

# Zheng Sun

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CONTACT INFORMATION	NASA Research Park Carnegie Mellon Silicon Valley Building 23, Moffett Field, CA 94035	<i>Voice:</i> (781)-654-5792 <i>E-mail:</i> zhengs@ece.cmu.edu <i>Web:</i> <a href="http://users.ece.cmu.edu/~zhengs/">http://users.ece.cmu.edu/~zhengs/</a>
TECHNICAL SKILLS	Extensive experiences in machine learning, cloud computing, signal processing for context-aware mobile and ubiquitous computing, activity recognition, and human-computer interactions. <ul style="list-style-type: none"><li>• Programming: C/C++ (Proficient), Java (Proficient), MATLAB (Proficient), Python (Prior Experience)</li><li>• Platforms: Android, Windows Phone, CUDA, GPU, MapReduce</li></ul>	
EDUCATION	<b>Carnegie Mellon University, Pittsburgh, PA</b> Sep. 2009-present Ph.D., Electrical and Computer Engineering (GPA: 3.86/4.00) <ul style="list-style-type: none"><li>• Advisor: Pei Zhang (ECE Dept.), co-advisor: Daniel P. Siewiorek (CS Dept.)</li><li>• Area of study: ubiquitous computing, human computer interactions, machine learning</li></ul> <b>Beijing University of Posts and Telecom, Beijing, China</b> Sep. 2002-Apr. 2009 B.E and M.S., Signal and Information Processing (Overall GPA: 89/100, Major GPA: 92/100) <ul style="list-style-type: none"><li>• Area of study: wireless communication and signal processing</li></ul>	
INDUSTRY EXPERIENCE	<b>Google</b> , Mountain View, CA USA <i>Industrial Collaboration</i> , Aug. 2013-Present <ul style="list-style-type: none"><li>• Gesture-based pairing techniques for smart devices and smart homes.</li><li>• Generative and discriminative models for gesture classifications.</li></ul> <b>Fitbit Inc.</b> , San Francisco, CA USA <i>Research Intern</i> , May 2013 <ul style="list-style-type: none"><li>• Developed activity classification technologies for Fitbit's smart trackers using machine learning and digital signal processing techniques.</li></ul> <b>Intel Corp.</b> , Mountain View, CA USA <i>Industrial Collaboration</i> , Aug. 2012-Apr. 2013 <ul style="list-style-type: none"><li>• Indoor positioning and device arrangement determination projects.</li></ul> <b>Nokia Research Center</b> , Palo Alto, CA USA <i>Research Intern</i> , May 2012 <ul style="list-style-type: none"><li>• Gesture-based device interaction and pairing projects.</li></ul> <b>Qualcomm Corp. (OOTCS)</b> , San Diego, CA USA <i>Research Intern</i> , May 2010 <ul style="list-style-type: none"><li>• Developed probabilistic positioning models using C++ and Matlab for indoor navigation systems using machine learning and sensor fusion techniques.</li></ul>	
PROJECTS	Spartacus: Spatially-Aware Interaction Through Energy-Efficient Audio Sensing ( <i>MobiSys 2013</i> , a collaboration with Google.) <ul style="list-style-type: none"><li>• Invented novel device pairing technologies for mobile devices using arm gestures.</li><li>• Developed a gesture recognition system using adaptive Logistic Regression algorithms</li><li>• Analyzed trajectories of user gestures and leveraged Doppler frequency shifts to determine target devices in interactions.</li><li>• Achieved &gt; 95% pairing accuracy, much faster and more intuitive than previous approaches.</li></ul>	

Headio: Zero-Configured Heading Acquisition for Indoor Mobile Devices through Multimodal Context Sensing (*UbiComp 2013, HotMobile 2012*, a collaboration with Nokia Research Center.)

- Developed highly accurate heading acquisition technologies for indoor mobile devices.
- Applied sensor fusion techniques on sensor data from cameras and gravity, magnetometer, and geolocation sensors.
- Achieved less than 1° heading errors, 33X better than the state of the art.

