2014 IEEE Radio & Wireless Week

FINAL PROGRAM

Newport Beach Marriott Hotel & Spa
Newport Beach, California, USA
19–22 January, 2014

2014 Radio & Wireless Week Sponsors:
IEEE Microwave Theory and Techniques Society (MTT-S)
IEEE Engineering in Medicine & Biology Society (EMBS)
http://www.radiowirelessweek.org
I have the great honor and pleasure to invite you to the 2014 IEEE Radio Wireless Week (RWW). This will be the eighth RWW and we return to the southern California area for the second time since 2007.

RWW2014 will be held at the Newport Beach Marriott Hotel & Spa, Newport Beach, California, 19 – 22 January, 2014. The venue is located at the south end of greater Los Angeles area just minutes away from a beautiful harbor and southern California shoreline. With many wireless semiconductor companies, aerospace and defense industry, as well as world class universities in the area, Newport Beach will be a great location for all the attendees.

RWW2014 consists of five related conferences that focus on the intersection between wireless communication theory, systems, circuits, and device technologies creating a unique forum for engineers to discuss various technologies for state-of-art wireless systems and their end-use applications. The conference targets to bridge the gap between digital, RF, hardware, and software that need to be seamlessly combined to keep wireless industry and mobile applications growing.

This year’s theme is “Next Innovation in Wireless.” RWW’s multidisciplinary events bring together innovations that are happening across the broad wireless spectrum. It is our hope that RWW is a place where you will not only find discussions for present problems, but you will also be inspired by the diverse technical contents that might spark ideas for future research. The diversity of RWW is underlined by four diverse co-sponsor IEEE societies: Microwave Theory and Techniques Society (MTT-S), Antennas and Propagation Society (APS), Communications Society (ComSoc), and Engineering in Medicine and Biology Society (EMBS).

In addition to traditional podium presentations and poster sessions, there will be a track for IEEE Distinguished Lectures, Sunday half day workshops, panels, industry exhibits, WirelessApps industry presentations, and a demo session. A highlight on Tuesday will be the plenary talk on “THz Imaging for Biomedical Application” by Dr. Peter Siegel of Caltech/JPL. Also on Tuesday afternoon, in its third year, there will be a demo session where presenters can bring in a demonstration of their latest wireless experiments for a hands-on interactive forum. Demo session is particularly appropriate with the spirit of RWW because we get to see and feel how people are tackling real-world problems to address the next wireless innovation.

To support and encourage students pursuing a career in wireless area, each conference will have a student paper competition with awards that will be presented at the Tuesday banquet. On Monday afternoon, all student paper competition finalists will present their work in the poster session. I encourage you to check out what the next generation of wireless engineers are working on. I would like to invite everyone to join us for 3½ days of great technical presentations, discussions, networking, and some fun in the beautiful Newport Beach, California, 19-22 January 2014.

RWW2014 General Chair
Takao Inoue

Technical Program Chair
Sergio Pacheco
The 14TH Topical Meeting on Silicon Monolithic Integrated Circuits in RF Systems

Message from the SiRF General Chair:
Welcome to SiRF 2014!

Welcome to the Beautiful Newport Beach, California for SiRF’14!
The IEEE SiRF conference has been at the forefront of moving silicon-based technologies into RF, microwave and millimeter-wave applications – a development trend now widely accepted and gaining more and more importance. Silicon-based technologies such as RF CMOS, RF SOI, and SiGe BiCMOS are not only critical for various commercial applications today, they are also being increasingly deployed for military and biomedical applications as well. RFSoI, for example, is now one of the fastest growing technologies in the handset front end modules (FEM) for realizing RF switches and antenna tuners. RF CMOS and SiGe BiCMOS have not only been the mainstream technologies for WLAN and set RF/analog transceiver ICs, but they also are serious contenders for RF power amplifiers applications as well. The 14th IEEE Topical Meeting on Silicon Monolithic Integrated Circuits in RF Systems (SiRF 2014) will again take place during the Radio and Wireless Week (RWW, January 20-22, 2014) in the charming city of Newport Beach in Southern California, USA. The conference is sponsored by IEEE Microwave Theory and Techniques Society (MTT), and is a great conference venue to report the latest breakthroughs in silicon-based RF technologies, to network with the world experts in this field.

As commented by the SiRF’13 General Chair Professor Shumaker: “Once comfortably in the realm of specialists’ workshops, where you met the same group of colleagues every year. SiRF now competes with established biggies like the International Solid-State Circuits Conference (ISSCC) or IEEE MTT-S International Microwave Symposium (IMS), which recently attract large numbers of papers on Si RFICs. Thus, SiRF has to constantly reinvent itself. Its main niche is that it was never a technologists’ or a circuit designers’ conference. It was and is the place where these two worlds meet, where new processes can be benchmarked against the needs of circuit designers at the bleeding edge of RF systems, where today’s design compromises can trigger tomorrow’s advanced technologies.” SiRF 2014 continues this trend, with a renewed emphasis on promoting discussions between IC designers and researchers on non-standard technologies, exploiting the maturity of silicon processes, but addressing the challenges of tomorrow. Therefore, technical papers in the areas of Materials, Technologies, Devices, Circuits, Silicon Photonics, Applications, Yield & Reliability, Signal Integrity, and Measurement & Modeling are covered.

To highlight some of the very important research development milestones, SiRF’14 features several important invited talks form both university and industry, and please see the list below with their titles:

1-Prof. Peter Asbeck, University of California San Diego, "Stacked Si MOSFET Strategies for Microwave and Mm-wave Power Amplifiers"
2-Prof. Chi On Chui, University of California Los Angeles, "RF Performance Limits of Ballistic Si Field-Effect Transistors"
3-Dr. Tahir Hussain, HRL Laboratories, "Recent Advances in Monolithic Integration of Diverse Technologies with Si CMOS"
4-Prof. Larry Larson, Brown University, "Wideband Envelope Tracking Power Amplifiers for Wireless Communications"
5-Prof. Gabriel Rebeiz, University of California San Diego, "Extremely Silicon RFICs for Phased-Array Applications"
6-Dr. Magnus Wiklund, Qualcomm, "Latest Development of Near-field communication (NFC) on Handsets Application"

A set of selected SiRF’14 papers is planned to be arranged for submission to IEEE Transactions on Microwave Theory and Techniques, for publication in a single issue. Papers will need to be significantly expanded from the conference version and will go through the regular review process for publication. Please visit us at http://www.silicon-rf.org/ to see the details and again, we cordially welcome you to be part of the SiRF 2014 and RWW in Newport Beach, California.

Yours sincerely,
Donald Y.C. Lie, Ph.D.
Kath-Swee Lu Regents Chair Professor
Texas Tech University
Donald.Lie@ttu.edu
SiRF’14 General Chair

SiRF 2014 Technical Program Committee

Technical Program Chairs:
Chien-Nan Kuo, National Chiao Tung University
Julioto Costa, RFMD

Technology, Devices and Modeling
Chair: Mehmet Kaynak, IHP Microelectronics
Julio Costa, RFMD
Mingfa Yang, Qualcomm
Katsuuyoshi Washio, Hitachi
Guofu Niu, Auburn University
Harrie Tilman, IMEC

Passives and MEMS
Chair: Jean-Pierre Raskin, UCL
Xun Gong, UCP
Pierre Blondy, University of Limoges
Emmanuel Defay, LETI
Hasan Sharifi, HRL Laboratories

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Chair: Larry Larson, UCSD
Hermann Schumacher, University of Ulm
Vince Fusco, Queen’s University of Belfast
Lance Kuo, Raytheon
Yunliang Zhu, Qualcomm
Austin Yang-Kuang Chen, Skyworks Solutions
Hsieh-Hung Hsieh, TSMC
Kenichi Okada, Tokyo Institute of Technology
Jae-Sung Rieh, University of Korea
Gang Liu, University of Ulm

Applications and Wireless Architectures
Chair: Francesco Dantoni, Texas Instruments
Donald Y.C. Lie, Texas Tech University
Chien-Nan Kuo, NCTU
Jürgen Hasch, Bosh
Han Li, RFMD
Himanshu Khatri, Qualcomm

Late News Papers
Chair: Sergio Pacheco, Freescale
Takao Inoue, National Instruments
Karl Varian, Raytheon
Xun Gong, University of Central Florida
Charles Jackson, Northrop Gruman
Kevin Chuang, MIT Lincoln Laboratory
Telesphor Kamenga, Intel

REGISTRATION HOURS
Registration is open during the following times at the Registration
Sunday, 19 January: 10:00-17:00
Monday, 20 January: 07:00-17:00
Tuesday, 21 January: 07:00-17:00
Wednesday, 22 January: 07:00-10:00

EXHIBIT HOURS
The exhibition area (Newport Coast Ballroom 1-5) is open during the following times:
Monday, 21 January 2013 13:00 - 17:00
Tuesday, 22 January 2013 10:00 - 17:00

For the latest information and details on how to become a sponsor and exhibit at RWW please visit: http://www.radionoireslessweek.org/exhibits.

