

# Grey Ballard

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PO Box 7311 • Computer Science Department • Wake Forest University • Winston Salem, NC 27106

## Professional

- Assistant Professor** 2016 – present  
Wake Forest University Department of Computer Science, Winston Salem NC
- Harry S. Truman Postdoctoral Fellow** 2013 – 2016  
Sandia National Laboratories, Livermore CA

## Education

- Ph.D. in Computer Science** Fall 2008 – Spring 2013  
University of California Berkeley, with a Designated Emphasis in Computational Science and Engineering  
Advisor: James Demmel, Thesis: Avoiding Communication in Dense Linear Algebra
- M.A. in Mathematics** Fall 2006 – Spring 2008  
Wake Forest University, Advisor: John Baxley
- B.S. in Mathematics and Computer Science** Fall 2002 – Spring 2006  
Wake Forest University, *summa cum laude* with honors in mathematics and honors in computer science

## Honors and Awards

- ICDM Best Paper Award** 2015  
Awarded by the program committee, with coauthors Tamara Kolda, Ali Pinar, and C. Seshadri
- ACM Doctoral Dissertation Award - Honorable Mention** 2014  
Presented annually to the authors of the best doctoral dissertations in computer science and engineering
- Harry S. Truman Fellowship in National Security Science and Engineering** 2013  
Three year fellowship at Sandia National Laboratories providing the opportunity for recipients to pursue independent research in the national interest
- IPDPS Best Paper Award in Algorithms Track** 2013  
Awarded by the program committee, with coauthors Dulceneia Becker, James Demmel, Jack Dongarra, Alex Druinsky, Inon Peled, Oded Schwartz, Sivan Toledo, and Ichitaro Yamazaki
- C.V. Ramamoorthy Distinguished Research Award** 2012  
Awarded by the UC Berkeley EECS Student Awards Committee, based on outstanding contributions by a computer science graduate student to a new research area in computer science and engineering
- SIAM SIAG/Linear Algebra Prize** 2012  
Awarded triennially by prize committee, with co-authors James Demmel, Olga Holtz, and Oded Schwartz
- SPAA Best Paper Award** 2011  
Awarded by program committee, with co-authors James Demmel, Olga Holtz, and Oded Schwartz
- William C. and Ruth N. Archie Award** 2006  
Awarded to outstanding senior demonstrating commitment to liberal learning, scholarship, and ideals of WFU
- John Y. Phillips Prize in Mathematics** 2006  
Awarded by WFU mathematics department to the outstanding graduating senior
- Walt Chyzowych Award** 2006  
Awarded by the WFU men's soccer coaching staff to the player who most embodies the ideals of the program
- Edwin G. Wilson Male Student Athlete of the Year** 2006

