

Zachary D. Sisco

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zsisco@ucsb.edu

www.zsisco.net

I conduct research at the intersection of Programming Languages and Computer Architecture. My research integrates formal methods into open-source languages for chip design based around increasing developer agility with correctness guarantees.

I have published this work in top venues such as PLDI and ASPLOS while mentoring more than 20 students in research, 11 of which are co-authors on 4 published conference and workshop papers and 3 manuscripts that are currently under review.

Education

University of California, Santa Barbara	Santa Barbara, CA
PhD Computer Science — Co-advisors: Jonathan Balkind & Ben Hardekopf	2019 – Present
Wright State University	Dayton, OH
MS Computer Science — Co-advisors: Adam Bryant & John M. Emmert	2018
Thesis: <i>Verifying Data-Oriented Gadgets in Binary Programs to Build Data-Only Exploits</i>	
Ohio University	Athens, OH
BS Mathematics	2014

Experience

Computing Community Fellow , College of Creative Studies, UCSB	2024 – 2025
Research Mentor , Research Mentorship Program, UCSB	Summer 2024
Intern , Galois, Inc.	Summer 2023
Graduate Student Researcher , UCSB	2020 – 2023
Graduate Research Assistant , Wright State University	2016 – 2018
Programmer Analyst , Motorists Insurance Group	2013 – 2016

Fellowships & Awards

PhD Student of the Year , UCSB Computer Science	2024
Neal Fenzi – Resonant Founder Fellowship , Resonant, Inc.	2024
2nd Place Award , ACM SIGPLAN PLDI Student Research Competition	2022

Refereed Publications

Conference and Journal Papers

Control Logic Synthesis: Drawing the Rest of the OWL

Zachary D. Sisco, Andrew David Alex, Zechen Ma, Yeganeh Aghamohammadi, Boming Kong, Benjamin Darnell, Timothy Sherwood, Ben Hardekopf, Jonathan Balkind
Architectural Support for Programming Languages and Operating Systems, Volume 4 (ASPLOS), 2024

Loop Rerolling For Hardware Decompilation

Zachary D. Sisco, Jonathan Balkind, Timothy Sherwood, Ben Hardekopf
Programming Language Design and Implementation (PLDI) 2023

A Semantics-Based Approach to Concept Assignment in Assembly Code

Zachary D. Sisco, Adam R. Bryant
International Conference on Cyber Warfare and Security (ICCWS) 2017

Modeling Information Flow for an Autonomous Agent to Support Reverse Engineering Work

Zachary D. Sisco, Patrick P. Dudenhofer, Adam R. Bryant
Journal of Defense Modeling and Simulation, 2017

Workshop Papers

There and Back Again: A Netlist's Tale With Much Egraphin'

Gus Henry Smith, **Zachary D. Sisco**, Thanawat Techaumnuiwit, Jingtao Xia, Vishal Canumalla, Andrew Cheung, Zachary Tatlock, Chandrakana Nandi, Jonathan Balkind

Workshop on Languages, Tools, and Techniques for Accelerator Design (LATTE) 2024

On the Generality of Matrix Multiplication

Andrew Alex, **Zachary D. Sisco**, Jonathan Balkind

Programming Languages for Architecture (PLARCH) 2023

Semi-Automated Translation of a Formal ISA Specification to Hardware

Harlan Kringen, **Zachary Sisco**, Jonathan Balkind, Timothy Sherwood, Ben Hardekopf

Programming Languages for Architecture (PLARCH) 2023

A Position on Program Synthesis for Processor Development

Zachary D. Sisco, Jonathan Balkind, Timothy Sherwood, Ben Hardekopf

Workshop on Languages, Tools, and Techniques for Accelerator Design (LATTE) 2022

Papers Under Review

Mycelium: Module Finding with Functional Netlist Representation

Jingtao Xia, **Zachary D. Sisco**, Harlan Kringen, Skanda Vasishta, Jonathan Balkind, Ben Hardekopf

Under revision.

A Memory Design Language for Automated Memory Technology Mapping

Zachary D. Sisco, Daniel Petrisko, Jingtao Xia, Varun Rao, Spencer Wang, Ben Hardekopf, Jonathan Balkind

Under revision.

Supporting Computer Architecture Ecological Impact Analysis

Pranjali Jain, **Zachary D. Sisco**, Alex Bologna, Dingsheng Li, Jonathan Balkind, Timothy Sherwood

Under revision.

Invited Talks

IEEE/ACM MICRO PhD Forum, MICRO-57, Austin, TX

Nov 2024

IEEE Council on EDA, Guangzhou Chapter, HKUST (Guangzhou), China

August 2024

Languages, Systems, and Data Seminar, UC Santa Cruz

May 2024

CIRCT Group, LLVM

May 2023

PLSE Lab, University of Washington

February 2023

Teaching Experience

Certificates Earned

Certificate in Inclusive Teaching, UCSB Instructional Development

2024

Instructor of Record

CS 1L: Programming Laboratory, UCSB (College of Creative Studies)

Winter 2025

CS 9: Intermediate Python Programming, UCSB

Summer 2024

CS 32: Object-Oriented Design & Implementation, UCSB

Fall 2022

CS 24: Problem Solving with Computers II, UCSB

Summer 2022

CS 16: Problem Solving with Computers I, UCSB

Summer 2021, Winter 2021

CS 138: Automata & Formal Languages, UCSB

Summer 2020

Lead Teaching Assistant

<i>CS 501</i> : Techniques of Computer Science Teaching, UCSB	Fall 2023, Fall 2022
Tutorial on “Leading Computer-based Labs”, UCSB	Fall 2022

Teaching Assistant

<i>CS 1L</i> : Programming Laboratory, UCSB (College of Creative Studies)	Fall 2024
<i>CS 154</i> : Computer Architecture, UCSB	Winter 2023
<i>CS 138</i> : Automata & Formal Languages, UCSB	Spring 2020
<i>CS 156</i> : Advanced Applications Programming, UCSB	Winter 2020, Fall 2019
<i>CS 7830</i> : Machine Learning, Wright State University	Fall 2017
<i>CS 4350</i> : Operating System Internals and Design, Wright State University	Fall 2017

Academic Service

Artifact Evaluation Committee, PLDI	2024
Program Committee, Workshop on Languages, Tools, and Techniques for Accelerator Design	2024
Organizing Committee, Workshop on Languages, Tools, and Techniques for Accelerator Design	2023
Tutorial Organizer, “Creating a Compelling and Sustainable Tutorial”, ASPLOS	2023
Student Volunteer, PLDI	2022
Artifact Evaluation Committee, OOPSLA	2020