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Professional Interests: *HUMAN COMMUNICATION AND INFORMATION PROCESSING*

APPLICATIONS OF SIGNAL PROCESSING, ACOUSTICS, STATISTICAL SYSTEMS MODELING, INSTRUMENTATION

- Speech production modeling, Articulatory-Acoustics, Speech/Audio Synthesis
- Speech and Language Processing, Automatic Speech Recognition, Audio, Music processing
- Human-Machine and Mediated Interactions; Spoken dialog and Multimodal Systems; Emotions
- Biomedical Signal Processing and Modeling: Imaging & Instrumentation

Education:

- June 1995 **Ph.D.** in *Electrical Engineering*, University of California, Los Angeles (UCLA).
Fields of Specialty: Signal Processing, Controls and Communication, Operations Research.
Thesis: “*Fricative consonants: An articulatory, acoustic, and systems study*”
Committee: A. Alwan (Chair), A. V. Balakrishnan, P. Ladefoged, M. M. Sondhi, A. Wilson
- June 1992 **Engineer degree** in *Electrical Engineering*, UCLA.
- December 1990 **Master of Science** in *Electrical Engineering*, UCLA.
Thesis: “*Nonlinear filtering and smoothing for noisy alternating renewal process signals*”
Committee: A. V. Balakrishnan, Richard Mortensen, Paul Wang
- June 1988 **Bachelor of Engineering** in *Electrical Engineering*
College of Engineering–Guindy, Anna University, Madras, India.

Professional Experience:

University of Southern California

- 07-present Andrew J. Viterbi Professor of Engineering
- 05-present Professor, Department of Electrical Engineering, Department of Computer Science (*Joint*),
Department of Linguistics & Program in Computational Linguistics (*Joint*)
Department of Psychology (*Joint*)
Member, Signal and Image Processing Institute
Research Area Director & Investigator, Integrated Media Systems Center (NSF-ERC)
Director, Speech Analysis and Interpretation Laboratory (SAIL)
- 03-05 Associate Professor, Department of Electrical Engineering (Computer Science, Linguistics: *Joint*)
- 00-03 Assistant Professor, Department of Electrical Engineering-Systems
- 95-00 **AT&T Labs-Research, Florham Park, NJ. (formerly, AT&T Bell Labs, Murray Hill)**
- 99-00 Principal Technical Staff Member
- 95-99 Senior Technical Staff Member
Speech and Image processing Research Laboratory.
Speech processing, Automatic speech recognition, Spoken dialog systems
Multimodal interfaces, Communication and information service applications
Experiments and modeling in speech acoustics.
- 9/92 - 5/95 **Research Assistant, Department of Electrical Engineering, UCLA.**
Speech Processing and Auditory Perception Laboratory.
Speech analysis, modeling, synthesis; Biomedical imaging and instrumentation.
- 6/93-10/93 **Member of Technical Staff, AT&T Bell Laboratories, Murray Hill, NJ. (intern)**
Speech analysis and articulatory synthesis research.
- 6/92-10/92 **Member of Technical Staff, AT&T Bell Laboratories, Murray Hill, NJ.(intern)**
Video coding; Motion compensation techniques.
- 9/89 - 10/91 **Research Assistant, Department of Electrical Engineering, UCLA.**
Filtering and control algorithms for energy systems modeling.

Awards and Honors:

2006	President, Phi Kappa Phi Academic Honor Society, USC Chapter
2006	IEEE Signal Processing Society Best Paper Award (for Narayanan & Potamianos, “Creating Conversational Interfaces for Children” published in IEEE Trans. Speech and Audio Processing)
2006	Co-author, best student paper (S. Sundaram), IEEE Multimedia Signal Processing Workshop 2006.
2006	Mellon Award for Excellence in Mentoring, USC
2005	Fellow of Acoustical Society of America (for “contributions to speech production and imaging”)
2005	Acoustical Society of America, “Hot topics” invited speaker (speech production)
2005	The Northrop Grumman High Visibility Research Award, USC Electrical Engineering
2005	Co-author, best student paper (S. Ananthakrishnan), ICASSP 2005.
2003	Faculty fellow, Phi Kappa Phi
2003	USC Engineering Junior Faculty Research Award
2003	Faculty Fellow, USC Provost Center for Interdisciplinary Research
2003	NSF CAREER award
2002	ISCA Best Student Paper, Second Place ICSLP 2002 (graduate student J. Shin & undergraduate student, A. Kazemzadeh).
2002	Senior Member, IEEE
2000,1997	AT&T Performance Award
1999,1996	AT&T True Achievement Award
1994	Vinnell Foundation Fellowship
1993	Anthony Fellowship;
1990-1991	DEED Scholarship, American Public Power Association

