

# Emily Mower Provost

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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, *Summa Cum Laude*, May 2004

## Research Experience

**Associate Professor** 2018–present  
University of Michigan Ann Arbor, Michigan  
Associate Professor in the Computer Science and Engineering Department, University of Michigan.

**Assistant Professor** 2012–2018  
University of Michigan Ann Arbor, Michigan  
Assistant Professor in the Computer Science and Engineering Department, University of Michigan.

**Postdoctoral Research Associate** 2011  
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** 2010–2011  
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

**Introduction to Artificial Intelligence** Fall 2012, Fall 2013, Fall 2014, Fall 2016, Winter 2017, Winter 2018, Fall 2019, Fall 2020, Fall 2021  
University of Michigan Ann Arbor, MI  
Department of Computer Science and Engineering

**Applied Machine Learning for Affective Computing** Winter 2020, Winter 2021, Winter 2022  
University of Michigan Ann Arbor, MI  
Department of Computer Science and Engineering

**Intelligent Interactive Systems** Winter 2014, Winter 2015  
University of Michigan Ann Arbor, MI  
Department of Computer Science and Engineering

**Human-Centered Computing** Winter 2013  
University of Michigan Ann Arbor, MI  
Department of Computer Science and Engineering

**Applications of Machine Learning in Human Centered Computing** Winter 2012  
University of Michigan Ann Arbor, MI  
Department of Computer Science and Engineering

## Journal Publications

1. Zakaria Aldeneh and **Emily Mower Provost**. “You’re Not You When You’re Angry: Robust Emotion Features Emerge by Recognizing Speakers,” *IEEE Transactions on Affective Computing*, vol: To appear, 2021.
2. Brian Stasak, Julien Epps, Heather T. Schatten, Ivan W. Miller, **Emily Mower Provost**, and Michael F. Armey. “Read Speech Voice Quality and Disfluency in Individuals with Recent Suicidal Ideation or Suicide Attempt,” *Speech Communication*, vol: 132, 10-20, 2021.
3. Noelle E. Carlozzi, Nicholas R. Boileau, Angela Roberts, Praveen Dayalu, Dana L. Hanifan, Jennifer A. Miner, Daniel Claassen, and **Emily Mower Provost**. “Understanding speech and swallowing difficulties in individuals with Huntington disease: Validation of the HDQLIFE Speech Difficulties and Swallowing Difficulties Item Banks.” *Quality of Life Research* 30, no. 1 (2021): 251-265.
4. John Gideon, Melvin McInnis, **Emily Mower Provost**. “Improving Cross-Corpus Speech Emotion Recognition with Adversarial Discriminative Domain Generalization (ADDoG),” *IEEE Transactions on Affective Computing*, vol:12, issue:4, Oct.-Dec., 2019. [Note: selected as one of five papers for the Best of IEEE Transactions on Affective Computing 2021 Paper Collection]
5. Soheil Khorram, Melvin McInnis, **Emily Mower Provost**. “Jointly Aligning and Predicting Continuous Emotion Annotations,” *IEEE Transactions on Affective Computing*, vol: To appear, 2019.
6. McInnis MG, Assari S, Kamali M, Ryan K, Langenecker SA, Saunders EFH, Versha K, Evans S, O’Shea KS, **Mower Provost E**, Marshall D, Forger D, Deldin P, Zoellner S. ”Cohort Profile: the Heinz C. Prechter longitudinal study of bipolar disorder.” *International journal of epidemiology* 47, no. 1 (2018): 28-28n.
7. Deema Totah, Lauro Ojeda, Daniel D. Johnson, Deanna Gates, **Emily Mower Provost**, and Kira Barton. ”Low-back electromyography (EMG) data-driven load classification for dynamic lifting tasks.” *PloS one* 13, no. 2 (2018): e0192938.
8. Duc Le, Keli Licata, and **Emily Mower Provost**. “Automatic Quantitative Analysis of Spontaneous Aphasic Speech,” *Speech Communication*, vol: To appear, 2018.
9. Yelin Kim and **Emily Mower Provost**. “ISLA: Temporal Segmentation and Labeling for Audio-Visual Emotion Recognition,” *IEEE Transactions on Affective Computing*, vol: To appear, 2017.
10. Biqiao Zhang, **Emily Mower Provost**, and Georg Essl. “Cross-corpus Acoustic Emotion Recognition with Multi-task Learning: Seeking Common Ground while Preserving Differences,” *IEEE Transactions on Affective Computing*, vol: To appear, 2017.
11. Duc Le, Keli Licata, Carol Persad, and **Emily Mower Provost**. “Automatic Assessment of Speech Intelligibility for Individuals with Aphasia,” *IEEE Transactions on Audio, Speech, and Language Processing*, vol: 24, no: 11, Nov. 2016.
12. Carlos Busso, Srinivas Parthasarathy, Alec Burmania, Mohammed AbdelWahab, Najmeh Sadoughi, and **Emily Mower Provost**, ”MSP-IMPROV: An Acted Corpus of Dyadic Interactions to Study Emotion Perception,” *IEEE Transactions on Affective Computing*, vol: 8, no: 1, 67-80, 2016.
13. Yelin Kim and **Emily Mower Provost**. “Emotion Recognition During Speech Using Dynamics of Multiple Regions of the Face.” *ACM Transactions on Multimedia Computing, Communications and Applications (ACM TOMM)*, Special Issue on ACM Multimedia Best Papers, 12:1 (2015).
14. **Emily Mower Provost**, Yuan (June) Shangguan, Carlos Busso, “UMEME: University of Michigan Emotional McGurk Effect Dataset,” *IEEE Transactions of Affective Computing*, 10:1(395-409). (2015)

