

RESEARCH INTERESTS

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

EDUCATION

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

REFEREED CONFERENCE PAPERS

- [1] **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.
- [2] 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.
- [3] 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.
- [4] Nikhil Pimpalkhare*, **Federico Mora**, Elizabeth Polgreen, and Sanjit Seshia. “MedleySolver: Online SMT Algorithm Selection”. In: *24th International Conference on Theory and Applications of Satisfiability Testing (SAT)*. 2021.
- [5] 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.
- [6] 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.
- [7] 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.
- [8] **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 D. 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).

* denotes undergraduate research mentee

 REFEREED SHORT OR TOOL PAPERS

- [1] Elizabeth Polgreen, Kevin Cheang, Pranav Gaddamadugu, Adwait Godbole, Kevin Laeuffer, Shaokai Lin, Yatin Manerkar, **Federico Mora**, and Sanjit Seshia. “UCLID5: Multi-Modal Formal Modeling, Verification, and Synthesis”. In: *34th International Conference on Computer-Aided Verification (CAV)*. 2022.
- [2] Joseph Scott, Hammad Rehman, Trishal Sudula, **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 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 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 (SMT) - Part II: Theories and Theory Solvers
 - Syntax-Guided Synthesis (SyGuS)CS 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

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

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)
- Symposium on the Foundations of Software Engineering (FSE '17)
- International Joint Conference on Automated Reasoning (IJCAR '18)
- Tools and Algorithms for the Construction and Analysis of Systems (TACAS '21)
- Programming Language Design and Implementation (PLDI '21)
- Formal Methods in Computer-Aided Design (FMCAD '21, '22)

Conference or Workshop Student Volunteer

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

Other Service

- UC Berkeley EECS Visit Day Coordinator ('21)
- UC Berkeley CSGSA Social Chair ('20)

AWARDS AND DISTINCTIONS

2023	Undergraduate Research Mentoring Award (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
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 Finnbarr O'Callahan, Alex Tough

COMMUNITY SERVICE

- 2022 **Citizen Clinic**
Worked with indigenous land rights activists to help them defend themselves and their communities from cyber threats.
- 2022 **Be A Scientist**
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).