

# Javier Hernandez

USA Citizenship  
Spanish Citizenship

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## Research Statement

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My research interest is focused on developing tools with affective intelligence that can foster greater health and quality of life while furthering the understanding of human beings. My research leverages techniques from Signal Processing, Machine Learning, Computer Vision, Psychophysiology, Mobile Health, and Human Computer Interaction.

## Education

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### Massachusetts Institute of Technology, Cambridge, MA, USA

(09/2010 – 08/2015) Ph.D. in Media Arts and Sciences, GPA: 5/5  
Thesis: *"Towards Wearable Stress Measurement"*

### Carnegie Mellon University, Pittsburgh, PA, USA

(08/2008 – 05/2010) M.S. in Robotics, GPA: 3.95/4  
Thesis: *"Supervised Classification with Structured Instance Selection"*

### LaSalle, Ramon Llull University, Barcelona, Spain

(09/2004 – 06/2007) M.S. in Information Technology, GPA: 8.12/10  
Thesis: *"Learning Kernels for Support Vector Machine Classification"*

(09/2001 – 06/2004) B.S. in Computer Systems Engineering, GPA: 8.03/10  
Thesis: *"Web Application Development for Human Resources Management"*

## Work Experience

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### Microsoft, Cambridge, MA, USA

(06/2019 – Present) Researcher with Mary Czerwinski in the Human Understanding and Empathy group  
Bringing emotional intelligence to technology

### Global Vitals, Cambridge, MA, USA

(08/2016 – Present) Founder and CEO  
Democratizing tools for physiological sensing ([www.globalvitals.com](http://www.globalvitals.com))

### The Media Lab at Massachusetts Institute of Technology, Cambridge, MA, USA

(05/2019 – Present) Research Affiliate with Rosalind Picard in the Affective Computing group  
Collaborator in Emotion Navigation and Onsite Stress Measurement initiatives

(08/2015 – 05/2019) Research Scientist with Rosalind Picard in the Affective Computing group  
Founder and Principal Investigator of the following initiatives:

- Emotion Navigation ([enavigation.media.mit.edu](http://enavigation.media.mit.edu))
- Onsite Stress Measurement

(09/2010 – 08/2015) Research Assistant with Rosalind Picard in the Affective Computing group  
Work primarily focused on Affective Computing. Main projects involve:

- Automatic stress recognition in real-life settings
- Measuring the "mood" of large scale settings through smiles
- Development of tools for behavioral and contextual annotation

### **Microsoft Research, Redmond, WA, USA**

(06/2013 – 09/2013) Intern with Asta Roseway in the Visualization and Interaction group  
Measuring the stress of computer users

(06/2012 – 09/2012) Intern with Zicheng Liu in the Multimedia, Interaction, and Communication group  
Measuring the engagement of TV viewers

### **The Robotics Institute at Carnegie Mellon University, Pittsburgh, PA, USA**

(09/2008 – 05/2010) Collaborator in the research laboratories Human Sensing and Component Analysis

(10/2007 – 09/2009) Research Associate under Dr. Fernando De la Torre  
Work primarily focused on Computer Vision and Machine Learning  
Examples of projects are:

- Automatic facial expression recognition
- Audio analytics for gunshot detection

(09/2006 – 10/2007) Visiting Scholar under Dr. Fernando De la Torre  
Research and writing of the M.S. Information Technology thesis

### **Psychiatry and Epidemiology at University of Pittsburgh School of Medicine, Pittsburgh, PA**

(08/2007 – 05/2008) Research Assistant under Dr. Rebecca C. Thurston  
Automated measurement of physiological hot flashes in menopausal women

### **LaSalle, Ramon Llull University, Barcelona, Spain**

(09/2003 – 07/2004) Collaborator in the Research Group in Intelligent Systems  
Development and writing of the B.S. Computer Systems Engineering thesis

## **Languages**

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Native Spanish and Catalan  
Fluent reading, writing and speaking in English

## **Computer Skills**

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**Programming Languages:** MATLAB, JAVA, PHP, HTML, JavaScript, Python, C, C++  
**Tools:** Android SDK, Bash (Unix shell), Keras, TensorFlow, MySQL, Processing, L<sup>A</sup>T<sub>E</sub>X and Office  
**Operating Systems:** Windows and Linux