Large-Scale Parallel Computing for Text Clustering, Natural Language Processing, and Social Media Analysis (*Invited talk at HPC and GPU Supercomputing Meetup, 2012*)

- Discovered contextually similar hashtags from 90 million Twitter tweets and 1 million unique hashtags.
- Created relationship models between popularity and textual features using large-scale music data (e.g. song names, lyrics).
- Achieved over 4X speedup on pairwise hashtag similarity computation using Hadoop MapReduce framework and Amazon's Elastic MapReduce platform.

PANDAA: Physical Arrangement-Detection for Networked Devices through Ambient Sound Awareness (*UbiComp 2011*, a collaboration with Intel Research.)

- Created a novel physical arrangement detection system for smart devices in indoor environments using *only* ambient sounds (human speech, music, clap, snap, etc).
- Developed a live demo app of the system using Android and Nokia phones.
- Won the **Best Demo Award** in ACM UbiComp 2011.

INVITED TALKS Zheng Sun, "Spatial Knowledge Acquisition for Device Interactions in Ubiquitous Computing", Guest Lecture, Carnegie Mellon University, November 2013.

Zheng Sun and Heng-Tze Cheng, "Modeling the Relationship between Popularity and Textual Features of Large-Scale Music Data", HPC and GPU Supercomputing Meetup, Mountain View, California, January 2013.

Zheng Sun, "PANDAA: Physical Arrangement Detection of Networked Devices through Ambient-Sound Awareness", Nokia Research Center, Palo Alto, CA October 2011.

AWARDS Best Ph.D. Forum Presentation Award, "Supporting Spatial-Awareness for Networked Ubiquitous Devices Through Ambient Context Sensing", ACM/IEEE IPSN, April 2013.

Best Demo Award, in the 13th ACM UbiComp, Beijing China, September 2011.

Dean's Fellowship, Carnegie Mellon University, August 2009.

Outstanding Graduate Student Award (Recognized the top 4% graduate students with the best academic and research performance), Beijing University of Posts and Telecom, November 2008.

First Class SONY Corp. Scholarship (Recognized the top 1% students in GPA each academic year), Beijing University of Posts and Telecom, September 2005.

First Class National Scholarship (Recognized the top 1% students in GPA each academic year), Beijing University of Posts and Telecom, September 2004.

First Class Alumni's Outstanding Student Scholarship (Recognized the top 1% students in GPA each academic year), Beijing University of Posts and Telecom, September 2003.

MEDIA  
COVERAGE

“Carnegie Mellon’s flying robots”, CBS SMART-PLANET, May 2011  
“SensorFly Featured on Sci-Fi Science”, Discovery Science Channel, Sep 2010  
“Swarm Bots”, BBC Focus Magazine, Mar 2010  
“Aerobot Invasion”, Popular Science, Mar 2010  
“Networked surveillance minicopters can’t be kept down”, New Scientist, Nov 2009  
“SensorFly robots hunt in packs and can take a battering”, Wired, Nov 2009  
“Self-righting autonomous swarming robots”, Makezine, Nov 2009  
“SensorFly survives racket beatdown”, Bot Junkie, Nov 2009

PUBLICATIONS

*Journal Papers*

**Zheng Sun**, Aveek Purohit, Philippe De Wagter, Irina Brinster, Chorom Hamm, and Pei Zhang. “PANDAA: A Physical Arrangement Detection Technique for Networked Devices through Ambient-Sound Awareness”. In ACM SIGCOMM Computer Communication Review, Volume 41 Issue 4, August 2011.

*Conference Papers*

**Zheng Sun**, Shijia Pan, Yu-Chi Su, and Pei Zhang. “Headio: Zero-Configured Heading Acquisition for Indoor Mobile Devices Through Multimodal Context Sensing”. In the 15th ACM International Conference on Ubiquitous Computing (UbiComp), Zurich, Switzerland, September 2013.

**Zheng Sun**, Aveek Purohit, Raja Bose, and Pei Zhang. “Spartacus: Spatially-Aware Interaction for Mobile Devices Through Energy-Efficient Audio Sensing”. In the 11th International Conference on Mobile Systems, Applications and Services (MobiSys), Taipei, Taiwan, June 2013.

Aveek Purohit, **Zheng Sun**, Shijia Pan, and Pei Zhang. “SugarTrail: Indoor Navigation in Retail Environments without Surveys and Maps”. In the 10th IEEE Conference on Sensing, Communication, and Networking (SECON), New Orleans, USA, June 2013.

