KIDUS WORKNEH

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I am interested in heterogeneous computing; specifically, language-level modifications, compiler optimizations, and hardware design to efficiently run programs on emerging hardware platforms. My research spans areas of systems, computer architecture, and security.

EDUCATION

Electrical, Computer and Energy Engineering, PhD
at University of Colorado Boulder - expected graduation year, 2027

Electrical, Computer and Energy Engineering, MSc
at University of Colorado Boulder - 2022-2023

Electrical and Computer Engineering, BSc
at Addis Ababa University, Ethiopia - 2016 - 2021

WORK EXPERIENCE

Graduate Research Assistant Jan 2022 - Present
University of Colorado, Boulder
Tech stack - C/C++, Python, x86 Assembly, LLVM/Clang Frontend, gem5, Git, LaTeX

1. Exploring programming language and compiler level mechanisms for efficient programming models for different memory technologies, in particular volatile DRAM in a non uniform memory access (NUMA) setting, persistent memory and secure memory [1], with an expected submission to ACM SIGPLAN Object Oriented Programming, Systems, Languages and Applications (OOPSLA) this winter.
2. Worked on a library extraction tool that improves the reusability, code size and ease of maintenance of imperative programming languages like Python [2].
3. Worked on exploring novel architectures and OS modifications to support secure memory on persistent memory for power-crash resilience [3] [4].

Researcher June 2025 - Present
University of Colorado, Boulder (Department of Physics) and Cerfe Labs.
Tech stack - C/C++, Keithley Test & Measurement Equipment

1. Working on optimizing the device characterization process for Correlated Electron Random Access Memory (CeRAM), a resistive non volatile random access memory technology that is as dense as and faster than secondary storage devices. I am exploring efficient testing mechanisms on a device characterization instrument for CeRAM devices that are fabricated for experimental purposes at the physics department.

Research Intern May 2020 - November 2020
University of Michigan, Ann Arbor
Tech stack - C/C++, Python, gem5, Git, LaTeX

1. Worked on the development of a privacy enhanced computer architecture platform that sequesters sensitive plaintext data into a small hardware root of trust for processing while encrypting this data in all other external micro-architectural structures [5].
2. Collaborated on a project that focused on the development of a benchmark suite with varying operational complexity and computational depth to evaluate competing privacy frameworks. Both projects were published in the IEEE Secure and Private Execution Environment (SEED) Conference [6].

Online and Infrastructure Support October 2018 - April 2020
Hurricane Computer Solutions, Addis Ababa
Tech stack - Javascript, HTML, CSS, Cisco Packet Tracer

1. Laid out computing infrastructures that involved setting up networking devices for clients and installing the necessary software support for their computers.
2. Collaborated with the application development team for a car spare parts inventory and built/maintained client websites using web development and markup languages.

PUBLICATIONS

[1] Kidus Workneh, Gowtham Kaki, and Joseph Izraelevitz. A numa-aware type extension with introspective typing. 2026 (In Progress).

[2] Abhiram Bellur, Razan Alghamdi, Kidus Workneh, and Joseph Izraelevitz. Leroy: Library learning for imperative programming languages. In *ACM SIGPLAN International Conference on Systems, Programming, Languages and Applications*, Human Aspects of Types and Reasoning Assistants, 2024.

[3] Sam Thomas, Kidus Workneh, Jac McCarty, Joseph Izraelevitz, Tamara Lehman, and Iris Bahar. A midsummer night's tree: Efficient and high performance secure SCM. In *ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, 2024.

[4] Samuel Thomas, Kidus Workneh, Ange-Thierry Ishimwe, Zack McKevitt, Phaedra Curlin, R. Iris Bahar, Joseph Izraelevitz, and Tamara Lehman. Baobab merkle tree for efficient secure memory. *IEEE Computer Architecture Letters*, 23(1):33–36, 2024.

[5] Lauren Biernacki, Meron Zerihun Demissie, Kidus Birkayehu Workneh, Fitsum Assamnew Andargie, and Todd Austin. Sequestered encryption: A hardware technique for comprehensive data privacy. In *2022 IEEE International Symposium on Secure and Private Execution Environment Design (SEED)*, pages 73–84. IEEE, 2022.

[6] Lauren Biernacki, Meron Zerihun Demissie, Kidus Birkayehu Workneh, Galane Basha Namomsa, Plato Gebremedhin, Fitsum Assamnew Andargie, Brandon Reagen, and Todd Austin. Vip-bench: A benchmark suite for evaluating privacy-enhanced computation frameworks. In *2021 International Symposium on Secure and Private Execution Environment Design (SEED)*, pages 139–149. IEEE, 2021.

TEACHING AND VOLUNTARY ACTIVITES

Teaching Assistant and Mentor
University of Colorado Boulder

- Served as a teaching assistant where I held recitations for the Computer Organization class at CU.
- Gave a guest lecture for a graduate level compiler construction class on type theory.
- Mentored an undergraduate student investigate the possibility of row hammer attacks in persistent memory technologies under the Discovery Learning Apprenticeship program.

Program-Commitee
ACM/IEEE ISCA, 2025 and IEEE Micro, 2025

- Served as a program committee at ACM/IEEE International Symposium on Computer Architecture (ISCA) 2025 as an artifact evaluator
- Served as a program committee at IEEE Micro 2025 as a reviewer.

Project Storm,
Self-initiated program

- Initiated a non-profit mentorship program where undergraduates from different parts of Ethiopia came and developed their coding and problem solving skills under the supervision of professionals.

Google Development Group - DevFest
Google Developers Community

- Assisted in facilitating a hackathon called Ethiopia Hacks where software developers worked on various projects and successful African entrepreneurs gave a speech.

AIESEC
Independent arm of the United Nations Department of Global Communications

- Worked in the marketing and communications team and designed posters and wrote blogs to help empower the youth in Ethiopia get involved in community support activities.

REFERENCES

Professor Joseph Izraelevitz Joseph.Izraelevitz@colorado.edu
Professor Tamara Lehman Tamara.Lehman@colorado.edu