Joseph P. Near

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Research Interests

Techniques for building **secure** and **reliable** software, including static and dynamic analysis; specification and verification; and programming language design. My research focuses on **domain-specific static analysis**, leveraging unique properties of a target domain to build scalable tools that help developers find bugs quickly.

Education

2010–2015 (expected)	**Ph.D. computer science**, *Massachusetts Institute of Technology*, Cambridge, MA, USA. Thesis: "Domain-Specific Static Analysis for Web Applications." Advisor: Daniel Jackson
2008–2010	**M.S. computer science**, *Massachusetts Institute of Technology*, Cambridge, MA, USA. Thesis: "An Imperative Extension to Alloy and a Compiler for its Execution." Advisor: Daniel Jackson
2003–2008	**B.S. computer science**, *Indiana University*, Bloomington, IN, USA. Advisor: Daniel Friedman

Awards

2009-2013	**National Science Foundation Graduate Research Fellowship**.
2007	**Undergraduate Instructor of the Year**, *Department of Computer Science, Indiana University*.
2007	**Member, Phi Beta Kappa**.
2004	**Research Grant, Hutton Honors College**, *Indiana University*. Project: "An Open Platform for Wearable Computing."

Publications

Refereed Conferences

Aleksandar Milicevic, **Joseph P. Near**, Eunsuk Kang, and Daniel Jackson. Alloy*: A general-purpose higher-order relational constraint solver. In *Proceedings of the 37th ACM/IEEE International Ionference on Software Engineering (ICSE)*, page to appear. ACM, 2015.

Joseph P. Near and Daniel Jackson. Derailer: interactive security analysis for web applications. In *Proceedings of the 29th ACM/IEEE international conference on Automated Software Engineering (ASE)*, pages 587–598. ACM, 2014.

Joseph P. Near and Daniel Jackson. Rubicon: bounded verification of web applications. In *Proceedings of the ACM SIGSOFT 20th International Symposium on the Foundations of Software Engineering (FSE)*, page 60. ACM, 2012.

Joseph P. Near, Aleksandar Milicevic, Eunsuk Kang, and Daniel Jackson. A lightweight code analysis and its role in evaluation of a dependability case. In *Proceedings of the 33rd International Conference on Software Engineering (ICSE)*, pages 31–40. IEEE, 2011.

Joseph P. Near and Daniel Jackson. An imperative extension to alloy. In *Proceedings of the 2nd International Conference on Abstract State Machines, Alloy, B and Z (ABZ)*, pages 118–131. Springer Berlin Heidelberg, 2010.

Joseph P. Near. From relational specifications to logic programs. In *Proceedings of the 26th International Conference on Logic Programming (ICLP) (Technical Communications)*, volume 7. Springer Berlin Heidelberg, 2010.

Derek Rayside, Zev Benjamin, Rishabh Singh, Joseph P. Near, Aleksandar Milicevic, and Daniel Jackson. Equality and hashing for (almost) free: Generating implementations from abstraction functions. In *Proceedings of the 31st International Conference on Software Engineering (ICSE)*, pages 342–352. IEEE Computer Society, 2009.

Joseph P. Near, William E Byrd, and Daniel P Friedman. αleantap: A declarative theorem prover for first-order classical logic. In *Proceedings of the 24th International Conference on Logic Programming (ICLP)*, pages 238–252. Springer Berlin Heidelberg, 2008.

Refereed Journals

Emina Torlak, Mana Taghdiri, Greg Dennis, and Joseph P. Near. Applications and extensions of alloy: past, present and future. *Mathematical Structures in Computer Science*, 23(04):915–933, 2013.

Invited Papers

William E Byrd, Daniel P Friedman, Ramana Kumar, and Joseph P. Near. A shallow scheme embedding of bottom-avoiding streams. *To appear in a special issue of Higher-Order and Symbolic Computation (HOSC) in honor of Mitchell Wand's 60th birthday.*

Theses

Joseph P. Near. An imperative extension to alloy and a compiler for its execution. Master's thesis, Massachusetts Institute of Technology, 2010.

Technical Reports

Aleksandar Milicevic, Joseph P. Near, Eunsuk Kang, and Daniel Jackson. Alloy*: A higher-order relational constraint solver, 2014.

Joseph P. Near and Daniel Jackson. Symbolic execution for (almost) free: Hijacking an existing implementation to perform symbolic execution. MIT CSAIL Technical Report MIT-CSAIL-TR-2014-007, 2014.

Teaching Experience

January 2010   **Instructor, So You've Always Wanted to Learn Haskell?**, *Massachusetts Institute of Technology*.
Co-taught a January-term course introducing the Haskell language and its applications.

Spring 2009   **Teaching Assistant, 6.005: Elements of Software Construction**, *Massachusetts Institute of Technology*.
Taught weekly sections; wrote & graded problem sets. Rating 5.5/6.0.

Fall 2005 – Spring 2008   **Undergraduate Instructor, C311: Programming Languages**, *Indiana University*.
Helped plan course material; taught weekly sections; wrote & graded exams and problem sets.
"Outstanding Instructor" rating 3.7/4.0. Awarded "Undergraduate Instructor of the Year," 2007.

1998 – 2008   **Summer Class Instructor**, *Bloomington Montessori School*.
Designed and taught summer courses for grades 4-7 in Python, QBasic, and image and video editing.

Presentations

Derailer: Interactive Static Security Analysis for Web Applications

International Conference on Automated Software Engineering (ASE)   October 2014

Indiana University   August 2014

Rubicon: Bounded Verification of Web Applications

International Symposium on the Foundations of Software Engineering (FSE)   October 2012

MIT-CSAIL Programming Languages and Software Engineering Seminar   September 2012

A Lightweight Code Analysis and its Role in Evaluation of a Dependability Case

International Conference on Software Engineering (ICSE)   May 2011

From Relational Specifications to Logic Programs

International Conference on Logic Programming (ICLP)   July 2010

An Imperative Extension to Alloy

International Conference on Abstract State Machines, Alloy, B and Z (ABZ)   February 2010

αleanTAP: A Declarative Theorem Prover for First-Order Classical Logic

International Conference on Logic Programming (ICLP)   December 2008

Service

External Reviewer, FM 2015

External Reviewer, Software Testing, Verification and Reliability (2014)

External Reviewer, OOPSLA 2010

Citizenship

United States of America

References

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Computer Science
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