Professional Memberships:

- Fellow, Acoustical Society of America
- Senior Member, Institute of Electrical and Electronic Engineers – Signal Processing Society
- Member, International Speech Communication Association (ISCA); Linguistic Society of America
- Member, Tau Beta Pi, National Engineering Honor Society; Member, Eta Kappa Nu, National Electrical Engineering Honor Society; Phi Kappa Phi Academic Honor Society
- Member, Institute of Engineers, India

Recent/Ongoing Professional Services:

2007-present	Editor, Computer, Speech and Language Journal, Elsevier.
2007	General Co-Chair, IEEE Multimedia Signal Processing Workshop
2006-present	Associate Editor, IEEE Signal Processing Magazine
2004-present	Speech Processing Technical committee – IEEE Signal Processing Society (Policy subcommittee)
2005-present	Multimedia Signal Processing Technical committee – IEEE Signal Processing Society
2001-present	Technical committee - Speech Communication, Acoustical Society of America
2002-present	ASA Committee on Standards Ex-officio member
2000-2004	Associate Editor, IEEE Transactions on Speech and Audio Processing
2005	Technical program committee, IEEE ASRU 2005
2008	Co-chair, Registration, ICASSP 2008/Las Vegas (upcoming)
2004	Publicity Chair, NAACL/Human Language Technology Conference (HLT)
2004	Sensory Information Processing Area Co-Chair, Intl Conf. Multimodal Interfaces (ICMI)
2003	Technical Program Chair, IEEE Automatic Speech Recognition and Understanding, Virgin Islands
2003	Workshop Technical Program Committees: SigDIAL; Multimodal User Authentication
2003	Education and Member subcommittee, IEEE Signal Processing Society Speech committee
2002	Technical Program Co-Chair, IEEE Speech Synthesis Workshop
2002	Tutorials Chair, International Conf. Spoken Language Processing
2002	Area Chair, Multilingual Processing, International Conf. Spoken Language Processing
2002	Special Session Chair, “Features and Models for Speech”, Acoust. Soc. of Am. Meeting
2002	Editorial Board, IEEE Trans. on Speech and Audio Processing, Spontaneous Speech Special Issue
2002	Co-Chair, Human-Machine Interface Track, International Conf. on Multimedia
2001	Scientific Program Committee- IEEE ASRU Workshop, Trento Italy
2000	Special Session Chair, “Speech Processing for Mobile Devices”, Acoust. Soc. of Am. Meeting

Research Funding at USC (09/2000-present)

