32ND IEEE INTERNATIONAL PERFORMANCE, COMPUTING AND COMMUNICATIONS CONFERENCE

PROGRAM GUIDE
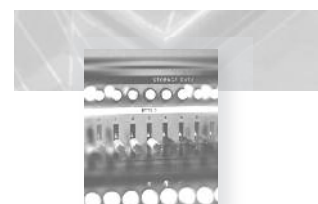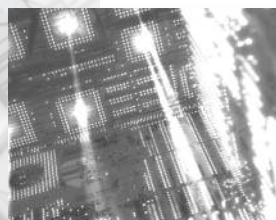
IEEE IPCCC 2013

SAN DIEGO, CALIFORNIA USA
DECEMBER 6-8, 2013

THE INTERNATIONAL PERFORMANCE, COMPUTING, AND COMMUNICATIONS CONFERENCE IS THE PREMIER IEEE CONFERENCE PRESENTING RESEARCH IN THE PERFORMANCE OF COMPUTER AND COMMUNICATION SYSTEMS.

FOR MORE THAN THREE DECADES, IPCCC HAS BEEN A RESEARCH FORUM FOR ACADEMIC, INDUSTRIAL AND GOVERNMENT RESEARCHERS.

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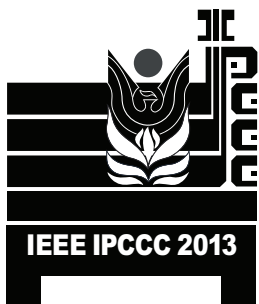
Message from the IPCCC 2013 General Co-Chairs

It is our great pleasure to welcome you to the 32nd IEEE International Performance, Computing, and Communications Conference, IPCCC 2013, December 6-8 at Coronado Island Marriott Resort & Spa, San Diego, California. IPCCC is a premier venue of IEEE Computer Society for researchers from academia, government, and industry to present, explore and discuss the latest research advances in the performance of computer and communication systems.

We are delighted to present you an excellent conference program this year. The conference program consists of two plenary keynote speeches, 34 technical papers and 12 research posters. We wish to thank all the contributors to this high-quality program and to the success of IPCCC 2013. In particular, we thank Program Co-Chairs Zhipeng Cai and Zhiqiang Lin and all the members of the Technical Program Committee for their tremendous effort and hard work in paper selection.

We also thank General Vice-Chair Song Fu, Poster Chair Peixiang Liu, Workshop Chair Xiaojun Ruan, Publications Chair Mea Wang, Publicity Co-Chairs Fan Li and Linwei Niu, Web Chair Neil Nelson, Financial Chair Nasr Ullah, and Registration Chair Jack Chen. Finally, we are grateful to IEEE Computer Society for its continuing sponsorship and support of this conference.

On behalf of the conference executive committee, we thank you for attending and participating in IPCCC 2013. We hope you enjoy the conference and have a great time in San Diego.

YU WANG AND KUAI XU
GENERAL CO-CHAIRS, IPCCC 2013

Message from the Technical Program Chairs

It is our great pleasure to present you the proceedings of the 32nd edition of the IEEE International Performance Computing and Communications Conference, December 6-8, 2013 in San Diego, California, United States. The conference continues to provide a forum for the exchange of ideas and results among researchers, developers, and practitioners working in all aspects of performance of computer and communication systems.

This year we received 126 submissions from 29 countries and regions: Australia, Bangladesh, Belgium, Brazil, Canada, Chile, China, Egypt, France, Germany, Hong Kong, Hungary, India, Islamic Republic of Iran, Italy, Jordan, Korea, Morocco, Norway, Pakistan, Portugal, Russian Federation, Saudi Arabia, Senegal, Spain, Taiwan, Tunisia, United Arab Emirates and the United States. The technical program committee accepted 34 submissions for oral presentation at the conference, representing an acceptance rate of 27 percent.

Most of the submissions received three or more peer reviews from our technical program committee members and external reviewers. We were only able to accept papers that were highly ranked and received broad support from the reviewers. The final technical program included nine technical sessions and one poster session.

