

May 18–22, 2015  
Florence, Italy



Association for  
Computing Machinery

*Advancing Computing as a Science & Profession*



# MobiSys'15

Proceedings of the 13th Annual International Conference on  
Mobile Systems, Applications, and Services

*Sponsored by:*

**ACM SIGMobile**

*Incooperation with:*

**ACM SIGOPS**

*Supported by:*

**Hewlett-Packard, Google, IBM, Microsoft Research, & NSF**



**Association for  
Computing Machinery**

*Advancing Computing as a Science & Profession*

**The Association for Computing Machinery  
2 Penn Plaza, Suite 701  
New York, New York 10121-0701**

Copyright © 2015 by the Association for Computing Machinery, Inc. (ACM). Permission to make digital or hard copies of portions of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyright for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, to republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permission to republish from: [permissions@acm.org](mailto:permissions@acm.org) or Fax +1 (212) 869-0481.

For other copying of articles that carry a code at the bottom of the first or last page, copying is permitted provided that the per-copy fee indicated in the code is paid through [www.copyright.com](http://www.copyright.com).

**Notice to Past Authors of ACM-Published Articles**

ACM intends to create a complete electronic archive of all articles and/or other material previously published by ACM. If you have written a work that has been previously published by ACM in any journal or conference proceedings prior to 1978, or any SIG Newsletter at any time, and you do NOT want this work to appear in the ACM Digital Library, please inform [permissions@acm.org](mailto:permissions@acm.org), stating the title of the work, the author(s), and where and when published.

**ISBN: 978-1-4503-3494-5**

Additional copies may be ordered prepaid from:

**ACM Order Department**

PO Box 30777  
New York, NY 10087-0777, USA

Phone: 1-800-342-6626 (USA and Canada)  
+1-212-626-0500 (Global)  
Fax: +1-212-944-1318  
E-mail: [acmhelp@acm.org](mailto:acmhelp@acm.org)  
Hours of Operation: 8:30 am – 4:30 pm ET

**ACM Order Number: 104158**

Printed in the USA

# General Chairs' Welcome

On behalf of the entire organizing committee, it is a great pleasure to welcome you to the 13th International Conference on Mobile Systems, Applications and Services – MobiSys 2015 in Florence, Italy.

The Program Chairs, Marco Gruteser and Jason Hong, have an excellent technical program lined up for you. I thank them, their Program Committee, and the external review committee for doing the heavy lifting on this front. We hope that you will enjoy the talks and have many stimulating discussions during your three days at this conference. The scientific program is enriched by our keynote presentations from Krishan Sabnani (Research VP at Bell Labs), and Deborah Estrin (Professor of Computer Science at Cornell Tech in New York City); which will outline the vision for the future of clouds and mobile data science.

In addition to the regular program, this year's MobiSys also includes a high quality program of videos, demos, posters and workshops. The video presentations are integrated with the technical presentations of the main track, and posters and demos will be presented at the end of the first day.

The workshop program consists of 5 workshops that will cover exciting topics in mobile Physical Analytics, mobile gaming, wearable computing, drone networks, mobile internet of things, mobile user interfaces, and mobile technologies applied to social sciences. The workshop program also includes a Ph.D. Forum that provides a friendly and supportive environment for doctoral students to present and discuss their dissertation work.

Last but not least, this year's MobiSys is co-located with WWW to enable community cross-pollination. I wish to thank Stefan Saroiu, Stefano Leonardi, the MobiSys Program Chairs, and the WWW Program Chairs for organizing a joint session and a joint keynote, which are open to attendees of both events.

We wish to thank the Organizing Committee members and the SigMobile leadership who have helped a lot during the conference preparation. Thank you all!

Finally, I wish to honor the memory of ACM MobiSys 2015 Co-Chair Gaetano Borriello, a dear friend and a leading member of our community. He will be greatly missed.

I sincerely hope that you will find your curiosity – as well as all of your senses – satisfied this week in Florence!

