

Emily Mower

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Education

Ph.D. Electrical Engineering, University of Southern California, December 2010

M.S. Electrical Engineering, University of Southern California, May 2007

B.S. Electrical Engineering, Tufts University, May 2004, *Summa Cum Laude*

Research Experience

Postdoctoral Research Associate 2011–present
University of Southern California Los Angeles, California
Researcher in the Signal Analysis and Interpretation Lab (SAIL) under the direction of Prof. Shrikanth Narayanan. Current research focuses on the development and evaluation of an Embodied Conversational Agent (ECA) for interactions with children with autism and on modeling inter-utterance temporal emotional dynamics.

Herbert Kunzel Engineering Scholar 2010–present
University of Southern California Los Angeles, California
Student in the Signal Analysis and Interpretation Lab (SAIL) under the direction of Prof. Shrikanth Narayanan and the Interaction lab under the direction of Prof. Maja Matarić. Current research focuses on quantification of emotion using multi-dimensional interpretable representations.

Intel Foundation Fellow 2008–2010
University of Southern California Los Angeles, California
Student in the Signal Analysis and Interpretation Lab (SAIL) under the direction of Prof. Shrikanth Narayanan and the Interaction lab under the direction of Prof. Maja Matarić. Research focused on creating generative models for classifying affective utterances using categorical labels.

Herbert Kunzel Engineering Scholar 2007–2008
University of Southern California Los Angeles, California
Student in the Signal Analysis and Interpretation Lab (SAIL) under the direction of Prof. Shrikanth Narayanan and the Interaction lab under the direction of Prof. Maja Matarić. Research focused on the human perception of robotic and simulated avatar emotional expressions.

NSF Graduate Fellow 2004–2007
University of Southern California Los Angeles, California
Student in the Signal Analysis and Interpretation Lab (SAIL) under the direction of Prof. Shrikanth Narayanan and the Interaction lab under the direction of Prof. Maja Matarić. Research focused on developing emotion tracking algorithms to determine the state of a user within the context of a human-robot interaction.

Research Assistant: CRA-W Internship Summer 2003
Tufts University Medford, MA
With Professor Lenore Cowen of Tufts University, analyzed adenocarcinoma microarray data to determine if the data could be clustered into groups representative of survival.

Research Assistant: Nerd Girls Fall 2003–Spring 2004
Tufts University Medford, MA
Designed a Solar Car’s control system and solar panel array. Participated in engineering outreach program designed to provide positive role models for young girls interested in science & engineering.

Research Assistant: Robotics Academy Fall 2003–Spring 2004
Tufts University Medford, MA
Developed a team of autonomous mobile and stationary robots capable of locating and localizing on a spot of light. Participated in an outreach program designed to introduce elementary school age children to engineering.

Research Assistant: Beta–Wrap Summer 2002
Tufts University Medford, MA
Worked with Professor Lenore Cowen’s research team and analyzed the validity of a set of beta helical proteins proposed by an opposing paper.

Teaching Experience

Teaching Assistant: Introduction to Probability and Statistics for Electrical Engineering Spring 2010
University of Southern California Los Angeles, CA
Ming Hseih Department of Electrical Engineering

Journal Publications

Emily Mower, Maja J Matarić and Shrikanth S. Narayanan, “A Framework for Automatic Human Emotion Classification Using Emotional Profiles.” *IEEE Transactions on Audio, Speech and Language Processing*. Accepted for publication, August 2010.

Emily Mower, Maja J Matarić and Shrikanth S. Narayanan, “Human perception of audio-visual synthetic character emotion expression in the presence of ambiguous and conflicting information.” *IEEE Transactions on Multimedia*, 11:5(843-855). August 2009.

Carlos Busso, Murtaza Bulut, Chi-Chun Lee, Abe Kazemzadeh, **Emily Mower**, Samuel Kim, Jeannette Chang, Sungbok Lee and Shrikanth S. Narayanan, “IEMOCAP: Interactive emotional dyadic motion capture database.” *Journal of Language Resources and Evaluation*, 42:4(335-359). December 2008.

Michael Grimm, Kristian Kroschel, **Emily Mower** and Shrikanth S. Narayanan, “Primitives-based evaluation and estimations of emotions in speech.” *Speech Communication*, 49:10-11(787-800). November 2007.

Conference Publications

Emily Mower, Matthew Black, Elisa Flores, Marian Williams, and Shrikanth S. Narayanan. “Rachel: Design of an Emotionally Targeted Interactive Agent for Children with Autism.” In Proceedings of *International Conference on Multimedia & Expo (ICME)*. Barcelona, Spain, July, 2011.

Emily Mower and Shrikanth S. Narayanan. “A Hierarchical Static-Dynamic Framework for Emotion Classification.” In Proceedings of *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. Prague, Czech Republic, May, 2011.

Emily Mower, Maja J Matarić and Shrikanth S. Narayanan, “Robust Representations for Out-of-Domain Emotions Using Emotion Profiles.” In Proceedings of *IEEE Workshop on Spoken Language Technology (SLT)*, Berkeley, CA, 2010.

Emily Mower, Kyu Jeong Han, Sungbok Lee and Shrikanth S. Narayanan. “A Cluster-Profile Representation of Emotion Using Agglomerative Hierarchical Clustering.” In Proceedings of *International Speech Communication Association (InterSpeech)*, Makuhari, Japan. September 2010.

Dongrui Wu, Thomas Parsons, **Emily Mower** and Shrikanth S. Narayanan. “Speech Emotion Estimation in 3D Space.” In Proceedings of *IEEE International Conference on Multimedia & Expo (ICME)*, Singapore, July 2010.