Additionally, the conference features keynote addresses by two invited and distinguished speakers. We are deeply indebted to all members of the technical program committee for their hard work and their tremendous efforts in reviewing and discussing each paper. We would also like to thank the external reviewers for volunteering their time to review the papers.

In addition, we are also grateful to the General Chairs and General Vice-Chair of the conference, Prof. Yu Wang, Prof. Kuai Xu and Prof. Song Fu, for their leadership, and to Finance Chair Nasr Ullah, Publication Chair Prof. Mea Wang, Publicity Chairs Prof. Fan Li and Prof. Linwei Niu, Poster Chair Prof. Peixiang Liu, Workshop Chair Prof. Xiaojun Ruan, Web Chair Neil Nelson, Registration Chair Jack Chen and Local Organization Chairs for their hard work in making IPCCC 2013 a successful event.

Last but not least we would like to thank all the authors for presenting their works at the conference and we also wish the papers that were not selected for presentation will benefit from the reviews and eventually will be published in other venues.

ZHIPENG CAI AND ZHIQIANG LIN,
TECHNICAL PROGRAM CHAIRS,
IEEE IPCCC 2013

Program Guide Contents

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Coronado Island Marriott Resort & Spa
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Coronado, Ca., 92118

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TEXAS STATE UNIVERSITY

Registration (Coronado Ballroom A Foyer, 7:45 a.m.) and Welcome Message (Coronado Ballroom A, 8:00 - 8:10 a.m.)
Keynote Address I: 8:10 - 9:10 a.m. – Professor Bill Lin, University of California, San Diego
Title: Dark Fiber Meets Dark Silicon
Chair: Kuai Xu (Arizona State University, USA)

Break – 9:10 - 9:25 a.m.

Session 1: 9:25 - 11:30 a.m.

Session 1: System Optimization
Chair: **Wei Zhang** (Virginia Commonwealth University, USA)

1.1: Queue Reorganization for Subscription Congestion Avoidance in Publish/Subscribe Systems
Wei Yan (State Key Laboratory of Software Engineering, Wuhan University, China/Department of Electrical Engineering and Computer Science, Vanderbilt University, USA)
Vinod Muthusamy (IBM Thomas J. Watson Research Center, USA)
Mingwen Chen and Yonghong Huang (Institute of Computing Technology, Chinese Academy of Sciences, China)
Zheng Xiao (State Grid Electricity Science Research Institute, China)
Xubin Pei (Zhejiang Electric Power Corporation, China)
Songlin Hu (State Key Laboratory of Software Engineering, Wuhan University, China / Institute of Computing Technology, Chinese Academy of Sciences, China)

1.2: A2E: Adaptively Aggressive Energy Efficient DVFS Scheduling for Data Intensive Applications
Li Tan and **Zizhong Chen** (University of California, Riverside. USA)
Ziliang Zong (Texas State University, USA)
Rong Ge (Marquette University, USA)
Dong Li (Oak Ridge National Laboratory, USA)

1.3: Expander Code: A Scalable Erasure-Resilient Code to Keep up with Data Growth in Distributed Storage
Guangping Xu and **Sheng Lin** (Computer and Communication Engineering School, Tianjin University of Technology, China)
Hua Zhang, Xing Guo and Kai Shi (Tianjin Key Laboratory of Intelligence Computing and New Software Technology, China)

1.4: Improved Kernel Security Through Memory Layout Randomization
Dannie Stanley, **Dongyan Xu and Eugene Spafford** (Department of Computer Science, Purdue University, USA)

1.5:Using Intelligent Prefetching to Reduce the Energy Consumption of A Large-Scale Storage System
Ziming Zhang (University of North Texas, USA)
Ziliang Zong, **Brian Romoser, Ribel Fares and Joal Wood** (Computer Science Department, Texas State University, USA)
Rong Ge (Department of Mathematics, Statistics, and Computer Science, Marquette University, USA)

Lunch (Black Swan Room): 11:30 a.m. - 12:45 p.m.

