

Soumyendu Raha

Mailing Address:
Department of Computational & Data
Sciences
Indian Institute of Science
Bangalore 560012, India

Office Phone: +91-80-2293-2791
Fax: +91-80-2360 6332
E-Mail: raha@iisc.ac.in
<http://cds.iisc.ac.in/faculty/raha>

- Work Experience**
- ◇ **Department of Computational & Data Sciences (formerly academic section of SERC), Indian Institute of Science (IISc), Bangalore 560012, India**
Professor: July 25, 2015 - present.
Associate Professor: July 25, 2009 - July 24, 2015.
Assistant Professor: (tenured since July 25, 2008): July 25, 2003 - July 24, 2009.
Associated Faculty of the Interdisciplinary Mathematical Sciences Doctoral Program (msci.iisc.ac.in) since its inception in 2005
 - ◇ **Computer Science Department, North Dakota State University, Fargo, ND, USA**
Assistant Professor, July 16, 2002 - June 23, 2003.
 - ◇ **IBM Corporation Microelectronics Division, East Fishkill, NY, USA**
Advisory Software Engineer, May 31, 2000 - July 8, 2002. Worked on fab-qualified VLSI physical design (clock optimization) and circuit simulation algorithms.
 - ◇ **Computer Science Department, University of California Santa Barbara, Santa Barbara, CA 93106, USA**
Lecturer [part-time] & Research Staff. 1997-2000
 - ◇ **Cray Inc., Eagan, MN, USA (www.cray.com)**
Intern Member of Technical Staff, 1997-1998. Optimized the vector pipelines of the Multi-streaming Processor for Cray X1, the fastest supercomputer, circa 1999. Also participated in development of one of the first Tensor Processing Units.
- Selected Academic Visits**
- ◇ **Visiting Researcher, INSA de Rouen, Rouen, France,** July 2017.
 - ◇ **Visiting Researcher, Institut für Stochastik, Johannes Kepler Universität, Linz, Austria,** October, 2013.
 - ◇ **Visiting Researcher, Applied and Computational Mathematics, CalTech, Pasadena, CA, USA,** (under Indo-US Virtual Institute of Mathematical and Statistical Sciences Program), May 2013.
 - ◇ **Visiting Researcher, McMaster University, Hamilton, Canada,** 19-22 July 2011.
 - ◇ **OCCAM Visiting Fellow, Oxford Centre for Collaborative Applied Mathematics (OCCAM), Mathematical Institute, University of Oxford, United Kingdom,** 1 September – 30 November 2010 and 22-26 August, 2011.
 - ◇ **Visiting Collaborating Researcher, Sobolev Institute of Mathematics, Siberian Branch of the Russian Academy of Sciences, Novosibirsk, Russia,** 14-30 July 2009 and 12-17 September, 2011. Repeat visits in Summer/Fall of 2018 & 2019.
 - ◇ **Visiting Researcher, Nagoya University**(Centre of Excellence in Computational Science), Nagoya, Japan, 15-29 May 2005
- Selected Research Grants**
- ◇ **Science and Engineering Research Board, Government of India, *Data Assimilation To Reaction-Diffusion Complex Networks*,** MATRICS grant, Jan 2021-Jan 2024.

- ◇ **Science and Engineering Research Board, Government of India**, *Containment Control over Economics Aware Local COVID-19 Infection Dynamics Networks*, MATRICS Special Grant, Jul 2020 – Jul 2021.
- ◇ **Indian Space Research Organization, RESPOND Grant**, *Data Assimilation to Space Dynamical Systems with Application to High Accuracy Orbital Estimation for the IRNSS Satellites*, as Principal Investigator. December 2017 to May 2019. (completed)
- ◇ **Science and Engineering Research Board, Government of India**, *Simulation, Control and Estimation of Path Constrained Stochastic Dynamics*, as Principal Investigator, March 2017–March 2020. (completed)
- ◇ **Defense Research and Development Organization-Naval Research Board, Government of India**, *Computational Methods for Control of Multiscale Dynamics*, as Principal Investigator, January, 2012–January, 2015. (Completed)
- ◇ **Department of Science and Technology**:International Collaboration with Johannes Kepler Universität, Linz, Austria. Stability Issues in Computation of Stiff Stochastic Differential Equation Systems. 2013-2015. (Completed).
- ◇ **Jointly funded by Department of Science and Technology in India and Russian Foundation of Basic Research in Russia**, with the Sobolev Institute of Mathematics, Russian Academy of Sciences, Novosibirsk, Russia; *Mobile Intelligent Wireless Sensor Networks: Control and Optimization*, as Principal Investigator, 1 April 2010-31 March 2012. (Completed)
- ◇ **Jointly funded by Department of Science and Technology in India and Russian Foundation of Basic Research in Russia**, with the Sobolev Institute of Mathematics, Russian Academy of Sciences, Novosibirsk, Russia; *Optimization problems in Mobile Sensor Networks*, as Principal Investigator, July 2008-July 2010. (Completed)
- ◇ **Jointly funded by the Department of Science and Technology in India and Russian Academy of Sciences in Russia**; with the Sobolev Institute of Mathematics, Russian Academy of Sciences, Novosibirsk, Russia; *Statistical Timing Driven Congestion Aware Global Routing for sub 65nm CMOS VLSI designs*, as Principal Investigator, September 2008-September 2010. (Completed)
- ◇ **Indian Space Research Organization(ISRO)** through the institute’s Space Technology Cell: *Computational Study of Path Constraints for Guidance and Control Planning*, as Principal Investigator, from April 1, 2007 to March 31, 2009 (Completed).
- ◇ **Defense Research and Development Organization-Naval Research Board, Government of India**, *Computational Study of SDAE models*, as Principal Investigator, from December 18, 2006 to March 10, 2010. (Completed)
- ◇ **Indian Space Research Organization(ISRO)** through the institute’s Space Technology Cell: *Trajectory Optimization with Path Constrained High Index DAEs* , as Principal Investigator, from April 1, 2004 to March 31, 2007. (Completed)
- ◇ **Intel Corporation**: High Performance Computing, Jan-Dec 2005 (as Co-Investigator) (Completed)

