

Jan Hoffmann

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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 quantitative verification, type systems, static resource analysis of programs, probabilistic programming, and programming languages for digital contracts.

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

- 2015 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

- 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] 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).
- [2] 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).
- [3] 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).
- [4] 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).
- [5] F. Brandt, M. Brill, F. Fischer, P. Harrenstein, and J. Hoffmann.
Computing Shapley's Saddles.
ACM SIGecom Exchanges, 8, 2009.
- [6] J. Hoffmann.
Finding a Tree Structure in a Resolution Proof is NP-Complete.
Theoretical Computer Science, 410(21-23), 2009.
- [7] 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.
- [8] 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

- [9] 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.
- [10] 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.
- [11] D. Wang and J. Hoffmann.
Type-guided worst-case input generation.
In *46th Symposium on Principles of Programming Languages (POPL'19)*, 2019.
- [12] 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.
- [13] A. Das, J. Hoffmann, and F. Pfenning.
Parallel complexity analysis with temporal session types.
In *23rd International Conference on Functional Programming (ICFP'18)*, 2018.

- [14] 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.
- [15] 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.
- [16] 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.
- [17] 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.
- [18] 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.
- [19] 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.
- [20] 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.
- [21] 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.
- [22] 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.
- [23] 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.
- [24] J. Hoffmann and Z. Shao.
Automatic Static Cost Analysis for Parallel Programs.
In *24th European Symposium on Programming (ESOP'15)*, 2015.
- [25] 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.
- [26] 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.
- [27] 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.
- [28] 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.

- [29] J. Hoffmann, K. Aehlig, and M. Hofmann.
Resource Aware ML.
In *24th International Conference on Computer Aided Verification (CAV'12)*, 2012.
- [30] 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.
- [31] 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.
- [32] J. Hoffmann and M. Hofmann.
Amortized Resource Analysis with Polynomial Potential.
In *19th European Symposium on Programming (ESOP'10)*, 2010.

Other Publications

- [33] D. Kahn and J. Hoffmann.
Exponential Automatic Amortized Resource Analysis, 2019. Working paper.
- [34] C. Yuan and J. Hoffmann.
BLT: Exact Bayesian Inference with Distribution Transformers, 2019. Working paper.
- [35] S. Muller and J. Hoffmann.
Combining Source and Target Level Cost Analyses for OCaml Programs, 2019. Working paper.
- [36] A. Das, S. Balzer, J. Hoffmann, and F. Pfenning.
Resource-aware session types for digital contracts, 2019. Working paper.
- [37] J. Hoffmann.
Types with Potential: Polynomial Resource Bounds via Automatic Amortized Analysis. PhD thesis, Ludwig-Maximilians-Universität München, 2011.
- [38] J. Hoffmann.
Resolution Proofs and DLL-Algorithms with Clause Learning. Diploma Thesis, LMU München, 2007.

Patents and Invention Disclosures

- **Compositional Certified Resource Bound Analysis**
U.S. Provisional Application No. 62/155,971
Filed May 1, 2015

Software Artifacts

- **Nomos**
A resource-aware programming language for digital contracts that is session types 2018–present
- **ReSyn**
A resource-guided and type-driven synthesis tool for functional programs 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

- **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

Nomos: Resource-Aware Session Types for Programming Digital Contracts	
<i>Invited talk</i> at the Workshop on Theory and Practice of Blockchains; Aarhus, Denmark	May 2019
<i>Invited talk</i> at the ETH Workshop on Dependable and Secure Software Systems; Zürich, Switzerland	October 2019
Resource-Aware Session Types	
<i>Invited talk</i> 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	
<i>Invited talk</i> at the meeting of the IFIP working group 1.9/2.15 “Verified Software”; Oxford, UK	July 2018
Resource Analysis for Probabilistic Programs	
<i>Invited talk</i> 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	
<i>Invited talk</i> 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 (POPL17); Paris, France	January 2017
Resource Aware ML	
University at Buffalo; Buffalo, NY	December 2017
<i>Invited talk</i> 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	
<i>Invited talk</i> at the workshop <i>Beyond Worst-Case Analysis</i> 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	
<i>Invited talk</i> 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

