

Pramod Ganapathi | Curriculum Vitae

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Education

Doctor of Philosophy (Ph.D.) in Computer Science **Aug 2011–Dec 2016**
Stony Brook University (SBU) *Stony Brook, USA*

Thesis: Automatic Discovery of Efficient Divide-&-Conquer Algorithms for Dynamic Programming Problems

Advisor: Prof. Rezaul Chowdhury

Bachelor of Engineering (B.E.) in Computer Science **Sep 2005–Jun 2009**
Sri Jayachamarajendra College of Engineering (SJCE) *Mysuru, India*

Experience

Entrepreneurship

Founder & CEO **May 2017–May 2018**
Learning is Beautiful *Bengaluru, India*

The aim of the company is to create entertaining animated videos on highly practical ideas from the most important topics in life and the world.

- Envisioned and wrote a strong business plan.
- Researched and wrote 50+ business case scenarios through stories, for business management.
- Hired professional American voice-over artists for 40+ business case scripts.
- Created a proof-of-concept of a high-budget high-quality animated higher educational course hiring professional East European 2-D animators. We used the GoAnimate platform.
- Networked with Professors, Investors, Animation Institutes, and Entrepreneurs.
- Selected as a Top-3000 startup to transform India, through an initiative called SmartFifty, by The Government of India and Indian Institute of Management Calcutta.

Research

Research Assistant **Apr 2012–Dec 2016**
Stony Brook University *Stony Brook, USA*

- Doctoral Advisor: Rezaul Chowdhury. Funded by National Science Foundation (NSF) grants CCF-1162196, CCF-1439084, and CNS-1553510.
- Designed algorithms/frameworks to (semi-)automatically discover efficient and portable algorithms for a wide class of dynamic programming (DP) problems.
- Designed 40+ algorithms. Co-authored 10+ refereed research papers.
- Specialties: Algorithms. Computer-discovered-algorithms. Data structures. Automation. Dynamic programming. Divide-and-conquer. Parallel algorithms. Cache-efficient algorithms.

Teaching.....

Teaching Assistant

Aug 2011–Jun 2012

Stony Brook University

Stony Brook, USA

Involved in taking recitation classes to teach problem-solving, grading, holding office hours, and problem-solving for the following undergraduate courses consisting of around 20-30 students:

- CSE 150: Foundations of computer science (Honors) - Assisted Leo Bachmair. Fall 2011.
- CSE 303: Theory of computation - Assisted Ker-I Ko. Fall 2011.
- CSE 160: Computer science A (Honors) - Assisted Eugene Stark. Spring 2012.
- CSE 350: Theory of computation (Honors) - Assisted Leo Bachmair. Spring 2012.

Founder & President

Aug 2013–Jun 2016

Stony Brook Puzzle Society

Stony Brook, USA

Conducted weekly sessions on algorithmic, mathematical, and logic puzzles to Ph.D., master's, and bachelor's students.

Industry.....

Software Engineer

Jul 2009–Jul 2011

IBM India Software Labs.

Bengaluru, India

Product - WebSphere Message Queue (WMQ) 7.1 .NET Clients. Language - C#.

Involved in the test development of the three important features:

- *Client Channel Weights*. A small feature that enables the client to choose a particular channel to connect to a server among many channels depending on the weights assigned on the channels. 30+ test cases.
- *Client Auto-reconnect*. A huge feature that enables the client to reconnect to a server automatically when the connection gets broken. 200+ test cases.
- *Distributed Transactions*. A huge feature that enables the transactions involving WMQ, SQL, and others to either commit or rollback depending on the transaction's success or failure, respectively. 200+ test cases.

Patents

- Pramod Ganapathi and Darshan S. Palasamudram. Balancing the Loads of Servers in a Server Farm Based on an Angle Between Two Vectors. IBM. *United States Patent 8676983 B2*. 2014. (This is an algorithm to accurately load balance a large number of streaming client requests on servers that have different serving capacities.)

Publications

In mathematics and theoretical computer science, we follow the convention of listing authors in alphabetical order of their last names.

Journal Papers.....

