

# Sean K. Barker

Bowdoin College  
Department of Computer Science  
8650 College Station, Room 220  
Brunswick, ME 04011

Phone: 207-798-4220  
Email: [sbarker@bowdoin.edu](mailto:sbarker@bowdoin.edu)  
Web: <http://www.bowdoin.edu/~sbarker>

**INTERESTS** I am broadly interested in distributed systems, green computing, and sustainability, with particular attention towards the design of smart buildings. My research emphasizes the design and implementation of novel software systems and real-world data analysis to address these challenges.

**EDUCATION**

- ◇ **University of Massachusetts Amherst**, Ph.D. in Computer Science, September 2014
  - Advisors: Prashant Shenoy and David Irwin
  - Dissertation: “Model-Driven Analytics of Energy Meter Data in Smart Homes”
- ◇ **University of Massachusetts Amherst**, M.S. in Computer Science, February 2012
- ◇ **Williams College**, B.A. with Honors in Computer Science, June 2009

**PROFESSIONAL** ◇ **Assistant Professor, Bowdoin College**  
**APPOINTMENTS** *Department of Computer Science*, Fall 2016 – Present

- ◇ **Visiting Assistant Professor, Bowdoin College**  
*Department of Computer Science*, Fall 2014 – Spring 2016
- ◇ **Teaching Associate, University of Massachusetts Amherst**  
*School of Computer Science*, Spring 2014
- ◇ **Research Assistant, University of Massachusetts Amherst**  
*School of Computer Science*, Fall 2009 – Spring 2014
- ◇ **Research Intern, NEC Laboratories America**  
*Data Management Department*, Summer 2011 and Summer 2012
- ◇ **IT Consultant, Graduate Employee Organization**  
*University of Massachusetts Amherst*, Fall 2010 – August 2017
- ◇ **Engineering Intern, Google**  
*Developer Operations Team*, Summer 2008

**HONORS & AWARDS**

- ◇ **BuildSys '14 paper chosen as Best Paper Award runner-up (top 3 of 59 submissions), 2014**
- ◇ **PerCom '12 paper chosen as Best Paper Award runner-up (top 3 of 150 submissions), 2012**
- ◇ **ASPLOS '11 paper chosen as IEEE Sustainable Computing Register Pick of the Month, 2012**
- ◇ **NSF Graduate Research Fellowship Honorable Mention, 2010, 2011**

JOURNAL  
ARTICLES

- ◇ **Pervasive Energy Monitoring and Control through Low-Bandwidth Power Line Communication**  
Sean Barker, David Irwin, and Prashant Shenoy. *IEEE Internet of Things Journal (IEEE IoT)*, vol. 4, no. 5, pp. 1349-1359, October 2017.
- ◇ **Managing Server Clusters on Intermittent Power**  
Navin Sharma, Dilip Krishnappa, Sean Barker, David Irwin, and Prashant Shenoy. *PeerJ Computer Science (PeerJ)* 1:e34, December 2015.
- ◇ **Empirical Characterization, Modeling, and Analysis of Smart Meter Data**  
Sean Barker, Sandeep Kalra, David Irwin, and Prashant Shenoy. *IEEE Journal on Selected Areas in Communications (J-SAC)*, vol. 32, no. 7, pp. 1312-1327, June 2014. Acceptance ratio: 16/57 = 28%.

