

Sara McAllister

Doctoral Candidate

Carnegie Mellon University

Computer Science Department

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Biography

I research sustainable datacenters from a computer systems perspective, particularly focused on caching and storage systems. My work includes improves efficiency and sustainability through hardware-software co-design and grounding design in mathematical modeling. My work has appeared at OSDI and SOSP, including receiving a Best Paper Award at SOSP 2021. I am a 2021 NDSEG fellow, a 2023 EECS Rising Star, and a 2025 Siebel Scholar. For my service work, I was awarded CMU’s Graduate Student Service Award in 2022 and a Best Paper Award at SIGCSE 2023.

Education

Carnegie Mellon University

PHD IN COMPUTER SCIENCE, ADVISORS: NATHAN BECKMANN AND GREG GANGER

Pittsburgh, PA

Aug 2019 - Summer 2025 (Expected)

Carnegie Mellon University

MASTERS IN COMPUTER SCIENCE RESEARCH

Pittsburgh, PA

Aug 2019 - May 2022

Harvey Mudd College

B.S. IN COMPUTER SCIENCE, GRADUATED WITH HIGH DISTINCTION

Claremont, CA

Aug. 2015 - May 2019

Honors and Awards

2025 Siebel Scholar , for outstanding academic performance and leadership	2024
2023 Rising Star , in Electrical Engineering & Computer Science (EECS)	2023
NDSEG Exemplary Poster Presentation , in computer and computational sciences at NDSEG fellows conference	2023
SIGCSE Best Paper Award , for CS-JEDI paper	2023
CMU Graduate Student Service Award , for the development of 15-996 CS-JEDI	2022
SOSP Best Paper Award , for Kangaroo paper	2021
NDSEG Graduate Fellowship , DoD sponsored 3-year fellowship	2021
NSF Graduate Research Fellowship (GRFP) , NSF sponsored 3-year fellowship	2021
Harvey Mudd Class of ‘94 Award , for an outstanding CS graduate in coursework, research, and service	2019
Harvey Mudd Computer Science Departmental Honors	2019
Harvey Mudd Clinic Team Award , for outstanding performance on an industry-sponsored team capstone project	2019
CRA Outstanding Undergraduate Researcher Award , Honorable Mention	2019

Employment History

Assistant Professor , University of Wisconsin-Madison – Madison, Wisconsin	Starting Aug 2026
Visiting Faculty Researcher , Google – Sunnyvale, CA	Starting Sept 2025
Managers: David Culler and Hank Levy Researching large-scale data systems for emerging applications	
Graduate Research Assistant , Carnegie Mellon University – Pittsburgh, PA	Aug 2019 - Aug 2025
Advisors: Nathan Beckmann and Greg Ganger Researched reducing IO to create sustainable caching and storage systems at scale	
Research Intern , Microsoft Research – Redmond, WA	Summer 2022
Mentor: Amar Phanishayee Researched serving LLMs more efficiently especially under failure	
Research Intern , Microsoft Research – Redmond, WA	Summer 2021
Mentor: Daniel Berger Researched in-kernel disaggregated CXL memory solutions	
Software Engineering Intern , Yelp – San Francisco, CA	Summer 2019
Database Team Designed, implemented, and rolled out a library to manage MySQL database permissions	

Clinic (Capstone) Project, Harvey Mudd College – Claremont, CA

Sponsored by Pure Storage

Technical lead for team of 4 designing failover mechanisms for NFS VMs running on a two-controller system

