

RESEARCH INTERESTS

I am interested in automated reasoning, programming language theory, and formal methods. Specifically, I am excited about useful languages that theoretically and empirically lend themselves to efficient reasoning.

EDUCATION

- Ongoing **Ph.D. in Computer Science**
Advised by Sanjit A. Seshia
University of California, Berkeley
- 2018 **M.Sc. in Computer Science**
Advised by Marsha Chechik
University of Toronto
- 2016 **B.Sc. in Computer Science and Mathematics**
First Class Honours with Distinction
Mount Allison University

REFEREED CONFERENCE PAPERS

- [1] **Federico Mora**, Ankush Desai, Elizabeth Polgreen, and Sanjit A. Seshia. “Message Chains for Distributed System Verification”. In: *Proceedings of the ACM on Programming Languages (OOPSLA)*. 2023.
- [2] **Federico Mora**, Murphy Berzish, Mitja Kulczynski, Dirk Nowotka, and Vijay Ganesh. “Z3str4: A Multi-armed String Solver”. In: *24th International Symposium on Formal Methods (FM)*. 2021.
- [3] Murphy Berzish, Joel Day, Vijay Ganesh, Mitja Kulczynski, Florin Manea, **Federico Mora**, and Dirk Nowotka. “String Theories Involving Regular Membership Predicates: From Practice to Theory and Back”. In: *13th International Conference on Words (WORDS)*. 2021.
- [4] Murad Akhundov*, **Federico Mora**, Nick Feng, Vincent Hui, and Marsha Chechik. “Verification by Gambling on Program Slices”. In: *19th International Symposium on Automated Technology for Verification and Analysis (ATVA)*. 2021.
- [5] Nikhil Pimpalkhare*, **Federico Mora**, Elizabeth Polgreen, and Sanjit A. Seshia. “MedleySolver: Online SMT Algorithm Selection”. In: *24th International Conference on Theory and Applications of Satisfiability Testing (SAT)*. 2021.
- [6] Murphy Berzish, Mitja Kulczynski, **Federico Mora**, Florin Manea, Joel Day, Dirk Nowotka, and Vijay Ganesh. “An SMT Solver for Regular Expressions and Linear Arithmetic over String Length”. In: *33rd International Conference on Computer-Aided Verification (CAV)*. 2021.
- [7] Nick Feng, **Federico Mora**, Vincent Hui, and Marsha Chechik. “Scaling Client-Specific Equivalence Checking via Impact Boundary Search”. In: *35th IEEE/ACM International Conference on Automated Software Engineering (ASE)*. 2020.
- [8] Joseph Scott, **Federico Mora**, and Vijay Ganesh. “BanditFuzz: A Reinforcement-Learning Based Performance Fuzzer for SMT Solvers”. In: *12th Working Conference on Verified Software: Theories, Tools, and Experiments (VSTTE)*. 2020.
- [9] **Federico Mora**, Yi Li, Julia Rubin, and Marsha Chechik. “Client-Specific Equivalence Checking”. In: *33rd IEEE/ACM International Conference on Automated Software Engineering (ASE)*. 2018.

REFEREED JOURNAL PAPERS

- [1] Murphy Berzish, Joel Day, Vijay Ganesh, Mitja Kulczynski, Florin Manea, **Federico Mora**, and Dirk Nowotka. “Towards more efficient methods for solving regular-expression heavy string constraints”. In: *Theoretical Computer Science* (2023).

REFEREED SHORT OR TOOL PAPERS

- [1] Elizabeth Polgreen, Kevin Cheang, Pranav Gaddamadugu, Adwait Godbole, Kevin Laeuffer, Shaokai Lin, Yatin Manerkar, **Federico Mora**, and Sanjit A. Seshia. “UCLID5: Multi-Modal Formal Modeling, Verification, and Synthesis”. In: *34th International Conference on Computer-Aided Verification (CAV)*. 2022.

* denotes undergraduate research mentee

- [2] Joseph Scott, Trishal Sudula, Hammad Rehman, **Federico Mora**, and Vijay Ganesh. “BanditFuzz: Fuzzing SMT Solvers with Multi-Agent Reinforcement Learning”. In: *24th International Symposium on Formal Methods (FM)*. 2021.
- [3] Dmitry Blotsky, **Federico Mora**, Murphy Berzish, Yunhui Zheng, Ifaz Kabir, and Vijay Ganesh. “StringFuzz: A Fuzzer for String Solvers”. In: *31st International Conference on Computer-Aided Verification (CAV)*. 2018.

REFEREED WORKSHOP PAPERS OR PRESENTATIONS

- [1] Yixuan Li, **Federico Mora**, Elizabeth Polgreen, and Sanjit A. Seshia. “Genetic Algorithms for Searching a Matrix of Metagrammars for Synthesis”. In: *12th Workshop on Synthesis (SYNT)*. 2023.
- [2] **Federico Mora**, Kevin Cheang, Elizabeth Polgreen, and Sanjit A. Seshia. “Synthesis in UCLID5”. In: *9th Workshop on Synthesis (SYNT)*. 2020.

