

# ALPER ÜNGÖR

Department of Computer Science  
Duke University  
Durham, NC 27708  
(919) 660-6503  
ungor@cs.duke.edu  
<http://www.cs.duke.edu/~ungor>

Home Address:  
5518 Butterfly Lane #206  
Durham, NC 27707  
(919) 308-4808

## RESEARCH INTERESTS

Design and analysis of algorithms, computational geometry, mesh generation, bio-geometric modeling, scientific computing, and computational biology.

## EDUCATION

- Ph.D. in Computer Science** (with Computational Science and Engineering option) Oct 2002  
University of Illinois at Urbana-Champaign (UIUC), IL  
*Thesis title:* Parallel Delaunay Refinement and Space-Time Meshing  
*Advisors:* Prof. Shang-Hua Teng and Prof. Jeff Erickson
- M.B.A. Master of Business Administration** Jan 1998  
Middle East Technical University, Ankara, Turkey  
*Thesis title:* Exchange Rate Forecasting: Box-Jenkins Method vs. Neural Networks  
*Advisor:* Prof. Ali Yazıcı
- M.S. in Computer Science** Dec 1996  
Rensselaer Polytechnic Institute, Troy, NY  
*Thesis title:* An Invariant Based Geometric Hashing Algorithm to Determine the Motion  
in Live Digitized Video Image Sequences of Human Retinal Angiogram  
*Advisors:* Prof. Badri Roysam and Prof. Mukkai Krishnamoorthy
- B.S. in Computer Engineering** July 1992  
Middle East Technical University, Ankara, Turkey

## ACADEMIC HONORS/AWARDS

- David J. Kuck Best Ph.D. Thesis Award, UIUC
- Computational Science and Engineering Fellowship, UIUC
- C.L. Dave and Jane W.S. Liu Award, UIUC
- Excellence in Teaching Award, UIUC
- Best Paper Award (among 360 papers submitted to) ISCIS'03
- Outstanding Graduate Student Service Award, UIUC
- Turkish Ministry of Education Scholarship

## WORK EXPERIENCE

- Visiting Assistant Professor** May 2002 - present  
Dept. of Computer Science, Duke University, Durham, NC
- Research Assistant** Sep 1998 - May 2002  
Dept. of Computer Science, University of Illinois at Urbana-Champaign, IL

<b>Visiting Researcher</b> Parallel Comp. Sci. Dept., Sandia National Labs at Albuquerque, NM	May 1999 - Aug 1999
<b>Teaching Assistant</b> Dept. of Computer Science, University of Illinois at Urbana-Champaign, IL	Jan 1997 - Sep 1998
<b>Teaching Assistant</b> Dept. of Computer Science, Rensselaer Polytechnic Institute, Troy, NY	Aug 1996 - Dec 1996
<b>Research/Teaching Assistant</b> Computer Eng. Dept., Middle East Technical University, Ankara, Turkey	Aug 1992 - Aug 1995
<b>Systems Analyst</b> (Senior year in college) Pentasy, Ankara, Turkey	Aug 1991 - June 1992

## PUBLICATIONS

(Available at <http://www.cs.duke.edu/~ungor/publications.html>)

### Journal Articles

- [1] Parallel Delaunay refinement: algorithms and analyses. *Submitted to Int. J. of Computational Geometry and Applications (IJCGA)*, with D. Spielman and S.-H. Teng.
- [2] Smoothing cleans up slivers. *Submitted to J. of Computational Geometry: Theory and Applications (CGTA)*, with H. Edelsbrunner, X.-Y. Li, G. Miller, A. Stathopoulos, D. Talmor, S.-H. Teng, and N. Walkington.
- [3] Dual-constrained capacity allocation problem. *Submitted to Naval Research Logistics*, with E. Akçali and R. Uzsoy.
- [4] Building space-time meshes over arbitrary spatial domains. *To appear in Engineering with Computers*, Springer, with J. Erickson, D. Guoy, and J. Sullivan.
- [5] Tiling space and slabs with acute tetrahedra. *J. of Computational Geometry: Theory and Applications (CGTA)*, 27(3):237–255, 2004, with D. Eppstein and J. Sullivan.
- [6] Pitching tents in space-time: mesh generation for discontinuous Galerkin method. *Int. J. of Foundations of Computer Science (IJFCS)*, special issue on Volume and Surface Triangulations, edited by S.-W. Cheng and T. K. Dey, 13(2):201–221, 2002, with A. Sheffer.
- [7] Efficient adaptive meshing of parametric models. *ASME Int. J. of Computing and Information Science in Engineering*, 1(4):366–375, 2001, with A. Sheffer.
- [8] Layer based solutions for constrained space-time meshing. *Applied Numerical Mathematics (APNUM)*, Elsevier, 46(3-4):425–443, 2003, with A. Sheffer, R.B. Haber and S.-H. Teng.
- [9] Biting: advancing front meets sphere packing. *Int. Journal of Numerical Methods in Engineering (IJNME)*, 49:61–81, 2000, with X.-Y. Li and S.-H. Teng.
- [10] Simultaneous refinement and coarsening for adaptive meshing. *Engineering with Computers*, Springer, 15:280–291, 1999, with X.-Y. Li and S.-H. Teng.

