

SUNIL SAIGAL, Ph.D., P.E., F.ASCE, F.ASME, F.AAAS
Distinguished Professor, Civil and Environmental Engineering
Newark College of Engineering, New Jersey Institute of Technology

EDUCATION

Ph.D., Aeronautics and Astronautics, Purdue University, December 1985

Ph.D. Coursework, Civil and Environmental Engineering, Rensselaer Polytechnic Institute, June 1981

M.S. Structures, Indian Institute of Science, Bangalore, India, June 1980

B.S., Civil Engineering, Punjab Engineering College, India, June 1978

RESEARCH INTERESTS

Computational Mechanics; Computational Orthopedic Biomechanics (Hip, Spine, Shoulder); Computational Nanomechanics for Nanocomposite Structures; Structural Design

PROFESSIONAL EXPERIENCE

Distinguished Professor, Department of Civil and Environmental Engineering, New Jersey Institute of Technology, (January 2013 – present)

Dean, Newark College of Engineering, also **Distinguished Professor** of Civil and Environmental Engineering, New Jersey Institute of Technology, (June 2007 – December 2012)

- *College*: The Newark College of Engineering (NCE) at the New Jersey Institute of Technology (NJIT) enrolls 3287 undergraduate and 1343 graduate students for a total of 4630 students. Its annual budget is \$ 32 M with additional research expenditures in AY 2009-2010 of \$ 16.1 M. The College is organized into six departments with 115 tenure track faculty members, 12 university lecturers and 64 staff members. All of its departments are ranked in the top 100 in the US News and World Record (USNWR) graduate school rankings with an overall ranking of 86 for the College. The College offers degrees at the BS, MS and PhD levels.
- *Growth*: The College has seen a steady growth in undergraduate enrollment, doctoral students and research expenditures since the time I have been the Dean. The overall growth in enrollment is 19.8% (from 3866 to 4630), undergraduate

enrollment grew by 25% (from 2630 to 3287), and graduate students by 8.7% (from 1236 to 1343). The college enrolls approximately 200 Ph.D. students performing research on cutting-edge interdisciplinary topics.

- *Faculty Recruitment:* Recruited three members of the National Academy of Engineering (NAE), one in full-time position and two in adjunct positions. Recruited the Ying Wu Endowed Professor of Electrical and Computer Engineering, Stable Professor of Innovation, two Associate Deans and four Department Chairmen. Developed a 3-year hiring plan for the college to strengthen presence in strategic areas of the college/university and gain national prominence. Recruited 7 faculty members under the first phase of this hiring plan.
- *Diversity:* Included a female and an African-American (for the first time) in the leadership team of the College of Engineering. Recruited two female faculty members in the College. Increased student participation in Society of Women Engineers (SWE) by offering free membership to students. Promoted participation of students in annual SWE conference by establishing travel awards for SWE member students. Organized information sessions in Spanish for Hispanic high-school students to increase Hispanic enrollment in undergraduate programs. Instituted enrollment efforts for graduate students in Spanish speaking countries.
- *Research:* Under my tenure as dean, research expenditures have grown under my tenure by 87.2% (from \$8.6M to \$16.1M); two new centers of excellence – Center for Natural Resources Protection and Development and Center for Brain Imaging – have been established.
- *Strategic Direction and Assessment:* Led the development of a Strategic Vision with the guiding objective of NCE reaching top-25 status by 2025 in USNWR graduate rankings. Reconstituted the Board of Visitors to enhance participation and formulate initiatives to assist the College in reaching its objectives. Developed signature research areas for focused research growth and resource investment in the next five years. Initiated consistent assessment and improvement strategies college-wide for ABET and Middle States Commission on Higher Education (MSCHE) accreditation for undergraduate and graduate curricula.
- *Distance Learning:* Developed a comprehensive plan for the development of online ‘industry-ready’ MS degrees in all engineering disciplines. The implementation of the plan is underway and will be fully completed by Fall 2015. The university expects to enroll 1000 online MS students by Fall 2015 under this plan.
- *Student Involvement and Engagement:* Established Student Advisory Board to include student input in formulating College initiatives and directions. Initiated the implementation of Learning Communities to improve retention via increased

- student engagement. Led the initiative (in collaboration with the Instructional Technologies Media Services) to introduce technology in the classroom. Developed metrics to assess the effectiveness of technology instruction in classroom. Target of 60% of the faculty engaged in technology enhanced pedagogy by Fall 2013.
- *Undergraduate Accreditation, Curriculum and Research:* Led the College through ABET accreditation. All seven programs in the College received accreditation. Leading efforts to institutionalize undergraduate research throughout the College giving the students an edge in creative thinking and innovation. Currently leading a complete upgrade of curriculum to allow maximum flexibility in course selection for students. Efforts include redesigning undergraduate design experience vital to student retention in undergraduate engineering programs.
 - *Graduate Curriculum:* Led the creation of nine-month Master's programs in each department of the College that includes coursework geared towards maximizing student attractiveness to potential employers. Led the introduction of seven new interdisciplinary M.S. programs including: Healthcare Management Systems, Pharmaceutical Management Systems, Pharmaceutical Materials, Pharmaceutical Bio-processing, Bioelectronics, Critical Infrastructure Systems, and Power and Energy Systems. Led the revision of MS curriculum to produce workforce ready graduates from the program. Revised curriculum included concentration in technical areas as well as soft skills (communication, management, entrepreneurship, accounting)
 - *Development:* Developed College priorities for the upcoming Capital Campaign. Reorganized the Development Office to facilitate fundraising consistent with the goals of the College and to enhance alumni participation. Finalized \$1M gift (September 2007) for scholarships, \$1M gift (December 2008) for the creation of an Endowed Professorship in Innovation, and \$0.25M gift for the development of Innovation Workspace. Major role in current fundraising Campaign at NJIT. Mobilized a large number of alums through personal visits and organization of an annual networking event.
 - *Partnerships:* Co-founded "Idea Factory" in collaboration with the College of Architecture and Design to facilitate development of products. Developed two Masters related to Aviation in partnership with an industry leader in aviation. Created partnership with a network of Indian universities to deliver MS programs in online/hybrid format.
 - *Globalization:* Delivery of MS in Engineering Management in partnership with Beijing University of Technology in Beijing, China. Currently, 64 students are enrolled in this program. Negotiated the creation of Dubai campus for the NCE. Implementation deferred due to economic climate both in the US and the Middle East. Dubai campus was planned for an enrollment of up to 1000 students in