15. Chi-Chun Lee, **Emily Mower**, Carlos Busso, Sungbok Lee & Shrikanth S. Narayanan, “Emotion recognition using a hierarchical binary decision tree approach,” *Speech Communication*, 53:9-10(1162-1171). (2011)
16. **Emily Mower**, Maja J. Mataric & Shrikanth S. Narayanan, “A Framework for Automatic Human Emotion Classification Using Emotional Profiles,” *IEEE Transactions on Audio, Speech and Language Processing*, 19:5(1057-1070). (2011)
17. **Emily Mower**, Maja J Mataric & 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). (2009)
18. Carlos Busso, Murtaza Bulut, Chi-Chun Lee, Abe Kazemzadeh, **Emily Mower**, Samuel Kim, Jeanette Chang, Sungbok Lee & Shrikanth S. Narayanan, “IEMOCAP: Interactive emotional dyadic motion capture database.” *Journal of Language Resources and Evaluation*, 42:4(335-359). (2008)
19. Michael Grimm, Kristian Kroschel, **Emily Mower** & Shrikanth S. Narayanan, “Primitives-based evaluation and estimations of emotions in speech.” *Speech Communication*, 49:10-11(787-800). (2007)

## Book Chapters

1. Zhang, Biqiao, and **Emily Mower Provost**. “Automatic recognition of self-reported and perceived emotions.” *Multimodal Behavior Analysis in the Wild*. Academic Press, 2019. 443-470.

## Conference Publications

1. Amrit Romana, John Bandon, Matthew Perez, Stephanie Gutierrez, Richard Richter, Angela Roberts, **Emily Mower Provost**. “Enabling Off-the-Shelf Disfluency Detection and Categorization for Pathological Speech.” *Interspeech*. Incheon, Korea. September 2022.
2. Matthew Perez, Mimansa Jaiswal, Minxue Niu, Cristina Gorrostieta, Matthew Roddy, Kye Taylor, Reza Lotfian, John Kane, **Emily Mower Provost**. “Mind the Gap: On the Value of Silence Representations to Lexical-Based Speech Emotion Recognition.” *Interspeech*. Incheon, Korea. September 2022.
3. Alex Wilf and **Emily Mower Provost**. “Towards Noise Robust Speech Emotion Recognition Using Dynamic Layer Customization.” *Affective Computing and Intelligent Interaction (ACII)*. Tokyo, Japan. September 2021.
4. Amrit Romana, John Bandon, Matthew Perez, Stephanie Gutierrez, Richard Richter, Angela Roberts and **Emily Mower Provost**. “Automatically Detecting Errors and Disfluencies in Read Speech to Predict Cognitive Impairment in People with Parkinson’s Disease.” *Interspeech*. Brno, Czech Republic. August 2021.
5. Matthew Perez, Amrit Romana, Angela Roberts, Noelle Carozzi, Jennifer Ann Miner, Praveen Dayalu and **Emily Mower Provost**. “Articulatory Coordination for Speech Motor Tracking in Huntington Disease.” *Interspeech*. Brno, Czech Republic. August 2021.
6. Zakaria Aldeneh, Matthew Perez, **Emily Mower Provost**. “Learning Paralinguistic Features from Audiobooks through Style Voice Conversions.” *Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL)*. Mexico City, Mexico. June 2021.
7. Amrit Romana, John Bandon, Noelle Carozzi, Angela Roberts, **Emily Mower Provost**. “Classification of Manifest Huntington Disease using Vowel Distortion Measures.” *Interspeech*. Shanghai, China. October 2020.
8. Matthew Perez, Zakaria Aldeneh, **Emily Mower Provost**. “Aphasic Speech Recognition using a Mixture of Speech Intelligibility Experts.” *Interspeech*. Shanghai, China. October 2020.

