

December 12, 2009

**Notes for next time:**

Emotion and video games?

Bushman: Desensitizing Effects of Violent Media on Helping Others (ba09.pdf)

**University of Southern California**

**Affective Computing CSCI534**

**Spring 2009** (Prior syllabus found [here](#))

Objective:

**Affective Computing** is computing that relates to, arises from, or deliberately influences emotions. This course will overview the theory of human emotion (how it arises from and influences cognition, the body and the social environment), techniques for recognizing and synthesizing emotional behavior, and illustrate how these can be applied to application design. The graduate Computer Science and Computer Engineering major will gain a strong background in the theory and practice in human-centered computing as it relates to games, immersive environments and pedagogical applications.

I Instructors: Stacy Marsella and Jonathan Gratch

Class Number/Units: 3

Date/Time: Thursday 2-4:50, KAP 158

Grades: Grades determined by class participation 10%, in-class quizzes 30%, mid-term project presentation 10%, homework 10%, final project presentation 15%, final project writeup 25%

Note: **Prior projects can be found [here](#)**

Software: Students will gain knowledge and/or hands-on experience with the following software tools related to affective computing:

- Emotion Recognition Techniques
  - Face (Watson, CERT, OKAO, other tools)
  - Speech (Shri, sentiment analysis)
  - Physiological signals
  - Gesture recognition
- Emotion Synthesis Techniques
  - Facial expressions (Smartbody)
  - Gestures (NVBG)
  - Gaze/Posture

- Machine Learning (Gesture toolkit)

## Course Outline (Tentative)

Classes end may 1

- Jan 15      **Introduction and Course Overview** ([Slides](#))
- Overview structure of the course
  - Discuss what emotion is and why it is of interest to computation.
  - Overview applications that utilize emotion in their models of intelligence or user interfaces.
- READING: (Gratch & Marsella, 2005) ([PDF](#))
- Jan 22      **Psychological perspectives on human emotion** ([Slides](#))
- Present psychological theories of how emotions arise from an appraisal of the relationship between external events and internal beliefs, desires and intentions.
  - Discuss value of computationally modeling these processes
  - Discuss computational models influenced by this view
- READING:      (Gratch, Marsella, & Petta, 2009) ([PDF](#))  
                    (Marsella & Gratch, 2009) ([PDF](#))  
                    [Definition of emotional terms](#)
- Jan 29      **Psychological perspectives on human emotion II** ([Slides](#))
- No additional reading
  - Homework due in class: In the last lecture we presented a [result by Clore](#) on how happy/sad music could induce biases in perception of time to climb a building. Please describe how these findings relate to the appraisal model discussed in class - i.e., can a strict appraisal model explain how music might impact the perceptions of an unrelated task? (1 paragraph).
- Feb 5      **Neuroscience perspectives on human emotion** ([Slides](#))
- Present neuroscience theories of how emotions arise from brain and physiological processes
  - Discuss computational models influenced by this view.
- READINGS: (Bechara & Damasio, 2005) ([PDF](#))  
Related Readings: (Bechara, Damasio, AntonioDamasio, & Lee, 1999; LeDoux, 1996; Panskepp, 1998)
- Feb 12      **Emotion as social signal** (encoding vs. decoding) ([Slides](#))
- Discuss how emotional behaviors are social signals that influence behavior of others

- Discuss how emotions arise from the perception of emotion's in others and interactive processes such as social contagion, empathy, rapport.
- Overview applications that exploit these social cues for teaching and persuasion

READINGS: TBD

Related readings (Coats, Feldman, & Philippot, 1999; Gifford, 1994; van Kleef, De Dreu, & Manstead, 2004)

Feb 19

### **How do we elicit emotion?**

- Discuss how we can predictably elicit emotion from people for the purpose of entertainment or study (Guest lecture, Ning Wang)
- Play with “emotion-eliciting” games in class
- Project proposals presentations, comments

Feb 26

### **How is emotion displayed? ([Slides-Lee](#)) ([Slides-Lance](#))**

Guest lecturers: Brent Lance and Jina Lee

- Discuss characteristics of emotional displays
- Discuss computational methods for animating emotional displays

READINGS:

Smartbody (Thiebaut, Marshall, Marsella, & Kallmann, 2008) ([PDF](#))

NVBG (Lee & Marsella, 2009) ([PDF](#))

Emotional Gaze (Lance & Marsella, 2008) ([PDF](#))

Mar 5

### **Emotion recognition ([Slides-Busso](#)) ([Slides-Gratch](#))**

- Using speech analysis. Guest lecture: Carlos Busso (USC Signal Analysis & Interpretation Lab)
- Applications of emotion recognition to building rapport

SUGGESTED READINGS:

(Gratch, Wang, Gerten, & Fast, 2007)

Chul Min Lee and Shrikanth Narayanan. Towards detecting emotions in spoken dialogs. IEEE Transactions on Speech and Audio Processing, 13(2):293–302, 2005.

