

M. Ehsan Hoque

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RESEARCH INTERESTS

Non-verbal behavior understanding, recognition and synthesis, applications of real time affect recognition, computer vision, speech processing and machine learning and multimodal data analysis.

EDUCATION

Massachusetts Institute of Technology, Massachusetts, USA September 2008 - Present
PhD Student of Media Arts and Science
Advisor: Rosalind Picard

University of Memphis, Tennessee, USA August 2005- May 2007
Masters in Electrical and Computer Engineering

Pennsylvania State University, Pennsylvania, USA August 2000- May 2004
Bachelor of Science in Computer Engineering

HIGHLIGHTED PROJECTS

- **MIT Mood Meter** (*Joint work with Javier Hernandez*):
 - Installation of 4 cameras at 4 busiest corners of MIT to understand and recognize how happy the entire MIT community is in day to day basis.
 - With this project, we were able to answer questions such as, “Do midterms lower the mood?”, “Does warmer weather lead to happiness?”, and “Are people from one department happier than others?”
 - My specific contribution involved development and implementation of the vision algorithms of the entire project.
 - Press: **MIT News** (<http://goo.gl/wCKnu>, <http://goo.gl/ctQeM>), **Popular Science** (<http://goo.gl/VBI98>) **PBS** (<http://goo.gl/h6ZpP>) **MSNBC** (<http://goo.gl/XRILD>), **Boston innovation** (<http://goo.gl/fTHqb>)
 - Project website: <http://moodmeter.media.mit.edu/>
- **Affect Sensing Billboard** (*Joint work with IBM Research*)
 - Development of a smart billboard prototype that can sense people and their moving patterns.
 - The system estimates the age and gender of its user and plays appropriate advertisements.
 - The system also keeps track of the engagement level of its user and provides option to the user to skip the ad using hand gestures if not engaged.
- **OTTO: The first autonomous Audio-Animatronics that can see, hear and make its own decisions** (*Joint work with Disney Imagineering*)
 - In 3 months, as a summer intern, I have designed, developed and tested vision algorithms, for a robot to be responsive and reactive to the expressions of its audience.
 - My effort has saved Disney \$50,000 which they were willing to spend to buy an off-the-shelf product to recognize expressions.
 - The show went live during my internship. A recorded version of the show: <http://tinyurl.com/disneyrobot>
- **Zaca: Can you make a cellphone taste like chili?** (*Project under MIT's [next billion network](#) effort*)
 - Zaca is a mobile-based platform that enables farmers 1) aggregate produce information and 2) query current historical market produce wholesale and market prices.
 - This technology was driven using widely available SMS technology to impose data transparency on the market, minimizing the possibilities for farmers to be exploited.
 - After the development of the technology, I traveled to Mexico to deploy the project.
 - Video of how the system works: <http://tinyurl.com/mit-mobile-tchnoogy>
 - Video of my experience of project deployment in Mexico. <http://tinyurl.com/mobile-deployment>

EXPERIENCE

INDUSTRIAL EXPERIENCE

IBM T. J. Watson Research Lab, Hawthorne, New York 05/10-09/10
Research Intern under Dr. Chandra Narayanaswami & Dr. Scott McFaddin

Walt Disney Imagineering R & D, Glendale, California 05/09-08/09
Summer Research Associate

Goldman, Sachs & Co., New York 05/06-08/06
Technology Analyst Intern

ACADEMIC EXPERIENCE

Media Laboratory, Massachusetts Institute of Technology
Research Assistant, Affective Computing Group 09-07-current

Institute for Intelligent Systems, Memphis, Tennessee
Research Assistant, Multiple Aspects of Discourse (MAD) and Computer Vision Lab 08/05-05/07

Pennsylvania State University, Pennsylvania 06/04-12/04
Research Assistant, Department of Electrical and Computer Engineering

