CHANDRAJIT L. BAJAJ

Professor of Computer Sciences, Computational Applied Mathematics Chair in Visualization, Director, Center for Computational Visualization, Institute for Computational Engineering and Sciences The University of Texas at Austin ACES 2.324, 201 East 24th Street, Austin, TX 78712

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PERSONAL

Born April 19, 1958 Married, 2 sons, 1 daughter United States Citizen

EDUCATION

1980 B.TECH. (Electrical Engineering), Indian Institute of Technology, Delhi 1983 M.S. (Computer Science), Cornell University 1984 Ph.D. (Computer Science), Cornell University

PROFESSIONAL EXPERIENCE

- Assistant Professor of Computer Sciences, Purdue University, 1984-89
- Associate Professor of Computer Sciences, Purdue University, 1989-93
- Visiting Associate Professor of Computer Sciences, Cornell University, 1990-91
- Professor of Computer Sciences, Purdue University, 1993-97
- Director of Image Analysis and Visualization Center, Purdue University, 1996-97
- CAM (Comp. Appd. Math) Chair of Visualization, University of Texas at Austin, 1997-Present
- Professor of Computer Sciences, University of Texas at Austin, 1997- Present
- Director of Computational Visualization Center, University of Texas at Austin, 1997- Present

HONORS, AWARDS & MEMBERSHIP IN PROFESSIONAL SOCIETIES

- National Science Talent Scholarship, 1975. Dean's Honor Roll, IIT Delhi, 1975-1980
- Scholastic Merit Award, (B. Tech. DGPA of 10.00/10.00)
- Member of National Science Foundation (NSF) Panels on Advanced Computational Research, Geometric, Symbolic and Numeric Computing, Major Research Instrumentation, 1990 2006
- Frame Technology Excellence in Publishing Award, 1993
- Purdue University, Provost's Research Center Initiation Award, 1994
- Association of Computing Machinery, Student Chapter, Appreciation Certificate 2001
- Member of National Institute of Health, Special Emphasis Study Sections, 2001, 2004
- Association of Computing Machinery, Recognition of Service Award, 2002
- University of Texas, Faculty Research Award 2004, Dean Research Assignment Award 2004
- Member of the Austrian Science Foundation (FWF), Scientific Evaluation Committee 2005 Present
- Best paper award at Computer Aided Design (CAD) 2006
- Invited Jacques Morgenstern Colloquium INRIA- Sophia Antipolis, France, 2006, William Mong Distinguished Colloquium, Hong Kong University, 2012, Barrs Distinguished Colloquium, U of Florida, 2013



