

Jay Taneja

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RESEARCH INTERESTS

I develop and study applications of sensing and communications technology on large-scale infrastructure systems in the developed and developing world. I also apply analytical tools to improve planning and operations of infrastructure systems.

RESEARCH EXPERIENCE

- 2017 Jan.* **University of Massachusetts – Amherst, U.S.A.**
– *Present* Assistant Professor, Department of Electrical and Computer Engineering
 Adjunct Assistant Professor, Department of Computer Science
 Tenure-track faculty position
- 2013 Sept.* **IBM Research – Africa, Nairobi, Kenya**
– *2016 Aug.* Research Scientist
 Supervisor: Dr. Kamal Bhattacharya (kamal@ke.ibm.com)
 Leads the lab’s research team on energy, including formulating a research strategy, building an ecosystem of partners and collaborators, conducting research projects, and publishing results on improving electricity reliability, access, and quality in sub-Saharan Africa. Supervises team members, interns, and students on research projects on energy and transportation in the developing world.
- 2005 –* **University of California, Berkeley, U.S.A.**
2013 Ph.D. Researcher
 Advisor: Professor David Culler (culler@cs.berkeley.edu)
 Constructed a networked system for sculpting electricity loads to match the availability of renewable supplies. Designed and built a networked system for demand-controlled ventilation in an office building. Designed a solar-powered microweather station and deployed 50 units in a forest environment. Managed and demonstrated a 600-node outdoor wireless target tracking network to DARPA.
- 2008 May* **Microsoft Research – India, Bangalore, India**
– *Sept.* Graduate Research Intern, Mobility, Networks, and Systems Group
 Supervisor: Dr. Venkat Padmanabhan (padmanab@microsoft.com)
 Designed a platform to enable a wide range of applications that use the sensors present on mobile phones. Demonstrated an opportunistic application on mobile phones to gather and stitch photographs of landmarks. Built a simulator to explore issues of scale in the emerging field of opportunistic sensing.
- 2004 Jun.* **Intel Corporation, Hudson, MA, U.S.A.**
– *Sept.* Electrical Eng. Intern, Global Electrical Performance Verification Team
 Supervisor: Richard Gammack (Richard.Gammack@intel.com)
 Learned a 64-bit Intel chip design flow and design tools working on next-generation Itanium processor. Developed process to stitch together hierarchical RC SPEF networks. Collaborated with architects to correct connectivity mismatches between RTL code and circuit schematics.

2003 Jun. **Eaton Corporation, Milwaukee, WI, U.S.A.**
– Sept. Research Intern, Innovation Center, Embedded Systems and Comm. Group
Supervisor: José A. Gutierrez (JoseGutierrez@eaton.com)
Designed and demonstrated a bitwise IEEE 802.15.4 decoder in C using a digital logic analyzer. Composed and delivered project presentation to team, facility, and Chief Technology Officer.

EDUCATION

2013 **University of California, Berkeley**
Ph.D., Computer Science
Advisor: Professor David Culler
Dissertation: “Assessment and Methods for Supply-Following Loads in Modern Electricity Grids with Deep Renewables Penetration”
Minors: Statistical Learning and Management of Technology Certificate

2007 Master of Science, Computer Science
Advisor: Professor David Culler
Thesis: “Design, Deployment, and Analysis of Sustainable Sensor Networks for Environmental Monitoring”

2005 **The Ohio State University**
Bachelor of Science, Electrical and Computer Engineering
Magna cum Laude

PEER-REVIEWED PUBLICATIONS

* - Advisees/Interns

Conferences

Noman Bashir, David Irwin, Prashant Shenoy, and Jay Taneja. “Enforcing Fair Grid Energy Access for Controllable Distributed Solar Capacity.” In the 4th ACM International Conference on Systems for Energy-Efficient Build Environments (BuildSys’17), November 2017.

Nathan Williams*, Paulina Jaramillo, and Jay Taneja. “PV-array Sizing in Hybrid Diesel/PV/Battery Microgrids under Uncertainty.” In the IEEE PES PowerAfrica Conference, June 2016.

Adedamola Adepetu* and Jay Taneja. “Filling Spatial and Temporal Gaps in Development Surveys Using Night Lights.” In the UNESCO Chair Conference on Technologies for Development (Tech4Dev 2016), May 2016.

Douglas Fabini*, Diego Ponce de Leon Barido*, Akomeno Omu, and Jay Taneja. “Mapping Induced Residential Demand For Electricity in Kenya.” In the Fifth ACM Symposium on Computing for Development (DEV-5), December 2014.