SiRF 2014 Steering Committee

General Chair:
Donald Lie, Texas Tech University

Technical Program Co-Chairs:
Chien-Nan Kuo, National Chiao Tung University
Julioto Costa, RFMD

Publicity Chair:
Hasan Sharifi, HRL Laboratories

Publications Chair:
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Jae-Sung Rieh, Korea University

International Liaison Europe:
Dietmar Kissing, University of Erlangen-Nuremberg

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Katsuyoshi Washio, Tohoku University
Robert Weigel, University of Erlangen-Nuremberg
Chien-Nan Kuo, National Chiao Tung University

SPECIAL EVENTS
Complimentary Daily Breakfast
Place: Lounge
Time: 07:00-08:00

Complimentary Daily AM Coffee Breaks
Place: Ballroom Foyer
Time: 9:40-10:10

Complimentary Daily PM Coffee Breaks
Place: Ballroom Foyer/Wednesday and Newport Coast Ballroom 1-5 (Monday and Tuesday)
Time: 15:10-15:40

Daily Lunch
A lunch buffet will be served Monday-Wednesday at Seaview Terrace (outside)
Time: 12:00-13:00

RWW New Attendee Reception
Place: Cardiff
Monday 17:30-19:00

RWW Reception
Place: Seaview Terrace (outside)
Monday 18:00-20:30

RWW/SiRF Awards Banquet
Place: Baycliff
Tuesday 18:00-20:30
### Power Amplifiers for Radio and Wireless Applications (PAWR)

Interest in power amplifier technology remains at an all-time high because of the emergence of new device materials such as GaN that offer improved performance, and the need for ever greater linearity and efficiency by the world’s expanding wireless communication infrastructure. This year, the Topical Conference on Power Amplifiers for Wireless and Radio Applications (PAWR) will feature a full day of power amplifier focused sessions, including the latest advances on power amplifier technology, efficiency enhancement techniques, system analysis, modeling, distortion reduction, and for the second year, an interactive workshop answering questions on power amplifier linearization and efficiency enhancement.

**Technical Committee:**

**Distortion Reduction Techniques in RF Power Amplifiers**
- **Chair:** Allen Katz
  - Jinsung Choi
  - Kiki Ikossi
  - Shabbir Mochalala
  - Joe Staudinger

**High Efficiency RF Power Amplifiers**
- **Chair:** Arturo Mediano
  - James Komiak
  - Chao Lu
  - Frederick Raab
  - Ali Tombak

**RF Power Amplifier Technology**
- **Chair:** Marc Franco
  - Nick Cheng
  - Murat Eron
  - Chan-Ho Lee
  - Zoya Popovic

**Power Amplifier Modeling and System Analysis**
- **Chair:** Andrei Grebenikov
  - Robert Cavery
  - Yang (Edward) Li
  - Almudena Suarez
  - Jose Carlos Pedro

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### Wireless Sensors and Sensor Networks (WiSNet)

WiSNet is dedicated to the advancement of wireless sensors for commercial and industrial applications and will be held to specifically focus on the latest developments in these areas of RF Sensors and Sensor Networks. Wireless sensors and sensor networks are critical system components for manufacturing, monitoring, safety, as well as positioning and tracking applications. This year, WiSNet2014 will be a full day topical conference focused on the latest developments in these areas. Different sessions will focus on sensors and smart sensor networks ranging from UHF, RFID applications, and millimeter-wave radar systems. Furthermore, novel ideas for wireless localization techniques and sensors for harsh environments will be the focus of two individual sessions.

**Technical Committee:**

**Wireless Sensors for Communication, Radar, Positioning and Imaging Applications**
- **Chair:** Martin Vossiek
  - Changzhi Li
  - Mario Pauli
  - Aly Fathy
  - Kamal Samanta

**Wireless Sensors for Localization, Tracking, and RFID Technologies**
- **Chair:** Manos M. Tentzeris
  - Xianming Qinq
  - Hao Xin
  - Apostolos Georgiadis
  - Reinhard Feger

**Wireless Integrated Sensors, Front-Ends, and Building Blocks**
- **Chair:** Linus Maurer
  - Hwei Wang
  - Nils Pohl
  - Daniela Dragomirescu

**Wireless Sensors for Harsh Environments, Home, Health and Communication**
- **Chair:** Alexander Koelpin
  - Georg Fischer
  - Maurizio Bozzi
  - Arne Jacob
  - Hendrik Rogier

**Sensor Network Communication Architecture and Topologies**
- **Chair:** Rahul Khanna
  - Alexander Koelpin
  - Xun Gong

**Six Port and Multi-port Technology**
- **Chair:** Alexander Koelpin
  - Sergio Tatuc
  - Fadhil Ghannouchi
  - Adriana Serban
  - Gabor Vincz

**Wireless Sensors for Wearable Computing and Internet of Things**
- **Chair:** Rahul Khanna
  - Alexander Koelpin
  - Ian Gresham
  - Ed Niehenke

**Invited Papers**
- **Chair:** Rahul Khanna
  - Alexander Koelpin

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### Biomedical Wireless Technologies, Networks, and Sensing Systems (BioWireleSS)

The IEEE Topical Conference on Biomedical Wireless Technologies, Networks, and Sensing Systems (BioWireleSS) will premier in Austin, Texas. This two day topical conference will be a vital part of the IEEE Radio and Wireless Symposium, featuring the latest developments in wireless biomedical technologies, networks and sensing systems. The wireless revolution has begun to infiltrate the medical community with patient health monitoring, telesurgery, mobile wireless biosensor systems, and wireless tracking of patients and assets becoming a reality. The rapid evolution of wireless technologies coupled with powerful advances in adjacent fields such as biosensor design, low power battery operated systems, and diagnosing and reporting for intelligent information management has opened up a plethora of new applications for wireless systems in medicine.

**Technical Committee:**

**Wireless Technologies for Biosignals and Modeling in Medical Environments**
- **Chair:** Jung-Chih Chiao
  - Alper Bozkurt
  - Marc Notten
  - Aydin Farajdavdar

**Wireless Position and Localization in Medicine**
- **Chair:** Mohamed Mahfouz
  - Andreas Stelzer
  - Michael Kuhn
  - Aydin Farajdavdar

**PAN, BAN, Energy Scavenging and Remote Patient Monitoring**
- **Chair:** Changzhi Li
  - David Ricketts
  - Syed Islam

**Micro-Sensors and In-vivo Microsystems**
- **Chair:** Rizwan Bashirullah
  - Jung-Chih Chiao
  - Michael Kuhn
  - Mohammad-Reza Tofighi

**Microwaves in Biological Applications and Interaction with Biological Tissues**
- **Chair:** Mohammad-Reza Tofighi
  - Yong Xin Guo
  - Dominique Schreurs
  - Usman Kawaos
  - Katia Grenier
  - Arne Vander Vorst

**Medical Imaging and Applications**
- **Chair:** Dietmar Kissinger
  - Victor Lubecke
  - Indira Chatterjee
  - Mohamad-Reza Tofighi

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Balboa Boardspors, Newport Beach
Courtesy: Newport Beach and Company

**Diamond Sponsor:**

![Sonnet](image-url)
### PA Design: From Device Model to High-Performance Circuit
**Room:** Baycliff  
**Organizers:** José A. García, University of Cantabria, Spain  
Zoya Popovic, University of Colorado at Boulder, CO, USA  

Power amplifiers (PA) have a vital role in modern wireless communication and sensor systems. The requirements for simultaneously providing improved efficiency and linearity, multi-band or broadband coverage, together with those of high output power and frequency of operation, have been forcing an aggressive evolution of design techniques. In order to arrive to an optimal practical solution, advancements at the device modeling level are necessarily combined with novel amplifying circuit topologies and with system level considerations, where the digital processing of the signal may offer additional benefits.

This workshop will address a wide variety of topics related to PA design. Starting with an overview presentation, covering technology and design issues at microwave and millimeter-wave bands, the relevance of dedicated characterization models, accurate transistor models will be highlighted. A wide variety of power MMIC designs, based on the disruptive GaN HEMT technology, will be then described, in which PAs are complemented by associated circuitry (limiters and switches).

Harmonically terminated and switched-mode amplifying theory can be shown to lead to multi-band and broadband architectures, integrated in high performance Doherty topologies. The application of these and other high efficiency techniques to mm-wave PAs will be also under consideration for Si and SiGe processes. Finally, wideband and efficient solutions based on load modulation concepts, such as the Doherty and outphasing techniques, are covered in a common framework.

**Speakers:**
- **Microwave and Millimeter-Wave Power Amplifiers: Devices, Technology, Design, Benchmarks**  
  James Komia, BAE Systems  

- **Device Modeling for PA Design**  
  Stéphane Deller, AMCAD Engineering  

- **High Power GaN MMICs**  
  Charles Campbell, Triquint  

- **Design Strategies for High Efficiency PAs**  
  Paolo Colantonio, University of Rome Tor Vergata  

- **High Efficiency Techniques for Millimeter-Wave PAs in Silicon/Silicon Germanium Processes**  
  James F. Buckwalter, University of California, San Diego  

- **Wideband and Efficient Power Amplifiers based on Advanced Doherty and Outphasing Techniques**  
  Christian Fager, Chalmers University of Technology

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### Diversity in Biomedical: Radar Applications
**Room:** Cardiff  
**Organizers:** Dominique Schreurs, KU Leuven, Belgium  
Changzhi Li, Texas Tech University, TX, USA  

Radar systems have traditionally been associated with traffic and defense applications. In recent years their distinctive advantage in biomedical applications has been recognized. Biomedical radars offer remote and thus contactless and non-invasive monitoring. This workshop presents an overview on the diversity in biomedical radar uses. Applications range from vital signs monitoring, human gait tracking, tumor tracking, fall detection, to cancer detection, etc. The underlying operational principles can usually be traced down to either CW or UWB radar techniques, and therefore a panel discussion is planned to explore the pros and cons of each approach.

