Jan Hoffmann

Address	Carnegie Mellon University 5000 Forbes Avenue Pittsburgh, PA 15213	**Phone** **Email** **Web page**	+1 412 268 6309 jhoffmann@cmu.edu `http://www.cs.cmu.edu/~janh`

Research Interests

My research areas are programming languages and verification. My mission is to discover beautiful mathematical ideas that have a real-world impact, shape the way programmers think, and help to create software that is more reliable, efficient, and secure. Currently, I am working on static and statistical resource analysis, type systems, and probabilistic programming.

Education

2008–2011 **Ph.D. in Computer Science**
Ludwig-Maximilians-Universität, Munich
Advisor: Prof. Martin Hofmann.
Topic: Types with Potential: Polynomial Resource Bounds via Automatic Amortized Analysis.

2001–2007 **Master with Honors in Computer Science (Diplom mit Auszeichnung)**
Ludwig-Maximilians-Universität, Munich

Employment

since 2023 **Associate Professor with Indefinite Tenure**
Carnegie Mellon University, Pittsburgh
In the Computer Science Department of the School of Computer Science

2020–2023 **Tenure-Track Associate Professor**
Carnegie Mellon University, Pittsburgh
In the Computer Science Department of the School of Computer Science

2015–2020 **Tenure-Track Assistant Professor**
Carnegie Mellon University, Pittsburgh
In the Computer Science Department of the School of Computer Science

2012–2015 **Associate Research Scientist**
Yale University, New Haven
Topic: Quantitative Verification

2011–2012 **Postdoctoral Associate**
Yale University, New Haven
In the group of Prof. Zhong Shao. Topic: Verification of Lock-Free Data Structures

Awards and Honors

2021 Amazon Research Award

2019 NSF CAREER Award

2016 Google Research Award

2008–2011 Ph.D. Scholarship
DFG Research Training Group (Graduiertenkolleg) PUMA

2005–2007 Student Scholarship
German National Academic Foundation (Studienstiftung des deutschen Volkes)

Publications

Refereed Journal Papers

[1] L. Pham and J. Hoffmann.
Worst-Case Input Generation for Concurrent Programs under Non-Monotone Resource Metrics.
Logical Methods in Computer Science, 2024.

[2] S. Muller and J. Hoffmann.
Modeling and Analyzing Evaluation Cost of CUDA Kernels.
ACM Transactions on Parallel Computing, 2024. Originally included in 48th Symposium on Principles of Programming Languages (POPL'21).

[3] J. Hoffmann and S. Jost.
Two Decades of Automatic Amortized Resource Analysis.
Math. Struct. Comput. Sci., 2022.

[4] J. Hoffmann and Z. Shao.
Type-Based Amortized Resource Analysis with Integers and Arrays.
J. Funct. Program., 2015. Originally included in 12th International Symposium on Functional and Logic Programming (FLOPS'14).

[5] D. Baumeister, F. Brandt, F. A. Fischer, J. Hoffmann, and J. Rothe.
The Complexity of Computing Minimal Unidirectional Covering Sets.
Theory of Computing Systems, 2013. Originally included in Algorithms and Complexity, 7th International Conference (CIAC'10).

[6] J. Hoffmann, K. Aehlig, and M. Hofmann.
Multivariate Amortized Resource Analysis.
ACM Trans. Program. Lang. Syst., 2012. Originally included in 38th Symposium on Principles of Programming Languages (POPL'11).

[7] F. Brandt, M. Brill, F. A. Fischer, and J. Hoffmann.
The Computational Complexity of Weak Saddles.
Theory of Computing Systems, 2010. Originally included in Algorithmic Game Theory, Second International Symposium (SAGT'09).

[8] F. Brandt, M. Brill, F. Fischer, P. Harrenstein, and J. Hoffmann.
Computing Shapley's Saddles.
ACM SIGecom Exchanges, 8, 2009.

[9] J. Hoffmann.
Finding a Tree Structure in a Resolution Proof is NP-Complete.
Theoretical Computer Science, 410(21-23), 2009.

[10] S. R. Buss, J. Hoffmann, and J. Johannsen.
Resolution Trees with Lemmas: Resolution Refinements that Characterize DLL Algorithms with Clause Learning.
Logical Methods in Computer Science, 4(4), 2008.

[11] S. R. Buss and J. Hoffmann.
The NP-hardness of Finding a Directed Acyclic Graph for Regular Resolution.
Theoretical Computer Science, 396(1-3), 2008.

Refereed Conference/Workshop Papers

[12] L. Pham, F. A. Saad, and J. Hoffmann.
Robust resource bounds with static analysis and bayesian inference.
In *45th Conference on Programming Language Design and Implementation (PLDI'24)*, 2024.

[13] L. Pham, D. Wang, F. Saad, and J. Hoffmann.
Programmable MCMC with Soundly Composed Guide Programs.
In *Conference on Object-Oriented Programming Systems, Languages, and Applications (OOPSLA'24)*, 2024.

