

## Full Curriculum Vitae for

### **Dianne Hansford, Ph.D.**

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#### **Professional Interests**

My research interests are in the fields of geometric modeling and scientific visualization. The focus of my work has been on industrial curve and surface applications related to mathematical definitions of shape. The three books that I have co-authored demonstrate my dedication to sharing my knowledge and passion for mathematics, geometric modeling, and scientific visualization.

#### **Professional Preparation**

- 1991 Ph.D., Arizona State University (Computer Science), Advisor: R. Barnhill
- 1988 M.S., Arizona State University (Computer Science), Advisor: R. Barnhill
- 1986 B.S., University of Utah (Mathematics)

#### **Professional Experience**

- 2016 - Present Lecturer, School of Computing, Informatics, and Decision Systems Engineering, Arizona State University
- 2000 - Present Co-founder and Vice President of Research and Development, 3D Compression Technologies, Inc., [www.3dcompress.com](http://www.3dcompress.com)
- 1994 - Present Co-owner, Farin-Hansford R&D and NURBS Depot  
Textbooks, consulting, and software development  
Sample projects see [www.farinhansford.com/consulting.html](http://www.farinhansford.com/consulting.html)
- 2006 - 2009 Associate Research Professor, School of Computing and Informatics, Arizona State University
- 2004 - 2006 Assistant Research Scientist, Arizona State University, within the Institute for Computing and Information Sciences and Engineering (InCISE) and Partnership for Research in Spatial Modeling (PRISM)
- 2002 - 2004 Adjunct Faculty, Arizona State University
- 1996 - 1997 Visiting Assistant Professor, Arizona State University
- 1992 - 1994 Senior CADD/CAM Scientist, Manufacturing & Consulting Services, Inc.
- 1991 - 1992 Fulbright Research Scientist in Germany at Technical University Darmstadt (Host: J. Hoschek) and Technical University Braunschweig (Host: W. Boehm)
- 1986 - 1990 Consulting for Lockheed Aeronautical Co., Daimler-Benz, and Environmental Systems Research Institute
- 1987 - 1991 Research Assistant/Associate, Arizona State University

1985 - 1987     Research Assistant, University of Utah

## **Teaching Activities**

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2016 Fall:     Advanced Computer Graphics CSE 570  
                  Geometric Modeling CSE 477  
                  Mathematical Foundations of Informatics CPI 200

2016 Spring:   Geometric Modeling CSE 477  
                  Advanced Geometric Modeling CSE 577  
                  Mathematical Foundations of Informatics CPI 200

2008 Spring:   Mathematical Foundations of Informatics CPI 200

2007 Spring:   Introduction to Informatics CPI 101 (co-taught with Pat Langley)

2005 Spring:   Introduction to Computer Graphics, CSE 470

2004 Spring:   Introduction to Computer Graphics, CSE 470  
                  Introduction to Computer Graphics, CSE 470

2003 Fall:     Introduction to Computer Graphics, CSE 470

2002 Spring:   Introduction to Computer Graphics, CSE 470  
                  Computer Aided Geometric Design CSE 477

1997 Spring:   Computer Aided Geometric Design CSE 477

1996 Fall:     Computer Aided Geometric Design CSE 477

1995 Fall:     Computer Aided Geometric Design CSE 477

1990 Summer: Computer Graphics CSE 470

### New course development:

2008 Mathematical Foundations of Informatics CPI 200 with Gerald Farin  
2007 Introduction to Informatics CPI 101 with Pat Langley

## **Mentoring**

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### Ph.D. Committee Member

2010 Ashish Amresh, Co-chairs G. Farin and A. Razdan

2009 Frank Michel, Simulation and Visualization on In- and Outdoor Sound, Chair: H. Hagen

2009 Pushpak Karnick, Procedural Modeling for Information Visualization, Chair: A. Razdan

2009 Wei Chen, Applications of Sibson Interpolation, Co-chair with G. Farin

2008 Tom Bobach, Natural Neighbor Interpolation, Chair: G. Farin and H. Hagen

2008 Kanav Kahol, Distal environment perception through haptic user interfaces for individuals who are blind", Chair S. Panchanathan

### Masters Committee Member

2016 Mohammad Hejazi, Automating GD&T schema for mechanical assemblies, Chair: Jami Shah

2016 Sanchit Ramnath, Developing CAD data translation methods and automating feature fitting algorithms, Chair: Jami Shah

2010 Pallavi Saytan, Pose invariant face recognitions using frontal and profile views, Chair: S. Panchanathan

2008 Ramesh Saddi, Analysis of different interpolation methods for scattered data interpolation, Chair: G. Farin

2008 Anusha Sridaran , Physics based hybrid deformation platform for introducing configurability in visio-haptic environments, Chair: S. Panchanathan