## **Honors & Awards**

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(2019) Honorable mention for the best paper award at *AutomotiveUI*  
(2019) Distinguished best paper award at *Ubicomp*  
(2019) Jury award winner of *NTT Data - Open Innovation Challenge*  
(2019) Business Insider *Best of CES 2019*  
(2017) Finalist in the ECUSA entrepreneurship competition  
(2016) Innovator under 35 by *MIT Technology Review (Spain)*  
(2016) Honorable mention award for the best paper at *MobileHCI*  
(2016) Honorable mention award for the best paper at *Computer and Human Interaction Conference*  
(2015) Finalist for the best student paper award at *Engineering in Medicine and Biology Society*  
(2015) Best poster award at *Body Sensor Networks*  
(2015) Finalist for the best paper award at *PervasiveHealth*  
(2014) Finalist in the *MIT 100K Pitch* competition  
(2014) Best student paper award at *MobiHealth*  
(2013) Semifinalist in the *MIT 100K Launch* competition  
(2013) Winner of the *Data Driven Hackathon* hosted by IDEO and Volkswagen  
(2012) Third position in the *Olympus Idea* competition  
(2012) One of the winners of the *Samsung Note Idea* competition

- (2011) *Council for the Arts at MIT (CAMIT)* award
- (2011) *Festival of Art, Science, and Technology (FAST)* award
- (2010) Invited to *Google GRAD CS Forum*
- (2009) Best poster award (Reading Faces with CRFs) at the CMU Machine Learning class
- (2009) *Caja España Scholarship* for graduate studies (renounced)
- (2009-2011) *Caja Madrid Scholarship* for graduate studies

## Teaching & Talks

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- (03/2019) Guest lecturer in the MIT class 6.835 – Bringing Emotional Intelligence to Technology
- (03/2019) Presentation at Apple – Emotion AI to Combat Real-life Stress
- (02/2019) Presentation at Facebook Reality Labs – Emotion AI to Combat Real-life Stress
- (02/2019) Presentation at Microsoft Research – Emotion AI to Combat Real-life Stress
- (02/2019) Presentation at Open Innovation Challenge by NTT Data – Global Vitals
- (02/2019) Invited speaker at Spaces in Space Workshop – Mental Health with Emotion AI
- (01/2019) Presentation at Lincoln Labs – Mental Health with Emotion AI
- (01/2019) Keynote speaker at Afectiva – CES: Emotion Navigation
- (11/2018) Speaker at AI in Health/Life Science Conference at MIT – Emotion AI and Future Health
- (10/2018) Guest lecturer in the MIT class MAS 630 – Stress Measurement and Intervention
- (10/2018) Keynote speaker at MIT J-WEL – Bringing Emotional Intelligence to the Workplace
- (10/2018) Presentation at IROS – Deep Learning for Engagement Measurement of Children with ASD
- (06/2018) Keynote speaker at NECINA – Bringing Emotional Intelligence to Technology
- (03/2018) Guest lecturer in the MIT class 6.835 – Bringing Emotional Intelligence to Technology
- (11/2017) Invited speaker by the Committee on Student Life at MIT on the topic of Stress
- (10/2017) Recitation in the MIT class MAS 630 – Physiological Measurement and Analysis
- (10/2017) Guest lecturer in the MIT class MAS 630 – Stress Measurement and Intervention
- (10/2017) Presentation at *ACII* – Stress Measurement from Tongue Color Imaging
- (03/2017) Guest lecturer in the MIT class 6.835 – Bringing Emotional Intelligence to Technology
- (11/2016) Presentation at *MIT Tech Review Under 35 (Spain)* – Using Technology to Combat Stress
- (09/2016) Presentation at *MobileHCI* – Wearable Experience Sampling
- (04/2016) Presentation at the Advancing Wellbeing Workshop – Traditional Chinese Medicine
- (12/2015) Invited speaker by the Boston Consulting Group – Affective Computing & Healthcare
- (11/2015) Invited speaker in the Affective Brain Lab at MIT
- (11/2015) Guest lecturer in the MIT class MAS 630 – Affective Computing & Stress
- (11/2015) Guest lecturer in the Tufts class – Affective Interfaces
- (09/2015) Keynote speaker at *DRT4All* – Bringing Emotional Intelligence to Computers
- (08/2015) Presentation at *EMBC* – Measuring Physiological Parameters with Smartphones
- (05/2015) Presentation at *PervasiveHealth* – Measuring Motion-based Physiology from the Wrist
- (11/2014) Demo at *Always Connected – The Promise of Wearable Technology* at the MIT Museum
- (11/2014) Presentation at *MobiHealth* – Measuring Physiological Parameters with Google Glass
- (09/2014) Presentation at *Ubicomp* – Measuring Social Engagement of Children
- (04/2014) Presentation at *CHI* – Under Pressure: Sensing Stress of Computing Users
- (04/2014) Invited speaker in *Google Glass Workshop* – Measuring Daily Emotions with Google Glass
- (04/2014) Co-guest lecturer in the MIT class MAS.962 – Automated Emotion Measurement
- (02/2014) Guest lecturer in the MIT class MAS.500 – Emotion Recognition
- (11/2013) Guest lecturer in the MIT class MAS 630 – Emotion Measurement in Real-life Settings
- (04/2013) Presentation in *UbiComp* – Mood Meter: Counting Smiles in the Wild
- (04/2013) Presentation in *UbiComp* – AMA, an application for behavioral annotation
- (04/2013) Invited speaker in *InspireYale* at Yale University
- (11/2013) Invited speaker in Daniel's Gilbert group at Harvard University
- (10/2012) Presentation in *Engineering & Autism Workshop* – Multimodal Behavioral Annotation
- (04/2012) Invited speaker at *TEDxNewHaven* – MIT Mood Meter
- (05/2012) Autonomic Nervous System Workshop at the Comp. Behavior Science summer school
- (11/2011) Demo at *TEDxCambridge* – MIT Mood Meter
- (11/2011) Invited speaker in the *Center for Biological & Computational Learning* group at MIT

