Dr. Anshuman Razdan

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Education

Ph.D., Computer Science, Arizona State University, 1995
M.S., Mechanical Engineering, Arizona State University, 1988
B.S., Mechanical Engineering, Kurukshetra University, India, 1986

Academic Experience and Appointments

- Associate Professor (with tenure), Department of Engineering, ASU Polytechnic campus, (2006 –)
- Director, Research Development, College of Technology & Innovation (2010 -).
- Director of I^3DEA (Image and 3D Data Exploitation and Analysis) Lab, Division of Computing Studies, ASU Polytechnic campus, (2006 -) http://i3dea.asu.edu
- Director, ATIC (Advanced Technology Innovation Center), ASU Polytechnic campus, (2006 –), http://atic.asu.edu
- Research Professor and Director Research & Technology, The Decision Theater at Arizona State University, July 2005 – April 2006
- Affiliated/Adjunct, Department of Computer Science & Engineering, 2004 - present
- Director, *PRISM* (Partnership for Research in Spatial Modeling), Arizona State University, July 2000 – June 2005
- Technical Director, *PRISM* (Partnership for Research in Spatial Modeling), Arizona State University, January 1996 – July 2000

Industry Experience

- Informative Graphics Inc., Phoenix, AZ, 1994 - 1996
- ADS Inc., Phoenix, AZ, 1992 - 1994
- Motorola Inc., (Semiconductor and Computer Division, Austin, TX/Tempe, AZ), 1988 - 1992

Principal Research and Teaching Interests

- **Computer-aided geometric design (CAGD):** Geometric and shape modeling, NURB curves and surfaces, and approximation techniques (for curves, surfaces, volumes, and scattered data).
- **Pattern recognition and computer vision:** 3D feature extraction, segmentation of 2D images, 3D surfaces, volumetric data and hyper/multi spectral data.
- **3D Digital Libraries:** Archiving and query of 3D shapes, 3D facial biometrics.

- **Document Exploitation:** Digital documents, image processing, writing and machine print analysis, stroke recovery, exploitation of language agnostic features for information triage.
- **Visualization and Informatics:** Geo-spatial imagery and data visualization for GIS, biological volumetric and other data.

Appointments

- Co-Chair Tutorials**, IEEE VR 2009**, Lafayette, LA, March 14-18, 2009.
- Program Committee Chair, **The Studio** @ SIGGRAPH 99, Los Angeles, CA.

Awards

- Innovator of the year, AzTE, Arizona State University, 2006.

Honors

- *Top Ten Non Resident Indians Abroad*, The Hindustan Times, 2005.

Patents

- United States Patent # 7,436,988, Awarded October 14, 2008: ***3D face authentication and recognition based on bilateral symmetry analysis***, Zhang, Liyan (Jiangsu, CN), *Razdan, Anshuman* (Phoenix, AZ), Farin, Gerald (Paradise Valley, AZ), Assigned to Arizona Board of Regents.
- United States Patent #7729541, Issue date June 1, 2010, ***Comparative and Analytic Apparatus and Method for Converting Two Dimensional Bit Map Data into Three-Dimensional Data,*** Anshuman Razdan (Phoenix, AZ) and John Femiani (Tempe, AZ).

Commercial Technologies

- 3D Handwriting and Machine Print Software. Developed for In-Q-Tel and CIA, this technology has potential for licensing to the commercial sector.
- 3D Building Visualization Tool. Supported by Department of Homeland Security Phase I and II STTR grants, the technology is being developed with Kutta Technology, Inc., who will commercialize the product. ASU will receive royalty and licensing revenue.

Professional Societies Membership

- Institute of Electrical and Electronics Engineers (IEEE)
- Association for Computing Machinery (ACM)

