

Eric M. Hernandez, Ph.D.

Assistant Professor
School of Engineering
College of Engineering and Mathematical Sciences
University of Vermont

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EDUCATION

- 2004 -2007** **Doctor of Philosophy**
Civil and Environmental Engineering Department
Northeastern University. Boston, MA. USA
- 2002-2004** **Master of Science in Civil Engineering - Fulbright Scholar**
Civil and Environmental Engineering Department
Northeastern University. Boston, MA. USA
- 1994-1999** **Bachelor of Science in Civil Engineer - Magna cum Laude**
Civil Engineering Department
Universidad Nacional Pedro Henríquez Ureña. Santo Domingo, Dom. Rep.

EMPLOYMENT

- 2011-current** **University of Vermont. Burlington, VT**
Position: Assistant Professor
School of Engineering
College of Engineering and Mathematical Sciences
- 2009-2010** **Instituto Tecnológico de Santo Domingo (INTEC). Dom. Rep.**
Position: Research Professor and Director of the Center for Infrastructure
Science and Technology
Civil Engineering Department
College of Engineering
- 2007 - 2008** **Simpson Gumpertz and Heger Inc. MA. U.S.A**
Position: Senior Engineer
Engineering Mechanics and Infrastructure Division
- 2006** **FM Global. Norwood. MA.**
Position: Summer Research Intern
Structural Mechanics Research Group
- 2005** **FM Global. Norwood. MA.**
Position: Summer Research Intern
Structural Mechanics Research Group

2002 - 2007 **Northeastern University. Boston. MA.**
Position: Teaching/Research Assistant
Civil and Environmental Engineering Department

2000 - 2002 **Haza y Pellerano. Architects and Engineers**
Position: Quality control engineer / structural engineer

RESEARCH FUNDING

Project Title: CAREER: Structural Health Monitoring, Diagnosis and Prognosis of Minimally Instrumented Structural Systems

Role: Principal Investigator

Source of Support (Amount): National Science Foundation: (\$500,000)

Total Award Period Covered: 06/1/15 – 05/31/20

Project Title: BRIGE: Multiscale Model-Data fusion for Structural Health Monitoring of Fracture Critical Structures

Role: Principal Investigator

Source of Support (Amount): National Science Foundation: (\$174,965)

Total Award Period Covered: 09/1/13 – 08/31/15

Project Title: Bridge Deterioration Model

Role: Principal Investigator

Source of Support (Amount): Vermont Transportation Department (\$45,150)

Total Award Period Covered: 06/1/14 – 08/31/15

Project Title: Quantifying the Vulnerability of Vermont Bridges to Seismic Loading

Role: Co-Principal Investigator

Source of Support (Amount): Vermont Transportation Department (\$214,150)

Total Award Period Covered: 06/1/13 – 08/31/16

Project Title: Statistical Analysis of Weigh-in-Motion Data to Validate Use of HL-93 AASHTO Vehicle Live Load for Bridge Design in Vermont

Role: Principal Investigator

Source of Support (Amount): Vermont Transportation Department-Federal Highway Adm.: (\$90,124)

Total Award Period Covered: 01/1/12 – 12/31/13

Project Title: Vibration Monitoring and Load Characteristics Evaluation of I-89 Bridges 58 N&S, Richmond – Phase I

Source of Support (Amount): Vermont Transportation Department: (\$93,099)

Role: Principal Investigator

Total Award Period Covered: 06/01/11 – 03/30/12

Project Title: Vibration Monitoring and Load Characteristics Evaluation of I-89 Bridges 58 N&S, Richmond – Phase II

Source of Support (Amount): Vermont Transportation Department: (\$53,098)

Role: Principal Investigator

Total Award Period Covered: 04/01/12 – 12/31/12

PUBLICATIONS

In-Review

Erazo, K. and Hernandez, E.M. "A mechanistic approach to post-earthquake damage assessment of instrumented structures with uncertain input" ASCE Journal of Engineering Mechanics

Polanco, N., May, G. and Hernandez, E.M. "Finite element model updating of semi-composite bridge decks using operational acceleration measurements" Journal of Engineering Structures