undergraduate engineering programs by the year 2014. Currently finalizing the delivery of hybrid MS programs in collaboration with a network of colleges in India. This initiative will lead to an addition of 1000+ students in the MS programs at NCE.

Interim Dean, College of Engineering, University of South Florida (2006 – 2007)

- *Research*: Orchestrated the development of two proposals for interdisciplinary Center of Excellence (~ \$10M each) to the State of Florida by facilitating collaborations between Colleges of Engineering, Arts and Sciences, and Medicine. One of these proposals was funded
- *Faculty Recruitment*: Recruited the first member of the National Academy of Engineering (NAE) at USF.
- *Global Connections*: Created a dual Ph.D. program in Power Engineering between USF College of Engineering and University Polytechnic Valencia in Spain.
- *Interdisciplinary Collaborations*: Initiated discussions on the creation of an interdisciplinary Institute for Advanced Materials jointly between Colleges of Engineering and Arts and Sciences to bring complementary researchers under one umbrella. Led discussions for the creation of a new Department of Biomedical Engineering jointly between the College of Engineering and the College of Medicine.
- *Strategic Alliances*: Initiated discussions with several key local industries and institutions to enhance research collaborations including Shriner's Hospitals; Blackbird Technologies, Inc.; Special Operations Command (SOCOM). Coordinated and prioritized congressional and state legislature requests from the College of Engineering to reflect niche areas of growth for the College and local opportunities for economic development. Initiated regular visits by personnel from funding agencies for interactions with faculty on emerging funding opportunities and on writing successful proposals.
- *Development*: Secured a development professorship (\$50K) and a \$100K gift.

Chairman, Department of Civil and Environmental Engineering, University of South Florida (2002 – 2006)

- *Strategic*: Developed strategic directions for the Department to aid in hiring new faculty and defining Department programs. Formed Executive Advisory Board to assist with review of Department activities and advise on initiatives to meet its objectives. Led the development and preparation of the Department self-study

reports and documents for the successful ABET accreditation visit in September 2007.

- *Program Development:* Restructured the Department and identified new research concentration areas based on regional needs and national demands. Established a strong program in Environmental Engineering with focus on water related research integrating water resources and environmental issues to provide comprehensive engineering solutions. Proposed, designed, and received approval for a new 9-month professional Masters of Engineering in Civil Engineering that included business, management, and leadership exposure. Developed partnerships with other colleges (School of Public Health, Environmental Science and Policy, Geology) to deliver joint interdisciplinary programs and research directions. Initiated delivery of online courses and certificates in the Transportation and Environmental areas.
- *Faculty Recruitment, Diversity, and Growth:* Recruited seven faculty members into the Department from top research institutions in the country. Increased faculty diversity by hiring faculty from groups underrepresented in engineering (two females, one African-American, one Hispanic faculty). Facilitated enhanced productivity in research by assigning a course load of 3 courses per year to the faculty. Developed and implemented a well structured Annual Faculty Performance Evaluation procedure with emphasis on faculty improvement and assistance that included a self-assessment by the faculty.
- *Research:* Enhanced research portfolio of the Department. Established NASA-USF National Center for Runway Friction with \$1.8M funding from NASA. Led the growth of Ph.D. program from 9 Ph.D. students to 62 *Ph.D. students*. Encouraged faculty to pursue federally funded research opportunities resulting in increased number of grants and funding. The *research expenditures per faculty increased by 39%*. Facilitated growth of articles published in archival journals. *Refereed publications grew by 45%*.
- *Student Involvement:* Established CEEGSA, the Graduate Student Association for the Department of Civil and Environmental Engineering. CEEGSA advised the Chairman on matters related to graduate student experiences in the Department. Created Graduate Student Handbook for the Department. The handbook includes information for graduate students on all aspects of graduate education in the Department. Increased involvement of undergraduate students in the Department by holding open discussions in student ‘focus groups’ once every 4-6 weeks on matters related to teaching and curriculum effectiveness.
- *Outreach:* Created Department website to better advertise programs and accomplishments. Developed Department and program brochures for enhancing the brand recognition in Civil engineering circles. Published the first Department

Newsletter to communicate Department activities to alumni, local industry, and the civil engineering community.

- *Strategic Alliances:* Breakfast meetings with industry leaders in the local area in various sub-disciplines of civil engineering to solicit advice to better prepare students for industry jobs upon graduation. Increased alumni participation in student activities, including in ASCE student chapter activities, bringing industry perspective to capstone classes, and teaching topics of current industry interest. Established Industry Affiliates Program for enhanced industry interaction and input in Department research activities.
- *Development:* Created two of fixed-term development professorships, each carrying \$50,000.