INDUSTRIAL RESEARCH POSITIONS

- 2020-21 **Applied Scientist Intern, Amazon**
AWS Automated Reasoning Group
Supervised by Ankush Desai
- 2017 **Research Intern, General Motors**
Electronic Control Systems Lab
Supervised by Ramesh S

TEACHING EXPERIENCE

- 2022-23 **Guest Lectures, UC Berkeley**
EECS 219C: Formal Methods: Specification, Verification, and Synthesis
 - Interpolation-Based Model Checking and IC3
 - Satisfiability Modulo Theories - Part II: Theories and Theory Solvers
 - Syntax-Guided SynthesisCS 164: Programming Languages and Compilers
 - Regular Expressions and Tokenization
- 2021-22 **Graduate Student Instructor, UC Berkeley**
CS 164: Programming Languages and Compilers (2)
- 2016-18 **Teaching Assistant, University of Toronto**
CSC 324: Principles of Programming Languages
CSC 384: Introduction to Artificial Intelligence (2)
CSC 410: Software Testing and Verification (2)
- 2015-16 **Teaching Assistant, Mount Allison University**
COMP 1631: Introduction to Computer Science

GRANT WRITING CONTRIBUTIONS

- With Sanjit A. Seshia as PI/Co-PI
- 2021 **Amazon Research Award**
“Scalable Verification of Secure Distributed Services through Synthesis and Learning”

PROFESSIONAL SERVICE

- Organizer**
 - Berkeley Programming Systems Seminar Series (Summer '20)
- Reviewer**
 - Formal Methods in System Design (FMSD '22)

Artifact Evaluation Committee Member

- Tools and Algorithms for the Construction and Analysis of Systems (TACAS '23)

External Reviewer or Subreviewer

- Automated Software Engineering (ASE '17, '18, '19)
- Computer Aided Verification (CAV '18, '21)
- Formal Methods in Computer-Aided Design (FMCAD '21, '22)
- Foundations of Software Engineering (FSE '17)
- International Joint Conference on Automated Reasoning (IJCAR '18)
- Programming Language Design and Implementation (PLDI '21)
- Tools and Algorithms for the Construction and Analysis of Systems (TACAS '21, '24)
- Verification, Model Checking, and Abstract Interpretation (VMCAI '24)

Conference or Workshop Student Volunteer

- Programming Language Design and Implementation (PLDI '22)
- Bryant Discoveries Day (FLoC '22)
- Waterloo Machine Learning, Verification, and Security Workshop ('19)

Other Service

- UC Berkeley EECS Equal Access to Application Assistance Reviewer ('23)
- UC Berkeley EECS Visit Day Coordinator ('21)
- UC Berkeley CSGSA Social Chair ('20)

AWARDS AND DISTINCTIONS

2023	<u>Undergraduate Research Mentoring Award</u> (UC Berkeley)
2022-23	<u>EECS Outstanding Teaching Assistant Award</u> (UC Berkeley)
2021-22	<u>Outstanding Graduate Student Instructor Award</u> (UC Berkeley)
2021	<u>Qualcomm Innovation Fellowship</u>
2020-21	<u>EECS Chair's Graduate Award</u> (UC Berkeley)
2019	EECS Department Fellowship (UC Berkeley)
2018	C. C. Gotlieb (Kelly) Graduate Fellowship (University of Toronto)
2017	Alfred B. Lehman Graduate Scholarship (University of Toronto)

RESEARCH MENTORING

2020-	UC Berkeley Undergraduate Students Amar Shah (<u>PLDI '23 USRC Winner</u>), Annamira O'Toole, Selina Kim, Nikhil Pimpalkhare
2023-	MiraCosta College Students Haley Lepe (<u>NDiSTEM '23 Presentation Award Winner</u>)
2022-23	City College of San Francisco Students Isaac Chan
2018-20	University of Toronto Undergraduate Students Murad Akhundov (<u>POPL '20 USRC Winner</u>), Lukas Finn barr O'Callahan, Alex Tough

COMMUNITY SERVICE

2022	<u>Citizen Clinic</u> Worked with indigenous land rights activists to help them defend themselves and their communities from cyber threats.
2022	<u>Be A Scientist</u> Mentored a group of four seventh grade students in Spanish.

Students designed and conducted their own scientific experiment over a six-week-long lab.

2020

Bay Area Scientists in Schools (BASIS)

Developed a new bilingual “You Belong” lesson on Ynés Mexía’s research.

Lesson delivered to schools serving low-income and historically marginalized communities.

NON-ACADEMIC

Languages	English (native), Spanish (native), and French (basic).
Certificates	Canadian Soccer Association community coaching: “Active Start” (ages 4-6), “Fundamentals” (ages 6-9), and “Learning to Train” (ages 8-12).
Awards	Canadian Interuniversity Sport Academic All-Canadian (4); Jack Drover Athletics Award (2); David MacArel MacAulay Award (2); Mount Allison men’s varsity soccer team captain (2); Soccer New Brunswick Male Bursary Award (1); and New Brunswick provincial soccer team captain (1).