AGENCY	ROLE/PRINCIPAL INVESTIGATOR	TITLE	DATES
DARPA	PI	SpeechLinks: Speech Translation for Tactical Communication	2006-2009
DHS	Co-PI, Hovy, PI	Center for Knowledge and Information Discovery	2007-2012
Army	PI	Virtual Humans-Natural Language	2007-2009
Army	PI	Tactical Questioning	2006-2008
NSF CRI	Investigator; PI Mataric	Assistive Robotics	2007-2008
NSF MRI	Investigator; PI Schaal	Humanoid Robots	2006-2008
Annenberg Center	PI	Emotions in Speaking and Singing	2006-2007
Provost Undergraduate Fund	Co-PIs: Byrd, Narayanan	Speech Production Modeling	2006
Zumberge Interdisciplinary Award	Co-PI; PI Zimmermann	Tele-rehabilitation	2006-2007
NIH	Co-PI; Byrd, PI	Prosody and Articulatory Dynamics in Spoken Language	2006-2011
ONR	Co-PI; PI B. Mel	Bioinspired audiovisual processing	2006-2009
MURI – ONR U Wash, Stanford, USC	USC PI ;co PI, Byrd	Human-like speech processing	2005-2010
NIH R01	PI; co-investigators: Byrd, Leahy, Lee, Nayak	Dynamics of vocal tract shaping	2005-2009
AT&T	PI	Multilingual processing	2005-07
Dept. of Interior/DARPA	PI	User interface for speech translation	2005-07
School of Social Work	Co-PI; PI Trickett	Planning grant for infrastructure creation for child social service research	2005-06
NSF ITR Collaborative Research (UCLA-UCB-USC)	USC PI; project director A. Alwan, UCLA	“Automating Early Assessment of Academic Standards for Very Young Native and Non-Native Speakers of American English”	2003-2007
ARDA VACE	Co-Investigator; PI Nevatia	“Multimodal Speaker Identification”	2004-05
Sandia Labs	PI	“Multimodal systems”	2004-2005
LASER ACTD	PI	Training for Speech Translation	2004-2005
Army Science Conference	Investigator	Interactive Virtual Soldier System	2004
Freedom Forum	Investigator; ICTsubcontract	“Newseum: Be a Reporter”	2003-2004
Provost Undergraduate Research Fund	with E. Andersen	“Cross-Cultural Issues in Child-Machine Interactions	2003-2004
Provost Undergraduate Research Fund	with D. Byrd	“Toward Illuminating Fine Details in Human Speech Production: Investigations of Vocal Tract Movements”	2003-2004
Center for Interdisciplinary Research	Fellow	“Multimodal-Multilingual Communication Technologies”	2003-2004
Pratt & Whitney Institute for Collaborative Engineering	PI, co-PIs Helmy, Lee, Ortega, Zimmerman	“Wireless Mobile and Distributed Networking System for Efficient Aircraft Engine Inspection and Maintenance”	2003-2006
ONR/DARPA	co-PI; Lewis Johnson, PI	“Training Superiority: Rapid Development of Mission-Oriented Communication Skills”	2003-2005
NSF CAREER award	PI	“Modeling and Optimizing User-Centric Mixed-Initiative Spoken Dialogue Systems”	2003-2008
Provost Undergraduate Research Fund	co-PIs D. Byrd, E. Andersen	“Monolingual and Bilingual Spoken Language Interactions of Preschoolers”	2002-2003
NIH R01	co-PI; Byrd, PI	“Prosody and Articulatory Dynamics in Spoken Language”	2002-2007
NSF ITR	PI, co-PIs E. Chew, C. Kuo	“Content Based Query and Retrieval of Music Using Signal Processing and Knowledge-Based Methods”	2002-2005
DARPA Babylon/CAST Project	PI	“Multilingual Speech to Speech Translation Systems”	2002-2005
US Army/STRICOM	PI	“Robust Speech Recognition for Immersive Training”	2001-2004
US Army	joint PI with L. Johnson	“Expressive Speech Synthesis for Animated Characters in Training Applications”	2002-2004
Acorn Technologies	PI	“Robust Speech Processing”	2002
ALI Microelectronic Corp	PI	“Processing and Retrieval of Music”	2002

Lockheed Martin	PI	“Multimodal Speech Interfaces”	2001-2002
Lucent Technologies	PI	“Speech Interfaces for Mobile Devices”	2001
Zumberge Interdisciplinary Grant	co-PIs: Andersen, McLaughlin	“Investigations Into Preschool Children Interacting with Machines”	2002-2003
NSF-ERC Integrated Media Systems Center	Co-PI with several USC investigators		
Powell Foundation	PI	“Speech Analysis and Interpretation Lab Set-Up”	2000-2002
USC Arts Initiative	PI: M. Lazzari; co-PIs: Breisch, McLaughlin, Narayanan	Tactile experiences for Arts	2002-2003
Provost Undergraduate Research Fund	co-PIs: Andersen, Byrd	“Analysis of Child-Machine Spoken Dialogues”	2002

