Pavel Panchekha

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Current Work

I am a Ph.D. Candidate at the University of Washington, graduating in 2019.

I study *mechanical reasoning and synthesis for domain-specific languages*, such as floating-point numerical programs and web page layout code.

Publications

- Functional Programming for Compiling and Decompiling Computer-Aided Design
  Nandi, Wilcox, Panchekha, Blau, Grossman, Tatlock
  ICFP'18, Sept 2018.

- Verifying that Web Pages have Accessible Layout
  Panchekha, Geller, Ernst, Tatlock, & Kamil
  PLDI'18, June 2018.

- Finding Root Causes of Floating Point Error
  Sanchez-Stern, Panchekha, Lerner, & Tatlock
  PLDI'18, June 2018.

- Automated Reasoning for Web Page Layout
  Panchekha & Torlak
  OOPSLA'16, November 2016. ⟨10.1145/2983990.2984010⟩

- Automatically Improving Accuracy for Floating Point Expressions
  Panchekha, Sanchez-Stern, Wilcox, & Tatlock
  PLDI'15 (Distinguished Paper), June 2015. ⟨10.1145/2813885.2737959⟩

- Verdi: A Framework for Implementing and Formally Verifying Distributed System
  Wilcox, Woos, Panchekha, Tatlock, Wang, Ernst, & Anderson
  PLDI'15, June 2015. ⟨10.1145/2737924.2737958⟩

- Expressing and Verifying Probabilistic Assertions
  Sampson, Panchekha, Mytkowicz, McKinley, Grossman, & Ceze
  PLDI'14, June 2014. ⟨10.1145/2594291.2594294⟩

Workshop Publications

- Combining Tools for Optimization and Analysis of Floating-Point Computations
  Becker, Panchekha, Darulova, & Tatlock
  FM'18 short, July 2018.

- Generating Interactive Web Pages from Storyboards
  Panchekha
  FSE'16 Doctoral Symposium, November 2016. ⟨10.1145/2950290.2983948⟩

- Toward a Standard Benchmark Format and Suite for Floating-Point Analysis
  Damouche, Martel, Panchekha, Qiu, Sanchez-Stern, & Tatlock
  NSV'16, July 2016. ⟨10.1007/978-3-319-54292-8_6⟩

- Blame Trees
  Demaine, Panchekha, Wilson, & Yang
  WADS'13, August 2013. ⟨10.1007/978-3-642-40104-6_25⟩

Awards

- *Adobe Research Fellowship* (2016)

- *National Science Foundation Graduate Research Fellow* (2015)

- *PLDI Distinguished Paper Award* (2015)

- *National Science Foundation Graduate Research Fellowship*, Honorable Mention (2014)

- *Wissner-Slivka Endowed Graduate Fellowship* (2013)

- *Achievement Rewards for College Scientists Fellow* (2013)

Talks and Reports

- *Verifying Web Pages*
  September 2018, invited talk, RacketCon
  September 2018, CSE Symposium, UW
  May 2018, PNW PLSE

- *Numerical Tools for Non-expert Users*
  January 2018, invited talk, MSR Redmond.
  August 2017, Dagstuhl.
  August 2017, invited talk, MPI-SWS Saarbrücken.

- *Automatically Improving Accuracy for Floating Point Expressions*
  April 2016, invited talk, Google.
  March 2016, invited talk, MIT.
  January 2016, invited talk, MathWorks.
  October 2015, invited talk, UW CSE Affiliates Day.
  October 2015, Numerical Analysis Research Club at the University of Washington.
  January 2015, invited talk, Reservior Labs.
  March 2014, invited talk, Dropbox.

- *Next-generation Eventual Consistency*
  January 2015, invited talk, Facebook.

- PANCHEKHA & BRODSKY, *Distributed Shared State with History Maintenance.*
  October 2013. MIT-CSAIL-TR-2013-024, ⟨1721.1/81365⟩

Internships

Adobe, Inc.   **Cambridge, MA**
Researcher   *2016*

- Extended automatic reasoning framework for web page layout.
- Added support for positioning, JavaScript, selectors.
- Applied synthesis to product needs.

Dropbox, Inc.   **San Francisco, CA**
Intern   *2011, 2013*

- Verified synchronization algorithms; caught numerous critical bugs.
- Wrote distributed profiler for server farms.
- Designed type system for database schemas.

MIT CSAIL   **Cambridge, MA**
Research intern   *2012*

- Worked on eventually-consistent distributed systems.
- Discovered novel eventually-strongly-consistent shared state algorithms.
- Developed tracing-based debugging techniques.

MIT Mathematics   **Cambridge, MA**
Research intern   *2012*

- Worked on parallel elliptic curve computation.
- Parallelized computations to scale near-linearly to multiple cores.
- Significantly ($100\times$) sped up certain operations in the Sage mathematics project.

Fairleigh Dickinson University   **Hackensack, NJ**
Research Intern   *2009–2010*

- Worked on control software for autonomous jeep
- Taught a jeep to drive across unmapped terrain.
- Worked on basic artificial intelligence infrastructure and path-finding.

Education

University of Washington   **Seattle, WA**
Ph.D. Candidate in Computer Science   *2013–2019*

- Advised by Michael D. Ernst and Zachary Tatlock
- Ph.D. candidacy in Computer Science (awarded 2017)
- Master's degree in Computer Science (awarded 2015)
- Courses: Programming language theory, sublinear algorithms, data visualization, machine learning, natural language processing, program synthesis

Massachusetts Institute of Technology   **Cambridge, MA**
B.S. in Mathematics   *2010–2013*

- Mathematics Major (Course 18), strong interest in Computer Science; 4.7 GPA
- Advanced computer science courses: distributed systems, systems security, large-scale symbolic systems, advanced algorithms
- Advanced mathematics courses: commutative algebra, differential geometry, stochastic processes, computational ring theory