

# Minho Shin

## Contact Information

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## Research Interests

### Privacy and Security in Mobile Systems

- Smartphone Security and Privacy
- Location Privacy
- Smart Grid Security

### Wireless Networks and Distributed Systems:

- WLAN, MANET, VANET, Mobile Sensing, Health Monitoring

### Power IT:

- Smart Grid, Electric Vehicle Charging

## Education

**Ph.D., Computer Science** 2008  
University of Maryland, College Park, MD  
Advisor: William A. Arbaugh

**M.S., Computer Science** 2003  
University of Maryland, College Park, MD  
Advisor: William A. Arbaugh

**B.S., Computer Science and Statistics** 1998  
Seoul National University, Seoul, Korea

## Work Experience

**Dept. of Computer Engineering, Myongji University, Korea** Mar 2015–present  
Associate Professor

**Dept. of Computer Engineering, Myongji University, Korea** Mar 2011–Feb 2015  
Assistant Professor

**Samsung Advanced Institute of Technology, Kiheung, Korea** Mar 2010–Feb 2011  
R&D Staff Member, Future IT Research Center  
I work on the project *Intelligent Mobile Platform (IMP)* with seven other research staffs. I designed the overall architecture of IMP, and developed *Sensor Abstraction Layer*, as well as a simulation framework. See *Research Projects* section for the detail.

**Institute for Security, Technology, and Society at Dartmouth College** Nov 2007–Feb 2010  
Postdoctoral Research Fellow with Prof. David Kotz  
I worked on privacy and data integrity problems in people-centric sensing and pervasive health monitoring. I lead *Metrosec* project team of three Ph.D students and another post-doctor. I also lead *SenseMed* project mentoring a Master student. I worked on the privacy-preserving and secure health monitoring project, mentoring two Ph.D students.

**Motorola Networks & Systems Lab, Schaumburg, IL** Jun–Aug 2006  
Internship with Dr. Judy Fu

I worked on the Spontaneous Inter-Provider Roaming project to design a general framework for spontaneous roaming between providers. With the proposed framework, users can access visiting networks without a prior roaming contract between the home- and visiting-networks. We filed two patents.

**Motorola Networks & Systems Lab, Schaumburg, IL**

Jun–Aug 2005

Internship with Dr. Madjid Nakhjiri

I implemented a prototype for broker-based inter-provider roaming scheme, which allows visiting users to authenticate through a broker service. I modified freeRadius server, open1x supplicant, and open1x authenticator.

**Samsung Advanced Institute of Technology, Kiheung, Korea**

May–Jun 2003

Internship with Dr. Insun Lee and Dr. Kyunghoon Jang

I designed a QoS-aware hand-off technology using Neighbor Graphs. I co-worked with two Ph.D students and filed a patent.

**Research  
Projects**

**V2G Service-Oriented Development**

2015–present

Build AC-based Bidirectional Power Transfer between EV and EV-Charger with flexible scheduling. My role is to develop the ISO/IEC 15118-compatible V2G communication protocol, and its domestic/international standardization Fund: Korea Institute of Energy Technology Evaluation and Planning (KETEP)

Duration: from Jun 2015 to May 2017 Joint work with KEPCO, Hyundai, INC Tech, Glquad, PNE Solutions, et al.

**Smart Cloudlet**

2013–present

High performance mobile cloudlet system for collaborative computation and sensing Fund: Korea Communications Commission

Duration: from Mar 2013 to Feb 2018 Joint work with KAIST, Korea University, Gyeongsang National University, Hankyong National University, et al.

**Mobile Privacy for Smartphones**

2012–2015

Preserving user privacy in smartphone.

Fund: National Research Foundation

Duration: from May 2012 to April 2015

**Smart Grid V2G Interoperability**

2011–14

Design & implement an interoperability testing system of EV charging system

Fund: Ministry of Knowledge Economy

Duration: from Dec 2011 to Nov 2014

**Intelligent Transportation Systems Simulator**

2011–2013

Design & implement a simulation framework for ITS by integrating transportation simulator (Paramics) and communication simulator (NS2), to emulate both the vehicle movements and vehicle communication with infrastructure (V2I) and other vehicles (V2V)

Fund: Korea Institute of Civil Engineering and Building Technology (KICT)

Duration: from June 2011 to Dec 2013

**IMP: Intelligent Mobile Platform**

2010

IMP provides a generic framework for context-aware computing on smart-phones. I designed the overall architecture of the platform, and also designed a special layer, called Sensor Abstraction Layer(SAL). SAL provides other middleware modules and application software with various context sources such as sensor values and other high-level context information. In addition, I developed a simulation framework for context-aware applications.