**Giovanni Pau**

*ACM MobiSys 2015 General Co-Chair*

*UPMC-LIP6*

# Program Chairs' Welcome

Welcome to MobiSys 2015, the 13th Conference on Mobile Systems, Applications, and Services. This year's technical program covers a wide and rich range of topics in mobile systems. The research themes include wearable computing, privacy and security, gaming, wireless networks, and more.

We are delighted to anchor the technical program with keynote talks by Dr. Krishan Sabnani and Dr. Deborah Estrin. Drs. Sabnani and Estrin have been leading researchers in Internet design, wireless networks, and sensing for over twenty years. In addition to the keynotes, we have an exciting technical program that includes 29 full-length technical papers chosen by the technical program committee (TPC).

This year, we had a record number of 219 submissions. To reduce the number of reviews each TPC member had to write, we augmented the TPC with an external review committee (ERC) of 30 experts. Most ERC members reviewed seven papers during the initial round of the review process.

Our review process consisted of three rounds. In the first round, all submissions received three reviews, each written by a member of the TPC or ERC. If a reviewer recommended that a paper be accepted, the paper advanced to the second round. In the second round, papers received two or more additional reviews. At the end of the second round, reviewers discussed each remaining paper online to determine whether it should advance to the third round of decisions. The third round of decisions occurred during an all-day face-to-face meeting of the TPC. By the conclusion of this meeting, the TPC had identified the 29 papers in the program. Finally, all accepted papers were shepherded by a TPC member to ensure that the final manuscripts met the standards of the committee. We also took strict precautions throughout the review process to avoid conflicts of interest.

Creating the technical program for MobiSys 2015 was a team effort, and we would like to thank the TPC members, ERC members, and shepherds who worked extremely hard reading papers and providing feedback to paper authors. We would also like to thank the authors for sending us a pool of very high-quality submissions.

We are also grateful to our colleagues who helped organize the conference, including the steering committee, the poster and demo chairs (Liqun Li, Ilias Leontiadis, Justin Manweiler, Andreas Terzis), the publicity chairs (Ling-Jyh Chen, Christos Efstratiou, Robert LiKamWa), the publication chair (Marco Levorato), the workshop co-chairs (Rajesh Balan, Andrea Passarella, Xia Zhou), the travel grants co-chairs (Jun Bi, Tamer Nadeem), the industrial liaison chair (Marco Magnarosa), and the web chair (Francesco Bronzino).

We would especially like to thank the general chairs, Gaetano Borriello and Giovanni Pau, and the local arrangements chair Gustavo Marfia. Their handling of the conference logistics was invaluable. We are also indebted to Justin Manweiler, who, in his role as Hotmobile general chair, handled the logistics of the co-located MobiSys technical program committee meeting. Finally, we thank our sponsors, ACM SIGMOBILE, and our supporters, HP, Google, Microsoft Research, IBM, and the National Science Foundation. We hope that you will find the technical program exciting and thought provoking, and that the conference will provide you with a valuable opportunity to share experiences and ideas with others from around the world.

Lastly, we would like to dedicate this year's Mobisys program in remembrance of Gaetano Borriello. Gaetano was not only an active member of our community, but also a mentor and friend to many of us. We will remember him for his warmth, his humor, his pioneering work, his leadership, and his kindness. He will be greatly missed.

**Marco Gruteser**

*MobiSys '15 Program Co-Chair  
Rutgers University, USA*

**Jason Hong**

*MobiSys '15 Program Co-Chair  
Carnegie Mellon University, USA*

# Table of Contents

<b>MobiSys'15 Organization</b> .....	xiii
--------------------------------------	------

