

AHMAD RAHMATI, PHD

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SUMMARY

Expertise in designing and building complete systems, platforms, and prototypes, followed by lab and field evaluations. In particular:

- Mobile, embedded, and wireless system design, applications, and productization
- 3GPP LTE and 802.11 Wi-Fi selection, interworking, and co-existence
- Context-aware computing through sensing and statistical learning on large data
- System power measurement, analysis, and battery optimization
- Human factors, user studies, and Human-Computer Interaction
- Pervasive health and biomedical applications

PROFESSIONAL EXPERIENCE

- **Senior Staff, Broadcom Corp, Mobile and Wireless Group**, Sunnyvale, CA April 2012 – present
 - Developing and evaluating system solutions for LTE / WLAN / Bluetooth coexistence (IDC algorithms in TDD and FDD; in-band jammer, out-of-band blocker, harmonics, IM3 effects; BT-SIG / WCI-2 and GPIO interfaces)
 - Designing and building custom HW/SW systems and prototypes, e.g. built a low-cost RF coexistence testing platform using off the shelf hardware and scripting (costing <\$2k each vs. ~\$100k commercial solutions)
 - Functional specification and system design of 3GPP LTE and WLAN interworking features, encompassing operator requirements (ANDSF, WLAN_NS, Hotspot 2.0, RCS, ProSe, WiFi offloading, VoLTE)
 - Experience with BRCM 802.11ac/n/g/a solutions, e.g. 4334, 4335, 4339, 4345, WLAN Bring Up Machine
 - Standards contributions in 3GPP LTE (SA2, CT1)
- **Research Assistant, Rice University**, Houston, TX 2006 – 2012
 - Utilized context information and statistical learning to significantly improve performance and usability of mobile and wireless systems. Applications I developed included cellular / Wi-Fi network condition prediction, selection, and switching, as well as predictive energy management
 - Quantitatively revealed long-term evolution of smartphone adoption/usage, impact of socioeconomic status
 - Led the HW / SW design and implementation of the Rice Orbit Platform, an open source Bluetooth body area platform for mobile computing and health applications (e.g. smart-watch, ECG monitoring). Used by collaborators in academia and industry
- **Intern, Deutsche Telekom R&D Lab USA**, Los Altos, CA November 2009 – March 2010
 - Developed network condition and device usage logger, system to enable/use multiple networks on Android
- **Intern, Motorola Labs**, Schaumburg, IL May 2008 – August 2008
 - Developed & demoed FM Radio / RDS solution to transfer data & enable social networking on featurephones
- **Intern, AT&T Labs Research - Shannon Laboratory**, Florham Park, NJ June 2006 – August 2006
 - Developed RFID object tracking system, measured and proved effectiveness of redundancy techniques
- **Developer, Resaneh Pouya Co**, Tehran 2003 – 2005
 - Telecine System (digitizing movie film): I designed and productized the custom PC interface / controller
 - Movie Audio Synchronizer: Part of two person team, developed hardware / software solution to play digital audio instead of a synchronous driven reel tape, while remaining in sync over a long stretch of movie film

EDUCATION

- **PhD in Computer Engineering**, Rice University, Houston, TX 2008 – 2012
Thesis: Context in Mobile System Design: Characterization, Theory, and Implications
- **MSc in Computer Engineering**, Rice University, Houston, TX 2005 – 2008
Thesis: Context for System Resource Management: An Application in Wireless Data Management
- **BSc in Computer Engineering**, Sharif University of Technology, Tehran 2000 – 2004

PATENTS (ISSUED AND PENDING)

- **Six Provisional Patents**; related to mobile and wireless systems including 3GPP LTE / WLAN interworking
- **Ahmad Rahmati et. al.** "A System for Heterogeneous Network Access on Devices with One or Multiple Network Interfaces", US Patent US 2012/0071141. July 7, 2011
- **Ahmad Rahmati et. al.** "Sensor-Assisted Motion Estimation for Efficient Video Encoding", US Patent 2010/0079605, September 28, 2009