Peer-Reviewed Journal Publications

Erazo, K. and Hernandez, E.M. (2015) "Uncertainty quantification of state estimation in nonlinear structural systems with application to seismic response in buildings" ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems. Accepted

Hernandez, E.M. (2015) "Identification of localized structural damage from highly incomplete modal information: theory and experiments" ASCE Journal of Engineering Mechanics. Accepted

Hernandez, E.M. and Polanco, N.R. (2015) "A lower bound for the variance of frequency and damping ratio identified from noisy vibration measurements" Journal of Structural Control and Health Monitoring. DOI: 10.1002/stc.1757

Hernandez, E.M. (2014) "Identification of Isolated Structural Damage from Incomplete Spectrum Information Using l1-norm Minimization". Mechanical Systems and Signal Processing, 46(1):59-69

Erazo, K. and Hernandez, E.M. (2014) "A Model-based Observer for State and Stress Estimation in Structural and Mechanical Systems: Experimental Validation". Mechanical Systems and Signal Processing, 43(1):141-152

Hernandez, E.M. and May, G. (2013) "The Dissipated Energy Ratio as Tool for Earthquake Induced Damage Detection and Classification of Instrumented Structures" ASCE Journal of Engineering Mechanics, 139(11), 1521–1529

Hernandez, E.M. (2013) "Optimal Model Based State Estimation in Mechanical and Structural Systems", Journal of Structural Control and Health Monitoring 20(4):532-543

Hernandez, E.M. and Bernal, D. (2013) "Iterative Finite Element Model Updating in the Time Domain" Journal of Mechanical Systems and Signal Processing, (34)1-2:39-46

Hernandez, E.M., Bernal, D. and Caracoglia, L. (2013) "On-line Monitoring of Wind Induced Stresses and Fatigue Damage in Structures" Journal of Structural Control and Health Monitoring 20(10):1291-1302

Hernandez, E.M. (2011) "A Natural Observer for Optimal State Estimation in Second Order Linear Structural Systems" Journal of Mechanical Systems and Signal Processing, (25)8:2938-2947

Hernandez, E.M. and Bernal, D. (2008) "State Estimation in Structural Systems with Uncertain Stiffness and Damping Matrices" ASCE Journal of Engineering Mechanics, (134)3:252-258

Bernal, D. and Hernandez, E. (2006) "A Data Driven Methodology for Assessing the Impact of Earthquakes on the Health of Building Structural Systems" The Structural Design of Tall and Special Buildings, (15)1:21-34

Book Chapter

Hernandez, E.M. (2015) "Post-earthquake Diagnosis of Partially Instrumented Building Structures". Springer Encyclopedia on Earthquake Engineering. Editors: Beer, M., Kougoumtzoglou, I.A., Patelli, E., Au, I.S.-K.

Reports

Hernandez, E.M. and May, G. (2015) Vibration Monitoring of Bridge 58N, 47p. University of Vermont Transportation Research Center.

Hernandez, E.M. and Tirk, N. (2014) Statistical Analysis of Weigh-in-Motion Data for Bridge Design in Vermont, 113p. University of Vermont Transportation Research Center.

Peer-Reviewed Conferences Proceedings

Polanco, N., Hernandez, E.M. (2014) "Finite element model updating of semi-composite bridge decks: application to reliability analysis". ASCE Engineering Mechanics Conference, Hamilton, ON, Canada (* Best student paper award in structural dynamics)

Erazo, K. and Hernandez, E.M. (2014) "Uncertainty quantification for state estimation in nonlinear structural systems" Proceedings of the 6th International Symposium on Uncertainty Modelling and Analysis, University of Liverpool, UK.

Hernandez, E.M. and Polanco, N. (2014) "Reliability-based Fatigue Monitoring of Structures" Proceedings of the European Workshop in Structural Health Monitoring" Nantes, France

Hernandez, E.M. (2014) "Use of L1 Minimization to Detect Localized Damage in structures Using Incomplete Modal Information" Proceedings of the IX International Conference on Structural Dynamics (EURODYN 2014), Porto, Portugal.

Erazo, K. and Hernandez, E.M. (2014) "Real-time Efficient State Estimation in Nonlinear Structural Systems" Proceedings of the IX International Conference on Structural Dynamics (EURODYN 2014), Porto, Portugal.

