

Klaus Aehlig

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Personal Information

full name Klaus Thomas Aehlig
date of birth October 23, 1976
place of birth Würzburg

Education

- 2005–2010 **Habilitation in Computer Science**, *Ludwig-Maximilians-Universität, München*.
The title of the thesis was “Parallel Time and Proof Complexity”.
- 2000–2003 **Dr. rer. nat.**, *Ludwig-Maximilians-Universität, München*, magna cum laude.
PhD in Mathematics, in the area of mathematical logic. The title of thesis was “On Fragments of Analysis with Strengths of Finitely Iterated Inductive Definitions”.
- 1996–2000 **Dipl. math. univ.**, *Ludwig-Maximilians-Universität, München*, Mit Auszeichnung.
Master degree in Mathematics with distinction. The title of the thesis was “Programm-extraktion für nicht-wachsende Polynomialzeitberechnungen” (program extraction for non-size-increasing polynomial-time computations).

Work Experience

full-time

- since Feb 2020 **Software Engineer**, *Huawei Munich Research Center, München*.
- 2011–2020 **Software Engineer**, *Google Germany GmbH, München*.
Apr 2016–Jan 2020 working on Bazel, an open-source build utility. <https://bazel.build/>
Apr 2013–Mar 2016 working on Ganeti, an open-source cluster virtual server management software tool. <http://www.ganeti.org/>
- Mar–Oct, 2011 **Senior Research Assistant**, *University of Southampton, Southampton, UK*.
This position was funded by the EPSRC research project “Casimir Forces in Dynamic Geometries for MEMS/NEMS Design”. The research project mainly involved developing software for numeric computation of Casimir forces.
- 2003–2011 **Wissenschaftlicher Assistent**, *Ludwig-Maximilians-Universität, München*.
Teaching and Research position.
- 2006–2009 **Senior Research Assistant**, *University of Wales, Swansea, UK*.
This position was funded by the EPSRC research project “Abstract Measures of Low-Level Computational Complexity”. Research was about proving meta-theorems about theories of Bounded Arithmetic, that is, fragments of Peano Arithmetic where the provably recursive functions form some computational complexity class.

- Jan–May, **Postdoctoral Researcher**, *University of Toronto*, Toronto, Ontario, Canada.
 2007 Research was on relativised computational complexity classes and propositional proof complexity.
- Jan–Dec, **Postdoctoral Reserarcher**, *University of Oxford*, Oxford, UK.
 2004 During that time, research was done on recursion scheme, i.e., simply-typed lambda-terms with fixed-point combinators.
- [internships and work during studies](#)
- 1999–2002 **Studentische Hilfskraft**, *Ludwig-Maximilians-Universität*, München.
 Marking homework and giving example classes.
- Jul–Sep, **Internship**, *Edinburgh Parallel Computing Center*, Edinburgh, UK.
 1999 This internship was part of the the “EPCC Summer Scholarship Progam”, working on the project “The Parallelisation of a Finite Element Code on a Shared-Memory Computer using OpenMP”.
- 1998–1999 **Studentische Hilfskraft**, *Technische Universität*, München.
 The programming part of the OMIS compliant monitor (where OMIS is “Online Monitoring Interface Specification”), a debugging and performance analysis tool for parallel and distributed programs.
- Apr 1997 **Internship**, *gsf – Forschungszentrum für Umwelt und Gesundheit GmbH*, München.

Awards and Scholarships

- 2008 **Invited research visit**, *Academy of Science*, Prague, Czech Republic.
- 2007 **Postdoctoral fellowship**, *German Research Foundation (DFG)*.
- 2004 **Postdoctoral fellowship**, *German Academic Exchange service (DAAD)*.
- 2000–2004 **PhD scholarship**, *PhD program “Logic in Computer Science”*.
- 1996–2000 **Scholarship**, *Studienstiftung des deutschen Volkes*.
- 1994, 1995 **Bundessieger**, *Bundeswettbewerb Mathematik*.
 one of the winners of the German national competition in Mathematics

Miscellaneous

- languages German (native), English (fluent), Basic knowledge of French
- programming Good knowledge in Haskell, Python, and Java from professional use. Fair knowledge in perl, C, and shell scripting from day-to-day Unix usage and administration. Knowledge of Javascript, Scheme, and ML.
- other In 2003, 2005, 2009, 2013, and 2016 I gave 17 day courses at the Deutsche Schülerakademie (<http://www.deutsche-schuelerakademie.de/>). The topics were the lambda calculus, computation and the arithemtical hierarchy, finite automata, SAT solvers, and games on graphs, respectively.

