Curriculum Vitae

Clark Barrett

Corbel Professor (Research) of Computer Science CoDa W344
Stanford University
Stanford, CA 94305
http://www.cs.stanford.edu/~barrett
barrettc@stanford.edu

Research Interests

Automated reasoning; satisfiability modulo theories (SMT); formal methods; formal verification; verification of smart contracts; verification of neural networks; AI safety; security; hardware design productivity and verification.

Education

Ph.D.: Stanford University, 2003, Computer Science. Advisor: David L. Dill.
Thesis Title: *Checking Validity of Quantifier-Free Formulas in Combinations of First-Order Theories.*

M.S.: Stanford University, 1998, Computer Science. Advisor: David L. Dill.

B.S.: Brigham Young University, 1995, Electrical and Computer Engineering (with Honors), Computer Science, and Mathematics. Summa Cum Laude with University Honors. Minors: Physics, Music.

Appointments

Professor (Research), Computer Science, Stanford University, Sept. 2021 to present.
Amazon Scholar, Amazon Web Services, Jan 2023 - May 2026.
Associate Professor (Research), Computer Science, Stanford University, Sept. 2016 to Aug. 2021.
Visiting Scientist, Google, Mountain View, CA, Jan. 2015 to July 2017.
Visiting Associate Professor, Stanford University, Sept. 2013 to Aug. 2016.
Associate Professor, Computer Science, Courant Institute, NYU, Sept. 2008 to Aug. 2016
Assistant Professor, Computer Science, Courant Institute, NYU, Sept. 2002 to 2008.

Research Group

Ph.D. Students: Scott Viteri, Hanna Lachnitt, Rachel Cleaveland, Samuel Akinwande, Abdalrhman Mohamed, Leni Aniva, Áron Ricardo Perez-Lopez, Elizaveta Pertseva, Daneshvar Amrollahi, Harun Khan, Milan Ganai, Yicheng Qian

Graduated Ph.D. Students:

- *Chuyue Sun*, "AI-Assisted Program Verification," Computer Science, Stanford University, 2026.
- *Amalee Wilson*, "Leveraging Subproblems for Improved SMT Solver Performance," Computer Science, Stanford University, 2026.
- *Alex Ozdemir*, "A Full Stack for Programmable Cryptography via Cryptography, Compiliers, and Verification," Computer Science, Stanford University, 2025.
- *Ying Sheng*, "Efficient Algorithms for Automated Reasoning and Large Language Models," Computer Science, Stanford University, 2024.
- *Haoze Wu*, "Bridging the Gap between Automated Logical Reasoning and Machine Learning," Computer Science, Stanford University, 2024.

- *Caleb Donovick*, "Enabling Agile Hardware Development with the PEak Programming Language," Computer Science, Stanford University, 2024.
- *Makai Mann*, "Augmenting Transition Systems for Scalable Symbolic Model Checking," Computer Science, Stanford University, 2021.
- *Andres Nötzli*, "Towards Better Simplifications in SMT Solvers with Applications in String Solving," Computer Science, Stanford University, 2021.
- *Kshitij Bansal*, "Decision Procedures for Finite Sets with Cardinality, and Local Theories Extensions," Computer Science, New York University, 2016.
- *Wei Wang*, "Partition Memory Models for Program Analysis," Computer Science, New York University, 2016.
- *Liana Hadarean*, "An Efficient and Trustworthy Theory Solver for Bit-vectors in Satisfiability Modulo Theories," Computer Science, New York University, 2014.
- *Tim King*, "Effective Algorithms for the Satisfiability of Quantifier-Free Formulas Over Linear Real and Integer Arithmetic," Computer Science, New York University, 2014.
- *Dejan Jovanović*, "SMT Beyond DPLL(T): A New Approach to Theory Solvers and Theory Combination," Computer Science, New York University, 2012.
- *Igor Chikanian*, "Automatic Deduction for Theories of Algebraic Data Types," Computer Science, New York University, 2011.
- *Chris Conway*, "Tools and Techniques for the Sound Verification of Low-Level Code," Computer Science, New York University, 2011.
- *Yeting Ge*, "Solving Quantified First Order Formulas in Satisfiability Modulo Theories," Computer Science, New York University, 2010.
- *Ying Hu*, "Translation Validation of Loop Optimizations," Computer Science, New York University, 2005.

Postdocs and Research Scientists:

- *Pei Huang*, Postdoc, 2022 - present.
- *Min Wu*, Postdoc, 2022 - 2026.
- *Aina Niemetz*, Postdoc, 2017 - 2019; Research Scientist, 2019 - present.
- *Mathias Preiner*, Postdoc, 2017 - 2019; Research Scientist, 2019 - present.
- *Nestan Tsiskaridze*, Research Scientist, 2020 - present.
- *Florian Lonsing*, Research Scientist, 2019 - 2022.
- *Max Lamparth*, Postdoc, 2023 - 2025.
- *Aleksandar Zeljić*, Postdoc, 2018 - 2022.
- *Gereon Kremer*, Postdoc, 2020 - 2022.
- *Yoni Zohar*, Postdoc, 2018 - 2021.
- *Ahmed Irfan*, Postdoc, 2019 - 2021.
- *Cristian Mattarei*, Postdoc, 2016 - 2018.
- *Guy Katz*, Postdoc, 2016 - 2018.
- *Morgan Deters*, Postdoc, 2008-2013; Senior Research Scientist, 2013-2015.
- *Dejan Jovanović*, Postdoc, 2012-2013.

Visiting Scholars:

- *Daniel Reichman*, WPI, 2026-2027.

- *Teruhiro Tagomori*, NRI Secure, 2020-present.
- *Stéphane Demri*, CNRS, 2012-2014.