Hernandez, E.M. (2014) "Identification Localized Damage in Structures Using Highly Incomplete Modal Information" Proceedings of the XXXII International Modal Analysis Conference IMAC, Orlando, FL

Hernandez, E.M. and Polanco, N. (2014) "Uncertainty Quantification in Identified Modal Parameters using Fisher Information Criterion" Proceedings of the XXXII International Modal Analysis Conference IMAC, Orlando, FL

Hernandez, E.M. and Erazo, K. (2014) "State Estimation in Nonlinear Structural Systems" Proceedings of the XXXII International Modal Analysis Conference IMAC, Orlando, FL

Hernandez, E.M. and Erazo, K. (2013) "Nonlinear model-data fusion for post-earthquake assessment of structures" International Workshop on Structural Health Monitoring. Stanford, CA.

Hernandez, E.M. (2013) "Real-time monitoring of fatigue reliability of partially instrumented structures excited by random fields" Proceedings of the 11th International Conference on Structural Safety and Reliability (ICOSSAR2013), New York, NY.

Erazo, K. and Hernandez, E.M. (2013) "Experimental verification of a finite element model based functional observer for structural systems" Proceedings of the 54th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Boston, MA

Hernandez, E.M. and May, G. (2013) , "Vibration Monitoring and Load Distribution Characterization of I-89 Bridge 58N" Proceedings of the XXXI International Modal Analysis Conference (IMAC) Orange County, CA

Hernandez, E.M. (2013), "Quantifying Maximum Achievable Accuracy of Identified Modal Parameters From Noise Contaminated Vibration Data" Proceedings of the XXXI International Modal Analysis Conference (IMAC) Orange County, CA

Hernandez, E.M. (2013), "Real-time Dynamic Stress Response Estimation at Critical Locations of Instrumented Structures Embedded in Random Fields" Proceedings of the XXXI International Modal Analysis Conference (IMAC) Orange County, CA

Hernandez, E.M. and May, G. (2011) "Post-Earthquake Damage Detection in Instrumented Buildings Using Identified Dissipated Energy" Proceedings of the XXX International Modal Analysis Conference (IMAC) Jacksonville, FL, Vol.6 pp. 351-358.

Hernandez, E.M., Bernal, D. and L. Caracoglia (2011) "Output-only Estimation of Wind Induced Stresses in Structures" Proceedings of the XXX International Modal Analysis Conference (IMAC) Jacksonville, FL, Vol.2 pp. 345-350.

Hernandez, E.M. (2011) "Finite Element Model Based State Estimation in Mechanical and Structural Systems". Proceedings of the International Workshop in Structural Health Monitoring, Stanford University, CA, pp.1087-1094

Hernandez, E. and Bernal, D. (2007) "State Estimation in Structural Systems in Nonlinear Structural Systems with Model Uncertainties" Proceedings of the XXV International Modal Analysis Conference (IMAC), Orlando, FL. (digital on CD)

Hernandez, E. and Bernal, D. (2006) "An Observer Approach to Model Updating," Proceedings of the XXIV International Modal Analysis Conference (IMAC), St. Louis, MO. (digital on CD)

Bernal, D. and Hernandez, E. (2005) "A Data Driven Methodology for Assessing Impact of Earthquakes on the Health of Building Structural Systems," Proceedings of the Seminar on Utilization of Strong Motion Data, Los Angeles, CA, pp.89-106

Bernal, D. and Hernandez, E. (2005) "A Residual Approach for Identifying Damage Induced by Earthquakes," Proceedings of the fifth International Workshop on Structural Health Monitoring, Stanford University, CA, pp. 315-320

Bernal, D. and Hernandez, E. (2005) "Identification of Damage Induced by Earthquakes," Proceedings of the XXIII International Modal Analysis Conference (IMAC), Orlando, FL. (digital on CD)

Bernal, D. and Hernandez, E. (2004) "Robust Data Driven Methodology for Damage Detection due to Earthquakes," Proceedings of the 13th World Conference on Earthquake Engineering, Vancouver, BC, Canada. (digital on CD)

Conferences Abstracts and Presentations

Erazo, K., Hernandez, E.M. (2015) "A mechanistic approach to seismic damage estimation of instrumented building structures using Bayesian filtering". ASCE Engineering Mechanics Conference, Stanford University, Palo Alto, CA.