Jay Taneja. “Growth in Renewable Generation and its Effect on Demand-Side Management.” In the Fifth IEEE International Conference on Smart Grid Communications (SmartGridComm’14), November 2014.

Jay Taneja, Ken Lutz, and David Culler. "The Impact of Flexible Loads in Increasingly Renewable Grids." In the Fourth IEEE International Conference on Smart Grid Communications (SmartGridComm'13), October 2013.

Jay Taneja, Virginia Smith, David Culler, and Catherine Rosenberg. "A Comparative Study of High Renewables Penetration Electricity Grids." In the Fourth IEEE International Conference on Smart Grid Communications (SmartGridComm'13), October 2013.

Jay Taneja, Andrew Krioukov, Stephen Dawson-Haggerty, and David Culler. "Enabling Advanced Environmental Conditioning with a Building Application Stack." In Proceedings of the 4th International Green Computing Conference (IGCC '13), June 2013. **Best paper award.**

Stephen Dawson-Haggerty, Andrew Krioukov, Jay Taneja, Sagar Karandikar, Gabe Fierro, Nikita Kitaev, and David Culler. "BOSS: Building Operating System Services." In Proceedings of the 10th USENIX Symposium on Networked Systems Design and Implementation (NSDI '13), April 2013.

Nathan Murthy*, Jay Taneja, Kamil Bojanczyk, David Auslander, and David Culler. "Energy-Agile Laptops: Demand Response of Mobile Plug Loads Using Sensor/Actuator Networks." In the Third IEEE International Conference on Smart Grid Communications (SmartGridComm'12), November 2012.

Anil Aswani, Neal Master, Jay Taneja, Andrew Krioukov, David Culler, and Claire Tomlin. "Quantitative Methods for Comparing Different HVAC Control Schemes." In the Sixth International ICST Conference on Performance Evaluation Methodologies and Tools (VALUETOOLS'12), October 2012.

Tyler C. Jones, David M. Auslander, Jay Taneja, Jason Trager, Michael Sankur, and Therese Peffer. "Improved Methods to Load Prediction in Commercial Buildings." In the ACEEE Summer Study on Energy Efficient Buildings, August 2012.

Jason Trager, Michael Sankur, Jorge Ortiz, Tyler Jones, Jay Taneja, Dave Auslander, David E. Culler, and Paul K. Wright. "Rapidly Adaptable Plug-load Simulation for Evaluating Energy Curtailment Strategies." In the ACEEE Summer Study on Energy Efficient Buildings, August 2012.

Therese Peffer, David Auslander, Domenico Caramagno, David Culler, Tyler Jones, Andrew Krioukov, Michael Sankur, Jay Taneja, Jason Trager, Sila Kiliccote, Rongxin Yin, Yan Lu, and Prasad Mukka. "Deep Demand Response: The Case Study of the CITRIS Building at the University of California-Berkeley." In the ACEEE Summer Study on Energy Efficient Buildings, August 2012.

H.Y. Iris Cheung, Steven Lanzisera, Judy Lai, Richard Brown, Stephen Dawson-Haggerty, Jay Taneja, and David Culler. "Detailed Energy Data Collection for Miscellaneous and Electronic Loads in a Commercial Office Building." In the ACEEE Summer Study on Energy Efficient Buildings, August 2012.

Anil Aswani, Neal Master, Jay Taneja, Andrew Krioukov, David Culler, and Claire Tomlin. "Energy-efficient Building HVAC Control Using Hybrid System LBMPC." In the IFAC Conference on Nonlinear Model Predictive Control, August 2012.

Jay Taneja, Randy Katz, and David Culler. "Defining CPS Challenges in a Sustainable Electricity Grid." In the ACM/IEEE Third International Conference on Cyber-Physical Systems, April 2012. (Invited)

Anil Aswani, Neal Master, Jay Taneja, Virginia Smith, Andrew Krioukov, David Culler, and Claire Tomlin. "Identifying Models of HVAC Systems Using Semiparametric Regression." In Proceedings of the American Control Conference, 2012.

Stephen Dawson-Haggerty, Steven Lanzisera, Jay Taneja, Richard Brown, and David Culler. "@scale: Insights from a Large, Long-Lived Appliance Energy WSN." In Proceedings of the 11th ACM/IEEE Conference on Information Processing in Sensor Networks, SPOTS Track (IPSN/SPOTS '12), April 2012.

