Eric Koskinen

Charles Berendsen Associate Professor (with tenure)
Stevens Institute of Technology

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Summary

I am an Associate Professor of Computer Science at Stevens Institute of Technology, where I teach and conduct a research program that has been supported by over $6M in funds from the National Science Foundation (NSF), DARPA and the Office of Naval Research. My career has ranged from the practical to the theoretical. I have over 15 years of experience in academia (Stevens, Yale, NYU) and 5 years of experience in industry (Amazon.com, Microsoft, IBM). I hold a PhD in Computer Science from the University of Cambridge. My research interests include formal methods/verification, programming languages, concurrency and systems.

Education

University of Cambridge, Ph.D. in Computer Science — 2008 – 2013

- Thesis: Temporal verification of programs. Advisors: Byron Cook and Michael J.C. Gordon.

Brown University, Sc.M. in Computer Science — 2005 – 2008

- Thesis: Transactional Boosting: Highly Concurrent Transactional Objects. Advisor: Maurice Herlihy.

College of William & Mary, B.S. in Computer Science (Highest Honors), B.S. in Physics — 1997 – 2001

Employment Summary

- Stevens Institute of Technology, Endowed Associate Professor (tenured), Hoboken, NJ — Sep 2023 *onward*
- Stevens Institute of Technology, Endowed Assistant Professor, Hoboken, NJ — 2021 – 2023
- Stevens Institute of Technology, Assistant Professor, Hoboken, NJ — 2017 – 2021
- Yale University, Lecturer & Research Scientist, New Haven, CT — 2015 – 2017
- IBM TJ Watson Research Center, Research Staff Member, Yorktown Heights, NY — 2014 – 2015
- New York University (NYU), Research Scientist; Visiting Professor, New York, NY — 2011 – 2014
- Nagoya University, Visiting Professor, Nagoya, Japan — Spring 2013
- Microsoft Research, Research Intern, Redmond, WA — Summer 2008
- Microsoft Research, Research Intern, Cambridge, UK — Summer 2006
- Amazon.com, Software Engineer, Seattle, WA — 2003 – 2005

Funding Summary

National Science Foundation (NSF)	Principal Investigator	$ 593,022	Jul 2023
Office of Naval Research (ONR)	Principal Investigator	$ 215,393	Aug 2022
National Science Foundation (NSF)	Principal Investigator	$ 399,995	Jun 2021
National Science Foundation (NSF)	Principal Investigator	$ 499,986	May 2020
Office of Naval Research (ONR)	Principal Investigator	$ 3,158,688	Jun 2017
National Science Foundation (NSF)	Principal Investigator	$ 250,000	Jun 2016
Defense Advanced Research Projects Agency (DARPA)	Principal Investigator	$ 800,000	Dec 2014
National Science Foundation (NSF)	Principal Investigator	$ 250,000	Jun 2014
NYU Office of the Provost (NYU)	Principal Investigator	$ 17,000	Jun 2014
Japan Society for Promotion of Science (JSPS)	Fellow	¥ 1,000,000	Sep 2012

Awards

- Distinguished Paper at POPL 2023. — Jan 2023
- Charles Berendsen Junior Professorship. — Fall 2021 – present
- Provost's Early Career Award for Research Excellence. Office of the Provost. — May 2020
- Computer Aided Verification (CAV) Award paper. — Oct 2011
- Gates Cambridge Scholarship. — Feb 2007
- Highest Honors for Undergraduate Thesis. — May 2001

Publications

Conferences

- J Pincus, E Koskinen. An Abstract Domain for Heap Commutativity. In *Proceedings of the 26th International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI 2025)*. **(VMCAI 2025)**. January 2025.
  http://www.erickoskinen.com/papers/heapcommute.pdf

- C Enea, E Koskinen. Scenario-based Proofs for Concurrent Objects. In *Proceedings of the ACM on Programming Languages (PACMPL)*. **(OOPSLA 2024)**. October 2024.
  http://www.erickoskinen.com/papers/quotients.pdf

- Adam Chen, Tegan Brennan, Parisa Fathololumi, Eric Koskinen, Mihai Nicola, Jared Pincus. Better Predicate Pruning and Heuristics for Commutativity Synthesis. In *Proceedings of the 21st International Symposium on Automated Technology for Verification and Analysis*. **(ATVA 2023)**. October 2023.
  http://www.erickoskinen.com/papers/servois2.pdf

- T. Antonopoulos, E. Koskinen, T. Le, R. Nagasamudram, D. Naumann, M. Ngo. An algebra of alignment for relational verification. In *Proceedings of the 50th ACM SIGPLAN Symposium on Principles of Programming Languages (POPL 2023)*. **(POPL 2023)**. January 2023.
  http://www.erickoskinen.com/papers/bikat.pdf

- H. Unno, T. Terauchi, Y. Gu, E. Koskinen. Modular Primal-Dual Fixpoint Logic Solving for Temporal Verification. In *Proceedings of the 50th ACM SIGPLAN Symposium on Principles of Programming Languages (POPL 2023)*. **(POPL 2023)**. January 2023. **Award Paper**.
  http://www.erickoskinen.com/papers/muclp.pdf

- A Chen, P Fathololumi, E Koskinen, J Pincus. Veracity: Declarative Multicore Programming with Commutativity. In *Proceedings of the ACM on Programming Languages (PACMPL)*. **(OOPSLA 2022)**. January 2022.
  http://www.erickoskinen.com/papers/veracity.pdf

- Y Liu, C Pang, D Dietsch, E Koskinen, T-C Le, G Portokalidis, J Xu. Proving LTL of Bitvector Programs and Decompiled Binaries. In *Proceedings of the 19th Asian Symposium on Programming Languages and Systems*. **(APLAS 2021)**. November 2021.
  http://www.erickoskinen.com/papers/darksea.pdf