Funding and Grants

1. Aerospace and Defense Collaboratory, *Sc. Foundation of Arizona*, Senior Personnel, member of leadership team and project manager **(10%), $1,000,000 with matching $1,000,000** from industry, November 2010, 1 year (with Mitzi Montoya and Werner Dahm as Co-PIs).
2. Geospecific Displacement Maps for Real Time, Stereoscopic Training Simulation, *Navy*, ASU **PI(30%) $26,000 (total $70,000)** on Phase I SBIR with Renaissance Sciences Corporation, November 2010, 6 months (with Peter Wonka and John Femiani).
3. Leap SDK, *Renaissance Sciences Corporation*, **Co-PI (30%), $100,000,** 1 year, Fall 2010 (with John Femiani as PI).
4. Multi-Source Visual Analytics, *National Science Foundation,* **Co-PI (25%), $498,000,** 3 years, Fall 2010 (with JiePing Ye and Peter Wonka).
5. Three-Dimensional Whole Body Scan Evaluation Support and Head Scan Post-processing, *US Army Soldier Center*, **PI (100%), $123,000,** 1 year, April 15, 2010.
6. Integrated Spectral Dimensionality Reduction, *National Geospatial Agency*, **Co-PI (25%), $300,000**, 2 years, 2008.
7. Development of Automated Scan Quality Software for Human 3D Surface Scans, *DOD/US Army*, **PI (100%), $80,000**, 1 year, 2008. Modified additional 6 months for additional **$53,000,** extended until April 2010 and additional **$15,000**.
8. 3D Visualization for First Responders, Phase II STTR, *Department of Homeland Security*, **ASU-PI (60%), $426,000 ($200,000 to ASU),** 2 years, 2008 (with Peter Wonka).
9. Imaging of Surfaces Using Structured Light, *Jet Propulsion Laboratory/NASA*, **PI (100%), $51,000,** 3 years, 2007.
10. Observations and Modeling of Orographic Cumulus Development using Data Collected during CuPIDO 2006, *National Science Foundation*, **ASU PI (90%), $201,000**, 2 years, February 2007 (with J. Hu). This is a sub-award from Creighton University. Joe Zehnder is the PI of the overall project. Total award $368,000.
11. A 2D/3D Visualization for Incident Commanders**,** STTR Phase I, *Department of Homeland Security*, **ASU-PI (60%), $100,000,** 2007, 6 months with Peter Wonka and Kutta Consulting**,** ($30,000 to ASU) **.**
12. Geo-Visual Analytics**,** Co-PI**,** *National Science Foundation,* **Co-PI (25%) $623,000,** 3 years, 2006 (with Peter Wonka, PI).
13. Hand versus Machine II, *In-Q-Tel***, PI (100%), $400,000,** 2 years, July 2006.
14. Crossover Resolutions in Documents, *ATP***, PI (80%), $150,000,** 1 year**,** July 2006 (Kevin Gary)**.**
15. Observations and Modeling of Orographic Cumulus Development using Digital Imaging and Data Cataloguing, *National Science Foundation***, Co-PI (17%), $111,000,** 1 year supplement to the original project for field study, January 2006 (with Joe Zehnder).
16. Separation of handwriting from annotated maps, *National Geospatial Agency (NGA)/In-Q-Tel*, **PI (100%), $50,000**, 6 months, 2005–2006.

17. In-Vivo Spectroscopy/Imaging System - an Instrumentation grant, *NIH*, **Co-PI (2%), $1,309,550**, 4 years, 2005 (with Ranu Jung PI).

18. Geometry-based Feature Extraction and Analysis for Geo-spatial Dataset, *National Geospatial Agency (NGA)*, **PI(50%), $450,000**, 3+1 years (July 1, 2005), 2005 (with Peter Wonka).

19. CRCNS: Modeling Neuromusculoskeletal Alterations after Spinal Cord Injury, *NIH*, **Co-PI (2%), $ 1,368,227**, 4 years, 2005 (with Ranu Jung, PI).

20. Catalyst: Center for Excellence in Adaptive Neuro-Biomechatronic Systems (CEANS), *National Science Foundation*, **Co-PI (4%), $133,118**, 3 years, 2005 (Ranu Jung, PI).

21. Research and Experience for Undergraduates, **PI (50%),** *National Science Foundation*, **$6,000**, 1 year, 2004. Supplement to the 3D Face Authentication award (with Gerald Farin).

22. Observations and modeling of orographic cumulus development using digital imaging and data cataloguing, *National Science Foundation***, Co-PI (17%), $319,206**, 2 years, 2004 (with Joe Zehnder, PI, and others).

23. Decision Center for Desert City, *National Science Foundation*, **Sr. Personnel (5%), $6.9M**, 5 years, 2004 (with Pat Gober, PI, and others).

24. Reconstructing George Washington, *Mount Vernon*, **PI (60%)**, $**139,000**, 1 year, 2004-2005 (with Dan Collins, Gerald Farin and others).

25. 3D Handwriting Analysis, *In-Q-Tel*, **PI (75%) $100,000**, 1 year, 2004 (with J. Rowe).

26. 3D Face Authentication, *National Science Foundation ITR grant*, **PI (50%)**, **$317,000,** 3 years, 2003 (with Gerald Farin and Charles Lockwood).

27. Quantitative Studies of Rock Abrasion on Earth & Mars, *NASA/JPL*, **Co-PI (87%), $45,000**, 3 years, 2003 (with Ron Greely, PI).

28. Advanced Neural Implants and Control, *DARPA*, **Co-PI (6%), $6,000,000**, 4 years, 2000 (with JiPing He, PI and others).

29. Neural and Musculoskeletal Adaptation in Forms and Function, *National Science Foundation IGERT grant*, **Co-PI (5%), $2,700,000**, 5 years, 2000 (with JiPing He, PI and others).

30. Adaptions: Using Remote Realtime and Interactive Nano-Visualization for Education (ARIVE), *National Science Foundation*, **Co-PI (20%), 199,367**, 2 years, 2000 (with Ramakrishna PI, and others).

31. 3D Knowledge: Acquisition, Representation and Analysis, *National Science Foundation KDI grant*, **PI (16%), $2,100,000**, 3 years, 1999 (with S. Panchanathan, G. Nielson. G. Farin, Mark Henderson and others).

32. Enabling & Extending the Arizona Infrastructure for Advanced Networking & Applications Research via the VBNS, *National Science Foundation*, **Co-PI (5%), $435,834**, 4 years, 1998.

33. Scientific Visualization Using Tactile Feedback for Visually Impaired, *National Science Foundation*, **PI (80%), $ 204,560**, 2 years, 1997; highlighted in March 1988 issue of

National Science Foundation Synergy magazine and The Scientist (with J.W. Mayer, and others).

