Matthew P. Black, Ph.D.

11820 Mayfield Ave., Apt. 215   *email*: mattpblack@gmail.com
Los Angeles, CA 90049   *cell*: (585) 314-5811

RESEARCH INTERESTS

Behavioral Signal Processing and Informatics, Human-Centered Engineering

Speech and Language Processing, Automatic Speech Assessment/Recognition, Paralinguistics, Emotion Recognition, Affective Computing, Multi–Person Interaction Modeling, Human–Computer Interaction, Prosody Modeling, Multimodal Signal Processing, Societally Significant Applications of Technology (Education, Family Studies, Health)

EDUCATION

University of Southern California, Signal & Image Processing Institute, Los Angeles, CA

Ph.D. in Electrical Engineering, Minor in Computer Science   *May 2012*
M.S. in Electrical Engineering, Emphasis in Signal Processing   *May 2007*

GPA: 3.95 / 4.00

Linear Algebra, Probability Theory, Random Processes, Information Theory, Statistics, Statistical Learning, Machine Learning, Mathematical Pattern Recognition, Digital Signal Processing, Wavelets, Adaptive Signal Processing, Digital Speech Processing, Automatic Speech Recognition, Natural Language Processing

Thesis: "Automatic quantification and prediction of human subjective judgments in behavioral signal processing"
Advisor: Shrikanth S. Narayanan, Professor of Electrical Engineering, Computer Science, Linguistics, Psychology
Committee: Prof. Shrikanth S. Narayanan (chair), Prof. Antonio Ortega (EE), Prof. Gayla Margolin (psychology)

The Pennsylvania State University, **Schreyer Honors College**, University Park, PA

B.S. in Electrical Engineering with Highest Distinction and with Honors   *May 2005*
Minors in Mathematics and Physics

GPA: 3.98 / 4.00

Advanced Calculus I-IV, Matrices, Differential Equations, Acoustics, Quantum Mechanics, Continuous and Discrete-Time Linear Systems, Digital Signal Processing, Communication Systems I-II, Linear Control Systems, Accounting, Psychology, Social Psychology, Jazz History, Technical Writing, Public Speaking

Thesis: "Development and characterization of a low-noise, high-impedance preamplifier"
Advisor: Jeffrey L. Schiano, Associate Professor of Electrical Engineering

EXPERIENCE

Research Scientist   *Dec. 2013 - present*

Information Sciences Institute, University of Southern California, Marina Del Rey, CA

Technical consultant for projects involving human-centered engineering and speech and language processing

Chief Executive Officer (CEO)   *Apr. 2013 - present*

Behavioral Informatix, Los Angeles, CA

Co-founder, owner, manager, and CEO of the Limited Liability Company, *Behavioral Informatix*
Mission statement: create core technologies that complete the "human loop" with behavioral speech/text data
Drafted business plan, mission statement, analytics requirements, and short- and long-term product strategy

Technical Consultant   *Aug. 2012 – Feb. 2013*

CallFire, Santa Monica, CA

Constructed preliminary designs for an emotion recognition system as additional data analytics for customers
Communicated the challenges and opportunities of speech signal processing in call center analytics

Technical Forensic Expert   *Oct. 2012 – Dec. 2012*

Sandra Ferrari Disner, Ph.D., Los Angeles, CA

Devised a procedure to automatically detect if and when an audio signal had been spliced or tampered with
Determined if speech samples were from the same speaker using long-term average spectrum and pitch

Actuarial Analyst, under Nicolas Boivin, FCAS   *Feb. 2012 - present*
Personal Lines Pricing Group, Farmers Insurance Group, Los Angeles, CA
    Managing team on the design, implementation, and delivery of an auto insurance price optimization tool
    Pitched potential price optimization schemes that incorporate retention, conversion, and elasticity modeling
    Improved existing auto pricing tool by combining the power of SAS with the user-friendliness of Excel
    Researched competitors' rate filings to make strategic changes to modeling and pricing catastrophes