Professor, Biomedical Engineering Program, University of South Florida (2004 – 2007)

Program Director, Mechanics and Materials Program, Division of Civil and Mechanical Systems, National Science Foundation (1996 – 1998)

Professor (with tenure), Department of Civil and Environmental Engineering, Carnegie Mellon University (1995 – 2003)

Professor (by courtesy), Department of Mechanical Engineering, Carnegie Mellon University (1998 – 2003)

Associate Professor, Department of Civil and Environmental Engineering, Carnegie Mellon University (1992 – 1995)

Assistant Professor, Department of Civil and Environmental Engineering, Carnegie Mellon University (1989 – 1992)

Assistant Professor, Department of Mechanical Engineering, Worcester Polytechnic Institute (1986 – 1989)

Research Associate, Naval Surface Warfare Center, Indian Head, MD (Summer 2002)

Research Engineer, Sandia National Laboratories, Albuquerque, NM (Summer 2001)

Research Fellow, Ford Motor Company, Dearborn, MI (Summer 1999)

Consultant, Mechanics and Materials Program, Civil and Mechanical Systems (CMS) Division (1998-1999)

Research Engineer, Musculoskeletal Research Center, University of Pittsburgh Medical Center, Pittsburgh, PA (Summer 1994)

Research Engineer, Metals and Ceramics Division, Oak Ridge National Laboratories, Oak Ridge, TN (Summer 1993)

Visiting Engineer, Division of Engineering Computations, Mercedes Benz AG, Stuttgart (Jan.-Aug, 1992)

Summer Research Fellow, Structures and Materials, NASA Lewis Research Center (Summer 1990 and Summer 1991)

Visiting Professor, Department of Mechanical Engineering, University of Arizona Tuscon, AZ (Summer 1988)

Visiting Engineer, Hibbitt, Karlsson, and Sorensen, Inc., Pawtucket, RI (Summer 1987)

HONORS AND AWARDS

Fellow of American Association for Advancement of Science

Fellow of American Society of Mechanical Engineers

Fellow of American Society of Civil Engineers

Associate Fellow of American Institute of Aeronautics and Astronautics

Achievement Award, Society of Indian American Engineers and Architects, 2010

Outstanding Administrator Award, NJIT Student Senate, 2009

Certificate of Appreciation (in support of your continued support and valuable contributions to The Society of Women Engineers and the NJIT community), NJIT Society of Women Engineers, 2009, 2010

HOST/SHPE's Educator of the Year (in recognition of support and promoting HOST/SHPE and the Hispanic community), NJIT Hispanic Organization of Students in Technology – Society of Hispanic Professional Engineers (HOST-SHPE), 2009

Certificate of Appreciation, Alfred P. Sloan Foundation, 2007

Recipient of **Leighton and Margaret Orr Award** for Best Paper, ASME Materials Division, 2004

Listed in **Who's Who in America**, 57th Edition, 2002.

Recipient of **Richard Teare Award** for Excellence in Engineering Education, Carnegie Mellon University, 1996

Outstanding Professor of the Year Award, ASCE Pittsburgh Section, 1994

Recipient of **George Tallman Ladd Research Award**, Carnegie Mellon University, 1990

Presidential Young Investigator Award, National Science Foundation, 1990

Recipient of **Ralph R. Teator Award**, Society of Automotive Engineers, 1988

Recipient of **Admiral Ralph Earle Medal**, Worcester Engineering Society, 1987

UNIVERSITY SERVICE ACTIVITIES

Co-chair, University Task Force for Retention and Graduation, New Jersey Institute of Technology, 2012 – present.

Mentor, Women’s Volleyball Team, 2012 – present.

Member, Strategy Committee, United Council of Academics at NJIT AFT, New Jersey Institute of Technology, 2010 – present.

Member, Committee on Department and Program Assessment, New Jersey Institute of Technology, 2010 – present.

Chairman, Steering Committee, NCE Strategic Planning, Newark College of Engineering, New Jersey Institute of Technology, 2009 – present.

Member, University Strategic Planning Committee, New Jersey Institute of Technology, 2009 – present.

Member, Advisory Board of the Dorman Honors College, New Jersey Institute of Technology, 2008 – present.

Member, University Athletics Oversight Committee, New Jersey Institute of Technology, 2008 – present.

Member, Dean’s Council, New Jersey Institute of Technology, 2007 – present.

Member, Collective Bargaining Agreement Negotiation Team, New Jersey Institute of Technology, 2007 – 2009.

President, Board of Visitors, Newark College of Engineering, New Jersey Institute of Technology, 2007 – present.

Member, Council of Deans, University of South Florida, 2006 - 2007

Member, Academic Affairs Planning Group, University of South Florida, 2006 - 2007

Member, Planning Team for Strategic Goals for the University of South Florida, 2006

Member, Committee for a Constitution for the University of South Florida, 2006

Member, Committee for Selection of USF Presidential Doctoral Fellowship Awardees, 2006

Search Committee, Associate Provost and Dean of Graduate Studies, University of South Florida, 2005 and 2006

Faculty Representative, Title IX Committee, University of South Florida, 2005 – 2007

Chairman, Graduate Studies Vision Taskforce, University of South Florida, 2004

Executive Council, College of Engineering, 2001 - 2007

Trustee (ex-officio), Carnegie Mellon University, 2002 – 2003

Educational Affairs and Enrollment Committee, 2002 – 2003

Chair, Faculty Senate, 2002 – 2003.

Vice-Chair, Faculty Senate, 2002

Faculty Affairs Committee, 2001 – 2002

Executive Committee of the Faculty Senate, 2001 – 2003

University Education Council, 2001 – 2003 also 1994-96

Coordinator, Graduate Admissions, 2000 – 2002 also 1990-1993

Faculty Senate, 1993 – 1996

Chairperson, Graduate Curriculum Committee, 1999 – 2002

Faculty Search Committees, 1992, 1999

Promotion and Tenure Committees 1996, 1999, 2001.