34. Interactive Nano Visualization for Science and Engineering, *National Science Foundation,* **Co-PI (25%), $2,585,044**, 3 years, 1997 (with Ramakrishna, PI).

35. Post-Doctoral grant, *National Science Foundation*, $46,000, 2 years, 1996. PI credit to Dr. Gerald Farin.

Declined Proposals (Since 2006)

- 3D Image Modeling for Urban Geospacial Intelligence, National Geospatial Agency, $450,000, Co-PI (50%), 2006.

- CyberForce: Cyberspace for Engineering Workforce Development, National Sc. Foundation, $750,000, Co-PI (20%), 2007.

- SW-ACE in GeoInt: Preparing a New Generation of Intelligence Professionals, National Geospatial Agency, $3,750,000, PI (20%), 2007.

- ASU Advanced Technology Innovation Collaboratory (ATIC) A Product Development Resource for SMEs in the Southwest, $592,000, Co-PI (12%), 2007.

- Planning for ARID: Annotated Repository of Image Data, National Sc. Foundation, $50,000, PI (100%), 2007.

- NGA Post Doc Fellowship, National Geospatial Agency, $365,000, PI (100%), 2007.

- ATIC - Kutta Consulting: Flexible Display, DOD, $21,000, PI (60%), 2007.

- Multi-Source Visual Analytics, National Sc. Foundation, $483.000, Co-PI (25%), 2008.

- ATIC-Small Business Catalytic Program: SFAz, $500,000, PI (60%), 2008.
- Digital 3D Database - Determine Biological Affinity, Sex, & Age-at-Death from Human Skeletal Remains, *National Science Foundation*, Anshuman Razdan (PI), Laura Fulginiti and Kristen Hartnett. 3-years $500,000 (submitted July 2008).

Courses Developed

- **Introduction to Applied Computer Graphics,** an introduction to applied computer graphics using JOGL (Java extension to OpenGL). The students learn how to draw in 2D and 3D, use a camera model for orthographic and perspective viewing. Other topics include textures, reading and writing triangle mesh files, understanding file formats, wire frame and other rendering techniques. (CST 494/598, Fall 2007, 2008).
- **Computation and Visualization Laboratory BME/EPE/BIO/ASM 598:** (co-developed with JiPing He, Mary Marzke, Dennis Young) An interdisciplinary course for BioEngineers, Anthropology and Exercise Sc. PhD students under the NSF IGERT grant (once a year in 2003, 2004, 2005).
- **3D Visualization and Prototyping** (co-developed with Dan Collins), a course open to seniors and graduate students from all disciplines that gives them an understanding of 3D paradigms, data collection, modeling, visualization and Rapid Prototyping concepts. (ARA 494/598, Fall 1999, 2000, 2001 and 2002)
- **Reverse Engineering Methods**, graduate level course taught at De MontFort University, Leicester England (Summer 1998).

Courses Taught (in addition to above)

- **Applied Data Structures (CST 230),** an introduction to applied data structures using Java as the primary language. Students are taught concepts of arrays, lists, queues, stacks, trees, etc., (Spring 2007, Fall 2007, Spring 2008 and scheduled for Fall 2008).
- **Operating Systems Principles (CST 386),** an introduction to principles of operating systems. The course covers topics such as process scheduling, memory management, file systems, etc. (Fall 2009).
- **Introduction to Computer Graphics (CSE 470),** an introductory course with rigorous mathematical underpinnings of computer graphics algorithms taught in C/C++ and OpenGL (Spring 1998).

Synergistic Activities

- Developed and established ATIC (Advanced Technology Innovation Collaboratory), an interdisciplinary center at ASU Polytechnic campus. The mission of the Center is to encourage interdisciplinary collaborations between small and medium enterprises and faculty across ASU as well as create opportunities for collaborative applied research at the federal level.
  ATIC was awarded the Arizona Board of Regents (ABOR) Center status in January 2008, less than two years after launching ATIC. ATIC has participated in project awards of approximately $2.3M, since in its first two years.
- Started a new laboratory, I^3DEA (Image and 3D Data Exploitation and Analysis), at the ASU Polytechnic campus upon joining the Division of Computing Studies as a tenure track faculty. The lab serves as the research enclave for research areas related to 2D and 3D data and its exploitation. The lab has an annual expenditure of over $300,000, employs one research scientist and several graduate research assistants who are working primarily on the funded research projects. With an additional faculty joining the lab in Fall 2008, the lab will gain in strength and we expect to increase the productivity even more.
- Architected and established Decision Theater, a 3D immersive visualization based research center at ASU in 2005. The $6M facility was built in record time of 18 months and attracted a $3M grant from Ira A Fulton.
- Research on 3D Face Authentication was used as a basis for Hi-Tech MBA project/business plan, 2002-2003.
- Established PRISM (Partnership for Research in Spatial Modeling), an interdisciplinary research center at ASU in 1996, with emphasis on 3D modeling and visualization. The primary goal of PRISM is to bring computer scientists and engineers together with domain scientists such as archaeologists, biologists, etc, to engage in cross disciplinary dialogues and research. I continue to engage with PRISM scientists collaborating on many research projects. PRISM is also home to several of my PhD students. I spend approximately one day a week in PRISM lab on the Tempe campus.
- Led a team of 14 Co-PIs from two institutions (ASU and UC San Diego) and several disciplines for the NSF KDI grant ($2.1M) on 3D Knowledge in 1999.
- Co-PI of two major interdisciplinary initiatives i.e., IGERT (NSF) and Neural Prosthetics (DARPA). (2000 - 05)
- Actively promoting interdisciplinary research and teaching as is evident from participation in broad spectrum of funded grants.
- Actively promoting new and strategic initiatives such as efforts to patent and commercialize technologies developed at PRISM/ASU and participation of Arizona businesses at ASU.