**Speakers:**
- **True Human Presence Detection with Doppler Radar Occupancy Sensors**  
  Victor Lubecke, University of Hawaii, HI, USA  

- **System-on-Chip UWB Pulse Radar for Contactless Detection of Respiratory Patterns in Adults and Infants**  
  Domenico Zito, University of Cork, Ireland  

- **SFCW Radar for Contactless Fall Detection and Human Gait Monitoring**  
  Dominique Schreurs, KU Leuven, Belgium  

- **Microwave Imaging at the University of Calgary: Prototype Systems and Patient Studies**  
  Elise Fear, University of Calgary, Canada  

- **Use of CW Radar for Tumor Tracking in Motion-Adaptive Cancer Radiotherapy**  
  Changzhi Li, Texas Tech University, USA  

- **UWB vs. SIFCW Approaches in Biomedical Radars**  
  Panel Discussion

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### RF Energy Harvesting: Challenges and Applications
**Room:** Laguna/Sunset  
**Organizers:** A. Georgiadis CTTC, Spain  
Manos M. Tentzeris, Georgia Institute of Technology, USA  

Ambient RF energy harvesting and RF power transmission enable the wireless powering of sensors, RFIDs and communication nodes. Advances in rectenna, voltage conversion and energy management circuits, complemented by progress in low power and power efficient circuit and sensor design, have spurred numerous research efforts and have enabled new innovative applications towards ubiquitous sensing and machine-to-machine communication. There are numerous challenges to be addressed, such as compact antennas and efficient voltage conversion circuits, system architectures, signal design for maximum power transfer, and the tradeoff between information and power transmission. This workshop provides an insight to RF energy harvester devices and their applications. The speakers will interact with the attendees emphasizing on future trends, expectations and opportunities of RF energy harvesting as well as practical design aspects and performance evaluation.

**Speakers:**
- **Multiband RF energy harvester design and signal optimization for maximum RF-DC conversion efficiency**  
  Ana Collado, CTTC, Spain  

- **Inkjet-Printed Nanotechnology-Enabled IoT Inter/intra-chip and Zero-Power**  
  Manos Tentzeris, Georgia Institute of Technology, USA  

- **Design rules for energy autonomous systems powered by ambient-available RF sources**  
  Alessandra Costanzo, University of Bologna, Italy  

- **Wireless powering of battery-less sensors through low power RF energy harvesting**  
  Zoya Popovic, University of Colorado, Boulder, USA  

- **Chipless tag evolution toward RFID-sensors for IoT**  
  Luca Roselli, University of Perugia, Italy  
  Co-Authors: F. Alimenti, C. Mariotti, M. Virili, G. Orecchini, P. Mezzannotte

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### Recent Advances On Radar Systems for Defense/Security, Localization and Other Emerging Applications
**Room:** Newport coast Ballroom 1/2  
**Organizers:** Roberto Gómez-García, University of Alcalá, SPA  
Arjuna Madanayak, University of Akron, OH, USA  

This workshop explores recent achievements in the exciting field of radar systems for defense/security, public safety, weather, RF imaging & sensing, source localization and other emerging applications. The workshop presents several state-of-the-art topics covering key aspects in radar.

The first talk addresses the utilization of IR-UWB radar sensors for the detection of trapped survivors under collapsed buildings in post-disaster scenarios. In the second talk, sophisticated backscatter transponder architectures operating at mm/microwave bands are presented for secondary radar-based localization. The third talk explores the field of multi-band radar as a further step in research into remote-sensing systems having enhanced capabilities. The fourth topic deals with noncontact detection of small mechanical vibrations and biological signals using Doppler radar sensors. Talk number five discusses findings from bleeding edge research on RFCI phased arrays having applications in automotive radars. Finally, the last talk discusses multi-dimensional signal processing techniques for aperture directed at radar and other steerable aperture applications.

**Speakers:**
- **A Dual-frequency IR-UWB Radar System for Detection of Trapped Survivors in Post-disaster Scenarios**  
  Zhao Li, Hao Lv, Yang Zhang, Xijing Jing, and Jianqi Wang, Fourth Military Medical University, Xi’an, China  

- **Millimeter-Wave Backscatter Transponders for Secondary Radar-Based Localization**  
  Wadim Stein, Christian Carlowitz, and Martin Vossiek, University of Erlangen-Nuremberg, Germany  

- **Multi-band LFM CW Radar Approaches for Improved Detection Capabilities**  
  Roberto Gómez-García and José María Muñoz-Ferreras, University of Alcalá, Madrid, Spain  

- **Accurate Small Movement Detection using Radar Sensor for Emerging Mechanical and Biomedical Applications**  
  Changzhuan Gu and Changzhi Li, Texas Tech University, Texas, USA  

- **Silicon Phase Arrays RFICs with a Large Number of Elements for Millimeter-Wave Automotive Radar Systems**  
  Gabriel M. Rebeiz, University of California, San Diego, La Jolla, CA USA  

- **Fundamental Theory of Digital/Analog Array Radar Receivers using 3-D Multi-Beam Planar-Resonant Filter Banks**  
  Arjuna Madanayak, University of Akron, Akron, OH, USA

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**Fashion Island, Newport Beach**  
**Courtesy: Newport Beach and Company**
SUNDAY, 19 JANUARY 2014

Panel Session - Future Wireless Communications 19:00-20:30

Moderator: Dr. G. P. Li, University of California, Irvine
Panlists:
Dan Sievenpiper, UCSD
Julio Navarro, Boeing
Russell Hannigan, Intellectual Ventures
Yahya Rahmat-Samii, UCLA
John Walley, Broadcom
Room: Newport Coast Ballroom 1/2

Abstract:
In the past decade, the exponential growth of mobile devices, big data, social media, and cloud services have driven the creation of a hyper-connected environment. In this environment the internet and its associated services are accessible and immediate, people and businesses can communicate with each other instantly, and machines are closely interconnected with each other. As wireless communication continues to evolve, the relationships among individuals, consumers and enterprises, and citizens and the state will all be redefined. The future wireless communications ecosystem will introduce new opportunities to increase productivity and well-being by redefining the way business is done, generating new products and services, and improving the way public services are delivered. However, wireless communication will also bring about new challenges and risks in terms of security, cybercrime, privacy, the flow of personal data, individual rights, and access to information in clouds.

There is no doubt that the rapid changes and consequences of living and working in a hyper-connected world will directly impact the development, deployment and delivery of communication technologies over the next decade and beyond. But what will those global transformations be and what roles will industry, government, and, ultimately, the end-user play.

ADVANCE REGISTRATION
Advance registration for RWW 2014 is open now until December 20, 2013. Register now to take advantage of the early registration pricing!
Please visit http://www.radiowireless-week.org and follow the registration links.

Newport Beach Attractions
Balboa Peninsula
The Balboa Peninsula features the original Ruby’s Diner and a view of a shoreline, surfers, and sunbathers spanning for miles

Newport Center / Fashion Island
With an open-air elegance that fuses Italian style with California cool, Fashion Island boasts chic luxury boutiques, cafés and restaurants on lushly landscaped piazzas accented by fountains and palm trees.

NEWPORT BEACH JAZZ PARTY
Enjoy 70 of the top straight-ahead jazz players in the country in a four-day party offering champagne brunch, pool, and evening sessions. Four- and single-day tickets available.

Back Bay
Known to locals as the Back Bay, the Upper Newport Bay Nature Preserve and Ecological Reserve draws naturalists and scientists from around the world. Some 35,000 migratory birds and 200 endangered species make their home on the 1,000 acres of coastal wetlands, which also offer hiking and cycling trails and amazing aquatic activities.

NEWPORT FUN TOURS
Premier destination for all your land and sea activities, tours, and adventures. Inventory includes beach-cruiser bikes, electric bikes, electric kayaks, electric loungers, paddle boards, electric boats, and electric skateboards. Private patio (also available for rent) and dock.
MONDAY, 20 JANUARY 2014

RWW Session: MO1A

RWW Distinguished Lectures I
Chair: Hermann Schumacher, University of Ulm
Room: Grand Pacific Ballroom A/B

08:00

MO1A-1 Embrace Circuit Nonlinearity to Get Transmitter Linearity and Energy Efficiency
E. McCune, Besser Associates

MO1A-2 Radio-Frequency Nanoelectronics—Bridging the Gap between Nanotechnology and R.F. Engineering Applications
L. Pierantoni, Universita Politecnica delle Marche

08:20

MO1A-3 Recent Advances in Monolithic Integration of Diverse Technologies with Si CMOS (Invited Paper)
T. Hussain, D. C. Wheeler, H. Sharifi, K. Shinohara, Z. Xu, J. C. Li, P. R. Patterson, K. R. Elliott, W. Ha, Y. Royter, P. D. Brewer, HRL, Malibu, United States

MO1A-4 Fabrication of Low Loss 67 GHz Coplanar Waveguides on Gold-Doped High Resistivity Silicon
N. Z. Hashim, A. Abuelgasim, C. H. de Groot, P. Ashburn, H. M. Chong, University of Southampton, Southampton, United Kingdom

08:40

MO1B-1 Recent Advances in Monolithic Integration of Diverse Technologies with Si CMOS (Invited Paper)
T. Hussain, D. C. Wheeler, H. Sharifi, K. Shinohara, Z. Xu, J. C. Li, P. R. Patterson, K. R. Elliott, W. Ha, Y. Royter, P. D. Brewer, HRL, Malibu, United States

MO1B-2 Non-linear Characteristics of Passive Elements on Trap-Rich High-Resistivity Si Substrates

