

Nalini Vasudevan

EDUCATION

- PhD (with Distinction), Computer Science, **Columbia University**. (2007 - 2011)
Advisor: Prof. Stephen Edwards. GPA: 4.05 (on a scale of 4)
- MPhil, Computer Science, **Columbia University**. (2007 - 2010)
GPA: 4.05 (on a scale of 4)
- Master of Science, Computer Science, **Columbia University**. (2006 - 2008)
GPA: 4.05 (on a scale of 4)
- Bachelor of Engineering, Computer Science, **RV College of Engineering**, Visveswariah Technological University (VTU), India. (2001 - 2005)
First Class with Distinction, Eight Semesters aggregate - 85 %. GPA: 4 (on a scale of 4)

WORK

EXPERIENCE

- Software Engineer, **Google**, Mountain View (Mar 2014 - Present)
Search Infrastructure Group
Improving the latency of a Google search query
- Research Scientist, **Intel Labs**, Santa Clara (Feb 2011 - Mar 2014)
Programming Systems Lab
Designed and implemented aggressive loop level optimizations for high performance computing applications. Added new assembly level instructions to Intel's ISA.
- Graduate Research Assistant, **Columbia University**, New York (Jan 2007 - Jan 2011)
Languages and Compilers Group
Designed and implemented parallel models for computation.
- Research Co-op, **IBM T.J.Watson Research Center**, New York (Jan 2010 - Aug 2010)
Programming Technologies Group
Designed algorithms for scheduling and synchronization in the X10 concurrent model.
- Research Intern, Alcatel-Lucent **Bell Laboratories**, New Jersey (Jun 2009 - Aug 2009)
Computing and Software Principles Group
Designed and verified lock-free data structures for concurrent hash tables.
- Research Co-op, **IBM T.J.Watson Research Center**, New York (Jun 2008 - Aug 2008)
Programming Technologies Group
Designed synchronization algorithms in the X10 concurrent programming model.
- Research Intern, **Microsoft Research**, United Kingdom (Jun 2007 - Aug 2007)
Programming Principles and Tools Group
Designed and implemented a deterministic concurrent library in Haskell
- Software Engineer, **Yahoo R&D Center**, Bangalore (July 2005 - Feb 2006)
Yahoo Direct Ads Group
Developed a heuristic based trigger management system that maps yahoo users' events to triggers
- Research Intern, **Indian Institute of Science**, Bangalore (Jan 2005 - May 2005)
Communication and Networking Lab
Implemented localization techniques for ad-hoc sensor networks

AWARDS AND

HONORS

- **Intel High 5 Award** 2013
For extraordinary dedication to innovation

- **Intel Divisional Recognition Award** 2013
For 'above and beyond' accomplishment
- **Intel High 5 Award** 2011
For extraordinary dedication to innovation
- **PhD with Distinction** 2011
- **Google Anita Borg Scholar** 2010
One of 25 scholars in the US to receive the award.
- **3rd Place, ACM Student Research Competition** 2010
Held at the Conference on Programming Architectures and Compilation Techniques (PACT'10).
- **Google Grace Hopper Sponsorship** 2010
All-paid expenses to attend Grace Hopper Celebration 2010 in Atlanta.
- **NSF PACT Travel Grant** 2010
To present at PACT'10.
- **HiPC Scholarship** 2010
One of the top few posters from US-based students at HiPC '10.
- **ACM SRC Award** 2010
To take part in the student research competition at PACT'10.
- **HotPar Student Grant** 2010
To present at HotPar'10 Workshop.
- **ACM SIGPLAN Travel Award** 2010
To attend the PLDI'10 conference at Toronto, Canada.
- **TCPP Travel Award** 2010
To present at the IPDPS PhD Forum in Atlanta.
- **Yahoo!/Columbia Gracehopper Scholarship** 2009
All expenses paid scholarship to attend the Grace Hopper Celebration'09 at Tucson.
- **ACM SIGPLAN PAC Award** 2009
ACM travel award to attend the PLDI'09 Conference at Dublin, Ireland.
- **Google PLDI'2009 Grant** 2009
One of 3 students to receive the Google grant to attend PLDI'09 at Dublin, Ireland.
- **CRA-W Travel Grant** 2009
Financial aid to attend the CRA-W Grad Cohort Program at San Mateo.
- **CRA/CDC Travel Scholarship** 2009
Selected to attend the PLOSA'09 Workshop at Washington D.C.
- **IBM Thanks! Award** 2008
Awarded during my internship at IBM Research in 2008.
- **TCPP Travel Award** 2008
To present at the IPDPS Conference at Miami.
- **Artist2 Network of Excellence Grant** 2008
Sponsored trip to the Artist2 Summer School in Grenoble, France.
- **Onassis Foundation Financial Aid** 2008
Travel aid to attend the 2008 Lectures in Computer Science, Greece.
- **NSF-Grace Hopper Scholarship** 2007
Selected to attend the Grace Hopper Conference at Orlando.

