

Kunal Agrawal

Work Address

32 Vassar Street
Cambridge, MA 02139
kunal_ag@mit.edu

Home Address

24 Magazine Street #3
Cambridge, MA 02139
(650) 704 3274

Education

Massachusetts Institute of Technology

Ph.D. Candidate, Computer Science and Engineering 2003—May 2009 [Expected]

Thesis Topic: Parallel Programming for Multicores: Scheduling and Synchronization

National University of Singapore, Singapore-MIT Alliance

S.M., Computer Science July 2001—June 2002

Cumulative GPA: 5.0/5.0

Ramrao Adik Institute of Technology, Mumbai University

Bachelors of Engineering, Electronics Engineering July 1997—June 2001

Cumulative GPA: 5.0/5.0.

Experience

MIT CSAIL, Supercomputing Technologies Group

Cambridge, MA August 2003—present

Research Assistant. Worked on new paradigms for scheduling and synchronization. In the domain of scheduling, my contributions includes provably efficient algorithms for adaptive resource allocation and scheduling for dynamic multithreaded languages like Cilk, complexity results of scheduling workflow applications, and provably good cache-efficient schedulers for streaming applications. In addition, I implemented an adaptive scheduler in the Cilk runtime system. In the domain of synchronization, I have primarily worked on transactional memory semantics and design. In particular, we designed the first transactional memory system that guarantees provably good performance for transactions with nested parallelism and unbounded nesting depth.

Adviser: Prof. Charles E. Leiserson.

VMWare Inc.

Palo Alto, CA June 2006—August 2006

Software Intern. Developed and evaluated algorithms for load balancing and resource allocation for virtual machines on a cluster of computers. Programming language: C++.

Mentor: Minwen Ji

Singapore-MIT Alliance, National University of Singapore

Singapore June 2002—June 2003

Research Assistant and Teaching Assistant. Implemented a efficient page-level distributed shared memory system using MPI and C.

Advisor: Prof. Wong Weng Fai

MIT LCS, Compilers Group

Cambridge, MA Feb 2003—April 2003

Visiting Scholar. Implemented bit packing optimizations in the Streamit Compiler. Programming language: Java.

Advisor: Saman Amarasinghe

Kent Ridge Digital Labs

Singapore January 2002—June 2002

Research Intern. Worked on two bioinformatics projects called “Splice Site Recognition using Support Vector Machines” and “Use of Self Organizing Neural Networks as Filters of Clean Start Codon.”

Advisor: Dr. Vladimir Bajic

Bhabha Atomic Research Center

Mumbai, India July 2000—June 2001

Research Intern. Worked on design and Implementation of Micro controller Interface to Measure Reactor Fluid Levels. The project involved hardware design using VHDL programming.

Advisor: Dr Patil.