Awards and Honors

Personal

Distinguished Paper, Computer Aided Verification (CAV), 2026. *Named Corbel Professor* February 2026.
ACM Fellow, January 2025.
CAV Award, 2024.
Distinguished Tutorial Paper, International Symposium on Formal Methods (FM), 2024.
Best SCP Tool Paper, International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), 2022.
CAV Award, 2021.
Test of Time Award, Conference on Logic in Computer Science (LICS), 2021.
Honorable Mention Paper, Conference on Formal Methods in Computer-Aided Design (FMCAD), 2020.
Best Paper, International Joint Conference on Automated Reasoning (IJCAR), 2020.
Distinguished Artifact Award, International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), 2018.
Best Short Paper, Symposium on SDN Research, 2018.
Best Paper, Conference on Formal Methods in Computer-Aided Design (FMCAD), 2016.
Best Paper, International Test Conference (ITC), 2015.
Haifa Verification Conference Award, October 2010.
Member, IFIP Working Group 2.3 (Programming Methodology), elected March, 2010.
IBM Software Quality Innovation Award, November 2008.
National Science Foundation CAREER award, 2007-2012.
Nominated for Miller Research Fellowship (declined), 2002.
Best Paper, Design Automation Conference (DAC), 1998.
National Science Foundation Graduate Fellowship (declined).
National Defense Science and Engineering Graduate Fellowship, 1995-1999.
Karl G. Maeser Graduate Fellowship, 1995.
Co-valedictorian, Brigham Young University, 1995.

Systems

ETAPS Rance Cleaveland Test-of-Time Tool Award, CVC4/cvc5, April 2026.
SMT-COMP 2024: winner in 21 of 38 competition-wide categories (cvc5);
SMT-COMP 2023: winner in 15 of 20 competition-wide categories (cvc5);
SMT-COMP 2022: winner in 15 of 20 competition-wide categories (cvc5);
SMT-COMP 2021: winner in 17 of 20 competition-wide categories (cvc5);
SMT-COMP 2020: winner in 6 of 8 competition-wide categories (CVC4);
HWMCC 2019: winner (Cosa2)
SMT-COMP 2019: winner of 13 first place trophies (of 18 possible) (CVC4);
SyGuS-COMP 2019: winner, general, PBE-BV, PBE-Strings, Inv tracks (CVC4)
SMT-COMP 2018: winner, main track (CVC4);
SyGuS-COMP 2018: winner, general, PBE-BV, PBE-Strings, and CLIA (tied) tracks (CVC4)
SMT-COMP 2017: winner, main track (CVC4);
SyGuS-COMP 2017: winner, linear-integer-arithmetic track and strings track (CVC4)
SMT-COMP 2016: winner, main track (CVC4);
SyGuS-COMP 2016: winner, linear-integer-arithmetic track (CVC4)
CASC 2015: winner, TFN division (CVC4);
SMT-COMP 2015: winner, main track (CVC4);
SyGuS-COMP 2015: winner, general track and linear-integer-arithmetic track (CVC4);
SV-COMP 2015: bronze medal, MemorySafety division (Cascade);
CASC 2014: winner, TFA division (CVC4);

SMT-COMP 2014: winner, ALIA, AUFLIA, AUFLIRA, LIA, LRA, QF_AUFBV, QF_LRA, QF_NRA, UF, UFLIA divisions (CVC4);
SMT-COMP 2012: winner, QF_UFLRA division (CVC4);
SMT-COMP 2007: winner, AUFLIRA division (CVC3);
SMT-COMP 2006: winner, AUFLIRA division (CVC3);

Systems Under Development

cvc5: An open-source SMT solver. Available at `http://cvc5.github.io`.

Pono: An SMT-based model checker. Available at `https://github.com/upscale-project/pono`.

Smt-switch: A solver-agnostic API for SMT solving. Available at `https://github.com/stanford-centaur/smt-switch`.

Marabou: An open-source verifier for neural networks. Available at `https://github.com/NeuralNetworkVerification/Marabou`.

Previously Developed Systems

CVC4: An open-source SMT solver. Available at `http://cvc4.stanford.edu/`.

Cosa2: An open-source SMT-based model checker. Available at `https://github.com/upscale-project/cosa2`.

CoSA: An open-source hardware model-checker. Available at https://github.com/cristian-mattarei/CoSA

SMT Solvers: Stanford Validity Checker (SVC), Cooperating Validity Checker (CVC), CVC Lite, CVC3

Cascade: A program verification platform. Available at `http://cvc4.cs.stanford.edu/cascade/`.

TVOC: A Translation Validator for Optimizing Compilers. Available at `http://cs.nyu.edu/acsys/tv`.

Teaching

New York University

Computer Systems Organization, Fall 2012, Spring 2013.
Class web page available at `http://cs.nyu.edu/web/Academic/Courses/archive.html`.

Logic and Verification, Spring 2003, Spring 2004.
2003 class web page available at `http://www.cs.nyu.edu/~barrett/courses/spr03/index.html`. 2004 class web page available at `http://cs.nyu.edu/courses/spring04/G22.3033-003/index.htm`.

Logic in Computer Science, Fall 2003, Fall 2004, Fall 2007, Fall 2008, Fall 2009.
Class web pages available at `http://cs.nyu.edu/web/Academic/Courses/archive.html`.

Programming Languages, Fall 2008, Spring 2012.
Class web pages available at `http://cs.nyu.edu/web/Academic/Courses/archive.html`.

Software Engineering, Spring 2005, Spring 2006, Spring 2007, Spring 2008.
Class web pages available at `http://cs.nyu.edu/web/Academic/Courses/archive.html`.

Topics in Automated Deduction, Spring 2007, Spring 2009.
Class web pages available at `http://cs.nyu.edu/web/Academic/Courses/archive.html`.

Stanford University

Introduction to Automated Reasoning (CS 257), Fall 2022, Helped design course. Instructors: Caroline Trippel and Haoze Wu.

Advanced Computer Organization: Processor Architecture (EE 482), Teaching assistant, Spring 1997. Instructor: Kunle Olukotun.

Discrete Structures, Accelerated (CS 103X), Teaching assistant, Spring 2000, Winter 2001. Instructors: David Dill and John Mitchell.

Techniques for Program Analysis and Verification (CS 357), Co-instructor, Fall 2013, Fall 2015. Other instructors: Alex Aiken and David Dill.

Professional Activities

Steering Committee

FMCAD: Conference on Formal Methods in Computer-Aided Design, 2019-present.

SMT: International Workshop on Satisfiability Modulo Theories, 2009-2012, 2014-2018, 2024-2026.