Chair, Promotion and Tenure subcommittee, 2001

Foreign Scholars Advisory Committee, 1994

Educational Facilities Committee, 1993 – 1996

Faculty Advisor, ASCE Student Chapter

EDITORIAL ACTIVITIES

Editorial Board, *International Journal for Numerical Methods in Engineering*, 1995 – present.

Associate Editor, *AIAA Journal*, 1997 – present.

Editorial Board, *Engineering with Computers*, 1998 – present

Editorial Board, *International Journal for Computational Civil and Structural Engineering*, 1998 – present.

Guest Editor, Special Issue of the *International Journal of Computers and Structures*.

Associate Editor, Computational Mechanics, *ASCE Journal of Engineering Mechanics*, 1996– 1999.

Publications Committee, *ASCE Journal of Aerospace Engineering*, 1998 – 1993.

PROFESSIONAL SERVICE ACTIVITIES

Session Co-chair (with David Garza-Salazar and Uriel Cukierman). Session on Curricular Innovation at Global Engineering Deans Council, Peking University, Beijing, China, October 20-22, 2011.

Secretary of Sigma Xi Tampa Bay, 2005 – 2006

Member, Board of Directors, ASCE West Coast Branch, 2006 - 2007

Member, Committee on Computing in Applied Mechanics, ASME, 1994 – 2003

Member, Technical Committee (TC) on Structures, AIAA, 1994 – 2002

Chair, Committee on Computational Mechanics, ASCE Engineering Mechanics Division, 1996-1998

Chair, Subcommittee on ASCE/AIAA Conference Liaison, 1992-1996

Secretary, ASME Worcester, MA section, 1988 -1989

Panelist, Proposal review for several agencies including the National Science Foundation, Air Force, Army, ORNL, and Western Pennsylvania Advanced Technology Center.

Reviewer for technical articles for over 20 archival journals

Organized several symposia in conferences of professional societies including the AIAA, ASME, and USACM

PROFESSIONAL SOCIETY AFFILIATIONS

Member, American Association for Advancement of Science, American Institute of Aeronautics and Astronautics, American Society of Civil Engineers, American Society of Mechanical Engineers, American Society of Engineering Education, US Association for Computational Mechanics, Sigma Xi Honors Society

GRANTS AND CONTRACTS

Principal Investigator

- TELUS for Transit; US Department of Transportation, Federal Transit Authority; Budget \$1,530,000; Duration 36 months; start date January 2008; Principal Investigator S. Saigal
- National Center for Runway Friction. NASA Langley Research Center, Langley, VA; Budget \$1,800,000; Duration 24 months; start date August 2006; Principal Investigator S. Saigal (contract turned over to a colleague at USF upon leaving the institution and joining NJIT).
- Hybrid Particle Methods for High Velocity Dynamic Events; Budget \$240,000; Duration 36 months; start date January 1, 2006; Principal Investigator S. Saigal
- Treatment for Facet Joint in the Spine. Orthopaedic Development Corporation, Clearwater, FL; Budget \$40,000; Duration 12 months; start date August 2004; Principal Investigator S. Saigal.
- Reverse Shoulder Prosthesis. Florida Orthopaedic Institute, Tampa, FL; Budget \$40,000; Duration 12 months; start date July 1, 2003; Principal Investigator S. Saigal.
- New Meshless/Particle Methods for Naval Structures and Weapon Systems. Office of Naval Research; Budget \$225,000; Duration 36 months; start date March 1, 2003; Principal Investigator S. Saigal
- Algorithms for STL Data Cleanup and Manipulation. Sandia National Laboratory, Albuquerque, NM. Budget \$140,500; Duration 20 months; start date February 1, 2003; Principal Investigator S. Saigal
- Algorithms for Determining Medial Surfaces. Sandia National Laboratory, Albuquerque, NM; Budget \$185,000; Duration 16 months; start date June 1, 2001; Principal Investigator S. Saigal
- Topology Optimization for MEMS. Pennsylvania Infrastructure Technology Alliance; Budget \$41,400; Duration 12 months; start date November 1, 1999; Principal Investigator S. Saigal.
- Analytical-Experimental Approach to Verified Cohesive Fracture Models in Engineering Applications. National Science Foundation; Budget \$210,055; Duration 36 months; start date September 1, 1999; Principal Investigator S. Saigal

- Hexahedral and Tetrahedral Finite Elements in Structural Analysis. Sandia National Laboratory, Albuquerque, NM; Budget \$99,000; Duration 12 months; start date June 1, 1999; Principal Investigator S. Saigal
- Cohesive Finite Elements for Physical Simulations. Sandia National Laboratories; Budget \$200,000; Duration 36 months; start date September 1, 1999; Principal Investigator S. Saigal
- Safety and Crashworthiness Simulations. Pennsylvania Infrastructure Technology Alliance; Budget \$52,222; Duration 12 months; start date September 1, 1998; Principal Investigator S. Saigal.
- Cohesive Zone Models for Polymeric Fracture. E.I. NeMours DuPont Company; Budget \$20,000; Duration 24 months; start date August 1, 1998; Principal Investigator S. Saigal
- Studies on Hexahedral vs. Tetrahedral Finite Element Meshes; ANSYS, Inc.; Budget \$21,000; Duration 12 months; start date January 1, 1998; Principal Investigator S. Saigal.
- Quality Metrics for 2D and 3D Finite Element Meshing; ANSYS, Inc.; Budget \$35,000; Duration 12 months; start date August 1, 1996; Principal Investigator S. Saigal
- VRML and HTML for Finite Elements Models Animation; ANSYS, Inc.; Budget \$35,000; Duration 12 months; start date August 1, 1996; Principal Investigator S. Saigal
- Finite Element Crash Simulations of Illinois 2399-1 Steel Post and Beam Bridge Railing; Federal Highway Administration; Budget \$20,000; Duration 12 months; start date January 1, 1995; Principal Investigator S. Saigal.
- p-Version Shell Finite Elements for Fast, Accurate Analysis of Thin Welded Structures; Martin Marietta Energy Systems/Oak Ridge National Laboratories, Oak Ridge, TN; Budget \$25,000; Duration 12 months; start date January 1, 1994; Principal Investigator S. Saigal.
- Investigation of Contact Stresses in the Acetabular Polyethylene Insert; University Orthopaedics, Inc.; Budget \$62,000; Duration 24 months; start date September 1, 1993; Principal Investigator S. Saigal.
- Finite Element Software for Soil Consolidation; Swanson Analysis Systems, Inc.; Budget \$92,000; Duration 24 months; start date September 1, 1993; Principal Investigator S. Saigal