2005 Rakesh Kushunapally, Roughness measure for meshes, Chair:: A. Razdan

2005 Rajesh Konda, Scattered data approximation based on Voronoi diagrams, Chair G. Farin

2005 Tarang Kaushal, Dynamic NURBS, Chair: G. Farin

2003 Ryan Holmes, Rendering volume meshes, Chair: G. Nielson

2003 Rupali Patekar, Hair modeling with spherical Voronoi diagrams, Chair: G. Farin

### Independent Study

2005 Jason Garland (Gaming) and R. Grafton (Music Visualizations)

2005 Randy Grafton, Schemes for Visualizing Music in Windows Media Player

### Fulton Undergraduate Research Initiative (FURI)

2005 Jeremy Hansen, Volume Deformations for Forensic Reconstruction of George Washington

2005 Robert Srinivasiah, Voronoi Diagrams for Gaming

### Honors Thesis

2016 Raquel Lippencott, Fractals for Terrain Modeling

2005 Bradford Huspeth, Java Applets for Teaching Linear Algebra

### Honors Project

2014 Grant Larson, Subdivision Surfaces

## **Service**

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2007-2008 Informatics Committee; develop curriculum

2006 - 2007 President of the ASU chapter of Sigma Xi

2005 - 2006 President-elect of the ASU chapter of Sigma Xi

1996 - 2002 Editorial Assistant for the journal Computer Aided Geometric Design, Elsevier Science Publishing, Amsterdam

## **Honors**

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- 1991 Fulbright Junior Research Position (accepted)
- 1991 NSF-NATO Postdoctoral Fellowship (declined, in favor of Fulbright)
- 1991 Distinguished Achievement Award from ASU Faculty Women's Association
- 1991 Sigma Xi Scientific Research Society (Induction)
- 1990 Achievement Rewards for College Scientists (ARCS) Scholarship
- 1990 Upsilon Pi Epsilon -- National Computer Science Honor Society

## Grants

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- 2006 *Tactile User Interface for project for Phoenix Urban Research Lab (PURL).*  
Granted \$2K by College of Design (Dean Reiter) for purchase of a Polhemus Tactile Digitizer
- 2005 *Incorporation of a psychological basis in the design of haptic user interfaces,*  
NSF SGER, 1 year for \$196K, Co-PI with S. Panchanathan (lead), D. Homa, T. Hedgepeth

## Current Society Membership and Activities

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SIAM: Society for Industrial and Applied Mathematics. Special interest group: Geometric Design  
 Fulbright Association  
 Sigma Xi Scientific Research Society

- 2016 Nominating Committee for Officers of the SIAM Geometric Design Group
- 2012 Nominating Committee for Officers of the SIAM Geometric Design Group
- 2006 - 2007 President Sigma Xi ASU Chapter
- 2005 - 2009 Webmaster for Sigma Xi at ASU.
- 2005 - 2009 Webmaster for Fulbright Arizona
- 2005 - 2006 President-elect, Sigma Xi at ASU

## Conference Program Committee

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- 2014 W2CG
- 2013 W2CG
- 2013 SIAM
- 2012 W2CG
- 2012 SIAM
- 2011 W2CG
- 2011 SIAM/ACM Joint Conference on Geometric and Physical Modeling
- 2011 SIAM Conference on Geometric and Physical Modeling
- 2010 W2CG: Conference on Computer Graphics, Visualization and Computer Vision
- 2010 International Conference on Computer Graphics, Visualization, and Computer Vision
- 2010 Computer Graphics International
- 2009 SIAM Conference on Geometric and Physical Modeling

## Refereeing and Reviewing

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### Journals:

Computer Aided Geometric Design	Journal of Computational and Applied Mathematics
Computer-Aided Design	Computer Graphics Forum
SIGGRAPH	Graphical Models
ACM Transaction on Graphics	Engineering with Computers
IEEE Multimedia Magazine	Information Visualization
IEEE Computer Graphics and Applications	Journal of Mathematics and the Arts
Articles for SIAM CAGD books (3)	The Visual Computer
Advances in Engineering Software	
Nexus Network Journal	