[14] J. Grosen, D. Kahn, , and J. Hoffmann.
Automatic Amortized Resource Analysis with Regular Recursive Types.
In *38th ACM/IEEE Symposium on Logic in Computer Science (LICS' 23)*, 2023.

[15] A. Das, D. Wang, and J. Hoffmann.
Probabilistic Resource-Aware Session Types.
In *50th Symposium on Principles of Programming Languages (POPL '23)*, 2023.

[16] D. Kahn and J. Hoffmann.
Automatic Resource Analysis with the Quantum Physicist's Method.
In *26th International Conference on Functional Programming (ICFP'21)*, 2021.

[17] D. Wang, J. Hoffmann, and T. Reps.
Sound Probabilistic Inference via Guide Types.
In *42th Conference on Programming Language Design and Implementation (PLDI'21)*, 2021.

[18] D. Wang, J. Hoffmann, and T. Reps.
Central Moment Analysis for Cost Accumulators in Probabilistic Programs.
In *42th Conference on Programming Language Design and Implementation (PLDI'21)*, 2021.

[19] V. Rajani, M. Gaboardi, D. Garg, and J. Hoffmann.
A Unifying Type-Theory for Higher-Order (Amortized) Cost Analysis.
In *48th Symposium on Principles of Programming Languages (POPL'21)*, 2021.

[20] S. Muller and J. Hoffmann.
Modeling and Analyzing Evaluation Cost of CUDA Kernels.
In *48th Symposium on Principles of Programming Languages (POPL'21)*, 2021.

[21] L. Pham and J. Hoffmann.
Typable Fragments of Polynomial Automatic Amortized Resource Analysis.
In *29th EACSL Annual Conference on Computer Science Logic (CSL'21)*, 2021.

[22] A. Das, S. Balzer, J. Hoffmann, F. Pfenning, and I. Santurkar.
Resource-aware session types for digital contracts.
In *2021 IEEE Computer Security Foundations Symposium (CSF'21)*, 2021.

[23] D. Wang, D. M. Kahn, and J. Hoffmann.
Raising Expectations: Automating Expected Cost Analysis with Types.
In *25th International Conference on Functional Programming (ICFP'20)*, 2020.

[24] T. Knoth, D. Wang, A. Reynolds, N. Polikarpova, and J. Hoffmann.
Liquid Resource Types.
In *25th International Conference on Functional Programming (ICFP'20)*, 2020.

[25] D. Kahn and J. Hoffmann.
Exponential Automatic Amortized Resource Analysis.
In *23rd International Conference on Foundations of Software Science and Computation Structures (FoSSaCS'20)*, 2020.

[26] D. Wang, J. Hoffmann, and T. Reps.
A denotational semantics for low-level probabilistic programs with nondeterminism.
In *Mathematical Foundations of Programming Semantics XXXV (MFPS'19)*, 2019.

[27] T. Knoth, D. Wang, J. Hoffmann, and N. Polikarpova.
Resource-guided program synthesis.
In *40th Conference on Programming Language Design and Implementation (PLDI'19)*, 2019.

[28] D. Wang and J. Hoffmann.
Type-guided worst-case input generation.
In *46th Symposium on Principles of Programming Languages (POPL'19)*, 2019.

[29] Y. Niu and J. Hoffmann.
Automatic space bound analysis for functional programs with garbage collection.
In *22nd International Conference on Logic for Programming Artificial Intelligence and Reasoning (LPAR'18)*, 2018.

[30] A. Das, J. Hoffmann, and F. Pfenning.
Parallel complexity analysis with temporal session types.
In *23rd International Conference on Functional Programming (ICFP'18)*, 2018.

[31] A. Das, J. Hoffmann, and F. Pfenning.
Work analysis with resource-aware session types.
In *33th ACM/IEEE Symposium on Logic in Computer Science (LICS'18)*, 2018.

[32] D. Wang, J. Hoffmann, and T. Reps.
PMAF: An Algebraic Framework for Static Analysis of Probabilistic Programs.
In *39th Conference on Programming Language Design and Implementation (PLDI'18)*, 2018.

[33] V. C. Ngo, Q. Carbonneaux, and J. Hoffmann.
Bounded Expectations: Resource Analysis for Probabilistic Programs.
In *39th Conference on Programming Language Design and Implementation (PLDI'18)*, 2018.

[34] B. Lichtman and J. Hoffmann.
Arrays and References in Resource Aware ML.
In *2nd International Conference on Formal Structures for Computation and Deduction (FSCD'17)*, 2017.

[35] Q. Carbonneaux, J. Hoffmann, T. Reps, and Z. Shao.
Automated Resource Analysis with Coq Proof Objects.
In *29th International Conference on Computer-Aided Verification (CAV'17)*, 2017.

[36] V. C. Ngo, M. Dehesa-Azuara, M. Fredrikson, and J. Hoffmann.
Verifying and Synthesizing Constant-Resource Implementations with Types.
In *38th IEEE Symposium on Security and Privacy (S&P '17)*, 2017.

