

Anna-Lena Roth

Postdoctoral Researcher

Fulda University of Applied Sciences, Germany
High Performance Computing • Julia for HPC • Resource Adaptivity



anna-lena.roth@cs.hs-fulda.de

Google Scholar GitHub LinkedIn ResearchGate

Postdoctoral researcher in applied computer science focusing on high performance computing, task-based parallel programming, and resource adaptivity. Current work centers on Julia, MPI.jl, and Dagger.jl for scalable applications on supercomputers. Doctoral dissertation successfully defended in July 2026.

Positions

Postdoctoral Researcher

07/2026–Present

Fulda University of Applied Sciences

Research on transparent resource adaptivity for dynamic and irregular task-based applications on HPC clusters. Current work focuses on Julia, MPI.jl, Dagger.jl, asynchronous many-task programming, and scalable execution on supercomputers.

Research Associate

10/2021–06/2026

Fulda University of Applied Sciences

Doctoral research in high performance computing, especially Message Passing Interface (MPI), performance analysis, and programming education.

Lecturer

10/2019–07/2021

Fulda University of Applied Sciences

Teaching assignments in programming labs and computer science courses.

Education

Ph.D. Computer Science

04/2022–07/2026

Fulda University of Applied Sciences

Ph.D. thesis: *Integrating Performance Analysis into HPC Education: Concept, Practice, and Evaluation*. Successfully defended in July 2026; certificate pending.

Master of Science, Applied Computer Science

10/2019–09/2021

Fulda University of Applied Sciences

Master's thesis: *A Survey of Intelligent Tools for Programming Education and Model-Checking-Based Enhancements*.

Bachelor of Science, Digital Media

10/2016–08/2019

Fulda University of Applied Sciences

Bachelor's thesis: *Automated Generation of E-Learning Assignments for Programming Education*.

Research Interests

- High performance computing and task-based parallel programming
- Resource adaptivity for dynamic and irregular HPC applications
- Julia, Dagger.jl, MPI, and performance analysis on supercomputers
- Agentic AI for scalable scientific computing on HPC systems
- Programming education and educational tooling for parallel programming

Teaching

Communication Networks and Protocols

2026

Lab; summer semester 2026

Programming 2

2026,

Lab; summer semesters 2019, 2020 and 2026

2019–2020

Parallel Programming

2023–2026

Lecture and lab in German and English; summer semesters 2023, 2024, 2025 and winter semesters 2024/25 and 2025/26

Fundamentals of Computer Science

2022–2024

Lab; winter semesters 2022/23 and 2023/24

Operating Systems

2021–2022

Lab; summer semesters 2021 and 2022

Algorithms and Data Structures

2021–2022

Lab; winter semester 2021/22

Introduction to Engineering Sciences

2020–2021

Lecture and lab in English; winter semester 2020/21

Programming 1

2017–2021

Lab; winter semesters 2017/18, 2018/19, 2019/20 and 2020/21

Supervising

Bachelor's Thesis

05/2025

Evaluation of Deployment Options for a Graphical HPC Application by Marvin Zein; supervisor and reviewer, ParCIO / Otto von Guericke University Magdeburg

Additional Experience

Intern

03/2019–05/2019

EDAG Engineering GmbH, Fulda; app concept, database integration, GUI development, visualization

Tutor

10/2017–07/2020

Fulda University of Applied Sciences

Student Assistant

10/2016–08/2018

Fulda University of Applied Sciences

Technical Experience

Programming

Julia, C, C++, C#, Java, Python, Qt

HPC & Parallel

Dagger.jl, JuliaGPU, MPI, OpenMP, CUDA, task-based parallel programming, performance analysis (Score-P, Scalasca, Vampir, CUBE, TAU)

