

Javier Hernandez

USA Citizenship
Spanish Citizenship

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Research Statement

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

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

Global Vitals LLC, Cambridge, MA, USA

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

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

(08/2015 – Present) Research Scientist with Rosalind Picard in the Affective Computing group
Principal Investigator of the following projects:

- Onsite Stress Measurement
- Emotional Navigation

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

(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

Panafold, Inc., Palo Alto, CA, USA

(01/2012 – 01/2012) Design and development of mobile applications to promote learning of words

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

Native Spanish and Catalan

Fluent reading, writing and speaking in English

Computer Skills

Programming Languages: MATLAB, JAVA, C, C++, PHP, HTML and JavaScript

Tools: Android SDK, Bash (Unix shell), MySQL, Processing, L^AT_EX and Microsoft Office

Operating Systems: Windows and Linux

Honors & Awards

(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

- (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

Supervised Undergraduates

- (01/2015 – 05/2015) Christian Infante (MIT)
- (08/2014 – 12/2014) Yang Chen (MIT)
- (06/2014 – 12/2014) Christian Infante (MIT)
- (06/2014 – 08/2014) Shirley Chen (MIT)
- (06/2014 – 08/2014) Descartes Holland (MIT)
- (06/2014 – 08/2014) Alexandra J Erixson (MIT)
- (06/2014 – 08/2014) Adrian Jimenez-Galindo (MIT)
- (01/2013 – 05/2013) Dalitso Banda (MIT)
- (01/2011 – 05/2011) Will Drevo (MIT)
- (01/2011 – 03/2011) Lakshmi Parthasarathy (Harvard University)

Reviewing & Outside Activities

- (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 IDEA² 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

- (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. Regh, 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


- 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, “**Non-Contact Physiological Measurements 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

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

References

Available upon request