- Unit/Truss/Continuum Scales Deformation Modeling of Particulate Materials; ALCOA Foundation; Budget \$15,000; Duration 24 months; start date July 1, 1993; Principal Investigator S. Saigal.
- Extension of the Integrated Force Method for Membrane and Bending Coupled Problems; NASA Lewis Research Center, Cleveland, Ohio; Budget \$32,082; Duration 12 months; start date January 1, 1993; Principal Investigator S. Saigal.
- Software for the Dynamic Simulation of Large Full-Vehicle Models; Swanson Analysis Systems, Inc.; Budget \$35,000; Duration 12 months; start date September 1, 1992; Principal Investigator S. Saigal.
- CAE Software for Electromagnetic Devices and Processes; Swanson Analysis Systems, Inc. and Ben Franklin Technology Center; Budget \$82,500; Duration 12 months; start date September 1, 1991; Principal Investigator S. Saigal.
- 1991, 1992, 1993 Research Experiences for Undergraduates; National Science Foundation; Budget \$13,000; Duration 3 months each year ; start date May 1, 1991, 1992, 1993; Principal Investigator S. Saigal.
- Lightweight Beam Sections for Manufactured Housing; Ben Franklin Technology Center; Budget \$55,400; Duration 12 months; start date September 1, 1990; Principal Investigator S. Saigal.
- Research into the Integration of Boundary and Finite Elements; Swanson Analysis Systems, Inc.; Budget \$50,000; Duration 12 months; start date September 1, 1990; Principal Investigator S. Saigal.
- Semi-analytical Univariate Perturbation and Implicit Differentiation for Structural Sensitivities of 3-D Solids Using Boundary Elements, The National Science Foundation, \$60,000; Duration 24 months; start date August 1, 1987. Principal Investigator: S. Saigal (Research Initiation Grant).
- Boundary Elements Research in Solid Mechanics; National Science Foundation, Presidential Young Investigator; Budget \$325,000; Duration 60 months; start date September 1, 1990; Principal Investigator S. Saigal.
- Finite Strain Shell Formulations, HKS Inc., Providence, RI, \$10,000; Duration 3 months; start date May 15, 1987. Principal Investigator: S. Saigal.
- Three Dimensional Structural Shape Optimization: Research Project Initiation and Preliminaries, WPI Research and Development Council, \$5,000; Duration 12 months; start date August 1, 1987. Principal Investigator: S. Saigal.

- Furnace Design Program for Optimal Temperature Profile on Dies for Ceramic Tile Manufacture, Norton Company, Worcester, MA, \$29,186; Duration 12 months; start date January 1, 1988. Principal Investigator: S. Saigal (Co-Principal Investigator: H.T. Grandin, Jr.)

Co-Principal Investigator

- Design for Deflection Control vs. Use of Specified Span to Depth Ratio Limitations; New Jersey Department of Transportation; Budget \$200,000; Duration 24 months; start date May 2009; Principal Investigators: M. Ala Saadeghvaziri, S. Saigal, Ali Khan.
- Structural Analysis in MEMS Design and Reliability, PITA – Pennsylvania Initiative for Technology Advancement, \$37,890; Duration 12 months; start date January 1, 2001. Principal Investigators: A. Acharya, S. Saigal, G. Fedder
- Microstructure Based Plasticity for Advanced Materials Development, PITA – Pennsylvania Initiative for Technology Advancement, \$37,890; Duration 12 months; start date January 1, 2001. Principal Investigators: A. Acharya, S. Saigal, H.R. Piehler
- Graduate Research Traineeship: Integrating Science, Technology, and Management in Global Civil Infrastructure Systems, The National Science Foundation, \$562,500; Duration 60 months; start date September 1, 1996; Principal Investigators: S. McNeil, S. Saigal, H. Koutsopoulos.
- Formulation of Boundary Element Substructuring, Reduced Design Sensitivity Analysis, and Re-analysis for Efficient Optimal Shape Configuration, The National Science Foundation, \$171,000; Duration 36 months; start date September 1, 1988. Principal Investigators: J.H. Kane, S. Saigal and R.H. Gallagher.
- Structural Shape Optimization of Solid Objects Using a Boundary Element Formulation, United Technologies Corporation, E. Hartford, CT, \$80,000; and Electric Boat Division of General Dynamics, New London, CT, \$76,000; Duration 24 months; start date August 1, 1987.. Principal Investigators: S. Saigal and J.H. Kane.

Faculty Associate

- Computer Aided Simultaneous Engineering; General Motors Research Corporation; Budget; \$38,000; start date September 1, 1989; faculty associate; Principal Investigator: S. Talukdar.