- Teaching** **MIT EECS Department, Women’s Technology Program**
 Cambridge, MA June 2003—August 2003
Mathematics Instructor. Independently designed and taught a condensed course on Discrete Mathematics in a summer program for talented high school girls. The program is designed to increase interest of women in engineering, especially electrical engineering and computer science.
- MIT EECS Department**
 Cambridge, MA Spring 2005, Fall 2005, Spring 2007
Teaching Assistant.
- Conference Publications**
- Adaptive Scheduling with Parallelism Feedback.**
 Kunal Agrawal, Yuxiong He, Wen Jing Hsu, and Charles E. Leiserson. In the *Proceedings of ACM/SIGPLAN Symposium of the Principles and Practices of Parallel Programming (PPOPP)* 2006.
 - An Empirical Evaluation of Work Stealing with Parallelism Feedback.**
 Kunal Agrawal, Yuxiong He, and Charles E. Leiserson. In the *Proceedings of the International Conference on Distributed Computing Systems (ICDCS)* 2006.
 - Work Stealing with Parallelism Feedback.**
 Kunal Agrawal, Yuxiong He, and Charles E. Leiserson. In the *Proceedings of the ACM/SIGPLAN Symposium of the Principles and Practices of Parallel Programming (PPOPP)* 2007.
 - Memory Models for Open-Nested Transactions.**
 Kunal Agrawal, Charles E. Leiserson, and Jim Sukha. In the *Proceedings of the ACM/SIGPLAN Workshop on Memory Systems Performance and Correctness (MSPC)* 2007.
 - Nested Parallelism in Transactional Memory.**
 Kunal Agrawal, Jeremy Fineman, and Jim Sukha. In the *Proceedings of the ACM/SIGPLAN Symposium of the Principles and Practices of Parallel Programming (PPOPP)* 2008.
 - Worst Page-Replacement Strategy.**
 Kunal Agrawal, Michael Bender and Jeremy Fineman. In the *Proceedings of the Forth International Conference on Fun with Algorithms (FUN)* 2007.
 - Mapping Linear Workflows with Computation/Communication Overlap**
 Kunal Agrawal, Anne Benoit and Yves Robert. In the *Proceedings of International Conference on Parallel and Distributed Systems (ICPADS)* 2008.
 - Safe Open-Nested Transactions Using Ownership**
 Kunal Agrawal, Angelina Lee and Jim Sukha. Technical Report MIT-CSAIL-TR-2008-038. *Submitted for Publication* 2008.
- Journal Publications**
- Adaptive Work Stealing with Parallelism Feedback**
 Kunal Agrawal, Yuxiong He, Wen Jung Hsu, and Charles Leiserson. To appear in *ACM Transactions on Computer Systems (TOCS)*
 - The Worst Page Replacement Strategy**
 Kunal Agrawal, Michael Bender and Jeremy Fineman. To appear in *ACM Transactions on Computer Systems (TOCS)*
- Conference Talks**
- Adaptive Scheduling with Parallelism Feedback**
Symposium of the Principles and Practices of Parallel Programming (PPOPP) 2006.
 - An Empirical Evaluation of Work Stealing with Parallelism Feedback.**
International Conference on Distributed Computing Systems (ICDCS) 2006.
 - Work Stealing with Parallelism Feedback.**
Symposium of the Principles and Practices of Parallel Programming (PPOPP) 2007.

	5. Nested Parallelism in Transactional Memory.	
	<i>Symposium of the Principles and Practices of Parallel Programming (PPOPP) 2008.</i>	
	6. Worst Page-Replacement Strategy.	
	<i>Intrenational Conference on Fun with Algorithms (FUN) 2007.</i>	
Invited Talks	Adaptive Scheduling with Parallelism Feedback.	
	<i>Stanford University</i>	2006.
	<i>Microsoft</i>	2007.
	<i>University of Paris 6</i>	2008.
	Feedback Driven Adaptive Scheduling	
	<i>NSF-NGS workshop held in conjunction with IPDPS</i>	2007
Patent	Computing the Processor Desires of Jobs in an Adaptively Parallel Scheduling Environment	
	<i>Co-authored with Charles E. Leiserson, Yuxiong He, and Wen Jing Hsu</i>	2006
	Under Review	
Grant	Feedback Driven Adaptive Scheduling	
	<i>Co-authored with Charles E. Leiserson (\$484,000 over 3 years)</i>	2006
Professional Service	Program Committee Chair and Organizer.	
	The Fourth CSAIL Student Workshop	2008
	Program Committee Member and Volunteer.	
	CSAIL Student Workshop	2005, 2006, 2007
	Reviewer.	
	Symposium on Paralellism in Algorithms and Architectures	2007
	European Conference on Parallelism	2005
	International Conference on High Performance Computing	2005
	Journal of Discrete Algorithms	
	Parallel Computing	
	Organizer.	
	Parallel Computing Reading Group	2004—2005
Honors	Merit award for outstanding performance in SMA5503: Design of Algorithms	2002
	Merit award for outstanding performance in SMA5506: Computer Systems Engineering.	2002
	2 nd among 120 students in the class in Bachelors of Electronics Engineering.	2001
	Finalist, Indian National Mathematics Olympiad	1996
References	1. Charles E. Leiserson	2. Michael Bender
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	cel@mit.edu	bender@cs.sunysb.edu
	3. Yves Robert	
	Voice: (+33) 4 72 72 85 86, Fax: (+33) 4 72 72 88 06	
	Yves.Robert@ens-lyon.fr	