

SANDEEP SOMANI

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Education

- 2006 – current** **Doctor of Philosophy (Chemical Physics)**
Department of Chemical Physics, University of Maryland (College Park)
- 2001 – 2002** **Master of Science (High Performance Computation for Engineered Systems)**
Singapore MIT Alliance¹, National University of Singapore
GPA: 4.47/5.0
- 1995 – 1999** **Bachelor of Technology (Mechanical Engineering)**
Indian Institute of Technology
CPI: 8.32/10

Publications

- Somani S, Chng Choon-Peng, Verma CS, “Hydration of a hydrophobic cavity and its functional role: a simulation study of human interleukin-1beta.” **Proteins** 2007 Jun 1;67(4):868-85
- Dhar P, Meng TC, Somani S, Ye L, Sairam A, Chitre M, Hao Z, Sakharkar K. “Cellware--a multi-algorithmic software for computational systems biology”. **Bioinformatics**. 2004 May 22;20(8):1319-2
- Dhar P, Meng TC, Somani S, Ye L, Sakharkar K, Krishnan A, Ridwan AB, Chitre M, Hao Z. “Grid Cellware: the first grid-enabled tool for modeling and simulating cellular processes”. **Bioinformatics**. 2004 Nov 16
- Meng, T. C., Somani, S., Dhar P., “Modeling and simulation of biological systems with stochasticity” **In Silico Biol.** 2004 Apr 16;4(2)

Conferences & Trainings

- Feb 2005** 49th Annual Meeting of **Biophysical Society**, Long Beach
Poster Presented: Sandeep Somani, Choon-Peng Chng and Chandra Verma, “Hydration of Hydrophobic Cavities: A Molecular Dynamics Study of Human Interleukin-1 β ”
- Feb 2004** 48th Annual Meeting of **Biophysical Society**, Baltimore
Poster Presented: Choon-Peng Chng, Sandeep Somani, Chandra Verma, "Burying water in proteins leads to increased flexibility: a molecular dynamics study"
- June 2003** Conference on **Intelligent Systems for Molecular Biology**, Brisbane
Poster presented: Sandeep Somani, Chee Meng, Li Ye, Anand Sairam, Zhu Hao, Mandar Chitre and Pawan Dhar, “Cellware: A Modeling and Simulation tool for Large Scale Biological Systems”
- April 2003** **Wet Lab Training on Experimental Techniques in Genetic Engineering** – A 6-week training at the Department of Biological Sciences (NUS) on experimental genetic engineering techniques like Plasmid DNA preparation & extraction, Restriction Enzyme digestion, Polymerase Chain Reaction and DNA sequencing.
- Sept 2002** **Intel HPC compute cluster workshop** – A 5 day training, conducted by Intel, on their HPC solutions on the latest 64-bit Itanium clusters and the various programming techniques for exploiting the Itanium architecture.

¹ The SMA Programme – A joint alliance between Singapore’s NUS & NTU and Massachusetts Institute of Technology of US (<http://web.mit.edu/sma/>)

Accomplishments

- 2006 - Fellowship for pursuing PhD studies in Chemical Physics at University of Maryland (College Park)
- 2004 - *Whitaker Biomedical Engineering Fellowship* by Department of Biomedical Engineering, Boston University for pursuing PhD studies
- 2001 - *Fellowship* to pursue post graduate studies in Singapore under the prestigious Singapore-MIT Alliance program
- 1995 - A rank holder (among top 1%) in the *All India Joint Entrance Exam* for Indian Institute of Technology
- 1995 - Among the top 1% in *Indian National Physics Olympiad*
- 1993 - *Indian National Talent Search Examination scholar*

Computational Skills

Programming Languages : **Proficient in C, C++, Java, FORTRAN, MPI, OpenMP.**

Hands-on experience of application development over **Grid**

Scientific Softwares : **Proficient in MATLAB and Mathematica**

Familiar with, **I-DEAS, LOQO, AMPL, R, ILOG-CPLEX**

Proficient in Computational Structural Biology softwares; esp. Molecular Dynamics packages such as GROMACS and NAMD.