Selected Industrial Consulting

- ◇ **Honorary Technical Adviser**, Tejosma Technologies, Bangalore, January 2013- December 2018.

Research Advisees

- ◇ **As Main or Sole Doctoral Advisor:**
- ◇ Abhishek Ajayakumar; PhD Candidate in Computational & Data Sciences. Working on Sparsification of Reaction-Diffusion Networks; joined 2018.
- ◇ Suthar Sumit; PhD Candidate in Computational & Data Sciences. Working on constrained stochastic dynamical systems; joined 2017.

- ◇ Saurabh Dixit; PhD Candidate in Computational & Data Sciences. Working on using DAEs for Data Assimilation to Dynamical Systems, joined 2016.
- ◇ Dr Ashutosh Simha; PhD in Computational & Data Sciences. Thesis: *Global control of mechanics on Riemannian manifolds, and applications to under-actuated aerial vehicles*, graduated in May 2018. Postdoc with Technical University, Tallinn, Estonia
- ◇ Dr. Tarun Uppal; PhD in Computational & Data Sciences. External student from Defence Research & Development Organization. Organizational adviser: Dr. Suresh Srivastava. Thesis: *Feasible Path Prescription for Engineering Systems in a High Index Constrained Dynamics Framework*; graduated in November, 2017. Employed as Scientist E in DRDO.
- ◇ Dr. Nigam Chandra Parida; PhD in Computational Science & Engineering (SERC, IISc). [Thesis: *Simulation and Optimization of Dynamical Systems with High Index and Disjunctive Constraints*. Graduated in November, 2014. Assistant Professor at Orissa University of Agriculture & Technology, Bhubaneswar.]
- ◇ Dr. Radhamanjari Samanta; interdisciplinary PhD in Nanoengineering for Integrated Systems (adviser: S. Raha & co-adviser: Prof Santanu Mahapatra (Electronic Systems Engineering)) [Thesis: *Timing-Driven Routing in VLSI Physical Design under Uncertainty*; graduated in December, 2013]. Initial Placement: AMD Bangalore
- ◇ Dr. Samar Bahadur Singh; interdisciplinary PhD in Mathematical Sciences (adviser: S. Raha & co-adviser: Prof. A. K. Nandakumaran (Mathematics)) [Thesis: *Study of Higher Order Split-Step Methods for Stiff Stochastic Differential Equations*; graduated in November, 2013]. Employed with Moody's Analytics, New York, USA. Past: Associate Vice-President with Copal Amba. Initial Placement: Visiting Faculty with Chennai Mathematical Institute, Chennai, India
- ◇ Dr. Saswati Dana; interdisciplinary PhD in Mathematical Sciences (Math-Bio) (adviser: S. Raha & co-adviser: Prof Sujit K Sikdar (Molecular Biophysics)). Thesis: *Computational Studies of Uncertainty in Intra-Cellular Biochemical Reaction Systems*; graduated in December 2011. Initial Placement: Samsung Advanced Institute of Technology, Bangalore.
- ◇ **As Doctoral Co-Advisor:**
- ◇ Deepa Maheswari, PhD Candidate in Computational & Data Sciences; Main Adviser: Prof Debnath Pal & co-adviser: S Raha; working on multi-organ biochemical modeling of disease systems, Joined 2016.
- ◇ Dr. Saptarsi Das, interdisciplinary PhD in Nano-engineering for Integrated Systems (co-adviser: S. Raha & main adviser: Prof S K Nandy). Thesis: *Reconfigurable Accelerator for High Performance Application Kernels*, graduated in May 2018. Employed with Samsung, Bangalore.
- ◇ Dr. Brahmanandam Javvaji, interdisciplinary PhD in Nano-engineering for Integrated Systems (co-adviser: S. Raha & main adviser: Prof. D. Roy Mahapatra(Aerospace Engineering)). Thesis: *Plasmon-Phonon Coupled Dynamics of Nanocrystalline Structures*, graduated in March 2018.
- ◇ Dr. Ashish Kumar Pradhan, interdisciplinary PhD candidate in Nano-engineering for Integrated Systems (co-adviser: S. Raha & main adviser: Prof S K Nandy). Thesis: *Energy Efficient Flexible Baseband Processing for Mobile and Cognitive Radios*; graduated in December 2017.
- ◇ Dr. Satadal Ghosh interdisciplinary PhD in Mathematical Sciences (co-adviser: S. Raha & main adviser: Prof. Debasis Ghose (Aerospace Engineering)). Thesis: *Analysis of Proportional Navigation Class of Guidance Laws against Agile Targets*, graduated December, 2014. Assistant Professor at IIT Madras.
- ◇ Dr. Santosh Doraisamy, interdisciplinary PhD in Nanoengineering for Integrated Systems (co-adviser: S. Raha & main adviser: Prof Rudra Pratap (Nano-science and engineer-