<b>MobiSys'15 Sponsors &amp; Supporters</b> .....	xv
---	----

## Session 1: Sensing and Applications

• <b>Invisible Sensing of Vehicle Steering with Smartphones</b> .....	1
Dongyao Chen, Kyong-Tak Cho, Sihui Han, Zhizhuo Jin, Kang G. Shin ( <i>University of Michigan</i> )	
• <b>Turning a Mobile Device into a Mouse in the Air</b> .....	15
Sangki Yun, Yi-Chao Chen, Lili Qiu ( <i>The University of Texas at Austin</i> )	
• <b>Tracking Keystrokes Using Wireless Signals</b> .....	31
Bo Chen, Vivek Yenamandra, Kannan Srinivasan ( <i>The Ohio State University</i> )	
• <b>Contactless Sleep Apnea Detection on Smartphones</b> .....	45
Rajalakshmi Nandakumar, Shyamnath Gollakota, Nathaniel Watson ( <i>University of Washington</i> )	

## Session 2: Mobile Advertising

• <b>MDdScope: Characterizing Mobile In-App Targeted Ads</b> .....	59
Suman Nath ( <i>Microsoft Research</i> )	
• <b>AdAttester: Secure Online Mobile Advertisement Attestation Using TrustZone</b> .....	75
Wenhao Li, Haibo Li, Haibo Chen, Yubin Xia ( <i>Shanghai Jiao Tong University</i> )	
• <b>Efficient Privilege De-Escalation for Ad Libraries in Mobile Apps</b> .....	89
Bin Liu ( <i>Samsung Research America</i> ), Bin Liu ( <i>Carnegie Mellon University</i> ), Hongxia Jin ( <i>Samsung Research America</i> ), Ramesh Govindan ( <i>University of Southern California</i> )	

## Session 3: Mobility, Gaming, and Performance

• <b>GameOn: p2p Gaming on Public Transport</b> .....	105
Nairan Zhang ( <i>University of Wisconsin-Madison</i> ), Youngki Lee, Meera Radhakrishnan, Rajesh Krishna Balan ( <i>Singapore Management University</i> )	
• <b>Kahawai: High-Quality Mobile Gaming Using GPU Offload</b> .....	121
Eduardo Cuervo, Alec Wolman ( <i>Microsoft Research</i> ), Landon P. Cox ( <i>Duke University</i> ), Kiron Lebeck ( <i>University of Washington</i> ), Ali Razeen ( <i>Duke University</i> ), Stefan Saroiu, Madanlal Musuvathi ( <i>Microsoft Research</i> )	
• <b>Accelerating Mobile Applications through Flip-Flop Replication</b> .....	137
Mark S. Gordon, David Ke Hong, Peter M. Chen, Jason Flinn, Scott Mahlke, Zhuoqing Morley Mao ( <i>University of Michigan</i> )	
• <b>Outatime: Using Speculation to Enable Low-Latency Continuous Interaction for Mobile Cloud Gaming</b> .....	151
Kyungmin Lee ( <i>University of Michigan</i> ), David Chu, Eduardo Cuervo, Johannes Kopf ( <i>Microsoft Research</i> ), Yury Degtyarev ( <i>St. Petersburg Polytechnic University</i> ), Sergey Grizan ( <i>Siberian Federal University</i> ), Alec Wolman ( <i>Microsoft Research</i> ), Jason Flinn ( <i>University of Michigan</i> )	

## Session 4: Cameras

• <b>RollingLight: Enabling Line-of-Sight Light-to-Camera Communications</b> .....	167
Hui-Yu Lee, Hao-Min Lin, Yu-Lin Wei, Hsin-I Wu, Hsin-Mu Tsai ( <i>National Taiwan University &amp; Intel-NTU Connected Context Computing Center, Taiwan</i> ), Kate Ching-Ju Lin ( <i>Academia Sinica &amp; Intel-NTU Connected Context Computing Center, Taiwan</i> )	