09:00

MO1B-3 High Linearity 1-ohm RF Switches with Phase-Change Materials
J. Moon, H. Seo, D. Le, HRL Laboratories, Malibu, United States

MO1B-4 Fabrication of Low Loss 67 GHz Coplanar Waveguides on Gold-Doped High Resistivity Silicon
N. Z. Hashim, A. Abuelgasim, C. H. de Groot, P. Ashburn, H. M. Chong, University of Southampton, Southampton, United Kingdom

09:20

MO1C-1 2D Forward Twin Nonlinear Two-Box Model for Concurrent Dual-Band Digital Predistortion
C. Quindroit, N. Naraharisetti, P. Roblin, S. Gheitanchi, V. Mauer, M. Fitton, “Ohio State University, Columbus, United States, “Altera Europe, High Wycombe, United Kingdom, “Altera, San Jose, United States

MO1C-2 High Efficiency Two-Stage GaN Power Amplifier with Improved Linearity
A. Khan, H. Sarbishaei, S. Boumaiza, University of Waterloo, Waterloo, Canada

MO1C-3 Investigation of the AM/PM Distortion in Doherty Power Amplifiers
L. Piazzon, R. Giofrè, P. Colantonio, F. Giannini, University of Roma Tor Vergata, Roma, Italy

MO1C-4 Front-end Modules with Versatile Dynamic EVM Correction for 802.11 Applications in the 2 GHz Band
A. Saneld, E. Whittaker, M. Ball, A. Bruce, J. Nisbet, L. Lam, W. Vaillancourt, Skyworks Solutions Inc., Bishop’s Stortford, United Kingdom

MO1C-5 Integrated Linearizer/Block Upconverter

MO1D-1 Full Dimensional MIMO for Future Cellular Networks
S. Akoum, J. Acharya, Hitachi America, Brisbane, United States

08:00

MO1D-2 High Capacity Wireless Data Links in the W-Band Using Hybrid Photonics-Electronic Techniques for Signal Generation and Detection
J. Vegas Olmos, I. Tafur Monroy, Technical University of Denmark, Kgs. Lyngby, Denmark

MO1D-3 10 Gbps Outdoor Mobile Communication Experiment Employing CoMP in 11 GHz Band
M. Takahashi, S. Suyama, H. Suzuki, K. Fukawa, Tokyo Institute of Technology, Meguro-ku, Japan

MO1D-4 Multi-Gigabit Data Transmission Using MMIC-based E-Band Frontends
Abstract:

This course will present design basics for passive RF and microwave filters. Included will be discussions of performance parameters, types of filter responses, estimating filter performance, characteristics of various filter technologies, specifying filters realistically to avoid surprises, and use of filter design software. Specfic topics will include two-port parameters; lowpass and highpass ladders; Chebyshev filter; imittance inverters and narrow-band design; resonator Q, delay and loss, and lossy coupling; TEM bandpass filters and band-stop filters; waveguide bandpass filters; general coupled-resonator prototype; loss approximation, the elliptic function filter; realization polynomials and immittances; bandpass filters with cross couplings; dual mode filters; environmental effects on filter performance.

The Industrial Forum includes an exhibit, Wireless Apps (similar to uApps) and special hardware demonstrations given by researchers.

MONDAY, 20 JANUARY 2014

PAWR Session: MO2C
Developing High Efficiency Power Amplifiers
Chair: Murat Eron, Miteq
Co-Chair: Ramon Beltran, Skyworks Solutions
Room: Grand Pacific Ballroom D

MO2C-1 Challenges in Designing 5 GHz 802.11ac WiFi Power Amplifiers (Invited talk)
Y. Wang, R. Naylor, RF Micro Devices, Billerica, United States

MO2C-2 A Novel Continuous Class-F Mode Power Amplifier
B. M. Merrick, J. B. King, T. J. Brazil, University College Dublin, Dublin, Ireland

MO2C-3 Novel Design of a 10 dB Back-Off Broadband Sequential Doherty Power Amplifier for Wireless Applications
X. Nghiem, R. Negra, RWTH Aachen University, Aachen, Germany

MO2C-4 A 10-W Modified LINC Power Amplifier with a Reduced-Size Chireix Power Combiner
O. Talebi Amiri, A. Koukab, Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland

RWS Session: MO2D
Emerging Wireless Technologies and Applications
Chair: Sergio Pacheco, Freescale
Room: Grand Pacific Ballroom C

MO2D-1 A Wideband Flexible Digital Receiver Using Polyphase Harmonic Mixer
W. Namgoong, University of Texas at Dallas, Richardson, United States

MO2D-2 Design of Touch-Sensitive Surface with Arbitrary Shape Based on Time-Domain Reflectometry Using Inkjet-Printing
M. Q. Duong, Y. Kawahara, T. Asami, The University of Tokyo, Bunkyo-ku, Japan

MO2D-3 High Dynamic-Range and Sensitivity Six-Port Receiver Using Reactive Matching Technique
S. Qayyum, M. Wei, R. Negra, RWTH Aachen University, Aachen, Germany

MO2D-4 Optimal Bits per Joule Power Allocation for Multiuser Cognitive Radio Networks
M. Naeem, K. Illanko, A. Karmokar, A. Anpalagan, M. Jaseemuddin, Ryerson University, Toronto, Canada

MO2B-1 Stacked Si MOSFET Strategies for Microwave and Mm-wave Power Amplifiers (Invited Paper)
P. Asbeck, UCSD, La Jolla, United States

MO2B-2 A Process-Technology-Scaling-Tolerant Pipelined ADC Architecture Achieving 6-bit and 4 GS/s ADC in 45 nm CMOS
M. W. Chen¹, L. R. Carley¹, D. S. Ricketts², ¹Carnegie Mellon University, Pittsburgh, United States, ²North Carolina State University, Raleigh, United States

MO2B-3 A 65 nm CMOS 0.1 GHz to 2.1 GHz Linear-in-db VGA with Active-Inductor Bandwidth Extension for the Square Kilometer Array
G. Wu, L. Belostotski, J. W. Haslett, University of Calgary, Calgary, Canada

MO2B-4 A Switchable-Core SiGe HBT Low-Noise Amplifier for Millimeter-Wave Radiometer Applications
C. A. Ulusoy, R. L. Schmid, C. Coen, J. D. Cressler, Georgia Institute of Technology, Atlanta, United States

SiRF Session: MO2B
ADC and Amplifier
Chair: Jae-Sung Rieh, Korea University
Room: Baycliff

MO2B-1 Optical Wireless Systems: Challenges and Opportunities
Jaafar M.H. Elmirghani, University of Leeds

MO2B-2 A 10-W Modified LINC Power Amplifier with Power Flexibility from 1 to 10 Watts
S. Dellier¹, T. Dehaene², E. Peragin³, ¹AMCAD Engineering, Limoges, France, ²Syrlinks, Buz, France, ³Centre National d’Etudes Spatiales (CNES), Toulouse, France

MO2B-3 GaN High-Efficiency S-band Power Amplifier with Power Flexibility from 1 to 10 Watts
S. Dellier¹, T. Dehaene², E. Peragin³, ¹AMCAD Engineering, Limoges, France, ²Syrlinks, Buz, France, ³Centre National d’Etudes Spatiales (CNES), Toulouse, France

RWW Session: MO2A
RWW Distinguished Lecturers II
Chair: Hermann Schumacher, University of Ulm
Room: Grand Pacific Ballroom A/B

MO2A-1 Optical Wireless Systems: Challenges and Opportunities
Jaafar M.H. Elmirghani, University of Leeds

MO2A-2 A Wideband Flexible Digital Receiver Using Polyphase Harmonic Mixer
W. Namgoong, University of Texas at Dallas, Richardson, United States

MO2A-3 A Novel Continuous Class-F Mode Power Amplifier
B. M. Merrick, J. B. King, T. J. Brazil, University College Dublin, Dublin, Ireland

MO2A-4 A Process-Technology-Scaling-Tolerant Pipelined ADC Architecture Achieving 6-bit and 4 GS/s ADC in 45 nm CMOS
M. W. Chen¹, L. R. Carley¹, D. S. Ricketts², ¹Carnegie Mellon University, Pittsburgh, United States, ²North Carolina State University, Raleigh, United States
### MONDAY, 20 JANUARY 2014

