

Joseph Reeves

jereeves@andrew.cmu.edu — jereeves6@gmail.com — (559) 907-6745
<https://www.cs.cmu.edu/~jereeves/>
109 North Montford Avenue, Baltimore MD, 21224

Education

- 2020–2025** **Ph.D.**, Computer Science, Carnegie Mellon University
Advisors: Marijn J. H. Heule and Randal E. Bryant
Thesis: Cardinality Constraints in Boolean Satisfiability Solving
Focus: Automated Reasoning, SAT Solving, Proofs and Verification
- 2018–2020** **M.S.**, Computer Science, California State University Fresno
Advisor: Todd Wilson
Thesis: Classifying Proof Strategies in Abella
Focus: Programming Languages and Interactive Theorem Proving
GPA: 4.0
- 2014–2018** **B.S.**, Computer Science (Minor: Mathematics), California State University Fresno
Advisor: Ming Li
Focus: Body Sensor Networks
GPA: 4.0
- 2010–2014** Clovis High School, Clovis, CA
GPA: 3.98 (unweighted)

Awards and Fellowships

- 2022–2025** National Defense Science and Engineering Graduate (NDSEG) Fellowship.
- 2019** Tarek Alameldin Computer Science Scholarship.
- 2018** Dean’s Medal Nominee, Department of Computer Science.
- 2014–2018** President’s Honors Scholar, Smittcamp Family Honors College.
- 2017** Lan Jin Computer Science Scholarship.
- 2015** F. Harold Downing Scholarship, Department of Computer Science.

Publications

Journal Articles

1. Joseph E. Reeves, Marijn Heule, and Randal Bryant. “Preprocessing of Propagation Redundant Clauses.” *Journal of Automated Reasoning (JAR)*. 67(3), p. 31, 2022. (Extension of Conference paper 7).

2. Ming Li, Joseph Reeves, Carlos Moreno. “Multi-level Sample Importance Ranking Based Progressive Transmission Strategy for Time Series Body Sensor Data,” *Computer Networks*, 136. pp. 119-127, 2018.

Conference papers

1. Amar Shah, Twain Byrnes, Joseph E. Reeves, and Marijn J. H. Heule. “Learning Short Clauses via Conditional Autarkies.” *Formal Methods in Computer-Aided Design (FMCAD)*, 2025.
2. Zachary Battleman, Joseph E. Reeves, and Marijn J. H. Heule. “Problem Partitioning via Proof Prefixes.” *Theory and Applications of Satisfiability Testing (SAT)*, 2025.
3. Aeacus Sheng, Joseph E. Reeves, and Marijn J. H. Heule. “Reencoding Unique Literal Clauses.” *Theory and Applications of Satisfiability Testing (SAT)*, 2025.
4. Joseph E. Reeves, João Filipe, Min-Chien Hsu, Ruben Martins, and Marijn J. H. Heule. “The Impact of Literal Sorting on Cardinality Constraint Encodings.” *Conference on Artificial Intelligence (AAAI)*, 2025.
5. Joseph E. Reeves, Marijn J. H. Heule, and Randal E. Bryant. “From Clauses to Klausers.” *Computer Aided Verification (CAV)*, 2024.
6. Joseph E. Reeves, Benjamin Kiesl-Reiter, and Marijn J. H. Heule. “Propositional Proof Skeletons.” *Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, 2023.
7. Joseph E. Reeves, Marijn J. H. Heule, and Randal E. Bryant. “Preprocessing of Propagation Redundant Clauses.” *International Joint Conference of Automated Reasoning (IJCAR)*, 2022. (Best student paper nomination).
8. Joseph E. Reeves, Marijn J. H. Heule, and Randal E. Bryant. “Moving Definition Variables in Quantified Boolean Formulas.” *Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, 2022.
9. Joseph Reeves, Carlos Moreno, Ming Li, Chengyu Hu and B. Prabhakaran. “Data Reliability-Aware and Cloud-Assisted Software Infrastructure for Body Area Networks.” *Conference on Body Area Networks (BODYNETS)*, 2017.
10. Joseph Reeves, and Ming Li. “Context-Aware Analysis Scheduling in Wireless Body Area Networks.” *Conference on Computing, Networking and Communications (ICNC)*, 2019.

Workshop Papers

1. Cayden R. Codel, Joseph E. Reeves, Marijn J. H. Heule, and Randal E. Bryant. “Bipartite Perfect Matching Benchmarks.” *Pragmatics of SAT*, 2021.
2. Joseph E. Reeves and Marijn J. H. Heule. “The Impact of Bounded Variable Elimination of Pigeonhole Formulas.” *Pragmatics of SAT*, 2021.

