

Affiliation

Ph.D Student
Control and Dynamical Systems Program
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Education

- **M.A.**, Mathematics, Pennsylvania State University, 2000.
 - *A brief overview of the Livschitz theorem.*
Advisor: Prof. Ya. Pesin.
- **M.S.**, Industrial Engineering, Pennsylvania State University, 1999.
 - *Issues of representation, detection, classification, and prediction in the context of machine condition monitoring & diagnosis and shape analysis.*
Advisors: Prof. Soundar Kumara and Prof. C. R. Rao.
- **B.Tech.**, Mechanical Engineering, Indian Institute of Technology Madras, 1997.
 - *Electronic chip breaker.*
Advisor: Prof. V. Radhakrishnan.

Experience

- **Research Assistant** November 2002 - current
California Institute of Technology, Prof. Steven R. Quartz and Prof. Erin M. Schuman. *My research is in structural plasticity in neuronal networks. With Dr. Schuman, I am investigating dendritic spine motility in rat hippocampal neurons. With Dr. Quartz, I am modeling auditory localization plasticity in barn owls and exploring theoretical issues in structural plasticity & network complexity.*
- **Teaching Assistant** Fall 2002
California Institute of Technology, Control and Dynamical Systems. CDS 101/110, "Principles of feedback and control". *Office hours, grading and mud-card answers.*
- **Teaching Assistant** Spring 2002
California Institute of Technology, Computation and Neural Systems. CNS120, "The Neural Basis of Consciousness". *Office hours, grading and website design & maintenance.*
- **Research Assistant** October 2001-September 2002
California Institute of Technology, Prof. Christof Koch and Prof. Demetri Psaltis. *Refinement and implementation of a hierarchical learning algorithm with attention on a 3-dof planar robotic manipulator. Project ended with building a 1-dof arm together with a feedback loop (h/w & s/w) for control.*
- **Graduate Fellow** September 2000 - September 2001
California Institute of Technology, Control and Dynamical Systems Option.
- **Summer Intern** May - August 2000
GE-Corporate Research and Development, Schenectady, NY. *Information Systems Laboratory. Worked on diagnostic information fusion in the presence of uncertainty. The context was diagnosis and fault detection in aircrafts. Developed improvements to fusion schemes using fuzzy logic.*

- **Research Assistant** August 1997 - May 2000
 Pennsylvania State University, State College, PA, Prof. Soundar Kumara and Prof. C. R. Rao. (i) *Designed and developed techniques for fault detection, prediction of time-to-failure and fault classification in helicopter gearboxes. The emphasis was on signal analysis and modeling using such tools as wavelets, neural networks.* (ii) *Investigated the use of chaos-based tools for diagnosis in gearboxes using accelerometer data.* (iii) *Investigatory work on shape analysis using wavelets.*
- **Summer Intern** May - August 1999
 GE-Transportation Systems, Erie, PA, Systems Group. (i) *Designed and implemented a locomotive turbocharger failure detection algorithm using neural networks* (ii) *Designed and developed a tool for 'snapshot data' manipulation using Perl.*
- **Project Trainee** May - July 1996
 Hindustan Motors, Tiruvallur, India. *Developed a coding system for adapters and connectors in earth moving equipment.*
- **Vacation Trainee** December 1994
 Lucas-TVS, Padi, India. *Introduced to manufacturing practices.*

Projects & term papers

- California Institute of Technology Fall 2002
 "Spiking neuronal network for the control of an animat's planar movement." *Investigation (in simulation) of planar goal-directed behavior by a network of integrate and fire neurons that receives patterned stimulation as feedback from the environment. The initial architecture was based on the "small-world networks" idea.*
- California Institute of Technology Spring 2001
 "Memory: A molecular perspective." *Reviewed the current state of understanding of the molecular mechanisms underlying the various stages of memory, that has been achieved through pharmacological, genetic and lesion studies.*
- California Institute of Technology Winter 2001
 "Dynamical systems and information theory (context: phase space reconstruction from time series)." *Described some interesting links between dynamical systems and information theory - Takens' embedding theorem, average mutual information between ensembles of time series and measure theoretic entropy of strange attractors - in the context of phase space reconstruction from experimental time series.*
- California Institute of technology Winter 2001
 "A Gestaltist view of vision." *Presented some psychophysical studies that support the idea that the visual system arrives at the simplest interpretation of incoming visual input, and other ideas of Gestalt psychology.*
- Pennsylvania State University Spring 1999
 "Double EWMA controller for a transfer function with offset and white noise." *Designed a double EWMA controller for a process that follows a transfer function model with offset and white noise. Derived stability and no-oscillation conditions.*
- Pennsylvania State University Fall 1998
 "Analysis of electro chemical arc machining (ECAM) as applied to chip breaking." *Performed statistical analysis of ECAM data and investigated robustness of the predictive equation developed in an earlier project.*

