

Josiah D. Hester

Electrical Engineering and Computer Science
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Research Interests

My goal is to make **sophisticated batteryless sensing** a reality. I explore and develop new hardware designs, software techniques, tools, and programming abstractions so that developers can easily design, debug, and deploy intricate batteryless applications that work in spite of frequent power failures. This enables the scale and vision of the Internet-of-Things, where trillions of invisible sensors sense and communicate for applications in wearables, space exploration, smart homes, infrastructure monitoring and wildlife tracking.

My work has received a **Best Paper Award**, a **Best Paper Nomination**, and two **Best Poster Awards**, and has consistently appeared in top conferences like ACM SenSys, and top journals like ACM TECS.

Education

Clemson University

Ph.D. in Computer Science
Dissertation Title: *Sophisticated Batteryless Sensing*
Advisor: Jacob M. Sorber

May 2017

Clemson University

Calhoun Honors College, *General and Departmental Honors*
B.S. in Computer Science, *Cum Laude*

2011

Academic Positions

Assistant Professor

Computer Engineering Division
Electrical Engineering and Computer Science
Northwestern University

2017 – Present

Awards

Best Paper Nominee, 15th ACM Conference on Embedded Networked Sensor Systems (SenSys'17)¹

Best Paper Award, 12th ACM Conference on Embedded Networked Sensor Systems (SenSys'14)

Outstanding Ph.D. Student in Computer Science for 2016, School of Computing, Clemson Univ.²

Best Poster Award, 13th ACM Conference on Embedded Networked Sensor Systems (SenSys'15)

Best Poster Award, IEEE International Conference on Sensing, Communication, and Networking (SECON'13)

¹Best paper nominees at SenSys'17 were the Top 3% of all papers submitted.

²One award per year, voted by SoC faculty.

Publications

Refereed Conference Papers

New Directions: The Future of Sensing is Batteryless, Intermittent, and Awesome

J. Hester, J. Sorber

15th ACM Conference on Embedded Networked Sensor Systems (SenSys'17)

[23.5% acceptance rate]

Flicker: Rapid Prototyping for the Batteryless Internet-of-Things

J. Hester, J. Sorber

15th ACM Conference on Embedded Networked Sensor Systems (SenSys'17)

[17.2% acceptance rate]

Best Paper Nominee — Top 3%

Timely Execution on Intermittently Powered Batteryless Sensors

J. Hester, K. Storer, J. Sorber

15th ACM Conference on Embedded Networked Sensor Systems (SenSys'17)

[17.2% acceptance rate]

Amulet: An Energy-Efficient, Multi-Application Wearable Platform

J. Hester, T. Yun, T. Peters, R. Peterson, J. Skinner, B. Golla, K. Storer, S. Hearndon, K. Freeman, S. Lord, R. Halter, D. Kotz, J. Sorber

14th ACM Conference on Embedded Networked Sensor Systems (SenSys'16)

[17.6% acceptance rate]

Tragedy of the Coulombs: Federating Energy Storage for Tiny, Intermittently-Powered Sensors

J. Hester, L. Sitanayah, J. Sorber

13th ACM Conference on Embedded Networked Sensor Systems (SenSys'15)

[19.8% acceptance rate]

Ekho: Realistic and Repeatable Experimentation for Tiny Energy-Harvesting Sensors

J. Hester, T. Scott, J. Sorber

12th ACM Conference on Embedded Networked Sensor Systems (SenSys'14)

[17.9% acceptance rate]

Best Paper Award

Refereed Journal Publications

Realistic and Repeatable Emulation of Energy Harvesting Environments

J. Hester, L. Sitanayah, T. Scott, J. Sorber

ACM Transactions on Sensor Networks (TOSN), Volume 13, Issue 2 (June 2017)

Shoulder Angel: An Open Platform for Reprogramming Wayward Wireless Sensors

N. Tobias, M. Bolton, J. Hester, J. Sorber

IEEE Embedded Systems Letters, Volume 8, Issue 4 (December 2016)

