

# Shaohan Hu

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RESEARCH INTERESTS	My research interests include cyber-physical systems, mobile ubiquitous computing, crowd and social sensing, big data analytics, cloud computing, and quantum computing.	
WORK	<b>IBM T. J. Watson Research Center</b> , Yorktown Heights, NY Research Staff Member	March 2017–Present
	<b>IBM T. J. Watson Research Center</b> , Yorktown Heights, NY Postdoctoral Researcher	September 2016–March 2017
	<b>University of Illinois at Urbana-Champaign</b> , Urbana, IL Research Assistant	January 2012–December 2016
	<b>Intel Corporation</b> - New Devices Group, Santa Clara, CA Graduate Intern Technical	May 2014–September 2014
	<b>University of Illinois at Urbana-Champaign</b> , Urbana, IL Teaching Assistant	August 2011–December 2011
	<b>Dartmouth College</b> , Hanover, NH Teaching Assistant	September 2008–September 2010
	<b>University of Massachusetts at Amherst</b> , Amherst, MA Teaching Assistant	January 2008–May 2008
EDUCATION	<b>Ph.D.</b> , Computer Science University of Illinois at Urbana-Champaign, IL USA Advisor: Tarek F. Abdelzaher	May 2017
	<b>M.S.</b> , Computer Science Dartmouth College, NH USA Advisor: Andrew T. Campbell	June 2011
	<b>B.S.</b> , <i>magna cum laude</i> , Computer Science, Mathematics and Statistics University of Massachusetts at Amherst, MA USA	May 2008
SERVICES	<b>Technical Program Committee</b> The Web Conference (WWW) IEEE International Workshop on Mission-Oriented Wireless Sensor and Cyber-Physical System Networking (MISENET) International Conference on Emerging Networks and Systems Intelligence (EMERGING) International Conference on Cyber-Technologies and Cyber-Systems (CYBER) International Conference on Sensor Technologies and Applications (SENSORCOMM) International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies (UBICOMM) ACM/IEEE International Conference on Information Processing in Sensor Networks - Posters (IPSN POSTERS)	2018  2018 2017 2017 2017 2012–2017 2016

### Conference Reviewer

ACM International Conference on Embedded Networked Sensor Systems (SENSYS)	2015–2017
ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN)	2017
International Conference on Decision and Control (CDC)	2016
International Symposium on Mobile Ad Hoc Networking and Computing (MOBIHOC)	2016
IEEE International Conference on Computer Communications (INFOCOM)	2015, 2016
IEEE International Conference on Distributed Computing Systems (ICDCS)	2015
IEEE International Conference on Communications (ICC)	2015
International Conference on Connected Vehicles & Expo (ICCVE)	2014
Military Communications Conference (MILCOM)	2014
IEEE International Conference on Sensing, Communication, and Networking (SECON)	2014
IEEE International Conference on Data Mining (ICDM)	2013
International Conference on Computing and Convergence Technology (ICCCT)	2013
ACM International Conference on Ubiquitous Computing (UBICOMP)	2012

### Journal Reviewer

Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)	2017
IEEE Transactions on Mobile Computing (TMC)	2014–2017
IEEE Transactions on Services Computing (TSC)	2017
IEEE Transactions on Computers (TC)	2017
Knowledge-Based Systems	2017
Current Signal Transduction Therapy (CSTT)	2017
Computer Networks (COMNET)	2017
Ain Shams Engineering Journal	2017
Computers	2017
Sensors	2016, 2017
ACM Transactions on Sensor Networks (TOSN)	2016
ACM Transactions on Cyber-Physical Systems (TCPS)	2016
Frontiers of Information Technology & Electronic Engineering	2016
Mobile Information Systems	2016
IEEE Transactions on Wireless Communications (TWC)	2015
IEEE Transactions on Industrial Informatics (TII)	2014
IEEE/ACM Transactions on Networking (TON)	2014
Ad Hoc & Sensor Wireless Networks	2013
International Journal of Geo-Information	2012