## Refereed Conference Proceedings

- [11] Parallel Delaunay refinement with off-centers. To appear in Proc. EuroPar, LNCS 2004, with D. Spielman and S.-H. Teng.
- [12] Time complexity of practical parallel Steiner point insertion algorithms. Ext. abstract. To appear in Proc. ACM Symp. on Parallel Alg. and Arch. (SPAA) 2004, with D. Spielman and S.-H. Teng.
- [13] Off-centers: A new type of Steiner points for computing size-optimal guaranteed-quality Delaunay triangulations. Proc. of Latin Amer. Theor. Inf.(LATIN), 152–161, Buenos Aires, Argentina, 2004.
- [14] Approximation algorithms for degree-constrained bipartite network flow. Proc. of Int. Symposium on Computer and Information Sciences, Lecture Notes in Computer Science, Springer, vol. 2869, 162–169, Antalya, Turkey, Nov 2003, with E. Akçali.
- [15] Relaxed scheduling in dynamic skin triangulation. Discrete and Computational Geometry, Japanese Conference, revised papers from JCDCG'02, Tokyo, Japan, edited by J. Akiyama and M. Kano, Lecture Notes in Computer Science, Springer, vol. 2866, 135–151, 2003, with H. Edelsbrunner.
- [16] Building space-time meshes over arbitrary spatial domains. Proc. of the 11th Int. Meshing Roundtable, 391–402, Ithaca, NY, Sep 2002 with J. Erickson, D. Guoy, and J. Sullivan.
- [17] Parallel Delaunay refinement: algorithms and analyses. Proc. of the 11th Int. Meshing Roundtable, 205–217, Ithaca, NY, Sep 2002, with D. Spielman and S.-H. Teng.
- [18] Tiling 3D Euclidean space with acute tetrahedra. Proc. of the 13th Canadian Conference on Computational Geometry, 169–172, Waterloo, ON, Canada, Aug 2001.
- [19] Efficient adaptive meshing of parametric models. Proc. of the 6th ACM Symp. on Solid Modeling and Applications, 59–70, Ann Arbor, MI, June 2001, with A. Sheffer.
- [20] Smoothing cleans up slivers. Proc. of the 32nd ACM Symp. on Theory of Computing (STOC), 273–277, Portland, OR, May 2000, with H. Edelsbrunner, X.-Y. Li, G.L. Miller, A. Stathopoulos, D. Talmor, S.-H. Teng, and N. Walkington.
- [21] Tent-pitcher: a meshing algorithm for space-time discontinuous Galerkin methods. Proc. of the 9th Int. Meshing Roundtable, 111–122, New Orleans, LA, Oct 2000, with A. Sheffer.
- [22] An alignment algorithm for anisotropic meshes with non-uniform flow fields. Proc. of the 7th Int. Conf. on Num. Grid Generation in Comp. Field Simulations, Whistler, BC, Canada, Sep 2000.
- [23] Space-time meshes for nonlinear hyperbolic problems satisfying a non-uniform angle constraint. Proc. of the 7th Int. Conf. on Num. Grid Generation in Comp. Field Simulations, 375–384, Whistler, BC, Canada, Sep 2000, with A. Sheffer and R. Haber.
- [24] Generation of 2D space-time meshes obeying the cone constraint. Advances in Computational Engineering & Sciences, revised papers from ICES2K, edited by S.N. Atluri and F.W. Burst, Tech Science, 1360–1365, Los Angeles, CA, Aug 2000, with A. Sheffer, R. Haber, and S.-H. Teng.
- [25] Point placement for meshless methods using sphere-packing and advancing-front methods. Advances in Computational Engineering & Sciences, revised papers from ICES2K, edited by S.N. Atluri and F.W. Burst, Tech Science, 1348–1353, Los Angeles, CA, Aug 2000, with X.-Y. Li and S.-H. Teng.