- H Unno, T Terauchi, E Koskinen. Constraint-Based Relational Verification. In *Proceedings of the 33rd International Conference on Computer Aided Verification*. **(CAV 2021)**. June 2021.
  http://www.erickoskinen.com/papers/cav21.pdf

- E Koskinen, K Bansal. Decomposing Data Structure Commutativity Proofs with mn-Differencing. In *Proceedings of the 24th International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI 2023)*. **(VMCAI 2021)**. January 2021.
  http://www.erickoskinen.com/papers/cityprover.pdf

- C Pang, R Yu, Y Chen, E Koskinen, G Portokalidis, B Mao, J Xu. SoK: All You Ever Wanted to Know About Binary Disassembly But Were Afraid to Ask. In *Proceedings of the 42nd IEEE Symposium on Security and Privacy*. **(S&P 2021)**. May 2021.
  https://www.portokalidis.net/files/sok86disas_oakland21.pdf

- C Pang, R Yu, D Xu, E Koskinen, G Portokalidis, J Xu. Towards Optimal Use of Exception Handling Information for Function Detection. In *Proceedings of the 51st Annual IEEE/IFIP International Conference on Dependable Systems and Networks*. **(DSN 2021)**. June 2021.
  https://www.portokalidis.net/files/fetch_dsn21.pdf

- T-C Le, T Antonopoulos, P Fathololumi, E Koskinen, T Nguyen. DynamiTe: Dynamic Termination and Non-termination Proofs. In *Proceedings of the ACM on Programming Languages (PACMPL) (OOPSLA 2020)*. **(OOPSLA 2020)**. 2020.
  http://www.erickoskinen.com/papers/dynamite.pdf

- T Dickerson, E Koskinen, M Herlihy, P Gazzillo. Conflict Abstractions and Shadow Speculation for Optimistic Transactional Objects. In *Proceedings of the Asian Symposium on Programming Languages and Systems*. **(APLAS 2019)**. 2019.
  http://www.erickoskinen.com/papers/proust.pdf

- T Antonopoulos, E Koskinen, T Le. Specification and Inference of Trace Refinement Relations. In *Proceedings of the ACM on Programming Languages (PACMPL).* **(OOPSLA 2019)**. November 2019.
  http://www.erickoskinen.com/papers/knotical.pdf
- Y Nanjo, H Unno, E Koskinen, T Terauchi. Dependent Temporal Effects and a Fixpoint Logic for Verification. In *Proceedings of the 33rd Annual ACM/IEEE Symposium on Logic in Computer Science.* **(LICS 2018)**. July 2018.
  http://www.erickoskinen.com/papers/lics18.pdf
- K Bansal, E Koskinen, O Tripp. Automatic Generation of Precise and Useful Commutativity Conditions. In *Proceedings of the International Conference on Tools and Algorithms for the Construction and Analysis of Systems.* **(TACAS 2018)**. 2018.
  http://www.erickoskinen.com/papers/ccr.pdf
- T Dickerson, P Gazzillo, M Herlihy, E Koskinen. Adding Concurrency to Smart Contracts. In *Proceedings of the ACM Symposium on Principles of Distributed Computing.* **(PODC 2017)**. 2017.
  http://www.erickoskinen.com/papers/podc17a.pdf
- T Dickerson, P Gazzillo, M Herlihy, E Koskinen. Proust: A Design Space for Highly-Concurrent Transactional Data Structures. In *Proceedings of the ACM Symposium on Principles of Distributed Computing.* **(PODC 2017 (Brief Announcement))**. 2017.
- T Antonopoulos, P Gazzillo, M Hicks, E Koskinen, T Terauchi, S Wei. Decomposition Instead of Self-Composition for Proving the Absence of Timing Channels. In *Proceedings of the ACM SIGPLAN Conference on Programming Language Design and Implementation.* **(PLDI 2017)**. 2017.
  http://www.erickoskinen.com/papers/blazer.pdf
- P Ferrara, O Tripp, P Liu, E Koskinen. Using Abstract Interpretation to Correct Synchronization Faults. In *Proceedings of the International Conference on Verification, Model Checking, and Abstract Interpretation.* **(VMCAI 2017)**. 2017.
  http://www.erickoskinen.com/papers/corrective.pdf
- E Koskinen, J Yang. Reducing Crash Recoverability to Reachability. In *Proceedings of the ACM SIGPLAN Symposium on Principles of Programming Languages.* **(POPL 2016)**. 2016.
  http://www.erickoskinen.com/papers/cr.pdf
- E Koskinen, M Parkinson. The Push/Pull model of transactions. In *Proceedings of the ACM SIGPLAN Conference on Programming Language Design and Implementation.* **(PLDI 2015)**. 2015.
  http://www.erickoskinen.com/papers/pushpull.pdf
- E Koskinen, T Terauchi. Local Temporal Reasoning. In *Proceedings of the ACM/IEEE Conference on Logic in Computer Science.* **(LICS 2014)**. 2014.
  http://www.erickoskinen.com/papers/ltr.pdf
- D Dimitrov, V Raychev, M Vechev, E Koskinen. Commutativity Race Detection. In *Proceedings of the ACM SIGPLAN Conference on Programming Language Design and Implementation.* **(PLDI 2014)**. 2014.
  http://www.erickoskinen.com/papers/crd.pdf
- M Herlihy (Invited talk), E Koskinen. Composable Transactional Objects: A Position Paper. In *Proceedings of the European Symposium on Programming.* **(ESOP 2014)**. 2014.
  http://www.erickoskinen.com/papers/esop2014.pdf
- O Tripp, E Koskinen, M Sagiv. Turning Nondeterminism into Parallelism. In *Proceedings of the ACM on Programming Languages a.k.a. Conference on Object-Oriented Programming Systems, Languages, and Applications.* **(OOPSLA 2013)**. 2013.
  http://www.erickoskinen.com/papers/tango.pdf
- B Cook, E Koskinen. Reasoning about nondeterminsim in software. In *Proceedings of the ACM SIGPLAN Conference on Programming Language Design and Implementation.* **(PLDI 2013)**. 2013.
  http://www.erickoskinen.com/papers/ctl.pdf