Polanco, N., Hernandez, E.M. (2015) "Multi-scale stress usage monitoring from global acceleration measurements: An experimental validation". ASCE Engineering Mechanics Conference, Stanford University, Palo Alto, CA.

Erazo, K., Hernandez, E.M. (2014) "Uncertainty quantification for state estimation and its application to post-earthquake damage assessment". ASCE Engineering Mechanics Conference, Hamilton, ON. Canada

Polanco, N., Hernandez, E.M. (2014) "Finite element model updating of semi-composite bridge decks: application to reliability analysis". ASCE Engineering Mechanics Conference, Hamilton, ON. Canada – BEST STUDENT PAPER AWARD

Hernandez, E.M. (2014) "Optimal Lp norm for detection of localized damage using highly incomplete modal information". ASCE Engineering Mechanics Conference, Hamilton, ON. Canada

Hernandez, E.M. (2013) "Tracking dynamic stress response based on acceleration measurements". ASCE Engineering Mechanics Conference, Evanston, IL.

Hernandez, E.M. (2011) "Optimal Model Based State Estimation in Mechanical and Structural Systems". ASCE Engineering Mechanics Conference, Boston, MA.

Hernandez, E.M. (2011) "Post Earthquake Damage Detection in Instrumented Buildings Using Identified Dissipated Energy". ASCE Engineering Mechanics Conference, Boston, MA.

Hernandez, E., Cabrera, E. and Reyes, P., (2009) "Seismic Vulnerability of Existing Buildings in Santo Domingo and Santiago" Proceedings of the Latin American Conference in Earthquake Engineering, Santiago, D.R.

Hernandez, E. and Bernal, D. (2006) "State Estimation in Structural Systems with Uncertain Stiffness and Damping Matrices," Proceedings of the 4th International Conference in Structural Control and Monitoring, San Diego, CA.

Bernal, D. and Hernandez, E. (2004) "Robust Data Driven Methodology for Damage Detection due to Earthquakes," 4th International Workshop in Structural Health Monitoring and Control, New York, NY.

Invited Presentations

“Structural Health Monitoring, Diagnosis and Prognosis using Minimal Instrumentation” University of Pittsburgh, PA 2015

“Recent Advances and Challenges in Structural Health Monitoring” Simpson Gumpertz and Heger, Consulting Engineers, Waltham, MA 2014

“Multiscale Model-Data fusion for Structural Health Monitoring of Fracture Critical Structures” Worcester Polytechnic Institute, Worcester, MA 2014

“Smart Engineers and Smart Structures”. UVM/GIV Engineering Summer Institute, Burlington, VT 2013

“Vibration Based Structural Health Monitoring of I-89 Bridge 58N” University of Massachusetts Amherst, MA 2013

“Vibration Based Structural Health Monitoring of I-89 Bridge 58N” Joint Vermont ASCE-SEA Winter Meeting, Burlington, VT 2013

“Stress Estimation using Observers” Northeastern University, Boston, MA 2013

“Smart Structures”. UVM/GIV Engineering Summer Institute, Burlington, VT 2012

“Optimal Model Based State Estimation in Second Order Systems”. Clarkson University, Clarkson, NY 2011

“ABC’s of Modern Earthquake Engineering”. UVM/GIV Engineering Summer Institute, Burlington, VT 2011

“Rapid Visual Screening of Seismic Vulnerability of Buildings in Santo Domingo”. International Conference of Seismic Engineering. Pontificia Universidad Catolica Madre y Maestra (PUCMM), Santiago, Dom. Rep. 2009

“Seismic Resistant Design of Reinforced Concrete Structures”. Instituto Tecnologico de Santo Domingo. INTEC. Santo Domingo, Dom. Rep. 2009

“Seismic Instrumentation of Buildings – Experiences in California”. National Conference in Earthquake Engineering and Seismology. Universidad Autonoma de Santo Domingo (UASD), Santo Domingo, Dom. Rep. 2008