### PUBLICATIONS

IMWUT 2017	Yiran Zhao, Shuochao Yao, Shen Li, <b>Shaohan Hu</b> , Huajie Shao, Tarek Abdelzaher, <i>VibeBin: A Vibration-Based Waste Bin Level Detection System</i> , Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), Volume 1 Issue 3, Article No. 122. Presented at UbiComp, Maui, HI USA, September, 2017.
TCPS 2017	Hongwei Wang, Yunlong Gao, <b>Shaohan Hu</b> , Shiguang Wang, Renato Mancuso, Minje Kim, Poliang Wu, Lu Su, Lui Sha, Tarek Abdelzaher, <i>On Exploiting Structured Human Interactions to Enhance Sensing Accuracy in Cyber-physical Systems</i> , ACM Transactions on Cyber-Physical Systems (IEEE TCPS), Volume 1, Number 3, July, 2017.
TPDS 2017	Wenjun Jiang, Chenglin Miao, Lu Su, Qi Li, <b>Shaohan Hu</b> , Shiguang Wang, Jing Gao, Hengchang Liu, Tarek F. Abdelzaher, Jiawei Han, Xue Liu, Yan Gao, Lance Kaplan, <i>Towards Quality Aware Information Integration in Distributed Sensing Systems</i> , IEEE Transactions on Parallel and Distributed Systems (IEEE TPDS), Accepted in 2017.

- ICDCS 2017      Tarek Abdelzaher, Md Tanvir Al Amin, Amotz Bar-Noy, William Dron, Ramesh Govindan, Reginald Hobbs, **Shaohan Hu**, Jung-Eun Kim, Jongdeog Lee, Kelvin Marcus, Shuochao Yao and Yiran Zhao, *Decision-driven Execution: A Distributed Resource Management Paradigm for the Age of IoT*, The 37th International Conference on Distributed Computing Systems (ICDCS 2017), Atlanta, GA USA. June 5–8, 2017.
- ICDCS 2017      Shen Li, Md Tanvir Al Amin, Raghu Ganti, Mudhakar Srivatsa, **Shaohan Hu**, Yiran Zhao and Tarek Abdelzaher, *Stark: Optimizing In-Memory Computing For Dynamic Dataset Collections*, The 37th International Conference on Distributed Computing Systems (ICDCS 2017), Atlanta, GA USA. June 5–8, 2017.
- VTC 2017        Yunfei Hou, Abhishek Gupta, Tong Guan, **Shaohan Hu**, Lu Su, Chunming Qiao, *VehSense: Slippery Road Detection Using Smartphones*, The IEEE 85th Vehicular Technology Conference (VTC2017), Sydney, Australia, June 4–7, 2017.
- TMC 2017        Chao Xu, **Shaohan Hu**, Wei Zheng, Tarek F. Abdelzaher, Pan Hui, Zhiheng Xie, Hengchang Liu, and John Stankovic, *Efficient 3G/4G Budget Utilization in Mobile Sensing Applications*, IEEE Transactions on Mobile Computing (IEEE TMC), Volume 16, Number 6, June, 2017.
- ICCPS 2017      Yiran Zhao, Shen Li, **Shaohan Hu**, Lu Su, Shuochao Yao, Huajie Shao and Tarek Abdelzaher, *GreenDrive: A Smartphone-based Intelligent Speed Adaptation System With Real-time Traffic Signal Prediction*, The 8th International Conference on Cyber-Physical Systems (ICCPS 2017), Pittsburgh, PA USA, April 18–21, 2017. (**Best paper award**)
- WWW 2017        Shuochao Yao, **Shaohan Hu**, Yiran Zhao, Aston Zhang, Tarek Abdelzaher, *DeepSense: A Unified Deep Learning Framework for Time-Series Mobile Sensing Data Processing*, The 26th International International World Wide Web Conference (WWW 2017), Perth, Australia, April 3–7, 2017.
- TMC 2016B        **Shaohan Hu**, Xiaoshan Sun, Lu Su, Tarek F. Abdelzaher, Pan Hui, Wei Zheng, Hengchang Liu, John Stankovic, *Participatory Sensing Meets Opportunistic Sharing: Automatic Phone-to-Phone Communication in Vehicles*, IEEE Transactions on Mobile Computing (IEEE TMC), Volume 15, Number 10, October, 2016.
- VLDB 2016        Yiran Zhao, Shen Li, **Shaohan Hu**, Hongwei Wang, Shuochao Yao, Huajie Shao, Tarek Abdelzaher, *An Experimental Evaluation of Datacenter Workloads On Low-Power Embedded Micro Servers*, The 42nd International Conference on Very Large Data Bases (VLDB 2016), New Delhi, India, September 5–9, 2016.
- ICCM 2016        Christian Lebiere, Don Morrison, Tarek Abdelzaher, **Shaohan Hu**, Cleotilde Gonzalez, Norbou Buchler, Vladislav D. Veksler, *Cognitive Models of Prediction as Decision Aids*, The 14th International Conference on Cognitive Modeling (ICCM 2016), College Park, PA USA, August 4–6, 2016.
- ICDCS 2016        Shuochao Yao, **Shaohan Hu**, Shen Li, Yiran Zhao, Lu Su, Lance Kaplan, Aylin Yener, Tarek F. Abdelzaher, *On Source Dependency Models for Reliable Social Sensing: Algorithms and Fundamental Error Bound*, The 36th IEEE International Conference on Distributed Computing Systems (ICDCS 2016), Nara, Japan, June 27–30, 2016.
- IPSN 2016        Shuochao Yao, Md Tanvir Amin, Lu Su, **Shaohan Hu**, Shen Li, Shiguang Wang, Yiran Zhao, Tarek Abdelzaher, Lance Kaplan, Charu Aggarwal, Aylin Yener, *Recursive Ground Truth Estimator for Social Data Streams*, The 15th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN 2016), Vienna, Austria, April 11–14, 2016.

