

## Ali Pınar

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RESEARCH INTERESTS Combinatorial scientific computing, combinatorial algorithms, parallel and high performance computing, interconnection networks, scientific computing, computational electric power systems, data analysis.

### EDUCATION **University of Illinois at Urbana-Champaign (UIUC)**

- Ph.D. in Computer Science, 2001  
with the option of Computational Science and Engineering
  - Thesis title: “Combinatorial Algorithms in Scientific Computing,”
  - Co-advisors: Michael Heath and Bruce Hendrickson

### **Bilkent University**, Ankara, Turkey

- M.S. in Computer Engineering and Information Science, 1996
  - Thesis title: “Decomposing Linear Programs for Parallel Solution,”
  - Advisor: Cevdet Aykanat.
- B. S. in Computer Engineering and Information Science, 1994

### HONORS, AWARDS, AND RECOGNITION

- Elected *Secretary of SIAM Activity Group on Supercomputing* (Jan 1, 2008 –Dec 31, 2009).
- Research Grant (2004–2007)  
“Advanced Computational Tools for Electric Power Systems,”  
funded under the Laboratory Directed Research Program for \$650K/3 years
- Research Grant (2001–2004)  
“Combinatorial Algorithms and Scientific Computing,”  
funded under the Laboratory Directed Research Program for \$265K/3 years
- *John Von Neumann Research Fellowship in Computational Science*,  
by Sandia National Laboratories, 2001 (declined)
- *Alston S. Householder Fellowship in Scientific Computing*,  
by Oak Ridge National Laboratory, 2001 (declined)
- *Outstanding Graduate Student Service Award*,  
Dept. of Computer Science, U. of Illinois at Urbana-Champaign, 2000

### PROFESSIONAL EXPERIENCE

- Computer Systems Engineer III, (May, 2004– )  
Lawrence Berkeley National Laboratory

- Postdoctoral Researcher, (Oct, 2001 – May, 2004)  
Lawrence Berkeley National Laboratory
- Visiting Researcher, (summers 1999, 2000)  
Sandia National Laboratories
- Research Assistant, Aug, 1997– Aug, 2001  
Department of Computer Science  
Computational Science and Engineering Program, UIUC
- Teaching Assistant, (Sep., 1994–July 1997)  
Dept. of Computer Engineering and Information Science,  
Bilkent University, Ankara, Turkey

TEACHING AND  
SUPERVISING  
EXPERIENCE

- Teaching Assistant for
  - Algorithms (for senior students),
  - Program Verification (for junior and senior students)
  - Combinatorics and Graph Theory (for junior students).
- Supervisor for
  - Vanessa Lopez, postdoctoral fellow, 2005–2006, now at IBM T.J. Watson
  - Adam Reichert, summer student, 2006, (UIUC)
  - Yonatan Fogel, summer student, 2006, State University of New York at Stony Brook
  - Virginia Vassilevska, summer student, 2004, Carnegie Mellon University
  - Manmeet Singh, summer student, 2003, UIUC
  - Tao Tao, summer student, 2002, UIUC
  - Feida Zhu, summer student, 2002, UIUC

JOURNAL  
PUBLICATIONS

1. V. Donde, V. Lopez, B. Lesieutre, A. Pinar, C. Yang, and J. Meza, “Severe multiple contingency screening in electric power systems,” to appear in *IEEE Transactions on Power Systems*.
2. A. Pinar, E. Chow, and A. Pothén, “Combinatorial Techniques for Constructing Sparse Null-space Bases,” *Electronic Transactions on Numerical Analysis*, special volume on saddle point problems: numerical solution and applications, Vol. 22, pages 122–145, 2006.
3. A. Pinar and B. Hendrickson, “Improving Load Balance with Flexibly Assignable Tasks,” *IEEE Transactions on Parallel and Distributed Systems*, Vol. 16, No. 10, pages 956–965, 2005.
4. A. Pinar and V. Vassilevska, “Finding Nonoverlapping Substructures of a Sparse Matrix,” *Electronic Transactions on Numerical Analysis*, special volume on combinatorial scientific computing, Vol. 21, pages 107–124, 2005.
5. A. Pinar and B. Hendrickson, “Interprocessor Communication with Limited Memory,” *IEEE Transactions on Parallel and Distributed Systems*, Vol. 15, No. 7, pages 606–616, 2004.
6. A. Pinar and C. Aykanat, “Fast Optimal Load Balancing Algorithms for 1D Partitioning,” *Journal of Parallel and Distributed Computing*, Vol. 64, pages 974–996, 2004.