- **InFrame++: Achieve Simultaneous Screen-Human Viewing and Hidden Screen-Camera Communication** ..... 181  
Anran Wang (*Beihang University*), Zhuoran Li, Chunyi Peng (*The Ohio State University*),  
Guobin Shen (*Microsoft Research, China*), Gan Fang (*The Ohio State University*),  
Bing Zeng (*University of Electronic Science and Technology of China*)
- **Real-Time Screen-Camera Communication Behind Any Scene** ..... 197  
Tianxing Li, Chuankai An, Xinran Xiao, Andrew T. Campbell, Xia Zhou (*Dartmouth College*)
- **Starfish: Efficient Concurrency Support for Computer Vision Applications** ..... 213  
Robert LiKamWa, Lin Zhong (*Rice University*)

## Session 5: Wearables

- **Typingring: A Wearable Ring Platform for Text Input** ..... 227  
Shahriar Nirjon, Jeremy Gummesson, Dan Gelb, Kyu-Han Kim (*Hewlett-Packard Labs*)
- **U-Wear: Software-Defined Ultrasonic Networking for Wearable Devices** ..... 241  
G. Enrico Santagati, Tommaso Melodia (*Northeastern University, Boston*)
- **LookUp: Enabling Pedestrian Safety Services via Shoe Sensing** ..... 257  
Shubham Jain (*Rutgers University*), Carlo Borgiattino (*Politecnico di Torino*),  
Yanzhi Ren (*Stevens Institute of Technology, Hoboken, NJ*), Marco Gruteser (*Rutgers University*),  
Yingying Chen (*Stevens Institute of Technology, Hoboken, NJ*),  
Carla-Fabiana Chiasserini (*Politecnico di Torino*)
- **ZOE: A Cloud-less Dialog-enabled Continuous Sensing Wearable Exploiting Heterogeneous Computation** ..... 273  
Nicholas D. Lane (*Bell Labs*), Petko Georgiev, Cecilia Mascolo (*University of Cambridge*),  
Ying Gao (*Intel Research*)

## Session 6: Understanding and Improving Mobile App Capabilities

- **Reducing Smartphone Application Delay through Read/Write Isolation** ..... 287  
David T. Nguyen, Gang Zhou (*College of William and Mary*), Guoliang Xing (*Michigan State University*),  
Xin Qi, Zijiang Hao, Ge Peng, Qing Yang (*College of William and Mary*)
- **AccelWord: Energy Efficient Hotword Detection through Accelerometer** ..... 301  
Li Zhang, Parth H. Pathak, Muchen Wu, Yixin Zhao,  
Prasant Mohapatra (*University of California, Davis*)
- **Wearables Can Afford: Light-weight Indoor Positioning with Visible Light** ..... 317  
Zhice Yang, Zeyu Wang (*Hong Kong University of Science and Technology*),  
Jiansong Zhang (*Microsoft Research Asia*), Chenyu Huang (*Wuhan University*),  
Qian Zhang (*Hong Kong University of Science and Technology*)
- **OverLay: Practical Mobile Augmented Reality** ..... 331  
Puneet Jain (*Duke University*), Justin Manweiler (*IBM Research*),  
Romit Roy Choudhury (*University of Illinois*)

## Session 7: Joint WWW-MobiSys Session

- **Visually Fingerprinting Humans without Face Recognition** ..... 345  
He Wang (*University of Illinois at Urbana-Champaign*), Xuan Bao (*Samsung Research America*),  
Romit Roy Choudhury (*University of Illinois at Urbana-Champaign*),  
Srihari Nelakuditi (*University of South Carolina*)
- **Analyzing the Use of Quick Response Codes in the Wild** ..... 359  
Adam Lerner (*University of Washington*), Alisha Saxena (*Massachusetts Institute of Technology*),  
Kirk Ouimet, Ben Turley (*Scan, Inc.*), Anthony Vance (*Brigham Young University*),  
Tadayoshi Kohno, Franziska Roesner (*University of Washington*)

