

# Mario E. Bergés

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## Research Interests

My research interests are broad and cross-disciplinary. In high-level terms I am interested in instrumenting our civil infrastructure to increase its resilience, adaptiveness and self-monitoring capabilities. In particular, I am interested in utilizing and/or implementing sensor systems to collect data to help us better understand the behavior of infrastructure systems, learn from the patterns and better plan for the future. My current research focuses on the application of signal processing and machine learning techniques to data collected from a variety of sensing systems to provide appliance-level energy feedback to building occupants.

## Education

- 2007-2010      Ph.D. in Civil and Environmental Engineering  
Carnegie Mellon University. Pittsburgh, PA USA  
Thesis title: A Framework for Enabling Energy-Aware Facilities Through Minimally-Intrusive Approaches  
Advisors: Dr. Lucio Soibelman, Dr. H. Scott Matthews
- 2006-2007      M.S. in Civil and Environmental Engineering  
Carnegie Mellon University. Pittsburgh, PA USA  
Concentration: Advanced Infrastructure Systems  
GPA: 3.96/4.00
- 2004-2005      Graduate Certificate in Construction Management  
Instituto Tecnológico de Santo Domingo (INTEC), Dominican Republic  
GPA: 3.25/4.00
- 2001-2004      B.S. in Civil Engineering  
Instituto Tecnológico de Santo Domingo (INTEC), Dominican Republic  
GPA: 3.76/4.00 (Summa Cum Laude)

## Honors and Awards

CARNEGIE	Carnegie Institute of Technology Dean's Fellowship	(2007-2008)
MELLON	Paul P. Christiano Distinguished Service Award	(2008)
UNIVERSITY	Steven Fenves Conference Travel Grant	(2009)
	Graduate Student Assembly Conference Travel Grant	(2009)
INTEC	2010 Distinguished Alum (2010)	
	The PIES National Scholarship for Undergraduate Studies	(2001-2004)
SOCIETIES	Phi Kappa Phi Honor Society	(2008)
	Chi Epsilon Honor Society of Civil Engineers	(2009)

## Professional Experience

ACADEMIA	<b>Carnegie Mellon University</b> <i>Assistant Professor</i>	August 2010 -
	Civil and Environmental Engineering Department	
	Energy Infrastructure Systems	
INDUSTRY	<b>Ruredil Dominicana, S. A.</b>	Dominican Republic
	<i>Assistant Engineer</i>	(May 2005 - June 2006)
	<b>Grupo Indarte, S. A.</b>	Dominican Republic
	<i>Project Manager</i>	(November 2004 - June 2006)
	<b>Empresas Mayo, S. A.</b>	Dominican Republic
	<i>Information Technology Advisor</i>	(August 1998 - November 2004)

## Publications

### JOURNALS

Shahandashti, Mohsen, Saledeh N. Razavi, Lucio Soibelman, Mario Berges, Carlos H. Caldas, Ioannis Brilakis, Jochen Teizer, Patricio A. Vela, Carl Haas, James H. Garrett Jr., Burcu Akinci, Zhenhua Zhu. "CEC: Data Fusion Approaches and Applications for Construction Engineering". *Journal of construction Engineering and Management*.

Berges, Mario, Ethan Goldman, Lucio Soibelman, H. Scott Matthews, Kyle Anderson. "User-centric Non-Intrusive Electricity Load Monitoring for Residential Buildings". *Journal of Computing in Civil Engineering*. (Under review).

Berges, Mario, Ethan Goldman, H. Scott Matthews, Lucio Soibelman.

“Enhancing Electricity Audits in Residential Buildings with Non-Intrusive Load Monitoring”. *Journal of Industrial Ecology: Special Issue on Environmental Applications of Information and Communication Technologies (ICT)*. (In print).

Rowe, Anthony, Mario Berges, Gaurav Bhatia, Ethan Goldman, Raj Rajkumar, Lucio Soibelman, James H. Garrett, José M. F. Moura. “Sensor Andrew: Large-Scale Campus-Wide Sensing and Actuation.” *IBM Journal of Research and Development: Special Issue on Smarter Cities and Sensed Infrastructures*. (In print).

Berges, Mario, Ethan Goldman, H. Scott Matthews, and Lucio Soibelman. “Training Load Monitoring Algorithms on Highly Sub-Metered Home Electricity Consumption Data.” *Tsinghua Science & Technology* 13 (2008): 406-411. (Invited Journal Paper)

CONFERENCES  
AND  
WORKSHOPS

Rowe, Anthony, Mario Berges, Raj Rajkumar. “Contactless Sensing of Appliance State Transitions Through Variations in Electromagnetic Fields”. *2nd ACM Workshop On Embedded Sensing Systems For Energy-Efficiency In Buildings (BuildSys 2010)*, Zurich, Switzerland, 2010. (Best paper by popular vote)

Quintal, Felipe, Nuno J. Nunes, Adrian Ocneanu, Mario Berges. “SINAIS: Home Consumption Package: A Low-Cost Eco-Feedback Energy-Monitoring Research Platform”. *Proceedings of the 8th ACM Conference on Designing Interactive Systems (DIS'10)*, Aarhus, Denmark, 2010.