- TMC 2016A Fatemeh Saremi, Omid Fatemieh, Hossein Ahmadi, Hongyan Wang, Tarek Abdelzaher, Raghu Ganti, Hengchang Liu, **Shaohan Hu**, Shen Li, Lu Su, *Experiences with GreenGPS – Fuel-Efficient Navigation using Participatory Sensing*, IEEE Transactions on Mobile Computing (IEEE TMC), Volume 15, Number 3, March 2016.
- RTSS 2015 **Shaohan Hu**, Shuochao Yao, Haiming Jin, Yiran Zhao, Yitao Hu, Xiaochen Liu, Nooreddin Naghibolhosseini, Shen Li, Akash Kapoor, William Dron, Lu Su, Amotz Bar-Noy, Pedro Szekely, Ramesh Govindan, Reginald Hobbs, Tarek F. Abdelzaher, *Data Acquisition for Real-time Decision-making under Freshness Constraints*, The 36th IEEE Real-Time Systems Symposium (RTSS 2015), San Antonio, TX USA, December 1–4, 2015.
- JRTS 2015 Dong Wang, Tarek Abdelzaher, Lance Kaplan, Raghu Ganti, **Shaohan Hu**, Hengchang Liu, *Reliable Social Sensing with Physical Constraints: Analytic Bounds and Performance Evaluation*, Journal of Real-Time Systems, Volume 51, Number 6, November, 2015
- UBICOMP 2015 **Shaohan Hu**, Lu Su, Shen Li, Shiguang Wang, Chenji Pan, Siyu Gu, Md Tanvir Amin, Hengchang Liu, Suman Nath, Romit Roy Choudhury, Tarek F. Abdelzaher, *Experiences with eNav: A Low-power Vehicular Navigation System*, The ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp 2015), Osaka, Japan, September 7–11, 2015.
- ATC 2015 Shen Li, **Shaohan Hu**, Raghu Ganti, Mudhakar Srivatsa, Tarek Abdelzaher, *Pyro: A Spatial-Temporal Big-Data Storage System for Dynamic Workload Hotspots*, USENIX Annual Technical Conference (USENIX ATC 2015), Santa Clara, CA USA, July 8–10, 2015.
- TOSN 2015 **Shaohan Hu**, Lu Su, Hengchang Liu, Hongyan Wang, Tarek F. Abdelzaher, *SmartRoad: Smartphone-based Crowd Sensing for Traffic Regulator Detection and Identification*, ACM Transactions on Sensor Networks (ACM TOSN), Volume 11, Number 4, July 2015.
- DCOSS 2015 **Shaohan Hu**, Shen Li, Shuochao Yao, Lu Su, Ramesh Govindan, Reginald Hobbs, Tarek F. Abdelzaher, *On Exploiting Logical Dependencies for Minimizing Additive Cost Metrics in Resource-Limited Crowdsensing*, The 11th IEEE International Conference on Distributed Computing in Sensor Systems (DCOSS 2015), Fortaleza, Brazil, June 10–12, 2015.
- IPSN 2015 Shiguang Wang, Lu Su, Shen Li, **Shaohan Hu**, Tanvir Amin, Hongwei Wang, Shuochao Yao, Lance Kaplan, Tarek Abdelzaher, *Scalable Social Sensing of Interdependent Phenomena*, The 14th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN 2015), Seattle, WA USA, April 13–17, 2015.
- RTAS 2015 Shen Li, **Shaohan Hu**, Tarek Abdelzaher, *The Packing Server for Real-time Scheduling of MapReduce Workflows*, The 21st IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS 2015), Seattle, WA USA, April 13–16, 2015.
- ICCPS 2015 Yunlong Gao, **Shaohan Hu**, Renato Mancuso, Hongwei Wang, Minje Kim, PoLiang Wu, Lu Su, Lui Sha, Tarek Abdelzaher, *Exploiting Structured Human Interactions to Enhance Estimation Accuracy in Cyber-physical Systems*, The 6th International Conference on Cyber-Physical Systems (ICCPS 2015), Seattle, WA USA, April 14–16, 2015.
- RTSS 2014 Lu Su, Qi Li, **Shaohan Hu**, Shiguang Wang, Jing Gao, Hengchang Liu, Tarek Abdelzaher, Jiawei Han, Xue Liu, Yan Gao, Lance Kaplan, *Generalized Decision Aggregation in Distributed Sensing Systems*, The 35th IEEE Real-Time Systems Symposium (RTSS 2014), Rome, Italy, December 2–5, 2014.