AWARDS/LEADERSHIP

- Recipient of grants from **Festival of Arts, Science and Technology (FAST)** and **Council for the Arts at MIT (CAMIT)** for **MIT Mood Meter** to celebrate MIT's culture of creativity and invention on its 150th anniversary.
- Recipient of **IEEE Gold Humanitarian Fellowship** 2009 and **IEEE Micro grant** (10k).
- **Finalist of the ACM Student Research Competition (SRC)** at ASSETS08 Halifax, NC, Canada.
- **Vice President of Communications** of MIT Media Lab's initiative to recruit sponsors from India.
- **Best of Papers** at the 6th Intelligent Virtual Agents (IVA) Conference, California, 2006.
- **Best Poster Award** at the "18th Annual Student Research Forum" awarded by Sigma Xi Honor Society, April 2006.
- **Best Design Award** for Undergraduate Senior Design Project at Penn State Univ. awarded by IEEE, 2004.

SKILLS

- **Programming Languages:** C/C++/C#, Java, Matlab and other scripting languages.
- **Computer Vision toolkit:** openCV -computer vision toolkit by Intel Google tracker (formerly Neven Vision).
- **Machine Learning toolbox:** Weka, LibSVM, Matlab, Torch.
- **Visualization:** vtk (Visualization Toolkit), Processing, openFrameworks.
- **Waveform and Spectrum Acoustic Analysis:** Praat (with extensive scripting abilities), Xwaves, Sony Sound Forge, Adobe Sound booth, Audacity.
- **Eye tracking:** Experience working with **ASL head mounted; chin rest; and remote eye-tracker.**
- **Video Editing and Annotation:** Anvil, VirtualDub, AviSynth, Adobe Premier Pro, Pinnacle, Ulead.
- **Graphic design and photo editing:** Adobe Lightroom, Photoshop, Illustrator, ImageJ, Picasa.
- **Certified to conduct research involving human subjects,** by Institutional Review Board (IRB) for the Protection of Human Subjects in Research at Massachusetts Institute of Technology.

Journal Publications

1. **M. E. Hoque**, D. J. McDuff, R. W. Picard, Exploring Temporal Patterns towards Classifying Frustrated and Delighted Smiles, *IEEE Transactions on Affective Computing*. [under review]
2. **M. E. Hoque**, M. Goodwin, R. elKaliouby, R. W. Picard, Development of Computerized Games to Enhance Speech Intelligibility in Children on the Autism Spectrum, *ACM Transactions on Accessible Computing*. [under review]
3. J. C. Heigel, J. S. Andrawes, J. T. Roth, **M. E. Hoque**, R. M. Ford, Determining the Viability of Electrically Treating 6061 T6511 Aluminum for Use in Manufacturing Processes, *Transactions of the North American Manufacturing Research Institute of the Society of Manufacturing Engineers, NAMRI/SME*, May 2005.