Berges, Mario, H. Scott Matthews, Lucio Soibelman. “A System for Disaggregating Residential Electricity Consumption by Appliance”. *The IEEE International Symposium on Sustainable Systems and Technology (ISSST) 2010*, Washington, DC. 2010.

Berges, Mario, Lucio Soibelman, H. Scott Matthews. “Leveraging Data From Environmental Sensors to Enhance Electrical Load Disaggregation Algorithms”. *13th International Conference on Computing in Civil and Building Engineering*, Nottingham, UK, 2010.

Berges, Mario, Lucio Soibelman, H. Scott Matthews. “Building Commissioning as an Opportunity for Training Non-Intrusive Load Monitoring Algorithms”, *6th International Conference on Innovation in Architecture, Engineering and Construction (AEC)*, State College, PA, 2010.

Berges, Mario, Lucio Soibelman, H. Scott Matthews, Ethan Goldman. “Evaluating the electric consumption of residential buildings: current practices and future prospects”. *Construction Research Congress 2010*, Banff,

Alberta, 2010.

Berges, Mario, Ethan Goldman, H. Scott Matthews, and Lucio Soibelman. “Learning Systems for Electric Consumption of Buildings”. *ASCE International Workshop on Computing in Civil Engineering*, Austin, Texas, 2009.

Rowe, Anthony, Mario Berges, Gaurav Bhatia, Ethan Goldman, Raj Rajkumar, Lucio Soibelman. “Sensor Andrew: Large-Scale Campus-Wide Sensing”. *8th ACM/IEEE International Conference on Information Processing in Sensor Networks*, San Francisco. 2009. (Demonstration Paper)

Berges, Mario, Ethan Goldman, H. Scott Matthews, and Lucio Soibelman. “Training Load Monitoring Algorithms on Highly Sub-Metered Home Electricity Consumption Data.” *12th International Conference on Computing in Civil and Building Engineering*, Beijing, 2008.

Matthews, H. Scott, Lucio Soibelman, Mario Berges, and Ethan Goldman. “Automatically Disaggregating the Total Electrical Load in Residential Buildings: a Profile of the Required Solution.” In *Intelligent Computing in Engineering (ICE08) Proceedings*. Plymouth, 2008.

TECHNICAL  
REPORTS

Rowe, Anthony, Mario Berges, Gaurav Bhatia, Ethan Goldman, Raj Rajkumar, Lucio Soibelman, James Garrett, José M. F. Moura, “Sensor Andrew: Large-Scale Campus-Wide Sensing and Actuation,” *Carnegie Mellon Technical Report*, ECE-TR-08-11 2008.

PATENTS

Berges, Mario E., Ethan J. Goldman, Lucio Soibelman, Burton W. Andrews, Diego S. Benitez, H. Scott Matthews, Michael Hoyneck. “Methods and Apparatuses for Monitoring Energy Consumption and Related Operations”. U.S. Provisional Patent #61/222,247. November 2009.

## Presentations

INVITED TALKS “Towards Energy-Aware Facilities: Inferring Appliance-Level Consumption”, Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland, November 2010.

“Towards Energy-Aware Facilities: Inferring Appliance-Level Consumption”, *Electrical and Computer Engineering Department Seminar Series*, Carnegie Mellon University, Pittsburgh, PA, September 2010.

“Habilitando Edificaciones Inteligentes: Métodos para la Determinación del Consumo Eléctrico por Aparato”, *Instituto Tecnológico de Santo Domingo (INTEC)*, Dominican Republic, August 2010.

“Enabling Energy-Aware Smart Facilities”, *IBM Research Center*, Hawthorn, NY, April 2010.

“Electricity Consumption of Buildings: What you need to know and why it matters” in *Annual Carnegie Mellon Course on The Environment Today: Energy and Water*, Pittsburgh, PA, March 2010.

“SensorAndrew: A virtual instrument for large-scale sensing and actuation that enables sensor-based decision support for built infrastructure” in *IBM Research Center’s Green Planet Seminar Series*, Yorktown, NY, 2009. (Along with Dr. James H. Garrett).

“Sensor Andrew: A Living Laboratory for Infrastructure Sensing Technologies” in *Annual Symposium of the Center for Sensed Critical Infrastructure Research (CenSCIR)*, Pittsburgh, PA, 2009. (Along with Anthony Rowe and Dr. James H. Garrett).