Program/Event Chair

AI Safety and Robustness in Finance Workshop, member of organizing committee, 2023.

CADE: Conference on Automated Deduction, Program Co-chair, 2025.

Formal Verification of Machine Learning, Workshop at ICML, co-organizer, 2022.

FMCAD: International Conference on Formal Methods in Computer-Aided Design, co-chair, 2019.

VNN: AAAI Spring Symposium on Verification of Neural Networks, co-chair, 2019.

NASA Formal Methods Symposium, co-chair, 2017.

SAT/SMT Summer School, organizer, 2014; chair, 2015.

SMT-COMP: Satisfiability Modulo Theories Competition, co-chair, 2005, 2006, 2007, 2008, 2009, 2010.

Amir Pnueli Memorial Symposium, chair, 2010.

SMT: International Workshop on Satisfiability Modulo Theories, co-chair, 2008.

Program Committees

CADE: Conference on Automated Deduction, 2017, 2019.

CAV: International Conference on Computer Aided Verification, 2006, 2008, 2009, 2016, 2018, 2021, 2025.

CPP: Conference on Certified Programs and Proofs, 2017.

DIFTS: Workshop on Design and Implementation of Formal Tools and Systems, 2011.

FM: International Symposium on Formal Methods, 2026.

FMCAD: International Conference on Formal Methods In Computer-Aided Design, 2006, 2020, 2023.

FoMLAS: Workshop on Formal Methods for ML-Enabled Autonomous Systems, 2019, 2020, 2021, 2022, 2023.

FroCoS: International Symposium on Frontiers of Combining Systems, 2005, 2011, 2013, 2015.

IJCAR: International Joint Conference on Automated Reasoning, 2018, 2026.

MEMOCODE: International Conference on Formal Methods and Models for Codesign, 2009.

NFM: NASA Formal Methods Symposium, 2016.

PAAR: Workshop on Practical Aspects of Automated Reasoning, 2012, 2014.

PDPAR: Workshop on Pragmatics of Decision Procedures in Automated Reasoning, 2003, 2004, 2005, 2006.

PXTP: Workshop on Proof eXchange for Theorem Proving, 2011.

SAIV: Symposium on AI Verification, 2024, 2025.

SAT: International Conference on Theory and Applications of Satisfiability Testing, 2005.

SBFM: Brazilian Symposium on Formal Methods, 2023.

SIGDA: Ph.D. Forum at the Design Automation Conference, 2004, 2005.

SMT: International Workshop on Satisfiability Modulo Theories, 2007, 2008, 2009, 2010, 2011, 2012, 2020, 2023, 2024.

SYNT: Workshop on Synthesis, 2021.

TACAS: International Conference on Tools and Algorithms for the Construction and Analysis of Systems, 2025, 2026.

TPHOLs: International Conference on Theorem Proving and Higher Order Logics, 2004, 2005.

VMCAI: International Conference on Verification, Model Checking and Abstract Interpretation, 2008.

VSTTE: Workshop on Verified Software: Theories, Tools and Experiments, 2012.

WING: Workshop on Invariant Generation, 2012.

Referee

Conference/Workshop papers: CADE, CAV, DAC, EMSOFT, FMCAD, FroCoS, FSTTCS, IJCAR, LPAR, MEMOCODE, PAAR, PDPAR, POPL, SMT, TACAS, STACS, TPHOLs, VMCAI.

Journal papers: *ACM Computing Surveys*, *ACM Transactions on Computational Logic*, *AI Communications*, *Artificial Intelligence Journal*, *Communications of the ACM*, *Formal Aspects of Computing*, *Information and Computation*, *IEEE Transactions on Computer-Aided Design*, *Journal of Formal Methods in System Design*, *Journal of Automated Reasoning*, *Journal of the ACM*, *Journal on Satisfiability, Boolean Modeling and Computation*, *Journal of Symbolic Computation*, *Journal of Zhejiang University-Science*

A, *Logical Methods in Computer Science*, *Science of Computer Programming*, *Theoretical Computer Science*.

Departmental Service (Stanford)

Awards committee, 2018-2021, 2025-2026.
CoDa space committee, 2025-2026.
Gates space committee, 2017-2025.
Industrial affiliates liason, 2025-2026.
Lecturer search committee, 2018-2019.
Masters program student advisor, 2016-2024.
PhD admissions, 2016-2018.
Strategic research initiatives committee (head), 2018-2024.

Departmental Service (NYU)

Appointments Committee, 2008-2009.
Coordinator for departmental spring showcase, 2007, 2008.
Department chair search committee, 2005-2006, 2008.
Director of Undergraduate Studies, 2009-2010.
Fellowship committee (PhD student admission and oversight committee), 2004-2008.
Graduate curriculum committee, 2006-2009.
Teaching load committee, 2006-2007.
Teaching assignments committee, 2009-2014.
Undergraduate curriculum committee, 2004-2010.
Undergraduate mentor, 2003-2008.

Other Activities

Participant at NSF workshops and panels.

On the CSLib steering committee. CSLib (`http://cslib.io`) is an international initiative to formalize computer science knowledge in the Lean 4 theorem prover.

One of three coordinators of the SMT-LIB initiative (see `http://www.smtlib.org`). Responsible for collecting and maintaining the library of benchmarks; chair of the SMT-LIB working group on model generation; contributor to many other aspects of the initiative.

Industry Experience

Chief Science Officer at Stealth Startup, 2026 - present.

Amazon, 2023 - 2026. Amazon Scholar (Robert Jones, host). Consulting on uses and applications of automated reasoning tools.

Facebook Novi, 2018 - 2022. Consultant for Move Prover team (smart contract verification tool).

Google, 2015 - 2017, Visiting Scientist (Domagoj Babic, host). Using SMT to find security vulnerabilities.

Intel, 1996, Summer Intern under Carl Seger. Prototyping and development of an early version of *Forte*, a formal verification tool suite.

Microsoft Research, 1993, Summer Intern under Charles Simonyi. Programmer on "Intentional Programming" project.

Consulting: Reservoir Labs Inc., Calypto Design Systems, MIT Lincoln Laboratory, Mentor Graphics (formerly 0-in Design Automation).

