Affective Media and Wearables: Surprising Findings

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ABSTRACT

Over a decade ago, I suggested that computers will need the skills of emotional intelligence in order to interact with regular people in ways that they perceive as intelligent. Our lab embarked on this journey of "affective computing" with a focus on first enabling computers to better understand and communicate human emotion. Our main tools have been wearable sensors (several which we created), video, and audio, coupled with signal processing, machine learning and pattern analysis of multimodal human data. Along the way we encountered several surprises. This talk will highlight some of the challenges we have faced, some accomplishments, and the most surprising and rewarding findings. Our findings reveal the power of the human emotion system not only in intelligence, in social interaction, and in everyday media consumption, but also in autism, epilepsy, and sleep memory formation.

Author Keywords

Affective computing, wearable sensors, emotion, autonomic nervous system, measuring engagement, stress and frustration

ACM Classification Keywords

A.0 General: Biographies, I.5 Pattern Recognition, J.3 Life and Medical Sciences, Health

BIO

Professor Rosalind W. Picard, Sc.D., FIEEE, is founder and director of the Affective Computing Research Group at the Massachusetts Institute of Technology (MIT) Media Lab where she also leads the Media Lab's Technology for Health initiative. Picard has co-founded two businesses, Empatica, Inc. creating wearable sensors and analytics to improve health, and Affectiva, Inc. delivering technology to help measure and communicate emotion using video.

Picard holds a bachelor's degree in electrical engineering with highest honors from the Georgia Institute of Technology, and masters and doctorate degrees, both in electrical engineering and computer science, from MIT. She started her career as a member of the technical staff at AT&T Bell Laboratories, where she designed VLSI chips for digital signal processing and developed algorithms for image compression. In 1991 she joined the MIT Media Lab Faculty where she rose to the level of full professor. Picard became known internationally for her work designing novel analytical models for content-based retrieval of images and for work pioneering methods of automated search and annotation in digital video, including the Photobook system. In 1996 she wrote and published the book Affective Computing, which envisioned a new area of research and today is credited as starting a new field by that name. Today that field has its own journal, international conference, and professional society. Picard also served as a founding member of the IEEE Technical Committee on Wearable Information Systems in 1998, helping launch the field of wearable computing.

Picard has authored or co-authored over two hundred scientific articles and chapters spanning computer vision, pattern recognition, machine learning, human-computer interaction, wearable sensors and affective computing. She is a recipient of several best paper prizes, including work on machine learning with multiple models (with Minka, 1998), a best theory paper prize for affect in human learning (with Kort and Reilly, 2001) a best paper prize for work with facial expressions (with McDuff, Kaliouby and Demirdjian, 2013) and a best UBICOMP 2013 paper for an automated conversation coach (with Hoque et al, 2013). Her paper (with Healey, 2005) on how to measure driver stress won best paper of the decade 2000-2009 for IEEE Intelligent Transportation Systems.

Picard is an active inventor with patents including wearable and non-contact sensors, algorithms, and systems for sensing, recognizing, and responding respectfully to human affective information. Her inventions have been applied in autism, epilepsy, sleep, stress, autonomic nervous system disorders, human and machine learning, health behavior change, market research, customer service, and human-computer interaction. In 2005 she was named a Fellow of the IEEE for contributions to image and video analysis and affective computing. Picard has been honored with dozens of distinguished and named lectureships and other international awards, and has given over 100 keynote talks.

Prof. Picard has served on international and national science and engineering program committees, editorial boards, and review panels, including the Advisory Committee for the National Science Foundation's (NSF's) division of Computers in Science and Engineering (CISE), the Advisory Board for the Georgia Tech College of Computing, and the Editorial Board of User Modeling and User-Adapted Interaction: The Journal of Personalization Research. Picard has also served on non-profit boards, including a school for children with special needs, and a pro-life organization that helps educate and support women with crisis pregnancies.

Picard interacts regularly with industry and has consulted for many companies including Apple, AT&T, BT, HP, i.Robot, Merck, Motorola, and Samsung. Her group's achievements have been featured in forums for the general public such as The New York Times, The London Independent, National Public Radio, Scientific American Frontiers with Alan Alda, ABC's Nightline and World News Tonight, Time, Vogue, Wired, Voice of America Radio, New Scientist, and BBC programs such as "Hard Talk" and BBC Horizon with Michael Mosley. Picard lives in Newton, Massachusetts with her amazing husband and three energetic sons.

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