### Book reviews:

Academic Press	Morgan Kaufmann
AK Peters	SIAM
Taylor and Francis	

## Invited Talks, Tutorial Speaker, & Visiting Research Positions

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- 2016 Spatial Modeling in the “STEAM is hot... literally” panel at the ScieTech conference, Scottsdale, AZ
- 2006 PRISM: A Focal Point of Modeling and Visualization at ASU, Technical University of Kaiserslautern, Computer Science Department.
- 2006 PRISM: A Focal Point of Modeling and Visualization at ASU, Psychology Department.
- 2003 Université de Valenciennes, ENSIAME – Laboratoire MACS (Applied Mathematics), Valenciennes, France; Two week research collaboration; Talk presented: Voronoi Diagrams in CAGD. Host: Gudrun Albrecht, <http://www.univ-valenciennes.fr/macs/albrecht/>
- 2002 Université de Valenciennes, ENSIAME – Laboratoire MACS (Applied Mathematics), Valenciennes, France; Two week research collaboration; Talk presented: Shape for Meshes. Host: Gudrun Albrecht, <http://www.univ-valenciennes.fr/macs/albrecht/>
- 2000 University of Umea, Department of Computer Science, Umea, Sweden; Four day NURBS tutorial with G. Farin; Host: Prof. Per-Ake Wedin, <http://www.cs.umu.se/>
- 1991 Fulbright Junior Research Position in Germany

## Conference Presentations & Invited Workshop Participant

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- 2011 SIGGRAPH, Technical Papers Session on Geometry Processing, K. Mueller, C. Fuenfzig, L. Reusche, D. Hansford, G. Farin, H. Hagen; DINUS – Double insertion, non-uniform, stationary subdivision surfaces, Presented by K. Mueller.
- 2011 Dagstuhl conference on Geometric Modeling.
- 2011 International Conference on Computer-aided Material and Engineering (ICCME 2011), Xiangjiu Che, G. Farin, Zhanheng Gao, D. Hansford, The product of two B-spline functions, Shanghai, China, August 2011, Presented by Zhanheng Gao

- 2008 Seventh International Conference on Mathematical Methods for Curves and Surfaces, Tonsberg, Norway. Co-author of three talks: *DINUS Subdivision Surfaces*, *PNG1 Triangles*, and *Extrapolation of Sibson Coordinates*
- 2008 Dagstuhl conference on Geometric Modeling. Co-author of *PNG1 triangles for tangent continuous surfaces on the GPU*. Presented by K. Mueller.
- 2007 International Research Training Group Workshop, T. U. Kaiserslautern, Germany
- 2007 SIGGRAPH in Boston; Exhibit title: *Tactile Urban Interface*; Presented in the Gorilla Studio; Presentation given by D. Collins and A. Simmons; Project team: D. Hansford, D. Collins (PRISM), R. Ron (COD), J. Fischer (COD), Y. Kobayashi (COD), K. Bullis (PURL), J. McIntosh (PURL), A. Simmons (PRISM)
- 2007 Workshop speaker at the Sally Ride Science Festival held at ASU on 25 February 2007. Presented two workshops on *Modeling and 3D Printing for the Forensic Reconstruction of George Washington* to approximately 80 kids ages 10-16.
- 2006 International Workshop on Visualization in Medicine and the Life Sciences, Ruegen, Germany
- 2006 Sixth International Conference on Curves and Surfaces, Avignon, France. Presented *Anamorphic 3D Geometry* and co-author of *Tangent Approximation*
- 2006 Dagstuhl workshop on InTraVis – International Research Training for Visualization of Large, Unstructured Data Sets in Geospatial Planning, Modeling, and Engineering; Organizer H. Hagen
- 2006 Invited Talk: Psychology Department, ASU, PRISM: *A Focal Point of Modeling and Visualization at ASU*
- 2005 SIAM conference on Geometric Design, organized the minisymposium Geometric Design at ASU: The PRISM Lab
- 2005 Attended the Preservation Technology Research Consortium (PTRC) Workshop on Remote Sensing, ASU.
- 2005 Dagstuhl conference on Geometric Modeling, presented *Volume Deformations in Action, the Forensic Reconstruction of George Washington*, <http://www.dagstuhl.de/05221/>
- 2004 Norwegian Coastal Workshop, Bergen, Norway
- 2003 SIAM Conference on Geometric Design, Seattle, WA; *Voronoi Diagrams in CAGD* Minisymposium: *Elements of extrapolation for Sibson coordinates*
- 2002 Schloss Dagstuhl CAGD Symposium, Dagstuhl, Germany
- 1999 Schloss Dagstuhl CAGD Symposium, Dagstuhl, Germany
- 1998 Mathematical Research Institute Conference on Freeform Curves and Surfaces, Oberwolfach, Germany; *A permanence principle for shape control*
- 1997 SIAM conference on Geometric Design, Nashville, TN; Focus session co-chair
- 1996 Schloss Dagstuhl CAGD Symposium, Dagstuhl, Germany
- 1995 SIAM conference on Geometric Design, Nashville, TN; Focus session co-chair
- 1994 Ship-Design Laboratory workshop, National Technical University of Athens, Athens, Greece; *Surface triangulations*
- 1993 SIAM conference on Geometric Design, Tempe, AZ; Minisymposium organizer – *Triangulations*
- 1993 Schloss Dagstuhl CAGD Symposium, Dagstuhl, Germany