Committee Work

- 2019–2020** Program Committee Member
International Conference on Functional Programming (ICFP'20)
- 2018–pres** Steering Committee Member
Logic Mentoring Workshop
- 2019–2021** Workshop and Co-Located Events Co-Chair
Symposium on Principles of Programming Languages (POPL)
- 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 Berlinger, 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

- 2015–pres.** ACM SIGPLAN Member

Editorial Duties

- 2015–2017** Guest Editor, Journal of Automated Reasoning

Contract and Grant Support

Pending

- 2019** *Next Generation Programming Languages for Digital Contracts*
PIs: Jan Hoffmann(CMU), Stephanie Balzer(CMU), Bryan Parno (CMU), and Frank Pfenning (CMU)

Current

- 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
- 2019** Gift
Jane Street Capital
PI: Jan Hoffmann (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
- 2018–2022** 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

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)

Past

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 (GammaTech), 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 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); 28 students
12 units; undergraduate course

Fall 2018 *15-411/15-611: Compiler Design*
15 units; undergraduate course (cross-listed as graduate course); 58 students

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; 41 students

Fall 2017 *15-411/15-611: Compiler Design*
15 units; undergraduate course (cross-listed as graduate course); 42 students

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); 58 students
- 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; 4 Students

Contributions to Education

- **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 Course *Resource Analysis***
Course design, development of lecture notes and exercises
Taught in 2016

Student Advising

Current PhD Students and Post-Docs

- 2018–pres.** Stefan Muller, Post-Doc
Research topic: Resource-aware compilation
- 2018–pres.** David Kahn, PhD Student
Research topic: Resource analysis
- 2017–pres.** Di Wang, PhD Student
Research topic: Probabilistic programming, program synthesis
- 2015–pres.** Ankush Das, PhD Student
Research topic: Resource-aware session types

Former Students and Post-Docs

- 2019** Biyuan Ding, MSCS Student
Research topic: Arrays and references in RaML
- 2018–2019** Charles Yuan, BS Student
Research topic: Bayesian inference
Next position: Software Engineer at Hudson River Trading
- 2016–2018** Chan Ngo, Post-Doc
Research topic: Preventing side channels; expected cost analysis
Next position: Senior Research Engineer at Aptiv
- 2018** Nicholas Roberts, BS Student
Research topic: Compiling OCaml to the EVM
Next position: Software Engineer at Jane Street Capital

- 2017–2018** Prachi Laud, BS Student
 Research topic: Implementing arrays and references in RAML
 Next position: Software Engineer at Facebook
- 2017–2018** Yue Niu, BS Student
 CMU Summer Undergraduate Research Fellowship (SURF)
 Research topic: Automatic Resource Bound Analysis for Programs with Garbage Collection
 Next position: PhD student at Carnegie Mellon
- 2016–2017.** Benjamin Lichtman, BS 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
- 2013–2017** Quentin Carbonneaux, PhD Student (at Yale, co-advised with Zhong Shao)
 Thesis: Modular and Certified Resource-Bound Analyses
 Next position: Software Engineer at Google

Student Service

Ph.D. Dissertation Committees

- 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

University Service

- 2018–2020** Organizer of the Computer Science Department's Open House, Carnegie Mellon
- 2018–pres.** Member of the Doctoral Review Committee (DRC), Computer Science Department, Carnegie Mellon
- 2018–2019** Ph.D. Admissions Committee, Computer Science Department, Carnegie Mellon
- 2015–pres.** Organizer of the weekly PLunch Meeting, Carnegie Mellon
- 2015–pres.** Organizer of the PoP Seminar, Carnegie Mellon
- 2015–2016** Master's Admissions Committee, Computer Science Department, Carnegie Mellon