Graduate Research Assistant, under Dr. Shrikanth S. Narayanan   *Sept. 2005 - Jan. 2012*
Signal Analysis and Interpretation Laboratory, University of Southern California, Los Angeles, CA
    Senior member of five interdisciplinary projects in behavioral signal processing and informatics
    Designed algorithms to classify high-level human behaviors from audio recordings of dyadic interactions
    Applied various predictive modeling techniques and supervised learning methods: generalized least squares
      linear regression, logistic regression, support vector machines, hidden Markov models (HMMs)
    Developed methodologies to automatically detect speaking errors in children's reading tasks
    Engineered a portable "smart-room" capture system with multiple audio, video, and physiological sensors
    Presented novel research at international conferences in USA, Australia, Japan, Belgium, Italy, and the UK

Teaching Assistant, under Dr. Shrikanth S. Narayanan   *Aug. 2007 - Dec. 2007*
Digital Speech Processing (EE 519), University of Southern California, Los Angeles, CA
    Devised applicable homework and examination problems for 60-student graduate-level course
    Tutored students in weekly office hours, offering insight on difficult course concepts
    Supervised advanced students on innovative human-computer interaction research

IBM Graduate-Level Research Intern, under Dr. Gerasimos Potamianos   *Summer, 2007*
IBM T.J. Watson Research Center, Human Language Technologies Department, Yorktown, NY
    Worked closely with leading professionals on cutting-edge acoustic event detection research
    Trained acoustic hidden Markov models using IBM's state-of-the-art speech processing software

Undergraduate Research Assistant, under Dr. Jeffrey L. Schiano   *Sept. 2003 - May 2005*
Quantum Control Lab, The Pennsylvania State University, University Park, PA
    Developed a procedure for modeling and measuring the internal noise of self-made preamplifiers
    Held weekly telephone conferences and PowerPoint presentations with DuPont research scientists

JOURNAL PUBLICATIONS

Daniel Bone, Ming Li, **Matthew P. Black,** and Shrikanth S. Narayanan. *Intoxicated speech detection: A fusion framework with speaker-normalized hierarchical functionals and GMM supervectors.* Computer Speech and Language, Special issue on Broadening the View on Speaker Analysis, vol. 28, no. 2, Mar. 2014.

Daniel Bone, Chi-Chun Lee, **Matthew P. Black**, Marian E. Williams, Sungbok Lee, Pat Levitt, and Shrikanth S. Narayanan. *The psychologist as an interlocutor in ASD assessment: Insights from a study of spontaneous prosody.* Journal of Speech, Language, and Hearing Research, accepted Oct. 2013.

Matthew P. Black, Athanasios Katsamanis, Brian R. Baucom, Chi-Chun Lee, Adam C. Lammert, Andrew Christensen, Panayiotis G. Georgiou, and Shrikanth S. Narayanan. *Toward automating a human behavioral coding system for married couples' interactions using speech acoustic features.* Speech Communication, vol. 55, no. 1, pp. 1-21, Jan. 2013.

Chi-Chun Lee, Athanasios Katsamanis, **Matthew P. Black**, Brian R. Baucom, Andrew Christensen, Panayiotis G. Georgiou, and Shrikanth S. Narayanan. *Computing vocal entrainment: A signal-derived PCA-based quantification scheme with application to affect analysis in married couple interactions.* Computer Speech and Language, In Press, accepted 2012.

Matthew P. Black, Abe Kazemzadeh, Joseph Tepperman, and Shrikanth S. Narayanan. *Automatically assessing the ABCs: Verification of children's spoken letter-names and letter-sounds.* ACM Transactions on Speech and Language Processing, Special Issue on Children's Speech for Child-machine Interaction Applications, vol. 7, no. 4, Aug. 2011.

Matthew P. Black, Joseph Tepperman, and Shrikanth S. Narayanan. *Automatic prediction of children's reading ability for high-level literacy assessment.* IEEE Transactions on Audio, Speech, and Language Processing, vol. 19, no. 4, pp. 1015-1028, May 2011.

Patti Price, Joseph Tepperman, Markus Iseli, Thao Duong, **Matthew P. Black**, Shizhen Wang, Christy Kim Boscardin, Margaret Heritage, P. David Pearson, Shrikanth S. Narayanan, and Abeer Alwan. *Assessment of emerging reading skills in young native speakers and language learners.* Speech Communication, Special issue on Spoken Language Technology for Education, vol. 51, no. 10, pp. 968-984, Oct. 2009.

CONFERENCE & WORKSHOP PUBLICATIONS

Daniel Bone, Chi-Chun Lee, Theodora Chaspari, **Matthew P. Black**, Marian E. Williams, Sungbok Lee, Pat Levitt, and Shrikanth S. Narayanan. *Acoustic-Prosodic, Turn-taking, and Language Cues in Child-Psychologist Interactions for Varying Social Demand.* In Proceedings of Interspeech, Lyon, France, Aug. 2013.