#### CONFERENCES

“Non-Intrusive Load Monitoring and Other Technology-Enabled Demand-Side Management Strategies” in *6th Annual Carnegie Mellon Conference on the Electricity Industry: Smart Grids*, Pittsburgh, PA, 2010.

“A Real-World Evaluation of NILM: Tradeoffs Between Data Collection and Information Effectiveness” in *5th Annual Carnegie Mellon Conference on the Electricity Industry: Smart Grids*, Pittsburgh, PA, 2009.

“Recognizing Appliance-specific Patterns in Multivariate Time Series of Power-metrics from a Building” in *2009 INFORMS Annual Meeting*, San Diego, CA, 2009.

#### POSTER SESSIONS

“Enabling Energy-Aware Smart Facilities” in *ASCE Construction Research Council (CRC) Annual Ph.D. Student Research Poster Session*, Banff, Alberta, 2010. (Selected as best poster)

“Automated Load Classification” in *Annual Symposium Center for Sensed Critical Infrastructure Research (CenSCIR)*, Pittsburgh, PA, 2008.

“Data Fusion and Integration from Multiple Sensor-Platforms using IBM’s System-S” in *Annual Symposium of the Center for Sensed Critical Infrastructure Research (CenSCIR)*, Pittsburgh, PA, 2008.

“Automatically Disaggregating the Total Electrical Load in Residential Buildings: A Profile of the Required Solution” in *ASCE Construction Research Council (CRC) 1st Annual Leadership Forum*, Chicago, IL, 2008.

“Detailed Electricity Consumption Monitoring” in *Annual Symposium of*

*the Center for Sensed Critical Infrastructure Research (CenSCIR)*, Pittsburgh, PA, 2007.

POPULAR PRESS “New System for Monitoring Electricity Use Heralds Greener Homes and Cheaper Bills”, *PhysOrg.com* 10/28/2010  
“New System for Monitoring Electricity Use Heralds Greener Homes and Cheaper Bills”, *ScienceDaily* 10/29/2010  
“Electricity-monitoring technology surges forward at Carnegie Mellon”, *The Tartan* 11/08/2010  
“‘Smart’ buildings, structures may save billions”, *Pittsburgh Tribune-Review* 02/03/2009  
“Study to track Downtown City-County building’s energy use”, *Pittsburgh Tribune-Review* 09/11/2009  
“New research will help consumers track home energy consumption”, *Carnegie Mellon’s “The Engineering Magazine”*, Winter 2009/2010 Winter 2009

## Teaching Experience

INSTRUCTOR Energy Demand and Utilization (39-611). Carnegie Mellon University. Fall 2010  
  
Special Topics: Concepts and Principles in Civil and Environmental Engineering (12-052). Carnegie Mellon University. Summer 2008  
  
Microsoft Excel for Advanced Users. Private lectures. Dominican Republic. Summer 2006  
  
Introduction to Computers. Private lectures for a company (Empresas Mayo, S.A.). Dominican Republic. Summer 2004

TEACHING ASSISTANT Engineering Economics (12-411). Carnegie Mellon University. Fall 2009  
AutoCAD (12-600). Carnegie Mellon University. Fall 2009  
Data Acquisition (12-740). Carnegie Mellon University. Fall 2008  
Data Management (12-741). Carnegie Mellon University. Fall 2008  
Data Acquisition (12-740). Carnegie Mellon University. Fall 2007  
Data Management (12-741). Carnegie Mellon University. Fall 2007

## Leadership Activities and Broader Impact

CARNEGIE MELLON UNIVERSITY Instructor for the Advanced Placement/Early Action (AE/PA) summer program for high school students (Summer 2008)  
Graduate Student Assembly Representative (2007 - 2010)  
University Student Affairs Council Member (2008)

University Education Council Member (2009 - 2010)  
CEE Annual Talent Show Committee Member (2009, 2010)  
Graduate Student Advisory Committee Member, Department of Civil and  
Environmental Engineering (Fall 2007, Fall 2009 - 2010)

OTHER Assistant for the organization of the ASCE Construction Research Council  
(CRC) 1st Annual Leadership Forum (Summer 2007)  
Representative for the Dominican Republic at the Presidential Classroom  
program in Washington, D.C. (Spring 2001)

## **Affiliations**

MEMBER American Society of Civil Engineers (ASCE) (2004 - Present)  
American Concrete Institute (ACI) (2005 - Present)  
Institute for Complex Engineered Systems (ICES) (2007 - Present)  
American MENSA (2007 - Present)  
Phi Kappa Phi Honor Society (2008 - Present)  
Chi Epsilon Honor Society of Civil Engineers (2009 - Present)  
Institute of Electrical and Electronics Engineers (IEEE) (2009 - Present)