

Brigitte Pientka

Carnegie Mellon University
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Research Interests

Programming Languages, Verification, Automated Theorem Proving,
Logical Frameworks, Logic, Type Theory, Logic Programming

Education

Carnegie Mellon University, Dept. of Computer Science, USA, 1998 — present
Ph.D. in Computer Science (expected Summer 2003)

Ph.D. Thesis: *Tabled higher-order logic programming*

Advisor: Frank Pfenning

Thesis committee: Robert Harper, Dana Scott, David S. Warren

Technical University Darmstadt, Germany, 1994 — 1997
Diplom (comparable to M.S.) with honors in Computer Science,
minor in Pedagogics
average grade: 1.04 (highest grade possible: 1.0)

University of Edinburgh, Scotland, 1993 — 1994
Course work in Computer Science and Artificial Intelligence

Technical University Darmstadt, Germany, 1990 — 1993
Vordiplom (comparable to B.S.) in Computer Science

Honors

Siebel Scholar, 2002

Gottlieb Daimler – Karl Benz Fellow, 2001

Graduate Research Fellowship, Carnegie Mellon University, 1998 — present

Gottlieb Daimler – Karl Benz Foundation Scholarship, 1997 — 1998

Awards

Conference Scholarship, Association of Logic Programming, 2002
GSA Conference Funds, Carnegie Mellon University, 2002
Woody Bledsoe Travel Award, CADE, 2001
Grace Hopper Conference Scholarship, 2000
Conference Scholarship, Intel Foundation, 1997

Research Experience

Doctoral researcher, Dept. of Computer Science, Carnegie Mellon University
Advisor: F. Pfenning, 1998 — present
Optimizing higher-order logic programming engine
Termination and reduction checking for higher-order logic programs

Visiting researcher, Dept. of Computer Science, Cornell University
Advisors: R. Constable and C. Kreitz, 1997 — 1998
Automating induction proofs in NuPRL

Master's thesis, Dept. of Computer Science, Technical University Darmstadt
Advisors: C. Walther and S. Gerberding, 1996 — 1997
Structured incremental proof planning

Research assistant, Institute for Professional Education, Technical University Darmstadt
Advisor: A. Paul-Kohlhoff, 1995 — 1996
Motivations for choosing careers in engineering (An interdisciplinary study of young people in Germany)

Research assistant, Dept. of Computer Science, Technical University Darmstadt
Advisors: C. Walther and J. Giesl, 1994 — 1995
Automating first-order termination proofs

Undergraduate researcher, Dept. of Artificial Intelligence, University of Edinburgh
Advisors: A. Bundy, A. Ireland, H. Lowe, 1993 — 1994
Heuristics for case analysis for the existing inductive proof planner

Professional Service

Journal reviewer: Journal of Higher-Order Symbolic Computation (HOSC)
Conference reviewer: LICS, PPDP, ASIAN, IJCAR, CLS

Publications (Computer Science)