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<td>Millimeter-Wave Antennas</td>
<td>Chair: Goutam Chattopadhyay, NASA - Jet Propulsion Laboratory</td>
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<td>PAWR Session: MO3C</td>
<td>Power Amplifier Technology Developments</td>
<td>Chair: Marc Franco, RFMD Co-Chair: Nathalie Deltilmple, IMS Laboratory, University of Bordeaux</td>
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<tr>
<td>MO3C-1</td>
<td>Advanced Design of Differential CMOS PA (Invited Paper)</td>
<td>B. Kim¹, S. Jin², B. Park², Y. Cho³, C. Zhao³, K. Moon³, ¹Pohang University of Science and Technology (EE), Pohang, Republic of Korea, ²Pohang University of Science and Technology (ITCE), Pohang, Republic of Korea</td>
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<td>MO3C-2</td>
<td>A Q-band Power Amplifier with High-gain Pre-driver and 18.7 dBm Output Power for Fully Integrated CMOS Transmitters</td>
<td>W. Tai¹, D. S. Ricketts², ¹Carnegie Mellon University, Pittsburgh, United States, ²North Carolina State University, Raleigh, United States</td>
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<td>MO3C-3</td>
<td>Watt-Level Non-Uniform Distributed 6–37 GHz Power Amplifier MMIC with Dual-Gate Driver Stage in GaN Technology</td>
<td>P. Dennler, R. Quay, P. Brückner, M. Schlechtweg, O. Ambacher, Fraunhofer Institute for Applied Solid-State Physics, Freiburg, Germany</td>
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<td>MO3C-4</td>
<td>Gain/Phase Compensation for Outphasing Transmitters Targeting LTE Applications</td>
<td>T. M. Hone, A. F. Aref, J. Guan, R. Negra, Mixed-Signal CMOS Circuits, Aachen, Germany</td>
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<td>MO3D-1</td>
<td>Prototyping and Performance Evaluation of TDD-Based 2x2 MIMO-OFDM Transceiver</td>
<td>K. Mitsuyama, N. Kogo, F. Uzawa, N. Iai, Japan Broadcasting Corporation (NHK), Tokyo, Japan</td>
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<td>MO3D-2</td>
<td>Nonlinear Distortion Suppression Scheme Employing Transmit Power Control for MU-MIMO-OFDM Systems</td>
<td>G. Osada, S. Takebuchi, F. Maehara, Waseda University, Shinjuku-ku, Japan</td>
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<td>MO3D-3</td>
<td>Development of Multiuser MIMO Testbed Adopting Tomlinson-Harashima-Precoding Subject to Limited CSI Feedback</td>
<td>T. Hatakawa, T. Matsumoto, K. Kitagawa, S. Konishi, KDDI R&amp;D Laboratories Inc., Fujimino, Japan</td>
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<td>MO3D-4</td>
<td>Joint Direction-of-Departure and Direction-of-Arrival Estimation in an Ultra-Wideband MIMO Radar System</td>
<td>I. Pasya¹, T. Kobayashi¹, N. Iwakiri¹, ¹Tokyo Denki University, Tokyo, Japan, ²University of Tokyo, Tokyo, Japan</td>
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<td>MO3D-5</td>
<td>Indoor Experiment of 8-by-2 Multilayer MIMO Transmission using Tomlinson-Harashima-Precoding</td>
<td>Y. Hatakawa, T. Matsumoto, K. Kitagawa, S. Konishi, KDDI R&amp;D Laboratories Inc., Fujimino, Japan</td>
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<tr>
<td>MO3A-1</td>
<td>Design and Measurements of Substrate Integrated Planar mm-Wave Antenna Array at 60 to 325 GHz</td>
<td>Z. Chen¹,², X. Qing³, S. Yeap³, J. Xu³, ¹National University of Singapore, Singapore, Singapore, ²Institute for Info-conn Research, Singapore, Singapore</td>
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<tr>
<td>MO3A-2</td>
<td>Investigating the Effect of Grounding GPS Antennas on their Radiation Properties on Vehicular Platforms</td>
<td>D. N. Aloi¹, E. Ghaftar³, A. Steffes³, M. S. Sharawi¹, ¹Oakland University, Rochester, United States, ³King Fahd University of Petroleum and Minerals (KFUPM), Dhahran, Saudi Arabia</td>
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<tr>
<td>MO3A-3</td>
<td>A 60 GHz Passive Repeater with Endfire Radiation Using Dielectric Resonator Antennas</td>
<td>D. Wang, R. Gillard, R. Loison, Institute of Electronics and Telecommunications of Rennes, Rennes, France</td>
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<td>MO3A-4</td>
<td>Hetero-Plane Beam Synthesis Using 60 GHz Band 3-D Phased Array Antenna Module</td>
<td>Y. Suzuki, S. Yoshida, S. Kameda, N. Suematsu, A. Taira, T. Takagi, K. Tsu-ouchi, Tohoku University, Sendai, Japan</td>
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<tr>
<td>MO3B-1</td>
<td>Extreme Silicon RFICs for Phased-Array Applications (Invited Paper)</td>
<td>G. M. Rebeiz, University of California, San Diego, La Jolla, United States</td>
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<td>MO3B-2</td>
<td>A 1.2 V, 2.7 mA Receiver Front-end for Bluetooth Low Energy Applications</td>
<td>L. Liao, A. Atac, Y. Zhang, Y. Wang, Z. Chen, M. Schleyer, R. Wunderlich, S. Heinen, RWTH Aachen University, Aachen, Germany</td>
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<tr>
<td>MO3B-3</td>
<td>0.35 dB Loss 20 dB Coupling Directional Coupler Integrated in 130 nm CMOS SOI Technology Targeting 3G PA SOC</td>
<td>F. Gianesello, C. Durand, D. Gloria, STMicroelectronics, Crolles, France</td>
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<td>MO3B-4</td>
<td>Universal Wideband Reconfigurable Transceiver with Extended Frequency Range up to 6 GHz</td>
<td>E. González-Rodríguez, H. Maune, Y. Zheng, R. Jakoby, Technische Universität Darmstadt, Darmstadt, Germany</td>
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<td>MO3B-5</td>
<td>Gain/Phase Compensation for Outphasing Transmitters Targeting LTE Applications</td>
<td>T. M. Hone, A. F. Aref, J. Guan, R. Negra, Mixed-Signal CMOS Circuits, Aachen, Germany</td>
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<td>MO3B-6</td>
<td>Development of Multilayer MIMO Testbed Adopting Tomlinson-Harashima-Precoding and Limited CSI Feedback</td>
<td>T. Matsumoto, Y. Hatakawa, K. Kitagawa, S. Konishi, KDDI R&amp;D Laboratories Inc., Fujimino, Japan</td>
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</table>
Panel Session - Commercialization of RF Technologies for Medical Applications

Monday 12:00-13:00

**Moderator:** Dr. J. C. Chiao, University of Texas at Arlington

**Panelists:**
- Jessi Johnson, Mira Dry
- Arthur Astrin, Astrin Radio
- Perry Li, St. Jude Medical

**Room:** Grand Pacific Ballroom C

**Abstract:**
With advances in high frequency electronics and research on the interaction between electromagnetic waves and tissues, radio frequency technologies bring novel and groundbreaking features and advantages to medical applications. The inspiring presentations and sparkling discussions in the past Bio-Wireless sessions have indicated numerous technical challenges to overcome and enormous opportunity in the near future for healthcare applications. The next steps of moving towards commercialization face issues not only in engineering but also in clinical needs and standards. In this panel, expert panels will discuss the vision, opportunities, pathways, challenges, industrial synergy and standards in commercialization of advanced RF technologies to the medical field.

Panel Session - Emerging PA Breakthrough for Efficiency and Linearity Enhancement

Monday 19:00-20:30

**Organizer:** Fred Schindler, RFMD; Robert Caverly, Vil- lanova University

**Panelists:**
- Steve Cropp, Cardiff University; Marc Franco, RFMD; Andrei Grebennikov, RF axis; Jose Carlos Pedro, Aveiro University; Joe Staudinger, Freescale

**Room:** Grand Pacific Ballroom C

**Abstract:**
Efficiency and linearity are typically among the most critical performance characteristics for power amplifiers, and it is essential to trade-off between them when designing a power-amplifier. In this panel session, emerging breakthroughs for efficiency and linearity enhancement will be discussed, covering theoretical aspects as well as technology, novel circuit topologies and architectures for distortion reduction. There will be no formal presentations. The aim is to provide answers to questions posed by session attendees. The panel of is made up of knowledgeable experts that will seed the discussion. Attendees are encouraged to participate in the conversation and express their views. Please bring your questions. All power amplifier types, frequencies and techniques are open for discussion.
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<td>15:40</td>
<td>RWS</td>
<td>MO4A Advanced Antenna Technologies</td>
<td>Chair: Goutam Chattopadhyay, NASA - Jet Propulsion Laboratory</td>
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<td>MO4A-1 Realizing Non-Foster Reactances Using Negative-Group-Delay Networks and Applications to Antennas</td>
<td>G. Eleftheriades, H. Mirzaei, University of Toronto, Toronto, Canada</td>
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<td>16:20</td>
<td>SIRF</td>
<td>MO4B Applications and Wireless Architectures I</td>
<td>Chair: Donald Lie, Texas Tech University</td>
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<td>MO4B-1 Wideband Envelope Tracking Power Amplifiers for Wireless Communications (Invited Paper)</td>
<td>L. Larson, D. Kimball, P. Asbeck, Brown University, Providence, United States</td>
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<td>16:40</td>
<td>PAWR</td>
<td>MO4C Modeling Advanced Power Amplifier Systems</td>
<td>Chair: Andrei Grebennikov, Alcatel/Bell Labs Ireland</td>
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<td>MO4C-1 A Single-Ended Power Amplifier Behavioral Model for AM/AM and AM/PM Predictions (Invited talk)</td>
<td>J. C. Pedro, L. C. Nunes, Universidade de Aveiro, Aveiro, Portugal</td>
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<td>MO4C-2 A Semi-Physical Power Amplifier Behavioral Model Capable of Predicting Gain Expansion Effects</td>
<td>S. Glock1, J. Rascher1, B. Sogl2, T. Ussmueller1, J. Mueller1, G. Fischer1, R. Weigel1, 1Friedrich-Alexander-University of Erlangen-Nuremberg, Erlangen, Germany, 2Intel Mobile Communications, Neubiberg, Germany</td>
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<td>MO4C-3 Digital Predistortion Based on Feedback Iteration for Concurrent Dual-Band Power Amplifier</td>
<td>Y. Li, K. Chen, Z. Hu, X. Wang, L. Ma, University of Electronic Science &amp; Technology of China, Chengdu, China</td>
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<td>MO4C-4 A Simple Characterization of Power Spectral Density for Nonlinearly Amplified OFDM Signals</td>
<td>T. Lee, H. Ochiai, Yokohama National University, Yokohama, Japan</td>
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<td>MO4D Advanced Transceiver Technologies II</td>
<td>Chair: Xin Wang, OmniVision Technologies, Inc.</td>
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<td>MO4D-1 Antenna Integration for SiP Systems</td>
<td>W. L. De Raedt, S. Brebels, IMEC, Leuven, Belgium</td>
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<td>17:00</td>
<td>RWS</td>
<td>MO4D</td>
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<td>MO4D-2 A 21.1 mW 6.2 dB NF 77~81 GHz CMOS Low-Noise Amplifier with 13.5±0.5 dB S21 and Excellent Input and Output Matching for Automotive Radars</td>
<td>Y. Lin, G. Lee, C. Wang, C. Chen, National Chi Nan University, Puli, Taiwan</td>
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<td>MO4D-4 Compact 120-140 GHz Radar Tx/Rx Sensors with On-Chip Antenna</td>
<td>S. Yuan, A. Strodl, V. Valenta, A. Tassner, H. Schumacher, Ulm University, Ulm, Germany</td>
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</table>
Title: THz Imaging: What You See and What You Don’t