Session 2: 12:45 - 2:30 p.m.

Session 2: Performance Analysis
Chair: **Ziliang Zong** (Texas State University, USA)

2.1: Reducing Worst-Case Execution Time of Hybrid SPM-Caches
Wei Zhang and **Lan Wu** (Compiler, Architecture, and Realtime Systems (CARS) Lab Virginia Commonwealth University Richmond, USA)

2.2: Providing Diagnostic Network Feedback to End Users on Smartphones
Xu Ye, **Bo Yan and Guanling Chen** (University of Massachusetts of Lowell, USA)

2.3: Exploit Real-time Fine-grained Access Patterns to Partition Write Buffer to Improve SSD Performance and Life-span
Mingyang Wang and **Yiming Hu** (Department of Electrical Engineering and Computing Systems, University of Cincinnati, USA)

2.4: OPS/OBS Scheduling Algorithms: Incorporating a Wavelength Conversion Cost in the Performance Analysis
Kurt Van Hautegem, **Wouter Rogiest and Herwig Bruneel** (SMACS Research Group, Department of Telecommunications and Information Processing (TELIN), Ghent University, Belgium)

Break: 2:30 - 2:45 p.m.

Session 3: 2:45 - 4:30 p.m.

Session 3: Network Protocols
Chair: **Jing (Selena) He** (Kennesaw State University, USA)

3.1: Reliable and Efficient Routing Protocol for Graph Theory based Communication Topology
Dongsoo Kim and **K. Wendy Tang** (Stony Brook University, USA)
Eric Noel (AT&T Laboratories, USA)

3.2: Distributed Protocol for Channel Assignment in Cognitive Wireless Sensor Networks
Amalya Mihnea and **Mihaela Cardei** (Department of Computer and Electrical Engineering and Computer Science, Florida Atlantic University, USA)

3.3: CSIR: Cellular Scheduling With Interest-Driven Routing
J. J. Garcia-Luna-Aceves, **Ashok Masilamani and Ali Dabirmoghaddam** (Department of Computer Engineering, University of California, Santa Cruz, USA)

3.4: A Novel Multi-Radio MAC Protocol based Union Mechanism in Wireless Sensor Networks
Longjiang Guo and **Jinbao Li** (School of Computer Science and Technology, Heilongjiang University, China/Key Laboratory of Database and Parallel Computing, China)
Zhigang Wang (School of Computer Science and Technology, Heilongjiang University, China)

Break: 4:30 - 4:45 p.m.

Session 4: 4:45 - 6:30 p.m.

Session 4: Wireless Networks
Chair: **Fan Li** (Beijing Institute of Technology, China)

4.1: Minimizing Routing Overhead With Two-Hop Coordinate Awareness in Ad Hoc Networks
Yali Wang and **J.J. Garcia-Luna-Aceves** (Computer Engineering Department, University of California, Santa Cruz, USA)

4.2: Automatic Incremental Routing Using Multiple Roots
J.J. Garcia-Luna-Aceves and **Rumi Ghosh** (Computer Engineering Department, University of California, Santa Cruz, USA)

4.3: Rumor Restriction in Online Social Networks
Songsong Li and Deying Li (School of Information, Renmin University of China, China)
Yuqing Zhu (Department of Computer Science, The University of Texas at Dallas, USA)
Donghyun Kim (Department of Mathematics and Physics, North Carolina Central University, USA)
Hejiao Huang (Department of Computer Science and Technology, Harbin Institute of Technology Shenzhen Graduate School, China)
Dr. Longjiang Guo (Professor, Department of Computer Science and Technology, Heilongjiang University, China - not an author)

4.4: Session Lengths and IP Address Usage of Smartphones in a University Campus WiFi Network: Characterization and Analytical Models
Xian Chen, **Lester Lipsky, Bing Wang and Wei Wei** (University of Connecticut, USA); **Kyoungwon Suh** (Illinois State University, USA)