9. Mimansa Jaiswal, Christian-Paul Bara, Yuanhang Luo, Mihai Burzo, Rada Mihalcea, and **Emily Mower Provost**, “MuSE: a Multimodal Dataset of Stressed Emotion.” *Language Resources and Evaluation Conference (LREC)*. Marseille, France. May 2020.
10. Mimansa Jaiswal and **Emily Mower Provost**, “Privacy Enhanced Multimodal Neural Representations for Emotion Recognition,” *AAAI*. New York, New York. February 2020.
11. Mimansa Jaiswal, Zakaria Aldeneh, **Emily Mower Provost**, “Using Adversarial Training to Investigate the Effect of Confounders on Multimodal Emotion Classification.” *International Conference on Multimodal Interaction (ICMI)*. Suzhou, Jiangsu, China. October 2019.
12. Katie Matton, Melvin G McInnis, **Emily Mower Provost**, “Into the Wild: Transitioning from Recognizing Mood in Clinical Interactions to Personal Conversations for Individuals with Bipolar Disorder.” *Interspeech*. Graz, Austria. September 2019.
13. Zakaria Aldeneh, Mimansa Jaiswal, Michael Picheny, Melvin McInnis, **Emily Mower Provost**. “Identifying Mood Episodes Using Dialogue Features from Clinical Interviews.” *Interspeech*. Graz, Austria. September 2019.
14. John Gideon, Heather T Schatten, Melvin G McInnis, **Emily Mower Provost**. “Emotion Recognition from Natural Phone Conversations in Individuals With and Without Recent Suicidal Ideation.” *Interspeech*. Graz, Austria. September 2019.
15. Mimansa Jaiswal, Zakaria Aldeneh, Cristian-Paul Bara, Yuanhang Luo, Mihai Burzo, Rada Mihalcea, **Emily Mower Provost**. “MuSE-ing on the impact of utterance ordering on crowdsourced emotion annotations.” *International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*. Brighton, England. May 2019.
16. Biqiao Zhang, Soheil Khorram, and **Emily Mower Provost**. “Exploiting Acoustic and Lexical Properties of Phonemes to Recognize Valence from Speech.” *International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*. Brighton, England. May 2019.
17. Soheil Khorram, Melvin McInnis, and **Emily Mower Provost**. “Trainable Time Warping: aligning time-series in the continuous-time domain.” *International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*. Brighton, England. May 2019.
18. Biqiao Zhang, Yuqing Kong, Georg Essl, **Emily Mower Provost**. “ $f$ -Similarity Preservation Loss for Soft Labels: A Demonstration on Cross-Corpus Speech Emotion Recognition.” *AAAI*. Hawaii. January 2019. [Note: oral presentation]
19. Soheil Khorram, Mimansa Jaiswal, John Gideon, Melvin McInnis, **Emily Mower Provost**. “The PRIORI Emotion Dataset: Linking Mood to Emotion Detected In-the-Wild.” *Interspeech*. Hyderabad, India. September 2018.
20. Matthew Perez, Wenyu Jin, Duc Le, Noelle Carlozzi, Praveen Dayalu, Angela Roberts, **Emily Mower Provost**. “Classification of Huntington’s Disease Using Acoustic and Lexical Features.” *Interspeech*. Hyderabad, India. September 2018.
21. Zakaria Aldeneh, Dimitrios Dimitriadis, **Emily Mower Provost**. “Improving End-of-Turn Detection in Spoken Dialogues by Detecting Speaker Intentions as a Secondary Task.” *International Conference on Acoustics and Speech Signal Processing*. Calgary, Canada, April 2018.
22. Biqiao Zhang, Georg Essl, and **Emily Mower Provost**. “Predicting the Distribution of Emotion Perception: Capturing Inter-Rater Variability.” *International Conference on Multimodal Interaction (ICMI)* Glasgow, Scotland, November 2017. [Note: full paper, oral presentation]
23. Zakaria Aldeneh, Soheil Khorram, Dimitrios Dimitriadis, **Emily Mower Provost**. “Pooling Acoustic and Lexical Features for the Prediction of Valence.” *International Conference on Multimodal Interaction (ICMI)*. Glasgow, Scotland, November 2017. [Note: short paper, oral presentation]
24. Duc Le, Zakariah Aldeneh, and **Emily Mower Provost**. “Discretized Continuous Speech Emotion Recognition with Multi-Task Deep Recurrent Neural Network.” *Interspeech*. Stockholm, Sweden, August 2017.