Publications

Conference Publications

(1) Aron Ricardo Perez-Lopez, Po-Chun Chien, Florian Lonsing, Samantha Archer, Ahmed Irfan, and Clark W. Barrett. Pono 2.0: A versatile smt-based model checker for safety and liveness (long tool paper). In Augusto Sampaio and Marielle Stoelinga, editors, *Formal Methods - 27th International Symposium, FM 2026, Tokyo, Japan, May 18-22, 2026, Proceedings, Part II*, Lecture Notes in Computer Science, pages 3–26. Springer, May 2026.

(2) Rachel Cleaveland and Clark W. Barrett. Integrating string reasoning in symbolic execution of C programs. In Sebastian Junges and Guy Katz, editors, *Tools and Algorithms for the Construction and Analysis of Systems - 32nd International Conference, TACAS 2026, Held as Part of the International Joint Conferences on Theory and Practice of Software, ETAPS 2026, Turin, Italy, April 11-16, 2026, Proceedings, Part II*, Lecture Notes in Computer Science, pages 151–172. Springer, April 2026.

(3) Hans-Jörg Schurr, François Bobot, Mathias Preiner, Aina Niemetz, Clark W. Barrett, Pascal Fontaine, and Cesare Tinelli. Exploring the SMT-LIB benchmark library. In Sebastian Junges and Guy Katz, editors, *Tools and Algorithms for the Construction and Analysis of Systems - 32nd International Conference, TACAS 2026, Held as Part of the International Joint Conferences on Theory and Practice of Software, ETAPS 2026, Turin, Italy, April 11-16, 2026, Proceedings, Part I*, Lecture Notes in Computer Science, pages 150–169. Springer, April 2026.

(4) Chuyue Sun, Yican Sun, Daneshvar Amrollahi, Ethan Zhang, Shuvendu K. Lahiri, Shan Lu, David L. Dill, and Clark W. Barrett. Veristruct: Ai-assisted automated verification of data-structure modules in verus. In Sebastian Junges and Guy Katz, editors, *Tools and Algorithms for the Construction and Analysis of Systems - 32nd International Conference, TACAS 2026, Held as Part of the International Joint Conferences on Theory and Practice of Software, ETAPS 2026, Turin, Italy, April 11-16, 2026, Proceedings, Part II*, Lecture Notes in Computer Science, pages 109–128. Springer, April 2026.

(5) Pei Huang, Dennis Wei, Omri Isac, Haoze Wu, Min Wu, and Clark W. Barrett. Parameterized abstract interpretation for transformer verification. In Sven Koenig, Chad Jenkins, and Matthew E. Taylor, editors, *Fortieth AAAI Conference on Artificial Intelligence, Thirty-Eighth Conference on Innovative Applications of Artificial Intelligence, Sixteenth Symposium on Educational Advances in Artificial Intelligence, AAAI 2026, Singapore, January 20-27, 2026*, pages 35500–35508. AAAI Press, January 2026.

(6) Haoze Wu, Clark W. Barrett, and Nina Narodytska. Cubing for tuning. In Sven Koenig, Chad Jenkins, and Matthew E. Taylor, editors, *Fortieth AAAI Conference on Artificial Intelligence, Thirty-Eighth Conference on Innovative Applications of Artificial Intelligence, Sixteenth Symposium on Educational Advances in Artificial Intelligence, AAAI 2026, Singapore, January 20-27, 2026*, pages 14361–14370. AAAI Press, January 2026.

(7) Min Wu, Xiaofu Li, Haoze Wu, and Clark W. Barrett. Efficiently computing compact formal explanations. In Sven Koenig, Chad Jenkins, and Matthew E. Taylor, editors, *Fortieth AAAI Conference on Artificial Intelligence, Thirty-Eighth Conference on Innovative Applications of Artificial Intelligence, Sixteenth Symposium on Educational Advances in Artificial Intelligence, AAAI 2026, Singapore, January 20-27, 2026*, pages 35857–35866. AAAI Press, January 2026.

(8) Tomaz Mascarenhas, Harun Khan, Abdalrhman Mohamed, Andrew Reynolds, Haniel Barbosa, Clark W. Barrett, and Cesare Tinelli. Formalization of a proof calculus for incremental linearization for satisfiability modulo nonlinear arithmetic and transcendental functions. In Kathrin Stark, Yannick Zakowski, Nikhil Swamy, and Nicolas Tabareau, editors, *Proceedings of the 15th ACM SIGPLAN International Conference on Certified Programs and Proofs, CPP 2026, Rennes, France, January 12-13, 2026*, pages 216–230. ACM, January 2026.

(9) Omri Isac, Idan Refaeli, Haoze Wu, Clark W. Barrett, and Guy Katz. Proof minimization in neural network verification. In Yu-Fang Chen, Thomas P. Jensen, and Ondrej Lengál, editors,

Verification, Model Checking, and Abstract Interpretation - 27th International Conference, VMCAI 2026, Rennes, France, January 12-13, 2026, Proceedings, Lecture Notes in Computer Science, pages 99–124. Springer, January 2026.

(10) Jackson Melchert, Caleb Terrill, Áron Ricardo Perez-Lopez, Clark Barrett, and Priyanka Raina. Automated translation validation of a compiler for statically scheduled accelerators. In Ahmed Irfan and Daniela Kaufmann, editors, *Proceedings of the* 25th *International Conference on Formal Methods In Computer-Aided Design (FMCAD '25)*, pages 198–208. TU Wien Academic Press, October 2025. Menlo Park, CA, USA.

(11) Mudathir Mohamed, Nick Feng, Andrew Reynolds, Cesare Tinelli, Clark Barrett, and Marsha Chechik. Solving set constraints with comprehensions and bounded quantifiers. In Ahmed Irfan and Daniela Kaufmann, editors, *Proceedings of the* 25th *International Conference on Formal Methods In Computer-Aided Design (FMCAD '25)*, pages 104–114. TU Wien Academic Press, October 2025. Menlo Park, CA, USA.