ing)). Thesis: *A Study of Mode Dependent Energy Dissipation in 2D MEMS Resonators*; graduated in October, 2014

- ◇ Dr. Sudarshan Iyengar, PhD Thesis: *Network Centrality Measures And Their Applications*, Interdisciplinary Program in Mathematical Sciences; graduated in 2012; Main Adviser: Prof. Veni Madhavan, C E (Computer Science); co-adviser: S. Raha. Assistant Professor at IIT Ropar
- ◇ Dr. Kalidas Yeturu, PhD Thesis: *A Novel Algorithmic Suite for Detection, Large Scale Comparison and Design of Ligand Binding Sites in Protein Structures*, SERC, IISc; graduated in 2011. Main adviser: Prof Nagasuma Chandra (Biochemistry), co-adviser: S Raha. Assistant Professor at IIT Tirupati
- ◇ **Masters:**
- ◇ Wupadrasta Raja Vikram Bhatt, MTech (Research), graduated in May, 2020. Worked on Stability Preserving Bisection Algorithms in Reaction-Diffusion Complex Networks. Employed with Microsoft India
- ◇ Milind R, MSc Engineering by Research (graduated in July, 2014). Commonwealth Fellowship recipient. Employed with Center for Study of Science, Technology & Policy, Bangalore.
- ◇ Vishal Metri, MSc Engineering by Research (graduated in December, 2013). Thesis titled *Stochastic chemical kinetics: A study on hTREK1 Potassium ion channel*; won the Marie Curie Fellowship for doctoral studies in Europe.
- ◇ Deepak Rout, MSc Engineering by Research (graduated, May 2006) [employed with IT companies].

**Post
Doctoral
Advisees**

- ◇ Dr Anindita Ganguly (PhD from Jadavpur University): Dr. D. S. Kothari Post-Doctoral Fellow of the UGC; joined January 2020
- ◇ Dr Atendra Kumar (PhD from IIT Mandi): Dr. D. S. Kothari Post-Doctoral Fellow of the UGC; January 2020–March 2021. Initial Placement: Assistant Professor, NIT Srinagar
- ◇ Dr. Dinesh Kumar (PhD from IIT Guwahati); National Board for Higher Mathematics Post Doctoral Fellow and later Dr. D. S. Kothari Post-Doctoral Fellow of the UGC; joined Jan 2017.
- ◇ Dr. Moitri Sen (PhD from IIT Kanpur); Dr. D. S. Kothari Post-Doctoral Fellow of the UGC; July, 2014–July 2016. [at present Assistant Professor at the National Institute of Technology, Patna]
- ◇ Dr. Ruchi Nigam (PhD from IIT Roorkee); Dr. D. S. Kothari Post-Doctoral Fellow of the UGC; Jan, 2014 – Dec 2016. [currently self-employed as educational consultant in Mysore, Karnataka]
- ◇ Dr. Nachiketa Mishra (PhD from IIT Madras); National Board for Higher Mathematics Fellow and later Dr. D. S. Kothari Post-Doctoral Fellow of the UGC; July 2011–July 2012. [initial placement: Assistant Professor of Mathematics at National Institute of Technology, Warangal; Currently faculty at IIITDM Kanchipuram]
- ◇ Dr. Raghuram Srinivasan (PhD from University of Cincinnati, Ohio, USA); 30 August 2010–31 July 2014. [Associate Professor at MS Ramaiah University Bangalore]
- ◇ Dr. Rajendra K Ray (PhD from IIT Guwahati); April - December 2009. [at present Associate Professor at IIT Mandi]
- ◇ Dr. Sk Safique Ahmad (PhD from IIT Guwahati); January 2008 - January 2009. [at present Associate Professor and former Head of Mathematics at IIT Indore]

**Selected
Services**

- ◇ Speaker and Resource Person, Vaibhav Summit – High Performance Computing/Computational Science, 2020