Publications

Impact Factors for Journals and Conference Proceedings (Source: Thomson's ISI web of Knowledge)

- IEEE Trans. of Visualization and Computer Graphics **1.600**
- IEEE Computer Graphics and Applications **1.398**
- Pattern Recognition Letters **0.853**
- IEEE Trans. of Geosciences and Remote Sensing **1.140**
- Computer Aided Geometric Design **1.382**
- Computer Graphics Forum **1.107**
- Monthly Weather Review **2.267**
- Visual Computer **0.69**
- Computer Aided Design **1.222**
- Journal of Human Evolution **2.712**

Journal articles under review or preparation

1. John Femiani, Chia Chen, Anshuman Razdan, *Least Eccentric Curves*, Computer Aided Geometric Design, March 2010.
2. Myungsoo Bae, John Femiani, Anshuman Razdan, *Semi-Automatic Hole Filling Guided by Hermite Curves,* Computer Aided Design, May 2010.

Book chapters, journal articles, invited talk with papers and refereed conference articles accepted and/or published

1. Sangram Redkar, Tom Sugar, Anshuman Razdan, Ujwal Koneru , Bill Dillard, and Karthik Narayanan, *Using Inertial Measurement to Sense Crash Test Dummy Kinematics*, Accepted for publication, International Journal of Modern Engineering, Spring- vol 10 number 2, pp 17-25, 2010.
2. Ming Cui, J. Hu, A. Razdan, P. Wonka, *Color to Gray Conversion Using ISOMAP*, Visual Computer, Dec 2009 (accepted).
3. P. Karnick, D. Cline, S. Jeschka, A. Razdan and Peter Wonka, *Route Visualization using Detail Lenses,* IEEE Trans. of Visualization and Computer Graphics, Vol 16 iss: 2, pp 235-247.
4. David Cline, Stefan Jeschke, Anshuman Razdan, Kenric White, Peter Wonka, *Dart Throwing on Surfaces,* Eurographics Symposium on Rendering (EGSR) volume 28, number 4. pp 1217-1226. 2009.
5. Nathan T Bridges, Anshuman Razdan, Xuetao Yin, Ronald Greeley, Saif Ali, *Quantification of Shape and Texture for Wind Abrasion Studies: Proof of Concept Using Analog Targets,* Geomorphology, vol 114 issue 3, January 2010 pp 213-226.

6. P. Karnick, D. Cline, A. Razdan, E. Wentz and P. Wonka, *Procedural GIS Visualization*, Computer Graphics Forum, Vol 8, num 8, pp 2176-2188, 2009.
7. John Femiani and Anshuman Razdan, *Interval HSV: Extracting Ink Annotations from Monochromatic Backgrounds*, CVPR 2009 (accepted).
8. X. Yin, B. D. Corner, A. Razdan, *EARS: A System for Geometric and Anthropometric Evaluation of Human Body Scans;* Computer-Aided Design and Applications, 2009 (Vol 6) Number 4, page 431-445.
9. Ming Cui, Anshuman Razdan, Jiuxiang Hu, and Peter Wonka, *Interactive Hyperspectral Image Visualization Using Convex Optimization*, IEEE Trans. of Geosciences and Remote Sensing, Vol 47, number 6, June 2009, pp 1673-1684.
10. Xuetao Yin, Peter Wonka, Anshuman Razdan, *Generating 3D Building Models from Architectural Drawings: A Survey*, submitted to IEEE Computer Graphics and Applications, Volume: 29, Issue: 1, pp 20-30, Jan-Feb 2009.
11. J. A. Zehnder, J. Hu, and A. Razdan, Evolution of the Vertical Thermodynamic Profile during the Transition from Shallow to Deep Convection during CuPIDO 2006, Monthly Weather Review, March 2009, pp 937-953.
12. Ming Cui, John Femiani, Anshuman Razdan, Peter Wonka, J. Hu, *Scale Invariant Curve Matching*, Pattern Recognition Letters, Volume 30, Issue 1, 1 January 2009, Pages 1-10.
13. J. Hu, Anshuman Razdan, J. Zehnder, *Geometric Calibration of Digital Cameras For 3D Cumulus Cloud Measurements*, Journal of Atmospheric and Oceanic Technology, February 2009, pp 200–214.
14. Saif Ali, Jieping Ye, Anshuman Razdan, Peter Wonka, *Compressed Facade Displacement Maps*, IEEE Trans. on Visualization and Computer Graphics, accepted July 2008.
15. David Cline, Peter Wonka and Anshuman Razdan, *A Comparison of Tabular PDF Inversion Methods*, Computer Graphics Forum, accepted June 2008.
16. J. Hu, Anshuman Razdan, Peter Wonka, Ming Cui and John Femiani, *Road Network Extraction and Intersection Detection from Aerial Images by Tracking Pixel Footprints*, IEEE Trans. of Geosciences and Remote Sensing, Vol. 45, No.12, pp. 4144 – 4157, December 2007. Images from the paper were selected for the cover of the issue.
17. R. Damiani, J. Zehnder , B. Geerts, J. Demko, S. Haimov, J. Petti , G.S. Poulos , A. Razdan, J. Hu , M. Leuthold *Cumulus Photogrammetric, In-situ and Doppler Observations: The CuPIDO 2006 Experiment*, Submitted to the Bulletin of the American Meteorological Society, 89 (1) 57-73.
18. MS Bae, Anshuman Razdan, G. Farin, *Automated 3D Face Authentication & Recognition,* IEEE International Conference on Advanced Video and Signal based Surveillance, London, September 5-7, 2007. IEEE Catalog Number: CFP07AVS-CDR.
19. Ming Cui, P. Wonka, Anshuman Razdan, J. Hu, *A New Image Registration Scheme Based on Curvature Scale Space Curve Matching*, Visual Computer, Springer-Verlag, Vol. 23, No. 8, (August 2005) pp. 607–618.