7. C. Aykanat, A. Pinar, and Ü. Çatalyürek, "Permuting Sparse Rectangular Matrices into Block-Diagonal Form," *SIAM Journal on Scientific Computing*, Vol. 25, No. 6, pages 1860–1879, 2004.
8. A. Pinar and C.L. Liu, "Compacting Sequences with Invariant Transition Frequencies," *ACM Transactions on Design Automation of Electronic Systems*, Vol. 8, No. 2, pages 214–221, 2003.

PENDING JOURNAL  
PUBLICATIONS

9. A. Pinar, E. Tabak, and C. Aykanat, "One dimensional partitioning for heterogeneous systems," submitted to *Journal of Parallel and Distributed Computing*.
10. A. Pinar, J. Meza, V. Donde, and B. Lesieutre, "Optimization Strategies for the Vulnerability Analysis of the Power Grid," submitted to *SIAM Journal on Optimization*.
11. S. Kamil, L. Oliker, A. Pinar, and J. Shalf, "Communication Requirements and Interconnect Optimization for High-End Scientific Applications," submitted to *IEEE Transaction on Parallel and Distributed Computing*.
12. G. Canahuate, H. Ferhatosmanoglu, and Ali Pinar, "Improving bitmap index compression by data reorganization," in preparation.
13. J. Berry, D. Coppersmith, L. Fleischer, B. Hendrickson, and A. Pinar, "A Divide-and-Conquer Algorithm for Identifying Strongly Connected Components," in preparation.
14. A. Pinar, "Complexity Results on the Nice Basis Problem," in preparation.

BOOK CHAPTER

15. A. Pinar and B. Hendrickson, "Combinatorial Parallel and Scientific Computing," chapter in *Parallel Processing for Scientific Computing*, editors: M. Heroux, P. Raghavan, and H. Simon, SIAM, 2006.

REFEREED  
CONFERENCE  
PUBLICATIONS

16. B. Lesieutre, A. Pinar, and S. Roy, "Power System Extreme Event Detection: The Vulnerability Frontier," to appear in *Proc. 41st Hawaii International Conference on System Sciences*.
17. S. Kamil, A. Pinar, D. Gunter, M. Lijewski, L. Oliker, and J. Shalf, "Reconfigurable hybrid interconnection for static and dynamic scientific applications," *Proc. 2007 ACM International Conference on Computing Frontiers*.
18. A. Pinar, A. Reichert, and B. Lesieutre, "Computing Criticality of Lines in a Power System," *Proc. 2007 IEEE International Symposium on Circuits and Systems*, New Orleans, LA, May 2007.
19. B. Lesieutre, S. Roy, V. Donde, and A. Pinar, "Power system extreme event analysis using graph partitioning," *Proc. the 39th North American Power Symposium*, Carbon-dale, IL, October 2006.
20. A. Pinar, T. Tao, and H. Ferhatosmanoglu, "Compressing Bitmap Indices by Data Reorganization," *Proc. 21st International Conference on Data Engineering (ICDE05)*, pages: 310–321.
21. V. Donde, V. Lopez, B. Lesieutre, A. Pinar, C. Yang, and J. Meza, "Identification of severe multiple contingencies in electric power networks," *Proc. the 38th North American Power Symposium*, Ames, IA, October 2005.
22. A. Pinar and B. Hendrickson, "Exploiting Flexibly Assignable Work to Improve Load Balance," *Proc. ACM 14th Symp. Parallel Algorithms and Architectures (SPAA) 2002*, pages 155-163.
23. A. Pinar and B. Hendrickson, "Graph Partitioning for Complex Objectives," *Proc. 15th International Parallel and Distributed Processing Symp. (IPDPS), IEEE, 2001*.

24. A. Pinar and B. Hendrickson, "Communication Support for Adaptive Computation," in *Proc. SIAM Conf. on Parallel Processing for Scientific Computing 2001*.
25. A. Pinar and B. Hendrickson, "Interprocessor Communication with Memory Constraints," *Proc. ACM Symp. Parallel Algorithms and Architectures (SPAA) 2000*, pages 39–45.
26. L. Fleischer, B. Hendrickson, and A. Pinar, "On Identifying Strongly Connected Components in Parallel," *Lecture Notes in Computer Science*, Vol. 1586, pages 505–511.
27. A. Pinar and M. Heath, "Improving Performance of Sparse Matrix-Vector Multiplication," *Proc. Supercomputing 99*, 1999.
28. A. Pinar and C.L. Liu, "Power Invariant Vector Sequence Compaction," *Proc. 1998 IEEE/ACM International Conf. Computer Aided Design*, pages 473–476, 1998.
29. A. Pinar and C. Aykanat, "Sparse Matrix Decomposition with Optimal Load Balancing," *Proc. International Conf. High Performance Computing (HiPC) 97*, pages 224–229, 1997.
30. A. Pinar and C. Aykanat, "An Effective Model to Decompose Linear Programs for Parallel Solution," *Lecture Notes in Computer Science*, Vol. 1184, pages 592–601.
31. A. Pinar, Ü. Çatalyürek, C. Aykanat, and M. Pinar, "Decomposing Linear Programs for Parallel Solution," *Lecture Notes in Computer Science*, Vol. 1041, pages 473–482.
32. A. Pinar, "A New Genetic Algorithm for Hypergraph Partitioning," *Proc. Turkish Artificial Intelligence and Neural Networks Symp. (TAINN) 96*, pages 167–176, 1996.
33. A. Pinar and U. Çetintemel, "Wide-Area Distributed Selective Dissemination of Information," *Proc. Tenth International Symp. on Computer and Information Sciences (ISCIS)*, pages 281–288, 1995.