(12) Amalee Wilson, Nina Narodytska, Clark Barrett, and Haoze Wu. Per-instance subproblem generation for strategy selection in smt. In Ahmed Irfan and Daniela Kaufmann, editors, *Proceedings of the* 25th *International Conference on Formal Methods In Computer-Aided Design (FMCAD '25)*, pages 94–103. TU Wien Academic Press, October 2025. Menlo Park, CA, USA.

(13) Daneshvar Amrollahi, Mathias Preiner, Aina Niemetz, Andrew Reynolds, Moses Charikar, Cesare Tinelli, and Clark Barrett. Towards smt solver stability via input normalization. In Ahmed Irfan and Daniela Kaufmann, editors, *Proceedings of the* 25th *International Conference on Formal Methods In Computer-Aided Design (FMCAD '25)*, pages 84–93. TU Wien Academic Press, October 2025. Menlo Park, CA, USA.

(14) Hanna Lachnitt, Mathias Fleury, Haniel Barbosa, Andrew Reynolds, Jibiana Jakpor, Bruno Andreotti, Clark Barrett, Hans-Joerg Schurr, and Cesare Tinelli. Improving the SMT proof reconstruction pipeline in Isabelle/HOL. In Yannick Forster and Chantal Keller, editors, *Proceedings of the* 16th *International Conference on Interactive Theorem Proving (ITP '25)*, volume 352 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 26:1–26:22. Schloss Dagstuhl – Leibniz-Zentrum für Informatik, September 2025. Reykjavik, Iceland.

(15) Zvika Berger, Yoni Zohar, Aina Niemetz, Mathias Preiner, Andrew Reynolds, Clark Barrett, and Cesare Tinelli. Bit-precise reasoning with parametric bit-vectors. In Jeremias Berg and Jakob Nordström, editors, *Proceedings of the* 28th *International Conference on Theory and Applications of Satisfiability Testing (SAT '25)*, volume 341 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 4:1–4:24. Schloss Dagstuhl – Leibniz-Zentrum für Informatik, August 2025. Glasgow, Scotland.

(16) Chuyue Sun, Viraj Agashe, Saikat Chakraborty, Jubi Taneja, Clark Barrett, David Dill, Xiaokang Qiu, and Shuvendu K. Lahiri. Classinvgen: Class invariant synthesis using large language models. In *Proceedings of the* 2nd *International Symposium on AI Verification (SAIV '25)*, pages 64–96. Springer, July 2025. Zagreb, Croatia.

(17) Abdalrhman Mohamed, Tomaz Mascarenhas, Harun Khan, Haniel Barbosa, Andrew Reynolds, Yicheng Qian, Cesare Tinelli, and Clark Barrett. Lean-SMT: An SMT tactic for discharging proof goals in lean. In Ruzica Piskac and Zvonimir Rakamarić, editors, *Proceedings of the* 37th *International Conference on Computer Aided Verification (CAV '25)*, volume 15931 of *Lecture Notes in Computer Science*, pages 197–212. Springer, July 2025. Zagreb, Croatia.

(18) Yicheng Qian, Joshua Clune, Clark Barrett, and Jeremy Avigad. Lean-auto: An interface between lean 4 and automated theorem provers. In Ruzica Piskac and Zvonimir Rakamarić, editors, *Proceedings of the* 37th *International Conference on Computer Aided Verification (CAV '25)*, volume 15931 of *Lecture Notes in Computer Science*, pages 175–196. Springer, July 2025. Zagreb, Croatia.

(19) Denis Mazzucato, Abdalrhman Mohamed, Juneyoung Lee, Clark Barrett, Jim Grundy, John Harrison, and Corina S. Păsăreanu. Relational hoare logic for realistically modelled machine code. In Ruzica Piskac and Zvonimir Rakamarić, editors, *Proceedings of the* 37th *International Conference on Computer Aided Verification (CAV '25)*, volume 15931 of *Lecture Notes in Computer Science*, pages 389–413. Springer, July 2025. Zagreb, Croatia.

(20) Elizaveta Pertseva, Alex Ozdemir, Shankara Pailoor, Alp Bassa, Sorawee Porncharoenwase, Işil Dillig, and Clark Barrett. Integer reasoning modulo different constants in smt. In Ruzica Piskac and Zvonimir Rakamarić, editors, *Proceedings of the* 37th *International Conference on Computer Aided Verification (CAV '25)*, volume 15931 of *Lecture Notes in Computer Science*, pages 339–362. Springer, July 2025. Zagreb, Croatia.

(21) Leni Aniva, Chuyue Sun, Brando Miranda, Clark Barrett, and Sanmi Koyejo. Pantograph: A machine-to-machine interaction interface for advanced theorem proving, high level reasoning, and data extraction in lean 4. In Arie Gurfinkel and Marijn Heule, editors, *Proceedings of the* 31st *International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS '25)*, volume 15696 of *Lecture Notes in Computer Science*, pages 104–123. Springer, May 2025. Hamilton, Ontario, Canada.

(22) Sunil Sudhakaran, Clark Barrett, and Mark Horowitz. Application of formal methods (SAT/SMT) to the design of constrained codes. In *Proceedings of Design, Automation & Test in Europe Conference (DATE '25)*. IEEE, April 2025. Lyon, France.

(23) Sophie Andrews, Matthew Sotoudeh, and Clark Barrett. Efficient sat-based bounded model checking of evolving systems. In *Proceedings of Design, Automation & Test in Europe Conference (DATE '25)*. IEEE, April 2025. Lyon, France.

(24) Lianmin Zheng, Liangsheng Yin, Zhiqiang Xie, Chuyue Sun, Jeff Huang, Cody Hao Yu, Shiyi Cao, Christos Kozyrakis, Ion Stoica, Joseph Gonzalez, Clark Barrett, and Ying Sheng. Sglang: Efficient execution of structured language model programs. In Amir Globersons, Lester Mackey, Danielle Belgrave, Angela Fan, Ulrich Paquet, Jakub M. Tomczak, and Cheng Zhang, editors, *Advances in Neural Information Processing Systems 37 (NeurIPS 2024)*, volume 37, pages 62557–62583. Neural Information Processing Systems Foundation, Inc. (NeurIPS), December 2024. Vancouver, Canada.