## Publications

### Journal Papers

1. MPI-FAUN: An MPI-Based Framework for Alternating-Updating Nonnegative Matrix Factorization. Ramakrishnan Kannan, Grey Ballard, Haesun Park. *IEEE Transactions on Knowledge and Data Engineering*, to appear. 2017.
2. Dynamic functional connectivity and individual differences in emotions during social stress. Michael J. Tobia, Koby Hayashi, Grey Ballard, Ian Gotlib, Christian Waugh. *Human Brain Mapping*, Volume 38, Number 12, pp. 6185–6205. 2017.
3. Hypergraph Partitioning for Sparse Matrix-Matrix Multiplication. Grey Ballard, Alex Druinsky, Nicholas Knight, Oded Schwartz. *ACM Transactions on Parallel Computing*, Volume 3, Issue 3, pp. 18:1–18:34. 2016.
4. Exploiting Multiple Levels of Parallelism in Sparse Matrix-Matrix Multiplication. Ariful Azad, Grey Ballard, Aydin Buluc, James Demmel, Laura Grigori, Oded Schwartz, Sivan Toledo, Samuel Williams. *SIAM Journal on Scientific Computing*, Volume 38, Number 6, pp. C624-C651. 2016.
5. Improving the Numerical Stability of Fast Matrix Multiplication Algorithms. Grey Ballard, Austin Benson, Alex Druinsky, Benjamin Lipshitz, and Oded Schwartz. *SIAM Journal on Matrix Analysis and Applications*, Volume 37, Number 4, pp. 1382-1418. 2016.
6. Reducing Communication Costs for Sparse Matrix Multiplication within Algebraic Multigrid. Grey Ballard, Christopher Siefert, and Jonathan Hu. *SIAM Journal on Scientific Computing*. Volume 32, Issue 3, pp. C203-C231. 2016.
7. Reconstructing Householder Vectors from Tall-Skinny QR. Grey Ballard, James Demmel, Laura Grigori, Mathias Jacquelin, Nicholas Knight, and Hong Diep Nguyen. *Journal of Parallel and Distributed Computing*. Volume 85, pp. 3-31. 2015.
8. Avoiding Communication in Successive Band Reduction. Grey Ballard, James Demmel, and Nicholas Knight. *ACM Transactions on Parallel Computing*. Volume 1, Issue 2, pp. 11:1-11:37. 2015.
9. Communication-Avoiding Symmetric-Indefinite Factorization. Grey Ballard, Dulceneia Becker, James Demmel, Jack Dongarra, Alex Druinsky, Inon Peled, Oded Schwartz, Sivan Toledo and Ichitaro Yamazaki. *SIAM Journal on Matrix Analysis and Applications*. Volume 35, Issue 4, pp. 1364-1406. 2014.
10. Communication Lower Bounds and Optimal Algorithms for Numerical Linear Algebra. Grey Ballard, Erin Carson, James Demmel, Mark Hoemmen, Nicholas Knight, Oded Schwartz. *Acta Numerica*. Volume 23, pp. 1-155. 2014.
11. Communication Costs of Strassen’s Matrix Multiplication. Grey Ballard, James Demmel, Olga Holtz, and Oded Schwartz. *Communications of the ACM*. Volume 57, Number 2, pp. 107-113. 2014.
12. Asymptotic Behavior of the Eigenvalues of Toeplitz Integral Operators Associated with the Hankel Transform. Grey Ballard and John Baxley. *Dynamic Systems and Applications*, Volume 23, pp. 505-530, 2014.
13. Graph Expansion and Communication Costs of Fast Matrix Multiplication. Grey Ballard, James Demmel, Olga Holtz, and Oded Schwartz. *Journal of the ACM*. Volume 59, Issue 6, Article 32. 2012.
14. Minimizing Communication in Linear Algebra. Grey Ballard, James Demmel, Olga Holtz, and Oded Schwartz. *SIAM Journal on Matrix Analysis and Applications*, Volume 32, Issue 3, pp. 866-901. 2011.
15. Communication-optimal parallel and sequential Cholesky decomposition. Grey Ballard, James Demmel, Olga Holtz, and Oded Schwartz. *SIAM Journal on Scientific Computing*. Volume 32, Issue 6, pp. 3495-3523. 2010.

16. Existence of Solutions for a Class of Singular Nonlinear Third Order Autonomous Boundary Value Problems. Grey Ballard and John Baxley. *Communications in Applied Analysis*. Volume 15, No. 2-4, pp. 195-202. 2011.
17. The Friedrichs extension of certain singular differential operators. Grey Ballard and John Baxley. *Electronic Journal of Qualitative Theory of Differential Equations*. Special Edition I, No. 5, pp. 1-11. 2009.
18. Qualitative behavior and computation of multiple solutions of nonlinear boundary value problems. Grey Ballard, John Baxley, and Nisrine Libbus. *Communications on Pure and Applied Analysis*. Volume 5, No. 2, pg. 251-259. 2006.

