

Akshay Bhosale, Ph.D.

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🌐 <https://akshayud.me/>

Interests

COMPILERS, OPTIMIZATION TECHNIQUES, HIGH PERFORMANCE COMPUTING

Education

- 2018 – 2024 📖 **Ph.D., Electrical and Computer Engineering, University of Delaware, USA**
Thesis title: *Compile-time Automatic Parallelization of Subscripted Subscripts using Recurrence Analysis* [On ProQuest](#)
ADVISOR: PROF. DR. RUDOLF EIGENMANN
- 2012 – 2016 📖 **B.E., Electronics Engineering, University of Mumbai, India**

Experience

- Jan 2024 – Present 📖 **Postdoctoral Research Associate**, Computer Architecture Group, Department of Computer Science and Technology, University of Cambridge, UK.
ADVISOR: PROF. DR. TIMOTHY JONES
- May 2018 – Jan 2024 📖 **Visiting Academic Researcher**, ARM Ltd., Cambridge, UK.
- May 2018 – Jan 2024 📖 **Research Assistant**, Department of Electrical and Computer Engineering, University of Delaware, USA.



Awards

- 2024 📖 **Best Artifact Award**, 29th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP), 2024, Edinburgh, United Kingdom. [zenodo link](#)
- 2023 📖 **Best Paper Award**, International Workshop on Languages and Compilers for Parallel Computing, LCPC, 2023, Kentucky, USA.


Research Publications

Conference Proceedings

- 1 Márton Erdős, Utpal Bora, **Akshay Bhosale**, Alexandra W Chadwick, Bob Lytton, Giacomo Gabrielli, Richard Cooper, Yuxin Guo, and Timothy M. Jones, “Loopfrog: In-core hint-based loop parallelization,” in *Proceedings of The 58th IEEE/ACM International Symposium on Microarchitecture, Seoul, Korea, 2025*, (Accepted to appear).
- 2 Yuxin Guo, **Akshay Bhosale**, Alexandra W Chadwick, Utpal Bora, Márton Erdős, Giacomo Gabrielli, and Timothy M. Jones, “Ghost threading: Helper-thread prefetching for real systems,” in *Proceedings of The 58th IEEE/ACM International Symposium on Microarchitecture, Seoul, Korea, 2025*, (Accepted to appear).
- 3 **Akshay Bhosale** and Rudolf Eigenmann, “Recurrence analysis for automatic parallelization of subscripted subscripts,” in *Proceedings of the 29th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*, ser. PPoPP ’24, Edinburgh, United Kingdom: Association for Computing Machinery, 2024, pp. 392–403, ISBN: 97984007043522403. 📄 DOI: [10.1145/3627535.3638493](https://doi.org/10.1145/3627535.3638493).
- 4 **Akshay Bhosale** and Rudolf Eigenmann, “Compass: A combined parallel subscripted subscript benchmark suite,” in *36th International Workshop on Languages and Compilers for Parallel Computing (LCPC), Lexington, KY, USA, October 11–13*, (Accepted to appear), 2023, p. 221.

- 5 **Akshay Bhosale** and Rudolf Eigenmann, “On the automatic parallelization of subscripted subscript patterns using array property analysis,” in *Proceedings of the ACM International Conference on Supercomputing*, ser. ICS ’21, Virtual Event, USA: Association for Computing Machinery, 2021, pp. 392–403, ISBN: 9781450383356.  DOI: [10.1145/3447818.3460424](https://doi.org/10.1145/3447818.3460424).
- 6 **Akshay Bhosale** and Rudolf Eigenmann, “Compile-time parallelization of subscripted subscript patterns,” in *2020 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*, 2020, pp. 317–325.  DOI: [10.1109/IPDPSW50202.2020.00065](https://doi.org/10.1109/IPDPSW50202.2020.00065).


Journal Articles

- 1 **Akshay Bhosale**, Parinaz Barakhshan, Miguel Romero Rosas, and Rudolf Eigenmann, “Automatic and interactive program parallelization using the cetus source to source compiler infrastructure v2.0,” *Electronics*, vol. 11, no. 5, 2022, ISSN: 2079-9292.  DOI: [10.3390/electronics11050809](https://doi.org/10.3390/electronics11050809).