- Rezaul Chowdhury, Pramod Ganapathi, Jesmin Jahan Tithi, Stephen Tschudi, Charles Bachmeier, Bradley Kuszmaul, Charles E. Leiserson, Armando Solar-Lezama, and Yuan Tang. Autogen: Automatic Discovery of Cache-Oblivious Parallel Recursive Algorithms for Solving Dynamic Programs. (Invited Paper) *Transactions on Parallel Computing (TOPC)*. 2017. 4(1):4. **Special Issue for Top Papers from PPOPP 2016.**

- Michael A. Bender, Rezaul Chowdhury, Pramod Ganapathi, Samuel McCauley, and Yuan Tang. The Range 1 Query (R1Q) Problem. (Invited Paper) *Theoretical Computer Science (TCS)*. 2016. **Special Issue for Top Papers from COCOON 2014**.

Conference / Workshop Papers.....

- Rezaul Chowdhury, Pramod Ganapathi, Yuan Tang, and Jesmin Jahan Tithi. Provably Efficient Scheduling of Cache-Oblivious Wavefront Algorithms. *Proceedings of the 29th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*. 2017. pages 339-350. Washington DC. USA.
- Rezaul Chowdhury, Pramod Ganapathi, Jesmin Jahan Tithi, Charles Bachmeier, Bradley Kuszmaul, Charles E. Leiserson, Armando Solar-Lezama, and Yuan Tang. Autogen: Automatic Discovery of Cache-Oblivious Parallel Recursive Algorithms for Solving Dynamic Programs. *Proceedings of the 20th Symposium on Principles and Practice of Parallel Programming (PPoPP)*. 2016. 51(8). article 10. Barcelona. Spain.
- Rezaul Chowdhury, Pramod Ganapathi, Vivek Pradhan, Jesmin Jahan Tithi, and Yunpeng Xiao. An Efficient Cache-oblivious Parallel Viterbi Algorithm. *Proceedings of the 22nd International European Conference on Parallel and Distributed Computing (Euro-Par)*. 2016. LNCS 9833. pages 574-587. Grenoble. France.
- Michael Bender, Rezaul Chowdhury, Alexander Conway, Martín Farach-Colton, Pramod Ganapathi, Rob Johnson, Samuel McCauley, Bertrand Simon, and Shikha Singh. The I/O Complexity of Computing Prime Tables. *Proceedings of the 12th Latin American Theoretical Informatics Symposium (LATIN)*. 2016. LNCS 9644. pages 192-206. Ensenada. Mexico.
- Jesmin Jahan Tithi, Pramod Ganapathi, Aakrati Talati, Sonal Aggarwal, and Rezaul Chowdhury. High-Performance Energy-Efficient Recursive Dynamic Programming with Matrix-Multiplication-Like Flexible Kernels. *Proceedings of the 29th IEEE International Parallel and Distributed Processing Symposium (IPDPS)*. 2015. pages 303-312. Hyderabad. India.
- Yuan Tang, Ronghui You, Haibin Kan, Jesmin Jahan Tithi, Pramod Ganapathi, and Rezaul Chowdhury. Cache-Oblivious Wavefront: Improving Parallelism of Recursive Dynamic Programming Algorithms without Losing Cache-efficiency. *Proceedings of the 20th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP)*. 2015. pages 205-214. San Francisco. USA.
- Michael Bender, Rezaul Chowdhury, Pramod Ganapathi, Samuel McCauley, and Yuan Tang. The Range 1 Query (R1Q) Problem. *Proceedings of the 20th International Conference on Computing and Combinatorics (COCOON)*. 2014. pages 116-128. Atlanta. USA.
- Yuan Tang, Ronghui You, Haibin Kan, Jesmin Jahan Tithi, Pramod Ganapathi, and Rezaul Chowdhury. Improving Parallelism of Recursive Stencil Computations without Sacrificing Cache Performance. *Proceedings of the SPLASH Workshop on Stencil Computations (WOSC)*. 2014. Portland. USA.

Short Papers / Brief Announcements / Posters.....

- Rezaul Chowdhury, Pramod Ganapathi, Yuan Tang, and Jesmin Jahan Tithi. Provably Efficient Scheduling of Cache-Oblivious Wavefront Algorithms. *Proceedings of the 22nd*

SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP). 2017. Austin. USA.