Abstract:
THz technology has developed to the point at which we can now begin to use customized-off-the-shelf components to construct near real-time imagers. However, traditional imaging at these wavelengths is extremely challenging. Most materials, and the atmosphere itself, have extremely high loss, limiting transmission measurements. Contrast from scattered energy is generally low, as the frequency and amplitude sensitivity to reflected power from most environmental objects is poor. Thermal contrast is limited by high background temperatures (generally above the energy range of THz signals). However, as advances in solid-state source and receiver technology push ever upwards in frequency, more and more proposals are aimed at using this new found capability for active and passive imaging. It turns out that there are at least a few tricks that one can play to help integrate millimeter and submillimeter wavelength transceivers into traditional imaging applications. One of the first application areas to take advantage of this is undergarment threat detection. This talk will discuss current techniques in active THz scanning, both to introduce the phenomenology of what we see reflected off the body, as well as the hidden phenomenology of what THz radiation may be stimulating in the body.

Plenary Speaker:
Dr. Peter Siegel, Caltech/JPL

Peter H. Siegel (BA Colgate 1976, PhD Columbia, 1983, IEEE member since 1975) has held appointments as Faculty Associate in Electrical Engineering and Senior Scientist in Biology at Caltech and Senior Research Scientist at the NASA Jet Propulsion Laboratory. At JPL, he founded and led for 20 years, the Submillimeter Wave Advanced Technology (SWAT) team, a group of 20+ scientists and engineers developing THz technology for NASA’s near and long term space missions. This included delivering key components for four major satellite missions and leading more than 75 NASA/R&D programs for NASA and the US department of defense. At Caltech, Dr. Siegel has been involved in new biological and medical applications of THz, especially low power effects on neurons and most recently, millimetre-wave monitoring of blood chemistry. Among many other functions, he serves as founding Editor-in-Chief of the IEEE Transactions on Terahertz Science and Technology and the General Secretary of the International Society of Infrared, Millimeter, and Terahertz Waves, the world’s largest society devoted exclusively to THz science and technology, which he founded in 2009. He is also an IEEE Fellow, and has served as an IEEE Distinguished lecturer, vice-chair and chair of IEEE MTT-S Committee 4 – THz Technology, and an ad-hoc member of the MTT-S AdCom. Dr. Siegel has published more than 300 articles on THz components and technology and has given more than 100 invited talks on this subject throughout his career of 37 years in THz.
Panel Session - THz Wireless Communication

Tuesday 12:00-13:00

**Moderator:** Dr. Frank Chang, UCLA

**Panelists:**
- Ken Cooper, JPL
- Peter Burke, UC Irvine
- Peter Siegel, JPL
- Richard Lai, Northrop Grumman
- Q. Jane Gu, UC Davis
- Mona Jarrahi, UCLA

**Room:** Grand Pacific Ballroom A/B

**Abstract:**
The Terahertz (THz) band is a frontier area for research in science and technology. This band from 300 GHz to 3000 GHz lies above the frequency range of traditional electronics, but below the range of optical and infrared regions. Many research and defense institutions have already demonstrated THz sensing and imaging techniques, but with the recent advancement in CMOS and solid-state devices researchers around the world are now discussing the future of THz communication systems for commercial applications. Standards bodies that address THz communications have also started to form. However, the challenges for THz communication are huge. In addition to the need for a THz source, an appropriate receiver system, and OTA testing, a solid understanding of electromagnetic propagation and absorption/diffraction characteristics of materials and the environment is absolutely essential. The necessary investment of time and money, the development of expensive hardware, and the creation of testing methodologies can all create bottlenecks in implementation of THz technology for commercial applications.

In an effort to discuss the challenges and prospects for THz technology, we have assembled a panel of distinguished researchers.

Demo Track Presentations
Room: Newport Coast Ballroom 1-5

Tuesday, 15:00-17:00

1-Development of Plough-able RFID Sensor Network Systems for Precision Agriculture
C. Wang, D. George, P. R. Green, University of Manchester, Manchester, United Kingdom

2-A 3D-Integrated, Low-Height, Small Module for 4.48GHz, 560MHz-Bandwidth TransferJet (TM) Transceiver
K. Agawa, I. Seto, A. Happoya, Y. Iida, T. Adachi, Toshiba Corporation, Kawasaki, Japan

3-Low-cost single channel F-band FMCW radar with compact on-chip antennas
S. Yuan, V. Valenta, H. Schumacher, Ulm University, Ulm, Germany

4-Demonstration of Advanced Tunable RF Filters and Oscillators
Y. Liu, A. Anand, X. Liu, University of California, Davis, Davis, United States

5-PIXI-based Non-contact Vital Sign Detection System for Human Healthcare and Structural Health Monitoring Applications
S. Banerjee, C. Gu, C. Li, Texas Tech University, Lubbock, United States

6-Data Compression Code for Fiber Optics Applications
R. Caputo1, G. Figueiredo1, M. Silveira2, 1Pulse Perfect Corporation, Geneva, United States, 2Federal University of ABC, Santo Andre, United States

Wireless Apps
Room: Newport Coast Ballroom 1-5

Tuesday, 15:30-17:30

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<td>Tentative</td>
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<td>Virginia Diodes</td>
<td>14:00-14:30</td>
<td>High Performance Test and Measurement Solutions for mm-wave Communications</td>
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<td>AWR Corporation</td>
<td>14:30-15:00</td>
<td>An Integrated Design through Test Framework for WLAN 802.11ac Components &amp; Systems</td>
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<td>Sonnet</td>
<td>15:00-15:30</td>
<td>Visualization of Substrate Currents in Silicon Under Spiral Inductors</td>
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<td>MOSIS</td>
<td>15:30-16:00</td>
<td>Getting your IC Designs from Concept to Production Quickly and Cost Effectively</td>
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<td>Maury Microwave</td>
<td>16:00-16:30</td>
<td>Mixed-Signal Active Load Pull- The Fast Track to 3G/4G Amplifier Design</td>
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<tr>
<td>National Instruments</td>
<td>16:30-17:00</td>
<td>Basics of Testing Envelope Tracking Power Amplifiers</td>
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Roger’s Gardens
Courtesy: Newport Beach and Company

Newport Theatre
Courtesy: Newport Beach and Company
### Industry Exhibits

**Room:** Newport Ballroom 1-5

**Monday 20 January**
1:30pm - 5:30pm and

**Tuesday 21 January**
9am - 5:30pm

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<td>MOSIS</td>
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**Newport Coast Ballroom, Marriott Hotel**

**Courtesy:** Marriott Hotel and Spa
## RWS Session: TU3A

**Novel Passive Antennas**

Chair: Glaucio Fontgalland, Universidade Federal de Campina Grande

Room: Grand Pacific Ballroom A/B

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<tbody>
<tr>
<td>TU3A-1</td>
<td>A CPW Fed Rectangular Slot Antenna for Wideband Circular Polarization</td>
<td>13:30</td>
</tr>
<tr>
<td>R. V. Ram Krishna1, R. Kumar2, DiAT(Deemed University), Pune, India, ARDE, Pune, India</td>
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<tr>
<td>TU3A-2</td>
<td>Design of CPW Feed Printed Monopole Antenna for Dual Polarization</td>
<td>13:50</td>
</tr>
<tr>
<td>R. V. Ram Krishna1, R. Kumar2, DiAT(Deemed University), Pune, India, ARDE, Pune, India</td>
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<tr>
<td>TU3A-3</td>
<td>Miniaturized Tunable Conical Helix Antenna</td>
<td>14:10</td>
</tr>
<tr>
<td>S. Zhu1,2, T. Ghazaany1,2, R. Abd-Alhameed1, S. Jones1, J. Noras1, T. Suggett3, S. Mark62, University of Bradford, Bradford, United Kingdom, Seven Technologies Group-Datong, Leeds, United Kingdom</td>
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<tr>
<td>TU3A-4</td>
<td>Slotted Microstrip Patch Antenna with Embedded Feed</td>
<td>14:30</td>
</tr>
<tr>
<td>S. S. Menon, P. Deo, D. Mirshekar-Syahkal, University of Essex, Colchester, United Kingdom</td>
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</table>