Publications

Journal Articles

- Klaus Aehlig, Stephen Cook, Phuong Nguyen. **Relativizing Small Complexity Classes and their Theories**. Computational Complexity 25(1) 177-215, 2016.
- Jan Hoffmann, Klaus Aehlig, Martin Hofmann. **Multivariate amortized resource analysis**. ACM Transactions on Programming Languages and Systems (TOPLAS), 34(1), 2012.
- Klaus Aehlig, Florian Haftmann, Tobias Nipkow. **A compiled implementation of normalisation by evaluation**. Journal of functional programming, 22(1) (2012), 9-30.
- Klaus Aehlig, Arnold Beckmann. **On the computational complexity of cut-reduction**. Annals of Pure and Applied Logic, 161(6) (2010),711-736.
- Klaus Aehlig. **Parameter-Free Polymorphic Types**. Annals of Pure and Applied Logic, 156 (2008), 1-3.
- Klaus Aehlig. **A Finite Semantics of Simply-Typed Lambda Terms for Infinite Runs of Automata**. Logical Methods in Computer Science, 3(3:1) (2007).
- Klaus Aehlig. **Induction and Inductive Definitions in Fragments of Second Order Arithmetic**. Journal of Symbolic Logic, 70(4) (2005), 1087-1107.
- Klaus Aehlig, Jan Johannsen. **An Elementary Fragment of Second-Order Lambda Calculus**. ACM Transactions of Computational Logic, 6(2) (2005), 468-480.
- Klaus Aehlig, Felix Joachimski. **Continuous Normalization for the Lambda-Calculus and Gödel's T**. Annals of Pure and Applied Logic, 133(1-3) (2005), 39-71.
- Klaus Aehlig, Felix Joachimski. **Operational Aspects of Untyped Normalization by Evaluation**. Mathematical Structures in Computer Science, 14(4) (2004), 587-611.
- Klaus Aehlig, Ulrich Berger, Martin Hofmann, Helmut Schwichtenberg. **An arithmetic for non-size-increasing polynomial-time computation**. Theoretical Computer Science, 318 (2004), 3-27.
- Klaus Aehlig, Helmut Schwichtenberg. **A syntactical analysis of non-size-increasing polynomial time computation**. ACM Transactions on Computational Logic, 3 (2002), 383-401.
- Raimund Winkler, Klaus Aehlig. **Temporal variation of thoron decay product concentration in the atmosphere and comparison with radon decay product concentration**. Radiation and Environmental Biophysics, 37 (1998), 35-39.

Conference Articles

- Jan Hoffmann, Klaus Aehlig, Martin Hofmann. **Resource Aware ML** International Conference on Computer Aided Verification (CAV'12), 2012.