- K Bansal, E Koskinen, T Wies, D Zufferey. Structural Counter Abstraction. In *Proceedings of the International Conference on Tools and Algorithms for the Construction and Analysis of Systems.* **(TACAS 2013)**. 2013.
  http://www.erickoskinen.com/papers/structural.pdf

- B Cook, E Koskinen, M Vardi. Temporal property verification as a program analysis task. In *Proceedings of the International Conference on Computer-Aided Verification.* **(CAV 2011 Award paper)**. 2011.
  http://www.erickoskinen.com/papers/branching.pdf

- B Cook, E Koskinen. Making Prophecies with Decision Predicates. In *Proceedings of the ACM SIGPLAN Symposium on Principles of Programming Languages.* **(POPL 2011)**. 2011.
  http://www.erickoskinen.com/papers/dpredicates.pdf

- E Koskinen, M Parkinson, M Herlihy. Coarse-Grained Transactions. In *Proceedings of the ACM SIGPLAN Symposium on Principles of Programming Languages.* **(POPL 2010)**. 2010.
  http://www.erickoskinen.com/papers/cgt.pdf

- E Koskinen, M Herlihy. Concurrent Non-commutative Boosted Transactions. In *Proceedings of the ACM Symposium on Principles of Distributed Computing.* **(PODC 2009 (BA))**. 2009.
  http://www.erickoskinen.com/papers/nc-boosting.pdf

- S Gulwani, S Jain, E Koskinen. Control-Flow Refinement and Progress Invariants for Bound Analysis. In *Proceedings of the ACM SIGPLAN Conference on Programming Language Design and Implementation.* **(PLDI 2009)**. 2009.
  http://www.erickoskinen.com/papers/cfr-pi.pdf

- E Koskinen, M Herlihy. Dreadlocks: Efficient Deadlock Detection. In *Proceedings of the Symposium on Parallelism in Algorithms and Architectures.* **(SPAA 2008)**. 2008.
  http://www.erickoskinen.com/papers/dreadlocks-spaa08.pdf

- E Koskinen, M Herlihy. Checkpoints and Continuations instead of Nested Transactions. In *Proceedings of the Symposium on Parallelism in Algorithms and Architectures.* **(SPAA 2008)**. 2008.
  http://www.erickoskinen.com/papers/checkpoints-spaa08.pdf

- M Herlihy, E Koskinen. Transactional Boosting: A Methodology for Highly-Concurrent Transactional Objects. In *Proceedings of the ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming.* **(PPoPP 2008)**. 2008.
  http://www.erickoskinen.com/papers/boosting-ppopp08.pdf

- E Koskinen, J Jannotti. BorderPatrol: Isolating Events for Black-box Tracing. In *Proceedings of the ACM SIGOPS European Conference on Computer Systems.* **(EuroSys 2008)**. 2008.
  http://www.erickoskinen.com/papers/borderpatrol.pdf

Journals

- K Bansal, E Koskinen, O Tripp. Synthesizing Precise and Useful Commutativity Conditions. In *Journal of Automated Reasoning.* **(Journal of Automated Reasoning (JAR 2020))**. 2020.
  http://www.erickoskinen.com/papers/jar20.pdf

- T Dickerson, P Gazzillo, M Herlihy, E Koskinen. Adding Concurrency to Smart Contracts. In *Distributed Computing.* **(Distributed Computing (DIST 2020))**. 2020.
  https://link.springer.com/article/10.1007/s00446-019-00357-z

- T Dickerson, P Gazzillo, M Herlihy, E Koskinen. How to add concurrency to smart contracts. In *Bulletin of the EATCS.* **(Bulletin of the EATCS, No. 124)**. 2019.
  http://eatcs.org/images/bulletin/beatcs124.pdf

- B Cook, E Koskinen, M Vardi. Temporal property verification as a program analysis task. In *Formal Methods of System Design.* **(Formal Methods of System Design (FMSD 2012))**. 2012.
  http://www.erickoskinen.com/papers/fmsd12.pdf

Workshops

- T Dickerson, P Gazzillo, M Herlihy, V Saraph, E Koskinen. Proof-Carrying Smart Contracts. In *Proceedings of the Workshop on Trusted Smart Contracts*. **(WTSC 2018)**. 2018.
  `http://www.erickoskinen.com/papers/pcsc.pdf`
- Kshitij Bansal, E Koskinen, O Tripp. Commutativity Condition Refinement. In *Proceedings of the Workshop on Explointing Concurrency Efficiently and Correctly*. **(EC2 2015)**. 2015.
  `http://www.erickoskinen.com/papers/ccr-ec2.pdf`
- E Koskinen and Y Terauchi. Local Temporal Reasoning. In *Proceedings of the Workshop on High Conference Software Systems*. **(HCSS 2014)**. 2014.
  `http://www.erickoskinen.com/papers/ltr.pdf`
- B Cook and E Koskinen. Reasoning about nondeterminism in programs. In *Proceedings of the Workshop on High Conference Software Systems*. **(HCSS 2012)**. 2012.
- E Koskinen, M Herlihy. Concurrent Non-commutative Boosted Transactions. In *Proceedings of the Workshop on Transactional Memory*. **(TRANSACT 2009)**. 2009.
- M Herlihy, E Koskinen. Dreadlocks: Efficient Deadlock Detection. In *Proceedings of the Workshop on Transactional Memory*. **(TRANSACT 2008)**. 2008.
  `http://www.erickoskinen.com/papers/dreadlocks.pdf`
- M Herlihy, E Koskinen. Checkpoints and Continuations instead of Nested Transactions. In *Proceedings of the Workshop on Transactional Memory*. **(TRANSACT 2008)**. 2008.
  `http://www.erickoskinen.com/papers/checkpoints.pdf`