- ◇ Visited City University Hong Kong to help with the exchange programme with IISc, September 2019
- ◇ Served on Doctoral Committee (as examiner for Kandidat and as observer for DSc) on Applied Mathematics, Sankt Peterburg State University, Russia, 2018-2019
- ◇ *Catalyzed and Helped sign MoU between IISc and Sankt Peterburg State University (Russia) and Russian Academy of Sciences (Transportation Institute - St Petersburg, Ershov Institute of Informatics - Novosibirsk, and Sobolev Institute of Mathematics - Novosibirsk) and the Novosibirsk State University, 2019-2020.*
- ◇ *Catalyzed the establishment of Computational and Data Sciences Department and Program (Syllabus, Hiring of New Faculty) at the Indian Institute of Science Education and Research Kolkata, 2020-2021 (ongoing). Department created in November 2020*
- ◇ *Framed Syllabus and helped establish Computational and Data Sciences (UG and PG) Program at the Mathematics Department, National Institute of Technology Karnataka, 2019. Passed in Senate in March 2019.*
- ◇ *Catalyzed the establishment of Mathematical and Computational Sciences Program at the Indian Association for Cultivation of Sciences, Kolkata. Helped in hiring new faculty, framed syllabi and initiated research. 2017. Council resolution in September 2017*
- ◇ Reviewer & Examiner of numerous PhD theses from IIT Kharagpur, Jadavpur University, Anna University, IIT Kanpur, IIT Jodhpur, Carleton University Ottawa Canada etc.
- ◇ Reviewer for journals such as Automatica, IEEE Transactions such as Intelligent Transportation Systems and Systems, Man and Cybernetics; Applied Mathematics & Computation, Measurement, SIAM SISC etc.
- ◇ Organizer of Mini-symposium on time varying systems, SIAM Annual General Meeting, Chicago, USA, July, 2014.
- ◇ Advised IIT Jodhpur on Systems Science post-graduate programme, May 2012
- ◇ Member, Promotion and Assessment Boards on Computer Science for Defence Research Development Organization, since 2009, held at Bengaluru and Hyderabad.
- ◇ Technical adviser to Social Welfare Commissioner, Government of Karnataka on VLSI training, 2008.
- ◇ Member, Indian delegation to International Congress on Industrial and Applied Mathematics 2007 at Zürich.
- ◇ Member of Indian Delegation, Indo-UK Grid Computing (e-Science) Workshop, February, 2004.
- ◇ Reviewer, Design Automation Conference, 2001 and 2002.
<http://www.sigda.org/Archives/ProceedingArchives/Dac/Dac2001/papers/2001/dac01/pdffiles/reviewer.pdf>
<http://www.sigda.org/Archives/ProceedingArchives/Dac/Dac2002/papers/2002/dac02/pdffiles/reviewer.pdf>
- ◇ Reviewer for IBM, CAD physical design Area funding opportunity proposals at Semiconductor Research Corporation, 2001.

**Selected
Invited Talks**

- ◇ On Reaction-Diffusion Networks, Russian Academy of Sciences, MOTOR Conference, July 2020.
- ◇ Partitioning a Reaction-Diffusion Ecological Network for Dynamic Stability, IISc-CityU joint workshop, City University of Hongkong, September, 2019.
- ◇ Constrained Dynamics and its Application to Stick-Slip Problems, 2nd FIRST Lecture, National Institute of Advanced Studies, August 2016.
- ◇ GIAN course on Numerical Linear Algebra, IIT Indore, June 2016.

- ◇ Time-scales of stick-slip dynamics. Mathematics, mechanics and physics for tomorrow's materials, International Centre for Mathematical Sciences, Edinburgh, UK, Oct 2015
- ◇ On High Index Differential-Algebraic Equations, SIAM Annual General Meeting, Chicago, July 2014.
- ◇ Optimization of Constrained Dynamics: Short Course for Faculty Development Program at National Institute of Technology Patna, June 2013.
- ◇ Modeling and Simulation of Stochastic Biochemical Reaction Networks, Workshop on system science : complex networks and applications, IIT Rajasthan, Jodhpur, May 2012.
- ◇ Modeling and Simulation in Nano-Engineering, Fifth Workshop on Nanocomputing and Biochips, Indian Statistical Institute, Kolkata, March 2012.
- ◇ Two Applications of Heterogeneous Computing, Keynote Address, HeMPa organized by the CDAC, University of Hyderabad, October 2011
- ◇ A Multiscale Numerical Study of the Radial Hedgehog Solution of Liquid Crystal Model, Liquid Crystal Modelling and Display Applications Workshop, OCCAM, University of Oxford, United Kingdom, August 2011
- ◇ Physically Consistent Simulation of Mesoscale Chemical Kinetics, McMaster University, Hamilton, Canada July 2011 and Indo-UK Symposium on Industrial and Applied Mathematics, IIT Bombay, November 2011
- ◇ The alpha-method of numerical integration of ODEs and DAEs: regularization and multi-scale properties, OCCAM Wednesday Morning Event, Oxford Centre for Collaborative and Applied Mathematics, Mathematical Institute, University of Oxford, Oxford, United Kingdom, October 2010 and AMMCS, Wilfried Laurier University, Waterloo, Canada, July 2011
- ◇ The fully implicit stochastic- α method for stiff stochastic differential equations, Computational Mathematics and Mathematical Biology Seminar, Department of Mathematics, Heriot-Watt University, Edinburgh, United Kingdom, September 2010
- ◇ Chemical Langevin Equations, Applied Mathematics Department, University of Leeds, Leeds, United Kingdom, September, 2010
- ◇ Stochastic- α Method, Colloquium of the Applied Statistics Unit, Indian Statistical Institute, Kolkata, India, February, 2010
- ◇ The α -method direct transcription in dynamic optimization, Sobolev Institute of Mathematics, Siberian Branch of Russian Academy of Sciences, Novosibirsk, Russia, July 2009.
- ◇ Keynote address at OPECG 2009 on multicore computing, Indian Institute of Technology Madras, Chennai, 2009.
- ◇ ABFT in numerical linear algebra libraries on chip multicore processors, Center for Development of Advanced Computing (PEEP-2008 keynote address), Pune, India, September, 2008.
- ◇ SDAE- α method, Centre of Excellence-Frontiers of Computational Science Colloquium, Nagoya University, Japan, May 2005