- Elected Member of Sigma Xi and Upsilon Pi Epsilon Honor Societies. Member of Association of Computing Machinery (ACM), Institute of Electrical and Electronic Engineers (IEEE), Biophysical Society, Society of Industrial and Applied Mathematics (SIAM), American Association for Advancement of Sciences (AAAS).
- Panel Member of the National Academy of Sciences, Vietnam Education Foundation, 2006, 2007
- Member of the NSF-CISE Board of Visitors, 2004, ETH Zurich, CS Dept Evaluation Committee (2004), INRIA Evaluation Committee 2007
- Chair Search Committee, King Abdullah University of Science and Technology (KAUST) Center Director 2008
- Member of Consolider Scientific Committee of the Spanish Ministerio de Ciencia e Innovacion, 2008, 2009
- Member of the NIH-NCRR National Biomedical Computation Resource Advisory Committee, 2006 Present
- Member of Mol. Structure Function (MSFD), Study Section, National Institute of Health, 2008 2010
- Chairperson of Mol. Structure Function (MSFD) Study Section, National Institute of Health, 2011 2014
- The 2010 Visions of Computing Lecture Series, UT-CS Austin, November 2010
- University of Texas-ICES-Moncrief Grand Challenge Faculty Research Award, 2009, 2012, 2016
- Fellow of the University of Texas Institute for Cellular and Molecular Biology (ICMB) 2009
- Fellow of The American Association for the Advancement of Science (AAAS), 2008 –, Association for Computing Machinery (ACM), 2009-, 2010-, Institute of Electrical and Electronic Engineers (IEEE), 2013 –; Fellow of the Society of Industrial and Applied Mathematics (SIAM) Aug, 2016 –
- Best Paper Award at ACM Symposium on Solid and Physical Modeling, 2010, Haifa, Israel
- Program Co-Chair, SIAM/ACM Geometric and Physical Modeling Conference, Orlando, Florida 2011
- Conference Co-Chair of Pacific Graphics 2016, Okinawa Institute of Science and Technology (OIST), Naha, Okinawa, Japan, October 2016
- Keynote Addresses at SIAM Computational Science (2000), Pacific Computer Graphics (2002), Volume Graphics (2004), EuroGraphics (2004), Computational Algebra (2004), Cyberworlds (2005), Institute of Mathematics and its Applications –IMA (2007), HSEMB Conference (2007), CAD Conference (2009), Physics/Biology Interface (2009), CompImage (2010), ACM Solid Physical Modeling (2010), Symposium on Geometry Processing (2011), IEEE Pacific Vis (2012), Intl Conf. On Contemporary Computing (2012), Advances in Comp. Mechanics, (2013), 22nd Meshing Roundtable (2013), NSF CyberBridges Workshop (2013), MBI-OSU Large Data Visualization Workshop (2014), Banff EM Workshop (BIRS) (2014), "Chemical Imaging and Visualization with Uncertainty Quantification", Computer Methods in Biomechanics and Biomedical Engineering, Imaging and Visualization, CMBBE (2015), Innovative Modeling Techniques for Predictive Medicine (2015), "Statistical Bio-Modeling for Predictive Medicine", UT Austin/Portugal CoLab-Advanced Computing research, Innovative Modeling Techniques for Predictive Medicine Workshop, 2015, IST, Lisbon, Portugal, "Mathematical Modeling and Analysis of Protein Cages", OIST, Jan 16, 2016.
- Invited Presentations at BIRS, Dagstuhl, Oberwolfach
- Collaborative Teaching Grant Award with Dr. D. Briscoe for BIO-(In)formatic Architecture Modeling in Architectural Design (ARC350R/ARC386M/CS378, Spring 2016, Funded by Learning Sciences, Provost Teaching Fellows Selection Committee, Oct 22, 2015
- Member of BIMOS Scientific Advisory Board to assist with further design and development of the BIMOS Program, June 20-21, 2016, Berlin Germany
- Pioneer Award on Solid Modeling from Solid Modeling Association, July, 2016
- Distinguished Alumni Award, Indian Institute of Technology, Delhi, Aug, 2016
- Moncrief Grand Challenge Faculty Award, ICES Institute for Computational Engineering and Sciences, 2014, 2016

RESEARCH ACTIVITIES

My interdisciplinary research is focused on the algorithmic and computational mathematics underpinnings of Imaging and Geometry Data Sciences, Computer Graphics, Bio-Informatics and Visualization with applications stemming from bio-medical engineering, physical and chemical sciences and bio-inspired architecture. My commitment to the field of computational and predictive medicine is evidenced by my research focus this past decade. I design and implement scalable solutions for: (a) forward and inverse problems in microscopy, spectroscopy, biomedical imaging; (b) constructing spatially realistic and hierarchical phenomenological models; (c) development of fast high-dimensional search/scoring engines for predicting energetically favorable multi-molecular and cellular complexes; and (d) statistical analysis and interrogative visualization of neuronal form-function. Additionally, I have courtesy appointments and



supervise M.S and Ph.D. students from several UT departments, including, biomedical and electrical engineering, neurobiology, and mathematics. I currently serve on the editorial boards for the International Journal of Computational Geometry and Applications, and the ACM Computing Surveys."

