



**Ownership-Aware TM:** Explored semantics of TM and open-nested transactions. Designed ownership-aware TM, a TM system that aims to provide stronger and more intuitive semantics for open-nested transactions.

**Memory-Mapped Transactions:** Developed Libxac, a C library supporting TM semantics on memory-mapped files. Converted existing serial implementations of a B-tree and a cache-oblivious B-tree into concurrent versions using Libxac.

Available at <http://people.csail.mit.edu/sukhaj/libxac/>.

My ongoing research includes:

- Developing runtime support for confining nondeterminism in dynamic threaded programs. Specific goals include guaranteeing deterministic results for parallel pseudorandom number generation and floating point reductions.
- Investigating techniques for improving locality in dynamic threaded programs by using hierarchical work-stealing schedulers, i.e., schedulers that are aware of a system's cache hierarchy.

TEACHING  
EXPERIENCE

**Massachusetts Institute of Technology**

Cambridge, MA USA

**6.884 Concepts in Multicore Programming**

Spring 2010

*Teaching Assistant.* Developed programming labs for the course. Spring 2010 was the first semester 6.884 was offered. Assisted students with labs and final projects.

**6.046 Introduction to Algorithms**

Fall 2005, Fall 2006

*Teaching Assistant.* Taught a weekly recitation section. Helped devise and grade problem sets and exams. Assisted students with problem sets or other material from class during homework-lab sessions.

WORK  
EXPERIENCE

**Advanced Micro Devices, RAD Lab,**

Bellevue, WA USA

*Internship*

May 19, 2008 – Aug. 15, 2008

Coded a functional simulation for AMD's **Lightweight Profiling** specification, a proposal for extending the AMD64 architecture to allow user-mode processes to efficiently gather performance data about their execution. Utilized **SimNow**, AMD's full-system functional simulator.

**Google**

Mountain View, CA USA

*Internship*

Jan. 27, 2008 – May 15, 2008

Constructed tools for visualizing click data for ads on mobile devices, with the goal of detecting invalid clicks. Analyzed data using **Sawzall**, a programming language designed for parallel analysis of large data sets.

**Intel, Programming Systems Lab**

Cambridge, MA USA

*Internship*

May 30, 2006 – Sept. 1, 2006

Implemented **Needle**, a transparent software transactional memory system based on **Pin**, a tool for dynamically instrumenting program binaries. Also investigated MySQL's InnoDB storage engine to attempt to try to convert the code to use transactions.

**MIT Undergraduate Research Opportunities Program**

Cambridge, MA USA

Undergraduate Research Opportunities Program (UROP) Student

- **SuperTech** Research Group June 2003 – December 2003  
Compiler development for **Cilk**, a language for multithreaded parallel programming. Modified Cilk's source-to-source compiler to add support for atomic transactions.

- SuperTech Research Group June 2002 – August 2002  
Project studying cache-oblivious algorithms and data structures.
- Advisor: Louis L. Bucciarelli June 2001 – August 2001, January 2002 – May 2002  
Assembled and programmed an electrical system to collect and transmit data from a rooftop photovoltaic module. Responsible for maintaining both hardware and Java code for processing and displaying real-time data. Developed a photovoltaic module simulation applet. See <http://pvbase.mit.edu>.

## FELLOWSHIPS

**Siebel Scholar, Class of 2005** — awarded annually for academic excellence and demonstrated leadership to 80 top students from the world’s leading graduate schools.

**MIT Presidential Fellowship**, 2004-05 (sponsored by Akamai) — MIT established the Presidential Fellowship program in 1999 to recruit outstanding students worldwide to pursue graduate studies at MIT.

## CONFERENCE PUBLICATIONS

1. **Executing Task Graphs Using Work-Stealing.**  
Kunal Agrawal, Charles E. Leiserson, and Jim Sukha. In *Proceedings of the 24th IEEE International Parallel and Distributed Processing Symposium (IPDPS)*, Atlanta, GA, USA. April 21, 2010.
2. **Helper Locks for Fork-Join Parallel Programming.**  
Kunal Agrawal, Charles E. Leiserson, and Jim Sukha. In *Proceedings of the 15th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP)*, Bangalore India, January 13, 2010.  
  