20. J.Hu, Anshuman Razdan, Peter Wonka, Ming Cui and John Femiani, *Fourier Shape Descriptors of Pixel Footprints for Road Extraction from Satellite Images,* Image Processing, IEEE ICIP 2007 (San Antonio, Tx), September 16-19, 2007, Vol. I, pp. 49-52.
21. Rakesh Kushnapally, Anshuman Razdan, Nathan Bridges, *Roughness as Shape Measure*, Computer Aided Design Conference 2007 (Honolulu, HI), June 25-29, 2007, in Computer-Aided Design & Applications, Vol. 4, Nos. 1-4, 2007, pp. 295-310.
22. Anshuman Razdan, Myung Soo Bae, Mahesh Chowdhari and Gerald Farin, *State of 3D Face Biometrics for Homeland Security Applications,* Book chapter in National Security (Part of the Elsevier Publishing Handbooks on Information Systems), Eds Hsinchun Chen, T. S. Raghu, Ram Ramesh, Ajay Vinze and Daniel Zeng, pp. 73-99.
23. J. A. Zehnder, J. Hu, and A. Razdan, *A Stereo Photogrammetric Technique Applied to Orographic Convection*, Monthly Weather Review (June 2007), 135**,** pp. 2265–2277.
24. J. A. Zehnder, L. Zhang, D. Hansford, A. Razdan, N. Selover and C. M. Brown, 2006: *Using Digital Cloud Photogrammetry to Characterize the Onset and Transition from Shallow to Deep Convection over Orography*, Monthly Weather Review, September 2006, pp. 2527-2546.
25. Adam Huang, Gregory M. Nielson, Anshuman Razdan, Gerald E. Farin, D. Page Baluch, and David G. Capco, *Thin Structure Segmentation and Visualization in Three-Dimensional Biomedical Images: A Shape-Based Approach*, IEEE Transactions On Visualization And Computer Graphics, Vol. 12, No. 1, January/February 2006, pp. 93–102.
26. L. Zhang, A. Razdan, G. Farin, M.S. Bae, J. Femiani, *3D Face Authentication and Recognition Based in Bilateral Symmetry Analysis*, Visual Computer, Vol. 22, No. 1 pp. 43-55, January 2006.
27. A. Razdan, J. Schwartz, M. Tocheri and D. Hansford, *Digital 3D facial reconstruction of George Washington,* Three-Dimensional Image Capture and Applications VII. Edited by Brian D. Corner; Peng Li, Matthew Tocheri, Proceedings of the SPIE, (2006) Vol. 6056, pp. 173-183.
28. M.W. Tocheri, A. Razdan, R.C. Williams and M.W. Marzke, A 3D Quantitative Comparison of Trapezium and Trapezoid relative Articular and Nonarticular Surface Areas in Modern Humans and Great Apes, Journal of Human Evolution, (2005), 49:570-586.
29. A. Razdan, M.S. Bae, *Curvature Estimation Scheme for Triangle Meshes Using Biquadratic Bezier Patches*, Computer Aided Design, Vol. 37, Issue 14, December 2005, pp. 1481-1491.
30. J. Hu, A. Razdan, G. Farin and G. Nielson, *Improved Geometric Constraints on Deformable Surface Model for Volumetric Segmentation*, Geometric Modeling and Processing Conference Beijing, China 2004, pp. 237-245.
31. P. Mongkalnam, A. Razdan, G. Farin, *Reverse Engineering Using Loop Subdivision*, Computer-Aided Design & Applications, Vol. 1, Nos. 1-4, 2004, CAD'04, pp. 619-626.
32. Anshuman Razdan, J. Femiani, J. Rowe, *3D Techniques for Analyzing Handwritten Manuscripts for Digital Libraries*, International Conference on Digital Libraries, New Delhi 2004, Vol. 1, pp. 430-436.