25. Duc Le, Keli Licata, and **Emily Mower Provost**. “Automatic Paraphasia Detection from Aphasic Speech: A Preliminary Study.” *Interspeech*. Stockholm, Sweden, August 2017.
26. John Gideon, Soheil Khorram, Zakariah Aldeneh, Dimitrios Dimitriadis, and **Emily Mower Provost**. “Progressive Neural Networks for Transfer Learning in Emotion Recognition.” *Interspeech*. Stockholm, Sweden, August 2017.
27. Soheil Khorram, Zakariah Aldeneh, Dimitrios Dimitriadis, Melvin McInnis, and **Emily Mower Provost**. “Capturing Long-term Temporal Dependencies with Convolutional Networks for Continuous Emotion.” *Interspeech*. Stockholm, Sweden, August 2017.
28. Zakariah Aldeneh and **Emily Mower Provost**. “Using Regional Saliency for Speech Emotion Recognition.” *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*. New Orleans, Louisiana, USA, March 2017.
29. Biqiao Zhang, Georg Essl, and **Emily Mower Provost**. “Automatic Recognition of Self-Reported and Perceived Emotion: Does Joint Modeling Help?” *International Conference on Multimodal Interaction (ICMI)*. Tokyo, Japan, November 2016. [**Note: Best paper honorable mention, oral presentation**]
30. Yelin Kim and Emily Mower Provost. “Emotion Spotting: Discovering Regions of Evidence in Audio-Visual Emotion Expressions?” *International Conference on Multimodal Interaction (ICMI)*. Tokyo, Japan, November 2016.
31. Soheil Khorram, John Gideon, Melvin McInnis, and **Emily Mower Provost**. “Recognition of Depression in Bipolar Disorder: Leveraging Cohort and Person-Specific Knowledge.” *Interspeech*. San Francisco, CA, September 2016.
32. Duc Le and **Emily Mower Provost**. “Improving Automatic Recognition of Aphasic Speech with AphasiaBank.” *Interspeech*. San Francisco, CA, September 2016.
33. Biqiao Zhang, **Emily Mower Provost**, Georg Essl. “Cross-Corpus Acoustic Emotion Recognition From Singing And Speaking: A Multi-Task Learning Approach.” *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. Shanghai, China, March 2016.
34. John Gideon, **Emily Mower Provost**, Melvin McInnis. “Mood State Prediction From Speech Of Varying Acoustic Quality For Individuals With Bipolar Disorder.” *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. Shanghai, China, March 2016.
35. Duc Le and **Emily Mower Provost**. “Data Selection for Acoustic Emotion Recognition: Analyzing and Comparing Utterance and Sub-Utterance Selection Strategies.” *Affective Computing and Intelligent Interaction (ACII)*. Xi’an, China, September 2015. [**Note: oral presentation**]
36. Biqiao Zhang, Georg Essl, and **Emily Mower Provost**. “Recognizing Emotion from Singing and Speaking Using Shared Models.” *Affective Computing and Intelligent Interaction (ACII)*. Xi’an, China, September 2015. [**Note: oral presentation**]
37. Yuan (June) Shangguan and **Emily Mower Provost**. “EmoShapelets: Capturing Local Dynamics of Audiovisual Affective Speech.” *Affective Computing and Intelligent Interaction (ACII)*. Xi’an, China, September 2015. [**Note: oral presentation**]
38. Yelin Kim and **Emily Mower Provost**. “Leveraging Inter-rater Agreement for Audio-Visual Emotion Recognition.” *Affective Computing and Intelligent Interaction (ACII)*. Xi’an, China, September 2015.
39. Yelin Kim, Jixu Chen, Ming-Ching Chang, Xin Wang, **Emily Mower Provost**, Siwei Lyu. “Modeling Transition Patterns Between Events for Temporal Human Action Segmentation and Classification.” *IEEE International Conference on Automatic Face and Gesture Recognition (FG)*. Ljubljana, Slovenia, May, 2015. [**Note: oral presentation**]
40. Biqiao Zhang, **Emily Mower Provost**, Robert Swedberg, Georg Essl. “Predicting Emotion Perception Across Domains: A Study of Singing and Speaking.” *AAAI*. Austin, TX, USA, January 2015.

41. Yelin Kim and **Emily Mower Provost**. “Say Cheese vs. Smile: Reducing Speech-Related Variability for Facial Emotion Recognition.” *Proceedings of the ACM International Conference on Multimedia*. Florida, USA, November, 2014. [Note: **winner, best student paper!**]
42. Duc Le and **Emily Mower Provost**. “Modeling Pronunciation, Rhythm, and Intonation for Automatic Assessment of Speech Quality in Aphasia Rehabilitation.” *Interspeech*. Singapore. September, 2014.
43. Duc Le, Keli Licata, Elizabeth Mercado, Carol Persad, **Emily Mower Provost**. “Automatic Analysis of Speech Quality for Aphasia Treatment.” *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. Florence, Italy. May 2014.
44. Zahi N Karam, **Emily Mower Provost**, Satinder Singh, Jennifer Montgomery, Christopher Archer, Gloria Harrington, Melvin Mcinnis. “Ecologically Valid Long-term Mood Monitoring of Individuals with Bipolar Disorder Using Speech.” *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. Florence, Italy. May 2014.
45. Duc Le and **Emily Mower Provost**. “Emotion Recognition From Spontaneous Speech Using Hidden Markov Models With Deep Belief Networks.” *Automatic Speech Recognition and Understanding (ASRU)*. Olomouc, Czech Republic. December, 2013.
46. Theodora Chaspari, **Emily Mower Provost**, and Shrikanth S. Narayanan. ”Analyzing the Structure of Parent-Moderated Narratives from Children with ASD Using an Entity-Based Approach.” *Interspeech*. Lyon, France. August, 2013.
47. **Emily Mower Provost** and Shrikanth Narayanan. “Using Emotional Noise to Uncloud Audio-Visual Emotion Perceptual Evaluation.” *International Conference on Multimedia and Expo (ICME)*. San Jose, CA. July, 2013. [Note: **oral presentation**]
48. Yelin Kim and **Emily Mower Provost**. “Emotion Classification via Utterance-Level Dynamics: A Pattern-Based Approach to Characterizing Affective Expressions.” *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. Vancouver, British Columbia, Canada. May, 2013.
49. Yelin Kim, Honglak Lee, and **Emily Mower Provost**. “Deep Learning for Robust Feature Generation in Audio-Visual Emotion Recognition.” *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. Vancouver, British Columbia, Canada. May, 2013.
50. **Emily Mower Provost**. “Identifying Salient Sub-Utterance Emotion Dynamics Using Flexible Units and Estimates of Affective Flow.” *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. Vancouver, British Columbia, Canada. May, 2013.
51. **Emily Mower Provost** and Shrikanth Narayanan, “Simplifying Emotion Classification Through Emotion Distillation”, *Asia-Pacific Signal and Information Processing Association (APSIPA)*, Los Angeles, CA, 2012.
52. Theodora Chaspari, **Emily Mower Provost**, Athanasios Katsamanis & Shrikanth Narayanan, “An Acoustic Analysis of Shared Enjoyment in ECA Interactions of Children with Autism,” *Proceedings of the International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Kyoto, Japan, 2012.
53. **Emily Mower**, Matthew Black, Elisa Flores, Marian Williams & Shrikanth S. Narayanan, “Design of an Emotionally Targeted Interactive Agent for Children with Autism,” *Proceedings of IEEE International Conference on Multimedia & Expo (ICME)*, Barcelona, Spain, pages 1-6, 2011.
54. **Emily Mower**, Chi-Chun Lee, James Gibson, Theodora Chaspari, Marian Williams, & Shrikanth Narayanan. “Analyzing the Nature of ECA Interactions in Children with Autism.” *International Speech Communication Association (Interspeech)*. Florence, Italy, August, 2011.
55. **Emily Mower**, Matthew Black, Elisa Flores, Marian Williams, & 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.

