

# M. Sakthi Balan

## Personal Information

Date of birth : September 08, 1974  
Sex : Male  
Marital Status : Married  
Nationality : India  
Status in Canada : On Work Permit  
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## Career Objective

My primary ambition is to do research and teaching in the field of computer science.

## Academic Background

Degree/Position	Institute/University	Year	Grade
Postdoctoral Fellow	University of Western Ontario, London, Ontario, Canada	April 2005 - till date	
Visiting Researcher	University of Western Ontario, London, Ontario, Canada	August 2004 - March 2005	
PhD in Computer Science and Engineering under Infosys Fellowship	Indian Institute of Technology, Madras, Chennai - 600036 India	2004	8.4/10
Master of Science(by research) in Computer Science and Engineering	Indian Institute of Technology, Madras, Chennai - 600036 India	2000	8.4/10
M.Sc. (Mathematics)	Manonmaniam Sundaranar University, Tirunelveli Tamil Nadu, India	1997	86%
B.Sc. (Mathematics)	Manonmaniam Sundaranar University, Tirunelveli Tamil Nadu, India	1995	87%
All India Senior School Certificate Examination	Sri Jayendra Swamigal Silver Jubilee School Tirunelveli	1992	80%
All India Secondary School Examination	Sri Jayendra Swamigal Silver Jubilee School Tirunelveli	1990	83%

## Academic Achievements

- Reviewed research papers for
  - Journal of Theoretical Computer Science (TCS).
  - International Journal of Unconventional Computing.
  - 11<sup>th</sup> International Meeting on DNA Computing.
- Recipient of Infosys Technologies, India fellowship for doing PhD in the Department of Computer Science and Engineering, Indian Institute of Technology, Madras, 2000-2004.
- Recipient of Indian Institute of Technology (GATE) Scholarship for doing Masters in the Department of Computer Science and Engineering, Indian Institute of Technology, Madras, 1998-2000. GATE All India Rank - 105.
- Recipient of Best Outgoing Post-Graduate student award in M.Sc Mathematics.
- Recipient of St. Xavier's college scholarship for needy and bright students in 1995-1997.
- Prizewinner for holding rank first in M.Sc, Mathematics.
- Prizewinner for holding rank three in B.Sc, Mathematics.

## Teaching Experience

- Teaching Assistant (includes occasional lectures too) at the Department of Computer Science and Engineering, IIT Madras from 1998-2004 (during Masters and Doctorate) for the following (under-)graduate courses. The duties for the following include part-time teaching, preparing assignments, conducting periodical tutorial sessions for students and evaluating students.
  1. Unconventional Models of Computing (graduate course)

The course includes occasional teaching of various topics from Molecular computing, preparing and evaluating assignments, and evaluating final exams.
  2. Logic, Machines and Computations (under-graduate course)

It is a basic introductory course for computer science students which includes occasional teaching of topics from formal languages theory and computing theory, arranging tutorial sessions for students, preparing assignments and evaluating, and conducting final exams and evaluating the same.
  3. Advanced Topics in Formal Language Theory (graduate course)

It is a very advanced course on various topics like grammar systems, machine models based on molecular computing. My duties include occasional lectures on grammar systems, preparing assignments and evaluating final examinations.
  4. Formal Languages and Automata Theory (under-graduate course)

It is a very basic level course for which my duties include preparing and conducting periodical tutorials, evaluating assignments and final examinations.

5. Mathematical Foundations of Computer Science (graduate course)

It is a basic course for graduate students – the duties include preparing and conducting periodical tutorial sessions for students, evaluating assignments, conducting and evaluating examinations.

6. Discrete Mathematics (under-graduate course)

It is a basic course on mathematics for computer science students. My duties for this course includes periodical tutorial sessions, conducting and evaluating assignments.

## Academic Visits

- Visited University of York, UK for presenting paper *Peptide Computing: Universality and Theoretical Model* in Unconventional Computation, held from Sep 4–8 2006.
- Visited EPFL, Lausanne, Switzerland for presenting paper *Parallel Computation of Simple Arithmetic using Peptide Antibody Interactions* in the International Workshop in Information processing in Cells and Tissues, held from September 8–11, 2003 (visit partially supported by Department of Science and Technology, India, Indian National Science Academy, India and contingency grant from Infosys Technologies, India).
- Visiting researcher in University of Western Ontario, London, Ontario, Canada for one month (Aug-Sep, 2002) for research discussions in the Department of Computer Science, University of Western Ontario, Canada and for presenting paper *Complexity Issues in Binding-Blocking Automata* in the Descriptive Complexity of Formal Systems held in the University of Western Ontario, Canada from August 21–24, 2002 (visit sponsored by University of Western Ontario).
- Visited University of South Florida, Florida, US for presenting paper *Peptide Computing Universality and Complexity* co-authored with Prof. Kamala Krithivasan and Y.Sivasubramanyam in The Seventh International Conference on DNA Based Computers, held from June 10–13, 2001 (visit partially supported by CSIR, India and contingency grant from Infosys Technologies, India).