- **CRA-W Travel Support** 2007
Financial aid to attend the CRA-W Grad Cohort Program at San Francisco.
- **Best Undergraduate Thesis of the year** 2005
Titled 'Localization of Ad-Hoc Sensor Networks', RV College of Engineering (VTU).
- **Merit Seat** 2001 - 2005
80% tuition waiver during all four years of undergraduate education. Given to top 10%.
- **Best Project Award** 2004
Project On 'Speech Recognition using ANNs' presented at IOTA 2004, CS Tech Fest, Bangalore, India.
- **Qualified in Graduate Aptitude Test in Engineering (GATE)** 2004
Obtained a percentile of 99.13. GATE is conducted by the seven IITs and IISc in India.
- **Runner-Up at Date with .Net** 2004
A Spot Programming Contest organized by .NET Users Group, Bangalore, India.
- **Third place in Spot Programming Contest at IOTA-2004** 2004
Inter-Collegiate Computer Science Fest, Bangalore, India.
- **First place at Impulse'04** 2004
Inter-collegiate System Modeling Event, Bangalore, India
- **51st rank in the Common Engineering Entrance Test (CET)** 2001
out of 100,000 candidates, Karnataka, India.
- **Commended by the Assoc. of Mathematics Teachers of India** 1998
in association with the National Board of Higher Mathematics, India.
- **Most determined student of the year** award 1998
Cluny Convent High School, Bangalore, India.

TEACHING

- **Faculty Member**, Columbia Video Network 2009 - 2010
Taught the COMS 3101-V03 C Programming Language course offered to off-campus students
- **Program Coordinator/Instructor, Emerging Scholars Program**, Columbia University 2009 - 2010
Organized weekly workshops to encourage freshmen to major in Computer Science
- **Instructor**, Columbia University 2009
Taught the COMS 3101-3 C Programming Language course
Designed my own class structure and slides, prepared assignments and graded them
- **Teaching Assistant**, Computer Science, Columbia University
 - CSEE W4840 course on Embedded System Design 2009
 - COMS W4115 course on Programming Languages and Translators 2008
 - COMS 3157 course on Advanced Programming 2008
 - COMS 1003 course on Introduction to Computer Programming in C 2006

SERVICE

- **Program Committee Member**
 - Workshop on Interaction and Concurrency Experience (ICE 2011) 2011
- **Session Chair**
 - IEEE/ACM International Conference on Computer-Aided Design (ICCAD 2011) 2011
- **Reviewer** for the following books/journals/conferences,