## Conference Proceedings

1. A Communication-Avoiding Parallel Algorithm for the Symmetric Eigenvalue Problem. Edgar Solomonik, Grey Ballard, James Demmel, Torsten Hoefer. *Proceedings of the 29th ACM Symposium on Parallelism in Algorithms and Architectures*. ACM, New York, NY, USA, 111-121. 2017.
2. Network Topologies and Inevitable Contention. Grey Ballard, James Demmel, Andrew Gearhart, Benjamin Lipshitz, Yishai Oltchik, Oded Schwartz and Sivan Toledo. *Proceedings of the First Workshop on Optimization of Communication in HPC*. IEEE Press, Piscataway, NJ, USA, 39-52. 2016.
3. Parallel Tensor Compression for Large-Scale Scientific Data. Woody Austin, Grey Ballard, and Tamara Kolda. *Proceedings of the 30th IEEE International Parallel and Distributed Processing Symposium*. IEEE Computer Society, Washington, DC, USA, 912-922. 2016.
4. A High-Performance Parallel Algorithm for Nonnegative Matrix Factorization. Ramakrishnan Kannan, Grey Ballard, and Haesun Park. *Proceedings of the 21st ACM Symposium on Principles and Practice of Parallel Programming*. ACM, New York, NY, USA, 9:1-9:11. 2016.
5. Diamond Sampling for Approximate Maximum All-pairs Dot-product (MAD) Search. Grey Ballard, Tamara Kolda, Ali Pinar, C. Seshadri. *Proceedings of the 2015 IEEE International Conference on Data Mining*. IEEE Computer Society, Washington, DC, USA, 11-20. 2015.
6. Brief Announcement: Hypergraph Partitioning for Parallel Sparse Matrix-Matrix Multiplication. Grey Ballard, Alex Druinsky, Nicholas Knight, and Oded Schwartz. *Proceedings of the 27th Annual ACM Symposium on Parallelism in Algorithms and Architectures*. ACM, New York, NY, USA, 86-88. 2015.
7. A Framework for Practical Parallel Fast Matrix Multiplication. Austin Benson and Grey Ballard. *Proceedings of the 20th ACM Symposium on Principles and Practice of Parallel Programming*. ACM, New York, NY, USA, 42-53. 2015.
8. Reconstructing Householder Vectors from TSQR. Grey Ballard, James Demmel, Laura Grigori, Mathias Jacquelin, Hong Diep Nguyen, and Edgar Solomonik. *Proceedings of the 28th IEEE International Parallel and Distributed Processing Symposium*. IEEE Computer Society, Washington, DC, USA, 1159-1170. 2014.
9. Communication Optimal Parallel Multiplication of Sparse Random Matrices. Grey Ballard, Aydin Buluc, James Demmel, Laura Grigori, Benjamin Lipshitz, Oded Schwartz and Sivan Toledo. *Proceedings of the 25th Annual ACM Symposium on Parallelism in Algorithms and Architectures*. ACM, New York, NY, USA, 222-231. 2013.
10. Communication Efficient Gaussian Elimination with Partial Pivoting using a Shape Morphing Data Layout. Grey Ballard, James Demmel, Benjamin Lipshitz, Oded Schwartz and Sivan Toledo. *Proceedings of the 25th Annual ACM Symposium on Parallelism in Algorithms and Architectures*. ACM, New York, NY, USA, 232-240. 2013.
11. Implementing a Blocked Aasen's Algorithm with a Dynamic Scheduler on Multicore Architectures. Grey Ballard, Dulceneia Becker, James Demmel, Jack Dongarra, Alex Druinsky, Inon Peled, Oded Schwartz, Sivan Toledo and Ichitaro Yamazaki. *Proceedings of the 27th IEEE International Parallel and Distributed Processing Symposium*. IEEE Computer Society, Washington, DC, USA, 895-907. 2013.