Hardware/Software Donations Received (09/2000-present)

- Intel, Sun Microsystems, IBM, AT&T, Speechworks

Invited Talks:

May 2007 Tsinghua-USC Workshop on Emerging Technologies, Beijing
Feb 2007 Microsoft Research Seminar, Redmond Washington
Dec 2006 Indian Institute of Science/IEEE Signal processing Society, Bangalore, India
Dec 2006 National University of Singapore-School of Computing, Singapore
Mar 2006 Indian National Academy of Sciences Seminar at IIT-Madras, India
Nov 2005 Samsung Electronics, Korea
Aug 2005 AT&T Shannon Labs, University Collaboration Seminar, Florham Park, NJ
July 2005 Cognitive Systems Workshop, Human Cognitive Models in System Design, Santa Fe, New Mexico
May 2005 Hot Topics in Speech Communication, Acoustical Society of America, Vancouver, BC
Mar 2005 Yonsei University EE Department Seminar, Seoul, Korea
Oct 2004 International Conference on Spoken Language Processing
Oct 2004 InHa University, Incheon, Korea
Apr 2004 DARPA Workshop on Speech to Speech Translation, San Diego, CA
Sept 2003 Technical University of Athens, Technical University of Crete, Greece
May 2003 Massachusetts Institute of Technology & Harvard, Cambridge, MA
Dec 2002 Cross EU-NSF ISLE Workshop, University of Edinburgh, Scotland
Mar 2002 UCLA-EE Department Communications-Signal Proc. Seminar, LA, CA
Oct 2001 California Institute of Technology-EE Department, Pasadena, CA
Sept 2001 UC-Santa Barbara, ECE Department, Santa Barbara, CA
Jun 2001 Panasonic Speech Technology Labs, Santa Barbara, CA
Nov 2000 Rockwell Science Center, Thousand Oaks, CA
Oct 2000 HRL Laboratories, Malibu, CA
Mar 2000 University of Southern California, CA
Nov 1999 Boston University, Boston, MA
Nov 1998 University of California, Los Angeles, CA
May 1997 Haskins Labs/Yale University, New Haven, CT
Oct 1996 Intl. Conf. Spoken Language Processing, Philadelphia, PA
Feb 1996 SPIE Conf. Medical Imaging, Newport Beach, CA
Oct 1995 Intl. Conf. on Signals, Systems and Electronics, Monterey, CA
Jun 1995 Haskins Labs, New Haven, CT
Nov 1994 University of Texas, Austin, TX

Review Services:

- NSF Panels on Human Language Technology, Universal Access
- Ad hoc Reviewer: National Institutes of Health; Israel Science Foundation; Irish Research Council for Science, Engineering and Technology
- IEEE Trans. on Speech and Audio Processing; IEEE Trans. on Automatic Control; Signal Processing Letters
- Journal of the Acoustical Society of America; Speech Communication Journal
- Journal of the International Phonetic Association ; Journal of Speech and Hearing Research
- Several conferences including ICASSP, ICSLP, IJCAI, ACC, ICME, HLT, Eurospeech and ASRU.

Key USC Services/Contributions

- Chair, USC University Research Committee, 2006-
- Member, USC University Research Committee, 2005-06
- Academic Promotions & Tenure Committee, USC Viterbi School of Engineering, 2004-2006
- Research Area Director (Applications Research), Integrated Media Systems Center (NSF-ERC), 2001-present
- Research Vision Leader – Communications Systems, Integrated Media Systems Center, 2002-present
- Research Leader, Pratt & Whitney Institute for Collaborative Engineering, USC, 2003-present
- Faculty Coordinator, Electrical Engineering Systems Teaching Assistants (2001-2004)
- Graduate Student Recruitment, Fellowship Committees (2001-present)
- Mentor: Undergraduate Research Program, Dean's Merit Research Program for freshmen engineers
- Freshmen interviews (Presidential Scholars/Trustee Scholars)
- Faculty, Interdisciplinary program in Computational Linguistics