56. **Emily Mower** & 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.
57. **Emily Mower**, Maja J Matarić & 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.
58. **Emily Mower**, Kyu Jeong Han, Sungbok Lee & 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.
59. Dongrui Wu, Thomas Parsons, **Emily Mower** & Shrikanth S. Narayanan. "Speech Emotion Estimation in 3D Space." In Proceedings of *IEEE International Conference on Multimedia & Expo (ICME)*, Singapore, July 2010.
60. **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.
61. **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.
62. Chi-Chun Lee, **Emily Mower**, Carlos Busso, Sungbok Lee & 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]
63. **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.
64. **Emily Mower**, Sungbok Lee, Maja J Matarić, Shrikanth Narayanan. "Joint-processing of audiovisual signals in human perception of conflicting synthetic character emotions." In Proceedings of *IEEE International Conference on Multimedia & Expo (ICME)*, Hannover, Germany, June 2008.
65. **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.
66. **Emily K. Mower**, David J. Feil-Seifer, Maja J Matarić, & 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, August 2007.
67. Michael Grimm, **Emily Mower**, Kristian Kroschel, & Shrikanth Narayanan. "Combining categorical and primitives-based emotion recognition." In Proceedings of *European Signal Processing Conference (EUSIPCO)*, Florence, Italy, September 2006.
68. 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.



## Tutorials

1. “The Ambiguous and Uncertain World of Emotion Representation.” Vidhyasaharan Sethu, Julien Epps, Nicholas Cummins, Shrikanth Narayanan, **Emily Mower Provost**, Carlos Busso. Affective Computing and Intelligent Interaction (ACII) 2019.
2. “Speech-Centered Mobile Health Monitoring.” **Emily Mower Provost**. Speech Science and Technology (SST), December 2018.
3. “Computational Models for Audiovisual Emotion Perception.” **Emily Mower Provost** and Carlos Busso. Interspeech, Singapore, September 2014.

## Invited Talks

1. “From Speech to Emotion to Mood: Mental Health Modeling in Natural Environments.” Biostatistics and Data Science (BADs) Seminar, The University of Texas Health Science Center at Houston. April 26, 2022.
2. “Automatically Measuring Emotion from Speech: New Methods to Move from the Lab to the Real World.” Johns Hopkins University. December 6, 2021.
3. “Modeling Emotional Speech in the Real World.” Meta (FB) Speech Audio Summit. December 3, 2021.
4. **Keynote:** “Modeling Emotional Speech in the Real World.” 5th International Workshop on Multimodal Analyses enabling Artificial Agents in Human-Machine Interaction, Affective Computing and Intelligent Interaction (ACII). September 28, 2021
5. “Automatically Measuring Emotion from Speech: New Methods to Move from the Lab to the Real World.” Emory University. September 3, 2021.
6. **Keynote:** “Modeling Speech in the Real World: Detecting Mood Severity via Affective Computing.” ACL2021 Multimodal AI Workshop. June 6, 2021.
7. “Modeling Speech in the Real World: Detecting Mood Severity via Affective Computing.” Behavioral Research In Technology and Engineering (BRiTE) Center, University of Washington. May 19, 2021.
8. “Human-Centered Computing: Using Speech to Understand Behavior.” Society for Affective Science, Flash Talk. St. Louis, Missouri. April 16, 2021.
9. “Modeling Speech in the Real World: Detecting Mood Severity via Affective Computing.” Amazon. Seattle, WA. January 31, 2020.
10. “Modeling Speech in the Real World: Detecting Mood Severity via Affective Computing.” MISC Seminar. University of Michigan, Ann Arbor, MI. December 12, 2019.
11. “Human-Centered Computing: Using Speech to Understand Behavior.” ASAPP, New York, New York. October 18, 2019.
12. “Human-Centered Computing: Using Speech to Understand Behavior.” CHEPS Seminar. University of Michigan, Ann Arbor, MI. October 7, 2019.
13. “Human-Centered Computing: Using Speech to Understand Behavior.” CS Kickstart. University of Michigan, Ann Arbor, MI. August 25, 2019.
14. “Human-Centered Computing: Using Speech to Understand Behavior.” University of Texas, Dallas. June 18, 2019.
15. “Human-Centered Computing: Using Speech to Understand Behavior.” Language Technologies Institute (LTI) Colloquium, Carnegie Mellon University. February 22, 2019.
16. “Human-Centered Computing: Using Speech to Understand Behavior.” University of New South Wales (UNSW). January 2019.
17. **Keynote:** “Human-Centered Computing: Using Speech to Understand Behavior.” MIND Summer School, Dartmouth. August 2018.