- (05/2011) Presentation in *ACII – Call Center Stress Recognition with Person-Specific Models*  
(10/2010) Guest lecturer in the MIT class MAS 622J – Dimensionality Reduction  
(09/2010) Teaching Assistant of the MIT class MAS 622J – Pattern Recognition and Analysis

## Reviewing & Outside Activities

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- (2018) Judge of *MIT Tech Review Innovators under 35 – Europe*  
(2018) Reviewer of *Human Factors in Computing Systems*, and *Journal of Biomedical and Health Informatics*, and *Wearable and Ubiquitous Technologies*.  
(2017) Judge of *MIT Tech Review Innovators under 35 – Europe*  
(2017) Reviewer of *Human Factors in Computing Systems*, *Transactions on Biomedical Engineering, Face & Gesture, Emotion Review, and Interactive, Mobile, Wearable and Ubiquitous Technologies*, and *Journal of Sensors*.  
(2016) Program Committee Member of *MindCare*  
(2016) Reviewer of *Transactions on Biomedical Engineering, Translational Engineering in Health and Medicine, Emotion Review, Journal of Sensors and Human Factors in Computing Systems*  
(2015) Reviewer of *Ubiquitous Computing and Human Factors in Computing Systems*  
(2014) Reviewer of *Pervasive and Mobile Computing*  
(2014) Program Committee Member of the *Work-in-progress Human Factors in Computing Systems*  
(2014) Catalyst for *M+Vision IDEA<sup>2</sup> Madrid* program  
(2013) President of the MIT graduate dorm *The Warehouse*  
(2013) Reviewer of *Pervasive and Mobile Computing*  
(2012) Technology officer of the MIT graduate dorm *The Warehouse*  
(2012) Reviewer of *Affective Computing and Pervasive*  
(2011) Reviewer at *Medical & Biological Engineering & Computing*