- [1] Brigitte Pientka and Frank Pfenning. Optimizing higher-order pattern unification To appear in F. Baader, editor, *19th International Conference on Automated Deduction, Miami, Florida, USA*, Lecture Notes in Computer Science (LNCS), Springer-Verlag, 2003.
- [2] Brigitte Pientka. A proof-theoretic foundation for tabled higher-order logic programming. In P. Stuckey, editor, *18th International Conference on Logic Programming, Copenhagen, Denmark*, Lecture Notes in Computer Science (LNCS), pages 271 –286. Springer-Verlag, 2002.
- [3] Brigitte Pientka. Memoization-based proof search in LF: an experimental evaluation of a prototype. In *Third International Workshop on Logical Frameworks and Meta-Languages (LFM'02), Copenhagen, Denmark*, Electronic Notes in Theoretical Computer Science (ENTCS), Volume 70, Issue 2, pages 1–14, 2002.
- [4] Brigitte Pientka. Termination and reduction checking for higher-order logic programs. In T. Nipkow, R. Gore, A. Leitsch, editor, *First International Joint Conference on Automated Reasoning, Siena, Italy*, Lecture Notes in Artificial Intelligence (LNAI) 2083, pages 401–415. Springer-Verlag, 2001. (*A preliminary version of this paper appeared in [8]*)
- [5] Brigitte Pientka. Termination and reduction checking in the logical framework. Technical report CMU-CS-01-105, Carnegie Mellon University, 2001. (*This is an extended and revised version of the paper [4, 8] including proofs and a description of the implementation*)
- [6] Christoph Kreitz and Brigitte Pientka. Connection-driven inductive theorem proving. *Studia Logica*, 69(2):pages 293–326, 2001. (*This is an extended journal version of [7]*).
- [7] Christoph Kreitz and Brigitte Pientka. Matrix-based inductive theorem proving. In R. Dyckhoff, editor, *9th International Conference on Automated Reasoning with Analytic Tableaux and Related Methods (TABLEAUX)*, Lecture Notes in Artificial Intelligence (LNAI) 1847, pages 294–308. Springer Verlag, 2000.
- [8] Brigitte Pientka and Frank Pfenning. Termination and reduction checking in the logical framework. In C. Schürmann, editor, *Workshop on Automation of Proofs by Mathematical Induction, Pittsburgh, USA*, 2000.
- [9] Christoph Kreitz, Jens Otten, Stephan Schmitt, and Brigitte Pientka. Matrix-based constructive theorem proving. In Steffen Hölldobler, editor, *Intellectics and Computational Logic. Papers in honor of Wolfgang Bibel*, Applied Logic Series, vol. 19, pages 189–205. Kluwer, 2000.
- [10] Brigitte Pientka and Christoph Kreitz. Automating inductive specification proofs. *Fundamenta Informatica*, 39(1–2):pages 189–209, 1999. (*This is an extended journal version of [11]*)

- [11] Brigitte Pientka and Christoph Kreitz. Instantiation of existentially quantified variables in inductive specification proofs. In J. Plaza and J. Calmet, editors, *4th International Conference on Artificial Intelligence and Symbolic Computation*, Lecture Notes in Artificial Intelligence (LNAI) 1476, pages 247–258. Springer-Verlag, 1998.
- [12] Stefan Gerberding and Brigitte Pientka. Structured incremental proof planning. In Brewka, G. Habel, C. Nebel, B: *Proceedings of the 21st Annual German Conference on Artificial Intelligence (KI-97): Advances in Artificial Intelligence*, Freiburg, Germany, Lecture Notes in Artificial Intelligence (LNAI) 1303, pages 63-74, Springer, 1997.
- [13] Brigitte Pientka. Structuring and optimizing incremental proof planning. Master’s thesis, Technical University Darmstadt, 1997.
- [14] Brigitte Pientka. A heuristic for case analysis. Technical Paper 37, Department of Artificial Intelligence, University of Edinburgh, 1995.

Presentations (Computer Science)

18th International Conference on Logic Programming, Copenhagen, Denmark, Jul 2002
A proof-theoretic foundation for tabled higher-order logic programming

Third International Workshop on Logical Frameworks and Meta-Languages (LFM’02) Copenhagen, Denmark, Jul 2002
Memoization-based proof search in LF: an experimental evaluation of a prototype

First International Joint Conference on Automated Reasoning, Siena, Italy, Jun 2001
Termination and reduction in higher-order logic programming,

Seminar on Deduction, Schloß Dagstuhl, Germany, Mar 2001
Termination and reduction in higher-order logic programming

AIDA – Seminar (Artificial Intelligence Darmstadt), Dept. of Computer Science, Technical University Darmstadt, Germany, Jan 2001
Termination and reduction in the logical framework

German Center for Artificial Intelligence, Saarbrücken, Germany, Dec 2000
Termination and reduction in the logical framework (including a general introduction to the logical framework)

Workshop on Automation of Proofs by Induction (in conjunction with CADE), Pittsburgh, USA, Jul 2000
Termination and eduction in the logical framework