18. "Human-Centered Computing: Using Speech to Understand Behavior." Cogito Presents: Behavioral Signal Processing and Machine Learning. March 2018.
19. "Human-Centered Computing: Using Speech to Understand Behavior." Invited flash talk, Ada Lovelace Opera: A Celebration of Women in Computing. November 16, 2017.
20. **Plenary:** "Human-Centered Computing: Using Speech to Understand Behavior." Frederick Jelinek Memorial Summer Workshop. August 4, 2017.
21. "Human Behavior Understanding and Engineering: A Partnership." Women in Data Science (WiDS) Seminar. February 3, 2017.
22. "Human-Centered Computing: Using Speech to Understand Behavior." Michigan Institute for Data Science (MIDAS) Seminar. January 27, 2017.
23. **Keynote:** "Human-Centered Computing: Using Speech to Understand Behavior." Emotion in the Wild Workshop, International Conference on Multimedia Interaction. November 12, 2016.
24. "Human-Centered Computing: Using Speech to Understand Behavior." Invited talk, Center for Autism Research (CAR), University of Pennsylvania. October 5, 2016.
25. "Affective Computing: Approaches to Understand Emotion and Mood." Invited flash talk, Society for Affective Science (SAS), Chicago, IL. March 18, 2016.
26. "Human-Centered Computing: Using Speech to Understand Behavior." Institute of Research in Cognitive Science Colloquium, University of Pennsylvania. February 19, 2016.
27. "Human-Centered Computing: Using Speech to Understand Behavior." Language Technologies Institute (LTI) Colloquium, Carnegie Mellon University. October 30, 2015.
28. "Human-Centered Computing: Using Speech to Understand Behavior." IBM, Yorktown, NY. November 17, 2014.
29. "Human-Centered Computing: Using Speech to Understand Behavior." Massachusetts Institute of Technology, Boston, MA. October 24, 2014.
30. "Human-Centered Computing: Using Speech to Understand Behavior." Massachusetts General Hospital, Boston, MA. October 23, 2014.
31. "Human-Centered Computing: Using Speech to Understand Behavior." SoarTech, Ann Arbor, MI. April 25, 2014.
32. "Human Behavior Understanding and Engineering: A Partnership." Women in Computing Lecture, Oakland University. February 19, 2014.
33. "Human Behavior Understanding and Engineering: A Partnership." CCN Seminar Series, Ann Arbor, MI. January 31, 2014.
34. "Emotions in Engineering: Uncovering Structure in Emotional Speech." University of Texas, Dallas. January 27, 2014.
35. "Emotions in Engineering: Uncovering Structure in Emotional Speech." SRI Sarnoff, Princeton NJ. December 12, 2013.
36. "Human Behavior Understanding and Engineering: A Partnership." IEEE Professor Seminar Series, Ann Arbor, MI. October 30, 2013.
37. **Keynote:** "Human Behavior Understanding and Engineering: A Partnership." 7th Annual Prechter Lecture, Ann Arbor, MI. October 28, 2013.
38. "The Computer-Human Interface and Mood Disorders." National Network Depression Center Conference, Ann Arbor, MI. October 8, 2013.
39. "Emotions in Engineering: Uncovering Structure in Emotional Speech." Microsoft Research, Redmond, WA. May 22, 2013.
40. "Using Emotional Noise to Uncloud Audio-Visual Emotion Perceptual Evaluation." University of Michigan Workshop on Data Mining. University of Michigan, Ann Arbor, MI. April 24, 2013.

41. "Emotions in Engineering: Uncovering Structure in Emotional Speech." Tufts University, Medford, MA. March 28, 2013.
42. "Human Behavior Understanding and Engineering: A Partnership." SIPI: 2000 and Beyond. Signal Processing Institute, University of Southern California. December 2, 2012.
43. "Emotions in Engineering: Methods for the Interpretation of Ambiguous Emotional Content." University of Wisconsin, Madison. October 17, 2012.
44. "Emotions in Engineering: Methods for the Interpretation of Ambiguous Emotional Content." Computer Science for High School (CS4HS), University of Michigan. August 21, 2012.
45. "Emotions in Engineering: Methods for the Interpretation of Ambiguous Emotional Content." Prechter Seminar, Center for Depression, University of Michigan. June 27, 2012.
46. "Emotions in Engineering: Methods for the Interpretation of Ambiguous Emotional Content." Northwestern University. May 14, 2012.
47. "Seeking Information in Emotion: Techniques and Challenges in the Modeling of Human Emotion Perception." Sensor Information Estimation and Exploitation (SIEEE) Workshop. University of Michigan. April 16, 2012.