Aug. 2018 - May 2019

Undergraduate Research Assistant, UNC Chapel Hill – Chapel Hill, NC

Advisor: Don Porter

Researched theoretical and experimental analysis of write-optimized dictionaries

May 2018 - Aug. 2018

Software Engineering Intern, Facebook – Menlo Park, CA

Developer Experience Team

Developed a Python library to restart and repair development servers

Summer 2017

Research Assistant, Harvey Mudd College – Claremont, CA

Advisor: Anna Ahn

Researched three-legged walking and led data analysis of wearable devices

May. 2016 - Jun. 2017

Peer-Reviewed Publications

FairyWREN: A Sustainable Cache for Emerging Write-Read-Erase Flash Interfaces

ACM TOS

[Sara McAllister](#), Yucong Wang, Benjamin Berg, Daniel S. Berger, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger

2025

A Call for Research on Storage Emissions

Energy Informatics Review

[Sara McAllister](#), Fiodar Kazhamiaka, Daniel S. Berger, Rodrigo Fonseca, Kali Frost, Aaron Ogus, Maneesh Sah, Ricardo Bianchini, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger

2025

FairyWREN: A Sustainable Cache for Emerging Write-Read-Erase Flash Interfaces

OSDI 2024

[Sara McAllister](#), Yucong Wang, Benjamin Berg, Daniel S. Berger, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger

Acceptance Rate: 18%

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%

DéjàVu: KV-cache Streaming for Fast, Fault-tolerant Generative LLM Serving

ICML 2024

Fonteini Strati, [Sara McAllister](#), Amar Phanishayee, Jakub Tarnawski, Ana Klimovic

Acceptance Rate: 27.5%

Towards Understanding the Carbon Impact in End-to-end Sensing Pipelines

HotEthics 2024

Harsh Desai*, [Sara McAllister](#)*, Nathan Beckmann, Brandon Lucia (* = co-first author)

CS-JEDI: Required DEI Education, by CS PhD Students, for CS PhD Students

🏆 SIGCSE 2023

Bailey Flanigan, Ananya Joshi, [Sara McAllister](#), Catalina Vajiac

Acceptance Rate: 35%

Kangaroo: Theory and Practice of Caching Billions of Tiny Objects on Flash

ACM TOS

[Sara McAllister](#), Benjamin Berg, Julian Tutuncu-Macias, Juncheng Yang, Sathya Gunasekar, Jimmy Lu, Daniel S. Berger, Nathan Beckmann, Gregory R. Ganger

August 2022

Kangaroo: Caching Billions of Tiny Objects on Flash

🏆 SOSP 2021

[Sara McAllister](#), Benjamin Berg, Julian Tutuncu-Macias, Juncheng Yang, Sathya Gunasekar, Jimmy Lu, Daniel S. Berger, Nathan Beckmann, Gregory R. Ganger

Acceptance Rate: 16%

External-memory Dictionaries in the Affine and PDAM Models

ACM ToPC

Michael A. Bender, Alex Conway, Martin Farach-Colton, William Jannen, Yizheng Jiao, Rob Johnson, Eric Knorr, [Sara McAllister](#), Nirjhar Mukherjee, Prashant Pandey, Donald E. Porter, Jun Yuan, Yang Zhan

September 2021

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%

Small Refinements to DAM Can Have Big Consequences for Data-Structure Design

SPAA 2019

Michael A. Bender, Alexander Conway, Martin Farach-Colton, William Jannen, Yizheng Jiao, Rob Johnson, Eric Knorr, [Sara McAllister](#), Nirjhar Mukherjee, Prashant Pandey, Donald E. Porter, Jun Yuan, Yang Zhan

Acceptance Rate: 40%

Talks

Taking off the compute-colored glasses: Storage is vital to datacenter sustainability

Stanford University (CS) – Stanford, CA

22 Apr 2025

Microsoft Research – <i>Redmond, WA</i>	21 Apr 2025
University of Wisconsin, Madison – <i>Madison, WI</i>	1 Apr 2025
University of Toronto – <i>Toronto, Canada</i>	27 Mar 2025
Cornell Tech – <i>New York City, NY</i>	20 Mar 2025
MIT – <i>Boston, MA</i>	6 Mar 2025
University of Maryland, College Park – <i>College Park, MD</i>	27 Feb 2025
Google – <i>Sunnyvale, CA</i>	25 Feb 2025