CONFERENCE  
PUBLICATIONS

- ◇ **PowerPlay: Creating Virtual Power Meters through Online Load Tracking**  
Sean Barker, Sandeep Kalra, David Irwin, and Prashant Shenoy. *Proceedings of the 1st ACM International Conference on Embedded Systems for Energy-Efficient Buildings (BuildSys 2014)*, Memphis, TN, November 2014. Acceptance ratio: 15/59 = 25%.  
**Best Paper Award runner-up.**
- ◇ **Non-Intrusive Load Identification for Smart Outlets**  
Sean Barker, Moaj Musthag, David Irwin, and Prashant Shenoy. *Proceedings of the 5th IEEE International Conference on Smart Grid Communications (SmartGridComm 2014)*, Venice, Italy, November 2014. Acceptance ratio: 166/399 = 42%.
- ◇ **ShuttleDB: Database-Aware Elasticity in the Cloud**  
Sean Barker, Yun Chi, Hakan Hacigumus, Prashant Shenoy, and Emmanuel Cecchet. *Proceedings of the 11th International Conference on Autonomic Computing (ICAC 2014)*, Philadelphia, PA, June 2014. Acceptance ratio: 12/53 = 22%.
- ◇ **Empirical Characterization and Modeling of Electrical Loads in Smart Homes**  
Sean Barker, Sandeep Kalra, David Irwin, and Prashant Shenoy. *Proceedings of the 2013 IEEE International Green Computing Conference (IGCC 2013)*, Arlington, VA, June 2013.
- ◇ **An Empirical Study of Memory Sharing in Virtual Machines**  
Sean Barker, Timothy Wood, Prashant Shenoy, and Ramesh Sitaraman. *Proceedings of the 2012 USENIX Annual Technical Conference (USENIX ATC 2012)*, Boston, MA, June 2012. Acceptance ratio: 33/234 = 14%.
- ◇ **“Cut Me Some Slack”: Latency-Aware Live Migration for Databases**  
Sean Barker, Yun Chi, Hyun Jin Moon, Hakan Hacigumus, and Prashant Shenoy. *Proceedings of the 15th International Conference on Extending Database Technology (EDBT 2012)*, Berlin, Germany, March 2012. Acceptance ratio: 43/193 = 22%.
- ◇ **SmartCap: Flattening Peak Electricity Demand in Smart Homes**  
Sean Barker, Aditya Mishra, David Irwin, Prashant Shenoy and Jeannie Albrecht. *Proceedings of the 10th IEEE International Conference on Pervasive Computing and Communications (PerCom 2012)*, Lugano, Switzerland, March 2012. Acceptance ratio: 16/150 = 11%.  
**Best Paper Award runner-up.**
- ◇ **Blink: Managing Server Clusters on Intermittent Power**  
Navin Sharma, Sean Barker, David Irwin, and Prashant Shenoy. *Proceedings of the 16th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2011)*, Newport Beach, CA, March 2011. Acceptance ratio: 35/152 = 21%.  
**IEEE Sustainable Computing Register Pick of the Month, June 2012.**
- ◇ **Empirical Evaluation of Latency-sensitive Application Performance in the Cloud**  
Sean Barker and Prashant Shenoy. *Proceedings of the 1st ACM Multimedia Systems Conference (MMSys 2010)*, Scottsdale, AZ, February 2010. Acceptance ratio: 25/59 = 42%.