The following is a link is to the publications by Chandrajit Bajaj:

http://scholar.google.com/citations?user=gyL3CZ0AAAAJ"&user=gyL3CZ0AAAAJ

JOURNAL PUBLICATIONS

- 1. C. Bajaj (1985). "Geometric Optimization and the Polynomial Hierarchy", *Lecture Notes in Computer Science*, 176-195.
- 2. C. Bajaj (1986). "Proving Geometric Algorithm Non-Solvability: An Application of Factoring Polynomials", Journal of Symbolic Computation, 2(1):99-102
- 3. C. Bajaj, M. Kim (1987). "Generation of Configuration Space Obstacles: The Case of Moving Algebraic Curves", *IEEE International Conference on Robotics and Automation*, *4*, 979-984
- 4. S. Abhyankar, C. Bajaj (1987). "Automatic Parameterization of Rational Curves and Surfaces I: Conics and Conicoids", *Computer Aided Design*, 19(1):11-14
- 5. S. Abhyankar, C. Bajaj (1987). "Automatic Parameterization of Rational Curves and Surfaces II: Cubics and Cubicoids", *Computer Aided Design*, 19(9):499-502
- 6. M. Atallah, C. Bajaj (1987). "Efficient Algorithms for Common Transversals", *Information Processing Letters*, 25(2):87-91
- 7. C. Bajaj (1987). "Geometric Optimization and the Polynomial Hierarchy", *Theoretical Computer Science*, 54(1):87-102
- 8. S. Abhyankar, C. Bajaj (1988). "Automatic Parameterization of Rational Curves and Surfaces III: Algebraic Plane Curves", *Computer Aided Geometric Design*, 5(4):309-321
- 9. M. Wu, C. Bajaj, C. Liu (1988). "Face Area Evaluation Algorithm for Solids", Computer Aided Design, 20(2):75-82
- 10. C. Bajaj, T. Moh (1988). "Generalized Unfoldings for Shortest Paths in Euclidean 3-Space", *International Journal of Robotics Research*, 7(1):71-76
- 11. C. Bajaj, M. Kim (1988). "Generation of Configuration Space Obstacles: The Case of Moving Spheres", *IEEE Journal of Robotics and Automation*, 4(1):94-99
- 12. C. Bajaj (1988). "The Algebraic Degree of Geometric Optimization Problems", *Discrete and Computational Geometry*, 3(1):177-191
- 13. C. Bajaj, C. Hoffmann, R. Lynch, J. Hopcroft (1988). "Tracing Surface Intersections", *Computer Aided Geometric Design*, 5(4):285-307
- 14. S. Abhyankar, C. Bajaj (1989). "Automatic Parameterization of Rational Curves and Surfaces IV: Algebraic Space Curves", *ACM Transactions on Graphics*, 8(4):325-334
- 15. C. Bajaj, M. Kim (1989). "Generation of Configuration Space Obstacles: The Case of Moving Algebraic Curves", *Algorithmica*, 4(1):157-172
- 16. C. Bajaj, M. Li (1989). "Geometric Optimization and D^P -Completeness", *Discrete and Computational Geometry*, 4(1):3-13. Abstract appears in *Zentralblatt fur Mathematik*.
- 17. C. Bajaj (1990). "Rational Hypersurface Display", Computer Graphics, 24(2), 117-127
- 18. C. Bajaj, M. Kim (1990). "Convex Hulls of Objects bounded by Algebraic Curves", Algorithmica, 6(1):533-553
- 19. C. Bajaj, M. Kim (1990). "Generation of Configuration Space Obstacles: The Case of Moving Algebraic Surfaces", *International Journal of Robotics Research*, 9(1):92-112
- 20. C. Bajaj, T. Dey (1990). "Polygon Nesting and Robustness", Information Processing Letters, 35(1):23-32
- 21. C. Bajaj, T. Dey (1990). "Robust Computations of Polygon Nesting", *International Workshop on Discrete Algorithms and Complexity*, 33-40
- 22. J. Johnstone, C. Bajaj (1990). "Sorting Points along an Algebraic Curve", Siam Journal on Computing, 19(5):925-967
- 23. C. Bajaj, I. Ihm (1992). "Algebraic Surface Design with Hermite Interpolation", ACM Transactions on Graphics, 11(1):61-91
- 24. C. Bajaj, T. Dey (1992). "Convex Decomposition of Polyhedra and Robustness", *Siam Journal on Computing*, 21(2):339-364