## Patents & Provisionals

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- (04/2016) W. Chen, J. Hernandez, R. W. Picard, “**Methods and Apparatus for Non-Contact Physiological Measurements from Near-Infrared Video of the Neck**,” US62319629, MIT  
(01/2015) J. Hernandez, D. McDuff, R. W. Picard, “**Estimation of Physiological Parameters from Motion of a Mobile Computing Device**,” US20160007935, MIT  
(03/2014) J. Hernandez, Y. Li, J. Rehg, R. W. Picard, “**Methods and Apparatus for Physiological Parameter Estimation**,” US14661747, MIT and Georgia Institute of Technology  
(02/2014) J. Hernandez, A. Roseway, M. Czerwinski, P. Paredes, D. Choi, “**User Stress Detection and Mitigation**,” US20150297140, Microsoft  
(04/2013) J. Hernandez, Z. Liu, G. Hulten, M. Conrad, K. Krum, D. DeBarr, Z. Zhang, “**Estimating Engagement of Consumers of Presented Content**,” US20130232515, Microsoft  
(07/2012) J. Hernandez, E. Hoque, R. W. Picard, “**Methods and Apparatus for Smile Analytics**,” US61676968, MIT

## Publications

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- Kosmyna N., Morris C., Nguyen T., Zepf S., Hernandez J., and Maes P. “**AttentivU: Designing EEG and EOG Compatible Glasses for Physiological Sensing and Feedback in the Car**,” in *Proceedings of the International Conference on Automotive User Interfaces and Interactive Vehicular Applications*, 2019.
- S. Zepf, M. Dittrich, J. Hernandez, A. Schmitt. “**Towards Empathetic Car Interfaces: Emotional Triggers while Driving**,” in the *Late Breaking Work of Human Factors in Computing Systems*, 2019.
- J. Hernandez, D. McDuff, K. Quigley, P. Maes and R. W. Picard, “**Wearable Motion-based Heart-rate at Rest: A Workplace Evaluation**,” *Journal of Biomedical and Health Informatics*, 2018.
- W. Chen, J. Hernandez, and R. W. Picard, “**Estimating Carotid Pulse and Breathing Rate from Near-Infrared Video of the Neck**,” *Journal of Physiological Measurement*, 2018.

-  A. Dementyev, J. Hernandez, I. Choi, S. Follmer, I. Choi, and J. Paradiso “**Epidermal Robots: Wearable Sensors that Climb on the Skin,**” *ACM Journal on Interactive, Mobile, Wearable and Ubiquitous Technologies*, 2018.
- O. Rudovic, Y. Utsumi, J. Lee, J. Hernandez, E. Castello, B. Schuller, R. W. Picard. “**CultureNet: A Deep Learning Approach for Engagement Intensity Estimation from Face Images of Children with Autism.**” In *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2018.
- M. Exposito, J. Hernandez, R. W. Picard, “**Affective Keys: Towards Unobtrusive Stress Sensing of Smartphone Users.**” In *Proceedings of Mobile Human Computer Interaction*, 2018.
- J. Amores, J. Hernandez, A. Dementyev, X. Wang, P. Maes. “**A Wearable Olfactory Display that Monitors Cardio-respiratory Information to Support Mental Wellbeing.**” *Proceedings of the International Conference of IEEE Engineering in Medicine and Biology Society*, 2018.
- J. Hernandez, C. Ferguson, A. Sano, W. Chen, L. Weihui, A. Yeung, and R. W. Picard, “**Stress Measurement from Tongue Color Imaging,**” *International Conference on Affective Computing and Intelligent Interaction*, 2017.
- A. Dementyev, J. Hernandez, S. Follmer, I. Choi, and J. Paradiso “**SkinBot: A Wearable Skin Climbing Robot,**” Demo at the ACM User Interface Software and Technology Symposium, 2017.
- P. H. Hai-Chi, C. Smuts, Markus A. R. Kayser and J. Hernandez, “**Ant-Based Modeling: Agent-Based City Simulation with Ants,**” *Proceedings of CHI Conference Extended Abstracts on Human Factors in Computing Systems*, 2017, pp. 475-475.
-  J. Hernandez, D. McDuff, C. Infante, P. Maes, K. Quigley, and R. Picard, “**Wearable ESM: differences in the experience sampling method across wearable devices,**” in *Proceedings of the 18th International Conference on Human-Computer Interaction with Mobile Devices and Services*, 2016, pp. 195–205.
-  D. McDuff, J. Hernandez, S. Gontarek, and R. W. Picard, “**COGCAM: Contact-free Measurement of Cognitive Stress During Computer Tasks with a Digital Camera,**” in *Conference on Human Factors in Computing Systems*, 2016, pp. 4000–4004.
-  J. Hernandez, D. McDuff, and R. W. Picard, “**BioPhone: Physiology Monitoring from Peripheral Smartphone Motions,**” in *Engineering in Medicine and Biology Society*, 2015, pp. 7180–7183.
-  J. Hernandez, D. McDuff, and R. W. Picard, “**BioInsights: Extracting Personal Data from ‘Still’ Wearable Motion Sensors,**” in *Wearable and Implantable Body Sensor Networks*, 2015.
-  J. Hernandez, D. McDuff, and R. W. Picard, “**BioWatch: Estimation of Heart and Breathing Rates from Wrist Motions,**” in *Pervasive Computing Technologies for Healthcare*, 2015, pp. 169–176 & in *EAI Endorsed Transactions on Pervasive Health and Technology* 15(3): e1
- J. Hernandez, Y. Li, J. Rehg, and R. W. Picard, “**Cardiac and Respiratory Parameter Estimation Using Head-mounted Motion-sensitive Sensors,**” *EAI Endorsed Trans. Pervasive Heal. Technol. Spec. Issue Mob. Wirel. Technol. Healthc.*, vol. 15, no. 1, p. e2, 2015.
-  J. Hernandez, Y. Li, J. Rehg, and R. P. Picard, “**BioGlass: Physiological parameter estimation using a head-mounted wearable device,**” in *Wireless Mobile Communication and Healthcare*, 2014, pp. 55–58.
- J. Hernandez and R. W. Picard, “**SenseGlass: Using Google Glass to Sense Daily Emotions,**” in *ACM Symposium on User Interface Software and Technology*, 2014, pp. 77–78.
- J. Hernandez, I. Riobo, A. Rozga, G. D. Abowd, and R. W. Picard, “**Using electrodermal activity to recognize ease of engagement in children during social interactions,**” in *Ubiquitous Computing*, 2014, pp. 307–317.
- J. Hernandez, D. McDuff, X. Benavides, J. Amores, P. Maes, and R. W. Picard, “**AutoEmotive: bringing empathy to the driving experience to manage stress,**” in *Designing Interactive Systems*, 2014, pp. 53–56.
- P. Paredes, R. Giald-Bachrach, M. Czerwinski, A. Roseway, K. Rowan, and J. Hernandez, “**PopTherapy: Coping with Stress through Pop-Culture,**” in *Pervasive Computing Technologies for*