REGISTRATION (CORONADO BALLROOM A FOYER, 7:45 A.M.) AND WELCOME MESSAGE (CORONADO BALLROOM A, 8 - 8:10 A.M.)
KEYNOTE ADDRESS I: 8:10 - 9:10 A.M. – PROFESSOR SONGWU LU, UNIVERSITY OF CALIFORNIA, LOS ANGELES
TITLE: NETWORK SUPPORT FOR MOBILE DEVICES AND APPLICATIONS: INFRASTRUCTURAL LIMITATIONS, ROOT CAUSES, AND SOLUTIONS
CHAIR: YU WANG (UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE)

BREAK – 9:10 - 9:25 A.M.

SESSION 5: 9:25 - 11:30 A.M.

SESSION 5: CLOUD COMPUTING
 Chairs: Neil Nelson and Nasr Ullah (Samsung, USA)

5.1: Location Matters: Eliciting Responses to Direct Probes
Ethan Blanton and Sonia Fahmy (Purdue University, USA)
Mehmet E Tozal (University of Louisiana at Lafayette, USA); Kamil Sarac (University of Texas at Dallas, USA)

5.2: Multi-keyword Ranked Search Supporting Synonym Query over Encrypted Data in Cloud Computing
Zhangjie Fu, Xingming Sun, Zhihua Xia, Lu Zhou and Jiangang Shu (School of Computer and Software & Jiangsu Engineering Center of Network Monitoring, Nanjing University of Information Science and Technology, China)

5.3: Message Digest as Authentication Entity for Mobile Cloud Computing
Saurabh Dey and Srinivas Sampalli (Faculty of Computer Science, Dalhousie University, Canada)
Qiang Ye (Department of Computer Science, University of Prince Edward Island, Canada)

5.4: Scalable Load Balancing for MapReduce-based Record Linkage
Wei Yan and Yuan Xue (Department of Electrical Engineering and Computer Science, Vanderbilt University, USA)
Bradley Malin (Department of Biomedical Informatics, Vanderbilt University, USA)

5.5: Performance Analysis of Fault-Tolerant Exact Motif Mining Algorithm on the Cloud
Nhan Nguyen and Mohammad Maifi Hasan Khan (Department of Computer Science and Engineering, University of Connecticut, USA)

LUNCH (TIDELANDS BALLROOM): 11:30 A.M. - 12:45 P.M.

SESSION 6: 12:45 - 2:30 P.M.

SESSION 6: SYSTEM ANALYSIS
 Chair: Longjiang Guo (Heilongjiang University, China)

6.1: Modeling and Analysis of Resources Availability in Volunteer Computing Systems
Bahman Javadi and Kenan Matawie (School of Computing, Engineering and Math, University of Western Sydney, Australia)
David Anderson (University of California, Berkeley, USA)

6.2: Impact of Sampling Design in Estimation of Graph Characteristics
Emrah Cem and Kami Sarac (Department of Computer Science, The University of Texas at Dallas, USA)
Mehmet Engin Tozal (School of Computing and Informatics, The University of Louisiana at Lafayette, USA)

6.3: Evaluating the Performance and Energy Efficiency of N-Body Codes on Multi-Core CPUs and GPUs
Ziliang Zong, Ivan Zecena and Martin Burtscher (Department of Computer Science, Texas State University, USA)
Tongdan Jin (Ingram School of Engineering, Texas State University, USA)

6.4: Extending ODMRP for On-Site Deployments in Disaster Area Scenarios
Jonathan Kirchhoff and Christoph Fuchs (University of Bonn - Institute of Computer Science / Fraunhofer FKIE, Germany)
Jan Bauer and Nils Aschenbruck (University of Osnabruck - Institute of Computer Science, Germany)
Raphael Ernst and Sascha A. Jopen (University of Bonn - Institute of Computer Science, Germany)

BREAK: 2:30 - 2:45 P.M.