Pre-USC Services

- AT&T Bell Labs Intern Mentor: Several graduate, undergraduate and highschool students mentored in speech and language projects (1995-2000)
- AT&T Labs PhD Recruiter (1997-99)
- AT&T United Way volunteer
- UCLA Graduate Students Association: EE Departmental representative
- UCLA Minority Engineering Program Facilitator

Industry Collaborations (2000-present)

- Lockheed International, HRL Labs, Speech works International, AT&T Research, Bell Labs-Lucent, IBM

Teaching Experience:

Fall'00,01,02,04,05	EE519: Digital Speech Processing (<i>Course Developed</i>) Graduate level introduction to speech signal processing. Applications to coding, recognition and synthesis
Spr'01	EE599: Graduate Seminar on advanced topics in speech processing
Spr'02,04,05,06	EE619: Speech recognition and Spoken Language Engineering (<i>Course Developed</i>) Emphasis on statistical approaches
9/90 - 6/94	Teaching Associate/Fellow , UCLA. Undergraduate engineering courses in Electrical and Electronic circuits, Signals and Systems, Feedback Control.

Mentoring

Postdoctoral Associates/Research Faculty:

- Matteo Gerosa, Postdoctoral Associate, Speech Recognition, (2006-2007)
- Panayiotis Georgiou, Research Assistant Professor, *Speech/Audio processing* (2002-present)
- Sungbok Lee, Research Assistant Professor, *Speech Production* (2001-present)
- Jon Nielsen, Postdoctoral Associate, *Imaging* (K. Nayak primary supervisor) (2005-2007)
- Scott Millward, Postdoctoral Associate, *User interfaces* (2004-05)

Served in over fifty PhD qualifying/dissertation committees in addition to the following students in my group:

PH.D STUDENTS (*research topic*)

- Shankaranarayanan Ananthakrishnan, "Prosody models for speech applications"
- Erik Bresch, "Dynamic models in speech production"
- Matt Black, "Robust Speech Recognition"
- Murtaza Bulut, "Data-driven approaches to expressive speech synthesis"
- Carlos Busso, "Multimodal person-specific processing"
- Selina Chu, "Style based multimedia indexing" (jointly with C. C. Jay Kuo)

- Prasanta Kumar Ghosh, “Novel Signal Representations for Speech”
- Kyu Jeong Han, “Speaker modeling methods”
- Ozlem Kalinli, “Robust speech processing”
- Ebrahim Kazemzadeh, “User modeling in conversational interactions”
- Samuel Kim, “Voice sources features: Emotions and Speaker Effects”
- Chu Ping Liu, “Cochlear Implant Speech Processing” (jointly with Qian-Jie Fu)
- Emily Mower, “Affective human robot interactions” (jointly with M. Mataric)
- Thomas Murray, “Syntax based Spoken Language Processing”
- Vivek Rangarajan, “Spontaneous speech processing”
- Viktor Rozgic, “Optimization methods in dialog modeling”
- Jongho Shin, “User modeling in human-machine conversations”
- Jorge Silva, “Information theoretic representations and models for classification”
- Shiva Sundaram, “Data-driven methods in speech and audio processing” (jointly with C. Kyriakakis)
- Joseph Tepperman, “Pronunciation modeling and assessment”
- Andreas Tsiartas, “Statistical Learning for Speech Translation”
- Erdem Unal, “Music Information Retrieval under uncertainty: Polyphonic Music”

