CHANDRAJIT L. BAJAJ

Professor of Computer Sciences,
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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).

Align EX1004

- 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
- American Association for the Advancement of Science- Fellow - 2008
- 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

1. 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), ,Computer Methods in Biomechanics and Biomedical Engineering, Imaging and Visualization, CMBBE (2015), Innovative Modelling 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, Workshop on Mathematical Modeling and Analysis of Protein Cages, OIST, Jan 16, 2016, Invited Speaker,Cryo-EM Workshop, August 8-9, 2018, New York, New York.

2. ChinaGraph, November 9-11, 2018, Guangzhou, China, International Conference on Machine Learning and Data Science (ICML & DS 2018), December 21-22, 2018, Invited Speaker, "Spatio-Spectral Tensor Super-resolution" New York University, NY, January 24, 2019, Invited Speaker, "Spatio-Spectral Tensor Super-resolution" Stony Brook University, NY, January 25, 2019, Invited Speaker "Spatio-Spectral Tensor Super-Resolution with Chemical Priors" SIAM Conference on Computational Science and Engineering, February 25–March 1, 2019, Spokane, Washington " Are Spline Kernels Useful", University of Chicago, May 15-May 19, 2019, "Learning to Sample and Sampling to Learn", Amazon, Seattle, June 8-16, 2019, "Computation, Mathematics, and Statistics for Visual Search Applications", Univeristy of Peking- Beijing, China, July, 2019, "Computation, Mathematics, and Statisics for Visual Search Applications", July 1-13, 2019, University of Peking- Beijing, China, ALBERT:A digital Pathology Electronic Assistant, August 2-4, 2019, UT Southwestern Medical center- Dallas and Univ of Oklahoma [Plenary] Statistical Deep Learning for Automatic 2D and 3D Cytotyping of tumor tissue-. Cold Spring Harbor- Asia conference, Shanghai, China, September 4, 2019, "Learning to Sense, Model. And Predict". Shanghai Jai Tong University- Shanghai, China, September 6, 2019, [Plenary] "Learning the Koopman Operator for Dynamic Simulations", Workshop on Digital Twins, University of Luxembourg, September 9-13, 2019, "Deep Learning Koopman Operator for Dynamic Data", Georgia Tech at Atlanta, Ga. Sept 17, 18, 2019, "Deep Learning for Static and Dynamic Data" Colloquium talk, NYU Data Sciences, Sept 27, 2019, "Deep Learning Koopman Modes for Dynamic Data" Colloquium talk, Princeton University, Sept 30, 2019, Learning to Correct Form and Function with Reinforcement, The 2nd TBSI Workshop on Learning Theory (TBSI-WOLT'20) July 20-22, 2020, Deep Learning to Correct Form and Function with Reinforcement, New Jersey Institute of Tech, December 9, 2020, Hyderbad, India, Numerical Geometry, Grid Generation and Scientific Computing, Moscow, November 2020

- Invited Presentations at BIRS, Dagstuhl, Oberwolfach
- Collaborative Teaching Grant Award (Dr. D. Briscoe) for BIO-(In)formatic Architecture Modeling in Architectural Design (ARC350R/ARC386M/CS378, Spring 2016, Funded by Learning Sciences, Provost Teaching Fellows.

- Member of BIMOS Scientific Advisory Board, Berlin Germany 2015 –
- Society for Industrial and Applied Mathematics- Fellow-2016
- 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, Institute for Computational Engineering and Sciences, 2014, 2016
- Member of Scientific Advisory board, Indian Institute of Technology, Delhi, 2018 –
- Honored with a Bountiful Tree at Trees for Tigers, Panna Tiger Reserve, Madhya Pradesh, India for delivering the talk during the IEEE CS-BITS GOA APPCAIR joint Webinar Series- 2021

EDITORIAL BOARDS

- Computing Surveys(CSUR)- 2020-
- International Journal of Computational Geometry and Applications- 2020

ACADEMIC ACTIVITIES

My current research is on the computer science and computational mathematics foundations of statistical and dynamic decision making, actionable intelligence and exploratory visualization. I develop classical and quantum, machine learning and geometric optimization algorithms for applications in the physical, chemical and environmental data sciences, medicine and neuro-morphic computing. I revisit my past research in modeling multi-scale form and function, through the lens of inferential data sciences,. My current research projects include (a) forward and inverse optimization problems in microscopy, spectroscopy, electro-magnetic and electro-optical wide spectrum imaging; (b) generative shape and new material design for spatially realistic and phenomenological models; (c) learning from nature and generating models and mechanisms with accelerated and emergent properties. I teach an undergraduate course titled "Geometric Foundations of Data Sciences" and a graduate course titled "Predictive Machine Learning". I have courtesy appointments and supervise undergraduates, M.S. and Ph.D. students from several UT departments, including biomedical and electrical engineering, neuroscience, and mathematics.