Technical Presentations

Professional Meetings and Conferences

- 3/25** “Trimming SMT Proofs.” *Dagstuhl Seminar on Certifying Algorithms for Automated Reasoning*, Dagstuhl, Germany.
- 2/25** “The Impact of Literal Sorting on Cardinality Constraint Encodings.” *AAAI*, Philadelphia, USA. (Conference paper 4)
- 7/24** “From Clauses to Klauses.” *Computer Aided Verification (CAV)*, Montreal, Canada. (Conference paper 5)
- 7/24** “Cardinality Constraints in Automated Reasoning.” *Annual NDSEG Conference*, New Orleans, USA.
- 4/23** “Propositional Proof Skeletons.” *Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, Paris, France. (Conference paper 6)
- 8/22** “Preprocessing of Propagation Redundant Clauses.” *International Joint Conference of Automated Reasoning (IJCAR)*, Haifa, Israel. (Conference paper 7)
- 8/22** “Moving Definition Variables in Quantified Boolean Formulas.” *International Workshop on Quantified Boolean Formulas and Beyond*, Haifa, Israel. (Conference paper 8)
- 4/22** “Moving Definition Variables in Quantified Boolean Formulas.” *Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, Munich, Germany. (Conference paper 8)
- 7/21** “Bipartite Perfect Matching Benchmarks.” *Pragmatics of SAT*, remote. (Workshop Paper 1)
- 7/21** “The Impact of Bounded Variable Elimination of Pigeonhole Formulas.” *Pragmatics of SAT*, remote. (Workshop Paper 2)
- 2/19** “Context-Aware Analysis Scheduling in Wireless Body Area Networks.” *Conference on Computing, Networking and Communications (ICNC)*, Honolulu, USA. (Conference paper 10)

Poster Presentations

- 2/25** The Impact of Literal Sorting on Cardinality Constraint Encodings.” *AAAI*, Philadelphia, USA. (Conference paper 4)
- 7/24** “Cardinality Constraints in Automated Reasoning.” *Annual NDSEG Conference*, New Orleans, USA. (Runner up Best Poster in Computer Science).
- 6/18** “Context-Aware Analysis Scheduling in Wireless Body Area Networks.” *Conference on Healthcare Informatics (ICHI)*, IEEE, New York City, USA.

Summer Research Internships

Amazon Web Services, Automated Reasoning Group — Research Scientist Intern

Summer 2023, San Jose, CA — Mentor: Benjamin Kiesl-Reiter

Project: Stochastic Local Search (SLS) for satisfiability with cardinality constraints. Developed a novel SLS method for SAT+cardinality optimization and planning problems in collaboration with research scientists.

Summer 2022, New York, NY — Mentor: Benjamin Kiesl-Reiter

Project: Propositional Proof Skeletons. Developed propositional proof skeletons to summarize solver-learned information for proof minimization and explainability. Project was open-sourced and resulted in a publication (Conference paper 6).

Teaching Experience

Teaching Assistant, Carnegie Mellon University, Pittsburgh PA

- Spring 2024** **Teaching Assistant**, Logic and Mechanized Reasoning
Carnegie Mellon University Instructors: Jeremy Avigad, Marijn Heule
Duties: Provided feedback, graded assignments/exams, held office hours.
Lectures: I lectured on the congruence closure algorithm for uninterpreted functions.
- Spring 2023** **Teaching Assistant**, Bug Catching: Automated Program Verification Carnegie Mellon University Instructor: Matt Fredrikson
Duties: Developed and graded assignments, held office hours.
Lectures: I lectured on proof systems for propositional logic and generating proof certificates in Boolean satisfiability solvers.

Teaching Assistant and Lab Instructor, California State University, Fresno

- 2018–2019** **Courses:**
- CSCI 117 Structures of Programming Languages*
 - CSCI 119 Introduction to Finite Automata
 - CSCI 191-T Programming Languages and Automata Theory**
 - CSCI 112 Introduction to Computer Systems
 - CSCI 60 Foundations of Computer Science
 - CSCI 5 Computers and Applications
- Duties: Prepared labs/quizzes/tests, taught 2-hour lab sections, held office hours, coordinated with lecturers.
- * We introduced a textbook not previously used, Concepts, Techniques, and Models of Computer Programming, and I assisted in creating a course schedule, lab assignments, and test questions.
- ** I wrote a simulation of the Oz language semantics in Haskell to be used by students for lab assignments.

Academic Employment

- 2017–2018** **Research Assistant**, Department of Computer Science, California State University Fresno
Project title: *MRI: Development of a Cloud Based Instrument for Heterogeneous Biomedical Body Sensor Systems*, NSF Grant #1626586. Primary Investigators: Ming Li and B. Prabhakaran.
- July 2017** **Camp Assistant Instructor**, Department of Computer Science, California State University Fresno
Assisted in instructional activities for the computer science summer program.
- Spring 2017** **Instructional Student Assistant**, Department of Computer Science, California State University Fresno
Supported grading, student assistance, and instructional preparation.
- Fall 2016** **Supplemental Instruction Leader**, Learning Center, California State University Fresno
Led peer study sessions, organized review materials, and provided academic support for introductory computer science coursework.

University Activities

- Fall 2023** – **Organized Formal Cookies Seminar**, Carnegie Mellon University
- Spring 2024** Founding organizer of a monthly seminar for faculty and graduate students studying formal methods. Arranged talks from graduate students and visiting faculty members.