PUBLICATIONS

Books

1. Boresi, A.P., K.P. Chong and S. Saigal. *Approximate Solution Methods in Engineering Mechanics*, John Wiley and Sons, New York, 2002.
2. *Modelling and Simulation Based Life Cycle Engineering*. Spon Press, London, 2001. K.P. Chong, S. Thynell, H. Morgan and S. Saigal (Editors)
3. *Advances in Unstructured Mesh Generation*. American Society of Mechanical Engineers. ASME AMD Vol. 220, New York, 1997. S. Canann and S. Saigal (Editors).
4. *Inverse Problems in Mechanics*. American Society of Mechanical Engineers. ASME AMD Vol. 186, New York, 1994. S. Saigal and L. Olson (Editors).
5. *Sensitivity Analysis and Shape Optimization with Numerical Methods*. American Society of Mechanical Engineers. ASME AMD Vol. 115, New York, 1990. S. Saigal and S. Mukherjee (Editors).

Patents

US Patent on Method of Making an Improved Hot Rolled I-Beam and Associated Product. U.S. Patent No. 5,823,042. October 20, 1998. With C.A. Snyder, M.A. Karczewski, and K.W. Shurskis.

Refereed Journal Publications

2001-present

1. Li, K., and S. Saigal. Micromechanical modeling of stress transfer in carbon nanotube reinforced polymer composites. *Materials Science and Engineering A* 457 (1-2), pp. 44-57, 2007.
2. Khan, S., S. Bandyopadhyay, A.R. Ganguly, S. Saigal, D.J. Erickson III, V. Protopopescu, G. Ostrouchov. Relative performance of mutual information estimation methods for quantifying the dependence among short and noisy data. *Physical Review E - Statistical, Nonlinear, and Soft Matter Physics* 76 (2), art. no. 026209, 2007.
3. Muralidhar, S., and S. Saigal. Crack Bridging in Polymer Nanocomposites. *ASCE Journal of Engineering Mechanics*. Vol. 133 (8), pp. 911-918, August 2007.

4. Muralidhar, S., S. Saigal, A. Jagota, and S.J. Bennison. Scaling of Fracture Energy in Tensile Debonding of Viscoelastic Films. *Journal of Applied Physics*. Vol. 101(9), Art. no. 093504, 2007.
5. Khan, S., Ganguly, A.R., Bandyopadhyay, S., Saigal, S, Erickson, D.J. III, Protopopescu, V., Ostrouchov, G. Nonlinear Statistics Reveal Stronger Ties Between ENSO and the Tropical Hydrological Cycle. *Geophysical Research Letters*. Vol. 33(24), Art. No. L24402, Dec. 20, 2006
6. Moore, R.H. and S. Saigal. Eliminating Slivers in Finite Elements. *CMES - Computer Modeling in Engineering & Sciences*. Vol. 7(3), pp. 283-291, Mar. 2005.
7. Khan, S., A.R. Ganguly, and S. Saigal. Detection and predictive modeling of chaos in finite hydrological time series. *Nonlinear Processes in Geophysics*, Vol. 12, pp. 41-53, 2005.
8. Huang, H., S. Saigal, and C.T. Dyka. Moving Least Squares Interpolants in the Hybrid Particle Method. *International Journal for Numerical Methods in Engineering*. Vol. 63(4), pp. 528-547, May 2005.
9. Huang, H., S. Saigal and C.T. Dyka. Finite Elements Based Boundary Treatment in the Hybrid Particle Methods. *AIAA Journal*. Vol. 43(7), pp. 1626-1628, July 2005.
10. Tang, H., A. Acharya, and S. Saigal. Directional Dependence of Crack growth Along the Interface of a Bicrystal with Symmetric Tilt Boundary in the Presence of Gradient Effects. *Mechanics of Materials*. Vo. 37(5), pp. 593-606, May 2005.
11. Dyka, C.T., and S. Saigal. On the Development of a Hybrid Particle Method Using the Differential Formulation. *International Journal for Computational Methods in Engineering Science and Mechanics*. Vol. 6(1), pp. 21-29, Jan-Mar. 2005.
12. White, D.R., Saigal, S., and Owen, S.J. Meshing complexity: predicting meshing difficulty for single part CAD models. *Engineering with Computers*, Vol. 21, pp. 76-90, 2005
13. Khan, S., A.R. Ganguly, and S. Saigal. Detection and predictive modeling of chaos in finite hydrological time series. *Nonlinear Processes in Geophysics*. Vol. 12, pp. 41-53, 2005.
14. Acharya, A., H. Tang, S. Saigal, and J.L. Bassani. On Boundary Conditions and Vertex Localization in Lower-Order Gradient Plasticity. *Journal of Mechanics and Physics of Solids*. Vol. 52(8), pp. 1793-1826, Aug. 2004.

15. Tang, H., Y.S. Choi, A. Acharya, and S. Saigal. Effects of Lattice Incompatibility Induced Hardening on the Fracture Behavior of Ductile Single Crystals. *Journal of Mechanics and Physics of Solids*. Vol. 52 (12), pp. 2841-2867, Dec. 2004.
16. Huang, H., C.T. Dyka and S. Saigal. Hybrid Particle Methods for Frictionless Impact-Contact Problems. *International Journal for Numerical Methods in Engineering*. Vol. 61 (13), pp. 2250-2272, Dec. 2004.
17. White, D.R. and S. Saigal. CCSweep: Automatic Decomposition of Multi-Sweep Volumes. *Engineering with Computers*. Vol. 20 (3), pp. 222-236, 2004.
18. Hill, J.C., S.J. Bennison, P.A. Klein, A. Jagota, and S. Saigal. Co-planar Crack Interaction in Cleaved Mica. *International Journal of Fracture*. Vol. 119 (4-2), pp. 365-386, 2003.
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2. Kikidis, D., Saigal, S., Papaioannou, G. "Sagittal Asymmetry in Bilateral Amputee Gait Kinetics." ORS 2013 Annual Meeting, San Antonio, TX, January 2013.
3. Kikidis, D., Saigal, S., Papaioannou, G. "Directional Variations in the Prosthetic Pylon Resultant Forces of Transtibial Amputees during Prolonged Strenuous Activities." ORS 2013 Annual Meeting, San Antonio, TX, January 2013.