Also appears as poster at the *Indo-US Workshop on Parallelism*, January 9–10, 2010. Bangalore, India.
3. **Safe Open-Nested Transactions Through Ownership.**  
Kunal Agrawal, I-Ting Angelina Lee, and Jim Sukha. In *Proceedings of the 14th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP)* Raleigh, NC, USA. February 17, 2009.  
  
Other versions of this work include a technical report *MIT-CSAIL-TR-2008-038*, and a brief announcement in SPAA 2008.
4. **Nested Parallelism in Transactional Memory.**  
Kunal Agrawal, Jeremy T. Fineman, and Jim Sukha. In *Proceedings of the 13th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP)* Salt Lake City, UT, USA. February 20, 2008.
5. **Memory Models for Open-Nested Transactions.**  
Kunal Agrawal, Charles E. Leiserson, and Jim Sukha. In *Proceedings of the ACM SIGPLAN Workshop on Memory Systems Performance and Correctness*. San Jose, CA, USA. October 22, 2006.

## BRIEF ANNOUNCEMENTS

1. **Brief Announcement: Serial-Parallel Reciprocity in Dynamic Multithreaded Languages.**  
Kunal Agrawal, I-Ting Angelina Lee, and Jim Sukha. In *22nd ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*. June 13 – 15, 2010. Santorini, Greece.

2. **Brief Announcement: A Lower Bound for Depth-Restricted Work Stealing.**  
Jim Sukha. In *21st ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*. August 11–13, 2009. Calgary, Alberta, Canada.

## PRESENTATIONS

1. Executing Task Graphs Using Work-Stealing  
*International Parallel and Distributed Processing Symposium* April 21, 2010  
Invited talk at Intel April 7, 2010
2. Helper Locks for Fork-Join Parallel Programming  
*Principles and Practice of Parallel Programming* Jan. 13, 2010
3. Brief Announcement: A Lower Bound for Depth-Restricted Work Stealing  
*Symposium on Parallelism in Algorithms and Architectures* Aug. 12, 2009
4. Nested Parallelism in Transactional Memory  
*Workshop on Transactional Computing* Aug. 16, 2007
5. Safe Open-Nested Transactions  
Position paper at *IBM Workshop on Transactional Memory and Programming Technologies* March 5, 2007
6. Memory Models for Open-Nested Transactions  
*Workshop on Memory Systems Performance and Correctness* Oct. 22, 2006
7. Concurrent Cache-Oblivious B-Trees Using Transactional Memory  
*Workshop on Transactional Memory Workloads* June 10, 2006

## PROFESSIONAL SERVICE

Reviewed papers the following conferences:

- Principles and Practice of Parallel Programming (PPoPP) 2011
- International Parallel and Distributed Processing Symposium (IPDPS) 2010
- Symposium on Parallelism in Algorithms and Architectures (SPAA) 2010
- Symposium on Parallelism in Algorithms and Architectures (SPAA) 2009

Chair of Technical Committee, CSAIL Student Workshop 2007 and 2008

Webmaster for MIT EECS Graduate Students Association Fall 2007

Treasurer for MIT EECS Graduate Students Association 2005-06

## AWARDS

- Winner of Best Paper Award at CSAIL Student Workshop 2009.
- Harry W. Poole Scholar (MIT financial aid award) (2002-03, 2003-04)
- Letters of Commendation for MIT subjects: 6.042 (one of top 5/154, Fall 00), 6.001 (top 17/336, Spring 01), 6.002 (top 10/337, Spring 01), 6.003 (Fall 01), and 6.011 (Spring 02).
- Member of Phi Beta Kappa (2004)
- Member of Eta Kappa Nu (2003)
- **Interdisciplinary Contest in Modeling**: Member of 2000 NCSSM team ranked **Outstanding**.
- National Merit Scholarship (2000)
- Robert C. Byrd Honor's Scholarship (2000)
- Siemens Award for Advanced Placement (1998)