[37] A. Das and J. Hoffmann.
ML for ML: Learning Cost Semantics by Experiment.
In *23rd International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS'17)*, 2017.

[38] E. Çiçek, G. Barthe, M. Gaboardi, D. Garg, and J. Hoffmann.
Relational Cost Analysis.
In *44th Symposium on Principles of Programming Languages (POPL'17)*, 2017.

[39] J. Hoffmann, A. Das, and S.-C. Weng.
Towards Automatic Resource Bound Analysis for OCaml.
In *44th Symposium on Principles of Programming Languages (POPL'17)*, 2017.

[40] Q. Carbonneaux, J. Hoffmann, and Z. Shao.
Compositional Certified Resource Bounds.
In *36th Conference on Programming Language Design and Implementation (PLDI'15)*, 2015. Artifact submitted and approved.

[41] J. Hoffmann and Z. Shao.
Automatic Static Cost Analysis for Parallel Programs.
In *24th European Symposium on Programming (ESOP'15)*, 2015.

[42] Q. Carbonneaux, J. Hoffmann, T. Ramananandro, and Z. Shao.
End-to-End Verification of Stack-Space Bounds for C Programs.
In *35th Conference on Programming Language Design and Implementation (PLDI'14)*, 2014. Artifact submitted and approved.

[43] G. Scherer and J. Hoffmann.
Tracking Data-Flow with Open Closure Types.
In *19th International Conference on Logic for Programming, Artificial Intelligence and Reasoning (LPAR'13)*, 2013.

[44] H. Liang, J. Hoffmann, X. Feng, and Z. Shao.
Characterizing Progress Properties of Concurrent Objects via Contextual Refinements.
In *24th International Conference on Concurrency Theory (CONCUR'13)*, 2013.

[45] J. Hoffmann, M. Marmar, and Z. Shao.
Quantitative Reasoning for Proving Lock-Freedom.
In *28th ACM/IEEE Symposium on Logic in Computer Science (LICS'13)*, 2013.

[46] J. Hoffmann, K. Aehlig, and M. Hofmann.
Resource Aware ML.
In *24rd International Conference on Computer Aided Verification (CAV'12)*, 2012.

[47] N. R. Krishnaswami, N. Benton, and J. Hoffmann.
Higher-Order Functional Reactive Programming in Bounded Space.
In *39th Symposium on Principles of Programming Languages (POPL'12)*, 2012.

[48] J. Hoffmann and M. Hofmann.
Amortized Resource Analysis with Polymorphic Recursion and Partial Big-Step Operational Semantics.
In *8th Asian Symposium on Programming Languages (APLAS'10)*, 2010.

[49] J. Hoffmann and M. Hofmann.
Amortized Resource Analysis with Polynomial Potential.
In *19th European Symposium on Programming (ESOP'10)*, 2010.

Other Publications

[50] E. Chu, Y. Guo, and J. Hoffmann.
Handling Exceptions and Algebraic Effects with Automatic Resource Analysis, 2025. Working paper.

[51] D. Kahn, R. Li, and J. Hoffmann.
Big-Stop Semantics, 2025. Working paper.

[52] D. Kahn, J. Hoffmann, and T. Reps.
Efficient Cost Bounds with Linear Maps, 2024. Working paper.

[53] S. Bakshi, A. Das, A. Miller, and J. Hoffmann.
Nomos-UC: A Programming Framework for Cryptography Based on Resource-Aware Session Types, 2023. Working paper.

[54] L. Pham and J. Hoffmann.
Worst-Case Input Generation for Concurrent Processes, 2023. Working paper.

[55] A. Das, J. Hoffmann, and F. Pfenning.
Nomos: A Protocol-Enforcing, Asset-Tracking, and Gas-Aware Language for Smart Contracts, 2022. Technical Report.

[56] C. Yuan and J. Hoffmann.
BLT: Exact Bayesian Inference with Distribution Transformers, 2019. Technical Report.

[57] S. Muller and J. Hoffmann.
Combining Source and Target Level Cost Analyses for OCaml Programs, 2020. Working paper.

[58] J. Hoffmann.
Types with Potential: Polynomial Resource Bounds via Automatic Amortized Analysis. PhD thesis, Ludwig-Maximilians-Universität München, 2011.

[59] J. Hoffmann.
Resolution Proofs and DLL-Algorithms with Clause Learning. Diploma Thesis, LMU München, 2007.