Thesis

- E Koskinen. Temporal verification of programs. In *Doctoral Dissertation*. **(Doctoral Dissertation)**. 2013.
  `http://www.erickoskinen.com/papers/thesis.pdf`

Drafts

- Y Liu, T-C Le, T Antonopoulos, E Koskinen, T Nguyen. DrNLA: Dual Rewriting for Branching-Time Verification of Non-Linear Arithmetic Programs. 2022.
  `http://www.erickoskinen.com/papers/drnla.pdf`
- T Antonopoulos, P Gazzillo, E Koskinen, Z Shao. Vertical Composition of Reversible Atomic Objects. 2016.
  `http://www.erickoskinen.com/papers/rao.pdf`
- E Koskinen, H Unno, M Vardi. Games Programs Play: Analyzing Multiplayer Programs. 2016.
  `http://cpsc.yale.edu/sites/default/files/files/tr1521.pdf`

Professional Activities

Keynote Talks

- *Invited Speaker*, 24th International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI 2023). "Programming with Commutativity" Jan 2023

Invited Talks

- *Invited Speaker*, The 11th Workshop on Formal Reasoning in Distributed Algorithms (FRIDA 2024) at CAV 2024 Jul 2024
- *Invited Speaker*, Workshop on Verification of Distributed Systems (VDS) 2024 at NETYS 2024 May 2024

Funding

- Principal Investigator. NSF. $ 593,022. Jul 2023.
  CISE-ANR: SHF: Small: Scenario-based Formal Proofs for Concurrent Software.
  Collaboration with École Polytechnique, Paris, FR

- Principal Investigator. ONR. $ 215,393. Aug 2022.
  AVTA Transition: Toolchain for Binary Decompilation and Alignment.
  Collaboration with University of Utah.
- Principal Investigator. NSF. $ 399,995. Jun 2021.
  Collaborative Research: SHF: Medium: Ensuring Safety and Liveness of Modern Systems through Dynamic Temporal Analysis.
  Collaboration with Yale University and George Mason University.
- Principal Investigator. NSF. $ 499,986. May 2020.
  SHF: Small: Symbolic Commutativity Analysis for Multicore Concurrency.
- Principal Investigator. ONR. $ 3,158,688. Jun 2017.
  Automatic Verification of Temporal Alignment of Transformed Software. (AVTA).
  Collaboration with Yale University.
- Principal Investigator. NSF. $ 250,000. Jun 2016.
  SHF: Small: Collaborative Research: Concurrent Software Verification with Rely/Guarantee Abstraction.
  Collaboration with New York University.
- Principal Investigator. (Subcontract from UMD) DARPA. $ 800,000. Dec 2014.
  SOUCIS: Sound Over- & Under-Approximations of Complexity & Information Security.
  Collaboration with University of Maryland and Berkeley.
- Principal Investigator. NSF. $ 250,000. Jun 2014.
  SHF: Small: Collaborative Research: Concurrent Programming with Composable Transactional Objects.
  Collaboration with Brown University.
- Principal Investigator. NYU Office of the Provost. $ 17,000. Jun 2014.
  Verification Tools for Modern Programming Languages.
- Fellow. JSPS. ¥ 1,000,000. Sep 2012.
  Fellowship from the Japan Society for Promotion of Science.

Funding Advising

- Dutch Research Council, 2023.
- NSF Panels, Software and Hardware Foundations (SHF) Program, CCF Core. 2015, 2017, 2018, 2019, 2021 (ad hoc reviewer), 2022.
- Invitation-only NSF panel on programming and concurrency. July 2013.

Dissertation Examination

PhD

- Hünkar Can Tunc. Feb 2024 (exp.)
- Ramana Nagasamudram, Stevens. Spring 2024.
- Yuchen Zhang, Stevens. Spring 2023.
- Mohammad Nikouei, Stevens. Fall 2019.
- Thomas Dickerson, Brown University. February 2019.
- Kshitij Bansal, New York University. December 2015.
- Paul Gazzillo, New York University. October 2015.
- Jingyue Wu, Columbia University. May 2014.

Master's

- TBD, Stellenbosch University, South Africa, December 2024.
- Jared Pincus, Stevens. Spring 2022.

Organizer

- *Co-organizer*, Verification Mentoring Workshop (VMW). CAV 2023 and CAV 2024.
- *Fellowships Chair*, International Conference on Computer Aided Verification. CAV 2023 and CAV 2024.
- *Founder/organizer*, First International Workshop on Commutativity Reasoning & Applications, co-located with ACM/SIGPLAN PLDI 2022.
- *Conference Chair*, IEEE/ACM Conference on Logic in Computer Science (LICS). July 2016.
- *Organizer*, CMACS grant PI Meeting. October 2012.
- *Organizer*, Workshop on concurrency and verification, co-located with POPL. January 2012.

Program Committee member

- ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA 2025).
- 51st ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (POPL 2025).