- ICDCS 2014      Shen Li, **Shaohan Hu**, Shiguang Wang, Lu Su, Tarek F. Abdelzaher, Indranil Gupta, Richard Pace, *WOHA: Deadline-Aware Map-Reduce Workflow Scheduling Framework over Hadoop Cluster*, The 34th International Conference on Distributed Computing Systems (ICDCS 2014), Madrid, Spain. June 30–July 3, 2014.
- ICAC 2014      Shen Li, **Shaohan Hu**, Shiguang Wang, Siyu Gu, Chenji Pan, Tarek F. Abdelzaher, *WattValet: Heterogenous Energy Storage Management in Data Centers for Improved Power Capping*, The 11th International Conference on Autonomic Computing (ICAC 2014), Philadelphia, PA USA, June 18–20, 2014.
- DCOSS 2014      Siyu Gu, Chenji Pan, Hengchang Liu, Shen Li, **Shaohan Hu**, Lu Su, Shiguang Wang, Dong Wang, Md Tanvir A Amin, Ramesh Govindan, Charu Aggarwal, Raghu Ganti, Mudhakar Srivatsa, Amotz Bar-Noy, Peter Terlecky, Tarek Abdelzaher, *Data Extrapolation in Social Sensing for Disaster Response*, The 10th IEEE International Conference on Distributed Computing in Sensor Systems (DCOSS 2014), Marina Del Rey, CA USA, May 26–28, 2014.
- INFOCOM 2014      **Shaohan Hu**, Hengchang Liu, Lu Su, Hongyan Wang, Tarek F. Abdelzaher, Pan Hui, Wei Zheng, Zhiheng Xie, John Stankovic, *Towards Automatic Phone-to-Phone Communication for Vehicular Networking Applications*, The 33rd IEEE International Conference on Computer Communications (INFOCOM 2014), Toronto, Canada, April 27–May 2, 2014.
- IPSN 2014      **Shaohan Hu**, Lu Su, Shen Li, Shiguang Wang, Chenji Pan, Siyu Gu, Md Tanvir Al Amin, Hengchang Liu, Suman Nath, Romit Roy Choudhury, Tarek F. Abdelzaher, *Poster Abstract: eNav – a Smartphone-based Energy Efficient Vehicular Navigation System*, The 13th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN 2014), Berlin, Germany, April 15–17, 2014. (**Best poster award**)
- PUC 2014      Nicholas D. Lane, Ye Xu, Hong Lu, **Shaohan Hu**, Tanzeem Choudhury, Andrew T. Campbell, Feng Zhao, *Community Similarity Networks*, ACM/Springer Journal of Personal and Ubiquitous Computing (PUC), Special Issue on Cross-Community Mining, February, 2014.
- RTSS 2013      Dong Wang, Tarek F. Abdelzaher, Lance Kaplan, Raghu Ganti, **Shaohan Hu**, Hengchang Liu, *Exploitation of Physical Constraints for Reliable Social Sensing*, The 34th IEEE Real-Time Systems Symposium (RTSS 2013), Vancouver, Canada, December 4–6, 2013.
- SENSYS 2013      Hengchang Liu, Siyu Gu, Chenji Pan, Wei Zheng, Shen Li, **Shaohan Hu**, Shiguang Wang, Dong Wang, Tanvir Amin, Lu Su, Zhiheng Xie, Ramesh Govindan, Charu Aggarwal, Amotz Barnoy, Tarek F. Abdelzaher, *Demo Abstract: Extrapolation from Participatory Sensing Data*, The 11th ACM Conference on Embedded Networked Sensor Systems (SenSys 2013), Rome, Italy, November 11–15, 2013.
- ICCCN 2013      Shiguang Wang, **Shaohan Hu**, Shen Li, Hengchang Liu, Md Yusuf Sarwar Uddin, and Tarek F. Abdelzaher, *MINERVA: Information-Centric Programming for Social Sensing*, The 22nd International Conference on Computer Communications and Networks (ICCCN 2013), Nassau, Bahamas, July 30–August 2, 2013.
- ICDCS 2013      Shen Li, Shiguang Wang, Fan Yang, **Shaohan Hu**, Fatemeh Saremi, Tarek F. Abdelzaher, *Proteus: Power Proportional Memory Cache Cluster in Data Centers*, The 33rd International Conference on Distributed Computing Systems (ICDCS 2013), Philadelphia, PA USA, July 8–11, 2013.