- 25. T. Dey, K. Sugihara, C. Bajaj (1992). "Delaunay Triangulations in Three Dimensions with Finite Precision Arithmetic", *Computer Aided Geometric Design*, 9(6):457-470
- 26. T. Dey, C. Bajaj, K. Sugihara (1991). "On Good Triangulations in Three Dimensions", *International Journal of Computational Geometry and Applications*, 2(1):75-95
- 27. C. Bajaj, I. Ihm (1992). "Smoothing Polyhedra using Implicit Algebraic Splines", Computer Graphics, 26(2):79-88.
- 28. C. Bajaj, J. Canny, T. Garrity, J. Warren (1993). "Factoring Rational Polynomials over the Complexes", *Siam Journal on Computing*, 22(2):318-331
- 29. C. Bajaj, I. Ihm, J. Warren (1993). "Higher-Order Interpolation and Least-Squares Approximation Using Implicit Algebraic Surfaces", *ACM Transactions on Graphics*, 12(4):327-347
- 30. V. Anupam, C. Bajaj, D. Schikore, M. Schikore (1994). "Distributed and Collaborative Visualization", *IEEE Computer*, 27(7)37-43
- 31. C. Bajaj, G. Xu (1994). "NURBS Approximation of Surface/Surface Intersection Curves", *Advances in Computational Mathematics*, 2(1):1-21
- 32. V. Anupam, C. Bajaj (1994). "SHASTRA An Architecture for Development of Collaborative Applications", International Journal of Intelligent and Cooperative Information Systems, 3(2):155-166
- 33. V. Anupam, C. Bajaj (1994). "SHASTRA: Multimedia Collaborative Design Environment", *IEEE Multimedia*, 1(2):39-49
- 34. C. Bajaj, F. Bernardini, G. Xu (1995). "Automatic Reconstruction of Surfaces and Scalar Fields from 3D Scans", *Computer Graphics*, ACM SIGGRAPH 1995 pp 109-118
- 35. C. Bajaj, A. Royappa (1995). "Finite Representations of Real Parametric Curves and Surfaces", *International Journal of Computational Geometry and Applications*, 5(3):313-326
- 36. C. Bajaj, J. Chen, G. Xu (1995). "Modeling with Cubic A-patches", ACM Transactions on Graphics, 14(2):103-133
- 37. C. Bajaj, E. Coyle, K. Lin (1996). "Arbitrary Topology Shape Reconstruction from Planar Cross Sections", *Graphical Models and Image Processing*, 58(6):524-543
- 38. C. Bajaj, G. Xu (1997). "Piecewise Rational Approximation of Real Algebraic Curves", *Journal of Computational Mathematics*, vol. 15(1):55-71
- 39. C. Bajaj, F. Bernardini, G. Xu (1997). "Reconstructing Surfaces and Functions on Surfaces from Unorganized Three-Dimensional Data", *Algorithmica*, 19(1):243-261
- 40. C. Bajaj, G. Xu (1997). "Spline Approximations of Real Algebraic Surfaces", *Journal of Symbolic Computation, Special Isssue on Parametric Algebraic Curves and Applications*, 23(23):315-333
- 41. C. Bajaj, G. Xu (1997). "Modeling and Visualization of C1 and C2 Scattered Function Data on Curved Surfaces", *Proc. of 2nd Pacific Conference on Computer Graphics and Applications*, 19-29
- 42. C. Bajaj, R. Holt, A. Netravali (1998). "Rational Parameterizations of Nonsingular Real Cubic Surfaces", *ACM Transactions on Graphics*, 17(1):1-31
- 43. E. Sacks, C. Bajaj (1998). "Sliced Configuration Spaces for Curved Planar Bodies", *International Journal Of Robotics Research*, 17(6):639-651
- 44. C. Bajaj, D. Schikore (1998). "Topology Preserving Data Simplification with Error Bounds", *Journal on Computers and Graphics*, 22(1):3-12
- 45. L. Moriarty, B. Duerstock, C. Bajaj, K. Lin, R. Borgens (1998). "Two and Three Dimensional Computer Graphics Evaluation of the Subacute Spinal Cord Injury", *Journal of Neurological Sciences*, 155(2):121-137 http://tinyurl.com/PMID9562256, PMID: 9562256, PMC Journal in Process
- 46. C. Bajaj, C. Baldazzi, S. Cutchin, A. Paoluzzi, V. Pascucci, M. Vicentino (1999). "A programming approach for complex animations. Part I. Methodology", *Computer Aided Design*, 31(11):695-710
- 47. C. Bajaj, G. Xu (1999). "A-Splines: Local Interpolation and Approximation Using Gk- Continuous Piecewise Real Algebraic Curves", Computer *Aided Geometric Design*, 16(6):557-578
- 48. F. Bernardini, C. Bajaj, J. Chen, D. Schikore (1999). "Automatic Reconstruction of 3D CAD Models from Digital Scans", *International Journal on Computational Geometry and Applications*, 9(4-5):327-369
- 49. C. Bajaj, J. Chen, R. Holt, A. Netravali (1999). "Energy Formulations of A-Splines", *Computer Aided Geometric Design*, 16(1):39-59
- 50. C. Bajaj, V. Pascucci, G. Zhuang (2002). "Single Resolution Compression of Arbitrary Triangular Meshes with Properties", *Computational Geometry: Theory and Applications*, 14(1-3):167-186
- 51. C. Bajaj, E. Coyle, K. Lin (1999). "Tetrahedral Meshes from Planar Cross Sections", *Computer Methods in Applied Mechanics and Engineering*, 179(1-2):31-52