- 11th International Conference on Networked Systems (NETYS 2024).
- 45th ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI 2024).
- 10th International Conference on Networked Systems (NETYS 2023).
- 44th ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI 2023).
- Asian Symposium on Programming Languages & Systems (APLAS 2022).
- 46th ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (POPL 2020).
- ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA 2019).
- 36th ACM Symposium on Principles of Distributed Computing (PODC 2018).
- 23rd ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP 2018).
- 19th International Conference on Verification, Model Checking & Abstract Interpretation (VMCAI 2018).
- 42nd International Colloquium on Automata, Languages, and Programming (ICALP 2015).
- 39th ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (POPL 2013).
- 16th International Conference On Principles Of DIstributed Systems (OPODIS 2012).
- 24th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA 2012).

External Review Committee member

- ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA 2021)
- ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI 2019).
- 21st ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP 2016).
- 26th European Conference on Object-Oriented Programming (ECOOP 2016).
- 14th Conference on Formal Methods in Computer-Aided Design (FMCAD 2014).

Referee for

- *Book chapter*: Handbook of Model Checking.
- *Journals*: Journal of Parallel and Distributed Computing (JPDC), Logical Methods in Computer Science (LMCS), Formal Methods in System Design (FMSD), Journal of the ACM (JACM), ACM Transactions on Programming Languages and Systems (TOPLAS).
- *Funding*: NSF Software and Hardware Foundations (NSF SHF). May 2015.

Patents

- Adding Concurrency to Smart Contracts. Application. US # 2019/0087793 A1. Filed 2018. Pending.
- Static Program Reduction for Complexity Analysis. US # 2010/0318980 A1. June 2009.
- Optimizing Across Interfaces. US # 8214813 B2. December 2006.

Membership

- Member of the ACM.
- Member of Cambridge in America.
- Microsoft Alumnus.

Teaching Experience

Courses

- *Professor.* "Discrete Structures" undergraduate, Stevens, Fall 2023.
- *Professor.* "Compilers" graduate/undergraduate, Stevens, Sp 2020, Sp 2021, Sp 2022, Sp 2023.
- *Professor.* "Societal Impacts of Information Technology," undergraduate, Stevens, Falls of 2017–2022.
- *Professor.* "Data Structures" undergraduate, Stevens, Spring 2019.
- *Professor.* "Introduction to Computer Science, Honors, Part II" undergraduate, Stevens, Spring 2018.
- *Professor.* "Object-Oriented Programming," undergraduate, New York University, NY, Fall 2014.
- *Professor.* "Data Structures," undergraduate, enrollment of 110, New York University, NY, Spring 2014.
- *Professor.* "Data Structures," undergraduate, enrollment of 80, New York University, NY, Fall 2013.
- *Professor.* "Software Project Planning," undergraduate, Newbury College, MA. Spring 2007.
- *Guest Lecturer.* "Databases," undergraduate, University of Cambridge. 2010.
- *Guest Lecturer.*"Verification of infinite-state programs," MPhil course, University of Cambridge. 2009.

Postdoctoral Supervision

- Ton-Chanh Le, PhD National University of Singapore. Spring 2018 – Summer 2022
- Timos Antonopoulos, PhD Cambridge. Fall 2015 – Summer 2017.

- Paul Gazzillo, PhD NYU. Fall 2015 – Spring 2018.

Graduated PhD Students

- Yuandong Liu. Defended December 2022.

Current PhD Student Supervision

- Adam Chen. Admitted Fall 2019. Passed Oral and Written exams. Published three papers.
- Parisa Fatholoumi. Admitted Fall 2021. Passed written exam. Published three papers.
- Mihai Nicola. Admitted Fall 2021. Joint with Tegan Brennan. Published one paper, submitted another.
- Jude Kanjamala. Admitted Fall 2024. Joint with Dave Naumann.

Mentoring Other Students

- Jared Pincus. (Master's Student) Summer 2021 – Summer 2022
- Kshitij Bansal (NYU). Research Assistant, Summer 2015.
- Mario Alvarez (UCSD). Research Assistant, Summer 2014.
- Ruben Zaccaroni (NYU undergraduate), Fall 2014.
- Patrick Yuen (NYU undergraduate), Fall 2014.
- *Oral Qualifying exams*: Ramana Nagasamudram (Spring 2021), Konstantinos Kleftogiorgos (Winter 2021), Yifan Wang (Summer 2020), Vidya Rajagopalan (2019).

Other Service

- Student Research Competition at PLDI'20 and PLDI'22.

Seminars and Visits

- Université Paris Cité, IRIF — Oct 2024
  "*Inferring Accumulative Effects of Higher Order Programs*"
- FRIDA, CAV, Montreal — July 2024
  "*Scenario-Based Proofs for Concurrent Objects*"
- VDS, Morocco — May 2024
  "*Code Commutativity: Verification and Inference for Automatic Parallelization*"
- MIT, Boston, MA — May 2022
  "*Reasoning and Programming with Commutativity*"
- Boston University, Boston, MA — May 2022
  "*Reasoning and Programming with Commutativity*"
- University of Maryland, MD — May 2020
  "*Automatic Commutativity Verification with Differencing Abstractions*"
- Boston University, Boston, MA — April 2020
  "*Reducing Commutativity Verification to Reachability with Differencing Abstractions*"
- ONR TPCP at Northeastern University, Boston — June 2019
  "*Automatic Verification of Temporal Alignment*"
- University of Johannesburg, South Africa — May 2019
  "*Concurrent Smart Contracts*"
- Princeton, New Jersey — May 2019
  "*Trace Refinement Relations*"
- SRI International, New York — Mar 2019
  "*Concurrent Smart Contracts with Commutativity & Atomicity*"
- ONR TPCP at the University of Washington, Seattle — June 2019
  "*Automatic Verification of Temporal Alignment*"
- Workshop on Trusted Smart Contracts (WTSC), Financial Cryptography, Curacao — Feb 2018
  "*Proof-Carrying Smart Contracts*"
- NYU, New York — Dec 2016
  "*Using Abstract Interpretation to Correct Synchronization Faults*"
- Columbia University, New York — Nov 2016
  "*Robust Concurrent Software from Commutativity & Atomicity*"
- Boston University, Boston — Nov 2016
  "*Temporal Verification of Programs*"
- NJPLS — Sep 2016
  "*Reversible Atomic Objects*"
- NFSC-JSPS Joint Research Workshop — July 2015
  "*Proving Crash Recoverability*"