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11. Tetambe, R.P., and S. Saigal, "A Comparative Study of Flux Projection Type Estimators in Elasto-Plastic Finite Element Analysis," ASME International Computers in Engineering Conference, Minneapolis, MN, September 1994.
12. Bezerra, L.M., and S. Saigal, "A Boundary Integral Formulation for the Inverse Problem of Detecting Open Cracks," ASME PVP-280, pp. 11-19, 1994 ASME Pressure Vessels and Piping Conference, June 19-23, Minneapolis, MN.
13. Xu, Y., S. Saigal, and H.E. Rubash, "Effect of Orientation of Acetabular Component in Total Hip Arthroplasty on Polyethylene Stresses," 13th Southern Biomedical Engineering Conference, Washington DC, April 1994
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Technical Reports (Partial List)

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2. Schmidt, D., S. Muralidhar, S. Saigal, P. Knupp, and R. Leland, "Comparative Study of Hexahedral and Tetrahedral Elements", report submitted to Sandia National Laboratories, Albuquerque, NM, August 2000.
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4. Zeisler, C.R., S. Saigal, and R.S. Gallagher, "Adaptive Visualization of 2D Boundary Data", CMU Report No. R93207, 1993
5. Saigal, S., and H. Li, "CAE Software for Electromagnetic Devices and Processes," report submitted to Swanson Analysis Systems, Inc., August 1992; and to Ben Franklin Technology Center, August, 1992.
6. Saigal, S. "Shape Sensitivities and Optimal Configurations for Heat Diffusion Problems: A BEM Approach," report submitted to General Dynamics Electric Boat Division, Groton, Connecticut, September 18, 1989.
7. Kane, J.H., S. Saigal, and A. Gupta, "Three-Dimensional Computational Simulation of the Metal Forging Process Utilizing the Boundary Element Method," report submitted to Wyman-Gordon Company, Worcester, MA, August 10, 1988.
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SELECTED INVITED PRESENTATIONS

- Curriculum Innovation, Panel Presentation (with Theo Andrews and Jaime Bonilla). ASEE Global Engineering Deans Council, Beijing, China, October 26, 2011.
- Completing the Cycle of Innovation in Engineering Education by Fostering Implementation of Best Practices, Panel Presentation (with C. Papadopoulos, M.W.

Ohland, C.J. Atman, R.A. Streveler and A. Dollar). ASEE Conference, Vancouver, Canada, June 28, 2011.

- Cohesive Zone Models for Polymer Interfacial Fracture Simulations, Purdue University, November 10, 2000.
- Computational Cohesive Zone Modeling of Fracture, Department of Mechanical Engineering, Johns Hopkins University, November 5, 1998.
- Mechanics and Materials Highlights, AFOSR Mechanics and Materials Program Review, October 14, 1998, Dayton, OH.
- NSF Mechanics and Materials Programs, IMM Young Investigators' Meeting, Seattle, WA, October 1996.
- Research Directions in Computational Mechanics in the U.S., Indian Institute of Science, Bangalore, India, December 1995.
- Research on the Acetabular Component in Total Hip Arthroplasty, Department of Orthopaedic Surgery, University of Pittsburgh Medical Center, June 1994.
- An Internal State Variables Model for Compaction of Powder Packings, ALCOA Technical Center, February 1994.
- Finite Element Analysis and Applications in Orthopaedics, Department of Orthopaedic Surgery, University of Pittsburgh Medical Center, March 1993.
- Issues in Modeling of Powder Consolidation Processes, Semiannual Meeting of the Center for Advanced Deformation Processing Research, Carnegie Mellon University, January 1993.
- Boundary Element Sensitivity Analyses with 2D Applications, Institut für Technische Mechanik, Universität Karlsruhe, Germany, May 1992.
- Contact and Inverse Problems with Boundary Elements using Optimization Techniques, Lehrstuhl für Technische Mechanik, Universität Erlangen-Nürnberg, Germany, June 1992.
- Research Advances and Directions in Boundary Element Design Sensitivity Analysis for Shape Optimization, Department of Civil Engineering, University of Split, Split, Yugoslavia, December 1990, also Department of Civil Engineering, University of Belgrade, Belgrade, Yugoslavia, January 1991.
- Review of Research Activities in Computational Mechanics at CMU, Rockwell International, El Segundo, CA, January 1990.

- Some Research Aspects of Boundary Element Design Sensitivity Analysis, Department of Theoretical and Applied Mechanics, Cornell University, March 1989.
- A Finite Strain Shell Theory with Non-Rotating Principal Directions, Department of Civil Engineering, Rutgers University, New Brunswick, NJ, October 1988.