Daniel Bone, **Matthew P. Black**, Chi-Chun Lee, Marian E. Williams, Pat Levitt, Sungbok Lee, and Shrikanth S. Narayanan. *Spontaneous speech acoustic-prosodic features of children with autism and the interacting psychologist.* In Proceedings of Interspeech, Portland, OR, USA, Sept. 2012.

Matthew P. Black and Shrikanth S. Narayanan. *Improvements in predicting children's overall reading ability by modeling variability in evaluators' subjective judgments.* In Proceedings of ICASSP, Kyoto, Japan, Mar. 2012.

Panayiotis G. Georgiou, **Matthew P. Black**, and Shrikanth S. Narayanan. *Behavioral signal processing for understanding (distressed) dyadic interactions: Some recent developments.* In Proceedings of the International ACM Workshop on Social Signal Processing, Scottsdale, AZ, USA, Nov. 2011.

Panayiotis G. Georgiou, **Matthew P. Black**, Adam C. Lammert, Brian R. Baucom, and Shrikanth S. Narayanan. *"That's aggravating, very aggravating": Is it possible to classify behaviors in couple interactions using automatically derived lexical features?* In Proceedings of ACII, Memphis, TN, USA, Oct. 2011.

Athanasios Katsamanis, James Gibson, **Matthew P. Black**, and Shrikanth S. Narayanan. *Multiple instance learning for classification of human behavior observations.* In Proceedings of ACII, Memphis, TN, USA, Oct. 2011.

Chi-Chun Lee, Athanasios Katsamanis, **Matthew P. Black**, Brian R. Baucom, Panayiotis G. Georgiou, and Shrikanth S. Narayanan. *Affective state recognition in married couples' interactions using PCA-based vocal entrainment measures with multiple instance learning.* In Proceedings of ACII, Memphis, TN, USA, Oct. 2011.

Matthew P. Black, Panayiotis G. Georgiou, Athanasios Katsamanis, Brian R. Baucom, and Shrikanth S. Narayanan. *"You made me do it": Classification of blame in married couples' interactions by fusing automatically derived speech and language information.* In Proceedings of Interspeech, Florence, Italy, Aug. 2011.

Matthew P. Black, Daniel Bone, Marian E. Williams, Phillip Gorrindo, Pat Levitt, and Shrikanth S. Narayanan. *The USC CARE Corpus: Child-psychologist interactions of children with autism spectrum disorders.* In Proceedings of Interspeech, Florence, Italy, Aug. 2011.

Daniel Bone, **Matthew P. Black**, Ming Li, Angeliki Metallinou, Sungbok Lee, and Shrikanth S. Narayanan. *Intoxicated speech detection by fusion of speaker normalized hierarchical features and GMM supervectors.* In Proceedings of Interspeech, Florence, Italy, Aug. 2011.

James Gibson, Athanasios Katsamanis, **Matthew P. Black**, and Shrikanth S. Narayanan. *Automatic identification of salient acoustic instances in couples' behavioral interactions using Diverse Density Support Vector Machines.* In Proceedings of Interspeech, Florence, Italy, Aug. 2011.

Chi-Chun Lee, Athanasios Katsamanis, **Matthew P. Black**, Brian R. Baucom, Panayiotis G. Georgiou, and Shrikanth S. Narayanan. *An analysis of PCA-based vocal entrainment measures in married couples' affective spoken interactions.* In Proceedings of Interspeech, Florence, Italy, Aug. 2011.

Emily Mower, **Matthew P. Black**, Elisa Flores, Marian E. Williams, and Shrikanth S. Narayanan. *Rachel: Design of an emotionally targeted interactive agent for children with autism.* In Proceedings of the International Conference on Multimedia and Expo, Barcelona, Spain, July 2011.

Athanasios Katsamanis, **Matthew P. Black**, Panayiotis G. Georgiou, Louis Goldstein, and Shrikanth S. Narayanan. *SailAlign: Robust long speech-text alignment.* In Proceedings of the Workshop for New Tools and Methods for Very-Large-Scale Phonetics Research, Philadelphia, PA, USA, Jan. 2011.