SESSION 7: 2:45 - 4:30 P.M.

SESSION 7: SOCIAL NETWORKS
 Chair: Mohammad Maifi Hasan Khan (University of Connecticut, USA)

7.1: A Comparison of IP Header Compression Schemes in MANETs
Bow-Nan Cheng and James Wheeler (MIT Lincoln Laboratory, USA)
Brian Hung (DISA, USA)
Scott Moore and Prasanna Sukuma (Riverbed Technology, Inc., USA)

7.2: Minimum-sized Positive Influential Node Set Selection for Social Networks: Considering Both Positive and Negative Influences
Jing Selena He and Hisham M. Haddad (Department of Computer Science, Kennesaw State University, USA)
Shouling Ji, Xiaojing Liao and Raheem Beyah (School of Electrical and Computer Engineering, Georgia Institute of Technology, USA)

7.3: Prediction-based Routing with Packet Scheduling under Temporal Constraint in Delay Tolerant Networks
Guoliang Liu, Janani Krishnamani, Rajshekhar Sunderraman and Yingshu Li (Department of Computer Science, Georgia State University, USA)
Jinghua Zhu (Associate Professor, Department of Computer Science and Technology, Heilongjiang University, China - not an author)

7.4: SEBAR: Social Energy Based Routing Scheme for Mobile Social Delay Tolerant Networks
Fan Li, Hong Jiang, Xin Li, Mingzhong Wang and Tabouche Abdeldjalil (School of Computer Science, Beijing Institute of Technology, China)
Yu Wang (Department of Computer Science, University of North Carolina at Charlotte, USA)

BREAK: 4:30 - 4:45 P.M.

SESSION 8: 4:45 - 6:30 P.M.

SESSION 8 : RESOURCE MANAGEMENT
 Chair: Mehmet Engin Tozal (The University of Louisiana at Lafayette, USA)

8.1: Automated Controllers for Bandwidth Allocation in Network Virtualization
M. Said Seddiki (Higher School of Communications of Tunis, University of Carthage, Tunisia / LORIA Research Laboratory, University of Lorraine, France)
Bilel Nefzi and Ye-Qiong Song (Higher School of Communications of Tunis, University of Carthage, Tunisia)
Mounir Frikha (LORIA Research Laboratory, University of Lorraine, France)

8.2: A Hybrid GPU/CPU FFT Library for Large FFT Problems
Shuo Chen and Xiaoming Li (Department of Electrical and Computer Engineering, University of Delaware, USA)

8.3: Sizing Router Buffer for the Internet with Heterogeneous TCP
Ertong Zhang, Peng Yang and Lisong Xu (Department of Computer Science and Engineering, University of Nebraska-Lincoln, USA)

8.4: On a Generalized Approach to Order-Independent Image Composition in Parallel Visualization
Dongliang Chu and Chase Qishi Wu (Department of Computer Science, The University of Memphis, Memphis, USA);
Jinzhu Gao (Department of Computer Science, University of the Pacific, USA)
 Li Wang (Center for Modern Educational Technologies, Xi'an International University, China)

*PRESENTER

RECEPTION AND POSTER SESSION (CORONADO BALLROOM B): 6:30 - 8:30 P.M.

POSTER SESSION
 Chair: Peixiang Liu (Nova Southeastern University, USA)

Optimization for Reliable Erasure-coded Storage Allocation under Multiple Constraints

Guangping Xu, Sheng Lin and Chunxia Yang (Computer and Communication Engineering School, Tianjin University of Technology, China)
Xing Guo and Hua Zhang (Tianjin Key Laboratory of Intelligence Computing and New Software Technology, China)

Proposed Enhancements to Fixed Segmented LRU Cache Replacement Policy

Kathlene Hurt and Byeong Kil Lee (University of Texas at San Antonio, USA)

Magnetic Field Modeling-based Energy efficient Routing in Wireless Sensor Networks