The following is a link is to my most cited publications :

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. S. Abhyankar, C. Bajaj (1987). "Automatic Parameterization of Rational Curves and Surfaces I: Conics and Conicoids", *Computer Aided Design,* 19(1):11-14
4. S. Abhyankar, C. Bajaj (1987). "Automatic Parameterization of Rational Curves and Surfaces II: Cubics and Cubicoids", *Computer Aided Design,* 19(9):499-502
5. M. Atallah, C. Bajaj (1987). "Efficient Algorithms for Common Transversals", *Information Processing Letters,* 25(2):87-91
6. C. Bajaj (1987). "Geometric Optimization and the Polynomial Hierarchy", *Theoretical Computer Science*, 54(1):87-102
7. S. Abhyankar, C. Bajaj (1988). "Automatic Parameterization of Rational Curves and Surfaces III: Algebraic Plane Curves", *Computer Aided Geometric Design,* 5(4):309-321
8. M. Wu, C. Bajaj, C. Liu (1988). "Face Area Evaluation Algorithm for Solids", *Computer Aided Design,* 20(2):75-82

9. C. Bajaj, T. Moh (1988). "Generalized Unfoldings for Shortest Paths in Euclidean 3-Space", *International Journal of Robotics Research,* 7(1):71-76
10. 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
11. C. Bajaj (1988). "The Algebraic Degree of Geometric Optimization Problems", *Discrete and Computational Geometry,* 3(1):177-191
12. C. Bajaj, C. Hoffmann, R. Lynch, J. Hopcroft (1988). "Tracing Surface Intersections", *Computer Aided Geometric Design,* 5(4):285-307
13. S. Abhyankar, C. Bajaj (1989). "Automatic Parameterization of Rational Curves and Surfaces IV: Algebraic Space Curves", *ACM Transactions on Graphics,* 8(4):325-334
14. C. Bajaj, M. Kim (1989). "Generation of Configuration Space Obstacles: The Case of Moving Algebraic Curves", *Algorithmica,* 4(1):157-172
15. 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.*
16. C. Bajaj (1990). "Rational Hypersurface Display", *Computer Graphics*, 24(2), 117-127
17. C. Bajaj, M. Kim (1990). "Convex Hulls of Objects bounded by Algebraic Curves", *Algorithmica,* 6(1):533-553
18. 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
19. C. Bajaj, T. Dey (1990). "Polygon Nesting and Robustness", *Information Processing Letters,* 35(1):23-32
20. C. Bajaj, T. Dey (1990). "Robust Computations of Polygon Nesting", *International Workshop on Discrete Algorithms and Complexity*, 33-40
21. J. Johnstone, C. Bajaj (1990). "Sorting Points along an Algebraic Curve", *Siam Journal on Computing,* 19(5):925-967
22. C. Bajaj, I. Ihm (1992). "Algebraic Surface Design with Hermite Interpolation", *ACM Transactions on Graphics,* 11(1):61-91
23. C. Bajaj, T. Dey (1992). "Convex Decomposition of Polyhedra and Robustness", *Siam Journal on Computing,* 21(2):339-364
24. T. Dey, K. Sugihara, C. Bajaj (1992). "Delaunay Triangulations in Three Dimensions with Finite Precision Arithmetic", *Computer Aided Geometric Design,* 9(6):457-470
25. T. Dey, C. Bajaj, K. Sugihara (1991). "On Good Triangulations in Three Dimensions", *International Journal of Computational Geometry and Applications,* 2(1):75-95
26. C. Bajaj, I. Ihm (1992). "Smoothing Polyhedra using Implicit Algebraic Splines", *Computer Graphics, 26(2):79-88.*
27. C. Bajaj, J. Canny, T. Garrity, J. Warren (1993). "Factoring Rational Polynomials over the Complexes", *Siam Journal on Computing,* 22(2):318-331
28. 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
29. V. Anupam, C. Bajaj, D. Schikore, M. Schikore (1994). "Distributed and Collaborative Visualization", *IEEE Computer,* 27(7)37-43
30. C. Bajaj, G. Xu (1994). "NURBS Approximation of Surface/Surface Intersection Curves", *Advances in Computational Mathematics,* 2(1):1-21
31. 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
32. V. Anupam, C. Bajaj (1994). "SHASTRA: Multimedia Collaborative Design Environment", *IEEE Multimedia,* 1(2):39-49
33. 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
34. C. Bajaj, A. Royappa (1995). "Finite Representations of Real Parametric Curves and Surfaces", *International Journal of Computational Geometry and Applications,* 5(3):313-326
35. C. Bajaj, J. Chen, G. Xu (1995). "Modeling with Cubic A-patches", *ACM Transactions on Graphics,* 14(2):103-133
36. C. Bajaj, E. Coyle, K. Lin (1996). "Arbitrary Topology Shape Reconstruction from Planar Cross Sections", *Graphical Models and Image Processing,* 58(6):524-543
37. C. Bajaj, G. Xu (1997). "Piecewise Rational Approximation of Real Algebraic Curves", *Journal of Computational Mathematics,* vol. 15(1):55-71
38. C. Bajaj, F. Bernardini, G. Xu (1997). "Reconstructing Surfaces and Functions on Surfaces from Unorganized Three-Dimensional Data", *Algorithmica,* 19(1):243-261