- [26] Biting spheres in 3D. *Proc. of the 8th Int. Meshing Roundtable*, 85–97, Lake Tahoe, CA, Oct 1999, with X.-Y. Li and S.-H. Teng.
- [27] Biting ellipsoid to generate anisotropic mesh, *Proc. of the 8th Int. Meshing Roundtable*, 97–108, Lake Tahoe, CA, Oct 1999, with X.-Y. Li and S.-H. Teng.
- [28] Simultaneous refinement and coarsening: adaptive meshing with moving boundary. *Proc. of the 7th Int. Meshing Roundtable*, 201–210, Dearborn, MI, Oct 1998, with X.-Y. Li and S.-H. Teng.

#### Other proceedings, manuscripts

- [29] Discontinuous Galerkin method for elastodynamics with local balance of energy and momentum. *Symposium on Discontinuous Galerkin Methods, Sixth USNCCM*, Dearborn, MI, August 2001, with R.B. Haber, L. Yin, A. Sheffer, and B. Petracovici.
- [30] A space-time discontinuous Galerkin method for nonlinear conservation laws. *Symposium on Discontinuous Galerkin Methods, Sixth USNCCM*, Dearborn, MI, August 2001, with J. Palaniappan, R.B. Haber, R.D. Moser, and A. Sheffer.
- [31] Constrained 2D space-time meshing with all tetrahedra. *Proc. of the 16th IMACS World Congress on Scientific Computation, Applied Mathematics and Simulation*, Lausanne, Switzerland, Aug 2000, with C. Heeren, X.-Y. Li, A. Sheffer, R. Haber, and S.-H. Teng.
- [32] Biting: advancing front meets sphere packing. *2nd Symposium on Trends in Unstructured Mesh Generation, Fifth USNCCM*, Boulder, CO, Aug 1999, with X.-Y. Li and S.-H. Teng.
- [33] Implementation of sweepline segment intersection algorithm in Geolab geometrical workbench. Rensselaer Polytechnic Institute, Troy, NY, 1996, with G. Gattormo.

#### Work in Progress

- [34] Computing Jacobi curves. With H. Edelsbrunner and J. Harer.
- [35] Multiple function analysis for protein protein interaction. With A. Ban, H. Edelsbrunner, J. Harer, and J. Rudolph.
- [36] Computing smaller quality-guaranteed triangulations in three dimensions. With E. Eade.
- [37] A time-optimal Delaunay refinement algorithm. With S. Har-Peled.

#### TALKS (Conference/Invited)

- [1] Refinement of triangulations. *SIAM Conference on Discrete Mathematics, Mini-symposium on Computational Geometry and Topology, Nashville, TN*, June 2004.
- [2] A new type of Steiner points for computing size-optimal quality-guaranteed Delaunay triangulations. *Latin American Theoretical Informatics, Buenos Aires, Argentina*, Apr 2004.
- [3] A new type of Steiner points for computing size-optimal quality-guaranteed Delaunay triangulations. *University of Florida, Gainesville, FL*, Dec 2003.
- [4] Mesh refinement for Jacobi curves. *BioGeometry Workshop, Duke Univ., Durham, NC*, Nov 2003.
- [5] Approximation algorithms for degree-constrained bipartite network flow. *Int. Symposium on Computer and Information Sciences, Antalya, Turkey*, Nov 2003.
- [6] Provably good triangulations for protein modeling. *Carnegie Mellon University, Pittsburgh, PA*, Oct 2003.