12. Communication-Avoiding Parallel Strassen: Implementation and Performance. Benjamin Lipshitz, Grey Ballard, Oded Schwartz, James Demmel. *Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis*. IEEE Computer Society Press, Los Alamitos, CA, USA, 101:1–101:11. 2012.
13. Communication-Optimal Parallel Algorithm for Strassen’s Matrix Multiplication. Grey Ballard, James Demmel, Olga Holtz, Benjamin Lipshitz, Oded Schwartz. *Proceedings of the 24th Annual ACM Symposium on Parallelism in Algorithms and Architectures*. ACM, New York, NY, USA, 193-204. 2012.
14. Brief Announcement: Strong Scaling of Matrix Multiplication Algorithms and Memory-Independent Communication Lower Bounds. Grey Ballard, James Demmel, Olga Holtz, Benjamin Lipshitz, Oded Schwartz. *Proceedings of the 24th Annual ACM Symposium on Parallelism in Algorithms and Architectures*. ACM, New York, NY, USA, 77-79. 2012.
15. Graph Expansion Analysis for Communication Costs of Fast Rectangular Matrix Multiplication. Grey Ballard, James Demmel, Olga Holtz, Benjamin Lipshitz, Oded Schwartz. *Proceedings of the 1st Mediterranean Conference on Algorithms*. Springer, Berlin, Germany. Lecture Notes in Computer Science, Vol. 7659, 13–36. 2012.
16. Communication Avoiding Successive Band Reduction. Grey Ballard, James Demmel, Nicholas Knight. *Proceedings of the 17th ACM Symposium on Principles and Practice of Parallel Programming*. ACM, New York, NY, USA, 35-44. 2012.
17. Graph Expansion and Communication Costs of Fast Matrix Multiplication. Grey Ballard, James Demmel, Olga Holtz, and Oded Schwartz. *Proceedings of the 23rd Annual ACM Symposium on Parallelism in Algorithms and Architectures*. ACM, New York, NY, USA, 1-12. 2011.
18. Brief Announcement: Communication Bounds for Heterogeneous Architectures. Grey Ballard, James Demmel, and Andrew Gearhart. *Proceedings of the 23rd Annual ACM Symposium on Parallelism in Algorithms and Architectures*. ACM, New York, NY, USA, 257-258. 2011.
19. Communication-Avoiding QR Decomposition for GPUs. Michael Anderson, Grey Ballard, James Demmel, and Kurt Keutzer. *Proceedings of the 25th IEEE International Parallel and Distributed Processing Symposium*. IEEE Computer Society, Washington, DC, USA, 48-58. 2011.
20. Efficiently Computing Tensor Eigenvalues on a GPU. Grey Ballard, Tamara Kolda, and Todd Plantenga. *Proceedings of the 25th IEEE International Parallel and Distributed Processing Symposium Workshops and PhD Forum*. IEEE Computer Society, Washington, DC, USA, 1340-1348. 2011.
21. Communication-optimal parallel and sequential Cholesky decomposition. Grey Ballard, James Demmel, Olga Holtz and Oded Schwartz. *Proceedings of the 22nd Symposium on Parallelism in Algorithms and Architectures*. ACM, New York, NY, USA, 245-252. 2009.

## Student Journals

1. Qualitative behavior and computation of multiple solutions of singular nonlinear boundary value problems. Grey Ballard and John Baxley. *Involve, a Journal of Mathematics*. Volume 1, No. 1, pp. 21-31. 2008.
2. Modeling protein dependency networks using CoCoA. Grey Ballard. *ACM Crossroads*. Issue 13.1. 2006.

## Technical Reports

1. The Geometry of Rank Decompositions of Matrix Multiplication II: 3x3 Matrices. Grey Ballard, Christian Ikenmeyer, J.M. Landsberg, and Nick Ryder. arXiv:1801.00843. 2018.
2. Shared Memory Parallelization of MTTKRP for Dense Tensors. Koby Hayashi, Grey Ballard, Yujie Jiang, and Michael J. Tobia. arXiv:1708.08976. 2017.
3. Communication Lower Bounds for Matricized Tensor Times Khatri-Rao Product. Grey Ballard, Nicholas Knight, and Kathryn Rouse. arXiv:1708.07401. 2017.