AIDA – Seminar (Artificial Intelligence Darmstadt), Dept. of Computer Science, Technical University Darmstadt, Germany, Jan 2000
Designing an inverse method theorem prover using focusing proofs

4th International Conference on Artificial Intelligence and Symbolic Computation, Plattsburgh, USA, Sep 1998

Instantiation of existentially quantified variables in inductive specification proof

PRL – Seminar (Proof/Program Refinement Logic), Dept. of Computer Science, Cornell University, USA, May 1998

Finding substitutions for meta-variables in specification proofs

POP – Seminar (Principles of Programming Languages), Dept. of Computer Science, Carnegie Mellon University, USA, Feb 1998

Finding substitutions for meta-variables in specification proofs

PRL – Seminar (Proof/Program Refinement Logic), Dept. of Computer Science, Cornell University, USA, Dec 1998

A uniform rippling approach for instantiating free variables

AIDA — Seminar (Artificial Intelligence Darmstadt), Dept. of Computer Science, Technical University Darmstadt, Germany, Nov 1995

A heuristic for case analysis

DREAM Meeting, Dept. of Computer Science, University of Edinburgh, Scotland, Sep 1995

A heuristic for case analysis

Publications (Gender Studies)

- [1] Brigitte Pientka. How to prove it. In *Proceeding of the Third International Conference on Women, Work and Computerization, Bonn, Germany*. Springer-Verlag, 1997.
- [2] Brigitte Pientka. Ist die Informatik männlich? Eindrücke, Erfahrungen, Forderungen. In A. Paul-Kohlhoff and C. Walter, editors, *“Eine Frau, die Maschinenbau studiert ist kein Wesen vom Mars ...” — Studentinnen motivieren Schülerinnen*, volume 17. Darmstädter Beiträge zur Berufspädagogik, 1996.

Presentations (Gender Studies)

Grace Hopper Celebration of Women in Computing, Cape Cod, Sep 2000

Participant on the panel *“Women in Computer Science: The Carnegie Mellon Experience”*

Third International Conference on Women, Work and Computerization, Bonn, Germany, May 1997

How to prove it

Teaching Experience

Teaching fellow, Eberly Center for Teaching Excellence, Carnegie Mellon University, May 2001 — present,

Co-teacher in seminars at the Eberly Center for Teaching Excellence, conducted micro-observations of other graduate students

Documentation of teaching development, Future faculty development program, Eberly Center for Teaching Excellence, Carnegie Mellon University, May 200 – present,

Participated in seminars on teaching and had two classroom observations

Teaching assistant for interdisciplinary undergraduate course, *Constructive Logic*, Carnegie Mellon University, with S. Awodey, Fall 2001

Weekly recitations, two guest lectures, supervision of the Tutch proof system

Teaching assistant for graduate course, *Computation and Deduction*, Carnegie Mellon University with F. Pfenning, Spring 2001

Design of assignments and grading, two guest lectures

Teaching assistant for advanced undergraduate course, *Programming Languages*, Carnegie Mellon University with S. Brooks, Fall 1999

Weekly recitations, design of assignments, grading, one guest lecture

Instructor on an interdisciplinary team for an Internet introductory course *The (social) Impact of the WWW — A course with practical experiments* at the Technical University Darmstadt, Summer 1996

Teaching assistant for undergraduate course, *Data Structures and Algorithms*, Technical University Darmstadt with A. Buchmann, Fall 1995

Weekly recitations, grading

University and Community Service

Founding member of *Women@SCS*, and the *Women in School of Computer Science Advisory Committee (WSCSAC)*, Carnegie Mellon University, Sep 1999 — present

Member of the Election Commission, Technical University Darmstadt, 1996 — 1997

Elected Equal Opportunity Officer, Technical University Darmstadt, 1995 — 1996

Elected into the Student Parliament, Technical University Darmstadt, 1995 — 1996

Committee of Student Representatives, Technical University Darmstadt, 1991 — 1997

Languages : German (native language), English (fluent), French (basic knowledge), Latin

References

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