- ◇ Conference on Parallel Architectures and Compilation Techniques (PACT 2012) 2012
- ◇ IEEE Conference on Parallel and Distributed Systems (ICPADS 2011) 2011
- ◇ Symposium on Principles and Practice of Parallel Programming (PPOPP) 2010
- ◇ Fundamenta Informaticae Journal 2010
- ◇ Springer Book on Correct-by-Construction Embedded Software Synthesis 2009
- ◇ ACM Conference on Languages, Compilers and Tools for Embedded Systems (LCTES) 2009
- ◇ ACM/IEEE Conference on Hardware/Software Codesign (CODES+ISSS) 2008
- **Memberships: IEEE, ACM, SIGPLAN, USENIX** 2008-2011
- **Panelist, Grace Hopper Celebration 2010** 2010
A panel on *Beyond your technical skills: What makes a successful researcher?*
- **PhD Committee Member**, Department of Computer Science, Columbia University 2008-2010
The PhD committee revises policies of the CS PhD program
- **Mentor, Women in Computer Science (WICS)**, Columbia University 2008-2010
Provided assistance to female students in courses, research work and job search
- **Speaker, LINUXASIA 2006**, open source conference in Asia 2006
Demonstrated Gambas, an open source environment like Visual Basic.
- **Speaker, FOSS.IN 2005**, India's largest free and open source conference 2005
A hands-on session about extensions in Firefox
- **Organizer of IOTA 2003**, Technical Fest, India. 2003
Conducted events such as spot programming and debugging

PATENTS

1. Cache Based DeAliaser for Speculative Vectorization [PTO pending] 2014
Nalini Vasudevan, Youfeng Wu, Cheng Wang, Sara Bagsorkhi, Albert Hartono
2. Methods and systems to vectorize frequently executed data parallel computer program loops. [PTO pending] 2013
Jay Bharadwaj, Nalini Vasudevan, Albert Hartono, Sara Bagsorkhi
3. Efficient code generation for partial vectorization [PTO pending] 2012
Nalini Vasudevan, Jay Bharadwaj, Chris Hughes, Milind Girkar, Mark Charney, Robert Valentine, Victor Lee, Daehyun Kim, Albert Hartono, Sara S. Bagsorkhi
4. Speculative non-faulting loads and gathers [PTO pending] 2012
Jay Bharadwaj, Nalini Vasudevan, Victor Lee, Sara Bagsorkhi, Albert Hartono, Kim Daehyun
5. Instruction to reduce elements in a vector register with strided access pattern [PTO pending] 2012
Albert Hartono, Jay Bharadwaj, Nalini Vasudevan, Sara Bagsorkhi, Victor Lee, Kim Daehyun
6. Instruction to reduce elements within a vector register [PTO pending] 2012
Victor Lee, Jay Bharadwaj, Kim Daehyun, Nalini Vasudevan, Tin-fook Ngai, Albert Hartono, Sara Bagsorkhi
7. Instruction to select the first or last element of a vector computation [PTO pending] 2011
Jay Bharadwaj, Nalini Vasudevan, Victor Lee, Kim Daehyun, Albert Hartono, Sara Bagsorkhi
8. Instructions to propagate conditionally evaluated values in SIMD/vector execution [PTO pending] 2011
Jay Bharadwaj, Nalini Vasudevan, Victor Lee, Kim Daehyun, Albert Hartono, Sara Bagsorkhi
9. Speculation support to enable vectorization [PTO pending] 2011
Jay Bharadwaj, Nalini Vasudevan, Victor Lee, Kim Daehyun, Albert Hartono, Sara Bagsorkhi

10. Instruction to break up vector execution due to data dependency [PTO pending] 2011
Victor Lee, Kim Daehyun, Tin-fook Ngai, Jay Bharadwaj, Albert Hartono, Nalini Vasudevan, Sara Bagsorkhi
11. Instruction to detect identical elements within a vector register [PTO pending] 2011
Victor Lee, Kim Daehyun, Tin-fook Ngai, Jay Bharadwaj, Albert Hartono, Nalini Vasudevan, Sara Bagsorkhi
12. Fast Biased Locks [SNo. 12/873,766. PTO Pending] 2010
Kedar Namjoshi, Nalini Vasudevan

PUBLICATIONS

Book Chapters

1. Compiling SHIM 2010
Stephen A. Edwards, Nalini Vasudevan
Synthesis of Embedded software - Frameworks and Methodologies for Correctness by Construction
Software Design, Springer, 1st edition, 2010.