4. A Practical Randomized CP Tensor Decomposition. Casey Battaglini, Grey Ballard, Tamara Kolda. arXiv:1701.06600. 2017.
5. Sequential Communication Bounds for Fast Linear Algebra. Grey Ballard, James Demmel, Olga Holtz and Oded Schwartz. UC Berkeley Technical Report EECS-2012-36. 2012.
6. Minimizing Communication for Eigenproblems and the Singular Value Decomposition. Grey Ballard, James Demmel, Ioana Dumitriu. UC Berkeley Technical Report EECS-2011-14. 2011.

## Theses

1. Avoiding Communication in Dense Linear Algebra. Grey Ballard. PhD Thesis. University of California Berkeley. 2013.
2. Asymptotic behavior of the eigenvalues of Toeplitz integral operators associated with the Hankel transform. Grey Ballard. Master's Thesis. Wake Forest University. 2008.

## Talks

- Communication Lower Bounds for Matricized-Tensor Times Khatri-Rao Product. Presented at the SIAM Annual Meeting in July 2017 in Pittsburgh, PA.
- Discovering Fast Matrix Multiplication Algorithms. Presented at Householder Symposium XX (poster) in June 2017 in Blacksburg, VA; at Texas A&M University in May 2017 in College Station, TX, and at Winthrop University in March 2017 in Rock Hill, SC.
- Discovering Fast Matrix Multiplication Algorithms via Tensor Decomposition. Presented at SIAM Conference on Computational Science and Engineering in March 2017 in Atlanta, GA.
- Parallel Multiway Data Compression using the Tucker Decomposition. Presented at Wake Forest University Physics Colloquium in February 2017 in Winston Salem, NC.
- Reducing Communication and Computation in Scientific Computing. Presented at Sandia National Laboratories in June 2016 in Livermore, CA.
- Diamond Sampling for Approximate Maximum All-Pairs Dot-Product Search. Presented at ICDM in November 2015 in Atlantic City, NJ.
- Hypergraph Partitioning for Parallel Sparse Matrix-Matrix Multiplication. Presented at SIAM Conference on Applied Linear Algebra in October 2015 in Atlanta, GA.
- Parallel Tensor Compression for Large-Scale Scientific Data. Presented at the Development of Modern Methods for Linear Algebra (DMML) Workshop in October 2015 in Berkeley, CA and at the SIAM Conference on Parallel Processing for Scientific Computing in April 2016 in Paris, France.
- Algorithmic Improvements for Dense Symmetric Tridiagonalization. Invited talk at the International Workshop on Eigenvalue Problems: Algorithms, Software, and Applications in September 2015 in Tsukuba, Japan.
- Hypergraph Partitioning for Sparse Matrix-Matrix Multiplication. Presented at SPAA in June 2015 in Portland, OR.
- Reducing Communication Costs for Sparse Matrix Multiplication in Algebraic Multigrid. Presented at SIAM Conference on Computational Science and Engineering in March 2015 in Salt Lake City, UT and at Copper Mountain Conference on Multigrid Methods in March 2015 in Copper Mountain, CO.
- Reducing Computation and Communication in Scientific Computing. Presented at Wake Forest University in January 2015 in Winston-Salem, NC, at the College of William & Mary in February 2015 in Williamsburg, VA, and at Georgia Tech in February 2015 in Atlanta, GA.
- How Practical is Fast Matrix Multiplication?. Presented at the Matrix Computations Seminar (UC Berkeley) in October 2014 in Berkeley, CA and at the Simons Institute in December 2014 in Berkeley, CA.