“Structronics – New Frontier in Structural engineering” Universidad Autonoma de Santo Domingo (UASD) Santo Domingo, Dom. Rep. 2008

“Advanced Methodologies for Post-Earthquake Assessment of Buildings” Pontificia Universidad Catolica Madre y Maestra (PUCMM), Santiago, Dom. Rep. 2005

TEACHING

2011-current

The University of Vermont. Burlington, VT

College of Engineering and Mathematical Sciences
School of Engineering

- Structural Analysis – CE170

- Spring 2012 (48 students)
- Spring 2013 (31 students)
- Spring 2014 (35 students)
- Spring 2015 (51 students)
- Concrete Structures – CE173
 - Spring 2011 (34 students)
- Advanced Structural Analysis – CE-271
 - Fall 2012 (27 students)
 - Fall 2014 (26 students)
- Safety and Reliability of Engineering Systems – CE-395
 - Fall 2011 (11 students)
 - Fall 2013 (11 students)

2009-2010

Instituto Tecnológico de Santo Domingo (INTEC). Santo Domingo, Dom. Rep.

Department of Civil and Environmental Engineering

- Reinforced Concrete Design II
 - Spring 2009 (24 students)
 - Summer 2009 (31 students)
- Structural Analysis I
 - Fall 2009 (16 students)
 - Winter 2009 (42 students)
 - Spring 2010 (29 students)
- Structural Analysis II
 - Fall 2009 (25 students)
 - Winter 2009 (40 students)
 - Spring 2010 (31 students)
- Structural Dynamics
 - Spring 2009 (19 students).
- Earthquake Engineering
 - Summer 2009 (19 students)

Professional Development Seminars:

- Structural Analysis and Design of High Performance Structures
 - Summer 2009 (45 participants)
 - Winter 2009 (12 participants)

2003 - 2006

Northeastern University. Boston, MA. U.S.A

College of Engineering

Department of Civil and Environmental Engineering

- Static and Strength of Materials (CIVU221).
 - Fall 2006 (14 students)
 - Spring 2007 (17 students)
- Structural Analysis I (CIVU320).
 - Fall 2004 (11 students)
 - Fall 2005 (33 students)
 - Spring 2005 (41 students)

- Reinforced Concrete Design I (CIVU324).
 - Summer (1) 2006 (35 students)

College of Arts and Sciences
Department of Architecture

- Structures I (ARC-U356).
 - Spring 2003 (14 students)
 - Spring 2004 (23 students)
 - Summer 2004 (16 students)
 - Summer 2005 (10 students)
 - Summer (2) 2006 (8 students)

2000 – 2002

Universidad Nacional Pedro Henríquez Ureña. Santo Domingo, Dom. Rep.

College of Science and Technology
Department of Civil and Environmental Engineering

- Structural Analysis I
 - Fall 2000 (26 students)
 - Fall 2001 (31 students)
- Structural Analysis II
 - Spring 2001 (21 students)

MENTORING

Graduate Students

Geoff May, MS (completed 2013)
Nathan Tirk, MS (completed 2014)
Kalil Erazo, PhD (completed 2015)
Nestor Polanco, PhD
Benjamin LeBlanc, PhD
John Lens, PhD

Undergraduate Students

Kristina Miele. Honors Thesis. Completed 2012
Hannah Viele Maloy. Barret Scholar 2012
Jack Dugdale. Honors Thesis. Completed 2015

SERVICE

Journal Reviewer

- ACI Journal of Structural Engineering
- Journal of Structural Control and Health Monitoring
- Mechanical Systems and Signal Processing
- ASTM Geotechnical Testing Journal
- ASCE Journal of Engineering Mechanics

- ASCE Journal of Computing in Civil Engineering
- ASCE Journal of Bridge Engineering
- Journal of Earthquake Engineering and Structural Dynamics
- Journal of Vibration and Control
- Korean Journal of Civil Engineering