- Pennsylvania State University Spring 1998
 “Hybrid classifier using neural networks and multicriteria decision making.” *Designed and implemented a hybrid classifier that fuses multiple sensor data and optimizes conflicting objectives during fault classification.*
- Pennsylvania State University Spring 1998
 “Effects of fixturing error on angular constraints: A comparison of single and multi set-up machining.” *Performed an experimental study on the effects of fixturing errors on angular constraints for single and multiple set-up machining operations. Compared Wade and Bourdet models.*
- Pennsylvania State University Fall 1997
 “Vendor selection agent.” *Implemented the basic concepts of an intelligent world wide web search agent.*
- Indian Institute of Technology, Madras 1996- 1997
 “Electronic chip breaker.” *Performed a detailed experimental investigation into the use of electro chemical arc machining for chip breaking in turning processes, as B.Tech project. This involved the design and fabrication of a chip holding mechanism, and the fabrication of a high voltage arcing circuit.*

Publications

- Mysore S. P., and Quartz, S. R., 2004. “Structural plasticity and auditory localization in barn owls - A computational model.”, Poster at *Computational and Systems Neuroscience*, held at the Cold Spring Harbor Laboratory.
- Shultz, T. R., Mysore, S. P., and Quartz, S. R., “Why let networks grow?”, (*in press*). In *Constructing Cognition: How the Brain Develops Representations Vol. II. Perspectives and Prospects*, Ed. Denis Mareschal, Sylvain Sirois, and Gert Westermann.
- Goebel, K., and Mysore, S. P., 2001. “Taking advantage of misclassifications to boost classification rate in decision fusion”, *Sensor Fusion: Architectures, Algorithms, and Applications V, Proceedings of SPIE #4385*.
- Kumara, S. R. T., Suh, J., and Mysore, S. P., 1999. “Machinery fault diagnosis and prognosis: application of advanced signal processing techniques”, *CIRP Annals*, Vol. 48/1, 317-320.
- Shreesh, M. P., 1996. “Application of pattern recognition and automated inspection in manufacturing - An overview”, *Proc. National (Student) Convention on Computer Engineering*.

Patents

- Mysore, S. P., and Goebel, K., (*Applied*). “Diagnostic Information Fusion - 2”, *US Patent and Trademark Office*.

Workshops and meetings

- Santa Fe Institute, Mathematical modeling workshop July 27-Aug 09, 2003
 “From Neuron to Network–Biophysically-Based Functional Models.”
- Cold Spring Harbor Laboratory, Workshop on Theoretical Neuroscience July 13-July 20, 2003
 “Optimization and Constraints in the Evolution of Brain Design.”
- UCSD Supercomputing Center, NEURON simulation course June 21-June 25, 2003
- Marina Del Ray, FSL & FreeSurfer Course June 09-11, 2003
 “Oxford FMRIB Centre and UCLA course on fMRI data analysis.”
- San Diego, Society for Neuroscience Annual Meeting Nov 10-15, 2001

Honors and awards

- Santa Fe Institute travel award for the mathematical modeling workshop (*July 2003*).
- Cold Spring Harbor Lab travel award for the workshop on theoretical neuroscience (*July 2003*).
- Research Assistantship, California Institute of Technology (*2001-present*).
- Engineering and Applied Sciences Fellowship, California Institute of Technology (*2000-2001*).
- Research Assistantship for Ph.D study, Mechanical Engineering Department, Massachusetts Institute of Technology (*Declined, Fall 2000*).
- Research Assistantship for Ph.D study, Mechanical Engineering Department, University of California, Berkeley (*Declined, Fall 2000*).
- Cash award, GE Transportation Systems, for contribution during internship (*August 1999*).
- Intern award nomination certificate, GE-Transportation Systems (*August 1999*).
- Research Assistantship, Industrial Engineering Department, Penn State University (*1997-2000*).
- K. C. Mahindra Education Trust loan scholarship for study abroad (*1997*).
- J. N. Tata Endowment loan scholarship for study abroad (*1997*).
- Jamssetji Tata gift scholarship (*1997*).
- First prize for the paper “Application of pattern recognition and automated inspection in manufacturing-An overview” (*1997*).
- Certificate of appreciation from the Director, I.I.T Madras for first prize in paper presentation (*1997*).
- Among the top 1% in the Joint Entrance examination conducted by the five Indian Institutes of Technology for 100000 students, (*May 1993*).

Courses

- Neuroscience & related: Introduction to Neurobiology, Neuronal basis of visual consciousness, Neuroscience for scientists and engineers, Neurobiology Lab, Development, evolution & the mind, Neural computation, Methods in modern microscopy.
- Mathematics: Topology, Applied operator theory, Real analysis, Complex and Functional analysis, Dynamical systems, Applications of dynamical systems, Geometry of nonlinear systems, Stochastic processes, Wavelets
- Computer science: Learning systems, Neural networks I, Neural networks II, Expert systems design, Quantum computation, Digital image processing
- Engineering: Information theory, Introduction to modern control, Robust control, Nonlinear control, Time series control and process adjustment, Design of experiments, Multi-criteria optimization.

References

- Available on request.

June. 2004