

# Joseph Reeves

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## Education

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<b>2020–2025</b>	<b>Ph.D.</b> , 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
<b>2018–2020</b>	<b>M.S.</b> , 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
<b>2014–2018</b>	<b>B.S.</b> , Computer Science (Minor: Mathematics), California State University Fresno Advisor: Ming Li Focus: Body Sensor Networks GPA: 4.0
<b>2010–2014</b>	Clovis High School, Clovis, CA GPA: 3.98 (unweighted)

## Awards and Fellowships

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

## Publications

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### 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 Klauses.” *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

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### 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

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### 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

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### Teaching Assistant, Carnegie Mellon University, Pittsburgh PA

<b>Spring 2024</b>	<b>Teaching Assistant</b> , 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.
<b>Spring 2023</b>	<b>Teaching Assistant</b> , 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

<b>2018–2019</b>	<b>Courses:</b> <ul style="list-style-type: none"><li>- CSCI 117 Structures of Programming Languages*</li><li>- CSCI 119 Introduction to Finite Automata</li><li>- CSCI 191-T Programming Languages and Automata Theory**</li><li>- CSCI 112 Introduction to Computer Systems</li><li>- CSCI 60 Foundations of Computer Science</li><li>- CSCI 5 Computers and Applications</li></ul> 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.
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## Academic Employment

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**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

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**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.