## Session 8: Mobility and Networking

- **Beyond the Radio: Illuminating the Higher Layers of Mobile Networks** ..... 375  
Narseo Vallina-Rodriguez, Srikanth Sundaresan (*ICSI*), Christian Kreibich (*ICSI & Lastline*),  
Nicholas Weaver, Vern Paxson (*ICSI & UC Berkeley*)
- **Mobilyzer: An Open Platform for Controllable Mobile Network Measurements** ..... 389  
Ashkan Nikravesh, Hongyi Yao, Shichang Xu (*University of Michigan*),  
David Choffnes (*Northeastern University*), Z. Morley Mao (*University of Michigan*)
- **Energy Efficient WiFi Display** ..... 405  
Chi Zhang, Xinyu Zhang (*University of Wisconsin-Madison*), Ranveer Chandra (*Microsoft Research*)
- **Practicalizing Delay-Tolerant Mobile Apps with Cedos** ..... 419  
YoungGyou Moon, Donghwi Kim, Younghwan Go, Yeongjin Kim, Yung Yi, Song Chong,  
Kyoungsoo Park (*Korea Advanced Institute of Science and Technology*)

## Video Presentations

- **Video: Lookup!: Enabling Pedestrian Safety Services via Shoe Sensing** ..... 435  
Shubham Jain (*Rutgers University*), Carlo Borgiattino (*Politecnico di Torino*),  
Yanzhi Ren (*Stevens Institute of Technology*), Marco Gruteser (*Rutgers University*),  
Yingying Chen (*Stevens Institute of Technology*), Carla Fabiana Chiasserini (*Politecnico di Torino*)
- **Video: Lightweight Visible Light Communication for Indoor Positioning** ..... 437  
Zeyu Wang, nZhice Yang (*Hong Kong University of Science and Technology*),  
Jiansong Zhang (*Microsoft Research Asia*), Chenyu Huang (*Wuhan Univeristy*),  
Qian Zhang (*Hong Kong University of Science and Technology*)

## Demo Presentations

- **Demo: Mobile Crowdsensing of Road Surface Roughness** ..... 439  
Giacomo Alessandrini, Alessandro Bogliolo, Alberto Carini, Saverio Delpriori, Valerio Freschi,  
Lorenz Klopfenstein, Emanuele Lattanzi, Gioele Luchetti, Brendan Paolini,  
Andrea Seraghiiti (*DiSBef - University of Urbino*)
- **Demo: D2D Rescue of Overloaded Cellular Channels** ..... 441  
Farid Benbadis (*Thales Communications & Security*),  
Filippo Rebecchi (*Thales Communications & Security and LIP6/CNRS – UPMC Sorbonne Universités*),  
Florian Cosnier (*Thales Communications & Security*),  
Matteo Sammarco, Marcelo Dias de Amorim (*LIP6/CNRS – UPMC Sorbonne Universités*),  
Vania Conana (*Thales Communications & Security*)
- **Demo: Irides: Attaining Quality, Responsiveness and Mobility for Virtual Reality Head-mounted Displays** ..... 443  
Yury Degtyarev (*St. Petersburg Polytechnic University*),  
Eduardo Cuervo, David Chu (*Microsoft Research*)
- **Demo: Using Wearables to Learn from Human Dynamics** ..... 445  
Sébastien Faye, Raphael Frank (*University of Luxembourg*)
- **Demo: Breathing-Based Text Input for Mobile Phones** ..... 447  
Jackson Feijó Filho, Thiago Valle, Wilson Prata (*Nokia Technology Institute*)
- **Demo: Continuous Emotional Status in Mobile-Mediated Communications** ..... 449  
Jackson Feijó Filho, Wilson Prata, Thiago Valle (*Nokia Technology Institute*)
- **Demo: Mobile Software Emotions Logging: Towards an Automatic Usability Evaluation** ..... 451  
Jackson Feijó Filho, Wilson Prata, Thiago Valle (*Nokia Technology Institute*)
- **Demo: TouchCom - Creating Real Excalibur Experience with Body Touch Communication** ..... 453  
Yawhuei Lam (*ETH Zurich*), Virag Varga (*Disney Research Zurich & ETH Zurich*),  
Lito Kriara (*Disney Research Zurich*), Thomas Gross (*ETH Zurich*),  
Stefan Mangold (*Disney Research Zurich*)