**Metrosec: Security of People-centric Sensor Networks** Nov 2007–Jul 2010  
This project aims to design secure and efficient people-centric sensing, which exploits mobile devices for environmental and human sensing. We developed a privacy-aware sensing architecture, ANONYSENSE, and an energy-efficient distributed sensing algorithm, DEAMON. We are developing a secure framework for sensor sharing between people.

**SenseMed: Data Assurance in Pervasive Health Monitoring** Nov 2007–2009  
This project aimed to provide the assurance and assessment of data quality in pervasive health-monitoring systems. We developed a physiology-based patient authentication framework with machine learning algorithms. Funded by Intel.

**Thesis: Peer-to-Peer Lookup for Multi-Hop Wireless Networks** 2006–2008  
My thesis work presented a novel approach to building a scalable and efficient peer-to-peer lookup service in multi-hop wireless networks. I proposed a highly-structured lookup scheme, RIGS, and a loosely-structured lookup scheme, VALLEYWALK, both of which achieve near-shortest paths to the destination with reasonable assumptions.

**Integrated Simulation Framework for Vehicular Ad-hoc Networks** 2007–2008  
Research on vehicular ad-hoc networks (VANET) needs a simulation method for evaluation. To present, no single simulator can simulate a VANET. We designed a VANET simulation framework by integrating two off-the-shelf simulators; *Paramics* for transportation simulation and *Qualnet* for network simulation.

**Distributed Channel Assignment in Multi-hop Wireless Networks** 2005–2007  
Radio interference is a major obstacle for multi-hop wireless networks. Although the use of multiple radios can improve network throughput, it is difficult to assign an appropriate channel to each link. We proposed a distributed channel assignment algorithm SAFE and Semi-Definite Programming algorithms.

**WLAN Hand-off and 3G-WLAN Interworking** 2002–2004  
This project aimed to design an efficient and secure method for hand-offs within a WLAN and between a 3G and a WLAN. We empirically identified the hand-off latency as a major obstacle for seamless hand-off. Then we proposed Neighbor Graphs (NG) to the reduced hand-off latency below 31 *ms*. We also proposed a proactive key distribution scheme (centralized) and a proactive context caching scheme (distributed) to avoid security-induced hand-off latency. Our solution was included in the IEEE Standard 802.11f. We extended the notion of NG for inter-network roaming. Funded by Samsung Corporation.

**Book  
Publications**

Korean interpretation of **Computer Security: Principles and Practice (2nd Edition)** by William Stallings and Lawrie Brown, Seoul, Korea: Kyobo 2013, ISBN 9788998886479

**Journal  
Publications**

**Building an Interoperability Test System for Electric Vehicle Chargers Based on ISO/IEC 15118 and IEC 61850 Standards**  
Minho Shin, Hwimin Kim, Hyoseop Kim and Hyuksoo Jang  
*Applied Sciences, Special Issue on "Smart Grid: Convergence and Interoperability"*, Vol 6 Issue 6 (SCIE, IF 1.474), 2016

**URALP: Unreachable Region Aware Location Privacy against Maximum Movement Boundary Attack**  
Nha Nguyen, Seungchul Han, and Minho Shin  
*International Journal of Distributed Sensor Networks, Vol 2015 (SCIE)*

**EM-KDE: A locality-aware job scheduling policy with distributed semantic caches**

Youngmoon Eom, Deukyeon Hwang, Junyong Lee, Jonghwan Moon, Minhoo Shin, Beom-seok Nam

*Journal of Parallel and Distributed Computing, Volume 83, September 2015, Pages 119132 (SCI)*