- Workshop on Exploiting Concurrency Efficiently and Correctly **((EC)2 2015)** July 2015
  "*Synthesizing Commutativity Conditions*"
- Dagstuhl Seminar 15191, Schloss Dagstuhl, Germany May 2015
  "*The Push/Pull model of Transactions*"
- MIT, Cambridge, MA Nov 2014
  "*Commutativity Race Detection*"
- IBM PL Day, Yorktown Heights, NY Nov 2014
  "*Commutativity Race Detection*"
- Microsoft Research, Cambridge, UK June 2014
  "*Local Temporal Reasoning*"
- University College, London, UK June 2014
  "*Local Temporal Reasoning*"
- Conference on High Confidence Software and Systems **(HCSS 2014)** May 2014
  "*Local Temporal Reasoning*"
- Yale University Mar 2014
  "*Local Temporal Reasoning*"
- Brown University Mar 2014
  "*The Push/Pull Model of Transactions*"
- Rice University Mar 2014
  "*Local Temporal Reasoning*"
- Cornell University Feb 2014
  "*Local Temporal Reasoning*"
- IBM Research, New York Feb 2014
  "*Local Temporal Reasoning*"
- NYU, New York Jan 2014
  "*Local Temporal Reasoning*"
- Tokyo University, Japan May 2013
  "*Temporal verification of programs*"
- Nagoya University, Japan Apr 2013
  "*Temporal verification of programs*"
- ETH Zurich, Switzerland Feb 2013
  "*Commutativity Race Detection*"
- Queen Mary University, London Feb 2013
  "*Specialization for Synchronization*"
- NEC Research Mar 2013
  "*Reasoning about Nondeterminism in Programs*"
- Microsoft Research Nov 2012
  "*A Theory of Serializabile Transactions*"
- CMACS NSF PI Meeting Oct 2012
  "*Reasoning about Nondeterminism in Programs*"
- IBM PL Day Jun 2012
  "*Reasoning about Nondeterminism in Programs*"
- Conference on High Confidence Software and Systems **(HCSS 2012)** May 2012
  "*Reasoning about nondeterminism*"
- Vienna Sci. Tech. Fund, Austria Dec 2011
  "*Data-structure Commutativity for Multicore Processing*"
- NJPLS Oct 2011
  "*Reasoning about Nondeterminism in Programs*"
- IBM TJ Watson Research Lab Apr 2011
  "*Systems Code Verification: A Moving Target*"
- RiSE Seminar, IST Austria Apr 2011
  "*Systems Code Verification: A Moving Target*"
- Microsoft Research Cambridge Mar 2011
  "*Systems Code Verification: A Moving Target*"
- The 2nd Workshop on the Theory of Transactional Memory **(WTTM 2010)** Sep 2010
  "*Simplified Synchronization through Optimistic Linearizability*"
- Oxford University May 2010
  "*Branching-time reasoning for general-purpose programs*"

- University of Maryland May 2010
  "*Making prophecies with decision predicates*"
- IBM TJ Watson Research Lab Feb 2010
  "*Making prophecies with decision predicates*"
- The 4th ACM SIGPLAN Workshop on Transactional Computing **(TRANSACT 2009)** Feb 2009
  "*Concurrent Non-commutative Boosted Transactions*"
- Queen Mary University of London Dec 2008
  "*Symbolic bound analysis*"
- The 3rd ACM SIGPLAN Workshop on Transactional Computing **(TRANSACT 2008)** Feb 2008
  "*Dreadlocks: Efficient Deadlock Detection*"
- The 3rd ACM SIGPLAN Workshop on Transactional Computing **(TRANSACT 2008)** Feb 2008
  "*Checkpoints and Continuations instead of Nested Transactions*"

Industrial Experience

IBM TJ Watson Research Center, Research Staff Member Yorktown Heights, NY • 2014 – 2015

- Initiated and lead research projects and cross-institution collaborations. (See Publications)
- Filed several patents on testing and concurrency techniques for software.

Amazon.com, Software Engineer Seattle, WA • 2003 – 2005

- Developed an e-commerce application, used by 300 customers/week and full-time editors.
- Worked with a product manager to design IMDb Resume Services (`resume.imdb.com`).
- Implemented a high-performance, custom web server capable of serving over 15,000 pages per minute, increasing performance by a factor of ten.
- Developed an engine to export data to customers such as Target, Comcast, Cablevision, and Warner.
- Developed numerous web-based tools, used by editors to manipulate live content on `imdb.com`.
- Built an interface to expose IMDb data on Amazon.com product detail pages.