- Communication-Avoiding Algorithms and Fast Matrix Multiplication. Presented at Microsoft Research in September 2014 in Redmond, WA.
- Algorithms with Provably Minimal Communication: Algorithmic Improvements for QR Decomposition. Presented at Duke University in July 2014 in Durham, NC.
- Avoiding Communication in Linear Algebra. Invited talk at the Microsoft Research Faculty Summit in July 2014 in Redmond, WA.
- Reconstructing Householder Vectors from TSQR. Presented at SIAM Conference on Parallel Processing for Scientific Computing in February 2014 in Portland, OR, at the Matrix Computations Seminar (UC Berkeley) in February 2014 in Berkeley, CA, at the University of Texas in March 2014 in Austin, TX, at International Parallel and Distributed Processing Symposium in May 2014 in Phoenix, AZ, at Householder Symposium XIX in June 2014 in Spa, Belgium, and at the Linear Algebra and Optimization Seminar (Stanford) in January 2015 in Stanford, CA.
- Searching for Fast Matrix Multiplication Algorithms. Presented at the Dean Seminar (Sandia National Labs) in November 2013 in Livermore, CA.
- Communication-Optimal Parallel Algorithm for Strassen's Matrix Multiplication. Presented at the Simons Institute in October 2013 in Berkeley, CA.
- Communication Efficient Gaussian Elimination with Partial Pivoting using a Shape Morphing Data Layout. Presented at SPAA in July 2013 in Montreal, Canada.
- Communication-Avoiding Algorithms and Autotuning. Presented at the Par Lab End-of-Project Celebration in May 2013 in Berkeley, CA.
- Avoiding Communication in Linear Algebra. Presented at the University of Virginia in April 2013 in Charlottesville, VA.
- Avoiding Communication in Dense Linear Algebra. Dissertation talk presented at UC Berkeley in April 2013 in Berkeley, CA.
- Avoiding Communication in Parallel Bidiagonalization of Band Matrices. Presented at SIAM Conference on Computational Science and Engineering in March 2013 in Boston, MA.
- Reducing Computation and Communication in Scientific Computing. Presented at Sandia National Laboratories in January 2013 in Livermore, CA and Albuquerque, NM.
- Avoiding Communication in Linear Algebra. Presented at Lawrence Berkeley National Laboratory in January 2013 in Berkeley, CA.
- Communication-Avoiding Parallel Strassen: Implementation and Performance. Presented at SC in November 2012 in Salt Lake City, UT and Bay Area Scientific Computing Day in December 2012 in Palo Alto, CA.
- Communication-Optimal Parallel Algorithm for Strassen's Matrix Multiplication. Presented at Sandia National Labs in August 2012 in Livermore, CA.
- Communication-Avoiding Successive Band Reduction. Presented at Householder Symposium XVIII on Numerical Linear Algebra in June 2011 in Tahoe City, CA and PPOPP in February 2012 in New Orleans, LA.
- Communication-Avoiding Nonsymmetric Eigensolver using Spectral Divide & Conquer. Presented at SIAM Conference on Parallel Processing for Scientific Computing in February 2012 in Savannah, GA and at IWASEP 9 in June 2012 in Napa, CA.
- Lower Bounds for Communication in Linear Algebra. Presented at Workshop on Synchronization-reducing and Communication-reducing Algorithms and Programming Models for Large-scale Simulations in January 2012 in Providence, RI.
- Graph Expansion and Communication Costs of Fast Matrix Multiplication. Presented at SPAA in June 2011 in San Jose, CA.
- Communication Bounds for Heterogeneous Architectures. Presented at SPAA in June 2011 in San Jose, CA.