Emily Mower, Angeliki Metallinou, Chi-Chun Lee, Abe Kazemzadeh, Carlos Busso, Sungbok Lee, Shrikanth Narayanan. “Interpreting Ambiguous Emotional Expressions.” In Proceedings of *ACII Special Session: Recognition of Non-Prototypical Emotion from Speech- The Final Frontier?*. Amsterdam, The Netherlands, September 2009.

Emily Mower, Maja J Matarić, Shrikanth Narayanan. “Evaluating Evaluators: A Case Study in Understanding the Benefits and Pitfalls of Multi-Evaluator Modeling.” In Proceedings of *International Speech Communication Association (InterSpeech)*. Brighton, England, September 2009.

Chi-Chun Lee, **Emily Mower**, Carlos Busso, Sungbok Lee and Shrikanth S. Narayanan, Emotion recognition using a hierarchical binary decision tree approach, In Proceedings of *International Speech Communication Association (InterSpeech)*, Brighton, England, September. 2009. [Emotion Challenge Winner]

Emily Mower, Maja J Matarić, Shrikanth Narayanan. “Selection of Emotionally Salient Audio-Visual Features for Modeling Human Evaluations of Synthetic Character Emotion Displays.” In Proceedings of *IEEE International Symposium on Multimedia (ISM)*. Berkeley, California, December 2008.

Emily Mower, Sungbok Lee, Maja J Matarić, Shrikanth Narayanan. “Joint-processing of audio-visual signals in human perception of conflicting synthetic character emotions.” In Proceedings of *IEEE International Conference on Multimedia & Expo (ICME)*, Hannover, Germany, June 2008.

Emily Mower, Sungbok Lee, Maja J Matarić, Shrikanth Narayanan. “Human perception of synthetic character emotions in the presence of conflicting and congruent vocal and facial expressions.” In Proceedings of *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*. Las Vegas, Nevada, March-April 2008.

Emily K. Mower, David J. Feil-Seifer, Maja J Matarić, and Shrikanth Narayanan. “Investigating Implicit Cues for User State Estimation in Human-Robot Interaction Using Physiological Measurements.” In Proceedings of *IEEE International Workshop on Robot and Human Interactive Communication (RO-MAN)*, Jeju Island, South Korea, Aug 2007.

Michael Grimm, **Emily Mower**, Kristian Kroschel, and Shrikanth Narayanan. “Combining categorical and primitives-based emotion recognition.” In Proceedings of *European Signal Processing Conference (EUSIPCO)*, Florence, Italy, September 2006.

Wenting Zhou, Weichen Wu, Nathan Palmer, **Emily Mower**, Noah Daniels, Lenore Cowen, Anselm Blumer. "Microarray Data Analysis of Survival Times of Patients with Lung Adenocarcinomas Using ADC and K-Medians Clustering." In Proceedings of *Critical Assessment of Massive Data Analysis (CAMDA)*. Durham, North Carolina, November 2003.

Honors and Awards

Herbert Kunzel Engineering Fellowship (2010-2011)

Achievement Rewards For College Scientists (ARCS 2009)

Emotion Challenge, Classification Challenge Winner, International Speech Communication Association Conference (InterSpeech 2009)

Intel Foundation Fellowship (2008-2010)

Herbert Kunzel Engineering Fellowship (2007-2008)

NSF Graduate Student Fellowship (2004-2007)

Graduated summa cum laude, Dean's list all semesters

Received Undergraduate Thesis Honors (2004)

Tau Beta Pi (2004)

Undergraduate Computing Research Association Distributed Mentor Project, CRA DMP (Summer 2003)

Eta Kappa Nu- Electrical and Computer Engineering Honor Society (2003)

Service

Organization Committees

Co-organizer (with Frank Broz and Marek Michalowski) *It's All In the Timing: Representing and Reasoning About Time in Interactive Behavior* at the AAAI Spring Symposium, Stanford University, Palo Alto, CA (March 2010).

Co-organizer (with Alan Wagner, Rosemarijn Looije, Maxim Makatchev, and Marek Michalowski) *HRI Young Pioneers Workshop* at the IEEE International Conference on Human-Robot Interaction (HRI), La Jolla, CA (March 2009).

Paper Review Committees

ACM Transactions on Interactive Intelligent Systems

Artificial Intelligence Journal

Autonomous Robots

Human Robot Interaction (HRI)

IEEE International Conference on Human-Robot Interaction (HRI)

IEEE International Conference on Rehabilitation Robotics (ICORR)

IEEE International Conference on Robotics and Automation (ICRA)

IEEE Transactions on Affective Computing

Journal of Intelligent and Robotic Systems

Robotics, Science, and Systems (RSS)

Speech Communication

Engineering Outreach

Organized and presented at a USC Robotics Workshop for local 4th and 5th graders (October 10, 2008)

Presentation to Germantown, Philadelphia 7th Grade English Class (December 21, 2007)

Presentation to ENGR 499 Engineering Science and Systems: From Humans to Robots (November 5, 2007)

Camp Geog: Summer geography camp, SUNY Albany, Albany, NY (August 9, 2007)

TRiO Program: College, Career and Information Day, University of Southern California, Los Angeles, CA (March 24, 2007)

TRiO Program: Upward Bound Math/Science, University of Southern California, Los Angeles, CA (October 14, 2006)

Membership

Member, Institute of Electrical and Electronics Engineers (IEEE)

Student member, International Speech Communication Association (ICSA)