Software Artifacts

- **Nomos**

  A resource-aware programming language for digital contracts that is session types
  `http://nomos-lang.org`
  2018–present

- **Resource Aware ML**

  A system for automatic derivation of resource bounds for OCaml programs
  `http://raml.co`
  2009–present

- **C4B/Absynth**

  A compositional certified resource-bound analyzer for C programs
  Approved by the *PLDI'14 Artifact Evaluation Committee*
  `http://www.cs.yale.edu/homes/qcar/aaa/`
  2013–present

- **ReSyn**

  A resource-guided and type-driven synthesis tool for functional programs 2018–2021

- **CertiKOS**

  A formally-verified hypervisor kernel
  `http://flint.cs.yale.edu/certikos`
  2012–2015

- **Quantitative CompCert**

  A formally-verified C compiler that preserves quantitative properties.
  Approved by the *PLDI'13 Artifact Evaluation Committee*
  2013–2014

Professional Activities

Talks

Combining Static and Data-Driven Resource Analysis
Invited talk at the meeting of the IFIP Working Group 2.8 on Functional Programming. May 2025
Invited talk at Boston University May 2025

Sound Probabilistic Inference with Guide Programs
Invited talk at the Workshop on Verification of Probabilistic Programs (VeriProP 2024) July 2024

Combining Automatic Amortized Resource Analysis with Bayesian Learning
Seminar talk at McGill University July 2024

Automatic Gas Bound Analysis for Smart Contracts
CMU Secure Blockchain Summit May 2023

Probabilistic Resource-Aware Session Types
Seminar talk SCOT: A Seminar on Semantic and Formal Approaches to Complexity April 2023

Automatic Amortized Resource Bound Analysis
Seminar talk at AWS Lambda May 2021
Invited talk at University of Massachusetts Lowell May 2023

Raising Expectations: Automating Expected Cost Analysis with Types
Seminar talk at University of Innsbruck, Austria — January 2021
Seminar talk at IRIF/PPS, Paris, France — October 2020
Seminar talk at Research Training Group UnRAVeL, RTWH Aachen, Germany — September 2020

Nomos: Resource-Aware Session Types for Programming Digital Contracts
Seminar talk at Inria; Paris, France — December 2019
Invited talk at the ETH Workshop on Dependable and Secure Software Systems; Zürich, Switzerland — October 2019
Invited talk at the Workshop on Theory and Practice of Blockchains; Aarhus, Denmark — May 2019

Resource-Aware Session Types
Invited talk at the 4th Workshop on Behavioral Types (BEAT '19); Lisbon, Portugal — January 2019

Programming Languages for Smart Contracts
CyLab Partners Conference; Pittsburgh, PA — October 2018

Resource Analysis for Probabilistic Programs
Invited talk at the meeting of the IFIP working group 1.9/2.15 "Verified Software"; Oxford, UK — July 2018

Resource Analysis for Probabilistic Programs
Invited talk at the 9th International Workshop on Developments in Implicit Computational Complexity (DICE '18); Thessaloniki, Greece — April 2018

Resource Analysis for Probabilistic Programs
ESOP 2018 Program Committee Workshop; Paris, France — December 2017

Resource Bound Analysis and Static Analysis
Invited talk at the 9th Working Conference on Verified Software: Theories, Tools, and Experiments (VSTTE '17); Heidelberg, Germany — July 2017

Towards Automatic Resource Bound Analysis for OCaml
Symposium on Principles of Programming Languages (POPL'17); Paris, France — January 2017

Resource Aware ML
University at Buffalo; Buffalo, NY — December 2017
Invited talk at the 5th South of England Regional Programming Language Seminar; Oxford; UK — January 2017
Max Planck Institute for Software Systems; Saarbrücken; Germany — June 2016

Automatic Resource Bound Analysis and Linear Optimization
Invited talk at the workshop *Beyond Worst-Case Analysis* at the Simons Institute; Berkeley; CA — November 2016

Static Analysis for Finding Space/Time Vulnerabilities
CyLab Partners Conference; Pittsburgh; PA — September 2016

Certified Resource Bounds in the CompCert Compiler
Invited talk at Mathematical Foundations of Programming Semantics (MFPS'16); Pittsburgh; PA — Mai 2016

Resource Aware Programming
Principles of Programming (PoP) Group Retreat; Seven Springs; PA — October 2015

Compositional Certified Resource Bounds
Conf. on Programming Language Design and Implementation (PLDI'15); Portland; OR — June 2015

Automatic Static Cost Analysis for Parallel Programs
European Symposium on Programming (ESOP'15); London; UK — April 2015

Formal Reasoning about Quantitative Properties of Software
University of Colorado Boulder; Boulder, CO — March 2015
Carnegie Mellon University; Pittsburgh, PA — February 2015
University of Illinois at Urbana-Champaign; Urbana-Champaign, IL — February 2015
University of Waterloo; Waterloo ON, Canada — January 2015
Heriot-Watt University; Edinburgh, UK — January 2015
TU Munich (Department of Computer Science); Munich, Germany — November 2014
Boston University; Boston MA — October 2014
Northeastern University; Boston MA — October 2014
MIT; Boston MA — April 2014

Harvard University; Boston MA — April 2014

Formal Verification of Quantitative Software Properties
TU Munich (Institute for Advanced Study); Munich, Germany — November 2014

End-to-End Verification of Stack-Space Bounds for C Programs
Workshop on Higher Order Computation: Types, Complexity, Applications; Paris, France — June 2014

Type-Based Amortized Resource Analysis with Integers and Arrays
Int. Symp. on Functional and Logic Programming (FLOPS'14); Kanasawa, Japan — June 2014

