ..... US Patent 8744429, June 2014
Miodrag Potkonjak, *Nathan Beckmann*

Differential uncloneable variability-based cryptography ..... US Patent 9020150, Jun 2013
Nathan Beckmann, Miodrag Potkonjak
Method and apparatus for efficient token matching using complex rules ..... US Patent 8160989, April 2012
Scott Schneider, *Nathan Beckmann* (at Symantec Research Labs)
Semantic compression ..... US Patent pending (filed Apr 2010)
Nathan Beckmann, Miodrag Potkonjak

TEACHING

15-213 Introduction to Computer Systems ..... INSTRUCTOR, CMU, Spring 2025
15-749 Post-Von Neumann Computer Architecture ..... INSTRUCTOR, CMU, Fall 2024
15-213 Introduction to Computer Systems ..... INSTRUCTOR, CMU, Spring 2024
15-740 Computer Architecture ..... INSTRUCTOR, CMU, Fall 2023
15-740 Computer Architecture ..... INSTRUCTOR, CMU, Fall 2022
15-418 Parallel Computer Architecture and Programming ..... INSTRUCTOR, CMU, Spring 2022
15-740 Computer Architecture ..... INSTRUCTOR, CMU, Fall 2021
15-920 Diversity, Equity, and Inclusion in Computer Science and Society ..... INSTRUCTOR, CMU, Fall 2021
15-418 Parallel Computer Architecture and Programming ..... INSTRUCTOR, CMU, Spring 2021
15-740 Computer Architecture ..... INSTRUCTOR, CMU, Fall 2020
15-418 Parallel Computer Architecture and Programming ..... INSTRUCTOR, CMU, Spring 2020
15-740 Computer Architecture ..... INSTRUCTOR, CMU, Fall 2019
15-418 Parallel Computer Architecture and Programming ..... INSTRUCTOR, CMU, Spring 2019
15-740 Computer Architecture ..... INSTRUCTOR, CMU, Fall 2018
15-740 Computer Architecture ..... INSTRUCTOR, CMU, Spring 2018
15-740 Computer Architecture ..... INSTRUCTOR, CMU, Spring 2017
6.823 Computer System Architecture ..... TEACHING ASSISTANT, MIT, Spring 2014

SERVICE

Panel member for NSF in 2018 and 2019.
Program Committee member for MICRO 2024, ISCA 2024, ASPLOS 2023, HPCA 2023, SIGMETRICS/Performance 2022, FAST 2022, HPCA 2022, MICRO 2021, ISCA 2021, MICRO 2020, ISCA 2020, MICRO 2019, ISCA 2019, and MICRO 2017.
External Program Committee member for ISPASS 2020, HPCA 2019, ASPLOS 2019, and ISCA 2017.
Reviewer for ACM Trans. on Architecture and Compiler Optimization (TACO), IEEE/ACM Trans. on Networks (TON), NSDI 2019, Eurosys 2017, HPCA 2016, MICRO 2015, HPCA 2015, MICRO 2014, PACT 2014, and MICRO 2013.
Organizer of ZSim tutorial at MICRO 2015 and Graphite tutorial at ISCA 2011.
Major open-source contributor to both ZSim and Graphite.

PHD STUDENTS

Guy Wilks (Ph.D.) ..... Fall 2024 - present
Sun A Cho (Ph.D.) ..... Fall 2024 - present
Jennifer Brana (Ph.D.) ..... Fall 2023 - present
Mitchell Fream (Ph.D.) ..... Fall 2022 - present
Xuesi Chen (Ph.D.) ..... Fall 2022 - Spring 2025
Souradip Ghosh (Ph.D.) ..... Fall 2021 - present
Nikhil Agarwal (Ph.D.) ..... Fall 2021 - present
Nathan Serafin (Ph.D.) ..... Fall 2020 - present
Sara McAllister (Ph.D.) ..... Fall 2019 - present
Mohammad Bakhshalipour (Ph.D.) ..... Fall 2019 - Spring 2020
Graham Gobieski (Ph.D.) ..... Fall 2017 - Summer 2022
Brian Schwedock (Ph.D.) ..... Fall 2017 - Summer 2023
Elliot Lockerman (Ph.D.) ..... Summer 2017 - Spring 2022
Haoxian Chen (Ph.D.) ..... Fall 2016 - Summer 2017

PERSONAL

Background: Born 1986 in Boulder, CO. Raised in Los Angeles, CA. *Citizenship:* United States of America.

Last updated on April 8, 2026.