- Efficiently Computing Tensor Eigenvalues on a GPU. Presented at at Sandia National Labs Student Intern Symposium in August 2010 in Livermore, CA and PDSEC Workshop in conjunction with IPDPS in May 2011 in Anchorage, AK.
- Communication-Avoiding Dense Linear Algebra. Presented at CScADS Autotuning Workshop in August 2010 in Snowbird, UT.
- Mapping Communication-Avoiding QR Decomposition to Various Architectures. Presented at SIAM Annual Meeting in July 2010 in Pittsburgh, PA.
- Communication Bounds for Sequential and Parallel Eigenvalue Problems. Presented at SIAM Conference on Parallel Processing for Scientific Computing in February 2010 in Seattle, WA and at AMS Western Section Meeting and at Sandia National Labs in April 2010 in Albuquerque, NM.
- Minimizing Communication in Linear Algebra. Presented at Par Lab Summer Retreat in June 2009 in Santa Cruz, CA and at SIAM Workshop on Combinatorial and Scientific Computing in October 2009 in Monterey, CA.
- Communication-Optimal Parallel and Sequential Cholesky Decomposition. Presented at SPAA in August 2009 in Calgary, Canada.

## Grants and Funding

<b>Scalable MTTKRP for Non-Negative Tensor Factorization</b>	2017
Subcontract with Oak Ridge National Laboratories, \$24K	
<b>Parallel Tensor Decompositions for Massive Data</b>	2017
Subcontract with Sandia National Laboratories, \$20K	
<b>High Performance Low Rank Approximation for Scalable Data Analytics</b>	2016 – 2018
SI2-SSE, National Science Foundation, \$168K (Collaborative project with PI Haesun Park at Georgia Tech, total of \$500K)	
<b>Linear and Multilinear Techniques for Data Analysis</b>	2016
Subcontract with Sandia National Laboratories, \$22K	
<b>Truman Fellowship in National Security Science and Engineering</b>	2013 – 2016
Sandia National Laboratories (DOE) Laboratory Directed Research and Development Program, \$780K	

## Teaching

<b>Instructor</b>	Wake Forest University
CSC 111: Introduction to Computer Science, Fall 2017	
CSC 191: Special Topics: Introduction to MATLAB, Spring 2018	
CSC 222: Data Structures and Algorithms II, Spring 2017, Fall 2017	
CSC 355/655 and MST 355/655: Introduction to Numerical Methods, Spring 2018	
CSC 721: Theory of Algorithms, Spring 2017	
CSC 352/652 and MTH 326/626: Numerical Linear Algebra, Fall 2016	
<b>Guest Lecturer</b>	UC Berkeley
CS 270: Communication-Avoiding Algorithms, Spring 2016	
<b>Graduate Student Instructor</b>	UC Berkeley
CS 170: Efficient Algorithms and Intractable Problems with Satish Rao, Fall 2012	
CS 267: Applications of Parallel Computers with James Demmel and Katherine Yelick, Spring 2011	
<b>Reader</b>	UC Berkeley
Math 221: Matrix Computations/Numerical Linear Algebra with James Demmel, Fall 2011	
<b>Teaching Assistant</b>	Wake Forest University

Math 109: Probability and Statistics with Julie Connolly, Spring 2008  
 Math 121: Linear Algebra with Jim Kuzmanovich, Fall 2007  
 Math 112: Calculus II with Miaohua Jiang, Spring 2007  
 Math 113: Vector Calculus with Stephen Robinson, Fall 2006  
 Math 112: Calculus II with Hugh Howards, Summer 2006

## Mentoring

<b>Undergraduate Students</b>	Wake Forest University
Yujie (Jeffrey) Jiang, ACC-IAC Fellow (Summer 2017)	
Irina Viviano, Reynolds Scholar	
<b>Graduate Students</b>	Wake Forest University
Koby Hayashi, Fall 2016 – Spring 2018	
Kathryn Rouse, Fall 2016 – Spring 2018	
<b>Master’s Thesis Committee</b>	Wake Forest University
Jiajie Xiao, 2018	
Larry Rush (Physics), 2017	
<b>PhD Thesis Committee</b>	Georgia Tech
Casey Battaglino	
Ramakrishnan Kannan, Spring 2016	
<b>Graduate Student Interns</b>	Sandia National Laboratories
Casey Battaglino (Georgia Tech), Summer 2016	
Woody Austin (University of Texas), Summer 2015	
Austin Benson (Stanford University), Summer 2014	