## Areas of Interest

- Molecular Computing
- Formal Language and Automata Theory
- Immunity-Based Systems

**PhD Thesis Title:** Computational Models using Peptide-Antibody Interactions

**Masters Thesis Title:** Distributed Processing in Automata

## Courses Done

- High Performance Computing

- Database Management Systems
- E-Commerce
- Advanced Topics in Formal Language Theory
- Data Structures and Programming
- Computer Organization
- Mathematical Foundations of Computer Science
- Computational Geometry
- Formal Language Theory
- Algorithmic Graph Theory
- Design and Analysis of Algorithm

### **Computer Practical Skills**

- Programming languages: C, C++, Java.
- Operating Systems: Unix, Linux, Win9x.
- Documentation Software: L<sup>A</sup>T<sub>E</sub>X.

### **Mini Projects done**

- Implementation of Point Location Problem in Java (for Computational Geometry Course)
- Writing a small search engine (for Database and Management Systems Course)
- Implementation of some Graph Algorithms in C (for Algorithmic Graph Theory Course)
- Writeup on "Virtual Carnatic Music University" (for the E-Commerce Course)

*[http : //nsl.cs.iitm.ernet.in/cs648/2001/2001/2001/version1/cs00p07/](http://nsl.cs.iitm.ernet.in/cs648/2001/2001/2001/version1/cs00p07/)*

- Project writeup on "Dimension Theory of Posets using Hypergraph Coloring" (in M.Sc)

### **List of Publications**

#### **Journal/Special Volumes Publications**

1. M. Sakthi Balan, H. Jürgensen, On the Universality of Peptide Computing, Natural Computing, accepted.
2. M. Sakthi Balan, Complexity Measures for Binding-Blocking Automata, Journal of Automata, Languages and Combinatorics, accepted.

3. M. Sakthi Balan, K. Krithivasan, Parallel Computation of Simple Arithmetic Using Peptide-Antibody Interactions, *Bio-Systems*, Vol. 76, No. 1-3, pp. 303-307, 2004.
4. M. Sakthi Balan, K. Krithivasan, Realizing Switching Functions using Peptide-Antibody Interactions, *Aspects of Molecular Computing, Lecture Notes in Computer Science*, Vol. 2950, ed. N. Jonoska, Gh. Paun, G. Rozenberg, pp. 353-360, 2004.
5. M. Sakthi Balan, Kamala Krithivasan and Mutyam Madhu, Some variants in Communication of Parallel Communicating Pushdown Automata, *Journal of Automata, Languages and Combinatorics*, Vol. 8, No. 3, pp. 401-416, 2003.
6. K. Krithivasan, M. Sakthi Balan and R. Rama, Array Contextual Grammars, In *Recent Topics in Mathematical and Computational Linguistics*, ed. C.Martin-Vide and Gh. Paun, pp. 154-168, 2000.
7. K. Krithivasan, M. Sakthi Balan and P. Harsha, Distributed Processing in Automata, *International Journal of Foundations of Computer Science*, Vol. 10, No. 4, 443-464, 1999.