## Sponsored Projects

1. "RI: Small: Advancing the Science of Generalizable and Personalizable Speech-Centered Self-Report Emotion Classifiers", (NSF; RI-2230172, E. Mower Provost (PI), 2022-2025)
2. "SaTC-EDU: Identifying Educational Conceptions and Challenges in Cybersecurity and AI The goal of this research is to create new coursework at the overlap of artificial intelligence and cybersecurity", (NSF; EAGER-2039445, E. Mower Provost (co-I), 2020-2022)
3. "Emotion Recognition on Smartphones: Towards 'In the Wild' Emotion Data Collections", (Cisco Systems, E. Mower Provost (PI), 2020-2021).
4. "RI: Small: Speech-Centered Robust and Generalizable Measurements of "In the Wild" Behavior for Mental Health Symptom Severity Tracking", (NSF; RI-2006618, E. Mower Provost (PI) 2020-2023).
5. "Precision Health Investigator Award", (University of Michigan, E. Mower Provost (PI) and M. McInnis (co-I), 2019).
6. "CAREER: Automatic Speech-Based Longitudinal Emotion and Mood Recognition for Mental Health Monitoring and Treatment", (NSF; CAREER-1651740, E. Mower Provost (PI) 2017-2022).
7. "Multimodal Sensing of Human Behavior", (Toyota Research Institute; E. Mower Provost (PI), R. Mihalcea (co-PI), M. Burzo (co-PI), 2017-2020).
8. "R01: Predicting Suicide: A Longitudinal Analysis of Speech Patterns in a High Risk Sample", (NIMH; H. Schatten (PI), E. Mower Provost (PI), Ivan Miller (PI), Michael Arney (co-PI), Melvin McInnis (co-PI), Gary Epstein-Lubow (co-PI), Richard Jones (co-PI), 2016-2021).
9. "Digital Advisor", (IBM, S. Singh (PI), E. Mower Provost and others (co-PIs), 2016-2018).
10. "Modeling Mood Affected Audio-Visual Emotion Perception: A Transformative Approach to Understanding Mood Disorders." (MICHR, E. Mower Provost (PI), 2014-2016).
11. "R34: Longitudinal Voice Patterns in Bipolar Disorder", (NIMH; M. McInnis (PI), E. Mower Provost (co-PI), M. Cafarella (co-PI), 2013-2016).
12. "RI: Small: Collaborative Research: Exploring Audiovisual Emotion Perception using Data-Driven Computational Modeling" (NSF; RI-1217183; E. Mower Provost (PI), C. Busso (co-PI, UT Dallas), 2012-2014).

## Honors and Awards

Best of IEEE Transactions on Affective Computing 2021 Paper Collection (2022)  
University of Michigan EECS Outstanding Achievement Award (2022)  
Toyota Faculty Scholar Award (2020-2023)  
Precision Health Investigator Award (2019)  
NSF CAREER Award (2017)  
IEEE Senior Member (2017)  
Oscar Stern Award for Depression Research (2015)  
Best Student Paper, ACM Multimedia (2014)  
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)

## Students Advised

### Ph.D. Students:

Matthew Perez, Estimated 2022.  
Mimansa Jaiswal, Estimated 2022.  
Amrit Romana, Estimated 2023.  
Minxue Niu, Estimated 2025.  
Barbara Korycki, Estimated 2025.  
James Tavernor, Estimated 2026.

### Graduated Ph.D. Students:

Zakariah Aldeneh (2020, Apple)  
John Gideon (2019, Toyota Research Institute)  
Biqiao Zhang (2018, Facebook)  
Duc Le, (2017, Facebook)  
Yelin Kim (2016, Amazon)

### Additional PhD Committees:

Patrick Wu, (UM, Political Science), 2021  
Jeeheh Oh, (UM, CSE), 2021  
Katie Skinner (UM, NAME), 2019

Scott Reed (UM, CSE), 2016

Rahul Jha (UM, CSE), 2015.

Catharine McGhan (UM, Aeronautical Engineering), 2014.

Amjad Abu Jbara (UM, CSE), 2013.