Nemroud Youssouf, Xin Li, Fan Li and Huiying Yuan (School of Computer Science, Beijing Institute of Technology, China)

Predicting DNS Server Load Distribution

Zheng Wang (Computer Network Information Center, Chinese Academy of Sciences / China Organizational Name Administration Center, China)
An-Lei Hu (Computer Network Information Center, Chinese Academy of Sciences, China)

A Lightweight Solution to Remote DNS

Zheng Wang (Computer Network Information Center, Chinese Academy of Sciences / China Organizational Name Administration Center, China)
An-Lei Hu (Computer Network Information Center, Chinese Academy of Sciences, China)

Defend GPUs Against DoS Attacks

Wei Zhang (Virginia Commonwealth University, USA)

The Impact of Interference from a Covert Link on a Data Link using OFDM, AMC, and Hybrid ARQ

Zaid Hijaz and Victor S. Frost (Information and Telecommunication Technology Center, Dept. of Electrical Engineering and Computer Science, University of Kansas, USA)

Trustworthy Data Management for Wireless Networks in Cyber-Physical Systems

Wenjia Li (Department of Computer Sciences, Georgia Southern University, USA)
Lindah Kotut (Department of Computer Science, Virginia Polytechnic Institute and State University, USA)

Energy-aware Image Allocation for Distributed Video Processing on Handheld Devices

Silvia Elena Restrepo, Philippe Pinaud, Jorge E. Pezoa and Sergio Sobarzo (Department of Electrical Engineering and the Center for Optics and Photonics, Universidad de Concepci¡äon, Concepci¡äon, Chile)

Backpressure Routing for the Backhaul in Sparse Small Cell Deployments

Jose Núñez-Martínez, Jorge Baranda and Josep Mangues-Bafalluy (Centre Tecnol`ogic de Telecomunicacions de Catalunya (CTTC), Spain)

Secure User Authentication in Cloud Computing Management Interfaces

Liliana F. B. Soares, Diogo A. B. Fernandes, Mário M. Freire and Pedro R. M. Inácio (Instituto de Telecomunicações, Department of Computer Science, University of Beira Interior Rua Marquês d'Ávila e Bolama, Portugal)

Enhanced Infrastructure Security through Inter-Level Anomaly Detection

Christian Horn and Jörg Krüger (Department of Industrial Automation Technology, Berlin Institute of Technology, Germany)

DAY ONE, FRIDAY, DECEMBER 6
8:10 - 9:10 A.M.

DARK FIBER MEETS DARK SILICON

PROFESSOR BILL LIN, UNIVERSITY OF CALIFORNIA, SAN DIEGO

Abstract:

With continued Moore scaling, 1000-core processors will soon become feasible. However, with the breakdown of Dennard scaling, an exponentially increasing fraction of the cores would have to be "dark" with each process generation. In this dark silicon regime, one promising research direction is to introduce highly specialized engines throughout the chip that can attain several orders of magnitude improvements in energy efficiency. These highly specialized engines would remain dark most of the time and only be lit up when portions of applications can benefit from their acceleration. However, when needed, the most energy efficient specialized engine for a given task will likely be located "far away."

Conventional on-chip networks are not suitable for such scenarios because the latency in either moving the data or migrating the computation to a remote specialized engine would likely take far too long, and the power consumption for the data movement or execution migration would be far too great. These issues would likely negate most of the benefits of pervasively specialized architectures.

In this talk, I will introduce the idea of "Dark Fiber Meets Dark Silicon" in which nanophotonics are used to move data or computation from anywhere to anywhere on-chip in a matter of nanoseconds, thus enabling highly specialized engines to be effectively location-independent. As the phrase "Dark Fiber" suggests, lanes of nanophotonics tracks would overlay the chip throughout, but they would remain "dark" until needed. I will provide a sketch of this "Dark Fiber Meets Dark Silicon" idea and outline some opportunities.