Journal Papers

2. Buffer Sharing in Rendezvous Programs 2010
Nalini Vasudevan, Stephen A. Edwards
IEEE Transactions on Computer Aided Design (TCAD 2010).

Conference Papers

3. Simple and Fast Biased Locks 2010
Nalini Vasudevan, Kedar Namjoshi, Stephen A. Edwards
Conference on Parallel Architectures and Compilation Techniques (PACT 2010), Vienna, Austria.
4. Compositional Deadlock Detection for Rendezvous Communication 2009
Baolin Shao, Nalini Vasudevan, Stephen A. Edwards
International Conference on Embedded Systems (EMSOFT 2009), Grenoble, France. Acceptance Rate = $33/106 = 31\%$.
5. A Determinizing Compiler 2009
Nalini Vasudevan, Stephen A. Edwards
ACM SIGPLAN Conference on Programming Languages Design and Implementation (PLDI 2009) - Fun Ideas and Thoughts (FIT), Dublin, Ireland.
6. Buffer Sharing in CSP-like programs 2009
Nalini Vasudevan, Stephen A. Edwards
7th ACM-IEEE International Conference on Formal Methods and Models for Codesign (MEMOCODE 2009), Cambridge, USA.
7. Compile-Time Analysis and Specialization of Clocks in Concurrent Programs 2009
Nalini Vasudevan, Olivier Tardieu, Julian Dolby, Stephen A. Edwards
International Conference on Compiler Construction (CC 2009), Lecture Notes in Computer Science, York, UK. Acceptance Rate: $141/532 = 26\%$.
8. Celling SHIM: Compiling Deterministic Concurrency to a Heterogeneous Multicore 2009
Nalini Vasudevan, Stephen A. Edwards
24th Annual ACM Symposium on Applied Computing (SAC 2009), Honolulu, Hawaii, USA. Acceptance Rate: $316/1084 = 29\%$.
9. Static Deadlock Detection for the SHIM Concurrent Language 2008
Nalini Vasudevan, Stephen A. Edwards

6th ACM-IEEE International Conference on Formal Methods and Models for Codesign (MEMOCODE 2008), Anaheim, USA.

10. A Deterministic Multi-Way Rendezvous Library for Haskell 2008
Nalini Vasudevan, Satnam Singh, Stephen A. Edwards
22nd IEEE International Parallel and Distributed Symposium (IPDPS 2008), Miami, Florida, USA.
Acceptance Rate: 105/410 = 25.
11. Programming Shared Memory Multiprocessors with Deterministic Message-Passing Concurrency:
Compiling SHIM to Pthreads 2008
Stephen A. Edwards, Nalini Vasudevan, Olivier Tardieu
Design Automation and Test in Europe (DATE 2008). Acceptance Rate: 198/839 = 23%.
12. Comparative Analysis of Neural Network Techniques Vs Statistical Methods in Capacity
Planning 2007
Nalini Vasudevan, Gowri C. Parthasarathy
5th IEEE ACIS International Conference on Software Engineering Research, Management & Applications (SERA 2007).

Workshop Papers

13. Determinate Deadlock-free X10 and its compilation 2010
Nalini Vasudevan, Vijay Saraswat, Olivier Tardieu, Julian Dolby
Workshop on Partitioned Global Address Space (PGAS 2010), New York, USA.
14. Deterministic Deadlock-free Concurrency 2010
Nalini Vasudevan
High Performance Computing - Student Research Symposium (HiPC 2010), Bangalore, India.
15. Determinism Should Ensure Deadlock Freedom 2010
Nalini Vasudevan, Stephen A. Edwards
2nd USENIX Workshop on Hot Topics in Parallelism (HotPar 2010), Berkeley, California.
16. Ensuring Deterministic Concurrency through Compilation 2010
Nalini Vasudevan, Stephen A. Edwards
24th IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPS 2010), Atlanta, April 2010.
17. Iterative Image Based Video Summarization by Node Segmentation 2006
Nalini Vasudevan, Arjun Jain, Himanshu Agrawal
Information Technology and Sustainable Development, Saudi Computer Society (SCS), Riyadh, Saudi Arabia, March 2006.
18. Linux Cluster Possibilities in 3-D Photo Quality Imaging and Animation 2005
Arjun Jain, Himanshu Agrawal, Nalini Vasudevan
World Academy of Science, Engineering and Technology (WASET), November 2005.
19. A Connectionist Framework For Feature Based Speech Recognition Using Artificial Neural
Networks 2004
Nalini Vasudevan, Anushruthi Rai, Arjun Jain
18th CSI Student Convention, Computer Society of India, Bangalore, India, Nov 2004.