OTHER  
PUBLICATIONS

34. A. Pinar, Y. Fogel, and B. Lesieutre, "The Inhibiting Bisection Problem," *Technical Report: LBNL-62142*, Lawrence Berkeley National Laboratory, Berkeley, CA.
35. P. Cesarz, G. Pomann, L. Torre, G. Villarosa, T. Flournoy, A. Pinar, and J. Meza, "Detecting Network Vulnerabilities Through Graph Theoretical Methods", *Technical Report: LBNL-63487*, Lawrence Berkeley National Laboratory, Berkeley, CA.
36. A. Pinar, "High Performance Combinatorial Algorithms," *Technical Report: LBNL-53989*, Lawrence Berkeley National Laboratory, Berkeley, CA.
37. A. Pinar, M. Singh, and E. Ng, "Nested Dissection Orderings for LU Factorization of Unsymmetric Matrices with Static Pivoting," extended abstract in *Proc. SIAM Workshop on Combinatorial Scientific Computing*, full version in preparation.
38. A. Pinar, "Combinatorial Algorithms in Scientific Computing" *PhD. Thesis*, University of Illinois at Urbana-Champaign, July 2001.
39. A. Pinar, "Decomposing Linear Programs for Parallel Solution," *M.S. Thesis*, Bilkent University, Ankara, Turkey, July 1996.

CONFERENCE  
PRESENTATIONS  
AND INVITED TALKS

1. "Vulnerability Analysis of the Power Grid," *Mathematical Sciences Research Institute Seminar*, Berkeley, CA, June 2007.
2. "Vulnerability Analysis of the Power Grid," *Georgia Institute of Technology High Performance Computing Seminar*, Atlanta, GA, February 2007.
3. "Vulnerability Analysis of the Power Grid," *SIAM Conf. on Computational Science and Engineering*, Mesa Verde, CA, February 2007.
4. "Advanced Computational Tools for Electric Power Systems," *SIAM Annual Meeting*, Boston, MA, July 2006.

5. "Improving Performance of Bitmap Indexing," *SIAM Workshop on Combinatorial Scientific Computing*, Toulouse, France, June 2005.
6. "Alternative Models for Load Balancing," *SIAM Conf. on Parallel Processing for Scientific Computing 2004*, San Francisco, California, February, 2004.
7. "Nested Dissection Orderings for LU Factorization with Static Pivoting," *SIAM Workshop on Combinatorial Scientific Computing*, San Francisco, California, February, 2004.
8. "Combinatorial Techniques for Constructing Sparse Null-space Bases," *SIAM Conf. on Applied Linear Algebra*, Williamsburg, VA, July 2003.
9. "The Nice Basis Problem," *Bay Area Scientific Computing Day*, Stanford University, March, 2003.
10. "The Nice Basis Problem," *Mathematics and Computer Science Division Seminar*, Argonne National Laboratory, May, 2003.
11. "Exploiting Flexibly Assignable Work to Improve Load Balance," *SIAM 50th Anniversary and 2002 Annual Meeting*, Philadelphia, Pennsylvania, July, 2002.
12. "Partitioning for Complex Objectives," *International Parallel and Distributed Processing Symp.*, San Francisco, California, April, 2001.
13. "Combinatorial Algorithms for Adaptive Computation," *NERSC Scientific Computing Seminar*, Berkeley, California, April, 2001.
14. "Communication Support for Adaptive Computation," *SIAM Conf. on Parallel Processing for Scientific Computing 2001*, Portsmouth, Virginia, March, 2001.
15. "Interprocessor Communication with Memory Constraints," *ACM Symp. on Parallel Algorithms and Architectures (SPAA)*, Bar Harbor, Maine, July, 2000.
16. "On Identifying Strongly Connected Components in Parallel," *International Parallel and Distributed Processing Symp. (IPDPS)*, Cancun, Mexico, May, 2000.
17. "Improving Performance of Matrix-Vector Multiplication," *Supercomputing 99*, Portland, Oregon, November, 1999.
18. "Power Invariant Vector Sequence Compaction," *International Conf. on Computer Aided Design*, San Jose, California, November, 1998.
19. "An Effective Graph Model to Decompose Linear Programs for Parallel Solution," *PARA96, Workshop on Applied Parallel Computing in Industrial Problems and Optimization*, Lyngby, Denmark, August, 1996.
20. "A New Genetic Algorithm for Hypergraph Partitioning," *Artificial Intelligence and Neural Network Symp.*, Istanbul, Turkey, June, 1996.
21. "Wide-Area Distributed Selective Dissemination of Information," *International Symp. on Computer and Information Systems*, Izmir, Turkey, November, 1995.
22. "Decomposing Linear Programs for Parallel Solution," Bilkent University, Dept. of Computer Science Seminar, Ankara, Turkey, December, 1995