(25) Ross Daly, Caleb Donovick, Caleb Terrill, Jackson Melchert, Priyanka Raina, Clark Barrett, and Pat Hanrahan. Efficiently synthesizing lowest cost rewrite rules for instruction selection. In Nina Narodytska and Philipp Rümmer, editors, *Proceedings of the* 24th *International Conference on Formal Methods In Computer-Aided Design (FMCAD '24)*, pages 8–17. TU Wien Academic Press, October 2024. Prague, Czech Republic.

(26) Clark Barrett, Pei-Wei Chen, Byron Cook, Bruno Dutertre, Robert Jones, Nham Le, Andrew Reynolds, Kunal Sheth, Mike Whalen, and Chriss Stephens. Smt-d: New strategies for portfolio-based smt solving. In Nina Narodytska and Philipp Rümmer, editors, *Proceedings of the* 24th *International Conference on Formal Methods In Computer-Aided Design (FMCAD '24)*, pages 39–48. TU Wien Academic Press, October 2024. Prague, Czech Republic.

(27) Udayan Mandal, Guy Amir, Haoze Wu, Ieva Daukantas, Fletcher Lee Newell, Umberto J. Ravaioli, Baoluo Meng, Michael Durling, Milan Ganai, Tobey Shim, Guy Katz, and Clark Barrett. Formally verifying deep reinforcement learning controllers with lyapunov barrier certificates. In Nina Narodytska and Philipp Rümmer, editors, *Proceedings of the* 24th *International Conference on Formal Methods In Computer-Aided Design (FMCAD '24)*, pages 95–106. TU Wien Academic Press, October 2024. Prague, Czech Republic.

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Refereed Workshop Publications

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(213) Sean McLaughlin, Clark Barrett, and Yeting Ge. Cooperating theorem provers: A case study combining HOL-Light and CVC Lite. In Alessandro Armando and Alessandro Cimatti, editors, *Proceedings of the* 3rd *Workshop on Pragmatics of Decision Procedures in Automated Reasoning (PDPAR '05)*, volume 144(2) of *Electronic Notes in Theoretical Computer Science*, pages 43–51. Elsevier, January 2006. Edinburgh, Scotland.

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Technical Reports

(222) Clark W. Barrett, Swarat Chaudhuri, Fabrizio Montesi, Jim Grundy, Pushmeet Kohli, Leonardo de Moura, Alexandre Rademaker, and Sorrachai Yingchareonthawornchai. Cslib: The lean computer science library. *CoRR*, abs/2602.04846, 2026.

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(225) Christopher A. Strong, Haoze Wu, Aleksandar Zeljić, Kyle D. Julian, Guy Katz, Clark Barrett, and Mykel J. Kochenderfer. Global optimization of objective functions represented by ReLU networks. Technical report, 2020.

(226) Sam Blackshear, David L. Dill, Shaz Qadeer, Clark W. Barrett, John C. Mitchell, Oded Padon, and Yoni Zohar. Resources: A safe language abstraction for money. Technical report, 2020.

(227) Lindsey Kuper, Guy Katz, Justin Gottschlich, Kyle Julian, Clark Barrett, and Mykel Kochenderfer. Toward scalable verification for safety-critical deep networks. Technical report, 2018.

(228) Nicholas Carlini, Guy Katz, Clark Barrett, and David L. Dill. Provably minimally-distorted adversarial examples. Technical report, 2018.

(229) Clark Barrett, Daniel Kroening, and Thomas Melham. Problem solving for the 21st century: Efficient solvers for satisfiability modulo theories. Technical Report 3, London Mathematical Society and Smith Institute for Industrial Mathematics and System Engineering, June 2014. Knowledge Transfer Report.

(230) Dejan Jovanović and Clark Barrett. Sharing is caring: Combination of theories. Technical Report TR2011-940, Depatrment of Computer Science, New York University, October 2011.

(231) Clark Barrett, Morgan Deters, Albert Oliveras, and Aaron Stump. Design and results of the 4th annual satisfiability modulo theories competition (SMT-COMP 2008). Technical Report TR2010-931, Depatrment of Computer Science, New York University, July 2010.

(232) Dejan Jovanović and Clark Barrett. Polite theories revisited. Technical Report TR2010-922, Depatrment of Computer Science, New York University, January 2010.

(233) Christopher L. Conway, Dennis Dams, Kedar S. Namjoshi, and Clark Barrett. Points-to analysis, conditional soundness, and proving the absence of errors. Technical Report TR2008-910, Depatrment of Computer Science, New York University, March 2008.

(234) Clark Barrett, Robert Nieuwenhuis, Albert Oliveras, and Cesare Tinelli. Splitting on demand in SAT Modulo Theories. Technical Report 06-05, Department of Computer Science, University of Iowa, August 2006.

(235) Clark Barrett, Igor Shikanian, and Cesare Tinelli. An abstract decision procedure for satisfiability in the theory of recursive data types. Technical Report TR2005-878, Department of Computer Science, New York University, November 2005.

Ph.D. Thesis

(236) Clark W. Barrett. *Checking Validity of Quantifier-Free Formulas in Combinations of First-Order Theories*. PhD thesis, Stanford University, January 2003. Stanford, California.

Book Reviews

(237) Clark Barrett. "Decision Procedures:An Algorithmic Point of View," by Daniel Kroening and Ofer Strichman, Springer-Verlag, 2008. *Journal of Automated Reasoning*, 51(4):453–456, December 2013.

Patents

(238) Subhasish Mitra, Clark Barrett, David Lin, and Eshan Singh. Post-silicon validation and debug using symbolic quick error detection, January 2020. Patent No. 10528448.

Selected Talks

"CSLib: Building a Platform for AI-assisted Formal Verification in Lean," City, University of London Seminar (virtual), February 20, 2026.

"CSLib and a Platform for Formally Verifying Everything," Stanford Center for Automated Reasoning Annual Meeting, September 23, 2025.

"Verifiable Code Generation," Stanford Center for AI Safety Annual Meeting, September 22, 2025.

"Certified Machine Learning," Stanford Center for Automated Reasoning Annual Meeting, August 27, 2024.