TECHNOLOGY EXPERIENCE

- PC and Mobile development and computing (C, C++, Java, MySQL, Perl, Python, bash/shell scripts, PHP, MATLAB, Hadoop, R, Wireshark, Visual Studio, Eclipse, Windows, Linux, Windows Mobile, Android, iOS)
- Rapid design, prototyping, and evaluation of systems, including lab studies, field studies, analysis of large data
- LTE, 802.11 Wi-Fi, Bluetooth, RFID, TCP/IP systems and application development
- Test equipment (LTE call box (R&S CMW500, Anritsu), oscilloscope, spectrum/network analyzer, signal generator,...)
- System power measurement, profiling, analysis, and optimization; in-depth knowledge of battery power systems
- Microcontrollers & embedded systems (TI MSP430, Microchip PIC, Motorola/Freescale 68000, Intel 8051, SPI, I²C)
- Printed circuit board (PCB) design and prototyping (Eagle, Protel)
- Digital systems development (Verilog HDL, Max+Plus/Quartus, Modelsim, LabView)

HONORS & AWARDS

- **Spotlight Paper of IEEE Transactions on Mobile Computing**, vol. 10, no. 1 2011
- **Spotlight Paper of IEEE Transactions on Mobile Computing**, vol. 9, no. 12 2010
- **ACM MobileHCI Best Paper Award** 2007
- **ACM/USENIX MobiSys Student Travel Grants** 2007 and 2008
- **Rice University Graduate Fellowship** 2005
- **Iranian Nationwide MSc Entrance Contests; 3rd place** in Computer Eng. (HW) and **3rd place** in IT (Networks) 2004
- **12th Iranian National Physics Olympiad, Bronze Medal** 1999
- **Member of the National Organization for Development of Exceptional Talents (NODET)** 1993 – 2000

PUBLICATIONS (600+ citations)

- [Ahmad Rahmati](#), Clayton Shepard, Chad Tossell, Lin Zhong, Phillip Kortum, Angela Nicoara, and Jatinder Singh, "Seamless Flow Migration on Smartphones without Network Support", to appear in *IEEE Transactions on Mobile Computing*.
- [Ahmad Rahmati](#) and Lin Zhong, "Studying smartphone usage: lessons from a four-month field study", in *IEEE Transactions on Mobile Computing*, vol. 12, no. 7, July 2013
- Chad Tossell, Phillip Kortum, Clayton Shepard, [Ahmad Rahmati](#), and Lin Zhong, "An Empirical Analysis of Smartphone Personalization: Measurement and User Variability", in *Behavior & Information Technology*, vol. 31, no. 10, October 2012.
- [Ahmad Rahmati](#), Chad Tossell, Clayton Shepard, Phillip Kortum, and Lin Zhong, "Exploring iPhone Usage: The Influence of Socioeconomic Differences on Smartphone Adoption, Usage and Usability", in *Proc. ACM Int. Conf. Human Computer Interaction with Mobile Devices and Services (MobileHCI)*, September 2012.
- [Ahmad Rahmati](#), Clayton Shepard, Chad Tossell, Lin Zhong, and Phil Kortum, "Practical context awareness: measuring and utilizing the context dependency of mobile usage," Rice University Technical Report 2012-08-31.
- Chad Tossell, Phillip Kortum, Clayton Shepard, [Ahmad Rahmati](#), and Lin Zhong, "Getting real: A naturalistic methodology for using smartphones to collect mediated communications", in *Advances in Human-Computer Interaction*, vol. 2012, art. 815972, June 2012.
- Chad Tossell, Phillip Kortum, [Ahmad Rahmati](#), Clayton Shepard, and Lin Zhong, "Characterizing web use on smartphones", in *ACM SIGCHI Conf. Human Factors in Computing Systems (CHI)*, May 2012
- Chad Tossell, Phillip Kortum, Clayton Shepard, Laura Barg-Walkow, [Ahmad Rahmati](#), and Lin Zhong, "A Longitudinal Study of Emoticon Use in Text Messaging from Smartphones", in *Computers in Human Behavior*, vol. 28, no. 2, March 2012
- Hang Yu, [Ahmad Rahmati](#), Ardalan Amiri Sani, Lin Zhong, Jehan Wickramasuriya, and Venu Vasudevan, "Data broadcasting using mobile FM radio: design, realization and application", in *ACM Int. Conf. Ubiquitous Computing (UbiComp)*, September 2011.
- Chad Tossell, Jo Jardina, Phillip Kortum, Camille Peres, Clayton Shepard, [Ahmad Rahmati](#), and Lin Zhong, "Effects of Socioeconomic diversity on iPod Touch Device Use in Real-World Environments", in *Proc. Human Factors and Ergonomics Society Annual Meeting (HFES)*, September 2011.
- [Ahmad Rahmati](#), Clayton Shepard, Chad Tossell, Mian Dong, Zhen Wang, Lin Zhong, and Phillip Kortum, "Tales of 34 iPhone Users: How they change and why they are different", *Rice Technical Report TR-2011-0624*.
- Xiaoming Chen, Zhendong Zhao, [Ahmad Rahmati](#), Ye Wang, and Lin Zhong, "Sensor-Assisted Video Encoding for Mobile Devices in Real-World Environments", in *Proc. IEEE Trans. Circuits and Systems for Video Technology (TCSVT)*, vol. 21, no. 3, March 2011