Tracking Data-Flow with Open Closure Types
Int. Conf. on Logic for Prog., Art. Intel. and Reasoning (LPAR'13); Stellenbosch, South Africa — December 2013

Characterizing Progress Properties of Concurrent Objects via Contextual Refinements
DARPA HACMS-CARS site visit; New Haven, CT — September 2013

Quantitative Reasoning for Proving Lock-Freedom
ACM/IEEE Symposium on Logic in Computer Science (LICS'13); New Orleans, LA — June 2013
University of Pennsylvania; Philadelphia, PA — February 2013
DARPA CRASH PI meeting; San Diego, CA — November 2012
DARPA CRASH-CertiKOS site visit; New Haven, CT — October 2012

Resource Aware ML
Int. Conf. on Computer Aided Verification (CAV'12); Berkeley, CA — July 2012

Polynomial Amortized Resource Analysis
DFG PUMA site visit; Munich, Germany — June 2012
Dissertation defense at LMU; Munich, Germany — October 2011

Higher-Order Functional Reactive Programming in Bounded Space
PUMA Workshop; Traunkirchen, Austria — October 2011

Multivariate Amortized Resource Analysis
Universite Paris 7 - Denis Diderot; Paris, France — September 2011
UPENN; Philadelphia, PA — June 2011
Yale University; New Haven, CT — June 2011
IST Austria; Vienna, Austria — June 2011
Microsoft Research; Cambridge, UK — March 2011
Symposium on Principles of Programming Languages (POPL'11); Austin, TX — January 2011
PUMA Workshop; Szentendre, Hungary — October 2010

Amortized Resource Analysis with Polymorphic Recursion and Partial Big-Step Op. Sem.
Asian Symposium on Programming Languages (APLAS'10); Shanghai, China — November 2010

Analysing Sorting Algorithms in Resource Aware ML
University of Kassel; Kassel, Germany — November 2010

Automatic Amortized Resource Analysis
National DFG GK Workshop; Dagstuhl, Germany — June 2010

Amortized Resource Analysis with Polynomial Potential
European Symposium on Programming (ESOP'10); Cyprus — March 2010
PUMA Workshop; Venice, Italy — October 2009

A Purely-Functional SAT Solver
PUMA Kickoff Meeting; Spitzingsee, Germany — October 2008

DLL-Algorithms and Resolution Proofs
Fall School: Logic and Complexity; Prague, Czech Republic — September 2008

Committee Work

2024–2025 Program Committee Member
International Conference on Functional Programming (ICFP'25)

2024–2025 Co-Chair

15th Workshop on Programming Language Approaches to Concurrency and Communication-cEntric Software (PLACES 2024)
With Farzaneh Derakhshan

2024–2025 Program Committee Member
Symposium on Principles of Programming Languages (POPL'25)

2023 Panel Member
National Science Foundation (NSF)

2022–2023 Program Committee Member
Conference on Programming Language Design and Implementation (PLDI'23)

2022–2023 Program Committee Member
European Symposium on Programming (ESOP'23)

2022 Program Committee Member
Symposium on Logic in Computer Science (LICS'22)

2019–pres. Steering Committee Co-Chair
Workshop on Logic and Computational Complexity

2021–2022 Program Committee Member
Symposium on Principles of Programming Languages (POPL'22)

2020–2021 Program Committee Member
Conference on Programming Language Design and Implementation (PLDI'21)

2019–2021 Workshop and Co-Located Events Co-Chair
Symposium on Principles of Programming Languages (POPL)

2018–2020 Steering Committee Member
Logic Mentoring Workshop

2020 Program Committee Member
Workshop on Semantic and Formal Approaches to Complexity (SCOT'20)

2019–2020 Program Committee Member
International Conference on Functional Programming (ICFP'20)

2019 Panel Member
National Science Foundation (NSF)

2019 Program Committee Member
European Symposium on Programming (ESOP'20)

2018–2019 Co-Organizer
Martin Hofmann Memorial Meeting
With Lennart Beringer, Steffen Jost, Ulrich Schöpp, and Don Sannella.

2019 Program Committee Member
6th Workshop on Rewriting Techniques for Program Transformations and Evaluation

2019 Program Committee Member
LOLA 2019 - Syntax and Semantics of Low-Level Languages

2018 Program Committee Member
Symposium on Principles of Programming Languages (POPL'19)

2018 Panel Member
National Science Foundation (NSF)

2018 Program Committee Member
Student Research Competition at the Conf. on Prog. Lang. Design and Impl. (PLDI'18 SRC)

2018 Program Committee Member
International Colloquium on Automata, Languages and Programming (ICALP'18)

2018 Co-Chair
3rd Logic Mentoring Workshop (LMW'18)
With Ugo Dal Lago, Sandra Kiefer, and Brigitte Pientka

2018 Co-Chair
19th Workshop on Logic and Computational Complexity (LCC'18)
With Erich Graedel

2017 Program Committee Member
European Symposium on Programming (ESOP'18)

2017 Program Committee Member
Joint Workshop on Developments in Implicit Computational Complexity
and Foundational and Practical Aspects of Resource Analysis (DICE-FOPARA'17)

2017 Program Committee Member
International Conference on Formal Structures for Computation and Deduction (FSCD'17)

2016–2017 Program Committee Member
Conference on Programming Language Design and Implementation (PLDI'17)

2016 Co-Chair
Workshop on Syntax and Semantics of Low-Level Languages (LOLA'16)
With Marco Gaboardi

2015–2017 Organizer
Dagstuhl Seminar *Resource Bound Analysis*.
With Marco Gaboardi, Reinhard Wilhelm, and Florian Zuleger.