<http://sail.usc.edu/publications/emotion-cml-journal.pdf>

Michael Grimm, Emily Mower, Kristian Kroschel, and Shrikanth Narayanan. Primitives based estimation and evaluation of emotions in speech. Speech Communication, 49:787–800, Nov 2007.

[http://sail.usc.edu/publications/spcom\\_grimm.pdf](http://sail.usc.edu/publications/spcom_grimm.pdf)

Carlos Busso, Sungbok Lee, and Shrikanth Narayanan. Using neutral speech models for emotional speech analysis. In Proceedings of InterSpeech ICSLP, Antwerp, Belgium, August 2007. URL:

[http://sail.usc.edu/publications/busso\\_icslp07.pdf](http://sail.usc.edu/publications/busso_icslp07.pdf)

- Mar 12      **Emotion recognition (continued)**
- Using machine vision. Guest lecture (Morency)
- Suggested Readings:
- (Vinciarelli, M.Pantic, Bourlard, & Pentland, 2008) ([PDF](#))
  - (Poppe, 2007) ([PDF](#))
  - (Pantic & Bartlett, 2007) ([PDF](#))
  - (Murphy-Chutorian & Trivedi, 2008) ([PDF](#))
  - (Hansen & Ji, 2009) ([PDF](#))
- March 16-21 (spring break).
- Mar 26      **TBD**
- April 2      **Tour of ICT. Presentation of demo systems** (stacy out)
- April 9      **Beyond human emotion (Emotions in art, theater, games)** (jon out)
- Emotions in game design: Tentative guest lecture (Tracy Fullerton)
- April 16     **Beyond human emotion (continued)** (jon out)
- Theatrical behavior: Guest lecture on artistic theatrical systems (Sharon Carnicke, Associate Dean, USC Theater School)
- April 23     **Final project presentations**
- April 30     **Final project presentations**

### **Bibliography**

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- Coats, E. J., Feldman, R. S., & Philippot, P. (1999). The influence of television on children's nonverbal behavior. In P. Philippot, R. S. Feldman & E. J. Coats (Eds.), *The social context of nonverbal behavior* (pp. 156-181). Paris: Cambridge University Press.

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- Hansen, D. W., & Ji, Q. (2009). In the Eye of the Beholder: A Survey of Models for Eyes and Gaze. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 99(1).
- Lance, B., & Marsella, S. (2008). *A Model of Gaze for the Purpose of Emotional Expression in Virtual Embodied Agents*. Paper presented at the 7th Int. Conf. on Autonomous Agents and Multiagent Systems.
- LeDoux, J. (1996). *The Emotional Brain: The Mysterious Underpinnings of Emotional Life*. New York, NY: Simon & Schuster.
- Lee, J., & Marsella, S. (2009). *Learning a Model of Speaker Head Nods using Gesture Corpora*. Paper presented at the 7th International Conference on Autonomous Agents and Multi-Agent Systems, Budapest, Hungary.
- Marsella, S., & Gratch, J. (2009). EMA: A Model of Emotional Dynamics. *Journal of Cognitive Systems Research*, 10(1), 70-90.
- Murphy-Chutorian, E., & Trivedi, M. M. (2008). Head Pose Estimation in Computer Vision: A Survey. *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*.
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- van Kleef, G. A., De Dreu, C. K. W., & Manstead, A. S. R. (2004). The interpersonal effects of anger and happiness in negotiations. *Journal of Personality and Social Psychology*, 86(1), 57-76.
- Vinciarelli, A., M. Pantic, Bourlard, H., & Pentland, A. (2008). *Social signal processing: state-of-the-art and future perspectives of an emerging domain*, . Paper presented at the 16th ACM international conference on Multimedia.