**Location Privacy for Mobile Crowd Sensing through Population Mapping**

Minhoo Shin, Cory Cornelius, Apu Kapadia, Nikos Triandopoulos, and David Kotz

*Sensors, special issue Sensors and Smart Cities, June 2015 (SCIE)*

**CAN Based Conformance Testing Using TTCN-3**

Tayyab Wahab Awan, Ahmed Mahdi Abed, Intaek Kim, Hyuk Soo Jang, and Minhoo Shin

*International Journal of Computer and Communication Engineering, Nov. 2014*

**Hide-n-Sense: preserving privacy efficiently in wireless mHealth networks**

Shrirang Mare, Jacob Sorber, Minhoo Shin, Cory T Cornelius, David Kotz

*Mobile Networks and Applications, Vol. 19, No. 3, June 2014 (SCIE)*

**Virtual world control system using sensed information and adaptation engine**

Sang-Kyun Kim, Yong Soo Joo, Minhoo Shin, Seungju Han, Jae-Joon Hanin

*SIGNAL PROCESSING-IMAGE COMMUNICATION, Vol. 28, Feb 2013 (SCI)*

**Distributing Network Loads in Tree-based Content Distribution System**

Seung Chul Han, Sungwook Chung, Kwang-Sik Lee, Hyunmin Park and Minhoo Shin

*KSII Transactions on Internet and Information Systems, Vol. 7, No. 1, Jan. 2013 (SCIE)*

**A Fault-tolerant Network Scheme for Large-scale Mission-critical Systems**

Minhoo Shin, R. A. Memon, Y.S. Ryu, J.M. Rhee, D.H. Lee

*Information Journal, Vol. 16, No. 3(B), pp. 3285-3290, Mar. 2013. (SCIE)*

**Development and Evaluation of Simulation-Based Training for Obstetrical Nursing Using Human Patient Simulators**

Miok Kim, Minhoo Shin *Computers, Informatics, Nursing (CIN), Feb 2013 (SSCI)*

**Secure Remote Health Monitoring with Unreliable Mobile Devices**

Minhoo Shin

*Journal of Biomedicine and Biotechnology, Jul. 2012 (SCIE)*

**High-throughput query scheduling with spatial clustering based on distributed exponential moving average**

Beomseok Nam, Deukyeon Hwang, Jinwoong Kim, Minhoo Shin

*Distributed and Parellel Databases, Vol 30, Aug 2012 (SCIE)*

**AnonySense: A System for Anonymous Opportunistic Sensing**

Minhoo Shin, C. Cornelius, D. Peebles, A. Kapadia, D. Kotz, N. Triandopoulos

*Pervasive and Mobile Computing, Feb 2011, Vol.7, Issue 1, pp 16-30 (SCIE)*

**Multiple Query Scheduling for Distributed Semantic Caches**

Beomseok Nam, Minhoo Shin, Henrique Andrade, and Alan Sussman

*Journal of Parallel and Distributed Computing, 2010, Vol.70, No.5, May 2010, pp 598-611 (SCI: impact factor 1.168)*

**Efficient and Scalable Peer-to-Peer Lookup in Multi-hop Wireless Networks**

Minhoo Shin, William Arbaugh

*Transactions on Internet and Information Systems, Vol.3, No.1, Feb. 2009 (SCIE)*

**Wireless Network Security and Interworking**

Minho Shin, Arunesh Mishra, Justin Ma, and William Arbaugh

*The Proceedings of IEEE on Cryptography and Security*, Vol.94, No.2, pp 455–466, Feb. 2006 (SCI: impact factor 4.613)

**Pro-active Key Distribution using Neighbor Graphs**

Arunesh Mishra, Minho Shin, N. L. Petroni, Jr., T. Charles Clancy, and William Arbaugh  
*IEEE Wireless Communications*, Vol.11, No.1, pp 26–36, Feb., 2004 (SCI: impact factor 2.577)

**An Empirical Analysis of the IEEE 802.11 MAC Layer Handoff Process**

Arunesh Mishra, Minho Shin, and William Arbaugh

*ACM SIGCOM Computer Communication Review (CCR)*, Vol.33, No.2, pp 93–102, Apr. 2003 (SCI: impact factor 0.947)

**Conference/  
Workshop  
Publications****A Crash Recovery Scheme for Log-based File System over Flash Memory using Shadow Paging**

Dileep Kumar, Yeonseung Ryu, Minho Shin

*International Conference on Platform Technology and Services (PlatCon'14)*, Feb. 11-13, 2014, Jeju, Korea

