

Kelly Heffner

kheffner at eeecs
<http://www.eecs.harvard.edu/~kheffner>

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- EDUCATION
- ◇ **Harvard University**, Cambridge, MA
Fall 2004-present.
PhD in Computer Science
On leave of absence for academic year 2007-2008
 - ◇ **University of Arizona**, Tucson, AZ
Spring 2002-Spring 2003.
Graduate course-work in Computer Science
 - ◇ **University of Arizona**, Tucson, AZ
BS in Computer Science, December 2001
Summa Cum Laude and Honors

- RESEARCH
- ◇ **Optimization Phase Ordering:** <http://www.eecs.harvard.edu/triforce/varia>
My research goals within the Varia project are to:

- Understand the interactions (positive and negative) between data-flow analyses and optimizations.
- Understand correlations between high-level transformations and their impact at the back end.

As part of these major goals, we are implementing our own expert system that can run as a phase in Microsoft's Phoenix Compiler, and will be more suited for expressing data-flow and transformation primitives. Creating such a system will most likely require applying techniques from databases and artificial intelligence to determine how we can exploit the structure of data-flow analysis and optimization to improve the complexity of rule-matching search space. (see papers)

- ◇ **SandMark Project** www.cs.arizona.edu/sandmark
SandMark is a tool developed to study the effectiveness of software protection algorithms. The tool currently provides dynamic and static watermarking algorithms, obfuscation algorithms, a code optimizer, and tools for viewing and analyzing Java bytecode. Under the direction of Christian Collberg, my contributions to the SandMark project include:
 - The Obfuscation Executive (see papers)
 - Research lead of SandMark:
 - Directing research of several undergrads
 - Managing the SandMark codebase and directing implementation of new software analysis, watermarking, and obfuscation code
 - Directing design, implementation, and refactoring of the SandMark framework including co-designing libraries for managing the editable units of a Java program
 - Writing monthly status reports to the Air Force Research Laboratory
 - Organizing and running weekly meetings of the SandMark team, including drawing up a weekly status report
 - Implementations of several static analysis tools, such as an operand stack simulator, local variable use-and-def analysis, and a class inheritance hierarchy library.
- ◇ **Senior honors thesis** File Compression using Plurally Parseable Tunstall encoding.

- PAPERS AND PUBLICATIONS
- ◇ **Extending Object-Oriented Optimizations for Concurrent Programs** Kelly Heffner, Michael D. Smith, and David Tarditi. PACT 2007, Brasov, Romania.
 - ◇ **Varia: Optimization by Logic Programming** Kelly Heffner and Kevin Redwine. Technical Report TR-13-05 Harvard University, Cambridge, MA.
 - ◇ **Varia: Inference-driven optimization** Kelly Heffner and Kevin Redwine. Poster for PLDI 2005, Chicago, IL.
 - ◇ **The Obfuscation Executive** Kelly Heffner and Christian Collberg. Information Security 2004, Palo Alto, CA.
- TEACHING
- ◇ **Co-Head Teaching Fellow, Harvard University**
 - CS 50 Fall 2005 - Introduction to Computer Science I
 - CS 50 Fall 2006 - Introduction to Computer Science I
 - ◇ **Co-Instructor, University of Arizona**
 - C SC 391 Spring and Fall 2001 - Undergraduate Section Leader Training
 - C SC 591 Spring - Graduate TA Training
 - ◇ **Teaching assistant, University of Arizona**
 - C SC 127a Spring 2000 - Introduction to Computer Science
 - C SC 227 Spring 2000 and Summer 2000 - Program Design and Development
 - C SC 335 Summer 2000, Fall 2000, and Spring 2001 - Object Oriented Programming and Design
 - C SC 245 Fall 2001 - Introduction to Discrete Structures
 - C SC 344 Spring 2002 - Foundations of Computing (Induction, Logic, Graph Theory, Program Verification, and Combinatorics)
 - C SC 520 Spring 2004 - Principles of Programming Languages
- AWARDS AND DISTINCTIONS
- ◇ **Derek C. Bok Award for Excellence in Graduate Student Teaching of Undergraduates** Harvard University, May 2007
 - ◇ **Fall 2005 DEAS Outstanding Teaching Fellow** Division of Engineering and Applied Sciences, Harvard University
 - ◇ **National Science Foundation** Honorable Mention for Graduate Research Fellowship
 - ◇ **Outstanding Senior of the Semester** College of Science, December 2001:
The Outstanding Senior of the Semester for the College of Science (CoS) is chosen by committee (composed of faculty representing each department in the CoS) from the Outstanding Seniors of every department in the CoS. Each Outstanding Senior provides a statement of purpose and vitae describing her scholarship, service, and research and is interviewed by the committee. I was the first Outstanding Senior of the CoS chosen from the Computer Science Department.
- SERVICE
- ◇ **Judge** – ACM University of Arizona Coding Competition Fall 2003
 - ◇ **President** – Women in Computer Science (WICS) Fall 1999-Spring 2002
 - ◇ **Co-Organizer**
 - WICS Coding Competition Spring 2000 through 2003
 - ACM University of Arizona Coding Competition Fall 2001
 - ACM Rocky Mountain Regional Coding Competition Fall 2001
 - U of A Daughter's Day on Campus – Computer Science Department 2000 and 2001
 - ◇ **Founding Member** and Treasurer – Association of Computing Machinery (ACM) UA student chapter academic year 2000-2001

- ◇ **Student Representative** – UA Computer Science department Undergraduate Program Committee academic year 2000-2001

WORK
EXPERIENCE

- ◇ **Instyll Inc**

Founder – June 2006-Present

At Instyll, we are striving to bring a new level of quality and efficiency to online communication and collaboration within virtual communities, social networks, and business environments.

We believe that a new environment that supports the effortless sharing of both information and software will enable a level of online cooperation far beyond current web-based technologies. And modern programming techniques will enable the creation of more robust and more powerful programs within these environments.

To this end, we are building a new software platform for direct, real-time communication and collaboration within graphically rich environments; we're currently building our first, publicly available software product that will use many in-house technologies, including a powerful new programming language.

- ◇ **Microsoft Research**, Advanced Compiler Technology Group

Intern - May 2005-August 2005

As an intern in the Advanced Compiler Technology Group, I added and improved several static analysis algorithms and optimizations in the Bartok compiler. The main focus of my summer research was on optimizations that are safe in the presence of concurrency. In addition, I implemented a basic framework for whole program data-flow analysis.

- ◇ **University of Arizona**, Department of Computer Science

Research Assistant - May 2002-December 2002

Research Scientist - January 2003-March 2003

See research: SandMark project

- ◇ **University of Arizona**, Department of Computer Science

Assistant Academic Advisor - May 2002-August 2002

- ◇ **Hewlett Packard**, Network Storage Solutions Organization:

Intern - May 2001-August 2001

- ◇ **University of Arizona** Department of Computer Science

Section Leader Coordinator – Fall 2001

Section leader coordinators are responsible for managing the undergraduate section leaders. They hold weekly meetings for all section leaders. Coordinators also interview and hire new section leaders each semester. The coordinators teach the weekly C SC 391 course that instructs newly hired section leaders on how to be effective teachers.

HOBBIES

- ◇ **Yoga and Pilates**

- ◇ **Poker**

- ◇ **Computer Games**