- Jesmin Jahan Tithi, Pramod Ganapathi, Rezaul Chowdhury, and Yuan Tang. Cache-Oblivious Wavefront Algorithms for Dynamic Programming Problems: Efficient Scheduling with Optimal Cache Performance and High Parallelism. *Proceedings of the 29th High Performance Computing, Networking Storage and Analysis (SC)*. 2016. Salt Lake City. USA.
- Jesmin Jahan Tithi, Pramod Ganapathi, Aakrati Talati, and Rezaul Chowdhury. High-performance Recursive Dynamic Programming for Bioinformatics using MM-like Flexible Kernels. *Proceedings of the 5th ACM Conference on Bioinformatics, Computational Biology, and Health Informatics (ACM BCB)*. 2014. pages 600-601. Newport Beach, USA.
- Rezaul Chowdhury, Pramod Ganapathi, and Yuan Tang. The R1Q Problem. *Proceedings of the 22nd Annual Fall Workshop on Computational Geometry (FWCG)*. 2012. University of Maryland. USA.

In Preparation

Books.....

- Pramod Ganapathi. **Thrill & Joy: Classic Mathematical Puzzles with Solutions.**

Papers.....

- Rama Badrinath, Pramod Ganapathi, and Abhiram Natarajan. A Framework to Design Combinatorial Algorithms.
- Mohammad Mahdi Javanmard, Pramod Ganapathi, Rathish Das, Zafar Ahmad, Stephen Tschudi, and Rezaul Chowdhury. Toward Efficient Architecture-Independent Algorithms for Dynamic Programs.
- Rezaul Chowdhury and Pramod Ganapathi. A Framework to Design Permutation Algorithms.
- Rezaul Chowdhury and Pramod Ganapathi. Divide-and-Conquer Variants of Bubble, Selection, and Insertion Sorting Algorithms.

Talks

- Provably Efficient Scheduling of Cache-Oblivious Wavefront Algorithms.
 - Indian Institute of Science (IISc). Bengaluru. India. Host: Uday Bondhugula. 2017.
 - Indian Institute of Technology (IIT). Chennai. India. Host: Rupesh Nasre. 2017.
- An Efficient Cache-Oblivious Parallel Viterbi Algorithm.
 - 22nd Euro-Par. Grenoble. France. 2016.
- Autogen: Automatic Discovery of Cache-Oblivious Parallel Recursive Algorithms to Solve Dynamic Programs.
 - 20th PPOPP. Barcelona. Spain. 2016.
 - Indian Institute of Technology (IIT). Chennai. India. Host: Rupesh Nasre. 2016.
 - Institute of Advanced Computational Science (IACS). Stony Brook. USA. 2016.

- Algorithms seminar. Stony Brook. USA. 2016.
- Indian Institute of Science (IISc). Bengaluru. India. Host: R. Govindarajan. 2015.
- o The Range 1 Query (R1Q) Problem.
 - 20th COCOON. Georgia State University. Atlanta. USA. 2014.
 - 22nd FWCG. University of Maryland. Maryland. USA. 2012.
- o Message Notification Management in Mobiles.
 - Global IBM Hackday. Bengaluru. India. 2010.
- o Enhancements to Sametime Announcements.
 - Global IBM Hackday. Bengaluru. India. 2010.
- o Remote Desktop Connect Through Sametime.
 - Global IBM Hackday. Bengaluru. India. 2009.
- o An Algorithm to Generate Permutations Using Rotations. 2009.
 - IEEE National-level Fest - Cyberia. SJCE. Mysuru. India.
 - National-level Competition - Anveeksha. St. Aloysius college. Mangalore. India.
 - State-level Technical Symposium - TechZone. JNNCE. Shimoga. India.
 - State-level Competition. SDMCET. Dharwad. India.
 - State-level Competition. BIT. Bengaluru. India.
- o An Algorithm to Generate Anagrams.
 - IEEE National-level Fest - Cyberia. SJCE. Mysuru. India. 2008.

Students Advised

Master's.....

- o Matthew Fleishman. Autogen C++. 2015-2016.
now @ Intelligent Product Solutions.
- o Nitish Garg. Space-bounded Schedulers with Time Stamps. 2015-2016.
now @ Intel.
- o Anshul Anshul. Space-bounded Schedulers with Time Stamps. 2015-2016.
now @ SpringPath.
- o Isha Khanna. Empirical Analysis of Space-Parallelism Tradeoff in Recursive DP Algorithms. 2015-2016. now @ Amazon.
- o Akhil Tiwari. A Cache-Oblivious Wavefront Algorithm for QR Decomposition. 2015-2016.
now @ Tower Research Capital.
- o Vivek Pradhan. Provably Cache-Efficient Viterbi Algorithm. 2014-2015.
now doing Ph.D. @ University of Texas, Austin.
- o Premadurga Kolli. Space-Parallelism Trade-off in Recursive DP Algorithms. 2014-2015.
now @ PernixData.
- o Yunpeng Xiao. Implementation of a High-Performance Viterbi Algorithm. 2014-2015.
now @ Microsoft.