Daphnia, Partner, Director of Technology New York, NY • 2001 – 2003

- Developed e-commerce web sites and custom web applications. Managed project teams consisting of employees, client personnel, partner companies, and freelancers.
- Hosted the majority of customers. Grew company to support one full-time Sales Representative. Clients included Wall Street Systems and Outsource Consultants Inc. `www.daphnianyc.com`

Software

- *Designer and contributor to* DrNLA: https://github.com/dynaroar/drnla
- *Designer and contributor to* Veracity: https://github.com/veracity-lang/veracity (OOPSLA'22)
- *Sole designer and developer of* CityProver: https://github.com/erickoskinen/cityprover (VMCAI'21)
- *Co-designer* of DarkSea, a binary verification tool: https://github.com/cyruliu/darksea (APLAS'21)
- *Co-designer* of DynamiTe, a termination verifier: https://github.com/letonchanh/dynamite (OOPSLA'20)
- *Co-designer* of ScalaProust, an extension of ScalaSTM to support Conflict Abstractions and Shadow Speculation (APLAS'19)
- *Co-designer* of Knotical, a tool for synthesizing trace refinement relations. https://github.com/knotical/knotical (OOPSLA'20)
- *Co-designer* of Servois, a commutativity condition synthesis tool. https://github.com/kbansal/servois (TACAS'18)
- *Author* of BorderPatrol, a suite of tools that enables developers to precisely trace requests through a distributed system without the need for instrumenting application components (EuroSys 2008). BorderPatrol inspired the start-up company Tracelytics, which was acquired by AppNeta.
  `http://cs.brown.edu/research/borderpatrol/`
- *Co-author* of Speed, a program analysis tool built on the Phoenix C/C++/C# compiler platform. Speed was applied it to a significant Microsoft product (>670,000 lines of code) and discovered complexity bounds for 90% of the loops (PLDI 2009).
  `http://research.microsoft.com/en-us/um/people/sumitg/pubs/speed.html`
- *Collaborator* on the T2 Termination prover. `http://research.microsoft.com/en-us/projects/t2/`. 2008 – 2012.
- *Designer* of IMDb Resume Services. `http://resume.imdb.com`. 2014 – 2015.

Consultation Experience

Trial Appearances

(The following list includes cases in which I testified in a jury trial. These appearances along with their case numbers are also included in the comprehensive list in the following subsection.)

1. Testifying Expert, Patent case. June 2024
   AlmondNet, Inc. and Intent IQ, LLC vs. Amazon.com.
   Representing AlmondNet, Inc. and Intent IQ, LLC, Firm: Russ August Kabat

2. Testifying Expert, Trade Secrets case. January 2019
   Broker Genius, Inc vs Drew Gainer and Seat Scouts LLC. Southern District of New York. No. 17-cv-08627.
   Representing Broker Genius, Inc., Firm: Pearl, Cohen, Zedek, Latzer, Baratz

Testifying Roles

1. Testifying Expert, Patent case. April 2025 – present
   Yieldmo, Inc. v. Teads SA and Teads, Inc., No. Case No. 1:25-cv-737 (S.D. NY).
   Representing Yieldmo, Inc, Firm: Global IP Law Group, LLC

2. Testifying Expert, Patent case. January 2025 – present
   Weple IP Holdings LLC v. Meta Platforms, Inc., No. 2:24-cv-01316-JLR (W.D. Wash.).
   Representing Weple IP Holdings LLC, Firm: Avantech Law

3. Testifying Expert, Patent case. November 2024 – present
   Cerence Operating Company v. Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc., Case No. 2:24-cv-00181 (E.D. Tex.), and Cerence Operating Company v. Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc., Case No. 2:23-cv00482 (E.D. Tex.).
   Representing Cerence Operating Company, Firm: Russ August & Kabat

4. Testifying Expert, Patent case. October 2024 – present
   Rally vs. Apple, United States District Court for the District of Delaware, Case No. 23-1106.
   Representing Rally AG LLC, Firm: Moore & Van Allen PLLC

5. Testifying Expert, Patent case. July 2024 – present
   AlmondNet, Inc. and Intent IQ, LLC vs. FreeWheel Media Inc and Beeswax.IO Corp., US District Court for the District of Delaware, Case No. 23-cv-220-MN.
   Representing AlmondNet, Inc. and Intent IQ, LLC, Firm: Russ August Kabat

6. Testifying Expert, Patent case. May 2024 – present
   VirtaMove, Corp. v. Amazon.com, Inc., et al., Case No. 7:24-cv-30 (W.D. Tex.); VirtaMove, Corp. v. Google LLC, Case No. 7:24-cv-33 (W.D. Tex.); VirtaMove, Cop. v. International Business Machines Corp., Case No. 2:24-cv-64 (E.D. Tex.); VirtaMove, Cop. v. Hewlett Packard Enterprise Company., Case No. 2:24-cv-93 (E.D. Tex.)..
   Representing VirtaMove, Corp., Firm: Russ August Kabat

7. Testifying Expert, Patent case. May 2024 – present
   Cobblestone Wireless, LLC v. T-Mobile USA, Inc., Case No. 2:22-cv-477 (E.D. Tex.); Cobblestone Wireless, LLC v. Cellco Partnership d/b/a Verizon Wireless, 2:23-cv-382 (E.D. Tex.); Cobblestone Wireless, LLC v. Cisco Systems, Inc., Case No. 2:23-cv-00454-JRG-RSP (E.D. Tex.)..
   Representing Cobblestone Wireless, LLC, Firm: Russ August Kabat

8. Testifying Expert, Patent case. March 2024 – present
   AlmondNet, Inc. and Intent IQ, LLC vs. Viant, US District Court for the District of Delware, Case No. 23-cv-174-MN.
   Representing AlmondNet, Inc. and Intent IQ, LLC, Firm: Russ August Kabat

9. Testifying Expert, Patent case. December 2023 – present
   AlmondNet, Inc. and Intent IQ, LLC vs. Amazon.com, US District Court for the Western District of Texas Waco Division. Case No. 6:21-cv-00898-ADA.
   Representing AlmondNet, Inc. and Intent IQ, LLC, Firm: Russ August Kabat

10. Testifying Expert, Trade Secrets case. Fall 2022 – present
Grey Wall Software, LLC and Veoci Inc. v. Aerosimple LLC, US District Court for the State of Connecticut, Case No. 3:22-cv-00203.
Representing Grey Wall Software, LLC and Veoci Inc., Firm: Patrick McHugh