Technical Reports

20. Efficient, Deterministic, and Deadlock-free Concurrency 2011
PhD Thesis, Technical Report CUCS.013.11, Columbia University, March 2011.
21. Static Deadlock Detection in SHIM with an Automata Type Checking System 2008

Dave Aaron Smith, Nalini Vasudevan, Stephen A. Edwards

Technical Report CUCS.053.08, Columbia University, Department of Computer Science, New York, USA, December 2008.

22. Analysis of Clocks in X10 Programs (Extended) 2008

Nalini Vasudevan, Olivier Tardieu, Julian Dolby, Stephen A. Edwards

Technical Report CUCS.052.08, Columbia University, Department of Computer Science, New York, USA, December 2008.

23. A JPEG Decoder in SHIM 2006

Nalini Vasudevan, Stephen A. Edwards

Technical Report CUCS.48.06, Columbia University, Department of Computer Science, New York, USA, December 2006.

TALKS

Invited Talks

1. Efficient, Deterministic and Deadlock-free Concurrency
Intel Labs, Santa Clara, Aug 2010. 2010
2. Static Deadlock Detection in Concurrent Programming Languages
At IBM Research, Watson Research Center, New York, May 2008. 2008
3. Gambas: Gambas Almost Means BASic:
 - At LINUX ASIA/2006, Open Source conference and exposition in Asia. 2006
 - At RV College of Engineering, India. 2005
 - At FOSS.IN/2004, India's largest Free and Open Source symposium. 2004
4. Add More to Firefox
At FOSS.IN/2005, India's largest Free and Open Source symposium. 2006

Conference Presentations

5. Simple and Fast Biased Locks 2010
International Conference on Programming Architectures and Compilation Techniques (PACT 2010), Vienna, Austria.
6. Buffer Sharing in CSP-like programs 2009
7th ACM-IEEE International Conference on Formal Methods and Models for Codesign (MEMOCODE 2009), Cambridge, USA.
7. A Determinizing Compiler 2009
ACM SIGPLAN Conference on Programming Languages Design and Implementation (PLDI 2009) - Fun Ideas and Thoughts (FIT), Dublin, Ireland.
8. Compile-Time Analysis and Specialization of Clocks in Concurrent Programs 2009
International Conference on Compiler Construction (CC 2009), York, UK.
9. Static Deadlock Detection for the SHIM Concurrent Language 2008
6th ACM-IEEE International Conference on Formal Methods and Models for Codesign (MEMOCODE 2008), Anaheim, USA.
10. A Deterministic Multi-Way Rendezvous Library for Haskell 2008
22nd IEEE International Parallel and Distributed Symposium (IPDPS 2008), Miami, Florida, USA.

POSTERS

- *D²C*: Deterministic, Deadlock-free Concurrency
Internal Conference on Parallel Architectures and Compiler Techniques (PACT 2010), Vienna, Austria.
2010
- Ensuring Deterministic Concurrency through Compilation
IEEE International Parallel & Distributed Processing Symposium (IPDPS), Atlanta. 2010
- Preventing Races and Deadlocks in Concurrent Programs: The SHIM Approach
 - Programming Languages, Operating Systems and Architecture Workshop 2009
 - CRA-W Grad Cohort, San Mateo 2009