2016 External Review Committee Member
Conference on Computer Aided Verification (CAV'16)

2015 Program Committee Member
Conference on Foundations of Software Science and Computational Structures (FOSSACS'16)

2015 Program Committee Member
Developments in Implicit Computational Complexity (DICE'15)

2014 External Review Committee Member
Symposium on Principles of Programming Languages (POPL'15)

Memberships

2022–pres. Sigma Xi Member

2015–pres. ACM SIGPLAN Member

Editorial Duties

2019–2023 Guest Editor, Mathematical Structures in Computer Science (special issue)

2015–2017 Guest Editor, Journal of Automated Reasoning (special issue)

Contract and Grant Support

Pending

2025 Research Grant
National Science Foundation (NSF)
FMitF: Track I: Probabilistic Modeling and Analysis Tools for Intermittent Systems
PIs: Jan Hoffmann (CMU), Limin Jia (CMU), Brandon Lucia (CMU), Feras Saad (CMU)
Status: Submitted

Current

2024 Gift
Jane Street Group
PI: Jan Hoffmann (CMU)
(unrestricted gift)

2023–2027 Research Grant
National Science Foundation (NSF)
SHF: Medium: Language Support for Efficient and Sound Programmable Inference
PIs: Jan Hoffmann (CMU) and Feras Saad (CMU)
$900,000

Past

2020–2024 Research Grant
National Science Foundation (NSF)
SHF: Small: Automatic Qualitative and Quantitative Verification of CUDA Code
PIs: Jan Hoffmann (CMU) and Stefan Muller (IIT)
$499,996

2019–2024 CAREER Award
National Science Foundation (NSF)
Title: *CAREER: Marlin: A Unified Framework for Automatic and Interactive Quantitative Program Analysis*
PI: Jan Hoffmann (CMU)
$518,815

2023 Gift
Jane Street Group
PI: Jan Hoffmann (CMU)
(unrestricted gift)

2022–2023 Research Contract
Formally Reasoning about Gas Cost and Fairness in Smart Contracts
Algorand Foundation - CMU ACE
PI: Jan Hoffmann (CMU)

2018–2023 Research Grant
National Science Foundation (NSF)
SaTC: CORE: Medium: Automated Support for Writing High-Assurance Smart Contracts
PIs: Jan Hoffmann (CMU), Bryan Parno (CMU), and Andrew Miller (UIUC)
$884,984 (CMU component), Award No. 1801369

2022 Gift
Jane Street Group
PIs: Jan Hoffmann (CMU) and Seth Goldstein (CMU)
(unrestricted gift)

2021–2022 Amazon Research Award
Automatic Static Resource Analysis for Serverless Computing
Amazon Web Services
PI: Jan Hoffmann (CMU)
(unrestricted gift)

2018–2022 Research Contract
DARPA Assured Autonomy
CMU PIs: J. Dolan, D. Held, J. Hoffmann, S. Mitch, F. Pfenning, A. Platzer
$3,053,448 (CMU component)

2021 Gift
Jane Street Capital
PI: Jan Hoffmann (CMU)
(unrestricted gift)

2020–2021 Gift
Ripple Labs
PIs: Jan Hoffmann and Frank Pfenning (CMU)
(unrestricted gift)

2018–2021 Research Grant
National Science Foundation (NSF)
Title: *SHF: Small: Resource-Guided Program Synthesis*
PIs: Jan Hoffmann (CMU) and Nadia Polikarpova (UCSD)
$250,000 (CMU component), Award No. 1812876

2020 Gift
Jane Street Capital
PI: Jan Hoffmann (CMU)
(unrestricted gift)

2019 Gift
Jane Street Capital
PI: Jan Hoffmann (CMU)
(unrestricted gift)

2018 Gift
Jane Street Capital
PIs: Jan Hoffmann (CMU) and Jean Yang (CMU)
(unrestricted gift)

2017–2018 Schmidt Sciences Grant
The Eric and Wendy Schmidt Fund for Strategic Innovation
Title: *An Automated Algorithm Designer*
PIs: Carl Kingsford (CMU), Nina Balcan (CMU), Guy Blelloch (CMU),
Anupam Gupta (CMU), and Jan Hoffmann (CMU)
(unrestricted gift)

2016–2017 Google Research Award
Google Inc.
Title: *Automated Static Resource Regression Analysis*
(unrestricted gift)