*Healthcare*, 2014, pp. 109–117.

J. Hernandez, I. Riobo, A. Rozga, G. D. Abowd, and R. W. Picard, “**How Easy Are Children to Engage during Child-Adult Play? Using Electrodermal Activity as Identifier,**” in *Extended Abstract of International Meeting for Autism Research*, 2014.

I. Riobo, A. Parnami, J. Hernandez, and G. D. Abowd, “**G.L.I.M.: Glass Live Interaction Monitor Live Internal State Interaction Monitor using Google Glass + EDA,**” in *Extended Abstract of International Meeting for Autism Research*, 2014.

J. Hernandez, P. Paredes, A. Roseway, and M. Czerwinski, “**Under Pressure: Measuring the Stress of Computer Users,**” in *Human Factors in Computing Systems*, 2014, pp. 51–60.

M. Zisook, J. Hernandez, M. S. Goodwin, and W. Picard R., “**Enabling Visual Exploration of Long-term Physiological Data,**” in *IEEE Conference on Visual Analytics Science and Technology*, 2013.

J. Hernandez, A. Sano, M. Zisook, J. Deprey, M. S. Goodwin, and R. W. Picard, “**Analysis and Visualization of Longitudinal Physiological Data of Children with ASD,**” in *International Meeting for Autism Research*, 2013.

J. Hernandez, G. Hulten, D. DeBarr, K. Krum, and Z. Zhang, “**Measuring the engagement level of TV viewers,**” in *Automatic Face and Gesture Recognition*, 2013, pp. 1–7.

J. Hernandez, D. McDuff, R. Fletcher, and R. W. Picard, “**Inside-out: Reflecting on your inner state,**” in *Pervasive Computing and Communications Workshops*, 2013, pp. 324–327.

J. Hernandez, M. E. Hoque, W. Drevo, and R. W. Picard, “**Mood Meter: Counting Smiles in the Wild,**” in *Ubiquitous Computing*, 2012, pp. 301–310.