- [7] Mesh refinement: theory and practice. *University of New Mexico, Albuquerque, NM*, Sep 2003.
- [8] Jacobi sets of multiple Morse functions. *NSF BioGeometry Workshop, Stanford University, Stanford, CA*, June 2003.
- [9] Geometric algorithms for structural biology. *Sabancı University, Istanbul, Turkey*, Dec 2002.
- [10] Geometric algorithms for structural biology. *Middle East Technical University, Ankara, Turkey*, Dec 2002.
- [11] Relaxed scheduling in dynamic skin triangulation. *Japan Conference on Discrete and Computational Geometry, Tokyo, Japan*, Dec 2002.
- [12] Relaxed scheduling in dynamic skin triangulation. *DIMACS Workshop on Algorithmic Issues in Modeling Motion, Rutgers University, Camden, NJ*, Nov 2002.
- [13] Parallel Delaunay refinement: algorithms and analyses. *Duke University, Durham, NC*, Oct 2002.
- [14] Parallel Delaunay refinement: algorithms and analyses. *Int. Meshing Roundtable, Cornell University, Ithaca, NY*, Sep 2002.
- [15] Tiling 3D Euclidean space with acute tetrahedra. *Canadian Conference on Computational Geometry, University of Waterloo, Waterloo, ON*, Aug 2001.
- [16] Tent-pitcher: a meshing algorithm for space-time discontinuous Galerkin methods. *Int. Meshing Roundtable, New Orleans, LA*, Oct 2000.
- [17] Constrained 2D space-time meshing with all tetrahedra. *IMACS World Congress on Scientific Computation, Applied Mathematics and Simulation, Lausanne, Switzerland*, Aug 2000.
- [18] Biting spheres in 3D. *Int. Meshing Roundtable, Lake Tahoe, CA*, Oct 1999.
- [19] Adaptive mesh generation. *NSF-DARPA OPAAL Workshop, University of Iowa, Iowa City, IA*, Sep 1999.
- [20] An advancing front scheme to compute good sphere packings. *NSF-DARPA OPAAL Workshop, University of Illinois, Urbana, IL*, Oct 1998.
- [21] Simultaneous refinement and coarsening: adaptive meshing with moving boundary. *Int. Meshing Roundtable, Dearborn, MI*, Oct 1998.

## TEACHING

### Professor/Instructor

- Computational Geometry, *Duke University*, Spring 2004  
(co-teaching with Herbert Edelsbrunner)
- Advanced Topics in Computer Science: Mesh Generation, *Duke University*, Fall 2003
- C++ Programming, *University of Illinois*, Summer 1998
- Software Laboratory, *University of Illinois*, Spring 1997

### Teaching Assistant

- Scientific Computing, *University of Illinois*, Spring 1998
- Data Structures and Algorithms, *Rensselaer Polytechnic Institute*, Fall 1997
- Programming Languages, *Middle East Technical University*, 1993-95

### Guest Lecturer

- Various Algorithms and Scientific Computing courses

**GRANTS**

- UIUC Computational Science and Engineering Fellowship. *Space-time mesh generation*, co-written with Jeff Erickson, Robert Haber, and Shang-Hua Teng, [~\$35,000].
- Various travel grants from ACM, NRL, DIMACS and others, [~\$2,500].
- NSF Small Grants for Exploratory Research (SGER). *Modeling geometric deformations in computational simulations for MEMS manufacturing*, in preparation with Ertuğrul Taciroğlu, [~\$90,000].

**PROFESSIONAL SERVICES****Chair**

Int. Meshing Roundtable, 2004

**Technical Papers Co-chair**

Int. Meshing Roundtable, 2003

**Program Committee Member**

Int. Symposium on Computer and Information Sciences, 2003, 2004

Int. Meshing Roundtable, 2003, 2004

**Guest Co-editor**

Int. J. of Computational Geometry and Applications (IJCGA), 2004

Engineering with Computers (EwC), 2004

**Referee/Reviewer**

J. of Computational Geometry: Theory and Applications (CGTA)

ASME Design Automation Conference (DAC)

Int. Journal of Foundations of Computer Science (IJFCS)

Int. Journal of Numerical Methods in Engineering (IJNME)

Applied Numerical Mathematics (APNUM)

Int. Meshing Roundtable (IMR)

ACM Conference on Computer Graphics and Interactive Techniques (SIGGRAPH)

ACM Symposium on Discrete Algorithms (SODA)

ACM Symposium on Computational Geometry (SoCG)

**Departmental Committees (at UIUC)**

Graduate Study Committee, 2001

Fellowships, Assistantships, and Admissions (FAA) Committee, 2000

Treasurer, Graduate Student Organization (CSGSO), 1999

**MEMBERSHIP**

- Association for Computing Machinery (ACM) member with special interest group SIGACT
- The Phi Kappa Phi Honor Society
- Turkish Mathematics Olympiads Crew