**Protecting location privacy against maximum movement boundary attack in constrained movement scenarios**

Nha Nguyen, Minho Shin

*The FTRA 2013 International Symposium on Ubiquitous Computing and Embedded Systems (UCES-13)*, Dec. 18-21, 2013, Danang, Vietnam

**Memory Efficient Parallelization for Aho-Corasick Algorithm on a GPU**

Nhat-Phuong Tran, Myungho Lee\*, Sugwon Hong, Minho Shin

*2012 IEEE 14th International Conference on High Performance Computing and Communications*

**Plug-n-Trust: Practical Trusted Sensing for mHealth**

Jacob Sorber, Minho Shin, Ron Peterson, David Kotz

*MobiSys12*, June 25-29, 2012, Low Wood Bay, Lake District, UK

**An Amulet for trustworthy wearable mHealth**

J. Sorber, M. Shin, R. Peterson, C. Cornelius, S. Mare, A. Prasad, Z. Marois, E. Smithayer, D. Kotz

*In the Workshop on Mobile Computing Systems and Applications (HotMobile)*, February, 2012

**Adaptive security and privacy for mHealth sensing**

S. Mare, J. Sorber, M. Shin, C. Cornelius, and D. Kotz

*In USENIX Workshop on Health Security (HealthSec)*, August, 2011

**Building Scalable Fault Tolerant Network**

Memon, R.A., Yeonseung Ryu, Minho Shin, Jong-myong Rhee

*14th International Conference on Advanced Communication Technology (ICACT)*, Feb. 19-22, 2012, Pyeong Chang, Korea

**Adapt-lite: Privacy-aware, Secure, and Efficient mHealth Sensing**

Shrirang Mare, Jacob Sorber, Minho Shin, Cory Cornelius, David Kotz

*WPES11*, October 17, 2011, Chicago, Illinois, USA.

**A Scalable and Fault Tolerant Network Structure for Tree Networks of Mission Critical Systems**

Memon, R.A., Yeonseung Ryu, Minhoo Shin, Jong-myong Rhee  
*International Conference on ICT Convergence, Sept 28-30, 2011, Seoul Korea*

**Activity-aware ECG-based Patient Authentication for Remote Health Monitoring**

Janani Sriram, Minhoo Shin, Tanzeem Choudhury, David Kotz

*Proceedings of the Eleventh International Conference on Multimodal Interfaces and Workshop on Machine Learning for Multi-modal Interaction (ICMI-MLMI), November, 2009, MA, USA*

**MPCS: Mobile-Phone Based Patient Compliance System for Chronic Illness Care**

Guanling Chen, Bo Yan, Minhoo Shin, David Kotz, Ethan Berke

*Proceedings of the First International Workshop on Ubiquitous Mobile Healthcare Applications, July, 2009, Toronto, Canada*

**DEAMON: Energy-efficient Sensor Monitoring**

Minhoo Shin, Patrick Tsang, David Kotz, Cory Cornelius

*IEEE Communications Society Conference on Sensor, Mesh, and Ad Hoc Communications and Networks (SECON), June, 2009, Rome, Italy (acceptance ratio:18.8%)*

**Challenges in Data Quality Assurance in Pervasive Health Monitoring Systems**

Janani Sriram, Minhoo Shin, David Kotz, Anand Rajan, Manoj Sastry, Mark Yarvis

*Conference "Future of Trust in Computing", June, 2008, Berlin, Germany*

**AnonySense: Privacy-Aware People-Centric Sensing**

C. Cornelius, A. Kapadia, D. Kotz, D. Peebles, Minhoo Shin, and N. Triandopoulos

*The ACM International Conference on Mobile Systems, Applications, and Services (MOBISYS), June, 2008, Breckenridge, Colorado, USA (acceptance ratio:17.8%)*

**An Integrated Transportation and Communication Simulation Framework for Vehicular Ad Hoc Network Applications**

Hyoungsoo Kim, Minhoo Shin, Beomseok Nam, David Lovell

*Transportation Research Board 2008 Annual Meeting, Washington D.C., USA.*

**SDP-based Approach for Channel Assignment in Multi-radio Wireless Networks**

Hieu Dinh, Yoo-Ah Kim, Seungjoon Lee, Minhoo Shin, Bing Wang

*Dial M-POMC 2007, Portland, Oregon, USA. (acceptance ratio:35%)*

**Soft Edge Coloring**

Chadi Kari, Yoo-Ah Kim, Seungjoon Lee, Alex Russell, and Minhoo Shin

*APPROX 2007, Princeton University, New Jersey.*

**AAA for Spontaneous Roaming Agreements In Heterogeneous Wireless Networks**

Judy Fu, Minhoo Shin, J. C. Strassner, N. Jain, V. Ram, S. Upadhyaya, and W. Arbaugh