Matthew P. Black, Athanasios Katsamanis, Chi-Chun Lee, Adam C. Lammert, Brian R. Baucom, Andrew Christensen, Panayiotis G. Georgiou, and Shrikanth S. Narayanan. *Automatic classification of married couples' behavior using audio features.* In Proceedings of Interspeech, Makuhari, Japan, Sept. 2010. *(Best Paper Award)*

Chi-Chun Lee, **Matthew P. Black**, Athanasios Katsamanis, Adam C. Lammert, Brian R. Baucom, Andrew Christensen, Panayiotis G. Georgiou, and Shrikanth S. Narayanan. *Quantification of prosodic entrainment in affective spontaneous spoken interactions of married couples.* In Proceedings of Interspeech, Makuhari, Japan, Sept. 2010.

Matthew P. Black, Jeannette Chang, Jonathan Chang, and Shrikanth S. Narayanan. *Comparison of child-human and child-computer interactions based on manual annotations.* In Proceedings of the Workshop on Child, Computer, and Interaction, Cambridge, MA, USA, Nov. 2009.

Matthew P. Black, Joseph Tepperman, Sungbok Lee, and Shrikanth S. Narayanan. *Predicting children's reading ability using evaluator-informed features.* In Proceedings of Interspeech, Brighton, UK, Sept. 2009.

Matthew P. Black, Joseph Tepperman, Abe Kazemzadeh, Sungbok Lee, and Shrikanth S. Narayanan. *Automatic pronunciation verification of English letter-names for early literacy assessment of preliterate children.* In Proceedings of ICASSP, Taipei, Taiwan, Apr. 2009.

Matthew P. Black, Jeannette Chang, and Shrikanth S. Narayanan. *An empirical analysis of user uncertainty in problem-solving child-machine interactions.* In Proceedings of Workshop on Child, Computer, and Interaction, Chania, Crete, Greece, Oct. 2008.

Matthew P. Black, Joseph Tepperman, Sungbok Lee, and Shrikanth S. Narayanan. *Estimation of children's reading ability by fusion of automatic pronunciation verification and fluency detection.* In Proceedings of Interspeech, Brisbane, Australia, Sept. 2008.

Matthew P. Black, Joseph Tepperman, Abe Kazemzadeh, Sungbok Lee, and Shrikanth S. Narayanan. *Pronunciation verification of English letter-sounds in preliterate children.* In Proceedings of Interspeech, Brisbane, Australia, Sept. 2008.

Gerasimos Potamianos, Jing Huang, Etienne Marcheret, Vit Libal, Rajesh Balchandran, Mark Epstein, Ladislav Seredi, Martin Labsky, Lubos Ures, **Matthew P. Black**, and Patrick Lucey. *Far-field multimodal speech processing and conversational interaction in smart spaces.* In Proceedings of Hands-Free Speech Communication and Microphone Arrays, Trento, Italy, May 2008.

Abeer Alwan, Yijian Bai, **Matthew P. Black**, Larry Casey, Matteo Gerosa, Margaret Heritage, Markus Iseli, Barbara Jones, Abe Kazemzadeh, Sungbok Lee, Shrikanth S. Narayanan, Patti Price, Joseph Tepperman, and Shizhen Wang. *A system for technology based assessment of language and literacy in young children: The role of multiple information sources.* In Proceedings of MMSP, Chania, Crete, Greece, Oct. 2007.

Matthew P. Black, Joseph Tepperman, Sungbok Lee, Patti Price, and Shrikanth S. Narayanan. *Automatic detection and classification of disfluent reading miscues in young children's speech for the purpose of assessment.* In Proceedings of Interspeech, Antwerp, Belgium, Aug. 2007.

Joseph Tepperman, **Matthew P. Black**, Sungbok Lee, Abe Kazemzadeh, Matteo Gerosa, Margaret Heritage, Abeer Alwan, and Shrikanth S. Narayanan. *A Bayesian Network classifier for word-level reading assessment.* In Proceedings of Interspeech, Antwerp, Belgium, Aug. 2007.

ABSTRACTS

Theodora Chaspari, Chi-Chun Lee, **Matthew P. Black**, and Shrikanth S. Narayanan. *Analyzing the physiological synchrony of children with autism and their parents with signal processing techniques.* In Proceedings of the International Meeting for Autism Research, Toronto, Ontario, Canada, May 2012.