33. Jiuxiang Hu, Page D. Baluch, Anshuman Razdan, Gregory M. Nielson, Gerald E. Farin, and David G. Capco (2003), *Case Study: Cellular Scaffold Extraction Using Crest Point for Volume Rendering*. Joint EUROGRAPHICS-IEEE TCVG Symposium on Visualization (Grenoble, France May 26 – 28). G.P. Bonneau, S. Hahmann, C.D. Hansen (Eds). pp. 123-128 (2003).

34. Jiuxiang Hu, Anshuman Razdan, Gregory Nielson, Gerald Farin, D. Page Baluch, David G. Capco, *Volume Segmentation Using Weibull E-SD Fields*, IEEE Transactions on Visualization and Computer Graphics Vol. 9, No. 3, pp. 320-328, 2003.

35. M.W. Tocheri, M.W. Marzke, D. Liu, M. Bae, G.P. Jones, R.C. Williams, A. Razdan, *Functional Capabilities of Modern and Fossil Hominid Hands: 3D Analysis of Trapezia*. American J Phys Anthropol (2003)122 (2):101-112.

36. Anshuman Razdan, Myung Soo Bae, *A Hybrid Approach to Feature Segmentation of 3-Dimensional Meshes*, Computer Aided Design, Vol. 35, No. 9, August 2003, pp. 783-790.

37. Adam Huang, Gregory Nielson, Anshuman Razdan, Gerald Farin, David Capco, and Page Baluch, *Line and Net Pattern Segmentation Using Shape Modeling, Visualization and Data Analysis*, 2003 (VDA 2003), Santa Clara, CA, Vol. 5009, pp. 171-180.

38. Ashish Amresh, Gerald Farin, Anshuman Razdan, *Adaptive Subdivision Schemes for Triangular Meshes*, in "Hierarchical and Geometric Methods in Scientific Visualization", edited by G. Farin, H. Hagen, B. Hamann, Springer-Verlag, 2003, pp. 319-327.

39. Jeremy Rowe, Anshuman Razdan, Dan Collins and S. Panchanathan, A *3D Digital Library System: Capture, Analysis, Query, and Display*, 4th International Conference on Digital Libraries (ICADL), Bangalore India, December 10-12, 2001.

40. Anshuman Razdan, J. Rowe, M. Tocheri, W. Sweitzer, *Adding Semantics to 3D Digital Libraries*, 5th International Conference on Digital Libraries (ICADL), Singapore, December 2002, pp. 419-420.

41. Anshuman Razdan, Kamal Patel, Gerald Farin and Dave Capco, *Visualization of Multicolor LCM data set*, Computers and Graphics, (2001) Vol. 25, No. 3, pp. 371-382.

42. Eddie W. Ong, Kenneth Mossman, B.L. Ramakrishna, Vincent B. Pizziconi, William S. Glaunsinger, Eric Patrick, Prashanth Vishwanath, Kranti Allagadda, Terence Tan and Anshuman Razdan; *Learning Materials Science Via the Web Using Nanospheres and Scanning Probe Microscopes*, MRS Symposium HH Proceedings, (Spring 2000).

43. Eddie W. Ong, Anshuman Razdan, Antonio A. Garcia, Vincent B. Pizziconi, B. L. Ramakrishna, and William S. Glaunsinger, *Interactive Nano-Visualization Of Materials Over The Internet,* Journal of Chemical Education, (2000) 77(9) 1114-1115.

44. Anshuman Razdan and Junyi Sun, *Remote Visualization of Microscope Data*; Dec 1998, Proceedings of the *Workshop on Multimedia Signal Processing*; pp. 209-214, Los Angeles, CA.

45. Anshuman Razdan and Gerald Farin, *Determination of End Conditions for NURB Surface Interpolation*, Computer Aided Geometric Design, Elsevier North Holland, Vol. 15, No. 7, July 1998, pp. 757-768.

46. Anshuman Razdan, J.W. Mayer, Ben Steinberg, *Scientific Visualization using Rapid Prototyping Technologies*, Proceedings of the *Sixth European Conference on Rapid Prototyping*, 1997, pp. 171-175, Nottingham, U.K.

47. Bernd Hamann, Brian Jean and Anshuman Razdan, *CAGD Techniques in the Control of Surface Grid Generation*, Co-author of the chapter for the book, pp. 29.1-26: Thompson, J.F., Weatherill, N.P. and Soni, B.K., eds., Handbook of Grid Generation, CRC Press, Inc., Boca Raton, FL, (1998)

48. Anshuman Razdan, M.R. Henderson, P. Chavez and P.E. Erickson, *Feature-Based Object Decomposition for Finite Element Meshing*, The Visual Computer, January 1990, pp. 291-303.

49. Anshuman Razdan and M.R. Henderson, *Feature Based Neighborhood Isolation Techniques for Automated Finite Element Meshing*, Geometric Modeling for Product Engineering, Editors Josh Turner, Ken Priess, Oct. 1989, North Holland.