"When AR Met AI," Stanford Center for Automated Reasoning Annual Meeting, August 17, 2023; NVidia, March 13, 2024.

"VeriX: Towards Verified Explainability of Deep Neural Networks," Stanford Center for AI Safety Annual Meeting, August 16, 2023.

"On the Surprising Usefulness of Proofs," Stanford Center for Automated Reasoning Annual Meeting, July 13, 2022.

"Toward Certified Robustness Against Real-World Distribution Shifts," Stanford Center for AI Safety Annual Meeting, July 12, 2022.

"Domain-Specific Reasoning with Satisfiability Modulo Theories," Invited Keynote, 24th International Symposium on Formal Methods (FM '21), November 22, 2021.

"Efficient Neural Network Analysis with Sum-of-Infeasibilities," Stanford Center for AI Safety Annual Meeting, September 14, 2021.

"Towards Rigorous Verification for Safe Artificial Intelligence," Invited Keynote, International Workshop on Machine Learning Systems Engineering, December 1, 2020.

"Parallelization Techniques for Verifying Neural Networks," Stanford Center for AI Safety Annual Meeting, August 10, 2020.

"Domain-Specific Reasoning with Satisfiability Modulo Theories," Invited Keynote, 10th International Joint Conference on Automated Reasoning (IJCAR '20), July 4, 2020.

"Towards Verification of Deep Neural Networks," IFIP Working Group 2.3, Los Altos, CA, October 31, 2019.

"Challenges and Opportunities in Formal Methods," Formal Methods at Scale (invitation-only NSA/DoD meeting), SRI, Menlo Park, CA, October 9, 2019.

"Upscale: Scaling up Verification for Open Source Hardware," Defense Advanced Research Projects Agency Electronics Resurgence Initiative Summit, Detroit, MI, July 16, 2019.

"Verification of Deep Neural Networks with SMT," Online Briefing for the Aerospace Vehicle Systems Institute Working Group on Machine Learning, November 13, 2018.

"Formal Methods for AI Safety," GE Edge & Controls Symposium, GE Global Research Center, Niskayuna, NY, September 27, 2018.

"Verification of Deep Neural Networks with SMT," Apple Computer Town Hall, Cupertino, CA, August 20, 2018.

"Breaking Barriers in Formal Hardware Verification," Defense Advanced Research Projects Agency Electronics Resurgence Initiative Summit, San Francisco, CA, July 24, 2018.

"Verification of Deep Neural Networks with SMT," Tutorial at the Design Automation Conference (DAC), San Francisco, CA, June 27, 2018.

"Towards Formally Verified Deep Neural Networks," High Confidence Software and Systems Conference, Annapolis, MD, May 7, 2018.

"Formal Methods for Safe Autonomy," Workshop on The Road to Safe Autonomy, Stanford, CA, April 18, 2018.

"Towards Verification of Deep Neural Networks," NeurIPS Workshop on Machine Learning and Computer Security, Los Angeles, CA, December 8, 2017.

"Dramatic Improvements in Pre-silicon and Post-silicon Validation of Digital Systems with Quick Error Detection and Formal Methods," USC Computer Engineering Seminar, Los Angeles, CA, September 21, 2017.

"20 Years of Decision Procedures," Dill@60 Workshop, Heidelberg, Germany, July 24, 2017.

"Formal Verification of Deep Neural Networks," SystemX Workshop, Stanford, CA, April 12, 2017.

"Automatic Discovery and Localization of Tough Bugs in Large SoCs using Formal-Enhanced Quick Error Detection," DREAM Seminar, Berkeley, CA, March 6, 2017.

"Reluplex: An Efficient SMT Solver for Verifying Deep Neural Networks," Google Brain Seminar, Mountain View, CA, February 24, 2017.

"Electrical Bug Localization with Quick Error Detection Enhanced by Formal Methods," SystemX Conference, Stanford, CA, November 15, 2016.

"Satisfiability Modulo Theories," Sixth Summer School on Formal Techniques, Menlo College, Menlo Park, CA, May 23, 2016.

"Satisfiability Modulo Theories," SRI, Menlo Park, CA, November 10, 2015; Stanford University, Stanford, CA, November 11, 2015.

"The Satisfiability Revolution and the Rise of SMT," Google, New York, NY, December 9, 2014; Samsung Research America, San Jose, CA, October 7, 2014; NASA Ames, Moffett Field, CA, August 14, 2015; UC Davis, Davis, CA, May 29, 2014.

"Satisfiability Modulo Theories," Ed Clarke Symposium, Carnegie Mellon University, Pittsburg, PA, September 19, 2014.

"Proofs in Satisfiability Modulo Theories," with Pascal Fontaine and Leonardo de Moura, All about Proofs, Proofs for All, Vienna, Austria, July 18, 2014.

"SMT: Where do we go from here?" 12th International Workshop on Satisfiability Modulo Theories, Vienna, Austria, July 17, 2014.

"Lazy and Eager Approaches to Solving Bit-vectors," SRC GRC CADTS Verification Review, Austin, TX, April 15, 2014.

"The Satisfiability Revolution and the Rise of SMT," ExCape Webinar, March 3, 2014, online at `https://excape.cis.upenn.edu/news-events.html`.

"Lazy Bit-Vector Solving using Subtheories," SRC GRC CADTS Verification Review, Berkeley, CA, April 10, 2013.

"Bit-Precise Reasoning in Systems Analysis and Verification," Yale University, New Haven, CT, February 14, 2013.

"The Satisfiability Revolution and the Rise of the Ingenious Machine," Stanford University, Stanford, CA, January 10, 2013.

"Scalable and Accurate SMT-based Model Checking of Data Flow Systems," AFOSR Annual Review, Washington, DC, November 27, 2012.

"Beyond DPLL(T): A New Model-Based Approach to Search in SMT and its Application to Solving Nonlinear Arithmetic," Carnegie Mellon University, Pittsburgh, PA, October 5, 2012.

"From SAT to SMT: Successes and Challenges," Harvard University, Cambridge, MA, August 19, 2012.

"New Insights on the Nelson-Oppen Method," Northeastern University, Boston, MA, August 13, 2012.