**External PhD Evaluator/PhD Jury:**

Rachid Riad, École normale supérieure Paris-Saclay (PhD Jury), 2022

Sina Alisamir, Université Grenoble Alpes (UGA), External Evaluator for Midterm Review, 2021

## Service

**University of Michigan**

*Computer Science and Engineering (CSE) Departmental Service*

Graduate Program, Chair, 2020-present

Graduate Program, Committee Member, 2015-2017, 2018-2020

Graduate Admissions, Committee Member, 2012-2015

*University of Michigan Service*

Precision Health, Racial Equity Task Force, 2020

ADVANCE Program, 2019-present

*Faculty Advisor*

Girls in Electrical Engineering and Computer Science (GEECS), Winter 2012 - 2018

**Elected Committees**

IEEE SPS SLTC (Spoken Language Technical Committee): Speech Production and Perception, Fall 2015 - December 2018

**Steering Committees**

ACM International Conference on Multimodal Interaction (ICMI), 2019 - present

**Organization Committees**

Affective Computing and Intelligent Interaction (ACII) 2021: Program Co-Chair

International Conference on Multimodal Interaction (ICMI) 2021: Workshop Co-Chair

International Conference on Multimodal Interaction (ICMI) 2020: Doctoral Consortium Co-Chair

Workshop for Young Female Researchers in Speech Science & Technology 2019, Co-organizer

International Conference on Multimodal Interaction (ICMI) 2018: Program Co-Chair

Workshop for Young Female Researchers in Speech Science & Technology 2018, Co-organizer

Affective Computing and Intelligent Interaction (ACII) 2017: Program Co-Chair

Face and Gesture 2017: Demo Co-Chair

International Conference on Multimodal Interaction (ICMI) 2016: Sponsorship Co-Chair

Interspeech 2016: Publicity Co-Chair

**Special Session and Workshop Committees**

Co-organizer *Young Female Researchers in Speech Workshop (YFRSW)* at Interspeech 2018, 2019.

Co-organizer *Women in Speech (WIS) Panel* at Interspeech 2018 (September 2018).

Co-organizer (with Nicholas Cummins, Julien Epps, Thomas Quatieri, Stefan Scherer) *Clinical and Neuroscience-Inspired Vocal Biomarkers of Neurological and Psychiatric Disorders* at Interspeech 2016 (September 2016).

Co-organizer (with Laurence Devillers, Bjørn Schuller, Peter Robinson, Joseph Mariani) *ETHICA<sup>2</sup> 2016: ETHics In Corpus collection, Annotation and Application* at Language Resources and Evaluation Conference (May 2016).

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).

### **Advisory Board**

NSF CCRI: ENS: Next Generation Tools for Spoken Language Science Technology, 2021-present

### **Associate Editor**

IEEE Transactions on Affective Computing, 2019-present

IEEE Open Journal of Signal Processing, 2019-present

Computer Speech and Language, 2017-2019

ACM Transactions on Multimedia, 2016-2018

### **Editorial Board**

Affective Science (Society for Affective Science, SAS)

### **Engineering Outreach**

EECS 110 Guest Lecture at University of Michigan, March 15, 2022

ENGR 151 Guest Lecture at University of Michigan, November 12, 2020

CS-Kickstart (talk) at University of Michigan, 2020

Girls Who Code (keynote) at University of Michigan, 2020

AI4All (talk) at University of Michigan, 2020

CS-Kickstart (keynote) at University of Michigan, 2019

Co-organizer *Young Female Researchers in Speech Workshop (YFRSW)* at Interspeech 2018 (September 2018).

Co-organizer *Women in Speech (WIS) Panel* at Interspeech 2018 (September 2018).

Girl up Michigan, Panelist (March 2018)

Girls in EECS (gEECS) Faculty Advisor (2012 – present)

Interview with Iridescent Learning, (December 2017)

Invited flash talk, Ada Lovelace Opera: A Celebration of Women in Computing (November 16, 2017)

Girls Encoded – Presentation to the parents of high school girls encouraging research in human-centered computing (November 8, 2014)

Tech Day Talk – Presentation to high school students encouraging research in human-centered computing (September 28, 2013)

Girls' Research Engineering and Technology (GREAT) Day Talk (April 13, 2013)

Tech Day Talk – Presentation to high school students encouraging research in human-centered computing (September 29, 2012)

Computer Science for High School (CS4HS), University of Michigan (August 21, 2012)

Participated in a career panel. Described careers in engineering to a group of high school girls as a part of the Iridescent Technovation Challenge. (March 31, 2011)

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)

### **Review Services**

National Science Foundation (2012, 2013, 2014, 2016, 2017)

National Institutes of Health (2018, 2019)

ACM Transactions on Interactive Intelligent Systems

Artificial Intelligence Journal

Autonomous Robots

Computer, Speech, and Language

Conference on Empirical Methods in Natural Language Processing and Natural Language Learning (EM-NLP)

Human Robot Interaction (HRI)

IEEE International Conference on Human-Robot Interaction (HRI)

IEEE International Conference on Multimedia and Expo (ICME)

IEEE International Conference on Rehabilitation Robotics (ICORR)

IEEE International Conference on Robotics and Automation (ICRA)

IEEE International Conference on Speech and Signal Processing (ICASSP)

IEEE Transactions on Affective Computing

Journal of Intelligent and Robotic Systems

Robotics, Science, and Systems (RSS)

Speech Communication

Ubicomp

### **Membership**

Senior Member, Institute of Electrical and Electronics Engineers (IEEE)

Member, International Speech Communication Association (ISCA)

Member, Association for Computing Machinery (ACM)