## RWS Session: TU3B

**Propagation Channel Modeling and Utilization**

Room: Grand Pacific Ballroom A/B

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<th>Session</th>
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</thead>
<tbody>
<tr>
<td>TU3B-1</td>
<td>Performance Analysis of Cognitive Radio Networks over Kappa-mu Fading Channel with Noise Uncertainty</td>
<td>13:30</td>
</tr>
<tr>
<td>F. von Glehn, U. S. Dias, University of Brasilia, Brasilia, Brazil</td>
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<tr>
<td>TU3B-2</td>
<td>Modeling the Influence of Wall Roughness on Tunnel Propagation</td>
<td>13:50</td>
</tr>
<tr>
<td>C. Zhou, J. Waynert, National Institute for Occupational Safety and Health, Pittsburgh, United States</td>
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<tr>
<td>TU3B-3</td>
<td>Path Loss Evaluation for Mobile-to-Mobile Wireless Channel</td>
<td>14:10</td>
</tr>
<tr>
<td>S. Zhu1,2, T. Ghazaany1,2, S. Jones1, R. Abd-Alhameed1, J. Noras1, A. Merrell1, W. Wilson2, University of Bradford, Bradford, United Kingdom, Seven Technologies Group-Datong, Leeds, United Kingdom</td>
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<tr>
<td>TU3B-4</td>
<td>Wideband MIMO Channel Sounding Setup for 2.4 GHz ISM Band</td>
<td>14:30</td>
</tr>
<tr>
<td>F. Talebi, T. G. Pratt, University of Notre Dame, Notre Dame, United States</td>
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## SIRF Session: TU3C

**Applications and Wireless Architectures II**

Chair: Hasan Sharifi, HRL Laboratories

Room: Baycliff

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<tr>
<td>TU3C-1</td>
<td>A 80-95 GHz Direct Quadrature Modulator in SiGe Technology</td>
<td>13:30</td>
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<tr>
<td>M. Abbas1, S. Carpenter1, H. Zirath1, F. Dielacher2, Chalmers University of Technology, Goteborg, Sweden, Infineon Technologies, Villach, Austria</td>
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<tr>
<td>TU3C-2</td>
<td>Integrated 60 GHz CMOS Variable-Gain Low-Noise Amplifier and Full 360° Phase Shifter for Phased-Array RF Receiving System</td>
<td>13:50</td>
</tr>
<tr>
<td>C. Yu, P. Lo, J. Luu, H. Kuo, H. Chuang, National Cheng Kung University, Institute of Computer and Communication Engineering, Tainan, Taiwan</td>
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<tr>
<td>TU3C-3</td>
<td>An X-band 6-Bit Active Phase Shifter</td>
<td>14:10</td>
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<tr>
<td>K. Kibaroglu, E. Ozeren, I. Kalyoncu, C. Caliskan, Y. Gurbuz, Sabanci University, Istanbul, Turkey</td>
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<tr>
<td>TU3C-4</td>
<td>An Inductorless RC-based Quadrature Phase Generator and Its Application to Vector-Sum Phase Shifter</td>
<td>14:30</td>
</tr>
<tr>
<td>T. Yan, W. Lin, C. Kuo, National Chiao-Tung University, Hsinchu, Taiwan</td>
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## BioWirelessSS Session: TU3D

**PAN, BAN, Energy Scavenging, and Remote Patient Monitoring**

Chair: Dietmar Kissinger, FAU Erlangen-Nuremberg

Co-Chair: Mohamed Mahfouz, University of Tennessee Knoxville

Room: Cardiff

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<td>TU3D-1</td>
<td>Electrophysiologic Monitoring and Minimally Invasive Neurosurgery: Opportunities for Medical Engineering</td>
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<tr>
<td>C. Chen, University of California San Diego, San Diego, United States</td>
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<tr>
<td>TU3D-2</td>
<td>SAR Evaluation of Ultra Wideband (UWB) Textile Antennas</td>
<td>13:50</td>
</tr>
<tr>
<td>P. Soh1, G. Vandenbosch1, F. Wee2, M. Mercouri1, A. van den Bosch1, M. Martinez-Vazquez2, D. Schreurs2, 1KU Leuven, Leuven, Belgium, 2IMST GmbH, Kamp-Lintfort, Germany, 3Universiti Malaysia Perlis, Arau, Malaysia</td>
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<tr>
<td>S. Okamoto1, T. Tsujioka1, S. Hara1, H. Nakamura1, T. Kawabata2, K. Watanabe1, M. Ise1, N. Arine1, H. Okuhata1, Osaka City University (School of Engg.), Osaka, Japan, 2Osaka City University (School of Medicine), Osaka, Japan, 3Kansai University, Osaka, Japan, 4Synthesis Corporation, Osaka, Japan</td>
<td></td>
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<tr>
<td>TU3D-4</td>
<td>A Mobile and Wireless Approach for Cardiac Output Monitoring</td>
<td>14:30</td>
</tr>
<tr>
<td>D. Teichmann, T. Bartelt, S. Leonhardt, P. Soh1,3, G. Vandenbosch1, F. Wee2, M. Mercouri1, A. van den Bosch1, M. Martinez-Vazquez2, D. Schreurs2, 1KU Leuven, Leuven, Belgium, 2IMST GmbH, Kamp-Lintfort, Germany, 3Universiti Malaysia Perlis, Arau, Malaysia</td>
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## TUESDAY, 21 JANUARY 2014

**Joint RWW Banquet**

Tuesday Evening, 21 January 2014 from 18:00-21:00

Room: Baycliff

Join your friends, co-workers and fellow researchers in an informal setting of lively discussion, dinner and wine. In addition, see the student paper award winners from the RWS, PAWR, WiSNet, BioWireless and SiRF receive their awards.

**Exhibits/Wireless Apps/Demo**

Industry Exhibits: Monday 20 January 13:30pm - 5:30pm and Tuesday 21 January 9am - 17:30pm

WirelessApps Talks: Tuesday 21 January 13:30pm - 17:30pm

Demo Session: Tuesday 21 January 13:30pm - 17:30pm
TUESDAY, 21 JANUARY 2014

RWS Session: TU5A
MIMO Signal Processing and Smart Antennas
Chair: Hideki Ochiai, Yokohama National University
Co-Chair: Alessandra Costanzo, University of Bologna
Room: Grand Pacific Ballroom C/D

TU5A-1 Nonlinear/Electromagnetic Approach for Time-Modulated Array Simulation
D. Masotti1, P. Francia1, A. Costanzo2, V. Rizzoli1, 1University of Bologna, Bologna, Italy, 2University of Bologna, Cesena, Italy

TU5A-2 Semi-Blind Interference Alignment over Correlated Wireless Channels
M. Takai1, K. Ishibashi2, T. Wada1, 1Shizuoka University, Hamamatsu, Japan, 2The University of Electro-Communications, Chofu, Japan

TU5A-3 A Rapid Direction of Arrival Estimation Procedure for Adaptive Array Antennas Covered by a Shaped Dielectric Lens
R. Sankaranarayanan, D. S. Badri, R V College of Engineering, Bangalore, India

TU5A-4 Effect of PAPR Reduction to BS Cooperation MIMO Systems under Multi-Cell Environment
R. Myoenzono, O. Takyu, F. Sasamori, S. Honda, Shinshu University, Nagano, Japan

16:00

RWS Session: TU5B
Late News
Chair: Kevin Chuang, MIT Lincoln Laboratory
Room: Grand Pacific Ballroom A/B

TU5B-1 A 5-5.8 GHz Fully-Integrated CMOS PA for WLAN Applications
J. Tsai, H. Ou-Yang, National Taiwan Normal University, Taipei, Taiwan

TU5B-2 Advanced Transmitters with Combined Crest Factor Reduction and Digital Predistortion Techniques
A. Farabegoli1,2, B. Sogl1, J. Mueller1, R. Weigel2, 1Intel Mobile Communications GmbH, Neubiberg, Germany, 2Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany

TU5B-3 Three-Way Doherty Power Amplifier for Efficient Amplification of Wideband Signals with Extended PAPR
H. Golestaneh, F. Arfaei Malekzadeh, S. Boumaiza, University of Waterloo, Waterloo, Canada

16:20

RWS Session: TU5C
Late News
Chair: Cagri Ulusoy, Georgia Institute of Technology
Room: Baycliff

TU5C-1 Measurement Setup for Linear Characterization of a Mixed-Signal SoC Wideband Receiver
P. M. Cruz, D. C. Ribeiro, N. B. Carvalho, IT-Universidade de Aveiro, Aveiro, Portugal

TU5C-2 Recent Results of High-Resolution Wireless Indoor Positioning Based on IEEE 802.11ac
A. N. Gaber, A. Omar, University of Magdeburg, Magdeburg, Germany

TU5C-3 A Radio System Design Tool for Forward Error Corrections in Wireless CSMA Networks: Analysis and Economics
H. Zhu, S. Bajekal, V. Lakamraju, B. Murray, United Technologies Research Center, EH, United States

16:40

BioWireleSS Session: TU5D
Wireless Position and Location in Medicine
Chair: Changzhi Li, Texas Tech Co-Chair: Michael Kuhn, University of Tennessee Knoxville
Room: Cardiff

TU5D-1 Asynchronous Subthreshold CMOS Event Detector for Wireless BAN Sensor Nodes
F. Grimminger1, G. Kowalcyzk2, H. Unterassinger2, A. Schwarzmeier1, G. Fischer1, R. Weigel1, D. Kissinger1, 1University of Erlangen-Nuremberg, Erlangen, Germany, 2Infineon Technologies Austria AG, Graz, Austria, 3Graz University of Technology, Graz, Austria