Persistent Clocks for Batteryless Sensing Devices

J. Hester, N. Tobias, A. Rahmati, L. Sitanayah, D. Holcomb, K. Fu, W. Burlison, J. Sorber
ACM Transactions on Embedded Computing (TECS), 15, 4, Article 77 (August 2016)

uRespond: iPad as Interactive, Personal Response System

S. Bryfczynski, R. Brown, J. Hester, A. Herrmann, D. Koch, M. Cooper, N. Grove
Journal of Chemical Education 2014 91 (3), 357-363

Refereed Workshop Papers**Personalized Medicine in the Wearable Era: Translational Barriers and Call to Action**

N. Alshurafa, J. Hester
ACM International Workshop on Human-centered Sensing, Networking, and Systems (HumanSys'17)

Deploying Data-Driven Security Solutions on Resource-Constrained Wearable IoT System

H. Cai, T. Yun, J. Hester, K. Venkatasubramanian
International Workshop on the Internet of Things Computing and Applications (IoTCA'17)

Realistic Simulation for Tiny Batteryless Sensors

M. Furlong, J. Hester, K. Storer, J. Sorber
4th International Workshop on Energy Harvesting & Energy Neutral Sensing Systems (ENSsys'16)

Towards A Language and Runtime for Intermittently Powered Devices

J. Hester, K. Storer, L. Sitanayah, J. Sorber
1st Workshop on Hilariously Low-Power Computing (HLPC'16)

Other Refereed Works**Remote and Wireless Long-term Vibration Monitoring of Historic Monuments**

J. Hester, S. Prabhu, S. Atamturkter, J. Sorber
10th International Conference on Structural Dynamics (EURODYN), September 2017 (Article)

The Amulet Wearable Platform

J. Hester, T. Yun, T. Peters, R. Peterson, J. Skinner, B. Golla, S. Hearndon, K. Storer,
S. Lord, R. Halter, D. Kotz, J. Sorber
14th ACM Conference on Embedded Networked Sensor Systems (SenSys), November 2016 (Demo)

Sophisticated Sensing on Transient Power

J. Hester
13th ACM Conference on Embedded Networked Sensor Systems (SenSys), November 2015 (PhD Forum)

Towards Robust Reprogrammability for Wireless Sensors

N. Tobias, C. Bolton, J. Hester, L. Sitanayah, J. Sorber
13th ACM Conference on Embedded Networked Sensor Systems (SenSys), November 2015 (Poster)
[**Best Poster Award**]

A Hardware Platform for Separating Energy Concerns in Tiny, Intermittently-Powered Sensors

J. Hester, L. Sitanayah, J. Sorber

13th ACM Conference on Embedded Networked Sensor Systems (SenSys), November 2015 (Demo)

Classroom Uses for BeSocratic

S. Bryfczynski, R. Brown, J. Hester, A. Herrmann, D. Koch, M. Cooper, N. Grove

The Impact of Pen and Touch Technology on Education, Springer, 2015, 127-136 (Book Chapter)

Ekho: Realistic And Repeatable Experimentation For Tiny Energy-harvesting Sensors

J. Hester, T. Scott, J. Sorber

12th ACM Conference on Embedded Networked Sensor Systems (SenSys), November 2014 (Demo)

Enabling Sustainable Sensing in Adverse Environments

J. Hester, L. King, J. Propst, K. Piratla, J. Sorber

IEEE International Conference on Sensing, Communication, and Networking (SECON), June 2013 (Poster)

[Best Poster Award]

Research Artifacts

Amulet Wearable Platform*An open source, open hardware wearable platform and toolchain for developing energy and resource-efficient applications on multi-application, extremely long lived, wearable devices.*<https://github.com/AmuletGroup/amulet-project>**Ekho***Ekho is an emulator capable of recording energy harvesting conditions and accurately recreating those conditions in the lab. This makes it possible to conduct realistic and repeatable experiments involving energy harvesting devices. Ekho is a general-purpose, mobile tool that supports any harvesting technology.*<https://github.com/jhester/ekho>