PROFESSIONAL  
SOCIETY  
MEMBERSHIPS

- Society of Industrial and Applied Mathematics (SIAM)
- Association of Computing Machinery (ACM)
- IEEE Computer Society
- SIAM activity groups on
  - Supercomputing
  - Optimization

SERVICES AND  
MEMBERSHIPS

- Computational Science and Engineering
- Volunteer mentor for MentorNet (<http://www.mentornet.net/>)
- Program Committee Member,
  - 4th SIAM Workshop on Combinatorial Scientific Computing, Monterey, CA, October 2009,
  - 22nd IEEE International Parallel & Distributed Processing Symposium, Miami, Florida, USA, April 2008.
  - 2nd International Conference on Grid and Pervasive Computing, Paris, France, May 2007.
  - 35th Annual International Conference in Parallel Processing, Columbus Ohio, August 2006.
  - 1st International Conference on Grid and Pervasive Computing, Taichung, Taiwan, May 2006.
  - 12th Annual International Conference on High Performance Computing (HiPC), Goa, India, 2005.
  - 19th International Symposium on Computer and Information Sciences (ISCIS), Antalya, Turkey, 2004.
- Minisymposium Organizer,
  - “Optimization with Discrete and Continuous Variables,” SIAM Conference on Computational Science and Engineering, Mesa Verde, California, February, 2007.
  - “Computational Challenges in Electric Power Systems,” SIAM Conference on Parallel Processing for Scientific Computing, San Francisco, California, February, 2006.
  - “Parallel Graph Algorithms,” SIAM Conference on Parallel Processing for Scientific Computing, San Francisco, California, February, 2006.
  - “Computational Challenges in Electric Power Systems,” SIAM Conference on Computational Science and Engineering, Orlando, Florida, February, 2005.
  - “Combinatorial Algorithms and Parallel Computing,” SIAM Conference on Parallel Processing for Scientific Computing, San Francisco, California, February, 2004.
  - “Combinatorial Algorithms in Scientific Computing,” SIAM Conference on Computational Science and Engineering, San Diego, California, February, 2003.
- Reviewer, *SIAM Journal on Discrete Mathematics*, *SIAM Review*, *SIAM Matrix Analysis*, *IEEE T. Parallel and Distributed Systems*, *Networks*, *ACM T. on Mathematical Software*, *Mathematical and Computer Modelling*, *Journal of Parallel and Distributed Computing*, *Electronic Transactions on Numerical Analysis*, and *Parallel Algorithms and Applications*, *Parallel Computing*.
- Member, Graduate Study Committee, Dept. of Computer Science, UIUC, 2000-2001.
- Member, Fellowships, Assistantships, and Admissions Committee, Dept. of Computer Science, UIUC, 1999–2000.
- Elected President of Faculty of Engineering Student Board, Bilkent University, Turkey (1992–1993).
- Elected Secretary of Faculty of Engineering Student Board, Bilkent University, Turkey (1991–1992).
- Secretary, IEEE Bilkent Student Branch, Bilkent University, Turkey (1991–1992).
- Founding member, Alumni Association of Istanbul High School of Sciences.

## REFERENCES

### **Prof. Michael Heath**

Interim Head and Fulton Watson Copp Chair  
Department of Computer Science  
2248 Siebel Center, MC-258  
University of Illinois at Urbana-Champaign  
201 North Goodwin Avenue  
Urbana, IL 61801  
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### **Dr. Bruce Hendrickson**

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Discrete Algorithms and Math Department  
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### **Dr. Juan Meza**

Department Head  
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### **Prof. Alex Pothén**

Professor  
Department of Computer Science and Center for Computational Science  
Old Dominion University  
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### **Dr. Esmond Ng**

Group Leader  
Scientific Computing Group  
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### **Prof. Cevdet Aykanat**

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