Richard Brown, Steven Lanzisera, Hoi Ying (Iris) Cheung, Judy Lai, Xiaofan Jiang, Stephen Dawson-Haggerty, Jay Taneja, Jorge Ortiz, and David Culler. "Using Wireless Power Meters to Measure Energy Use of Miscellaneous and Electric Devices in Buildings." In the 6th International Conference on Energy Efficiency in Domestic Appliances and Lighting (EEDAL '11), Copenhagen, Denmark. May 2011.

Jay Taneja, David Culler, and Prabal Dutta. "Towards Cooperative Grids: Sensor/Actuator Networks for Renewables Integration." In the First IEEE International Conference on Smart Grid Communications (SmartGridComm'10), October 2010.

Xiaofan Jiang, Minh Van Ly, Jay Taneja, Prabal Dutta, and David Culler. "Experiences with a High-Fidelity Wireless Building Energy Auditing Network." In the Seventh ACM Conference on Embedded Networked Sensor Systems (SenSys'09), November 2009.

Prabal Dutta, Jay Taneja, Jaein Jeong, Xiaofan Jiang, and David Culler. "A Building Block Approach to Sensornet Systems." In the Sixth ACM Conference on Embedded Networked Sensor Systems (SenSys '08), November 2008.

Jay Taneja, Jaein Jeong, and David Culler. "Design, Modeling, and Capacity Planning for Micro-Solar Power Sensor Networks." In the Seventh International Conference on Information Processing in Sensor Networks Special Track on Platform Tools and Design Methods for Network Embedded Sensors (IPSN SPOTS '08), April 2008.

Prabal Dutta, Jonathan Hui, Jaein Jeong, Sukun Kim, Cory Sharp, Jay Taneja, Gilman Tolle, Kamin Whitehouse, and David Culler. "Trio: Enabling Sustainable and Scalable Outdoor Wireless Sensor Network Deployments." In the Fifth International Conference on Information Processing in Sensor Networks Special Track on Platform Tools and Design Methods for Network Embedded Sensors (IPSN SPOTS '06), April 2006.

Kamin Whitehouse, Gilman Tolle, Jay Taneja, Cory Sharp, Sukun Kim, Jaein Jeong, Jonathan Hui, Prabal Dutta, and David Culler. "Marionette: Providing an Interactive Environment for Wireless Debugging and Development." In the Fifth International Conference on Information Processing in Sensor Networks Special Track on Platform Tools and Design Methods for Network Embedded Sensors (IPSN SPOTS '06), April 2006.

Journals

Nathan Williams*, Paulina Jaramillo, and [Jay Taneja](#). "Investment Risk Assessment of Microgrid Utilities for Rural Electrification Using the Stochastic Techno-Economic Microgrid Model: A Case Study in Rwanda." Energy for Sustainable Development, 2017.

Diego Ponce de Leon Barido*, Simone Fobi Nsutezo*, and [Jay Taneja](#). "The Natural and Capital Infrastructure of Potential Post-Electrification Wealth Creation in Kenya." Energy, Sustainability and Society, 2017.

Nathan Williams*, Paulina Jaramillo, [Jay Taneja](#), and Taha Selim Ustun. "Enabling Private Sector Investment in Microgrid-based Rural Electrification in Developing Countries: A Review." Renewable and Sustainable Energy Reviews, 2015.

Steven Lanzisera, Stephen Dawson-Haggerty, H.Y. Iris Cheung, [Jay Taneja](#), David Culler, and Richard Brown. "Methods for Detailed Energy Data Collection of Miscellaneous and Electronic Loads in a Commercial Office Building." Building and Environment, 2013.

Thomas Clasen, Douglas Fabini*, Sophie Boisson, [Jay Taneja](#), Joshua Song*, Elisabeth Aichinger, Anthony Bui*, Sean Dadashi*, Wolf-Peter Schmidt, Zachary Burt, and Kara L. Nelson. "Making Sanitation Count: Developing and Testing a Device for Assessing Latrine Use in Low-Income Settings." Environmental Science and Technology, 2012.

Anil Aswani, Neal Master, [Jay Taneja](#), David E. Culler, and Claire Tomlin. "Reducing Transient and Steady State Electricity Consumption in HVAC Using Learning-based Model Predictive Control." Proceedings of the IEEE, volume 100, no. 1: 240-253. 2011.