*Autonomic and Trusted Computing 2007, Hong Kong, China.*

**Distributed Channel Assignment for Multi-radio Wireless Networks**

Minhoo Shin, Seungjoon Lee, and Yooah Kim

*The IEEE International Conference on Mobile Ad-hoc and Sensor Systems (MASS), Oct, 2006, Vancouver, Canada. (acceptance ratio:24.9%)*

**Improving the Latency of 802.11 Hand-offs using Neighbor Graphs**

Minhoo Shin, Arunesh Mishra and William Arbaugh

*The ACM International Conference on Mobile Systems, Applications, and Services (MOBISYS), June, 2004, Boston, MA. (acceptance ratio: 13.4%)*

**Context Caching using Neighbor Graphs for Fast Handoffs in a Wireless Network**  
Arunesh Mishra, Minh Shin, and William Arbaugh  
*IEEE INFOCOM*, March, 2003, Hong Kong, China, Mar., 2004 (acceptance ratio:20.8%)

**The Robust Routing Protocol in Ad Hoc Networks**  
Seungjoon Lee, Bohyung Han, and Minh Shin  
*International Workshop on Ad Hoc Network(IWAHN) 2002*, Vancouver, Canada.

**Technical Reports**      **The Design of Efficient Internetwork Authentication for Ubiquitous Wireless Comm.**  
Minh Shin, Justin Ma, and William A. Arbaugh  
*Tech. Report of University of Maryland, 2004 (CS-TR-4617, UMIACS-TR-2004-59)*

**Posters**      Reliable People-centric Sensing with Unreliable Participants  
Minh Shin, C. Cornelius, D. Peebles, A. Kapadia, P. Tseng, and D. Kotz  
*The ACM International Conference on Mobile Systems, Applications, and Services (MOBISYS)*,  
June, 2008, Breckenridge, Colorado, USA

**Patents**      **"Method and Apparatus for Dynamic and Spontaneous Roaming Agreement of Heterogeneous Networks"** (US 2008067877, IN/1410/ DEL/ 2007)  
**"Probing Method for Fast Handoff in WLAN"** (US 7,400,604, KR 2004-90573)  
**"Method for fast roaming in a wireless network"** (US 7,421,268)  
**"Mobility Management Method using an Improved Neighbor Graph"** (US 7,450,546)  
**"Authentication method for wireless distributed system"** (US 7,756,510 (July 13, 2010),  
KR 2006-41227, WO/2006/121307, EP 20060009984)  
**"Method for performing handoff in wireless network"** (US 8,977,265 Mar 10, 2015)  
**"Reconfiguration of Neighborhood Graph for QoS Support in Heterogeneous Network, and its use for seamless handoff"** (KR 2003)

**Skills**      Languages : C, C++, Object C, Java, Ruby, PHP, SQL, Object Pascal  
System and Network Programming : TCP/IP Socket, Linux/BSD Kernel  
Simulation Tools : Matlab, ns-2, Qualnet, Paramics

**Professional Services**      **Program Committee:** IEEE LCN Workshop on Network Security (WNS) 2008, IEEE LCN  
Workshop on Security in Communications Networks (SICK) 2010, Asia-Pacific Conference on Communications (APCC) 2010

**Active Reviewer:** IEEE Transactions on Mobile Computing, IEEE Transactions on Networking, IEEE ICC, IEEE Globecom, IEEE HPSR, IEEE Sarnoff, IEEE WCNC, IEEE ICCN, IEEE PIMRC, IEEE Communications Magazine, ACM IWCMC, European Wireless, European Transactions on Telecommunications, IEEE Communications Surveys and Tutorials (COMST), Springer Wireless Personal Communications

**References**

**William A. Arbaugh** Professor, Department of Computer Science  
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**David Kotz** Professor, Department of Computer Science  
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**David Lovell** Professor, Dept. of Civil and Environmental Engineering  
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