### Conference Publications

1. M. Sakthi Balan, H. Jürgensen, Peptide Computing: Universality and Theoretical Model, *Unconventional Computation, LNCS 4135*, pp. 57-71, 2006. (Also in a Tech report – see below)
2. M. Sakthi Balan, H. Jürgensen and Kamala Krithivasan, Peptide Computing: A Survey, Research Level Discussion on Natural Computing, IIT Madras, India, Nov 2005. (Also in a Tech Report – see below)
3. M. Sakthi Balan, K. Krithivasan, Modeling Boolean Circuits using Peptide-Antibody Interactions, In *Mathematical Biology*, ed. Peeyush Chandra, Anshan publishers, pp. 187-193, Nov 2005.
4. M. Sakthi Balan, Algorithms for Peptide Computer, *National Conference on Algorithms and Artificial Systems*, ed. P. Thangavel, Allied Publishers, pp. 73-85, 2003.
5. M. Sakthi Balan, String Binding-Blocking Automata, *Genetic and Evolutionary Computation Conference, USA, LNCS 2723*, pp. 425-426, 2003.
6. M. Sakthi Balan, K. Krithivasan, Parallel Computation of Simple Arithmetic Using Peptide-Antibody Interactions, *International Workshop on Information Processing in Cells and Tissues*, Switzerland, pp. 461-469, 2003.
7. M. Sakthi Balan, K.Krithivasan and Y.Sivasubramanyam, Peptide Computing: Universality and Complexity, In N. Jonoska and N. Seeman, editors, *Proceedings of Seventh International Conference on DNA based Computers (DNA7)*, LNCS 2340, pages 290-299, 2002.
8. M. Sakthi Balan, K. Krithivasan, Binding-Blocking Automata, *Preliminary proceedings of International Meeting on DNA Based Computers*, M. Hagiya and A. Ohuchi (Eds.), 2002, pp. 327.

9. M. Sakthi Balan, Watson-Crick Distributed Automata, SIAM Discrete Mathematics Conference, San Diego, USA, 2002.
10. M. Sakthi Balan, K. Krithivasan, Normal-Forms of Blocking-Binding Automata, Unconventional Models of Computing, published as CDMTCS Research Report at the University of Auckland, CDMTCS-195, C.S. Calude and M.J. Dinneen and F. Peper (Eds.), Japan, 2002, pp. 3.
11. M. Sakthi Balan, Complexity Issues in Binding-Blocking Automata, Pre-proceedings of International Workshop on Descriptive Complexity of Formal Systems, University of Western Ontario, London, Ontario, Canada, Aug 21-24, 2002, J. Dassow, M. Hoeberechts, H. Jürgensen and D. Wotschke (Eds.), pp. 43–54.
12. M. Sakthi Balan, Parallel Communicating Pushdown Automata with Filters, ed. J. Dassow and D. Wotschke, Proceedings of Third International Workshop on Descriptive Complexity of Automata, Grammars and Related Structures, Vienna, Austria, July 21-22, 2001, Preprint Nr. 16 of the Fakultät für Informatik, Otto-von-Guericke-Universität, Magdeburg, pages 167–175, 2001.
13. K. Krithivasan and M. Sakthi Balan, Distributed Processing in Deterministic PDA, In Proceedings of the International Workshop on Grammar Systems, Austria, ed. R. Freund and A. Kelemenova, pp. 127–145, 2000.
14. K. Krithivasan and M. Sakthi Balan, Some properties of Array Contextual Grammars, presented in National Seminar on Discrete Mathematics and Applications, 2000.

### **Technical Reports**

1. M. Sakthi Balan, H. Jürgensen, Peptide Computing - Universality and Theoretical Model, preprint 1/2006, ISSN 0946-7580, Universität Potsdam, Germany, May 2006.
2. M. Sakthi Balan, H. Jürgensen, K. Krithivasan, Peptide Computing: A Survey, preprint 4/2005, ISSN 0946-7580, Universität Potsdam, Germany, Nov 2005.
3. M. Sakthi Balan, H. Jürgensen, On the Universality of Peptide Computing, preprint 6/2005, ISSN 0946-7580, Universität Potsdam, Germany.

### **Manuscripts/Communicated Papers**

1. M. Sakthi Balan, K. Krithivasan, Binding-Blocking Automata, communicated.
2. M. Sakthi Balan, H. Jürgensen, Non-determinism in Peptide Computing, in preparation.
3. M. Sakthi Balan, K. Krithivasan, Variants of Binding-Blocking Automata, manuscript.

### **Extra Curricular Activities**

- Co-ordinated the hosting of the following international conferences at IIT Madras

Conference	Date
FST&TCS	17-19 Dec 1998
FST&TCS	13-15 Dec 1999
ISAAC	16-18 Dec 1999
INDOCRYPT	16-20 Dec 2001

- Research Scholars Representative, Department of Computer Science & Engineering, IIT Madras, 2001-2002
- Class Representative - MSc Maths: 1995-1997

### **Extras/Hobbies**

- Carnatic Classical Music Singer - student of Late Prof. Palghat Shri. K.V.Narayanaswamy.
- Passed Higher Grade Examinations in Music (Vocal) conducted by the Government of Tamil Nadu.
- Participated in Music Competitions and won many prizes.
- Was a member of University Cultural Team in 1995-1997
- Playing chess and analyzing chess games.