Randy H. Katz, David E. Culler, Seth Sanders, Sara Alspaugh, Yanpei Chen, Stephen Dawson-Haggerty, Prabal Dutta, Mike He, Xiaofan Jiang, Laura Keys, Andrew Krioukov, Ken Lutz, Jorge Ortiz, Prashanth Mohan, Evan Reutzler, [Jay Taneja](#), Jeff Hsu, and Sushant Shankar. "An Information-Centric Energy Infrastructure: the Berkeley View." Sustainable Computing: Informatics and Systems 1 (2011): 7-22.

Workshops

Steven Lanzisera, Stephen Dawson-Haggerty, Xiaofan Jiang, Hoi Ying Cheung, [Jay Taneja](#), Judy Lai, Jorge Ortiz, David Culler, and Richard Brown. "Wireless Electricity Metering of Miscellaneous and Electronic Devices in Buildings." In the 2011 Future of Instrumentation International Workshop, November 2011.

Prabal Dutta, Mark Feldmeier, [Jay Taneja](#), Joseph Paradiso, and David Culler. "Energy Metering for Free: Augmenting Switching Regulators for Real-Time Monitoring." In the International Symposium on Low-Power Electronics and Design (ISLPED '08) Design Contest, August 2008. Design Contest winner.

Xiaofan Jiang, [Jay Taneja](#), Jorge Ortiz, Arsalan Tavakoli, Prabal Dutta, Jaein Jeong, David Culler, Philip Levis, and Scott Shenker. "An Architecture for Energy Management in Wireless Sensor Networks." In the International Workshop on Wireless Sensor Network Architecture (WWSNA'07), April 2007.

Phoebus Chen, Songhwai Oh, Michael Manzo, Bruno Sinopoli, Cory Sharp, Kamin Whitehouse, Gilman Tolle, Jaein Jeong, Prabal Dutta, Jonathan Hui, Shawn Schaffert, Sukun Kim, [Jay Taneja](#), Bonnie Zhu, Tanya Roosta, Michael Howard, David Culler, and Shankar Sastry.

"Experiments in Instrumenting Wireless Sensor Networks for Real-Time Surveillance." In the 2006 IEEE International Conference on Robotics and Automation (ICRA '06). Video and Poster.

SERVICE

ACM e-Energy 2018 – Conference – Technical Program Committee
ICTD 2017 – Conference – Technical Program Committee
ACM BuildSys 2016 – Conference – Technical Program Committee
ACM DEV 2016 – Conference – Technical Program Committee
ACM DEV 2016 – Conference – Poster Chair
ACM e-Energy 2016 – Conference – Publications Chair
IARIA ENERGY 2016 – Conference – Technical Program Committee
IEEE PerEnergy 2016 – Workshop – Technical Program Committee
ACM e-Energy 2015 – Conference – Technical Program Committee
ACM DEN 2015 – Workshop (co-located with ACM e-Energy) – Co-Chair
IEEE AfriCon 2015 – Conference – Technical Program Committee
IFIP/IEEE SustainIT 2015 – Conference – Technical Program Committee
IEEE PerEnergy 2015 – Workshop – Technical Program Committee

INVITED TALKS

9/6/2017 – Georgia Tech (Host: Valerie Thomas)
7/6/2017 – Lawrence Berkeley National Lab – Energy and Environmental Technologies Division (Host: Rich Brown)
6/30/2017 – MCC (Host: Hana Freymiller)
6/29/2017 – World Bank (Host: Rhonda Jordan)
5/18/2017 – Duke University Energy Initiative (Host: Kyle Bradbury)
4/25/2017 – IEEE Springfield (MA) Chapter (Host: Ken Harstine)
4/5/2017 – UN Sustainable Energy for All (SE4All) Annual Conference (Host: Vijay Modi)
10/13/2016 – Carnegie Mellon University Africa – Kigali, Rwanda (Host: Paulina Jaramillo)

TEACHING EXPERIENCE

2017 Jan. **University of Massachusetts, Amherst**
– *present* ECE 597ED/697ED (Electricity Delivery and Infrastructure in the Developing World) – Fall 2017
ECE 232 (Computer Organization and Design – Co-Instructor) – Spring 2017

2005 Aug. **University of California, Berkeley**
– *Dec.* Graduate Student Instructor under the guidance of Prof. Babak Ayazifar (babak@eecs.berkeley.edu).
Head teaching assistant for EECS 20N, an introductory course on signals and systems. Led weekly meetings to coordinate team of nine teaching assistants for a course with enrollment of 230 students. Served as chief liaison between professor and teaching team. Also taught weekly laboratory and discussion sections along with grading laboratory write-ups.

STUDENTS ADVISED

*sole advisor, +on committee

Ph.D.