2015–2019 Research Contract
DARPA STAC – Space/Time Analysis for Cybersecurity
Title: *CURB: Calculating and Understanding Resource Bounds to Detect Space/Time Vulnerabilities*
$6,230,090; Award FA8750-15-C-0082; PIs: A. Loginov (GrammaTech), T. Reps (U Wisconsin),
J. Hoffmann (CMU), and Z. Shao (Yale); CMU component: $884,984

2013–2017 Research Grant
National Science Foundation (NSF)
Title: *VeriQ: Formal Quantitative Software Verification in Realistic Application Scenarios*
$449,721, 3 years, Award CCF-1319671, PIs: Zhong Shao and Jan Hoffmann

Teaching

Fall 2025 *15-814: Resource Aware Programming Languages* (planned)
12 units; graduate course

Spring 2025 None (professional leave)

Fall 2024 *15-814: Types and Programming Languages*
12 units; graduate course

Spring 2024 *15-411/15-611: Compiler Design*
15 units; undergraduate course (cross-listed as graduate course)

Fall 2023 *15-814: Types and Programming Languages* (planned)
12 units; graduate course

Spring 2023 *15-411/15-611: Compiler Design*
15 units; undergraduate course (cross-listed as graduate course)

Fall 2022 *15-814: Types and Programming Languages*
12 units; graduate course

Spring 2022 *15-312: Foundations of Programming Languages*
12 units; undergraduate course

Fall 2021 None (parental leave)

Spring 2021 *15-312: Foundations of Programming Languages*
12 units; undergraduate course

Fall 2020 *15-819: Resource Aware Programming Languages*
12 units; graduate course

Spring 2020 *15-312: Foundations of Programming Languages*
12 units; undergraduate course

Fall 2019 *15-819: Foundations of Quantitative Program Analysis*
12 units; graduate course

Sum. 2019 *Type-Based Resource Analysis*
Oregon Programming Languages Summer School (OPLSS)

Spring 2019 *15-312: Foundations of Programming Languages* (with Stephanie Balzer)
12 units; undergraduate course

Fall 2018 *15-411/15-611: Compiler Design*
15 units; undergraduate course (cross-listed as graduate course)

Sum. 2018 *Introduction to Types and Semantics*
Oregon Programming Languages Summer School (OPLSS)

Spring 2018 *15-312: Foundations of Programming Languages*
12 units; undergraduate course

Fall 2017 *15-411/15-611: Compiler Design*
15 units; undergraduate course (cross-listed as graduate course)

Spring 2017 *15-312: Foundations of Programming Languages* (with Bob Harper)
12 units; undergraduate course

Fall 2016 *15-411/15-611: Compiler Design*
15 units; undergraduate course (cross-listed as graduate course)

Sum. 2016 *Type-Based Resource Analysis*
Oregon Programming Languages Summer School (OPLSS)

Spring 2016 *15-819: Advanced Topics in Programming Languages: Resource Analysis*
12 units; graduate course

Contributions to Education

- **Graduate Course *Resource Aware Programming Languages***

  Course design, development of lecture notes and exercises
  Taught in 2016, 2019, 2020, and 2025

- **Workshop *Security Challenges with Cryptocurrencies and Smart Contracts***

  Research@CMU Educator Professional Development Program
  Taught in 2019 (with Bryan Parno)

- **Course Module *Writing Efficient Code***

  Girls of Steel program, development of lecture notes and exercises
  Taught in 2018

Graduate Student Advising

Current Ph.D. Students and Post-Docs

2024–pres. Ethan Chu, Ph.D. Student
Research topic: Resource analysis

2024–pres. Nathan Glover, Ph.D. Student
Research topic: Mechanization of substructural type systems

2019–pres. Long Pham, Ph.D. Student
Research topic: Hybrid Resource-Bound Analyses of Programs

Former Graduate Students and Post-Docs

2023–2024 Ethan Chu, M.Sc. Student
Defense date: December 11, 2023
Research topic: Resource Aware ML 2

2018–2024 David Kahn, Ph.D. Student
Thesis title: Leveraging Linearity to Improve Automatic Amortized Resource Analysis
Defense date: June 28, 2024
Current position: Assistant Professor at Danison University

2022–2023. Yiyang Guo, M.Sc. Student
Research topic: Resource-aware session types
Defense date: August 18, 2023
Current position: Software Engineer at Apple

2017–2022 Di Wang, Ph.D. Student
Thesis title: Static Analysis of Probabilistic Programs: An Algebraic Approach
Defense date: May 4, 2022
Current position: Assistant Professor at Peking University, China

2015–2021 Ankush Das, Ph.D. Student
Thesis title: Resource-Aware Session Types for Digital Contracts
Defense date: April 22, 2021
Current position: Assistant Professor at Boston University

2018–2020 Stefan Muller, Post-Doc
Research topic: Resource-aware compilation, CUDA
Current position: Assistant Professor at Illinois Institute of Technology, Chicago

2016–2018 Chan Ngo, Post-Doc
Research topic: Preventing side channels; expected cost analysis
Next position: Senior Research Engineer at Aptiv