- Ahmad Rahmati and Lin Zhong, "Context-Based Network Estimation for Energy-Efficient Ubiquitous Wireless Connectivity", in *IEEE Transactions on Mobile Computing*, vol. 10, no. 1, January 2011 (**Issue's Spotlight Paper**).
- Clayton Shepard, Ahmad Rahmati, Chad Tossell, Lin Zhong, and Phillip Kortum, "LiveLab: Measuring Wireless Networks and Smartphone Users in the Field", in *ACM SIGMETRICS Perform. Eval. Rev.*, vol. 38, no. 3, Dec. 2010.
- Yunxin Liu, Ahmad Rahmati, Yuanhe Huang, Hyukjae Jang, Lin Zhong, Yongguang Zhang, and Shensheng Zhang, "Design, realization, and evaluation of xShare for impromptu sharing of mobile phones", in *IEEE Transactions on Mobile Computing*, vol. 9, no. 12, December 2010 (**Issue's Spotlight Paper**).
- Xiaozhu Lin, Ahmad Rahmati, and Lin Zhong, "Dandelion: A framework for transparently programming phone-centered wireless body sensor applications for health", in *ACM Wireless Health*, October 2010
- Chad Tossell, Phillip Kortum, Clayton Shepard, Ahmad Rahmati, and Lin Zhong, "Assessing the Performance of Common Tasks on Handheld Mobile Computers", in *Proc. Human Factors and Ergonomics Soc. (HFES)*, Sept 2010.
- Bo Han, Ahmad Rahmati, and Bhojan Anand, "Report of HotMobile 2010", in *IEEE Pervasive Computing*, vol. 9, no. 3, July 2010 (invited article).
- Clayton Shepard, Ahmad Rahmati, Chad Tossell, Lin Zhong, and Phillip Kortum, "LiveLab: Measuring Wireless Networks and Smartphone Users in the Field", in *Proc. Wrkshp. Hot Topics in Measurement & Modeling of Computer Systems (HotMetrics)*, June 2010.
- Ahmad Rahmati, Lin Zhong, Venu Vasudevan, Jehan Wickramasuriya, and Daniel Stewart, "Enabling Pervasive Mobile Applications with the FM Radio Broadcast Data System", in *Proc. 10th ACM/SIG Int. Wrkshp. Mobile Computing Systems and Applications (HotMobile)*, February 2010.
- Xiaoming Chen, Zhendong Zhao, Ahmad Rahmati, Ye Wang, and Lin Zhong, "SaVE: sensor-assisted motion estimation for efficient H.264/AVC video encoding", in *Proc. ACM Multimedia*, October 2009.
- Ahmad Rahmati and Lin Zhong, "Human-battery interaction on mobile phones", in *Pervasive and Mobile Computing Journal*, vol. 5, no. 5, October 2009.
- Ahmad Rahmati and Lin Zhong, "A longitudinal study of non-voice mobile phone usage by teens from an underserved urban community", Technical Report 0515-09, Rice University, May 2009
- Yunxin Liu, Ahmad Rahmati, Yuanhe Huang, Hyukjae Jang, and Lin Zhong, "xShare: supporting impromptu sharing of mobile phones", in *ACM/USENIX Int. Conf. Mobile Systems, Applications, and Services (MobiSys)*, June 2009.
- Ahmad Rahmati, Clayton Shepard, and Lin Zhong, "NoShake: Content Stabilization for Shaking Screens of Mobile Devices", in *Proc. IEEE Int. Conf. Pervasive Computing and Communication (PerCom)*, March 2009.
- Guang-ming Hong, Ahmad Rahmati, Ye Wang, and Lin Zhong, "SenseCoding: Accelerometer-assisted motion estimation for efficient video encoding", in *Proc. ACM Multimedia*, October 2008.
- Nilanjan Banerjee, Ahmad Rahmati, Mark Corner, Sami Rollins, and Lin Zhong, "Users and batteries: interactions and adaptive energy management in mobile systems", in *Int. Conf. Ubiquitous Computing (UbiComp)*, Sept. 2007.
- Ahmad Rahmati and Lin Zhong, "Usability evaluation of a commercial Pocket PC phone: A pilot study", in *Proc. ACM Int. Conf. Mobile Technology, Applications and Systems (Mobility)*, September 2007.
- Ahmad Rahmati, Angela Qian, and Lin Zhong, "Understanding human-battery interaction on mobile phones", in *Proc. ACM Int. Conf. Human Computer Interaction with Mobile Devices and Services (MobileHCI)*, September 2007 (**MobileHCI Best Paper Award**).
- Ahmad Rahmati, Matti Hiltunen, Lin Zhong, and Rittwik Jana, "Reliability techniques for RFID-based object tracking applications", in *Proc. IEEE Int. Conf. Dependable Systems & Networks (DSN)*, June 2007.
- Ahmad Rahmati and Lin Zhong, "Context-for-Wireless: Context-sensitive energy-efficient wireless data transfer", in *Proc. ACM/USENIX Int. Conf. Mobile Systems, Applications, & Services (MobiSys)*, June 2007.