- *Santiago Correa Cardona (UMass) – Electrical and Computer Engineering, model of crowdsourced system for monitoring electricity outages in a developing world city (2017-present)
- +Destenie Nock (UMass) – Industrial Engineering, model for integration of renewables into grid planning systems (2017-present)
- +Simone Fobi (Columbia) – Mechanical Engineering, analysis and prediction of electricity consumption patterns among sub-Saharan African consumers (2016-present)
- Noah Klugman (University of Michigan) – Computer Science, enhanced GridWatch mobile application for detecting the occurrence of electricity grid outages using unplugged commodity smartphones (2016-present)
- Gabriel Cadamuro (University of Washington) – Computer Science, built machine learning models to develop road quality predictions using satellite mapping imagery in urban and rural sub-Saharan Africa (2016-present)
- Adedamola Adepetu (University of Waterloo) – Computer Science, built machine learning models for using satellite night light imagery to interpolate socioeconomic data over time and space for Kenya and Nigeria (2015-2016)
- +Nathan Williams (Carnegie Mellon) – Engineering and Public Policy, built a techno-economic model for analyzing investment risks of private capital in microgrids for electricity access (2015-2017)
- Diego Ponce de León Baridó (UC Berkeley) – Energy and Resources Group, created a metric for the intensity of microenterprise development across Kenya to be used for determining latent nonresidential electricity demand (2014-2015)
- Douglas Fabini (UC Santa Barbara) – Materials Science and Engineering, formulated and evaluated a methodology for determining latent residential electricity consumption for unelectrified locales in Kenya (2014)

M.S.

- Neha Yadav (UMass) – Computer Science, design of a system for measuring roof size and type using satellite imagery (2017-present)
- Simone Fobi (Stanford) – Environmental Engineering, design and analysis of an optimization model for directing energy storage research for applications in off-grid electricity systems in Kenya and development of a GIS-based model for selecting optimal off-grid electricity sources for Kenya (2014-2015)
- Majid Khan (UC Berkeley) – Industrial Engineering and Operations Research, design and deployment of rainwater cistern water level sensor for supporting research in Brazil (2011-2016)
- Deepak Subramanian (UC Berkeley) – School of Information, design and deployment of second-generation latrine usage sensor for supporting research in India (2011-2012)
- Anu Sridharan and Jack Reilly (UC Berkeley) – Civil Engineering, sensors for detecting electricity grid frequency (2010)

B.S.

- Chulabhaya Wijesundara (UMass) – Electrical and Computer Engineering, development of a system for using internal temperature sensors on mobile phones for measuring indoor air temperatures (2017-2018)
- Joseph Breda (UMass) – Electrical and Computer Engineering, development of a

- system to indirectly measure electricity grid voltage using mobile phones (2017-2018)
- Stephanie Yan and Jeffrey Nieh (UC Berkeley) – Computer Science, development of a city-scale dashboard combining housing energy and real estate data for improving city planning (2012)
- Nathan Murthy (UC Berkeley) – Applied Mathematics, development of a supply-aware laptop battery charging algorithm (2010-2012)
- Douglas Fabini, Joshua Song, Anthony Bui, and Sean Dadashi (UC Berkeley) – Mechanical Engineering, design and deployment of first-generation latrine usage sensor for supporting research in India (2010-2011)
- Greg Rulifson, Nicole Walter, and Lauren Valdez (UC Berkeley) – Civil Engineering and Architecture, advice on a sustainable housing project in French Polynesia (2009-2010)
- Larry Ly (UC Berkeley) – Electrical Engineering, deployment of a solar-powered microclimate sensing network in a forest (2008-2009)

AWARDS, HONORS, AND ACCOMPLISHMENTS

<i>2013</i>	Lawrence Berkeley National Laboratory, EETD Rosenfeld Postdoctoral Fellowship (declined)
<i>2012</i>	California Council on Science and Technology Policy Fellowship (declined)
<i>2007–10</i>	National Defense Science & Engineering Graduate (NDSEG) Fellowship
<i>2001</i>	National Merit Finalist

REFERENCES

David Culler
Professor, Computer Science
University of California, Berkeley
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510-643-7572

Randy Katz
Professor, Computer Science
University of California, Berkeley
randy@cs.berkeley.edu
510-642-8778

Kara Nelson
Professor, Civil and Environmental Engineering
University of California, Berkeley
nelson@ce.berkeley.edu
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Paulina Jaramillo
Assistant Professor, Engineering and Public Policy
Carnegie Mellon University
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