Scaling the bandwidth-per-TB wall with Declarative Storage Interfaces

Salesforce – <i>Database Reading Group, San Francisco, CA</i>	4 Dec 2024
PDL Retreat – <i>Bedford, PA</i>	15 Oct 2024
PDL Retreat – <i>Bedford, PA</i>	6 Nov 2023

A Call for Research on Storage Emissions

PDL Retreat – <i>Bedford, PA</i>	15 Oct 2024
Western Digital – <i>San Jose, CA</i>	5 Sep 2024
HotCarbon – <i>Santa Cruz, CA</i>	9 July 2024

FairyWREN: A Sustainable Cache for Write-Read-Erase Interfaces

OSDI – <i>San Jose, CA</i>	12 July 2024
PDL Retreat – <i>Bedford, PA</i>	7 Nov 2023
PDL Retreat – <i>Pittsburgh, PA</i>	7 Nov 2022

Towards Understanding the Carbon Impact in End-to-end Sensing Pipelines

HotEthics – <i>Co-presented with Harash Desai, San Diego, CA</i>	29 Apr 2024
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Overcoming Write Limitations to achieve Sustainable Flash Caching

AMD – <i>Santa Clara, CA</i>	29 Mar 2024
Salesforce – <i>Database Reading Group, San Francisco, CA</i>	27 Mar 2024
University of California, Berkeley – <i>Berkeley, CA</i>	25 Jan 2024
Stanford – <i>Stanford, CA</i>	24 Jan 2024
University of California, Santa Cruz – <i>Santa Cruz, CA</i>	11 Jan 2024
McGill University – <i>Montreal, Canada</i>	16 Nov 2023
Microsoft – <i>Pittsburgh, PA</i>	2 Nov 2023
MIT – <i>Boston, MA</i>	10 Oct 2023
NDSEG 2021 Fellows Conference – <i>San Antonio, TX</i>	31 July 2023
University of Toronto – <i>Toronto, Canada</i>	20 Mar 2023

CS-JEDI: DEI education by PhD students, for PhD students

McGill – <i>Montreal, Canada</i>	31 Oct 2023
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Caching on Flash: Kangaroo and Beyond

Meta – <i>Menlo Park, CA</i>	11 Mar 2022
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Kangaroo: Caching Billions of Objects on Flash

Microsoft Research – <i>Redmond, WA</i>	22 Nov 2021
SOSP – <i>Remote</i>	27 Oct 2021
Cache@Scale – <i>Industry Remote Caching Meetup hosted by Meta</i>	4 Mar 2021

Building a Stronger, More Just Academic Community Through Mandatory Anti-bias Learning

University of Pittsburgh Diversity Forum – <i>Co-presented w/ Bailey Flanigan and Catalina Vajiac, Pittsburgh, PA</i>	28 July 2021
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Teaching

Carnegie Mellon University

Storage Systems (15-746/18-746)	TA, Fall 2023
Parallel Computer Architecture and Programming (15-418/618)	TA, Spring 2022
Diversity, Equity, and Inclusion in Computer Science and Society (15-996)	Co-Creator and TA, Spring 2021

Harvey Mudd College

Programming Languages (CS131)
 Introduction to Computer Systems (CS105)
 Introduction to Computer Systems (CS105)
 Data Structures and Programming Development (CS70)
 Principles of Computer Science (CS60)
 Introduction to Biology and Computer Science (CS5 Green)

Grader and Tutor, Spring 2019
Grader and Tutor, Fall 2018
Grader and Tutor, Spring 2018
Grader and Tutor, Fall 2017
Grader and Tutor, Spring 2017
Grader and Tutor, Fall 2016