Education

- ◇ **Department of Computer Science and Engineering, University of Minnesota, Minneapolis, MN 55455, USA**
Ph.D. in Scientific Computation with a minor in Aerospace Engineering, April, 2000.
 - Thesis Title: *Constraint Partitioning For Solution Of Path-Constrained Dynamic Optimization Problems*
 - Thesis Advisor: Prof. Linda Petzold [Currently with University of California Santa Barbara].
- ◇ **M.S. in Computer Science**, December, 1997.

- ◇ **Civil Engineering Department, Indian Institute of Technology Bombay, Powai, Mumbai 400076, India**
Master of Technology in Civil Structural Engineering, February, 1993.
- ◇ **Civil Engineering Department, Jadavpur University, Kolkata 700032, India**
Bachelor of Civil Engineering (Honours), July, 1991.
- ◇ **Academic Awards**
 - Sommerfeld Graduate School Fellowship at University of Minnesota, Fall 1994-Spring 1995.
 - Graduate School Fellowship at Minnesota Supercomputer Institute, Summer 1996.

- Publication in Peer-Reviewed Journals**
- ◇ Factorization of Boolean Polynomials: Parallel Algorithms and Experimental Evaluation
PG Emelyanov, M Krishna, V Kulkarni, SK Nandy, DK Ponomaryov, S Raha
Programming and Computer Software 47 (2), 108-118, 2021
 - ◇ Four-directional spatial regularization for sparse hyperspectral unmixing
T Ahmad, RB Lyngdoh, AS Sahadevan, S Raha, PK Gupta, A Misra
Journal of Applied Remote Sensing 14 (4), 046511, 2020.
 - ◇ A quantitative study on the role of TKI combined with Wnt/ β -catenin signaling and IFN- α in the treatment of CML through deterministic and stochastic approaches
S Pan, S Raha, SP Chakrabarty
Chaos, Solitons & Fractals 133, 109627, 2020.
 - ◇ Robust Initial Satellite Orbit Determination method using a Modified Kalman Filter
S Potu, SK Anand, S Raha
The Journal of Navigation 72 (3), 528-538, 2019.
 - ◇ Partitioning a reaction-diffusion ecological network for dynamic stability
Dinesh Kumar, Jatin Gupta, S Raha
Proceedings of the Royal Society A 475 (2223), 20180524, 2019.
 - ◇ Patch clamp data driven stochastic modeling and simulation of hTREK1 potassium ion channel gating
V Metri, S Ghatak, S Raha, SK Sikdar
Chemical Physics 516, 182-190, 2019.
 - ◇ Adaptive Control Based Harvesting Strategy for a Predator–Prey Dynamical System
Sen, M., Simha, A. & Raha S.
Acta Biotheoretica (2018). <https://doi.org/10.1007/s10441-018-9323-1>
 - ◇ Efficient realization of householder transform through algorithm-architecture co-design for acceleration of QR factorization.
Merchant FA, Vatwani T, Chattopadhyay A, Raha S, Nandy SK, Narayan R.
IEEE Transactions on Parallel and Distributed Systems. 2018 Feb 7.
DOI: 10.1109/TPDS.2018.2803820
 - ◇ Almost-Global Exponential Tracking of a Variable Pitch Quadrotor on SE (3)
A Simha, S Vadgama, S Raha
IFAC-PapersOnLine, vol. 50 (1), pp. 10268–10273, 2017.
 - ◇ Geometric Methods in Analysis and Control of Implicit Differential Systems
A Simha, S Raha
Journal of the Indian Institute of Science, vol. 97 (3), pp 391–411, 2017.
 - ◇ Numerical simulation of a glucose sensitive composite membrane closed-loop insulin delivery system
Shashi Bajaj Mukherjee, Debabrata Datta, Soumyendu Raha, Debnath Pal
Bioprocess and Biosystems Engineering, Volume 40, Issue 10, pp 1453–1462, 2017.
 - ◇ Trajectory evaluation using path prescribed control of Unmanned Aerial Vehicle in Differential Algebraic Equations framework
Tarun Uppal, Soumyendu Raha and Suresh Srivastava
The Aeronautical Journal, Volume 121, Issue 1240, pp. 770–789, 2017.
 - ◇ Accelerating BLAS and LAPACK via Efficient Floating Point Architecture Design
Farhad Merchant, Anupam Chattopadhyay, Soumyendu Raha, S. K. Nandy, Ranjani Narayan
Parallel Processing Letters, vol. 27 (03n04), 1750006, 2017.
 - ◇ Length-Scale and Strain Rate Dependent Mechanism of Defect Formation and Fracture in Carbon Nanotubes Under Tensile Loading
Brahmanandam Javvaji, D Roy Mahapatra and Soumyendu Raha
Journal of Nanoparticle Research 19(2), 37, 2017.