RESEARCH SUPERVISION

Current Ph.D. Students

- Fernando Martinez Encinas, Ph.D. Candidate, Civil and Environmental Engineering
- Dimitrios Kikidis, Ph.D. Candidate, Biomedical Engineering
- Balraj S. Mani, Ph.D. Candidate, Mechanical Engineering

Completed Ph.D. Theses

- Aithal, Raghavendra, "Boundary Element Formulations for Shape Design Sensitivity Analysis Using Implicit Differentiation," unpublished PhD Dissertation, Department of Mechanical Engineering, Worcester Polytechnic Institute, Worcester, MA, August 1989. Presently Senior Development Engineer, Automated Analysis Corporation, Ann Arbor, MI.
- Bezerra, Luciano M., "Inverse Elastostatics Solutions with Boundary Elements", unpublished PhD Dissertation, Department of Civil Engineering, Carnegie Mellon University, Pittsburgh, PA, July 1993. Presently Assistant Professor, Instituto de Pesquisas Energeticas e Nucleares, Brazil.
- Simunovic, Srdan, "Boundary Element Formulations for Contact Problems", unpublished PhD Dissertation, Department of Civil Engineering, Carnegie Mellon University, Pittsburgh, PA, August 1993. Presently Member of the Technical Staff, Materials Process Modeling Division, Oak Ridge National Laboratory, Oak Ridge, TN.
- Kaljevic, Igor, "Probabilistic Formulation with Boundary Elements", unpublished PhD Dissertation, Department of Civil Engineering, Carnegie Mellon University, Pittsburgh, PA, August 1993. Presently Development Engineer, ANSYS, Inc., Houston, PA.
- Li, Hui, "Constitutive Modeling for Densification of Aluminum Powder Aggregate", unpublished PhD Dissertation, Department of Civil and Environmental Engineering, Carnegie Mellon University, Pittsburgh, PA, July 1994. Presently Senior Software Engineer, Utility Translation Systems, Inc. (subsidiary of Itron, Inc.), NC
- Tetambe,, Ravindra P., "Adaptive Remeshing and Rezoning in Nonlinear Finite Element Analysis", unpublished PhD Dissertation, Department of Civil and Environmental Engineering, Carnegie Mellon University, Pittsburgh, PA, December

1994. Presently at General Electric Corporate Research and Development, Schnectady, NY

- Xu, Yu, “Element Free Galerkin Formulations for Steady Crack Growth in Solids”, unpublished PhD Dissertation, Department of Civil and Environmental Engineering, Carnegie Mellon University, Pittsburgh, PA, 1997. Presently Development Engineer, ALGOR, Inc. Pittsburgh, PA
- Pakalkumar, Rahul, “Computational Fracture Mechanics Using Cohesive Element Formulations“, unpublished Ph.D. Dissertation, Department of Civil and Environmental Engineering, Carnegie Mellon University, Pittsburgh, PA, 1999. Presently at ExxonMobil, Houston, TX
- Barry, William, “Element Free Galerkin Formulations for Large and Small Strain Elastic and Elastoplastic Analysis”, unpublished Ph.D. Dissertation, Department of Civil and Environmental Engineering, Carnegie Mellon University, Pittsburgh, PA, 1998. Presently Assistant Professor, Asian Institute of Technology, Thailand.
- Zakaria, Ahmed Salem, “Robust Distortion Metric for Quadratic Finite Elements”, unpublished Ph.D. Dissertation, Department of Civil and Environmental Engineering, Carnegie Mellon University, Pittsburgh, PA, December 1998. Presently Development Engineer, ANSYS, Inc. Pittsburgh, PA
- Owen, Steve, “Non-simplicial Unstructured Mesh Generation. Dissertation”, unpublished Ph.D. dissertation, Department of Civil and Environmental Engineering, Carnegie Mellon University, Pittsburgh, PA, 1999. Presently Senior Member of Technical Staff, Parallel Computing Group, Sandia National Laboratory, Albuquerque, NM
- Seshadari, Muralidhar, “Mechanics of Glass-Polymer Laminates using Multi Length Scale Cohesive Zone Models”, unpublished Ph.D. dissertation, Department of Civil and Environmental Engineering, Carnegie Mellon University, Pittsburgh, PA, 2001. Presently at University of South Florida.
- White, David, “Assessment, Metrics, and techniques for Hexahedral Finite Element Mesh Generation”, unpublished Ph.D. dissertation, Department of Civil and Environmental Engineering, Carnegie Mellon University, Pittsburgh, PA, 2002. Presently Manager, Sandia National Laboratories, Albuquerque, NM.
- Tang, H., “Gradient Effects in Inhomogeneous Plastic Flow and Fracture Behavior of Single Crystals”, unpublished Ph.D. dissertation, Department of Civil and Environmental Engineering, Carnegie Mellon University, Pittsburgh, PA, 2003. Presently Postdoctoral Fellow, Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, MA.

- Moore, Robert. Meshless Materials Microstructure Analysis, unpublished Ph.D. dissertation, Department of Civil and Environmental Engineering, Carnegie Mellon University, Pittsburgh, PA, 2007.
- Khan, Shiraj, “Nonlinear Dependence and Extremes in Hydrology and Climate”, unpublished Ph.D. dissertation, Department of Civil and Environmental Engineering, University of South Florida, Tampa, FL, 2007.

Post-Doctoral Fellows and Visiting Researchers

- Burman, Ake. Analysis of Acetabular Component in Total Hip Arthroplasty, Visiting Professor from Lund Institute of Technology, Lund, Sweden, 1994 -1996.
- Shet, Chandrakanth. Crystal Plasticity Simulations in Materials, Post-doctoral Research Assistant, 1996 -1998. Presently employed at Florida A&M University.
- Huang, Hao. 2003-2004. Shoulder Biomechanics, Hybrid Particle Methods. Presently employed at ExxonMobil, Houston, TX.
- Li, Ke. 2004 - 2005. Shoulder Biomechanics, Nanomechanics of Nanocomposites. Presently employed at Schlumberger Corporation.
- Seshadri, Muralidhar. 2005 - 2007. Nanotube Crack Bridging. Presently employed at Schlumberger Corporation.