"Beyond DPLL(T): A New Boolean Search Framework for Model-Based Theory Reasoning," IFIP Working Group 2.3, Seattle, WA, July 18, 2012.

"Efficient SMT Solving for Bit-vectors and Arrays," SRC GRC CADTS Verification Review, Boulder, CO, April 11, 2012.

"Scalable and Accurate SMT-based Model Checking of Data Flow Systems," AFOSR Annual Review, Arlington, VA, October 26, 2011.

"From SVC to CVC4: 15 Years of Decision Procedures," SMT Summer School, MIT, Cambridge, MA, June 13, 2011.

"An Abstract Decision Procedure for a Theory of Bit-Vectors," SRC GRC CADTS Verification Review, Santa Barbara, CA, April 6, 2011.

"Tools and Techniques for the Sound Verification of Low-Level Code," MIT, Cambridge, MA, March 31, 2011.

"Sharing is Caring: An Efficient New Theory Combination Method," SRC GRC CADTS Verification Review, Austin, Texas, April 13, 2010.

"New Insights on the Nelson-Oppen Method," IFIP Working Group 2.3, Lachen, Switzerland, March 2, 2010.

"An Introduction to Satisfiability Modulo Theories," Tutorial (with Sanjit Seshia) at the International Conference on Computer-Aided Design (ICCAD), San Jose, CA, November 2, 2009.

"From SAT to SMT: Successes and Challenges," Keynote address at the Eighth International Workshop On The ACL2 Theorem Prover and Its Applications, Northeastern University, Boston, MA, May 12, 2009.

"Improving Bit-Vector Reasoning in Satisfiability Modulo Theories," SRC GRC CADTS Verification Review, Raleigh, NC, April 15, 2009.

"Satisfiability Modulo Theories: Successes and Challenges," NSF Workshop on Symbolic Computation for Constraint Satisfaction, Arlington, VA, November 14, 2008.

"Satisfiability Modulo Theories," MIT, Cambridge, MA, September 25, 2008.

"SAT Solvers: Theory and Practice," and "SMT Solvers: Theory and Practice," invited lectures at the Summer School on Verification Technology, Systems & Applications, Max-Planck-Institut für Informatik, Saarbrücken, Germany, September 15-19, 2008.

"SAT and SMT Solvers: Theory and Practice," MIT Lincoln Laboratory, Lincoln, MA, September 5, 2008.

"Bit-Precise Reasoning Using Satisfiability Modulo Theories," IFIP Working Group 2.3, Cambridge, UK, July 23, 2008.

"Satisfiability Modulo Theories," IBM T. J. Watson Research Center, Hawthorne, New York, May 19, 2008.

"Satisfiability Modulo Theories," UT Austin, April 18, 2008.

"Satisfiability Modulo Theories," IFIP Working Group 2.3, Santa Fe, NM, October 11, 2007.

"Satisfiability Modulo Theories in Practice," CMU, Pittsburgh, PA, April 16, 2007.

"An Abstract Decision Procedure for Satisfiability in the Theory of Recursive Data Types," Microsoft Research, Redmond, Washington, November 6, 2006.

"Satisfiability Modulo Theories," Reservoir Labs, New York, New York, October 20, 2006.

"Formal Software Verification," Cooper Union, New York, New York, October 19, 2006.

"CASCADE: C Assertion Checker and Deductive Engine," IBM T. J. Watson Research Center, Hawthorne, New York, August 31, 2006.

"Compiler Validation with Automated Decision Procedures," University of Iowa, Iowa City, Iowa, November 11, 2005.

"DPLL(T) with Generalized Theory Propagation," Workshop on Deduction and Applications, Schloß DagStuhl, October 28, 2005.

"Satisfiability Modulo Theories," Princeton University, Princeton, New Jersey, October 5, 2005.

"Theory and Practice of Decision Procedures for Combinations of Theories," invited tutorial presented with Cesare Tinelli at the 17th International Conference on Computer Aided Verification (CAV '05), Edinburgh, Scotland, July 6, 2005.

"Compiler Validation using Automated Decision Procedures," Microsoft Research, Redmond, Washington, December 16, 2004.

"Compiler Validation with Automated Decision Procedures," Reservoir Labs Technical Presentation, Reservoir Labs, New York, New York, November 29, 2004; Bioinformatics Lab Talk, New York University, New York, New York, November 24, 2004; Computer Science Invited Lecture Series, Pace University, New York, New York, October 26, 2004.

"CVC Lite: Selected Stories from the Trenches," Combination of Decision Procedures Summer School, SRI International, Menlo Park, California, August 11, 2004.

"Using Proofs for Fast and Reliable Boolean Reasoning in CVC Lite," Intel Formal Verification Symposium, Hillsboro, Oregon, June 11, 2004.

"The Common Roots of Mathematics and Computing," Faculty Resource Network, New York University, New York, New York, June 8, 2004.

"Formal Software Verification," Pace University, New York, New York, March 22, 2004.

"Applying Automated Decision Procedures: Using CVC Lite in Compiler Validation," Computer Science Colloquium, Washington University, St. Louis, Missouri, September 12, 2003.

"Efficiently Combining Boolean and First-Order Reasoning," Max Planck Institut für Informatik, Saarbrücken, Germany, June 10, 2003.

"The Nelson-Oppen Method for Combining Decision Procedures," Max Planck Institut für Informatik, Saarbrücken, Germany, June 5, 2003.

"Checking Validity of Quantifier-Free Formulas in Combinations of First-Order Theories," Rice University, April 2002; University of Pisa, April 2002; California Institute of Technology, March 2002; Northrop Grumman, March 2002; NEC Laboratories, March 2002; New York University, March 2002; University of Utah, March 2002; Columbia University, March 2002; Brigham Young University, February 2002.

"A Framework for Cooperating Decision Procedures," Intel Strategic CAD Laboratories, Hillsboro, Oregon, May 2000.

"A Unified Framework for Cooperating Decision Procedures," Brigham Young University Computer Science Colloquium, Provo, Utah, March 2000.

"Bit-Vector Decision Procedures in the Stanford Validity Checker," SRI International, Menlo Park, California, May 1998.