Aveek Purohit, **Zheng Sun**, and Pei Zhang. “SugarMap: Location-less Coverage for Micro-Aerial Sensing Swarms”. In the 12th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN), Philadelphia PA, April 2013.

**Zheng Sun**, Aveek Purohit, Shijia Pan, Frank Mokaya, Raja Bose, and Pei Zhang, “Polaris: Getting Accurate Indoor Orientations for Mobile Devices Using Ubiquitous Visual Patterns on Ceilings.” In the 13th ACM Workshop on Mobile Computing Systems and Applications (HotMobile), San Diego, CA, USA, February 2012.

**Zheng Sun**, Aveek Purohit, Kaifei Chen, Shijia Pan, Trevor Pering, and Pei Zhang, “PANDAA: Physical Arrangement Detection of Networked Devices through Ambient-Sound Awareness”. In the 13th ACM International Conference on Ubiquitous Computing (UbiComp), Beijing, China, September 2011.

**Zheng Sun**, Aveek Purohit, Kathleen Yang, Neha Pattan, Dan Siewiorek, Asim Smailagic, Ian Lane, and Pei Zhang, “CoughLoc: Location-Aware Indoor Acoustic Sensing for Non-Intrusive Cough Detection”. In the International Workshop on Emerging Mobile Sensing Technologies, Systems, and Applications (Mobisense), San Francisco, CA, June 2011.

Aveek Purohit, **Zheng Sun**, Frank Mokaya, and Pei Zhang, “SensorFly: Controlled-mobile Sensing Platform for Indoor Emergency Response Applications”. In the 10th

ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN), Chicago, IL, USA, April 2011.

**Zheng Sun**, Rick Farley, Telis Kaleas, Judy Ellis, and Kiran Chikkappa, “Cortina: Collaborative Context-aware Indoor Positioning Employing RSS and RToF Techniques”. In the 9th IEEE Pervasive Computing and Communication Conference (PerCom), Seattle, WA, USA, March 2011.

Heng-Tze Cheng, **Zheng Sun**, and Pei Zhang, “Imirok: Real-Time Imitative Robotic Arm Control for Home Robot Applications”. In the 9th IEEE Pervasive Computing and Communication Conference (PerCom), Seattle, WA, USA, March 2011.

**Zheng Sun**, Zhiqiang He, Ruochen Wang, and Kai Niu, “A Heuristic Scheduling Scheme in Multiuser OFDMA Networks”. In the 68th IEEE Vehicular Technology Conference (VTC Fall), Calgary, Canada, September 2008.

Ruochen Wang, Zhiqiang He, **Zheng Sun**, Shan Lu, and Kai Niu, “A Revenue-Based Low-Delay and Efficient Downlink Scheduling Algorithm in OFDMA Systems”. In the 68th IEEE Vehicular Technology Conference (VTC Fall), Calgary, Canada, September 2008.

**Zheng Sun**, Wenjun Xu, Zhiqiang He, and Kai Niu, “Criteria on Utility Designing of Convex Optimization in FDMA Networks”. In the 3rd IEEE Broadband Wireless Access Workshop of the International Conference on Communications (ICC), Beijing, China, May 2008.

**Zheng Sun**, Xiaohong Huang, and Yan Ma, “Load Balancing Strategies to Solve Flowshop Scheduling on Parallel Computing”. In the International Conference on Broadband Network & Multimedia Technology (IC-BNMT), Beijing, China, September 2007.

*Posters & Demos*

**Zheng Sun**, Aveek Purohit, KathleenYang, Neha Pattan, Dan Siewiorek, Asim Smailagic, Ian Lane, and Pei Zhang, “VMA: Indoor Acoustic Sensing Platform for In-home Patient Monitoring”. In the 8th ACM MobiSys, San Francisco, CA, USA, June 2010.

**Zheng Sun**, Aveek Purohit, Philippe De Wagter, Irina Brinster, Chorom Hamm, and Pei Zhang, “PANDAA: A Physical Arrangement Detection Technique for Networked Devices through Ambient-Sound Awareness”. In the ACM SIGCOMM 2011, Toronto, Canada, August 2011.