

Michael Vollmer

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Research Interests

My research sits at the intersection of programming languages and systems, focusing on memory-safe systems programming, efficient data representations, and compiler and runtime support for building reliable and high-performance software.

Education

- 2021 **Indiana University**
PhD in Computer Science
Thesis: *A Language-based Approach to Programming with Serialized Data*
Advisor: Prof. Ryan R. Newton
- 2013 **California State University, Sacramento**
BS in Computer Science

Work Experience

- 2022 – Present **Lecturer / Assistant Professor** – University of Kent
Lecturer in the School of Computing, part of the *Programming Languages and Systems* (PLaS) group.
- 2025 – Present **SCI Semiconductor Ltd** – Engineer
Part-time work on Rust support for CHERIoT and capability-oriented embedded systems software.
- 2020 – 2022 **Research Associate** – University of Kent, with Dominic Orchard
Worked on the Granule project, doing research on graded modal types and linear types.
- 2017 – 2018 **Microsoft** – Research Intern
Improving performance of program synthesis algorithms using parallelism.

- 2015 **Visiting Researcher** — University of Edinburgh
Funded on a HiPEAC grant to work on verified optimisations for high-performance GPU kernels.
- 2013 — 2014 **Eyefinity/VSP Global** — Software Engineer
Java Enterprise application development.
- 2010 — 2013 **CSUS University Union** — Web Developer
Front-end coding using Javascript and JQuery, including experience with mobile websites and responsive layouts.

Grant Funding

- 2025 Co-I: **Evolving Memory Safe Languages & Analysis For Critical National Infrastructure Applications**
Innovate UK, £1,055,182.
- 2023 PI: **Rust for Bare Metal Morello**
DASA, £87,607.
- 2021 Co-I: **Transparent pointer safety: Rust to Lua to OS Components**
EPSRC and Innovate UK DSbD Software Ecosystem, £494,770.

Active Research

- 2017 — Present **Gibbon**
A compiler and language project for operating directly on packed, serialized recursive data structures, with contributions spanning layout-aware compilation and efficient traversals.
- 2021 — Present **Rust+CHERI**
Research and toolchain work combining Rust with CHERI hardware capabilities to deliver stronger memory safety for systems code, including support for CHERIoT and upstream-focused ecosystem development.

Publications

- JOT 2026 Octave Larose, **Michael Vollmer**, Stefan Marr. **AST, Bytecode, and the Space In Between: An Exploration of Interpreter Design Tradeoffs**. *Journal of Object Technology*. March 2026.
- ITP 2025 David Castro-Perez, Marco Paviotti, and **Michael Vollmer**. **Program Optimisations via Hylomorphisms for Extraction of Executable Code**. *International Conference on Interactive Theorem Proving*. September 2025, Reykjavik.

- ECOOP 2025 Jack Hughes, **Michael Vollmer**, and Mark Batty. **Speigion: Implicit and Non-Lexical Regions with Sized Allocations**. *European Conference on Object-Oriented Programming*. July 2025, Bergen.
- ECOOP 2025 Arthur Jamet and **Michael Vollmer**. **Type-safe and Portable Support for Packed Data**. *European Conference on Object-Oriented Programming*. July 2025, Bergen.
- ECOOP 2024 Vidush Singhal, Chaitanya Koparkar, Joseph Zullo, Artem Pelenitsyn, **Michael Vollmer**, Mike Rainey, Ryan Newton, Milind Kulkarni. **Optimizing Layout of Recursive Datatypes with Marmoset**. *European Conference on Object-Oriented Programming*. September 2024, Vienna.
- ISMM 2024 Chaitanya Koparkar, Vidush Singhal, Aditya Gupta, Mike Rainey, **Michael Vollmer**, Artem Pelenitsyn, Sam Tobin-Hochstadt, Milind Kulkarni, and Ryan R. Newton. **Garbage Collection for Mostly Serialized Heaps**. *International Symposium on Memory Management*. June 2024, Copenhagen.
- ECOOP 2023 Sarah Harris, Simon Cooksey, **Michael Vollmer**, and Mark Batty. **Rust for Morello: Always-On Memory Safety, Even in Unsafe Code**. *European Conference on Object-Oriented Programming*. July 2023, Seattle.
- ESOP 2022 Danielle Marshall, **Michael Vollmer**, and Dominic Orchard. **Linearity and Uniqueness: An Entente Cordiale**. *European Symposium on Programming*. April 2022, Munich.
- EPTCS 2021 Jack Hughes, **Michael Vollmer**, and Dominic Orchard. **Deriving Distributive Laws for Graded Linear Types**. *Electronic Proceedings in Theoretical Computer Science*. December 2021, Virtual.
- ICFP 2021 Chaitanya Koparkar, Mike Rainey, **Michael Vollmer**, Milind Kulkarni, and Ryan R. Newton. **Efficient Tree-traversals: Reconciling Parallelism and Dense Data Representations**. *International Conference on Functional Programming*. August 2021, Virtual.
- PLDI 2019 **Michael Vollmer**, Chaitanya Koparkar, Mike Rainey, Laith Sakka, Milind Kulkarni, and Ryan R. Newton. **LoCal: A Language for Programs Operating on Serialized Data**. *Programming Language Design and Implementation*. June 2019, Phoenix.
- ECOOP 2017 **Michael Vollmer**, Sarah Spall, Buddhika Chamith, Laith Sakka, Milind Kulkarni, Sam Tobin-Hochstadt, and Ryan R. Newton. **Compiling Tree Transforms to Operate on Packed Representations**. *European Conference on Object-Oriented Programming*. June 2017, Barcelona.
- PPoPP 2017 **Michael Vollmer**, Ryan G. Scott, Madanlal Musuvathi, and Ryan R. Newton. **SC-Haskell: Sequential Consistency in Languages That Minimize Mutable Shared Heap**. *Symposium on Principles and Practice of Parallel Programming*. February 2017, Austin.

- FHPC 2015 **Michael Vollmer**, Bo Joel Svensson, Eric Holk, and Ryan R. Newton. **Meta-programming and Auto-tuning in the Search for High Performance GPU Code**. *Workshop on Functional High-Performance Computing*. August 2015, Vancouver.
- FHPC 2015 Bo Joel Svensson, **Michael Vollmer**, Eric Holk, Trevor L. McDonell, and Ryan R. Newton. **Converting Data-parallelism to Task-parallelism by Rewrites: Purely Functional Programs Across Multiple GPUs**. *Workshop on Functional High-Performance Computing*. August 2015, Vancouver.