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My research aim is to address and seek methods to solve key problems in complex biochemical and biological systems with the help of mathematical modeling and computational techniques. My career goal is to work in an interdisciplinary group in a premier institution and promote integrated working of mathematics and life sciences through research and teaching of undergraduate and graduate curriculum.

Research Areas:

(a) Mathematical modeling of biological signal transduction mechanisms using dynamical systems approach, (b) Inferring reaction mechanism from biological and chemical time course data using computational approach.

Education

1994 - 1997	University of Madras, Chennai, India Bachelor's in Chemistry (B.Sc.)
1997 - 1999	Indian Institute of Technology Madras (IITM), Chennai, India Master's in Chemistry (M.Sc.)
2000 - 2005	Council for Scientific and Industrial Research (CSIR) fellow and Graduate student - IITM (Ph.D.) (Modeling dynamical systems in chemistry and biology with delay differential equations) <i>Supervisor:</i> Prof. M.S. Gopinathan

Appointments

1999 - 2000	Graduate Student at Tata Institute of Fundamental Research (TIFR) Supersonic Jet, Nano and Pico second laser spectroscopy
2000 - 2002	Junior Research Fellow (Council for Scientific and Industrial Research (CSIR) India)
2002 - 2005 Jun	Senior Research Fellow (CSIR)
2005 Jun - 2005 Oct	Senior Research Associate Department of Electrical Engineering, IITM
2005 Nov - 2008 Aug	Post Doctoral Research Associate Indiana University School of Informatics. (Unraveling reaction mechanisms from time series data) (<i>Supervisor:</i> Dr. Santiago Schnell)
2008 Sep - 2010 Aug	NSF Post Doctoral Fellow Institute for Mathematics and its Applications, Minnesota

Awards

- 1999 Council of Scientific and Industrial Research (CSIR) Fellow from 1999-2005 (Stipend of INR 1,32,000 per annum and INR 50,000 for research expenses)
 - 1999 Best candidate in the national competitive examination held by TIFR
 - 2002 Best Candidate in Science Seminar presentation in Diamond Jubilee celebration of CSIR
 - 2002 IITM Alumni association Travel award for attending Euro summer school in Italy.
 - 2007 Landahl Travel award from Society for Mathematical Biology.
 - 2008 Landahl Travel award from Society for Mathematical Biology.
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Teaching

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| 2000 Spring | <i>Chemistry Laboratory course</i> for undergraduates (IITM) |
| 2000 Fall | <i>Physical chemistry laboratory course</i> for Graduate students (IITM) |
| 2001, 2002-Fall | <i>Numerical methods and computations for chemists</i> - (Graduate level) in IITM |
| 2003 Spring | <i>Numerical methods using Matlab</i> for M. Tech. in Civil Engineering IITM |
| 2008 Spring | <i>Systems Biology</i> course for IU Informatics graduate students |
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Service

Refereeing and Reviewing

Biophysical Chemistry, Journal of Theoretical Biology, IET Proceedings in Systems Biology, Royal society of chemistry, Bulletin of Mathematical Biology, Nonlinearity

Memberships

Society of Mathematical Biology (SMB), Association for Women in Mathematics (AWM), International Society of Computational biology (ISCB)

Administration

Student representative for CSIR fellows in IITM

Publications

Experimental and mathematical modeling in chemistry:

1. **J. Srividhya** and M. S. Gopinathan, Modeling experimental oscillations in liquid membranes using delay equations, *J. Phys. Chem. B*, 2003, 107, pp 1438-1443.
2. S. Usharani, **J. Srividhya**, M. S. Gopinathan and T. Pradeep, Concentration of CO₂ over Melting Ice Oscillates, *Phys. Rev. Lett.*, 2004, 93(4), Article No: 048304, pp 1-4.

Dynamical systems approach to biological systems:

3. **J. Srividhya** and M. S. Gopinathan, A simple time delay model for eukaryotic cell cycle, *J. Theor. Biol.*, 2006, 241, pp 617-627.
4. **J. Srividhya** and Santiago Schnell, Why substrate disappearance in enzyme digestion follows apparent first-order kinetics, *Comp. Biol. and Chem.*, 2006, 10, pp 209-214.
5. **J. Srividhya**, M. S. Gopinathan and Santiago Schnell, Effect of time delay in a model of phosphorylation - dephosphorylation network, *Biophys. Chem.*, 2007, 125, pp 286-297.

Computational Biology Method development:

6. **J. Srividhya**, Santiago Schnell, Edmund J. Crampin and Patrick E. McSharry, Reconstructing biochemical pathways from time series data, *Proteomics*, 2007, 7, pp 828-838.