PH.D STUDENTS GRADUATED

- Abhinav Sethy, “Unsupervised methods for Speech and language modeling” (Spring 2007), IBM Watson
- Chartchai Meesookho, “Collaborative Classification and Tracking of multiple targets” (with U. Mitra)
- Dagen Wang, “Embedded Speech Systems with applications to speech translation” (Spring 2006), IBM
- Serdar Yildirim, “Multimodal processing for child-machine interactions” (Spring 2006), Assistant Professor, Mustafa Kemal University, Turkey
- Soonil Kwon, “Unsupervised speaker indexing” (Spring 2005), Korea Institute of Science & Technology
- Chul Min Lee, “Automatic Emotion Recognition from Speech and Language Information” (Fall 2004), LG Electronics
- Naveen Srinivasamurthy, “Joint compression and classification with applications to distributed speech recognition” (jointly with A. Ortega) (2003 Fall), Qualcomm Inc.
- Hsuan-Huei Shih, “Statistical Recognition and Theme finder for Query by Humming Systems” (jointly with C.-C. Kuo) (2003 Spring), CEO/Founder, MavLabs, Taiwan

M.S. STUDENTS (*research topic*)

- Stephen Tobin, “Speech Production Analysis using realtime MRI” (2007)
- Farhad Farahani, “Multiresolution analysis of pitch for speaker recognition” (2005)
- Donal McErlean, “Graphical Models for Collaborative Processing in Sensor Networks” (2003)
- Alvertos Diamantopolous, “Multimodal speech interfaces” (2002)
- Jeff Haynes, “Optimization in sensor networks using genetic algorithms” (2002)

UNDERGRADUATE RESEARCH STUDENTS (*research topic*)

The students were funded through the undergraduate research program (NSF funded or funded by the USC Provost Research Fund), or the Dean’s Merit Research Program. Some of their work has contributed to conference publications.

- Jeannette Chang, “Detecting Certainty in Problem Solving: Multimodal Processing”, 2006-present
- Jeremy Chi-chun Lee, “Gesture information processing from motion capture”, 2006-2007
- Joshua Izumigawa, “Toward modeling multiperson interactions”, 2006-2007
- Celeste De Frietas, “Speech production modeling from real time MRI data”, 2006-2007
- Sharad Rao, “Audio modeling: Creating ontologies”, Summer 2005 (from UIUC)
- David Hunt and Nathan Go, “Creating a novel speech production database”, 2005
- Nirali Shah, “Analysis of MRI Speech production data”, (2003-04)
- Jason Adams and Daylen Riggs, “Speech production”, (2004-05)
- Sonia Khurana, Marni Landes, Lewis Lawyer, “Children’s Interactive Multimedia Project”, (2003-04).
- Sonia Khurana and Talip Ucar, “Acoustic Analysis of Children’s speech”, (2002-03).
- Joe Tepperman, “Spoken Name Recognition”, (2002-03).

- Marni Landes, “Human factors for child machine interactions”, (2002-03).
- Abe Kazemzadeh, “Analysis of user behavior in spoken dialogs”, (2000-02). *Honor’s Thesis: Towards biological models for Linguistics: Human-computer dialog analysis and protein folding*
- Sudha Arunachalam (Neuroscience) and Dylan Gould (Linguistics), “Politeness and frustration language in child-machine interactions (2000-01)
- Joshua Katz (Annenberg) and Sonia Khurana (EE), “Experimental design and tools for investigating preschoolers talking to machines” (2001-02)
- Dylan Gould (Linguistics) and Ryan Cunningham (EE), “Design and collection of data for expressive speech synthesis” (2001-02)
- Ahmet Certen (EE) and Unal Erdem (EE), “Signal Analysis and User modeling for Query by Humming Systems”, (2001-02)

VISITING RESEARCH STUDENTS

- Sergi Hernanz, Technical University of Catalunya, Barcelona, 2004, “Robust Speaker Recognition” (Diploma Thesis)
- Matteo Gerosa, IRST/University of Padova, 2005, “Modeling and recognizing children’s speech (Ph.D)
- David Suunderman, Siemens, Germany, 2005, “Signal transformation for synthesis” (Ph.D.)
- Michael Grimm, Karlsruhe University, 2005, “Emotions in speech” (Ph.D.)
- Andreu Fernandez, Technical University of Catalunya, Barcelona, 2006, “Error propagation and models for speech recognition” (Diploma Thesis)
- Arthur Pouzet, “Speech Imaging and Acoustic Modeling”