39. 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

40. C. Bajaj, R. Holt, A. Netravali (1998). "Rational Parameterizations of Nonsingular Real Cubic Surfaces", *ACM Transactions on Graphics,* 17(1):1-31

41. E. Sacks, C. Bajaj (1998). "Sliced Configuration Spaces for Curved Planar Bodies", *International Journal Of Robotics Research,* 17(6):639-651

42. C. Bajaj, D. Schikore (1998). "Topology Preserving Data Simplification with Error Bounds", *Journal on Computers and Graphics,* 22(1):3-12

43. 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

44. 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

45. 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

46. 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

47. C. Bajaj, J. Chen, R. Holt, A. Netravali (1999). "Energy Formulations of A-Splines", *Computer Aided Geometric Design,* 16(1):39-59

48. 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

49. 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

50. 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

51. C. Bajaj, I. Ihm, S. Park (2000). "Compression-Based 3D Texture Mapping for Real-Time Rendering", *Graphical Models,* 62(6):391-410

52. C. Bajaj, A. Royappa (2000). "Parameterization in Finite Precision", *Algorithmica,* 27(1):100-114

53. G. Xu, C. Bajaj, W. Xue (2000). "Regular algebraic curve segments (I)-Definitions and characteristics", *Computer Aided Geometric Design,* 17(6):485-501

54. G. Xu, C. Bajaj, C. Chu (2000). "Regular Algebraic Curve Segments (II) - Interpolation and Approximation", *Computer Aided Geometric Design,* 17(6):503-519

55. C. Bajaj, I. Ihm, S. Park (2001). "3D RGB Image Compression for Interactive Applications", *ACM Transactions on Graphics,* 20(1):10-38

56. G. Xu, H. Huang, C. Bajaj (2001). "C1 Modeling with A-patches from Rational Trivariate Functions", *Computer Aided Geometric Design,* 18(3):221-243

57. 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

58. 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

59. C. Bajaj, S. Schaefer, J. Warren, G. Xu (2002). "A Subdivision Scheme for Hexahedral Meshes", *The Visual Computer,* 18(5):343-356

60. 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

61. C. Bajaj, G. Xu, R. Holt, A. Netravali (2002). "Hierarchical Multiresolution Reconstruction of Shell Surfaces", *Computer Aided Geometric Design,* 19(2):89-112

62. 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

63. W. Blanke, C. Bajaj (2003). "Active Visualization in a Multidisplay Immersive Environment", *Computers & Graphics,* 27(5):681-691

64. C. Bajaj, G. Xu (2003). "Anisotropic Diffusion of Surfaces and Functions on Surfaces", *ACM Transactions on Graphics,* 22(1):4-32

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