• <b>Demo: Real-Time Screen-Camera Communication Behind Any Scene</b> .....	455
Tianxing Li, Chuankai An, Xinran Xiao, Andrew T. Campbell, Xia Zhou ( <i>Dartmouth College</i> )	
• <b>Demo: Energy Harvesting Using Everyday Objects</b> .....	457
Adiyan Mujibiya, Junji Torii ( <i>Rakuten, Inc.</i> )	
• <b>Demo: NOMAD: An Edge Cloud Platform for Hyper-Responsive Mobile Apps</b> .....	459
Andreas Pamboris ( <i>Imperial College London</i> ), Miguel Báguena ( <i>Universitat Politècnica de València</i> ), Alexander L. Wolf ( <i>Imperial College London</i> ), Pietro Manzoni ( <i>Universitat Politècnica de València</i> ), Peter Pietzuch ( <i>Imperial College London</i> )	
• <b>Demo: Bringing the Internet of Toys to Life</b> .....	461
Virag Varga ( <i>Disney Research Zurich &amp; ETH Zurich</i> ), Lito Kriara, Vladimir Vukadinovic ( <i>Disney Research Zurich</i> ), Thomas Gross ( <i>ETH Zurich</i> ), Stefan Mangold ( <i>Disney Research Zurich</i> )	
• <b>Demo: Achieving Simultaneous Screen-Human Viewing and Hidden Screen-Camera Communication</b> .....	463
Anran Wang ( <i>Beihang University</i> ), Zhuoran Li, Gan Fang, Chunyi Peng ( <i>The Ohio State University</i> ), Guobin Shen ( <i>Microsoft Research, China</i> ), Bing Zeng ( <i>University of Electronic Science and Technology of China</i> )	
• <b>Demo: Lightweight Visible Light Communication for Indoor Positioning</b> .....	465
Zeyu Wang, Zhice Yang ( <i>Hong Kong University of Science and Technology</i> ), Jiansong Zhang ( <i>Microsoft Research Asia</i> ), Chenyu Huang ( <i>Wuhan University</i> ), Qian Zhang ( <i>Hong Kong University of Science and Technology</i> )	
• <b>Demo: Mobilyzer: Mobile Network Measurement Made Easy</b> .....	467
Shichang Xu, Ashkan Nikraves, Hongyi Yao ( <i>University of Michigan</i> ), David Choffnes ( <i>Northeastern University</i> ), Z. Morley Mao ( <i>University of Michigan</i> )	
• <b>Demo: Turning a Mobile Device into a Mouse in the Air</b> .....	469
Sangki Yun, Yi-Chao Chen, Wenguang Mao, Lili Qiu ( <i>The University of Texas at Austin</i> )	
• <b>Demo: Finger and Hand Gesture Recognition Using Smartwatch</b> .....	471
Yixin Zhao, Parth H. Pathak, Chao Xu, Prasant Mohapatra ( <i>University of California, Davis</i> )	