11. Testifying Expert, Patent case. Summer 2022 – present
Uber Technologies Inc and Unified Patents LLC vs LBT IP II LLC, US Patent and Trademark Office, Case Nos. IPR2022-00926, IPR2022-00806, IPR2202-00880.
Representing LBT IP II LLC, Firm: Alston & Bird

12. Testifying Expert, Patent case. Summer 2022 – present
Roku Inc. vs. AlmondNet, Inc. and Intent IQ, LLC, US District Court for the District of Delaware, Case No. 21-1035-MN.
Representing AlmondNet, Inc. and Intent IQ, LLC, Firm: Russ August Kabat

13. Testifying Expert, Breach of Contract case. Spring 2020 – Fall 2021
VoterLabs, Inc. vs Ethos Group Consulting Services, LLC.
Representing Ethos Group, Firm: Wick Phillips Gould & Martin LLP

14. Testifying Expert, Patent case. March 2018 – Summer 2018 & Fall 2020 – Spring 2021
Mirror Worlds vs Facebook. Southern District of New York. Case No. 1:17-cv-03473-JGK.
Representing Mirror Worlds Technologies LLC, Firm: Russ August & Kabat

15. Testifying Expert, Copyright case. Spring 2020 – *present*
eSTEPs vs America's Leading Finance, LLC et al.
Representing eSTEPs, LLC, Firm: Becker-Vissepó

16. Testifying Expert, Patent, District Court and CBM case. Fall 2019 – Summer 2021
Stripe Inc., Shopify Inc., and Shopify (USA) INC. vs. Boom Payments Inc..
Representing Ethos Group, Firm: Russ, August, Kabat

17. Testifying Expert, Trade Secrets case. Spring 2019 – Fall 2020
Opternative, Inc. vs. JAND, Inc. d/b/a Warby Parker. Southern District of New York. No. 1:17-cv-06936.
Representing Opternative, Inc., Firm: Spence PC

18. Testifying Expert, Trade Secrets case. Fall 2017 – Winter 2019
Broker Genius, Inc vs Drew Gainer and Seat Scouts LLC. Southern District of New York. No. 17-cv-08627.
Representing Broker Genius, Inc., Firm: Pearl, Cohen, Zedek, Latzer, Baratz

19. Testifying Expert, Trade Secrets case. Fall 2017
Broker Genius, Inc vs Matthew Berry. Southern District of New York. No. 1:2017-cv-08511.
Representing Broker Genius, Inc., Firm: Pearl, Cohen, Zedek, Latzer, Baratz

20. Testifying Expert, Trade Secrets case. Winter 2017 – Fall 2017
Broker Genius, Inc vs Nathan Zalta et al. Southern District of New York. No. 17-cv-02099.
Representing Broker Genius, Inc., Firm: Pearl, Cohen, Zedek, Latzer, Baratz

21. Testifying Expert, Class-Action case. Winter 2017 – Fall 2017
Facebook Biometric Information Privacy Litig., Northern District of California. No. 15-cv-3747.
Representing same, Firm: Edelson PC, Robbins Geller Rudman & Dowd LLP, and Labaton Sucharow LLP

22. Source Code Expert, Audit case. Winter 2017
eClinicalWorks, LLC.
Representing eClinicalWorks, LLC, Firm: Quandary Peak

23. Testifying Expert, Arbitration, Breach of Contract case. Fall 2016
MachroTech LLC d/b/a GoECart vs Olive Brands LLC d/b/a MetroKitchen.com. Connecticut District Court. Arbitrartion. 3:17-cv-00376.
Representing MetroKitchen, Firm: Daniels, Porco, Lusardi

24. Expert, Copyright case. Fall 2016
Fox Television Stations, Inc. vs FilmOn X, LLC etc. District of California. Case No. 13-cv-758.
Representing FilmOn X, LLC, Firm: Baker Marquary LLP

25. Expert, Financial Dispute case. Fall 2016 – Summer 2017
D.K. Shah, M.D., P.C. d/b/a Grand Street Medical Associates vs Hal Nathan Buch, M.D. New York Supreme Court. Case No. 07-353.
Representing D.K. Shah, Firm: Daniels, Porco, Lusardi

26. Testifying Expert, Breach of Contract case. Winter 2016
Confluence, Intl. vs Minnesota Department of Transportation. State of Minnesota District Court No. 62-CV-15-857.
Representing Confluence, Intl., Firm: Walsten & Te Slaa, P.A.

Source Code Expert

1. Source Code Expert, Patent case. Winter 2016
FitBit vs Jawbone, ITC No. 337-TA-973.
Representing FitBit, Firm: Gibson, Dunn & Crutcher LLP

2. Source Code Expert, Trade Secrets case. 2014 – 2016
Mediware Information Systems, Inc. vs HemaTerra Technologies, LLC. District Court. Middle District of Florida. No.: 3:13-cv-103-JRK.
Representing Mediware Information Systems, Inc., Firm: Barack Ferrazzano Kirschbaum & Nagelberg LLP

3. Source Code Expert, Patent case. 2013 – 2014
Ericsson Inc vs Samsung Electronics Co, LTD., Northern District of Texas 6:12-cv-894-LED.
Representing Samsung Electronics Co, LTD., Firm: Kirkland & Ellis, LLP

4. Source Code Expert, Patent case. 2013
Ericsson Inc vs Samsung Electronics Co, ITC No. 337-TA-866.
Representing Samsung Electronics Co, LTD., Firm: Kirkland & Ellis, LLP

5. Source Code Expert, Patent case. 2013
AON Benfield Global, Inc. vs Guy Carpenter & Company, LLC, New York State Court. 2:11-cv-03529.
Representing AON Benfield Global, Inc., Firm: Irell & Manella LLP