University Service

- ASCE Student Chapter Advisor (2011-current)
- Civil Engineering search committee member for assistant professor (2011)
- Civil Engineering search committee member for lecturer (2011)
- Advisor to SEED student group (2011)
- University of Vermont Scholarship, Research and Creative Arts Committee (Spring 2013)
- College of Engineering and Mathematical Sciences Faculty Council (2012-2013)
- Thesis committee member:
 - Strength and durability of porous concrete, after being freezing/ thawing and salt exposure (MS)
 - Student: Ian Anderson (CEE)
 - Advisor: M. Dewoolkar
 - Assessment of the Simplified Procedure for Liquefaction Potential Evaluation (PhD)
 - Student: Lolita Oka (CEE)
 - Advisor: M. Dewoolkar
 - A Diagnostics Approach for Helicopter Drive Train Systems (MS)
 - Student: Praneet Menon (ME)
 - Advisor: D. Huston
 - Data Classification and uncertainty assessment: development of a new Bayesian artificial neural network (PhD)
 - Student: Nikos Fytilis (CEE)
 - Advisor: D. Rizzo
- Thesis committee chair:
 - A lab environment for object detection and tracking (MS)
 - Student: X. Ouyang (EE)
 - Advisor: G. Mirchandani
 - Fusion Systems with Standard Components of Small Rank (PhD)
 - Student: Matthew Welz (Mathematics)
 - Advisor: R. Foote
 - 2D/3D Feature-based visual tracking and localization for planetary rover exploration (PhD)
 - Student: Clark Van Dam (EE)
 - Advisor: G. Mirchandani

Professional Service

- Proposal Reviewer for ETH (2015)
- Organizing Committee EERI New England chapter (2013)

- Board of Directors Vermont ASCE Chapter (2012-present)
- NSF Panel reviewer (2012)
- ASCE Engineering Mechanics Conference (2011), Boston, MA. Local Organizing Committee Member
- Minimum Requirement for Seismic Analysis and Design of Buildings and Other Structures. Ministry of Public Works. Dom. Rep. (2010). Scientific and Code Drafting Committee Member
- ACI 369R "Guide for Seismic Rehabilitation of Existing Concrete Frame Buildings" (2010). External reviewer
- Latin American Conference in Earthquake Engineering (2009), Santiago, Dom. Rep. Organizing Committee Member

Professional Affiliations and Memberships

- American Society of Civil Engineers (ASCE).
 - * Structural Engineering Institute (ASCE-SEI)
 - * Engineering Mechanics Institute (ASCE-EMI) – Member of the Dynamics Committee.
 - * Engineering Mechanics Institute (ASCE-EMI) – Member of the Structural Health Monitoring and Control Committee.
- Society of Industrial and Applied Mathematics (SIAM)
- Earthquake Engineering Research Institute (EERI)
- Seismological Society of America (SSA)

CONSULTING EXPERIENCE

Client: Lotti Associati

Structural Design

Project: Support buildings for East Santo Domingo Aqueduct,. Dom. Rep.

Client: Cabrera Consulting Engineers

Seismic Failure Risk Assessment and Retrofit Design

Project: Cabral y Baez Hospital, Santiago, Dom. Rep.

Client: LEXCO

Performance Based Seismic Design

Project: AGORA Mall, Santo Domingo, Dom. Rep.

Client: LEXCO

Structural Design Peer-Review

Project: CEDIMAT Cardiovascular Hospital, Santo Domingo, Dom. Rep.

Client: LEXCO

Structural Design Peer-Review

Project: AILA International Airport, Santo Domingo, Dom. Rep.

Client: SUBURBIA

Structural Design Peer-Review

Project: Meridian Residential Tower, Santo Domingo, Dom. Rep.

Client: LEXCO

Structural Design Peer-Review

Project: L. Aybar Hospital, Santo Domingo, Dom. Rep.

HONORS AND AWARDS

Faculty Early Career Development Award. National Science Foundation. 2015

Outstanding Young Faculty Award. College of Engineering and Mathematical Sciences. 2014

Outstanding Teaching Award. Civil and Environmental Engineering Department, Instituto Tecnológico de Santo Domingo, 2010

Outstanding Teaching Assistant Award. Civil and Environmental Engineering Department, Northeastern University, 2004.

Fulbright Scholarship. Department of State of the United States of America. 2002-2004