Data

PostgreSQL, TimescaleDB, MongoDB, Oracle Essbase

Tools

Linux, Git, Docker, Bash, CMake, LaTeX, MS Office, Codex, Claude Code

Creative Tools

Adobe Creative Cloud

Publications

Conferences and Workshops

- [1] **Anna-Lena Roth** and Tim Süß. “Performance Analysis Tools for MPI Applications and their Use in Programming Education”. In: *Companion of the International Conference on Performance Engineering (ICPE)*. ACM, Apr. 2023. DOI: [10.1145/3578245.3584358](https://doi.org/10.1145/3578245.3584358).
- [2] **Anna-Lena Roth**, David James, Michael Kuhn, and Johannes Konert. “Enhancing Parallel Programming Education with High-Performance Clusters Utilizing Performance Analysis”. In: *Proceedings of DELFI*. Gesellschaft für Informatik e.V., Sept. 2024. DOI: [10.18420/delfi2024_42](https://doi.org/10.18420/delfi2024_42).
- [3] **Anna-Lena Roth**, David James, and Michael Kuhn. “EduMPI - Simplifying the Use of High-Performance Clusters and Focusing Performance Analysis in Parallel Programming Education”. In: *PARS-Mitteilungen* 37 (Sept. 2025). Gesellschaft für Informatik e.V., Fachgruppe PARS. ISSN: 0177-0454. URL: <https://dl.gi.de/handle/20.500.12116/46131>.
- [4] **Anna-Lena Roth**, David James, Michael Kuhn, and Dustin Frisch. “Making MPI Collective Operations Visible: Understanding Their Utility and Algorithmic Insights”. In: *Euro-Par 2025*. LNCS. Springer, Aug. 2025. DOI: [10.1007/978-3-031-99854-6_5](https://doi.org/10.1007/978-3-031-99854-6_5).
- [5] **Anna-Lena Roth**, David James, Jonas Posner, and Michael Kuhn. “Performance Analysis in Parallel Programming Education: A Comparative Usability Study”. In: *PARS-Mitteilungen* (Jan. 2026). Gesellschaft für Informatik e.V., Fachgruppe PARS. URL: <https://dl.gi.de/handle/20.500.12116/48841>.
- [6] **Anna-Lena Roth**, Jonas Posner, and Michael Kuhn. “Enabling Interactive Visualization for Near-Real-Time Performance Analysis of MPI Applications”. In: *Companion of the International Conference on Performance Engineering (ICPE)*. ACM, Apr. 2026. DOI: [10.1145/3777911.3800642](https://doi.org/10.1145/3777911.3800642).
- [7] **Anna-Lena Roth** and Jonas Posner. “An Empirical Analysis of High-Performance Computing Education in Germany”. In: *Computational Science (ICCS) Workshops (WTCS)*. LNCS. Springer, June 2026. DOI: [10.1007/978-3-032-29918-5_32](https://doi.org/10.1007/978-3-032-29918-5_32).
- [8] Linus Bantel, **Anna-Lena Roth**, Jonas Posner, and Dirk Pflüger. “Generated, Parallel, Scalable? A Study of Agentic AI-Generated Julia Code on Supercomputers”. In: *Proceedings Parallel Processing and Applied Mathematics (PPAM) Workshops (AMTE)*. To appear. Preprint. Springer, Sept. 2026. arXiv: [2606.16534](https://arxiv.org/abs/2606.16534).
- [9] **Anna-Lena Roth** and Jonas Posner. “From a Last-Week Add-On to First-Day Practice: Three Years of Integrating MPI Performance Analysis into HPC Education with EduMPI Suite”. In: *Proceedings of the SC '26 Workshops of the International Conference for High Performance Computing, Networking, Storage and Analysis*. accepted for publication: SC '26 Workshops, EduHPC; to appear. IEEE, Nov. 2026.
- [10] Paul Schäfer, **Anna-Lena Roth**, Peter Arzt, Felix Krull, Sebastian Krenz, Felix Wolf, and Jonas Posner. “Saving Energy Costs and Time on Supercomputers: Scheduler-Integrated Recurring Node Shutdown Exploiting Malleable Jobs”. In: accepted for publication: SC '26 Workshops, EESP; to appear. IEEE, Nov. 2026.

Dissertation

- [11] **Anna-Lena Roth**. “Integrating Performance Analysis into HPC Education: Concept, Practice, and Evaluation”. PhD thesis. Fulda, Germany: Fulda University of Applied Sciences, July 2026. URL: <https://nbn-resolving.org/urn:nbn:de:hebis:66-opus4-12322>.

Posters

- [12] **Anna-Lena Roth** and Jonas Posner. “Near-Real-Time Performance Visualization of MPI Applications: Integrating Performance Analysis into HPC Education”. In: Accepted for publication: SC '26: Doctoral Showcase; to appear. Nov. 2026.

Artifacts

- [13] **Anna-Lena Roth**. *EduMPI + EduStore*. Software artifact. GitHub repository. 2026. URL: <https://github.com/AnnaLena77/EduMPI>.
- [14] **Anna-Lena Roth**. *EduMPI GUI*. Software artifact. GitHub repository. 2026. URL: https://github.com/AnnaLena77/EduMPI_GUI.
- [15] Linus Bantel and **Anna-Lena Roth**. *Agentic AI-Generated Julia Code on Supercomputers*. Software artifact. GitHub repository. 2026. URL: <https://github.com/BaLinuss/Agentic-AI-Generated-Julia-Code-on-Supercomputers>.

Talks

Peer-Reviewed Presentations

- | | |
|---|---------|
| <i>Making MPI Collective Operations Visible: Understanding Internal Algorithms and Performance Implications</i>
Invited talk at the Institute for Parallel and Distributed Systems (IPVS) at the University of Stuttgart | 09/2026 |
| <i>Generated, Parallel, Scalable? A Study of Agentic AI-Generated Julia Code on Supercomputers</i>
PPPAM Workshop for Asynchronous Many-Task Systems for Exascale (AMTE), Poznań, Poland | 09/2026 |

<i>Enabling Interactive Visualization for Near-Real-Time Performance Analysis of MPI Applications</i> ICPE Workshops (WEPPE), Florence, Italy	05/2026
<i>Performance Analysis in Parallel Programming Education: A Comparative Usability Study</i> PARS Workshop, Hagen, Germany	09/2025
<i>Making MPI Collective Operations Visible: Understanding Their Utility and Algorithmic Insights</i> Euro-Par Main Track, Dresden, Germany	08/2025
<i>EduMPI - Simplifying the Use of High-Performance Clusters and Focusing Performance Analysis in Parallel Programming Education</i> PARS Workshop, Ingolstadt, Germany	09/2024
<i>Enhancing Parallel Programming Education with High-Performance Clusters Utilizing Performance Analysis</i> DELFI Conference, Fulda, Germany	09/2024
<i>Performance Analysis Tools for MPI Applications and their Use in Programming Education</i> ICPE Workshops (WEPPE), Coimbra, Portugal	04/2023

Service to Profession

Reviewing

Cluster Computing Invited reviewer	06/2026
--	---------

Awards

Best Presentation Award PARS Workshop 2025, Hagen, Germany; awarded by the PARS Special Interest Group of the German Informatics Society (GI)	09/2025
---	---------

Further Qualifications

Languages

German	Native
English	Fluent (C1)

Good scientific practice Doctoral Centre for Applied Computer Science (PZAI)	12/2025
--	---------

Introduction to Julia Leibniz Supercomputing Centre (LRZ)	06/2026
---	---------

Professional Memberships

Association for Computing Machinery (ACM) Member	2026–Present
--	--------------