## University and Departmental Service

<b>Upsilon Pi Epsilon Faculty Sponsor</b>	2016 – 2017
<b>CS Graduate Committee</b>	2016 – present
<b>CS Curriculum Committee</b>	2017 – present
<b>Reynolds, Stamps, and Gordon Scholarships Selection Committee</b>	2017 – 2018

## Professional Activities

<b>Panelist</b>	2017
National Science Foundation	
<b>Guest Editor</b>	2017
ACM Transactions on Parallel Computing (TOPC) Special Issue: Invited papers from PPOPP 2016	
<b>Program Committee</b>	2014, 2017, 2018
IEEE International Parallel and Distribution Processing Symposium (IPDPS)	
<b>Program Committee</b>	2015, 2018
ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)	
<b>Program Committee</b>	2016
The International Conference for High Performance Computing, Networking, Storage and Analysis (SC)	
<b>Program Committee</b>	2015



ACM Symposium on Principles and Practice of Parallel Programming (PPoPP)

## **Program Committee**

2014-2017

IEEE International Workshop on Parallel and Distributed Scientific and Engineering Computing (PDSEC)

## **Program Committee**

2011-2015

Euromicro International Conference on Parallel, Distributed, and Network-Based Processing (PDP)

## **Minisymposium Organizer**

SIAM Conference on Applied Linear Algebra 2018: “Constrained Low-Rank Matrix and Tensor Approximations”

SIAM Annual Meeting 2017: “High Performance Tensor Computations”

SIAM Conference on Computational Science and Engineering 2017: “Tensor Decompositions: Applications and Efficient Algorithms”

SIAM Conference on Parallel Processing for Scientific Computing 2016: “Parallel Algorithms for Tensor Computations”

SIAM Conference on Applied Linear Algebra 2015: “Sparse Matrix-Matrix Multiplication: Applications, Algorithms, and Implementations”

SIAM Conference on Parallel Processing for Scientific Computing 2014: “Minimizing Communication in Linear Algebra”

## **Workshop Organizer**

WFU Computational and Applied Math Retreat, 10 attendees, Winston Salem, NC, 2016

Workshop on Fast Matrix Multiplication, 12 attendees, Berkeley, CA, 2014

## **Proposal Reviewer**

U.S. Army Research Office

## **Reviewer**

SIAM Journal on Matrix Analysis and Applications (SIMAX)

SIAM Journal on Scientific Computing (SISC)

ACM Transactions on Mathematical Software (TOMS)

ACM Transactions on Parallel Computing (TOPC)

ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)

IEEE International Parallel and Distributed Processing Symposium (IPDPS)

ACM/IEEE International Conference for High Performance Computing, Networks, Storage, and Analysis (SC)

ACM Symposium on Principles and Practice of Parallel Programming (PPoPP)

International European Conference on Parallel Processing (Euro-Par)

Numerical Linear Algebra with Applications (NLA)

Parallel Computing

IEEE Transactions on Parallel and Distributed Computing (TPDS)

Journal of Computational Science

Algorithmica

Applied Mathematics and Computation (AMC)

ACM Symposium on Principles of Programming Languages (POPL)

European Symposium on Algorithms (ESA)

Symposium on Theoretical Aspects of Computer Science (STACS)

International Symposium on Algorithms and Computation (ISAAC)

IEEE Transactions on Mobile Computing (TOMC)

IEEE International Conference on High Performance Computing (HiPC)

International Conference on Parallel Processing (ICPP)

AMS Mathematical Reviews

## **Book Reviewer**

SIAM Review (SIREV)

## **Member**

SIAM, ACM, IEEE