

# MADHUSUDANA SHASHANKA

Department of Cognitive and Neural Systems  
Boston University  
677 Beacon St.  
Boston, MA 02215

Tel: (617) xxx-xxxx  
Fax: (617) 353-7755  
shashanka@cns.bu.edu  
<http://cns.bu.edu/~mvss/>

## RESEARCH AREAS

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**Machine Learning, Semantic Analysis, Auditory Scene Analysis**

## EDUCATION

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2003 - present	<b>Boston University</b> PhD Candidate, Cognitive and Neural Systems (CNS) <i>Advisor: Prof. Barbara Shinn-Cunningham</i>	<b>Boston, MA, USA</b> 3.96/4.00
1999 - 2003	<b>Birla Institute of Technology &amp; Science (BITS)</b> BE (Honors) in Computer Science	<b>Pilani, India</b> 9.39/10.00

## PUBLICATIONS & MANUSCRIPTS

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In Preparation	MVS Shashanka (with B Raj and P Smaragdis). Transformation Invariant Probabilistic Latent Component Analysis.
Journals	MVS Shashanka, B Raj, P Smaragdis. Probabilistic Latent Variable Model for Sparse Decompositions of Non-negative Data. <i>IEEE Trans. on Pattern Analysis and Machine Intelligence</i> , submitted.  P Smaragdis, MVS Shashanka. A Framework for Secure Speech Recognition. <i>IEEE Trans. on Audio, Speech and Language Processing</i> , to appear.  E Ardizzoni, AA Bertossi, MC Pinotti, S Ramaprasad, R Rizzi, MVS Shashanka. Optimal Skewed Data Allocation on Multiple Channels with Flat Broadcast per Channel. <i>IEEE Trans. on Computers</i> , Vol. 54, No. 5, May 2005.  MVS Shashanka, A Pati, AM Shende. A Characterisation of Optimal Channel Assignments for Wireless Networks Modelled as Cellular and Square Grids. <i>Mobile Networks and Applications</i> , Vol. 10, Issue 1-2, Feb-Apr 2005.
Conferences	MVS Shashanka, B Raj, P Smaragdis. Sparse Overcomplete Decomposition for Single Channel Speaker Separation. <i>IEEE ICASSP</i> , Honolulu, Hawaii, Apr 2007.  P Smaragdis, MVS Shashanka. A Framework for Secure Speech Recognition. <i>IEEE ICASSP</i> , Honolulu, Hawaii, Apr 2007.

B Raj, R Singh, MVS Shashanka, P Smaragdis. Bandwidth Expansion with a Polya Urn Model. *IEEE ICASSP*, Honolulu, Hawaii, Apr 2007.

B Raj, P Smaragdis, MVS Shashanka, R Singh. Separating a Foreground Singer from Background Music. *Intl Symposium on Frontiers of Research on Speech and Music*, Mysore, India, Jan 2007.

P Smaragdis, B Raj, MVS Shashanka. A Probabilistic Latent Variable Model for Acoustic Modeling. *NIPS Workshop on Advances in Models for Acoustic Processing*, Dec 2006.

MVS Shashanka, P Smaragdis. Secure Sound Classification: Gaussian Mixture Models. *IEEE ICASSP*, Toulouse, France, May 2006. (**Finalist for the Best Student Paper Award**).

B Raj, MVS Shashanka, P Smaragdis. Latent Dirichlet Decomposition for Single Channel Speaker Separation. *IEEE ICASSP*, France, May 2006.

AA Bertossi, MC Pinotti, S Ramaprasad, R Rizzi, MVS Shashanka. Optimal Multi-Channel Data Allocation with Flat Broadcast per Channel. *Proceedings of IPDPS*, Santa Fe, USA, Apr 2004.

MVS Shashanka, A Pati, AM Shende. A Characterisation of Optimal Channel Assignments for Wireless Networks Modelled as Cellular and Square Grids. *Proceedings of IPDPS*, Nice, France, Apr 2003.

A Dubhashi, MVS Shashanka, A Pati, S Ramaprasad, AM Shende. Channel Assignment for Wireless Networks Modelled as d-Dimensional Square Grids. *Proc. of Intl. Workshop on distributed Computing*, India, Dec 2002.

#### Abstracts

BG Shinn-Cunningham, S Bressler, MVS Shashanka. Separating and Understanding a Talker from a Mixture in Reverberant Spaces. *152nd Meeting of the Acoust. Soc. of America*, Honolulu, Hawaii, Dec 2006.

MVS Shashanka, BG Shinn-Cunningham, S Nasser. The Role of Fundamental Frequency in Segregating and Understanding a Talker Competing with Another Talker in a Reverberant Setting. *29th Midwinter Meeting of the ARO*, Baltimore, Feb 2006.