- Jan Hoffmann, Klaus Aehlig, Martin Hofmann. **Multivariate Amortized Resource Analysis** Symposium on Principles of Programming Languages (POPL '11), 2011.
- Klaus Aehlig, Florian Haftmann, Tobias Nipkow. **A Compiled Implementation of Normalization by Evaluation.** In *Proceedings of the Twenty-first International Conference on Theorem Proving in Higher Order Logics (TPHOLs '08)*. Springer Lecture Notes in Computer Science 5170 (2008), 39-54.
- Klaus Aehlig, Arnold Beckmann. **On the computational complexity of cut-reduction.** In *Proceedings of the Twentythird Annual IEEE Symposium on Logic in Computer Science (LICS '08)*, 284-293.
- Klaus Aehlig, Stephen A. Cook, Phuong Nguyen. **Relativizing Small Complexity Classes and their Theories.** In Jacques Duprac and Thmoas Henzinger, editors *Proceedings of the Sixteenth Annual Conference on Computer Science and Logic (CSL 2007)*. Springer Lecture Notes in Computer Science 4646 (2007), 374-388.
- Klaus Aehlig, Arnold Beckmann. **Propositional Logic for Circuit Classes.** In Jacques Duprac and Thmoas Henzinger, editors *Proceedings of the Sixteenth Annual Conference on Computer Science and Logic (CSL 2007)*. Springer Lecture Notes in Computer Science 4646 (2007), 512-526.
- Andreas Abel, Klaus Aehlig, Peter Dybjer. **Normalization by Evaluation for Martin-Löf Type Theory with One Universe.** In Marcelo Fiore, editor, *Proceedings of the twenty-third Conference on the Mathematical Foundations of Programming Semantics (MFPS 2007)*. Electronic Notes in Theoretical Computer Science 173 (2007), 17-39.
- Klaus Aehlig. **A Finite Semantics of Simply-Typed Lambda Terms for Infinite Runs of Automata.** In Zoltan Esik, editor, *Computer Science Logic (CSL 2006)*. Springer Lecture Notes in Computer Science 4207 (2006), 104-118.
- Klaus Aehlig, Jolie G. de Miranda, C.-H. Luke Ong. **The Monadic Second Order Theory of Trees Given by Arbitrary Level-Two Recursion Schemes Is Decidable.** In Pawel Urzyczyn, editor, *Typed Lambda Calculi and Applications (TLCA 2005)*. Springer Lecture notes in Computer Science 3461 (2005), 39-54.
- Klaus Aehlig, Jolie G. de Miranda, C.-H. Luke Ong. **Safety is Not a Restriction at Level 2 for String Languages.** In Vladimiro Sassone, editor, *Foundations of Software Sciences and Computation Structures (FOSSACS 2005)*. Springer Lecture Notes in Computer Science 3441 (2005), 490-504.
- Klaus Aehlig, Felix Joachimski. **On Continuous Normalization.** In Julian Bradfield, editor, *Computer Science Logic (CSL 2002)*. Springer Lecture Notes in Computer Science 2471 (2002), 59-73.

- Klaus Aehlig, Jan Johannsen, Helmut Schwichtenberg, and Sebastiaan A. Terwijn. **Linear ramified higher type recursion and parallel complexity.** In Reinhard Kahle, Peter Schröder-Heister, and Robert Stärk, editors, *Proof Theory in Computer Science*. Springer Lecture Notes in Computer Science 2183 (2001), 1-21.
- Klaus Aehlig, Helmut Schwichtenberg. **A Syntactical Analysis of Non-Size-Increasing Polynomial Time Computation.** Proceedings of the 5th Annual IEEE Symposium on Logic in Computer Science (LICS 2000), 84-91.

Other Publications

- Klaus Aehlig. **Parallel Time and Proof Complexity.** Habilitation thesis, University of Munich, 2010.
- Klaus Aehlig. **On Fragments of Analysis with Strengths of Finitely Iterated Inductive Definitions.** PhD thesis, University Munich, 2003.
- Klaus Aehlig. **Programmextraktion für nicht-wachsende Polynomialzeitberechnungen.** Diplomarbeit (Master thesis), University Munich, 2000.
- Klaus Aehlig. **The Parallelisation of a Finite Element Code on a Shared-Memory Computer using OpenMP.** (Final report of a project of the EPCC Summer Scholarship Programme; published as technical report of the Edinburgh Parallel Computing Center, 1999)
- Franz Ruckerbauer, Klaus Aehlig, Raimund Winkler. **Zeitaufgelöste Messung niedriger Radongaskonzentrationen.** gsf-Bericht 4/98. (Technical report of the “Institut für Strahlenschutz” of the “gsf – Forschungszentrum für Umwelt und Gesundheit GmbH” , 1998)