Matthew P. Black, Daniel Bone, Theodora Chaspari, Andreas Tsiartas, Phillip Gorrindo, Marian E. Williams, Pat Levitt, and Shrikanth S. Narayanan. *Signal processing tools for the automatic analysis of child-psychologist interactions.* In Proceedings of the International Meeting for Autism Research, San Diego, CA, USA, May 2011.

Emily Mower, **Matthew P. Black**, Marian E. Williams, and Shrikanth S. Narayanan. *Rachel: A data collection paradigm for the quantitative assessment of children's speech patterns.* In Proceedings of the International Meeting for Autism Research, San Diego, CA, USA, May 2011.

Matthew P. Black, Elisa Flores, Emily Mower, Shrikanth S. Narayanan, and Marian E. Williams. *Comparison of child-human and child-computer interactions for children with ASD.* In Proceedings of the International Meeting for Autism Research, Philadelphia, PA, USA, May 2010.

Emily Mower, Elisa Flores, **Matthew P. Black**, Marian E. Williams, and Shrikanth S. Narayanan. *Rachel: An embodied conversational agent for eliciting and analyzing emotional interactions in children with autism.* In Proceedings of the International Meeting for Autism Research, Philadelphia, PA, USA, May 2010.

David Feil-Seifer, **Matthew P. Black**, Maja Mataric, and Shrikanth S. Narayanan. *Toward designing interactive technologies for supporting research in autism spectrum disorders.* In Proceedings of the International Meeting for Autism Research, Chicago, IL, USA, May 2009.

Shrikanth S. Narayanan, Abe Kazemzadeh, **Matthew P. Black**, Joseph Tepperman, Sungbok Lee, and Abeer Alwan. *Letter sound and letter name recognition for automated literacy assessment of young children.* The Journal of the Acoustical Society of America, vol. 123, no. 5, p. 3327, May 2008.

AWARDS & HONORS

Selected for Rising Talent Development Initiative Program, Farmers Insurance Group	*2013–2014*
Ming Hsieh Institute Ph.D. Scholar, Ming Hsieh Dept. of Electrical Eng., Univ. of Southern California	*2011–2012*
Alfred E. Mann Innovation in Engineering Doctoral Fellowship, University of Southern California	*2010–2012*
Best Student Paper Award, Ming Hsieh Dept. of Electrical Engineering, University of Southern California	*2010–2011*
Interspeech 2011 Speaker State Challenge Award – Intoxicated speech detection (with team led by D. Bone)	*2011*
Interspeech 2011 Travel Grant, International Speech Communication Association (ISCA)	*2011*
Interspeech 2010 Best Paper Award, International Speech Communication Association (ISCA)	*2010*
Simon Ramo Fellowship, Viterbi School of Engineering, University of Southern California	*2009–2010*
Dean's Fellowship, Viterbi School of Engineering, University of Southern California	*2005–2009*
Russell Scott General Scholarship, College of Engineering, Penn State University	*2004–2005*
The Evan Pugh Scholar Award, Penn State University	*2003–2004*
James M. Barnak Outstanding Electrical/Computer Engineering Award, Penn State University	*2003–2004*
Lockheed Martin Engineering Scholars Award, Penn State University	*2002–2003*
Honors Societies: Phi Kappa Phi, Tau Beta Pi, Eta Kappa Nu	

COMPUTER SKILLS

Operating Systems: GNU/Linux, UNIX, Windows, Mac OS X
Programming: Perl, MATLAB, VBA, SAS, SQL, LaTeX, proficient in: UNIX/Linux shell programming, C/C++
Tools: HTK (Hidden Markov Model Toolkit), SRILM (language modeling), Praat, openSMILE, SVM-light, LIBSVM, LIBLINEAR, Weka, SAS EG, SVN (Subversion), Microsoft Office: Excel, Access, Word, PowerPoint

ACTIVITIES & INTERESTS

Member of IEEE Signal Processing Society

Attained Scientific Integrity and Research Ethics Certificate, University of Southern California

Passed Actuarial Examinations: Probability, Financial Mathematics, Models for Financial Economics, Models for Life Contingencies, Construction/Evaluation of Actuarial Models, CAS Course on Professionalism, Risk Management and Insurance Operations, Insurance Accounting/Law/Regulation, Finance/Accounting for Insurance Professionals

Competitive tennis