Guest Lecturer

Computer Systems – Sustainable Computing (CMU 15-213/513)	<i>Fall 2024</i>
Storage Systems – Overcoming Flash’s Write Limitations to Achieve Sustainable Caching (CMU 15/18-746)	<i>Fall 2023</i>
Graduate Computer Architecture – Sustainable Computing (CMU 15-740)	<i>Fall 2023</i>
Computer Systems – Kangaroo: Caching Billions of Tiny Objects on Flash (CMU 18-213/613)	<i>Fall 2022</i>
Data Center Computing – Kangaroo Discussion (CMU 18-847C)	<i>Spring 2022</i>
CS-JEDI – Panel on Allyship (CMU 15-996)	<i>Spring 2022</i>
Computer Systems – Kangaroo: Caching Billions of Tiny Objects on Flash (CMU 18-213)	<i>Fall 2021</i>
Storage Systems – Kangaroo: Caching Billions of Tiny Objects on Flash (CMU 18-746)	<i>Fall 2021</i>

Mentoring

Theo Gregersen. CMU CS PhD student	<i>Fall 2024 - Present</i>
Yiwei Chen. CMU ECE masters student	<i>Fall 2024 - Present</i>
Tim Kim. CMU CS PhD student	<i>Spring 2024 - Present</i>
Sanjith Athlur. CMU CS PhD student	<i>Spring 2024 - Present</i>
Lucy Wang. CMU ECE undergraduate student	<i>Spring 2024 - Present</i>
Sophia (Qingyang) Cao. CMU CS undergraduate student	<i>Fall 2023 - Present</i>
Sarvesh Tandon. CMU ECE masters student	<i>Fall 2023 - Present</i>
Suhas Thalanki. CMU computational data science masters capstone	<i>Spring 2024 - Fall 2024</i>
Sriya Ravi. CMU computational data science masters capstone	<i>Spring 2024 - Fall 2024</i>
Yu Liu. CMU computational data science masters capstone	<i>Spring 2024 - Fall 2024</i>
Sherry (Yucong) Wang. CMU ECE undergraduate student, After degree: Salesforce	<i>Fall 2022 - Spring 2024</i>
Akshath Karanam. CMU ECE masters student, After degree: Salesforce	<i>Fall 2022</i>
Priyal Suneja. University of Washington CS PhD student	<i>Fall 2021 - Summer 2022</i>
Julian Tutuncu-Macias. CMU CS undergraduate student, After degree: Goldman Sachs	<i>Fall 2019 - Spring 2021</i>
Sheng Xu. CMU CS masters student, After degree: Amazon Web Services	<i>Spring 2020</i>
Karina Mejia. Ontario High School	<i>Summer 2016</i>

Service

Reviewer

Transactions on Storage (TOS)	<i>2024</i>
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External Reviewer

ACM SIGMETRICS	<i>2025</i>
USENIX Annual Technical Conference (ATC)	<i>2024</i>

Faculty Hiring Committee

Carnegie Mellon University, Computer Science Department	<i>2024</i>
Harvey Mudd College, Computer Science Department	<i>2019</i>

PhD Admissions

Carnegie Mellon University, Computer Science Department	<i>2022</i>
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Student Organizer

DEI initiatives in CMU’s CS Department – <i>Informal Survey, CS-JEDI course, advisor-advisee feedback form</i>	<i>2020-2023</i>
Parallel Data Lab (PDL) Meeting Coordinator	<i>2021</i>
PhD Orientation Committee – <i>CMU CS Department’s Introductory Course (IC)</i>	<i>2020</i>

Community Outreach

TechNights volunteer – <i>CS program for middle school girls</i>	2019-2020
AP CS Remote Talk at Eagan High School – <i>On CS career opportunities</i>	2021
Science Bus Volunteer and Treasurer – <i>Teaching 4/5th graders at under-resourced schools science lessons</i>	2015 - 2018
STEAM:coders Site Coordinator and Instructor – <i>CS program for students from disadvantaged communities</i>	2016