Non peer reviewed conference articles accepted and/or published

50. K. Gary, A. Razdan, H. Koehnemann, A. Sannier, and A. Kagan, *Work-in-Progress: Embedding Entrepreneurship in the Computing Curricula*, Frontiers in Education (FIE 2008), Saratoga Springs, NY, October 2008.
51. J.C. Femiani, M. Phielipp, and A. Razdan, *A System for Discriminating Handwriting from Machine Print in Noisy Arabic Documents*, 2005 Symposium on Document Image Understanding Technology, pp. 65-70, 2005, UMCP October 2005.
52. Arleyn W. Simon, David Van Alfen, Anshuman Razdan, Gerald Farin, Myung Soo Bae, and Jeremy Rowe, 3D Modeling for Analysis and Archiving of Ceramic Vessel Morphology: A Case Study from the American Southwest. In Proceedings of the 33rd International Symposium on Archaeometry, April 22-26, 2002, Amsterdam, edited by H. Kars and E.Burke, pp. 257-263. Geoarchaeological and Bioarchaeological Studies Vol. 3, Institute for Geo- and Bio-archaeology, Vrije Universiteit, Amsterdam, Netherlands. [ISBN 90-77456-03-1].
53. Jiuxiang Hu, Anshuman Razdan, Gerald Farin and Gregory M. Nielson, *Segmenting Linear Parts using Layered Region Growing*, Eighth Edition of 3D MODELING Symposium, April 23-24, 2003, UIC – PARIS, pp. 1-8.
54. Anshuman Razdan, Vinodth Mohanam and Gerald Farin, *Triangle Mesh Compression using BSpline Curves*, CISST 2003, Vol. II, pp. 378-383, Eds. H.R. Arabnia and Youngsong Mun.
55. Anshuman Razdan, J. Rowe and J. Femiani, *3D Methods to aid Handwriting Analysis and OCR*, Proceedings of Symposium on Document Image Understanding, April 9-11 (2005), Univ. of Maryland College Park, pp. 287.
56. J. Riel-Salvatore, M. Bae, P. McCartney, and A. Razdan, *Palaeolithic archaeology and 3D visualization technology: Recent developments*. Antiquity 76 (294): n.d.
57. Anshuman Razdan, Dezhi Liu, Myung Soo Bae, Mary Zhu ,Gerald Farin, Arleyn Simon, and Mark Henderson, *Using Geometric Modeling for Archiving and Searching 3D Archaeological Vessels*, CISST 2001, pp. 451-457, June 25-28, 2001, Las Vegas, NV.
58. Utsav Schurmans, Anshuman Razdan, Arleyn Simon, Peter McCartney, Mary Marzke, David Van Alfen, Gram Jones, Jeremy Rowe, Gerald Farin, Daniel Collins, Mary Zhu, Dezhi Liu and Myung Soo Bae, *Advances in Geometric Modeling and Feature Extraction on Pots, Rocks and Bones for Representation and Query via the Internet*, Computer Applications in Archaeology (CAA) 2001, Visby, Sweden, April 25-29, 2001.
59. Bharath Vasudevarao, Dharma Prakash Natarajan, Mark Henderson and Anshuman Razdan; *Sensitivity of RP Surface Finish to Process Parameter Variation*, Proceedings of the *Solid Freeform Fabrication Conference*, pp. 251-258, Austin, TX 2000.
60. Anshuman Razdan, A. Amresh, N.K. Bade, et al., *Remote Operation of Scanning Probe Microscopes Over the Internet*, Proceedings of the Royal Microscopy Society, (2000), 35(4), 297-305.
61. Ben Steinberg, Anshuman Razdan and Gerald Farin; *Turning Laser Digitized Data into NURBS Surface*; Solid Freeform Fabrication Conference, pp. 277-284, Austin, TX, (1998).

62. Anshuman Razdan, Gerald Farin and Ben Steinberg; *Reverse Engineering using NURBS Surfaces*; Proceedings of the International Conference of Rapid Prototyping and Manufacturing, pp. 749-754, Beijing, China, (1998).

Information about co-authors in major and recent publications listed above.

- Jiuxiang Hu and David Cline – Research Scientist and Post Doc respectively, are in the area of Computing, and work under my leadership on research grants where I am the PI or Co-PI.
- John Femiani, Myung Soo Bae, Pornchai Mongkalnam, Ming Cui, Xuetao Yin, Pushpak Karnick, and, Ashish Amresh are current or former PhD students where I am the Chair or Co-Chair of their committees.
- Joe Zehnder (Atmospheric Sciences, Creighton University), Mathew Tocheri (Smithsonian), Peter Wonka (Computer Science, ASU), L. Zhang (visiting scientist from China), Mark Henderson (Engineering, ASU), Mary Marzke (Anthropology, ASU), David Capco (Cell Biology, ASU), Nathan Bridges (Geologist, JPL) are professional collaborators.