Bachelor's.....

- o Stephen Tschudi. Autogen and Autogen-Fractile. 2015-2016.
now @ Google.
- o Charles Bachmeier. Extend Autogen Implementation. Summer 2013.

now @ Capital One.

Professional Service

External Reviewer.....

- 27th Symposium on Parallelism in Algorithms and Architectures (SPAA). 2015.
- 9th International Workshop on Algorithms and Computation (WALCOM). 2015.
- 21st International Conference on High Performance Computing (HiPC). 2014.
- 11th Latin American Theoretical INformatics Symposium (LATIN). 2013.

Awards

- Selected (12 out of 20 dissertations) for Dissertation Showcase program. International Conference for High Performance Computing, Networking, Storage, and Analysis (SC). 2016
- Institute of Advanced Computational Science Travel Award. SC. 2016.
- NSF Travel Award. 20th Symposium on Principles and Practice of Parallel Programming (PPoPP). 2016.
- NSF/TCPP Travel Award. 29th Parallel & Distributed Processing Symposium (IPDPS). 2015.
- IACS Young Writer's Award. For first publication. 2014.
- ACM-SIGACT Travel Award. 46th Symposium on Theory of Computing (STOC). 2014.
- ACM-SIAM Travel Award. 25th Symposium on Discrete Algorithms (SODA). 2014.
- Best Poster Award for R1Q. Graduate Research Conference. Best out of 50+ posters. Stony Brook. 2013.
- Special Computer Science Departmental Fellowship, Stony Brook University. 2011–2012.
- Rank 1. Math Quiz. CSI-Technologix. SJCE. Mysuru. 2006.
- Rank 3. Math Quiz. Vijaya Pre-University College. Bengaluru. 2005.
- Rank 1. Math Quiz. Vijaya Pre-University College. Bengaluru. 2004.
- Rank 60. National-level Infosys Mathematics Olympiad. 2004.
- State-level National Talent Search Examination (NTSE) Scholarship. Rank: 27/15000+. Karnataka. 2003-2005.
- Top-33 out of 1500+. MathWorld's Math Quiz. Bengaluru. 2004.

Academic Projects

- *Bayesian Face Revisited: A Joint Formulation*. Implemented three algorithms from a research paper published in European Conference on Computer Vision (ECCV 2012), to check if two images are of the same person. Matlab. Stony Brook University. USA. 2012.
- *Image Deformation Using Moving Least Squares*. Implemented the algorithm from a research paper published in Special Interest Group on Computer GRAPHics and Interactive Techniques (SIGGRAPH 2006) to deform an image based on a fixed number of control points. C++. Matlab. OpenGL. Stony Brook University. USA. 2012.

- *n-grams*. Designed an algorithm to reconstruct chunks of a book from a multiset of *n-grams*. C++. Stony Brook University. USA. 2011.
- *A Face's Parent/Offspring Determination Using Geometric Features & Principal Components Analysis*. Designed an algorithm for identifying offspring from a dataset with a good probability. Matlab. Mysuru. India. 2008-2009.
- *Optical Character Recognition*. Designed and implemented algorithms for recognizing Malayalam characters. C++. Mysuru. India. 2008.

References

Rezaul Chowdhury: Associate Professor. Department of Computer Science. Stony Brook University. New York 11794-2424. USA. Email: rezaul@cs.stonybrook.edu. Phone: (+1) 631-632-8959.

Yanhong Annie Liu: Professor. Department of Computer Science. Stony Brook University. New York 11794-2424. USA. Email: liu@cs.stonybrook.edu. Phone: (+1) 631-632-8463.

Michael A. Bender: Professor. Department of Computer Science. Stony Brook University. New York 11794-2424. USA. Email: bender@cs.stonybrook.edu. Phone: (+1) 631-632-7835.

Yuan Tang: Associate Professor. School of Computer Science. School of Software. Fudan University. Shanghai 200433. China. Email: yuantang@csail.mit.edu. Phone: (+86) 139-1704-7105.