J. Hernandez, A. Sano, J. Deprey, M. R. Eckhardt, R. W. Picard, and M. Goodwin, “**Multimodal annotation tool for challenging behaviors in people with Autism spectrum disorders,**” in *Workshop on Ubiquitous Mobile Instrumentation at Ubiquitous Computing*, 2012, pp. 737–740.

J. Hernandez, M. E. Hoque, and R. W. Picard, “**Mood Meter: Large-Scale and Long-Term Smile Monitoring System,**” in *ACM SIGGRAPH Emerging Technologies*, 2012, pp. 1–1.

J. Hernandez, A. Sano, M. S. Goodwin, and R. W. Picard, “**AMA, an application for Annotation, Monitoring, and Analysis of behavioral activity,**” in *Extended Abstract of the International Meeting for Autism Research*, 2012.

Y. Ayzenberg, J. Hernandez, and R. W. Picard, “**FEEL: frequent EDA and event logging - a mobile social interaction stress monitoring system,**” in *Extended Abstracts of Human Factors in Computing Systems*, 2012, pp. 2357–2362.

J. Hernandez, R. R. Morris, and R. W. Picard, “**Call center stress recognition with person-specific models,**” in *Affective Computing and Intelligent Interaction*, 2011, pp. 125–134.

R. C. Thurston, J. Hernandez, J. M. Del Rio, and F. De La Torre, “**Support Vector Machines to improve physiologic hot flash measures: application to the ambulatory setting,**” *Psychophysiology*, vol. 48, no. 7, pp. 1015–21, Jul. 2011.

J. Hernandez, Z. Harchaoui, and F. De la Torre, “**Instance-selecting Regularization Penalty for Supervised Image Classification,**” in *Carnegie Mellon University Tech. Report CMU-RI-TR-10-42*, 2010.

R. C. Thurston, K. A. Matthews, J. Hernandez, and F. De La Torre, “**Improving the performance of physiologic hot flash measures with support vector machines,**” *Psychophysiology*, vol. 46, no. 2, pp. 285–92, Mar. 2009.

## Selected Press

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**The best new technology we saw at CES 2019** by Dave Smith, *Business Insider*, January 19, 2019

**Kia wants future autonomous cars to be able to read passengers' emotions** by Kia Motors America, PR Newswire, January 7, 2019

**This robot crawls over your body and scans your skin with a microscope**, by Douglas Heaven, *NewScientist*, September 28, 2018

**Javier Hernandez's intelligent devices detect stress and emotions to help people**, by Laura Crespo, *MIT Tech Review*, October 13, 2016

**Track Your Heart with Your Phone**, by Rachel Metz, *MIT Tech Review*, November 11, 2015

**Shifting Identity**, by Matt Kaplan, *The Economist*, June 18, 2015

**Daily Planet**, by Lucas Cochran, *Discovery Channel*, December 18, 2014

**Google Glass Can Now Track Your Stress Level**, by Rachel Metz, *MIT Technology Review*, September 5, 2014

**Google Glass, Now in Tune with Your Emotions**, by Hal Hodson, *NewScientist*, September 4, 2014

**Researchers Turn Google Glass into Health Sensor**, by Madhumita Venkataramanan, *WIRED UK*, September 4, 2014

**Rise of the Machines that Read Your Mind**, *The Times*, May 8, 2014

**Devices that Know How We Really Feel**, by Nick Bilton, *The New York Times*, May 4, 2014

**Feeling Glum, Happy, Aroused? New Technology Can Detect Your Mood**, by Kieron Monks, *CNN*, February 5, 2014

**Computers Scan a Crowd, Gauging Its Mood**, by John Pavlus, *FastCompany*, June 29, 2012

**MIT Meter Measures the Mood of Passers-By**, by Susannah F. Locke, *Popular Science*, Nov. 10, 2011

**Photo Essay: Furry Robots, Foldable Cars and More Innovations from MIT's Media Lab**, *PBS Newshour*, May 20, 2011

**Smile, MIT! You're on the Mood Meter**, by Laura Stilwell, *The Tech*, May 6, 2011

**Eye in the Sky: MIT's Mood Meter is Watching You - Smile!** by Gregory Gomer, *BostInnovation*, April 25, 2011