## GRADUATE COURSEWORK

BIOCHEMISTRY/COMPUTER SCIENCE, DUKE UNIVERSITY, NC

<i>Course</i>	<i>Professor</i>	<i>Course</i>	<i>Professor</i>
Biological macromolecules	Dave-Jane Richardson	Structural biochemistry I	Lorena Beese
BioGeometric modeling	Herbert Edelsbrunner	Structural biochemistry II	Homme Hellinga

COMPUTER SCIENCE, UNIVERSITY OF ILLINOIS, URBANA-CHAMPAIGN, IL

<i>Course</i>	<i>Professor</i>	<i>Course</i>	<i>Professor</i>
Randomized algorithms	Shang-Hua Teng	Geometric data structures	Jeff Erickson
Cryptology	Shang-Hua Teng	Scientific computing	Michael Heath
Combinatorial algorithms	Herbert Edelsbrunner	Scientific visualization	Donald Hearn
Geometry and topology	Herbert Edelsbrunner	Programming languages	Gul Agha
Computational complexity	Leonard Pitt	Operating systems	Klara Nahrstedt
Graph theory	Douglas West	Linear programming	Derek Robinson
Advanced analysis of algorithms	Edward Reingold	Advanced robotics	Jean Ponce

COMPUTER SCIENCE, RENSSELAER POLYTECHNIC INSTITUTE, TROY, NY

<i>Course</i>	<i>Professor</i>	<i>Course</i>	<i>Professor</i>
Computer graphics	Randolph Franklin	Computer vision	Charles Stewart
Computational geometry	Randolph Franklin	Object recognition	Ellen Walker
Compiler design theory	Mukkai Krishnamoorthy	Programming languages	David Musser
Computer hardware	Franklin Luk	Artificial intelligence	Joseph Mundy

BUSINESS ADMINISTRATION, MIDDLE EAST TECHNICAL UNIVERSITY, ANKARA, TURKEY

<i>Course</i>	<i>Professor</i>	<i>Course</i>	<i>Professor</i>
Business policy	Muhan Soysal	Marketing	Hüseyin Ateş
Organization	Muhan Soysal	Information systems	Zeynep Onay
Managerial economics	Alaeddin Tileylioğlu	Accounting	Erkut Göktan
Human resources	Alaeddin Tileylioğlu	Operations management	Ömer Yağız
Expert systems	Ali Yazıcı	Organizational culture	Robert Schemel
Database management systems	Ali Yazıcı	Management science	Ahmet Acar
Data analysis	Uğur Çağlı	Finance	Erkut Göktan

COMPUTER ENGINEERING, MIDDLE EAST TECHNICAL UNIVERSITY, ANKARA, TURKEY

<i>Course</i>	<i>Professor</i>	<i>Course</i>	<i>Professor</i>
Design & analysis of algorithms	Adnan Yazıcı	Knowledge based systems	Mehmet Tolun
Fundamentals of databases	Adnan Yazıcı	Automated reasoning	Ferda Alpaslan
Logic & databases	Hakkı Toroslu	Computational linguistics	Cem Bozşahin

## REFERENCES

- **Herbert Edelsbrunner**  
Department of Computer Science  
Duke University  
Durham, NC 27708  
(919) 660-6545  
edels@cs.duke.edu
- **Jeff Erickson**  
Department of Computer Science  
University of Illinois at Urbana-Champaign  
Urbana, IL 61801  
(217) 333-6769  
jeffe@cs.uiuc.edu
- **Robert Haber**  
Department of Theoretical and Applied Mechanics  
University of Illinois at Urbana-Champaign  
Urbana, IL 61801  
(217) 333-3826  
r-haber@uiuc.edu
- **Shang-Hua Teng**  
Department of Computer Science  
Boston University  
Boston, MA 02215  
(617) 353-8919  
steng@cs.bu.edu

## ADDITIONAL REFERENCES (Available upon request)

- **David Eppstein**  
School of Information and Computer Science  
University of California  
Irvine, CA 92697  
(714) 824-6384  
eppstein@ics.uci.edu
- **Gary Miller**  
School of Computer Science  
Carnegie Mellon University  
5000 Forbes Avenue  
Pittsburgh PA 15213-3891  
(412) 268-2631  
glmiller@cs.cmu.edu