Invited Talks and Panels

- Research Talk, Lawrence Livermore Labs, December 2008.
- Research Talk, Louisiana Immersive Technologies Enterprise (LITE), University of Louisiana at Lafayette, March 3, 2008.
- NIST (National Institute of Standards and Technology), Maryland, April 23-25, 2007, invited talk at workshop on 2D and 3D Shape Matching and Retrieval.
- SME (Society of Manufacturing Engineers), Detroit, MI, May 2-5, 2007, as part of 3D Scanning and Rapid Prototyping Conference.
- Invited talk and paper at the SPIE 2006 Conference, San Jose, CA. A. Razdan, J. Schwartz, M. Tocheri and D. Hansford, *Digital 3D facial reconstruction of George Washington*, Three-Dimensional Image Capture and Applications VII. Edited by Corner, Brian D.; Li, Peng; Tocheri, Matthew. Proceedings of the SPIE, Volume 6056, pp. 173-183**.**
- International Conference on Digital Archaeology, invited talk, Mussoorie, India, November 10-14, 2005, Joint Indo US Science and Technology Forum.
- International Conference on Digital Libraries, invited talk, New Delhi, India, February 24-27, 2004.
- 4th International Conference on Digital Libraries, invited talk, Bangalore, India, December 10-12th, 2001.
- Invited talk, National Center for Software Technology, December 2001, Bombay, India.
- Invited talks at Departments of Computer Science and Fine Arts at Washington University, St. Louis, MO, January 25-27, 2000.
- TeleSculpture Conference, Arizona State University, Tempe, November 1999.
- Scientific Volume Visualization at the *Flourescnece Optical Techniques in Modern Biology Symposium*, October 11, 1999, Cedar Sinai Medical Center, Los Angeles, CA.
- Anshuman Razdan, Dan Collins, Mary Bates; invited panel members on Computer-Aided Rapid Prototyping Panel at *Third International Conference on Contemporary Cast Iron*, Johnson Atelier, NJ, 1998.

Journals and Conference Papers Reviewer

- Computer Aided Geometric Design (CAGD) journal.
- Computer Aided Design (CAD) journal.
- IEEE Transaction on Visualization and Computer Graphics.
- IEEE Transactions on Pattern Analysis and Machine Intelligence.
- IEEE Transactions of Geos-Science and Remote Sensing.
- ACM SIGGRAPH Conference / ACM Transactions on Graphics.
- Visual Computer journal.
- Graphic Models journal.
- EUROGRAPHICS, the European Association for Computer Graphics conference.
- Shape Modeling International 2001 conference.
- X3D Conference.

Proposal Reviewed for following Organizations

- National Science Foundation (NSF)
- Department of Energy (DOE)
- State of Kentucky Science Foundation

Current* and Former Graduate Students

- Pornchai Mongkolnam (PhD), Lecturer, School of Information Technology, King Mongkut's University of Technology Thonburi, Thailand. Co-Chair.
  PhD thesis title: *Reverse Engineering with Loop Subdivision Surfaces*.
- Myung Soo Bae (MS and PhD), graduated December 2008, started a Post-Doc position on a project funded by US Army/TSE. Co-Chair.
  Phd thesis title: *3D Face Authentication*.
- John Femiani (PhD) Spring, 2009. Has accepted position of Assistant Professor at ASU Polytechnic campus. Chair.
  Topic area: Geometric methods for modeling handwritten strokes using color (3D) and a network of higher dimensional (3D+) curves for segmenting document images.
- Cui Ming* (PhD). Co-Chair. February 2010. At Google Earth.
  Topic area: Geospatial data, image registration, hyper and multi spectral data visualization.
- Pushpak Karnick (PhD). Co-Chair, Fall 2009.
  Topic area: Geospatial visualization, map routing, and procedural modeling.
- Xuetao Yin* (PhD). Chair, expected graduation December 2009.
  Topic area: Triangle meshes, segmentation,
- Ashish Amresh* (PhD), Lecturer in Gaming, School of Computing Informatics, Arizona State University. Co-Chair, expected graduation summer 2009.
  Topic area: Advanced rendering techniques using GPU.
- Kamal Patel (MS), Arizona State University 1998 - industry.
  Topic area: Tinviz – Tod for Interactive Visualization of Multicolor Laser Confocal Microscopy Data Sets.
- Ujwal Korneu* (MS)
- Supreet Verma* (MS)
- Subhash Bharadwaj (MS) Garmin
- Ben Steinberg (MS), industry.
- Junyi Sun (MS), industry.
- Priti Agarwal (MS), industry.
- Sandeep Pulla (MS), industry.
- R Krovidi (MS), industry.
- Vinodth Mohanam (MS), industry.
- Rakesh Kushnapally (MS), industry.
- Mangai Sethuramachandran (MS), industry.
- Sujatha Gohad (MS), industry.

- Subhash Uppalapati* (MS), currently at Garmin Inc.

University Committee Service

- Member, task force on raising RA fees.
- Chair, Departmental Faculty Search Committee (2009)
- Chair, Graduate affairs committee of the Division (2008)
- Senator elect from Division of Computing Studies to the ASU-P senate. (2007 – present)
- Senator nominated to Senate Committee on Research Affairs, a consultative body to ASU Vice President for Research and Economic Affairs, Fall 2008 - .
- Director ATIC – ATIC is an Arizona Board Of Regents Center at ASU.
- University Research Council. As Director of a Center, I am part of the ASU URC organized by the Office of Vice President of Research and Economic Affairs.
- Chair, organizing committee for polyTECH day 2007, an event attended by 275 people that showcased research and student projects from the Polytechnic campus at ASU.
- Faculty search committee of the Division (2006 – 2008).
- Graduate admissions committee of the Division (2006 –2007).
- Graduate affairs committee of the Division (2006 – 2007).