- 52. B. Duerstock, C. Bajaj, V. Pascucci, D. Schikore. K. Lin, R. Borgens (2000). "Advances in three-dimensional reconstruction of the experimental spinal cord injury", *Computerized Medical Imaging and Graphics*, 24(6):389-406, http://tinyurl.com/PMID11008186, PMID: 11008186, PMC Journal in Process
- 53. C. Bajaj, I. Ihm, S. Park (2000). "Compression-Based 3D Texture Mapping for Real-Time Rendering", *Graphical Models*, 62(6):391-410
- 54. C. Bajaj, A. Royappa (2000). "Parameterization in Finite Precision", Algorithmica, 27(1):100-114
- 55. G. Xu, C. Bajaj, W. Xue (2000). "Regular algebraic curve segments (I)-Definitions and characteristics", *Computer Aided Geometric Design*, 17(6):485-501
- 56. G. Xu, C. Bajaj, C. Chu (2000). "Regular Algebraic Curve Segments (II) Interpolation and Approximation", Computer Aided Geometric Design, 17(6):503-519
- 57. C. Bajaj, I. Ihm, S. Park (2001). "3D RGB Image Compression for Interactive Applications", ACM Transactions on Graphics, 20(1):10-38
- 58. G. Xu, H. Huang, C. Bajaj (2001). "C1 Modeling with A-patches from Rational Trivariate Functions", *Computer Aided Geometric Design*, 18(3):221-243
- 59. C. Bajaj, G. Xu (2001). "Regular Algebraic Curve Segments (III) Applications in Interactive Design and Data Fitting", *Computer Aided Geometric Design*, 18(3):149-173
- 60. H. Pfister, B. Lorenson, C. Bajaj, G. Kindlmann, W. Schroeder, L. Avila, K. Raghu, R. Machiraju, J. Lee (2002). "The Transfer Function Bake-off", *IEEE Computer Graphics and Applications*, 21(3):16-22
- 61. C. Bajaj, S. Schaefer, J. Warren, G. Xu (2002). "A Subdivision Scheme for Hexahedral Meshes", *The Visual Computer*, 18(5):343-356
- 62. G. Xu, C. Bajaj, S. Evans (2002). "C1 Modeling with Hybrid Multiple-sided A-patches", Special issue on Surface and Volume Reconstructions in the International Journal of Foundations of Computer Science, 13(2):261-284
- 63. C. Bajaj, G. Xu, R. Holt, A. Netravali (2002). "Hierarchical Multiresolution Reconstruction of Shell Surfaces", Computer Aided Geometric Design, 19(2):89-112
- 64. B. Duerstock, C. Bajaj, R. Borgens (2003). "A Comparative Study of the Quantitative Accuracy of Three-Dimensional Reconstructions of Spinal Cord from Serial Histological Sections", *Journal of Microscopy*, 210(2):138-148, http://tinyurl.com/PMID12753096, PMID: 12753096, PMC Journal In Process
- 65. W. Blanke, C. Bajaj (2003). "Active Visualization in a Multidisplay Immersive Environment", *Computers & Graphics*, 27(5):681-691