- 1992 Mathematical Research Institute Conference on Freeform Curves and Surfaces, Oberwolfach, Germany; *Gauss frame offsets*
- 1990 Workshop on Computer Aided Geometric Design, Erice, Sicily
- 1989 RPI workshop on Discrete Curves, Troy, NY
- 1989 SIAM conference on Computational Geometry, Tempe, AZ; *The neutral case for the min-max criterion*

## Publications

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### Books

G. Farin and D. Hansford. Practical Linear Algebra, A Geometry Toolbox, 3<sup>rd</sup> Edition, CRC Press Taylor & Francis Group An A K Peters Book, 2013. ISBN 978-7-111-47334-3, Chinese translation.

G. Farin and D. Hansford. Practical Linear Algebra, A Geometry Toolbox, 3<sup>rd</sup> Edition, CRC Press Taylor & Francis Group An A K Peters Book, 2013. ISBN 978-1-4665-7956-9.  
[www.farinhansford.com/books/pla](http://www.farinhansford.com/books/pla)

G. Farin and D. Hansford, Mathematical Principles for Scientific Computing and Visualization, AK Peters, 2008. ISBN: 978-1-56881-321-9.  
[www.farinhansford.com/books/scv](http://www.farinhansford.com/books/scv)

G. Farin and D. Hansford. Practical Linear Algebra, A Geometry Toolbox, AK Peters, 2005. ISBN 1-56881-234-5, (2nd edition of The Geometry Toolbox)  
[www.farinhansford.com/books/pla2](http://www.farinhansford.com/books/pla2)

G. Farin and D. Hansford. Lineare Algebra: ein geometrischer Zugang, Springer Verlag, Heidelberg, 2003. German translation of The Geometry Toolbox for Graphics and Modeling. ISBN: 3-540-41854-7

G. Farin and D. Hansford. The Essentials of CAGD, 229 pages, AK Peters, Natick, Massachusetts, 2000. ISBN: 1-56881-123  
[www.farinhansford.com/books/essbook/essentials-cagd](http://www.farinhansford.com/books/essbook/essentials-cagd)

G. Farin and D. Hansford. The Geometry Toolbox for Graphics and Modeling, 288 pages, AK Peters, Natick, Massachusetts, 1998. ISBN: 1-56881-074  
[www.farinhansford.com/books/geometrytoolbox](http://www.farinhansford.com/books/geometrytoolbox)

### Refereed Articles

G. Farin, D. Hansford. Agnostic G1 Gregory surfaces, Graphical Models, volume 74, pp. 346-350, 2012.

Xiangjiu Che, G. Farin, Zhanheng Gao, D. Hansford. The product of two B-spline functions, Advanced Materials Research, volume 186, pp. 445-448, 2011.

K. Mueller, C. Fuenfzig, L. Reusche, D. Hansford, G. Farin, H. Hagen. DINUS – Double insertion, non-uniform, stationary subdivision surfaces, ACM Transactions on Graphics, volume 29, number 3, pp. 1-21, 2010.

T. Bobach, G. Farin, D. Hansford, G. Umlauf, Natural neighbor extrapolation using ghost points, CAD, volume 41, issue 5, pp. 350-365, May 2009

G. Albrecht, J.P. Bécar, G. Farin, D. Hansford. On the approximation order of tangent estimators, Computer Aided Geometric Design, volume 25, pp 80-95, 2008

D. Hansford, D. Collins, Anamorphic 3D geometry , Computing, volume 79, Nos. 2-4, pp. 211-223, Springer Wien, April 2007.

J. Zehnder, J. Rowe, A. Razdan, J. Hu, D. Hansford, Using digital cloud photogrammetry to characterize the onset and transition from shallow to deep convection over orography, Monthly Weather Review, volume 134, pp. 2527-2545, September 2006.

G. Albrecht, J.P. Bécar, G. Farin, D. Hansford. Détermination de tangentes par l'emploi de coniques d'approximation, Revue Internationale de CFAO et d'informatique graphique, 1(1): 91-103. 2005.