2013–2017 Quentin Carbonneaux, Ph.D. Student (at Yale, co-advised with Zhong Shao)
Thesis title: Modular and Certified Resource-Bound Analyses
Defense date: August 3, 2017
Current position: Research Scientist at Meta, Paris

Ph.D. Dissertation Committees

2024 Surya Bakshi
University of Illinois Urbana-Champaign
Advisor: Andrew Miller

2024 Jenny Lin
Carnegie Mellon University
Advisor: James McCann

2024 Yue Niu
Carnegie Mellon University
Advisor: Robert Harper

2023 Rishabh Iyer
École Polytechnique Fédérale de Lausanne
Advisors: Katerina Argyraki and George Candea

2022 Samuel Westrick
Carnegie Mellon University
Advisor: Umut Acar

2021 Alexis Ghyselen
ENS Lyon
Advisor: Patrick Baillot

2021 Maximilian Haslbeck
Technical University Munich
Advisor: Tobias Nipkow

2021 Ryan Kavanagh
Carnegie Mellon University
Advisor: Frank Pfenning and Stephen Brookes

2020 Mengqi Liu
Yale University
Advisor: Zhong Shao

2019 Armaël Guéneau
Inria Paris (Gallium Team)
Advisors: Arthur Charguéraud and François Pottier

2019 Rijnard van Tonder
Carnegie Mellon University
Advisor: Claire Le Goues

2019 Hannah Gommerstadt
Carnegie Mellon University
Advisor: Frank Pfenning

2018 Anthony Canino
Binghamton University, State University of New York
Advisor: David Liu

2018 Xiongnan (Newman) Wu
Yale University
Advisor: Zhong Shao

Student Service

Advised Undergraduate Students

2023–2025 Lauren Sands, B.Sc. Student
Research topic: Resource Bounds for Parallel Programs

2025 Arnav Sabharwal, B.Sc. Student
Research topic: Data-Driven Resource Analysis

2023-2024 Nathan Glover, B.Sc. Student
Research topic: Combining Manual and Automatic Resource Analysis

2023 Ziqi Liu, B.Sc. Student
Research topic: Resource Bounded Smart Contracts

2023 Zhongyi Cao, B.Sc. Student
Research topic: Sound Programmable Inference

2022 Runming Li, B.Sc. Student
Research topic: Resource Aware ML

2021 Vanshika Chowdhary, B.Sc. Student
Research topic: Probabilistic programming

2021 Mohamed Lotfi, B.Sc. Student
Research topic: Probabilistic inference

2020 Brandon Wu, B.Sc. Student
Research topic: Interactive RaML

2020 Stephen McIntosh, B.Sc. Student
Research topic: Compiling Nomos to a blockchain

2019–2020 Ishani Santurkar, B.Sc. Student
Research topic: Integrating functional programming in Nomos

2019–2020 Yinglan Chen, B.Sc. Student
Research topic: Error reporting in RaML
Next position: Site Reliability Engineer at Google

2018–2019 Charles Yuan, B.Sc. Student
Research topic: Bayesian inference
Next position: Ph.D. student at MIT

2018 Nicholas Roberts, B.Sc. Student
Research topic: Compiling OCaml to the EVM
Next position: Software Engineer at Jane Street Capital

2017–2018 Prachi Laud, B.Sc. Student
Research topic: Implementing arrays and references in RAML
Next position: Software Engineer at Facebook

2017–2018 Yue Niu, B.Sc. Student
CMU Summer Undergraduate Research Fellowship (SURF)
Research topic: Automatic Resource Bound Analysis for Programs with Garbage Collection
Next position: Ph.D. student at Carnegie Mellon

2016–2017 Benjamin Lichtman, B.Sc. Student
Research project: Resource Bounds for Functional Programs with Side-Effects
Senior thesis: Combining Liquid Types and Automatic Amortized Resource Analysis
Next position: Software Engineer at Microsoft

University Service

2024–pres. Head of the Community and Culture Committee, Computer Science Department, CMU

2020–2024 Member of the Diversity, Equity and Inclusion (DEI) Committee, Computer Science Department, CMU

2018–pres. Member of the Doctoral Review Committee (DRC), Computer Science Department, CMU

2015–pres. Organizer of the weekly PLunch Meeting, CMU

2015–pres. Organizer of the PoP Seminar, CMU

2023–2024 Member of the University Committee on Faculty Appointments without Indefinite Tenure, CMU

2022–2023 Member of the Hiring Committee, Computer Science Department, CMU

2020–2021 Member of the Hiring Committee, Computer Science Department, CMU

2017–2021 Member of the Committee for Selecting Fellowship Candidates, Computer Science Department, CMU

2020 Organizer of the Computer Science Department's Open House, CMU

2019–2020 Member of the Ph.D. Admissions Committee, Computer Science Department, CMU

2019 Organizer of the Computer Science Department's Open House, CMU

2018–2019 Member of the Ph.D. Admissions Committee, Computer Science Department, CMU

2015–2016 Master's Admissions Committee, Computer Science Department, CMU