- 66. C. Bajaj, G. Xu (2003). "Anisotropic Diffusion of Surfaces and Functions on Surfaces", *ACM Transactions on Graphics*, 22(1):4-32
- 67. W. Jiang, M. Baker, Q. Wu, C. Bajaj, W. Chiu (2003). "Applications of Bilateral Denoising Filter in Biological Electron Microscopy", *Journal of Structural Biology*, 144(1-2):132-143, doi:10.1016/j.jsb.2003.09.028, http://tinyurl.com/PMID14643214, PMID: 14643214, PMC Journal In Process
- 68. G. Xu, C. Bajaj (2003). "Curvature Computations of 2-manifolds in R^k", *Journal of Computational Mathematics*, 21(5):681-688
- 69. C. Bajaj, V. Pascucci, A. Shamir, R. Holt, A. Netravali (2003). "Dynamic Maintenance and Visualization of Molecular Surfaces", *Discrete Applied Mathematics*, 127(1):23-51 doi: 10.1016/S0166-218X(02)00283-4.
- 70. C. Bajaj, A. Netravali (2003). "NURBS Approximation of A-splines and A-patches", *International Journal of Computational Geometry and Applications*, 13(5):359-390
- 71. C. Bajaj, Z. Yu, M. Auer (2003). "Volumetric Feature Extraction and Visualization of Tomographic Molecular Imaging", *Journal of Structural Biology*, 144(1-2):132-143, doi:10.1016/j.jsb.2003.09.037, http://tinyurl.com/PMID14643216, PMID: 14643216, PMC Journal In Process
- 72. C. Bajaj, G. Xu (2004). "Adaptive Surfaces Fairing by Geometric Diffusion", Geometric Modeling: Techniques, Applications, Systems and Tools, 2004, M. Sarfraz(ed), Kluwer Academic Publishers, ISBN: 1-4020-1817-7, 31-49, doi: 10.1109/IV.2001.942137
- 73. Y. Zhu, B. Carragher, R. Glaeser, D. Fellmann, C. Bajaj, M. Bern, F. Mouche, F. Haas, R. Hall, D. Kriegman, et al (2004). "Automatic Particle Selection: Results of a Comparative Study, *Journal of Structural Biology*, 145(1-2):3-14, doi: 10.1016/j.jsb.2003.09.033, https://tinyurl.com/PMID15065668, PMID: 15065668, PMC Journal In Process
- 74. Y. Song, Y. Zhang, C. Bajaj, N. Baker (2004). "Continuum Diffusion Reaction Rate Calculations of Wild-Type and Mutant Mouse Acetylcholinesterase: Adaptive Finite Element Analysis", *Biophysical Journal*, 87(3):1558-1566, doi: 10.1529/biophysj.104.041517, http://tinyurl.com/PMC1304562, PMCID: PMC1304562
- 75. Z. Yu, C. Bajaj (2004). "Detecting Circular and Rectangular Particles Based on Geometric Feature Detection in Electron Micrographs", *Journal of Structural Biology*, 145(1-2):168-180, doi: 10.1016/j.jsb.2003.10.027, http://tinyurl.com/PMID15065684, PMID: 15065684, PMC Journal In Process



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