SELECTED PRESENTATIONS & DEMONSTRATIONS

- **MobiCom Poster**, September 2010
Mobile TCP usage characteristics and the feasibility of network migration without infrastructure support
- **MobiSys Demo Session**, June 2008
NoShake: Reducing Perceived Shake on Mobile Displays
- **Texas Regional Human Factors and Ergonomics Society Conference Poster**, April 2008
User performance on the iPhone touchscreen keyboard
- **MobiSys Demo Session**, June 2007
OrbitECG: Mobile phone-based ambulatory wearable ECG monitoring
- **TI Developers Conference Poster**, March 2006
Bluetooth based body sensor network platform for physiological diary applications

TEACHING EXPERIENCE

- **Dept of Electrical and Computer Engineering, Rice University, Houston, TX** 2006 – 2008
TA for Mobile & embedded system design and applications (ELEC424)
- **Dept of Computer Engineering, Sharif University of Technology, Tehran** 2002 – 2005
Instructor for Digital Electronics Lab, Digital System Design (FPGA) Lab, and Electronics Circuits Lab. TA for Comp. Networks, Comp. Architecture, Electronic Circuits, Comp. Structure and Language, and Electric Circuits
- **Tehran Allameh Helli High School, NODET, Tehran** 2001 – 2002
Instructor for Honors Physics Lab