- ◇ Inverse Simulation for Gas Turbine Engine Control through Differential Algebraic Inequality Formulation
Uppal, Tarun, Soumyendu Raha, and Suresh Srivastava
DOI: <https://doi.org/10.1515/tjj-2016-0057>, International Journal of Turbo & Jet-Engines, October 2016.
- ◇ Unified Time-to-Go Algorithms for Proportional Navigation Class of Guidance
Satadal Ghosh, Debasish Ghose, and Soumyendu Raha
Journal of Guidance, Control, and Dynamics, Ahead of Print : pp. 1-18, (doi: 10.2514/1.G001472), April, 2016.
- ◇ Composite guidance for impact angle control against higher speed targets
Satadal Ghosh, Debasish Ghose and Soumyendu Raha
Journal of Guidance, Control, and Dynamics, Vol. 39, No. 1, pp. 98-117, 2016 .
- ◇ Time-Scales of the Stick-Slip Dynamics of the Peeling of an Adhesive Tape
Nachiketa Mishra, Nigam Chandra Parida, Soumyendu Raha
Proceedings of the Royal Society of London A, 2015, 20140399.
<http://dx.doi.org/10.1098/rspa.2014.0399>
- ◇ A Provably Tight Delay-Driven Concurrently Congestion Mitigating Global Routing Algorithm
Radhamanjari Samanta; Adil I Erzin; Soumyendu Raha; Yuriy V Shamardin; Ivan I Takhonov; V V Zalyubovskiy
Applied Mathematics and Computation, DOI: 10.1016/j.amc.2014.11.062, November 2014
- ◇ Capturability Analysis of a 3-D Retro-PN Guidance Law for Higher Speed Nonmaneuvering Targets
Satadal Ghosh, Debasish Ghose, Soumyendu Raha
Control Systems Technology, IEEE Transactions on, (2014), Volume:22 , Issue: 5, pp. 1864–1874
- ◇ Performance metrics in a hybrid MPI–OpenMP based molecular dynamics simulation with short-range interactions.
Pal, Anirban, Abhishek Agarwala, Soumyendu Raha, and Baidurya Bhattacharya,
Journal of Parallel and Distributed Computing 74.3 (2014): pp.2203-2214.
- ◇ Capturability of Augmented Pure Proportional Navigation Guidance Against Time-Varying Target Maneuvers.
Ghosh, Satadal, Debasish Ghose, and Soumyendu Raha
Journal of Guidance, Control, and Dynamics, 37.5 (2014): pp. 1446-1461.
- ◇ Rollover-Preventive Force Synthesis at Active Suspensions in a Vehicle Performing a Severe Maneuver With Wheels Lifted Off.
Parida, Nigam Chandra, Soumyendu Raha, and Anand Ramani.
Intelligent Transportation Systems, IEEE Transactions on (2013), DOI:10.1109/TITS.2014.2319263
- ◇ Five stage Milstein methods for SDEs
Samar B Singh and S. Raha
International Journal of Computer Mathematics, doi:10.1080/00207160.2012.657629, vol. 89, issue 6, pp. 760-779, 2012.
- ◇ Physically Consistent Simulation of Mesoscale Chemical Kinetics: the Non-Negative FIS-alpha Method
Saswati Dana and Soumyendu Raha,
Journal of Computational Physics, doi:10.1016/j.jcp.2011.07.032, vol. 230, pp. 8813-8834, 2011.
- ◇ Growing pseudo-eigenmodes and positive logarithmic norms in rotating shear flow
Banibrata Mukhopadhyay, Ranchu Mathew, Soumyendu Raha
New Journal of Physics, vol. 13, 023029, Feb 2011.