## Poster Presentations

• <b>Poster: bPart - A Small and Versatile Bluetooth Low Energy Sensor Platform for Mobile Sensing</b> .....	473
Matthias Berning, Matthias Budde, Till Riedel, Michael Beigl ( <i>Karlsruhe Institute of Technology</i> )	
• <b>Poster: Detecting if a Smartphone is Indoors or Outdoors with Ultrasounds</b> .....	475
Igor Bisio, Alessandro Delfino, Fabio Lavagetto ( <i>University of Genoa</i> )	
• <b>Poster: Swarming Drones Can Connect You to the Network</b> .....	477
Albert Y. Chung, Jongtaek Jung, Kangho Kim, Hyung Kyu Lee, Jiyeon Lee, Suk Kyu Lee, Seungho Yoo, Hwangnam Kim ( <i>Korea University</i> )	
• <b>Poster: Constructing a Unique Profile for Mobile User Identification in Location Recommendation Systems</b> .....	479
Muawya H. Sarnoub Eldaw, Mark Levene, George Roussos ( <i>Birkbeck, University of London</i> )	
• <b>Poster: Detection of Cyberbullying in a Mobile Social Network: Systems Issues</b> .....	481
Homa Hosseinmardi, Sabrina Arredondo Mattson, Rahat Ibn Rafiq, Richard Han, Qin Lv, Shivakant Mishra ( <i>University of Colorado Boulder</i> )	
• <b>Poster: A Hybrid Indoor Audio Localization System</b> .....	483
Lito Kriara, Giorgio Corbellini, Vladimir Vukadinovic ( <i>Disney Research Zurich</i> ), Ruben Kaelin, Roman Frigg ( <i>Disney Research Zurich &amp; ETH Zurich</i> ), Stefan Mangold ( <i>Disney Research Zurich</i> )	
• <b>Poster: TVisor – A Practical and Lightweight Mobile Red-Green Dual-OS Architecture</b> .....	485
Wenhao Li, Liang Liang, Mingyang Ma, Yubin Xia, Haibo Chen ( <i>Shanghai Jiao Tong University</i> )	

• <b>Poster: A Continuous and Noninvasive User Authentication System for Google Glass</b> .....	487
Ge Peng, David T. Nguyen, Gang Zhou ( <i>College of William and Mary</i> ), Shuangquan Wang ( <i>Institute of Computing Technology, Chinese Academy of Sciences</i> )	
• <b>Poster: A Context Simulation Harness for Realistic Mobile App Testing</b> .....	489
Manoj R. Rege, Vlado Handziski, Adam Wolisz ( <i>Technische Universität Berlin</i> )	
• <b>Poster: Localized Content for Village Schools</b> .....	491
Morgan Vigil ( <i>University of California, Santa Barbara</i> ), David Johnson ( <i>Center for Scientific and Industrial Research, South Africa</i> ), Elizabeth Belding ( <i>University of California, Santa Barbara</i> )	
• <b>Poster: Context-Triggered Mobile Network Measurement</b> .....	493
Shichang Xu, Ashkan Nikravesh, Hongyi Yao ( <i>University of Michigan</i> ), David R. Choffnes ( <i>Northeastern University</i> ), Z. Morley Mao ( <i>University of Michigan</i> )	
• <b>Poster: Emergency Management Using SHERLOCK</b> .....	495
Roberto Yus, Eduardo Mena ( <i>University of Zaragoza</i> )	
• <b>Poster: Location Verification and Recovery for Mobile In-Vehicle Applications</b> .....	497
Kexiong (Curtis) Zeng, Yanzhi Dou, Yaling Yang ( <i>Virginia Tech</i> ), Ranveer Chandra ( <i>Microsoft Research</i> )	
<b>Author Index</b> .....	499