G. Farin, D. Hansford. A permanence principle for shape control, in Computational Geometry: Lectures at the Morningside Center of Mathematics, ed. Ren-Hong Wang, AMS/IP Studies in Advanced Mathematics, Volume 34, pp. 83-87, ISBN 0-8218-2044-3, 2003.

G. Farin, D. Hansford. Discrete Coons patches, Computer Aided Geometric Design, 16(7) pages 691-700, 1999

D. Hansford, R.E. Barnhill, G. Farin. Curves with quadric boundary precision, Computer Aided Geometric Design, 11(5), pages 519-531, 1994

W. Boehm, D. Hansford. Parametric representation of quadric surfaces, Mathematical Modelling and Numerical Analysis, 26(1), pages 191-200, 1991.

W. Boehm, D. Hansford. Bézier patches on quadrics, in NURBS for Curve and Surface Design, ed. G. Farin, SIAM, pages 1-14, 1991

D. Hansford. The neutral case for the min-max triangulation, Computer Aided Geometric Design, 7(5), pages 431-438, 1990.

G. Farin, D. Hansford, A. Worsley. The singular cases for gamma-spline interpolation, Computer Aided Geometric Design, 7(6), pages 533-546, 1990.

### **Invited Articles and Book Chapters**

Simon, D. Hansford, A. Razdan, Geometric Modeling, in The SAS Encyclopedia of Archaeological Sciences, edited by Professor Sandra L. Lopez Varela, sponsored by the Society for Archaeological Sciences, Publisher Wiley-Blackwell, to appear 2016

G. Farin, D. Hansford. A practical approach to teaching linear algebra, TIES Magazine, The Magazine of Design and Technology in Education, pp. 42-44, Fall 2005, [www.tiesmagazine.org](http://www.tiesmagazine.org).

D. Hansford. Review of 3D Computer Graphics A Mathematical Introduction with OpenGL, by Samuel R. Buss, for SIAM Review, vol 46, no 2, 2004.

G. Farin, D. Hansford. Shape in automotive design, TIES Magazine, The Magazine of Design and Technology in Education. March 2002. [www.tiesmagazine.org](http://www.tiesmagazine.org)

D. Hansford, G. Farin. Curve and surface constructions, in The Handbook of 3D Modeling and Graphics, eds. G. Farin, J. Hoschek, and M.-S. Kim, pp. 165-188, Elsevier, The Netherlands, ISBN 0-444-51104-0, 2001.

D. Hansford. Bézier techniques, in The Handbook of 3D Modeling and Graphics, eds. G. Farin, J. Hoschek, and M.-S. Kim, pp. 75-104, Elsevier, The Netherlands, ISBN 0-444-51104-0, 2001

## Conference Proceedings

K. Mueller, C. Fuenfzig, G. Farin, and D. Hansford, PNG1 Patches for Tangent Continuous Surfaces on the GPU, Proceedings of Graphics Interface 2008, pp. 119-226.

T. Bobach, G. Farin, D. Hansford, G. Umlauf, Discrete Harmonic Functions from Local Coordinates, Mathematics of Surfaces XII, Sheffield, UK, September 2007.

Anusha Sridaran, Dianne Hansford, Kanav Kahol, Sethuraman Panchanathan, Surface Interrogation Methods for Haptic Rendering of Virtual Objects, World Haptics Conference, pp. 237-242, Second Joint EuroHaptics Conference and Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems (WHC'07), 2007.

A.Razdan, J. Schwartz, M. Tocheri, D. Hansford, Digital 3D Facial Reconstruction for George Washington, Proceedings of SPIE 6056, 11 pages, SPIE Electronic Imaging, San Jose, CA, 2006.

G. Albrecht, J.P. Bécar, G. Farin, D. Hansford, Une methode d'ordre 2 pour l'estimation de tangentes, Actes des Journées de Modelisation Geometrique, Poitiers, GTMG, 2005.

R.E. Barnhill, G. Farin, D. Hansford. Adaptive Surface Triangulations, Computer Aided Geometric Design, eds. P. Kaklis and N. Sapidis, National Technical University of Athens, pages 19-30, 1996.

## Theses

D. Hansford. Boundary curves with quadric precision for a tangent continuous scattered data interpolant, Ph.D. Thesis, Computer Science, Arizona State University, Advisor: R.E. Barnhill, 1991. (Note: Results published in Hansford, et al. 1994.)

D. Hansford. *Gamma spline interpolation*, M.S. Thesis, Computer Science, Arizona State University, Advisor: R. E. Barnhill, 1989. (Note: Results published in Farin, Hansford, Worsey 1989.)