INFOCOM 2013	Hengchang Liu, <b>Shaohan Hu</b> , Wei Zheng, Zhiheng Xie, Shiguang Wang, Pan Hui, and Tarek F. Abdelzaher, <i>Efficient 3G Budget Utilization in Mobile Participatory Sensing Applications</i> , The 32nd IEEE International Conference on Computer Communications (INFOCOM 2013), Turin, Italy, April 14–19, 2013.
IPSN 2013	<b>Shaohan Hu</b> , Lu Su, Hengchang Liu, Hongyan Wang, Tarek F. Abdelzaher, <i>Poster Abstract: SmartRoad: A Crowd-Sourced Traffic Regulator Detection and Identification System</i> , The 12th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN 2013), Philadelphia, PA USA, April 8–11, 2013.
RTSS 2012	Lu Su, <b>Shaohan Hu</b> , Shen Li, Feng Liang, Jing Gao, Tarek F. Abdelzaher, and Jiawei Han, <i>Quality of Information based Data Selection and Transmission in Wireless Sensor Networks</i> , The 33rd IEEE Real-Time Systems Symposium (RTSS 2012), San Juan, Puerto Rico, December 4–7, 2012.
UBICOMP 2011	Nicholas D. Lane, Ye Xu, Hong Lu, <b>Shaohan Hu</b> , Tanzeem Choudhury, Andrew T. Campbell, and Feng Zhao, <i>Enabling Large-scale Human Activity Inference on Smartphones using Community Similarity Networks (CSN)</i> , The 13th International Conference on Ubiquitous Computing (UbiComp 2011), Beijing, China, September 17–21, 2011. ( <b>Best paper nominee</b> )
MOBIHELD 2010	Andrew T. Campbell, Tanzeem Choudhury, <b>Shaohan Hu</b> , Hong Lu, Matthew K. Mukerjee, Mashfiqui Rabbi, and Rajeev D. S. Raizada, <i>NeuroPhone: Brain-Mobile Phone Interface using a Wireless EEG Headset</i> , The 2nd ACM SIGCOMM Workshop on Networking, Systems, and Applications on Mobile Handhelds (MobiHeld 2010), New Delhi, India, August 30, 2010.
PAKDD 2010	Pallika Kanani, Andrew McCallum and <b>Shaohan Hu</b> , <i>Resource-bounded Information Extraction: Acquiring Missing Feature Values On Demand</i> , The 14th Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD 2010), Hyderabad, India. June 21–24, 2010. ( <b>Best student paper runner-up award</b> )
TEACHING	<p><b>University of Illinois at Urbana-Champaign</b></p> <ul style="list-style-type: none"> <li>• <b>Teaching Assistant</b> CS 125: Introduction to Computer Science Basic Data Structure, Algorithm, OOP using Java</li> </ul> <p><b>Dartmouth College</b></p> <ul style="list-style-type: none"> <li>• <b>Teaching Assistant</b> CS 23: Software Design and Implementation – or, how to be a hacker Linux Bash scripting, design and implementation using C: web search (data crawling, indexing, and querying), and embedded Linux environment distributed concurrent system (remote robot control system)</li> <li>• <b>Teaching Assistant</b> CS 8: Problem Solving with Computer Science Functional programming, Haskell language</li> <li>• <b>Teaching Assistant</b> CS 5: Introduction to Computer Science Basic Data Structure, OOP using Java</li> <li>• <b>Teaching Assistant</b> CS 4: Concepts in Computing Overview of computing and computer science, basic programming using html/css/javascript, debugging, design</li> </ul>