Work Experience (Research)

Jan 2006 – current: Graduate Student at [Center for Advanced Research in Biotechnology](#) (CARB)

Modeling and Simulation of Biomacromolecules.

Supervisor: Prof Michael K. Gilson (Principal Investigator, CARB)

September 2002 – Dec 2005: Research Associate at [Bioinformatics Institute](#) (BII), Singapore

I have worked with two research groups at BII. A summary of projects and research follows:

- ◆ **Systems Biology Group (2002 – 2003):** My principal project was the development of a simulation package *Cellware*². In a team of four my responsibilities included implementation of various modeling and simulation algorithms, for example, deterministic and stochastic simulation algorithms for biochemical pathway simulation; various optimization algorithms for parameter estimation. Cellware is the first Grid-enabled tool for biopathway simulation and I was responsible for the design and implementation of the Grid architecture.

Supervisor: **Dr Pawan K. Dhar** (Principal Investigator, BII)

Computational Skills: Understanding of various modeling and simulation techniques used for biological processes, OOP using C++ and Java, Grid technology (Globus, Java COG kit), Scientific libraries like Netlib, GSL, etc.

- ◆ **Computational Structural Biology (2004 – 2005):** I used atomistic molecular dynamics based simulation methods for understanding the relationship between protein dynamics and function. Central theme of my projects has been elucidating the structure, dynamics and ultimately the function of water molecules frequently found buried in protein cavities.

Supervisor: **Dr Chandra S. Verma** (Principal Investigator, BII)

Computational Skills: Various MD packages and tools such as GROMACS, NAMD, CHARMM and understanding of underlying statistical mechanics based algorithms.

² <http://www.bii.a-star.edu.sg/research/sbg/cellware>

Teaching and Supervision

At BII (2002-2005) I jointly **supervised two Masters Thesis projects** in Bioinformatics and **one Final Year Undergraduate** project.

Work Experience (Industry)

July 2000 – April 2001: Oracle India Development Center (Hyderabad)

Worked as MTS (Member of Technical Staff) and was involved in the development of a software product called Oracle Student System, a university automation package and got a first hand experience to complete Software Product Development Lifecycle.

Software Skills: Oracle 8i, GUI design, Developer 2000, Solaris OS, and Application Object Library

Aug 1999 - June 2000: Wipro Technologies (Bangalore)

Worked as Systems Engineer in one of India's largest software services company and was involved in two projects involving maintenance of a mainframe based ERP Package of GE-Medical Systems.

Software Skills: Database concepts, DB2, CICS, IDMS, ADS/O and VSAM

Academic Thesis Projects

Graduate Thesis project at Temasek Labs, Singapore

Project Title: *Simulation of One-Dimensional Detonation waves using the method of Conservation Element and Solution Element (Jan 2002 – June 2002)*

Temasek Labs in one of Singapore's premier defense labs. The project involved developing a Computational Fluid Dynamics (CFD) simulation code for detonation. This project was done individually and involved the solution of 1-D Euler equation coupled with a species equation, which models combustion. The solution technique was based on a relatively recent CFD algorithm called *Conservation Element/Solution Element* method. **(Appendix A)**

Domain knowledge: Gas Dynamics, CFD, Combustion modeling

Software Skills : MATLAB, Fortran90

Undergraduate Thesis project at Indian Institute of Technology

Project Title: *Adaptive Mesh Generation for Finite Element Analysis (July 1998 – March 1999)*

Developed an adaptive mesh generation package, based on h-refinement, for the Finite Element Analysis of a 2-D Steady State Heat Transfer Problem. All modules for Mesh Generation, Error Estimation, Finite Element Analysis and Mesh Refinement and visualization were developed from scratch and implemented in C/C++. **(Appendix B)**

Domain knowledge: Heat Transfer, Finite Element Analysis

Software Skills : MATLAB, C++, Linux tools

Relevant Coursework

Graduate Level Courses in

- Quantum Mechanics
- Quantum Chemistry
- Statistical Mechanics
- Thermodynamics
- Numerical Methods for Partial Differential Equations
- Optimization Methods
- Numerical Algorithms on Advanced Computer Architectures

References

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Dr Murali Damodaran

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