# MobiSys 2015 – The Thirteenth International Conference on Mobile Systems, Applications, & Services Organization

<b>General Co-chairs</b>	Gaetano Borriello ( <i>University of Washington, USA</i> ) Giovanni Pau ( <i>UPMC-LIP6, France / UCLA, USA</i> )
<b>Technical Program Co-chairs</b>	Marco Gruteser ( <i>Rutgers University, USA</i> ) Jason Hong ( <i>Carnegie Mellon University, USA</i> )
<b>Local Arrangements Chair</b>	Gustavo Marfia ( <i>Università di Bologna, Italy</i> )
<b>Workshop Co-chairs</b>	Rajesh Balan ( <i>SMU, Singapore</i> ) Andrea Passarella ( <i>CNR, Italy</i> ) Xia Zhou ( <i>Dartmouth College, USA</i> )
<b>Posters/Demos/Video Co-Chairs</b>	Liqun Li ( <i>Microsoft Research Asia, China</i> ) Ilias Leontiadis ( <i>Telefonica Research, Spain</i> ) Justin Manweiler ( <i>IBM Research, USA</i> ) Andreas Terzis ( <i>Google, USA</i> )
<b>Publication Chair</b>	Marco Levorato ( <i>University of California, Irvine, USA</i> )
<b>Publicity Co-Chairs</b>	Ling-Jyh Chen ( <i>Academia Sinica, Taiwan</i> ) Christos Efstratiou ( <i>University of Kent, UK</i> ) Robert LiKamWa ( <i>Rice University, USA</i> )
<b>Industrial Liaison Chair</b>	Marco Magnarosa ( <i>Cubit Innovation Labs, Italy</i> )
<b>Travel Grants Co-Chairs</b>	Jun Bi ( <i>Tsinghua University, China</i> ) Tamer Nadeem ( <i>Old Dominion University, USA</i> )
<b>Web Chair</b>	Francesco Bronzino ( <i>Rutgers University, USA</i> )
<b>Technical Program Committee</b>	Yuvraj Agarwal ( <i>Carnegie Mellon University, USA</i> ) Mary Baker ( <i>HP Labs, USA</i> ) Rajesh Balan ( <i>Singapore Management University, Singapore</i> ) Ramon Caceres ( <i>Google, USA</i> ) Hao Chen ( <i>University of California, Davis, USA</i> ) Yingying (Jennifer) Chen ( <i>Stevens Institute of Technology, USA</i> ) Romit Roy Choudhury ( <i>University of Illinois at Urbana-Champaign, USA</i> ) David Chu ( <i>Microsoft Research, USA</i> ) Landon Cox ( <i>Duke University, USA</i> )

**Technical Program Committee  
(continued)**

Peter Druschel (*MPI-SWS, Germany*)  
Prabal Dutta (*University of Michigan, USA*)  
Deepak Ganesan (*University of Massachusetts at Amherst, USA*)  
Shyam Gollakota (*University of Washington, USA*)  
Ben Greenstein (*Google, USA*)  
Robin Kravets (*University of Illinois at Urbana-Champaign, USA*)  
Anthony LaMarca (*Intel Labs, USA*)  
Janne Lindqvist (*Rutgers University, USA*)  
Yunxin Liu (*Microsoft Research Asia, China*)  
Z. Morley Mao (*University of Michigan, USA*)  
Margaret Martonosi (*Princeton University, USA*)  
Cecilia Mascolo (*University of Cambridge, USA*)  
Suman Nath (*Microsoft Research, USA*)  
Chunyi Peng (*The Ohio State University, USA*)  
Bodhi Priyantha (*Microsoft Research, USA*)  
Mahadev Satyanarayanan (*Carnegie Mellon University, USA*)  
James Scott (*Microsoft Research, UK*)  
Junehwa Song (*KAIST, South Korea*)  
Tam Vu (*University of Colorado, Denver, USA*)  
Lin Zhong (*Rice University, USA*)

**External Review Committee**

Ashwin Ashok	Justin Manweiler
Fan Bai	Tamer Nadeem
Alastair Beresford	Vishnu Navda
Octav Chipara	Srihari Nelakuditi
Eduardo Cuervo Laffaye	Lenin Ravindranath Sivalingam
Samir Das	Souvik Sen
Nigel Davies	Kannan Srinivasan
Jeremy Gummeson	Andreas Terzis
Charlie Hu	Michael Tsai
Wenjun Hu	Kamin Whitehouse
Minkyong Kim	Guoliang Xing
Nic Lane	Chenren Xu
Youngki Lee	Wenyuan Xu
Mo Li	Jie Yang
Qin (Christine) Lv	Pei Zhang

# MobiSys 2015 Sponsors and Supporters

**Sponsor**



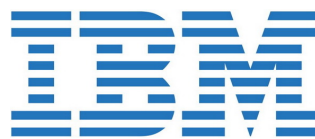
**In cooperation with**



**Silver Supporter**



**Bronze Supporters**



Microsoft Research

**Travel Grant Support**