- WORKSHOP PUBLICATIONS
- ◇ **Improving the Scalability of Search in Networks Through Multiple Random Walks**  
Mark Squillante, Don Towsley, and **Sean Barker**. *Proceedings of the 16th Workshop on Mathematical performance Modeling and Analysis (MAMA 2014)*, Austin, TX, June 2014.
  - ◇ **NILM Redux: The Case for Emphasizing Applications over Accuracy**  
**Sean Barker**, Sandeep Kalra, David Irwin, and Prashant Shenoy. *Proceedings of the Second International Workshop on Non-Intrusive Load Monitoring (NILM 2014)*, Austin, TX, June 2014.
  - ◇ **Non-Intrusive Occupancy Monitoring using Smart Meters**  
Dong Chen, **Sean Barker**, Adarsh Subbaswamy, David Irwin, and Prashant Shenoy. *Proceedings of the 5th ACM Workshop on Embedded Systems for Energy-Efficiency in Buildings (BuildSys 2013)*, Rome, Italy, November 2013. Acceptance ratio: 22/57 = 39%.
  - ◇ **Smart\*: An Open Data Set and Tools for Enabling Research in Sustainable Homes**  
**Sean Barker**, Aditya Mishra, David Irwin, Emmanuel Cecchet, Prashant Shenoy, and Jeannie Albrecht. *Proceedings of the 2012 Workshop on Data Mining Applications in Sustainability (SustKDD 2012)*, Beijing, China, August 2012.
  - ◇ **Exploiting Home Automation Protocols for Load Monitoring in Smart Buildings**  
David Irwin, Anthony Wu, **Sean Barker**, Aditya Mishra, Prashant Shenoy, and Jeannie Albrecht. *Proceedings of the 3rd ACM Workshop on Embedded Sensing Systems for Energy-Efficiency in Buildings (BuildSys 2011)*, Seattle, WA, November 2011. Acceptance ratio: 10/29 = 35%.
- OTHER PUBLICATIONS
- ◇ **Model-Driven Analytics of Energy Meter Data in Smart Homes**  
**Sean Barker**. *Doctoral dissertation, University of Massachusetts Amherst, June 2014*.
  - ◇ **Kudzu: A Decentralized and Self-Organizing Peer-to-Peer File Transfer System**  
**Sean Barker**. *Honors thesis, Williams College, May 2009*.
  - ◇ **Kudzu: A Self Balancing P2P File Transfer System**  
**Sean Barker**, Marius Catalin Iordan, Jeannie Albrecht, and Barath Raghavan. *Poster session of the 3rd Workshop on Tackling Computer Systems Problems with Machine Learning Techniques (SysML 2008)*, San Diego, CA, December 2008.
- FUNDING
- ◇ Bowdoin College Course Development Award for Distributed Systems (2015)
  - ◇ NSF and USENIX travel grants for USENIX ATC, PerCom, EDBT (2012)
- PROFESSIONAL SERVICE
- ◇ Technical Program Committee member:
    - ACM e-Energy (2018)
    - ACM BuildSys (2017, 2016)
    - NILM (2016)
  - ◇ External reviewer:
    - ACM Transactions on Cyber-Physical Systems (TCPS)
    - ACM Transactions on Sensor Networks (TOSN)
    - ACM Transactions on Storage (TOS)
    - IEEE Transactions on Cloud Computing (TCC)
    - IEEE Journal on Selected Areas in Communication (JSAC)
    - IEEE Internet of Things Journal (IoT)
    - IEEE Computer Architecture Letters
    - Pervasive and Mobile Computing
    - Applied Energy
    - Journal of Cloud Computing

- COLLEGE SERVICE
- ◇ Committee work:
    - Executive Director of Career Planning Search Committee, 2018
    - Curriculum Implementation Committee (CIC), 2017–present
  - ◇ Bowdoin Science Experience (BSE) faculty mentor, 2015
- TECHNICAL TALKS
- ◇ “Non-Intrusive Load Identification for Smart Outlets” at SmartGridComm 2014.
  - ◇ “NILM Redux: The Case for Emphasizing Applications over Accuracy” at NILM 2014.
  - ◇ “Empirical Characterization and Modeling of Electrical Loads in Smart Homes” at IGCC 2013.
  - ◇ “Smart\*: An Open Data Set and Tools for Enabling Research in Sustainable Homes” at SustKDD 2012.
  - ◇ “An Empirical Study of Memory Sharing in Virtual Machines” at USENIX 2012.
  - ◇ “Cut Me Some Slack: Latency-Aware Live Migration for Databases” at EDBT 2012.
  - ◇ “SmartCap: Flattening Peak Electricity Demand in Smart Homes” at PerCom 2012.
  - ◇ “Exploiting Home Automation Protocols for Load Monitoring in Smart Buildings” at BuildSys 2011.
  - ◇ “Empirical Evaluation of Latency-sensitive Application Performance in the Cloud” at MMSys 2010.
- STUDENTS
- ◇ Honors Thesis Supervision
    - Dylan Parsons, Bowdoin College (2018)
  - ◇ Summer Research Supervision
    - Dylan Parsons, Bowdoin College (2017)
    - Tucker Williams, Bowdoin College (2017)
    - Ben Wolf, Bowdoin College (2017)
    - Bridget Went, Bowdoin College (2016)
    - Son Ngo, Bowdoin College (2016)
    - Lyle (Bo) Bleckel, Bowdoin College (2016)
    - James Boyle, Bowdoin College (2016)
- COURSES TAUGHT
- ◇ Introduction to Computer Science (CSCI 1101)
  - ◇ Data Structures (CSCI 2101)
  - ◇ Foundations of Computer Systems (CSCI 2330)
  - ◇ Operating Systems (CSCI 3310)
  - ◇ Distributed Systems (CSCI 3325)