Conference Publications

4. **M. E. Hoque**, L-P. Morency, R. W. Picard, Are you friendly or just polite? – Analysis of smiles in spontaneous face-to-face interactions, *Affective Computing and Intelligent Interaction (ACII)*, Memphis, TN, USA, October, 2011.
5. **M. E. Hoque**, R. W. Picard, Acted vs. natural frustration and delight: Many people smile in natural frustration, *9th IEEE International Conference on Automatic Face and Gesture Recognition (FG'11)*, Santa Barbara, CA, USA, March 2011.
6. **M. E. Hoque**, R. elKaliouby, R. W. Picard, When Human Coders (and Machines) Disagree on the Meaning of Facial Affect in Spontaneous Videos, *9th International Conference on Intelligent Virtual Agents (IVA)*, Amsterdam, Netherlands, September 2009.
7. **M. E. Hoque**, J. K. Lane, R. elKaliouby, M. Goodwin, R. W. Picard, Exploring Speech Therapy Games with Children on the Autism Spectrum, *In Proceedings of InterSpeech*, Brighton, UK, September, 2009.
8. M. M. Louwerse, P. Jeuniaux, B. Zhang, W. Jie, **M. E. Hoque**, The Interaction between Information and Intonation Structure: Prosodic Marking of Theme and Rheme, *The 30th meeting of Cognitive Science Society*, Washington, DC, July 2008.
9. **M. E. Hoque**, M. S. Sorower, M. Yeasin, M. M. Louwerse, What Speech Tells us about Discourse: The Role of Prosodic and Discourse Features in Dialogue Act Classification, *IEEE International Joint Conference on Neural Networks (IJCNN)*, Orlando, FL, August 2007.
10. M. M. Louwerse, N. Benesh, **M. E. Hoque**, P. Jeuniaux, G. Lewis, J. Wu, M. Zirnstein, Multimodal Communication in Face-to-Face Conversations, *The 29th meeting of Cognitive Science Society*, Nashville, TN, August 2007.
11. **M. E. Hoque**, M. Yeasin, M. M. Louwerse, Robust Recognition of Emotion from Speech, *6th International Conference on Intelligent Virtual Agents (IVA)*, Marina Del Rey, CA, August 2006. **[Nominated for Best Paper Award]**
12. M. Louwerse, P. Jeuniaux, **M. E. Hoque**, J. Wu, G. Lewis, Multimodal Communication in Computer-Mediated Map Task Scenarios, *The 28th Annual Conference of the Cognitive Science Society*, Vancouver, Canada, July 2006.
13. **M. E. Hoque**, D. J. Russomanno, M. Yeasin, 2D Captchas from 3D Models, *IEEE SoutheastCon*, Memphis, TN, April 2006.
14. **M. E. Hoque**, R. M. Ford, and J. T. Roth, Automated Image Analysis of Microstructure Changes in Metal Alloys, *IS&T/SPIE Symposium on Electronic Imaging 2005, Machine Vision Applications in Industrial Inspection XVIII*, San Jose, CA, January 2005.

Workshops/Abstracts/Posters/Demo

15. P. Robbel, **M. E. Hoque**, C. Breazeal, An Integrated Approach to Emotional Speech and Gesture Synthesis in Humanoid Robots, *Workshop on Affective Interaction in Natural Environments (AFFINE) in ICMi 2009*, Cambridge, MA 2009.

16. M. Madsen, R. elKaliouby, M. Eckhardt, **M. E. Hoque**, M. Goodwin, R. W. Picard, Lessons from Participatory Design with Adolescents on the Autism Spectrum, *Work-In-Progress in the Extended Abstract of CHI 2009*, Boston, MA, April 2009.
17. M. Eckhardt, M. Madsen, Y. Kashef, A. R. Nasser, **M. E. Hoque**, R. el Kaliouby, M. Goodwin, R. W. Picard, User-Centered Design of Technology for Just-In-Time, In-Situ Exploration of Facial Affect on the Autism Spectrum, *Extended Abstract of IMFAR*, Chicago, Illinois, USA, May 7-9, 2009.
18. **M. E. Hoque**, Analysis of Speech Properties of Neurotypicals and Individuals Diagnosed with Autism and Down Syndrome, *10th ACM conference on Computers and Accessibility (ASSETS)*, Halifax, Nova Scotia, October, 2008. **[Finalist of the Student Research Competition]**
19. **M. E. Hoque**, R. W. Picard, I See You (ICU): Towards Robust Recognition of Facial Expressions and Speech Prosody in Real Time, *International Conference on Computer Vision and Pattern Recognition (CVPR), DEMO*, San Francisco, CA, 2010.
20. **M. E. Hoque**, M. Yeasin, M. M. Louwerse, Robust Recognition of Emotion in e-Learning Environment, poster presented at *18th Annual Student Research Forum*, Memphis, TN April, 2006. **[Best Poster Award]**
21. P. Jeuniaux, M. Louwerse, J. Wu, **M. E. Hoque**, Embodied Conversational Agents: Multimodal Communication and Embodiment, *The Garachico workshop, Symbols, Embodiment and Meaning : A Debate*. December 15-19, Tenerife, Spain, 2005.

MS Thesis

M. E. Hoque, What Speech Tells us about Discourse: The Role of Prosodic and Discourse Features in Dialogue Act Classification, *MS Thesis*, May 2007. (PDF: 552 KB)