**University of Massachusetts at Amherst**

- **Teaching Assistant**

Math 300: Fundamental Concepts of Mathematics

Discrete mathematics, number theory, logics, set theory, rigorous proofs

- **Teaching Assistant**

CS 311: Introduction to Algorithms

Basic algorithm design, analysis, and implementations, sorting, searching, string processing, graphs

**PRESS**

NEWS BUREAU - ILLINOIS, *New mobile app expands the outreach of SAWBO videos*, May 2015

CBS NEWS, *The Next Step in Bionics*, October 2011

THE NEW YORK TIMES MAGAZINE, *The Cyborg in Us All*, October 2011

TECHNOLOGY REVIEW, *Mobile Phone Mind Control*, March 2010

**AWARDS AND  
HONORS**

ICCPS Best Paper Award, April 2017

IPSN Best Poster Award, April 2014

Teachers Rated Excellent, Department of Computer Science, UIUC, March 2012

UBICOMP Best Paper Nominee, September 2011

Best TA, Department of Computer Science, Dartmouth College, September 2010

PAKDD Best Student Paper Runner-up, June 2010

Outstanding Graduate Student Teacher, Dartmouth Center for the Advancement of Learning, Dartmouth College, April 2010

CSEM (Computer Science, Engineering and Mathematics) Scholarship, UMass Amherst, January 2005–May 2008

Dean's List Honors, UMass Amherst, January 2005–May 2008

Barksdale Scholarship, UMass Amherst, March 2007

First Place Winner, Henry Jacob Mathematics Competition, UMass Amherst, March 2006

Second Place Winner, Henry Jacob Mathematics Competition, UMass Amherst, March 2005

**WORK  
AUTHORIZATION**

U.S. Citizen