Presentations

Amulet: An Energy-Efficient, Multi-Application Wearable Platform

14th ACM Conference on Embedded Networked Sensor Systems (SenSys'16)

Towards A Language and Runtime for Intermittently Powered Devices

1st Workshop on Hilariously Low-Power Computing (HLPC'16)

Tragedy of the Coulombs: Federating Energy Storage for Tiny, Intermittently-Powered Sensors

13th ACM Conference on Embedded Networked Sensor Systems (SenSys'15)

Ekho: Realistic and Repeatable Experimentation for Tiny Energy-Harvesting Sensors

12th ACM Conference on Embedded Networked Sensor Systems (SenSys'14)

Teaching Experience

CPSC 4820/6820: Embedded Systems Prototyping (Clemson University)

Instructor and Course Designer, Fall 2015

CPSC 3220: Operating Systems (Clemson University)

Guest Lecturer, Spring 2015

CPSC 2150: Software Development Foundations (Clemson University)

Teaching Assistant, Spring 2012

Undergraduate Mentoring

Taylor Hardin, *PERSIST Lab 2015-2016*, now at Dartmouth College

Connor Bolton, *PERSIST Lab 2015-2016*, now at Univ. of Michigan, Ann Arbor

Austin Anderson, *PERSIST Lab 2016*, now at Google

Matthew Furlong, *PERSIST Lab 2014-2016*, now at Univ. of Michigan, Ann Arbor

Diana Zhang, *REU 2014*, now at Carnegie Mellon University

Kyle McGuigan, *PERSIST Lab 2013-2014*, now at SPARC

Service and Professional Development

Panelist, *ACM Conference on Embedded Networked Sensor Systems (SenSys)*, 2017

Panelist, *ACM Workshop on the Engineering of Reliable, Robust, and Secure Embedded Wireless Sensing Systems (FAILSAFE)*, 2017

TPC Member, *IEEE Workshop on Sensing Systems and Applications Using Wrist Worn Smart Devices (Wrist-Sense)*, 2018

TPC Member, *ACM Workshop on the Engineering of Reliable, Robust, and Secure Embedded Wireless Sensing Systems (FAILSAFE)*, 2017

Publicity Chair, *ACM Workshop on Energy Harvesting & Energy Neutral Sensing Systems (ENSsys)*, 2017

TPC Member, *ACM Workshop on Energy Harvesting & Energy Neutral Sensing Systems (ENSsys)*, 2017

Invited Attendee, *2016 NextProf Fall Engineering Workshop at the University of Michigan in Ann Arbor*³, 2016

Publicity Chair, *ACM Workshop on Energy Harvesting & Energy Neutral Sensing Systems (ENSsys)*, 2016

TPC Member, *ACM Workshop on Energy Harvesting & Energy Neutral Sensing Systems (ENSsys)*, 2016

Shadow TPC Member, *ACM/IEEE Information Processing in Sensor Networks (IPSN)*, 2015 and 2016

Member, *College of Engineering and Science Student Advisory Board (CESSAB)*, at Clemson Univ., 2015

Secretary, *School of Computing Graduate Student Association at Clemson Univ.*, 2014

Chairman, *Student Advisory Board for Online Education at Clemson Univ.*, 2012-2013

³NextProf candidates must go through a competitive selection process.

Memberships

Member, *Institute of Electrical and Electronics Engineers (IEEE), 2016-*

Member, *Association for Computing Machinery (ACM), 2015-*

Member, *Upsilon Pi Epsilon, National Computer Science Honorary Society, 2013-*

Consulting Experience

International ThermoDyne

Development of miniaturized Ekho device for energy harvesting profiling , 2015

Penton Media

Development of Android / iOS media platform , 2013-2014