Submitted:

7. **J. Srividhya**, Yongfeng Li and Joe Pomerening, A length induced positive feedback in open signal transduction cascades is revealed, *PLoS Comp. Biol.* (under revision)
8. Yongfeng Li and **J. Srividhya**, Goldbeter-Koshland model for open signaling cascades: A mathematical study, *J. Math. Biol.*
9. **J. Srividhya**, Marcio D. A. Muraao, Edmund J. Crampin, Santiago Schnell, Enzyme catalyzed reactions: from experiments to mechanism reconstruction. *J. Chem. Inf. and Model.*

Soon to be submitted:

10. Marcio D. A. Muraao and **J. Srividhya**, Reverse engineering in biology: Past, present and future.

Dissertation :

11. **J. Srividhya**, Modeling chemical and biological dynamical systems with delay differential equations, Ph.D. thesis, 2005, Dept. of Chemistry, IITM.

Conferences:

1. **J. Srividhya** and M. S. Gopinathan, Modeling experimental oscillations in liquid membranes with time delay, First SIAM (Society of Industrial and Applied Mathematics) conference on Life Sciences, Boston, March 2002.
2. **J. Srividhya** and M. S. Gopinathan, Modeling oscillations in oil/water interface with delay equations, Fourth National symposium in Chemistry, National Chemical Laboratory, Pune, India, February 2002.
3. **J. Srividhya** and M. S. Gopinathan, Modeling biochemical networks with delay equations, Fifth National symposium in Chemistry, Central Leather Research Institute, Chennai, India, February 2003.
4. **J. Srividhya** and M. S. Gopinathan, Modeling Phosphorylation - dephosphorylation networks with delay equations, Dr. Ramanujam Symposium in Mathematics, IITM, Chennai, India, April 2003.
5. **J. Srividhya** and Santiago Schnell, Method for Inferring Kinetic and Network Architecture(MIKANA), Society of Mathematical Biology Meeting 2007, Contributed Talk, San Jose, July-August 2007.
6. **J. Srividhya** and Santiago Schnell, Global non-linear modeling of time course data to infer biochemical pathways Poster, Mathematics Biosciences Institute Young Scientists Workshop, MBI, Columbus, OH, September 2007.
7. **J. Srividhya**, M. S. Gopinathan and Santiago Schnell, Can delays replace phosphorylation dephosphorylation cycles in signaling cascades?, Society of Mathematical Biology Meeting 2008, Contributed Talk, Toronto, Canada, July-August 2008.
8. **J. Srividhya**, Marcio D. A. Muraao, Santiago Schnell, Computational determination of enzyme reaction mechanisms, IMA workshop on career options for women in Mathematical Sciences, Minneapolis, MN. April 2009.

Presentations:

1. Lasers in biology and chemistry (June 2003) Children and Youth summer training academy, Chennai, India.

2. Delays in Biochemical networks (October 2003) Symposium on Dynamics in chemistry and biology, Indian Institute of Technology Madras, Chennai, India (Symposium)
3. Modeling dynamics in chemistry and biology (August 2005) National center for Biological sciences, Bangalore, India. (Research presentation)
4. Solving the proteomics using global non-linear modeling (February 2007) IU School of Informatics, Bloomington, IN, USA. (Research seminar)
5. Method for Inferring Kinetic and Network Architecture (MIKANA) (August 2007) Society of Mathematical Biology Meeting 2007, Contributed Talk, San Jose, July-August 2007.
6. Can delays replace phosphorylation dephosphorylation cycles in signaling cascades? (August 2008), Society of Mathematical Biology Meeting 2008, Contributed Talk, Toronto, July-August 2008.
7. Computational determination of enzyme reaction mechanisms, (April 2009), IMA workshop Career Options for Women in Mathematical Sciences, Minneapolis, MN.

Grants and Research support:

1. Council of Scientific and Industrial Research Fellowship for graduate school for 5 years. (2000-2005)

Software:

MIKANA - Hosted by Indiana University servers
URL: <http://cheminfo.informatics.indiana.edu:8080/biofw/biofw>

News Highlights:

1. Carbon dioxide concentration oscillates over melting ice: News India, Chennai, October 2004
2. Top 25 Hottest Articles, Journal of Theoretical Biology, 2006
3. What goes in must come out: Predicting biochemical pathways, In this Issue, Proteomics, 2007

References

Prof. M. S. Gopinathan, FASc, FNA (PhD Supervisor)

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Dr. Santiago Schnell, DPhil (Oxon) (Post doc Supervisor)

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