#### Poster

MVS Shashanka, BG Shinn-Cunningham, M Cooke. Effects of Reverberant Energy on Statistics of Speech. *Workshop on Speech Separation and Comprehension in Complex Acoustic Environments*, Montreal, Nov 2004.

#### PATENTS

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P Smaragdis, MVS Shashanka. System and Method for Recognizing Speech Securely. *USA Patent Application filed*.

MVS Shashanka, P Smaragdis. Secure Classification of Data with Gaussian Distributions. *USA Patent Application filed*.

## TEACHING EXPERIENCE

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Spring 2005      **Teaching Assistant for CN550**      **Boston University**  
Computational Models of Recognition, Memory and Attention

## RESEARCH EXPERIENCE

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2006 - Present      **Mitsubishi Electric Research Labs**      **Cambridge, MA, USA**  
Research Intern. Working on probabilistic models and algorithms for separating sources from single-channel audio recordings.

2004 - Present      **Boston University**      **Boston, MA, USA**  
Research Assistant in the *Auditory Neuroscience Lab*. Designed and conducted experiments to understand human auditory processing in natural environments.

Summer 2005      **Mitsubishi Electric Research Labs**      **Cambridge, MA, USA**  
Research Intern. Developed algorithms for secure classification between parties such that private data is not exchanged; worked on sound separation algorithms.

Spring 2003      **University of Trento**      **Trento, Italy**  
Research Fellow in the *Dept. of Informatics and Telecommunication*. Developed efficient algorithms for optimally allocating data over multiple channels for broadcast such that average client waiting time is minimized.

Summer 2002      **Indian Institute of Science (IISc)**      **Bangalore, India**  
Summer Research Fellow (program administered by Dept. of Science and Technology, Govt. of India) in the *Dept. of Electrical Engineering*. Worked on applying learning automata to the problem of channel assignment in wireless networks.

Summer 2001      **Bhabha Atomic Research Centre (BARC)**      **Mumbai, India**  
Summer Intern in the *Ultrasonics Instrumentation Section, Electronics Division*. Developed a software module using Visual Basic for better visualization of scan data for an ultrasonic imaging system.

## ENTREPRENEURIAL EXPERIENCE

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Fall 2005      Completed technology and venture assessments for the Boston University startup Biomimetic Systems (<http://www.biomimetic-systems.com>).

## SKILL SET

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Programming      MATLAB, C, Java

OS      Windows, UNIX, GNU/Linux

Publishing      MS Office, T<sub>E</sub>X, L<sup>A</sup>T<sub>E</sub>X, HTML/CSS

## SCHOLARSHIPS & AWARDS

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2003 - 2004	<b>Arts and Science Dean's Fellowship</b> , Boston University
Summer 2002	<b>Research Fellowship (top 3%)</b> , JN Center for Advanced Scientific Research and Govt. of India
1999 - 2002	<b>Merit Scholarship</b> , Birla Institute of Technology & Science (awarded to top ten students across majors in order of merit)
1997 - 2003	<b>National Talent Search Scholarship</b> , Govt. of India
1999	<b>National Top 1%</b> of 17846 candidates, National Standard Exam in Physics. <b>Rank 7</b> in Pre University Examinations, State of Karnataka.
1997	<b>Rank 1</b> in the state of Karnataka, National Talent Search Exam. <b>Rank 16</b> in Secondary School Examinations, State of Karnataka. <b>Rank 6</b> in Regional Mathematical Olympiad, State of Karnataka.
1996	<b>Rank 13</b> in Regional Mathematical Olympiad, State of Karnataka. <b>Rank 12</b> XXVII Inter-State Talent Tests in Mathematics.

## TALKS / PRESENTATIONS

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- Probabilistic Models for Single Channel Audio Processing.  
Boston University Hearing Research Seminar, Boston, MA, 19 Jan 2007.
- Probabilistic Models for Acoustic Processing.  
Mitsubishi Electric Research Labs, Cambridge, MA, 21 Nov 2006.

## GRADUATE COURSES

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Hearing	Neural and Computational Models of Speech and Hearing Perception Neural Coding & Perception of Sound ( <i>Harvard/MIT Speech &amp; Hearing Program</i> ) Psychoacoustics
CNS	Computational Neuroscience (Introductory and Advanced) Neural and Computational Models of Recognition, Memory and Attention Neural and Computational Models of Vision Neural and Computational Models of Adaptive Movement & Planning
Engineering	Information Theory and Coding Signals and Systems Technology Commercialization Estimation Theory

## MEMBERSHIPS

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Institute of Electrical and Electronics Engineers (IEEE)

## MISCELLANEOUS

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Languages	English, Kannada (fluent reading, writing, speaking), Hindi (functional)
Citizenship	India
Visa Status	Student Visa (F1)
References	Available on request