Patents


- 1 Richard Cooper, Giacomo Gabrielli, Bob Lytton, Marton Erdos, Alexandra Winifred Chadwick, **Akshay Bhosale**, Utpal Bora, and Timothy Jones, “Handling reductions in micro-threaded code,” Patent Application No.: 202 511 074 400, Application filed in India, 2025.
- 2 Giacomo Gabrielli, Bob Lytton, Richard Cooper, Alexandra Winifred Chadwick, Marton Erdos, Yuxin Guo, Utpal Bora, **Akshay Bhosale**, and Timothy Jones, “Support for parallel function continuations,” Patent Application No.: 202 511 074 398, Application filed in India, 2025.
- 3 Giacomo Gabrielli, Bob Lytton, Ali Zaidi, Utpal Bora, **Akshay Bhosale**, Marton Erdos, and Timothy Jones, “Memory aliasing discriminators,” Patent Application No.: 202 511 074 399, Application filed in India, 2025.

Posters


- 1 Alexandra W. Chadwick, Márton Erdős, Utpal Bora, Akshay Bhosale, Bob Lytton, Yuxin Guo, Richard Cooper, Giacomo Gabrielli, and Timothy M. Jones, *The future of instruction-level parallelism (ilp)*, 2025 *IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)*, 2025.  DOI: [10.1109/ISPASS64960.2025.00040](https://doi.org/10.1109/ISPASS64960.2025.00040).

Projects

Speculative Task-Parallelization

- 2024 – Present  The ParaSol project funded by the Engineering and Physical Sciences Research Council (EPSRC) UK, seeks to develop compiler analyses and transformations to extract parallelism for future processors. I successfully implemented optimization techniques (in C++) to take advantage of and improve instruction-level parallelism for efficient speculative execution of application codes. The techniques have been incorporated into the ParaSol compiler, developed using the industry standard LLVM infrastructure.

Software Prefetching

- June 2025 – Present  Implemented a compiler transformation pass (in LLVM) to automatically extract helper thread for prefetching data in a Simultaneous Multi-threading (SMT) execution context.

Projects (continued)

Automatic Parallelization

- 2018 – 2023
- Developed and implemented advanced automatic parallelization techniques for Sparse Matrix computations within the Cetus compiler infrastructure. Cetus (written in Java) analyzes an input C code and automatically generates the Multi-threaded (OpenMP) version of the code. Evaluated the performance impact of the techniques on a state-of-the-art HPC cluster. ([Project Website](#))
 - Fixed bugs and added features to the Cetus compiler infrastructure. Released new versions of the compiler on the official Cetus website hosted at the University of Delaware. ([Website](#), [GitHub](#))

The ATOM Project

- 2019 – 2023
- The ATOM project funded by the United States National Science Foundation (NSF) aims to make available high-quality atomic data generated by a team of physicists using computation codes. For this project, I developed Python scripts for automatically generating web pages to display the atomic data. I also developed Python web scrapping scripts to scrape the displayed data and test against data provided by physicists, ensuring integrity and consistency. ([Project Website](#))

Internships

- Jan – May 2022
- Pacific Northwest National Laboratory**, Implemented a Python / Numpy front-end for the COMET domain-specific compiler infrastructure for computational chemistry applications. The compiler is based on the MLIR framework developed by Google. ([Python Package on PyPI](#))

Supervision Experience

- Lent Term 2025
- Course Supervisor**, Course on Optimizing Compilers, Department of Computer Science and Technology, University of Cambridge.
- 2024 - 2025
- Supervisor**, Undergraduate Final Year Project titled "*A JIT Compiler for BEAM bytecode to RISC-V*"

Professional Service

- 2024
- Committee Member**, International Symposium on Code Generation and Optimization (CGO) - ACM Student Research Competition (SRC), 2025, Las Vegas, USA.
 - Program Committee Member**, The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC), 2024, Atlanta, USA.

Leadership

- 2019 - 2020
- Vice President of Student Affairs**, University of Delaware Graduate Student Government.

References

Prof. Dr. Timothy M. Jones

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Dept. of Computer Science and Technology
University of Cambridge,
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Prof. Dr. Rudolf Eigenmann

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