Speaker's Biography:

Prof. Lin currently works on all aspects of network and chip architecture problems, including the design of data networks, high-performance switches and routers, high-speed network measurement mechanisms, and on-chip interconnection networks. He is also interested in the design of multiprocessor Systems-on-Chips and 3D chip architectures.

Lin holds a BS, a MS, and a Ph.D. degree in Electrical Engineering and Computer Sciences from the University of California, Berkeley. He is currently a Professor in the Department of Electrical and Computer Engineering at UCSD where he has been actively involved with the Center for Wireless Communications (CWC) and the Center for Networked Systems (CNS).

Lin is also currently an Adjunct Professor in the Department of Computer Science and Engineering at UCSD. Prior to joining UCSD, he was the head of the System Control and Communications Group at IMEC where he led a research team that worked on various aspects of chip architectures, system design methodologies, and systems-on-chip applications.

Lin has co-authored over 160 journal and conference publications, including two Best Paper awards, three Best Paper nominations, and two Distinguished Paper citations. He has served on panels and given invited presentations at several major conferences, and has served on over 60 program committees, including serving as the General Chair for NOCS-2009, ANSC-2010, and IWQoS-2011. Prof. Lin holds four awarded patents.

DAY TWO, SATURDAY, DECEMBER 7
8:10 - 9:10 A.M.

NETWORK SUPPORT FOR MOBILE DEVICES AND APPLICATIONS: INFRASTRUCTURAL LIMITATIONS, ROOT CAUSES, AND SOLUTIONS

## PROFESSOR SONGWU LU, UNIVERSITY OF CALIFORNIA, LOS ANGELES

Abstract:

We are experiencing the explosive growth of mobile devices and mobile apps. Recent market statistics show that, 700 million smartphones and 55 million tablets have been shipped in 2012, and both the Apple Store and Google Play have exceeded 10 billion downloads of mobile apps.

However, our study shows that, the current network and systems architecture are not adequate to bring such devices and mobile apps to prime stage. In this talk, I will use examples from operational networks to illustrate the infrastructural limitations, their root causes of current 3G/4G cellular infrastructure, as well as WiFi networks, when supporting mobile devices and apps. I will further suggest possible remedies and future directions.

Speaker's Biography:

Songwu Lu is currently a professor of Computer Science at UCLA. Prof. Lu's research areas include wireless networking, mobile systems, data center networking, and network security.
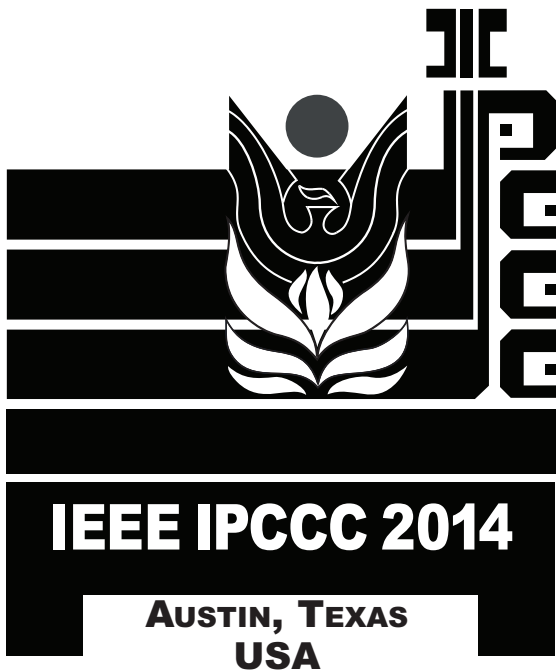
Preliminary Call for Papers and Participation in December 2014

33rd IEEE International Performance, Computing, and Communications Conference

Yu Wang, General Chair

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- Mobile Ad Hoc, Sensor and Mesh Networks
- Multi- and Single-Core Processor Architecture
- Network Data Mining
- Network Information Assurance and Security
- Network Protocols
- Online Social Network Analysis
- Parallel and Distributed Systems
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- Ubiquitous Computing
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- Workload Characterization and its Impact on Architecture Design

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