- ◇ Activator induced dynamic disorder and molecular memory in human two-pore domain hTREK1 K⁺ channel
Tapan K. Nayak, Saswati Dana, Soumyendu Raha, Sujit K. Sikdar
Journal of Chemical Biology, doi:10.1007/s12154-010-0053-3, Volume 4, Issue 2, pp 69-84, 2011.
- ◇ Computation of Restoration of Ligand Response in the Random Kinetics of a Prostate Cancer Cell Signaling Pathway
S. Dana, T. Nakakuki, M. Hatakeyama, S. Kimura, S. Raha
Computer Methods and Programs in Biomedicine, doi:10.1016/j.cmpb.2010.04.001, vol. 101, pp.1-22, 2011.
- ◇ On Estimation of Transient Stochastic Stability of Linear Systems
Sk. Safique Ahmad; Nagalinga Rajan; Soumyendu Raha,
Stochastics and Dynamics, doi 10.1142/S0219493710003017, Volume 10, Issue 3, pp. 385-405, September 2010.
- ◇ An Efficient Reduction Algorithm for Computation of Interconnect Delay Variability for Statistical Timing Analysis in Clock Tree Planning
S. Bondada, S. Mahapatra, S. Raha
Sadhana, Academy Proceedings in Engineering Science, Vol. 35, Part 4, pp. 407 August 2010
- ◇ An Implicit Method for Some NSDDEs of Itô's Form
S. Singh & S. Raha
Journal of Numerical Mathematics and Stochastics,2 (1) : 45-53, 2010
- ◇ The α Method for Solving Differential-Algebraic Inequality Systems
Joey Peter, Nigam C. Parida and S. Raha
International Journal of Numerical Analysis and Modeling (IJNAM), Volume 7, Number 2, pp. 240-260, 2010.
- ◇ The Fully Implicit Stochastic- α Method for Stiff Stochastic Differential Equations
Sk. Safique Ahmad, Nigam C Parida and S. Raha
Journal of Computational Physics, vol. 228, pp. 8263–8282, 2009.
DOI: 10.1016/J.JCP.2009.08.002
- ◇ Regularized Numerical Integration of Multibody Dynamics with the Generalized α Method
Nigam C Parida and S. Raha
Applied Mathematics and Computation, vol. 215 pp. 1224–1243, 2009.
DOI:10.1016/J.AMC.2009.06.063
- ◇ Power-aware speed-up for multithreaded numerical linear algebraic solvers on chip multi-core processors.
Jayanta Mukherjee and Soumyendu Raha,
Scalable Computing: Practice and Experience (formerly Parallel and Distributed Computing Practices), vol. 10, no. 2, pp. 217–228, June 2009
- ◇ The α -Method Direct Transcription in Path Constrained Dynamic Optimization,
Nigam Chandra Parida and Soumyendu Raha,
SIAM J. Sci. Computing, Volume 31, Issue 3, pp. 2386–2417, 2009
PERMALINK: [HTTP://DX.DOI.ORG/10.1137/070682289](http://dx.doi.org/10.1137/070682289)
- ◇ The Stochastic- α Method: A Numerical Method for Simulation of Noisy Second Order Dynamical Systems,
Nagalinga Rajan and Soumyendu Raha,
CMES: Computer Modeling in Engineering and Sciences, Vol. 23, No. 2, pp. 91-116, 2008
- ◇ Parallel implementation of AutoDock,
P. Khodade, R. Prabhu, N. Chandra, S. Raha and R. Govindarajan,
J. Appl. Cryst. 40, pp. 598-599, 2007.

- ◇ Processing Multimode Binding Situations in Simulation-Based Prediction of Ligand-Macromolecule Affinities
Khandelwal, A., Lukacova, V., Kroll, D.M., Raha, S., Comez, D., and Balaz, S.,
J. Phys. Chem. A.; (Communication); 2005; 109(29); pp. 6387-6391.
- ◇ A Comparison of the Binding Sites of Matrix Metalloproteinases and Tumor Necrosis Factor- Converting Enzyme: Implications for Selectivity
Viera Lukacova, Yufen Zhang, Daniel M. Kroll, Soumyendu Raha, Dogan Comez, and Stefan Balaz
J. Med. Chem.; (Article); 2005; 48(7); 2361-2370. ASAP Article 10.1021/jm0491703 S0022-2623(04)09170-8 Web Release Date: March 2, 2005
- ◇ A Combination of Docking, QM/MM Methods, and MD Simulation for Binding Affinity Estimation of Metalloprotein Ligands
Akash Khandelwal, Viera Lukacova, Dogan Comez, Daniel M. Kroll, Soumyendu Raha, and Stefan Balaz
J. Med. Chem., 48 (17), 5437 -5447, 2005. 10.1021/jm049050v S0022-2623(04)09050-8 Web Release Date: July 26, 2005
- ◇ Simulation-Based Predictions of Binding Affinities of Matrix Metalloproteinase Inhibitors
Akash Khandelwal, Viera Lukacova, Daniel M. Kroll, Dogan Comez, Soumyendu Raha, Stefan Balaz
Molecular Informatics/Combinatorial Science Volume 23, Issue 9 , Pages 754 - 766 Published Online: 15 Nov 2004.
- ◇ Similarity of Binding Sites of Human Matrix Metalloproteinases
Viera Lukacova, Yufen Zhang, Martin Mackov, Peter Baricic, Soumyendu Raha, Jorge A. Calvo, and Stefan Balaz
J. Biol. Chem., Apr 2004; 279: 14194 - 14200 ; 10.1074/jbc.M313474200.
- ◇ Constraint Partitioning for Stability in Path-Constrained Dynamic Optimization Problems.
S. Raha and L.R. Petzold, 22(6), pp. 2051-2074, *SIAM J. Sci. Comput.*, 2001.
- ◇ Constraint Partitioning for Structure in Path-Constrained Dynamic Optimization Problems.
S. Raha and L.R. Petzold, *Applied Numerical Math.*, vol. 39, pp 105-126, 2001.
- ◇ Sensitivity analysis and design optimization of differential-algebraic equation systems.
L. Petzold, R. Serban, S. Li, S. Raha and Y. Cao,
In: J. Ambrsio and M. Kleiber, Editors, *NATO-ARW on Computational Aspects of Non-linear Struct. Systems with Large Rigid Body Motion*, Pultusk, Poland, July 2-7, 2000. Amsterdam: IOS Press. *NATO Sci. Ser. III*, pp 247-262. *Comput. Syst. Sci.* 179, pp 153-167, 2001
- ◇ A Time Integration Algorithm for Flexible Mechanism Dynamics : The DAE- α Method.
Jeng Yen, Linda Petzold, Soumyendu Raha
J. Comput. Methods in App. Mech. Engr. (CMAME), 158 (1998), pp 341-355
- ◇ V Kulkarni, P Emelyanov, D Ponomaryov, M Krishna, S Raha, SK Nandy
Parallel Factorization of Boolean Polynomials
International Andrei Ershov Memorial Conference on Perspectives of System, Russia, 2019.
- ◇ Merchant F, Vatwani T, Chattopadhyay A, Raha S, Nandy SK, Narayan R.
Achieving Efficient Realization of Kalman Filter on CGRA through Algorithm-Architecture Co-design.
In *Applied Reconfigurable Computing. Architectures, Tools, and Applications: 14th International Symposium, ARC 2018, Santorini, Greece, May 2-4, 2018, Proceedings 2018* May 16 (Vol. 10824, p. 119). Springer.
- ◇ F. Merchant, T. Vatwani, A. Chattopadhyay, S. Raha, S. K. Nandy, R. Narayan;
Achieving Efficient QR Factorization by Algorithm-Architecture Co-design of Householder

**Selected
Conference
Papers**

- Transformation; 2016 29th International Conference on VLSI Design and 2016 15th International Conference on Embedded Systems (VLSID), Page(s):98–103; DOI: 10.1109/VLSID.2016.109, 2016
- ◇ Farhad Merchant, Arka Maity, Mahesh Mahadurkar, Kapil Vatwani, Ishan Munje, Madhava Krishna, Nalesh S, Nandhini Gopalan, Soumyendu Raha, S. K. Nandy, Ranjani Narayan
“Micro-architectural Enhancements in Distributed Memory CGRAs for LU and QR Factorizations”, 28th International Conference on VLSI Design (VLSID), 2015.
 - ◇ Brahmanandam Javvaji, D Roy Mahapatra, S Raha, “Molecular dynamics study of phonon screening in graphene”, SPIE Smart Structures and Materials+ Nondestructive Evaluation and Health Monitoring,90600H, 2014.
 - ◇ Samanta, Radhamanjari, Adil Erzin, and Soumyendu Raha. “Timing-driven Steiner tree construction on uniform λ -geometry.” VLSI Design and Test, 18th International Symposium on. IEEE, 2014.
 - ◇ Ghosh, Satadal, Debasish Ghose, and Soumyendu Raha. “Capturability of augmented proportional navigation (APN) guidance with nonlinear engagement dynamics.” American Control Conference (ACC), 2013. IEEE, 2013.
 - ◇ Ghosh, Satadal, Debasish Ghose, and Soumyendu Raha. “Three dimensional PN based impact angle control for higher speed nonmaneuvering targets.” American Control Conference (ACC), 2013. IEEE, 2013.
 - ◇ Ghosh, Satadal, Debasish Ghose, and Soumyendu Raha. “Three dimensional retro-PN based impact time control for higher speed nonmaneuvering targets.” Decision and Control (CDC), 2013 IEEE 52nd Annual Conference on. IEEE, 2013.
 - ◇ Javvaji, Brahmanandam, S. Raha, and D. Roy Mahapatra. “Electromagnetic characteristics of carbon nanotubes with strain.” In SPIE Smart Structures and Materials+ Nondestructive Evaluation and Health Monitoring, 83440Z. International Society for Optics and Photonics, 2012.
 - ◇ Analysis of a Retro-PN Guidance Law
S. Ghosh, D. Ghose and S. Raha
50th IEEE Conference on Decision and Control and European Control Conference, Paper ThC13.4, December 12-15, 2011, Orlando, FL, USA
 - ◇ On Stochastic Differential Algebraic Equations
S. Raha
International Conference on Scientific Computation and Differential Equations SciCADE 2011, University of Toronto, Canada, July 2011
 - ◇ A Timing Driven Congestion Aware Global Router
Erzin, A.I.; Zalyubovskiy, V.V.; Shamardin, Y.V.; Takhonov, I.I.; Samanta, R.; Raha, S.; Emerging Applications of Information Technology (EAIT), 2011 Second International Conference on
IEEE Xplore Digital Object Identifier: 10.1109/EAIT.2011.33, pp. 375 - 378, 2011
 - ◇ High-index differential-algebraic equations and application to trajectory optimization
S. Raha
International Congress of Industrial and Applied Mathematics, 2336, ICIAM, Zürich, Switzerland, 2007.
 - ◇ The Stochastic- α Method for Time Integration of Noisy Second Order Dynamics
S. Raha
International Conference on Scientific Computation and Differential Equations SciCADE 2007, Saint Malo, France, July 2007
 - ◇ A Problem Solving Environment for Dynamic Optimization of Partial Differential-Algebraic Equation Systems.
L.R. Petzold, R. Serban, S. Li, S. Raha, A. Strelzoff, 16th IMACS World Congress, Lussannes, Switzerland, 2000