TU5D-2 Design and Implementation of Wearable RFID Tag for Real-Time Ubiquitous Medical Care
Y. Chen1, H. Sun1, R. Chen1, 1National Tsing Hua University, Hsinchu, Taiwan, 2China University of Technology, Hsinchu, Taiwan

TU5D-3 A Low-Power Fall Detection and Activity Monitoring System for Nursing Facilities and Hospitals
A. Schwarzmeier, R. Weigel, G. Fischer, D. Kissinger, University of Erlangen-Nuremberg, Erlangen, Germany

TU5D-4 Detection of Trapped Survivors Using 270/400 MHz Dual-frequency IR-UWB Radar based on Time Division Multiplexing
Z. Li, H. Lv, Y. Zhang, G. Lu, S. Li, X. Jing, J. Wang, The Fourth Military Medical University, Xi’an, China

17:00

Golf Course Near Marriot Hotel
Courtesy: Marriot Hotel and Spa
Wednesday, 22 JANUARY 2014

WiSNet Session: WE1A
Six-Port and Multi-Port Technology
Chair: Alex Koelpin, University Erlangen-Nuremberg
Co-Chair: Tuami Lasri, IEMN, University of Lille
Room: Grand Pacific Ballroom C/D

RWW Session: WE1B
Passive Components and Packaging I
Chair: Roberto Gomez Garcia, University of Alcala
Co-Chair: Danush Mirshekar-Syahkal, University of Essex
Room: Grand Pacific Ballroom A/B

PAWR Session: WE1C
Power Amplifier
Chair: Chiennan Kuo, National Chiao Tung University
Room: Baycliff

BioWireleSS Session: WE1D
Micro-Sensors and In-vivo Microsystems
Chair: Jung-Chih Chiao, University of Texas Arlington
Co-Chair: Rizwan Bashirullah, University of Florida
Room: Cardiff

08:00
WE1A-1 Six-Port Technology for Millimeter-wave Radar and Imaging Applications
K. Haddadi, T. Lasri, Institute of Electronics, Microelectronics and Nanotechnology (IEMN), Villeneuve d'Ascq, France

WE1B-1 R10 Time-Varying Transmission Lines - A new Pathway to a non-Reciprocal and Intelligent RF Front-End (Invited Paper)
Y. Wang, University of California at Los Angeles, Los Angeles, United States Invited Paper

WE1C-1 RF Performance Limits of Ballistic Si Field-Effect Transistors (Invited Paper)
A. Pan, C. Chui, University of California, Los Angeles, Los Angeles, United States

WE1D-1 A Power Consumption Optimized Reflective In-ear Pulse Oximeter for Mobile Health Monitoring
B. Venema, M. S. Wolke, V. Blazek, S. Leonardt, RWTH Aachen University, Aachen, Germany

08:20
WE1A-2 A Tank Level Sensor Based on Six-Port Technique Comprising a quasi-TEM Waveguide
S. Mann, S. Lindner, F. Barbon, S. Linz, A. Talai, R. Weigel, A. Koelpin, Friedrich-Alexander University Erlangen-Nürnberg, Erlangen, Germany

WE1B-2 Symmetric Coupled Composite Right-/Left-Handed Transmission Line with Dual-Mode Balanced Filter Characteristics
Y. Kim1, S. Sim1, Y. Yoon2, ‘Kumoh National Institute of Technology, Gyungbuk, Republic of Korea, ‘Kwangdong University, Gangwon do, Republic of Korea

WE1C-2 A 28 GHz Class-J Power Amplifier with 18 dBm Output Power and 35% peak PAE in 120 nm SiGe BiCMOS
A. Sarkar, B. Floyd, North Carolina State University, Raleigh, United States

WE1D-2 Optimal Design of Energy Efficient Inductive Links for Powering Implanted Devices
F. L. Cabrera, F. Rangel de Sousa, Federal University of Santa Catarina, Florianopolis, Brazil

08:40
WE1A-3 Butler Matrix Based Six-port Passive Junction
A. Moscoso-Mártir, J. Ávila-Ruiz, E. Durán-Valdeiglesias, L. Moreno-Pozas, I. Molina-Fernández, A. Ortega-Morlux, J. de-Oliva-Rubio, Málag University, ETSI Telecommunicación, Málaga, Spain

WE1B-3 A Tunable Directional Coupler with A Wide Tuning Range of Coupling Ratios
M. Zhou, J. Shao, B. Arigong, H. Ren, R. Zhou, H. Zhang, University of North Texas, Denton, United States

WE1C-3 An X- to Ka-Band Fully-Integrated Stacked Power Amplifier in 45 nm CMOS SOI Technology
S. R. Helmi, J. Chen, S. Mohammad, Purdue University, West Lafayette, United States

WE1D-3 A Low Switching Frequency AC-DC Boost Converter for Wireless Powered Miniaturized Implants
H. Jiang1, B. Lariviere1, J. Zhang1, R. Feddis2, M. Hanson3, S. Roy3, ‘San Francisco State University, San Francisco, United States, ‘University of California San Francisco, San Francisco, United States, ‘University of California San Francisco, San Francisco, United States

09:00
WE1A-4 Water Temperature Monitoring by Microwave Six-Port Interferometry at 24 GHz
A. Talai, S. Mann, R. Weigel, A. Koelpin, Friedrich-Alexander-University Erlangen-Nuremberg, Erlangen, Germany

WE1B-4 Characterization of Liquid Crystal Polymer (LCP) From 110 GHz to 170 GHz
W. T. Khan, C. A. Donado Morcillo, A. C. Ulusoy, J. Papapolymerou, Georgia Institute of Technology, Atlanta, United States

WE1C-4 A 69-81 GHz Power Amplifier Using 90 nm CMOS Technology
J. Tsai, R. Chang, J. Lin, National Taiwan Normal University, Taipei, Taiwan

WE1D-4 Radiation Efficiency of Planar Implantable Antennas at ISM Band
M. Tofighi1, S. Huang2, ‘Pennsylvania State University, Harrisburg, Middletown, United States, ‘Braxel University, Philadelphia, United States

09:20
WE1A-5 Fast In-Situ Diode Detector Characterization for Six-Port Interferometer Receivers
F. Barbon, S. Lindner, S. Mann, S. Linz, R. Weigel, A. Koelpin, University of Erlangen-Nuremberg, Erlangen, Germany

WE1B-5 Characterization of Linear and Two-Port Parameters of a 160 GHz Frequency Converter
W. T. Khan, C. A. Donado Morcillo, A. C. Ulusoy, J. Papapolymerou, Georgia Institute of Technology, Atlanta, United States

WE1C-5 83-95 GHz Power Amplifier for Measuring Radar Cross Section of Small Objects
J. Tsai, R. Chang, J. Lin, National Taiwan Normal University, Taipei, Taiwan

WE1D-5 Radiation Efficiency of Planar Implantable Antennas at UWB Band
M. Tofighi, S. Huang, ‘Pennsylvania State University, Harrisburg, Middletown, United States, ‘Braxel University, Philadelphia, United States
Wednesday, 22 January 2014

**WisNet Session: WE2A**
Advanced Localization and Sensing Technologies
Chair: Manos Tentzeris, Georgia Tech
Co-Chair: Maurizio Bozzi, University of Pavia
Room: Grand Pacific Ballroom C/D

**RWW Session: WE2B**
Passive Components and Packaging II
Chair: Rashaunda Henderson, University of Texas at Dallas
Co-Chair: Roberto Gomez Garcia, University of Alcala
Room: Grand Pacific Ballroom A/B

**SiRF Session: WE2C**
Technology, Devices, and Modeling
Chair: Mehmet Kaynak, IHP Microelectronics
Co-Chair: Julio Costa, RFMD
Room: Baycliff

**BioWireSS Session: WE2D**
Microwaves in Biological Applications and Interaction with Biological Tissues
Chair: Katia Grenier, LAAS CNRS
Co-Chair: Dietmar Kissinger, FAU Erlangen-Nuremberg
Room: Cardiff

**WE2A-1** Advanced Multilayer Photo-imaged Substrate Integrated Waveguides and RF Front-End for Emerging mm-wave Wireless Applications
K. K. Samanta1,2, 1Milmega Ltd., Ryde, United Kingdom, 2University of Leeds, Leeds, United Kingdom

**WE2A-2** Review on Microwave/Millimeter-Wave Systems for Vital Sign Detection
H. Wang, J. Cheng, J. Kao, T. Huang, National Taiwan University, Taipei, Taiwan

**WE2A-3** Compact, Mobile, Low Power UWB System for Through-Wall Imaging
S. Magoon1, A. E. Fathy1, C. Th-judeen2, A. Hoofar3, 1University of Tennessee, Knoxville, United States, 2Villanova University, Villanova, United States

**WE2A-4** A SAW Delay Line Based Dual-Band Low-Power Tag for Precise Time-of-Arrival Ranging
M. Chaabane, E. M. Beibl, Technische Universität München, Munich, Germany

**WE2A-5** Mobile-phone Indoor Localization Based on Microwave Identification Using Web-access Time
M. Yamamoto1,2, T. Ohtsuki2, H. Utsumi2, N. Furukawa2, 1Hitachi, Ltd., Tokyo, Japan, 2Keio University, Yokohama, Japan, 3Hitachi Solutions East Japan, Ltd., Sendai, Japan

**WE2B-1** Frequency-Asymmetrical Signal-Interference Microwave Planar Filters Based on Stub-Loaded Transversal Filtering Sections (Invited Paper)
R. Gomez-Garcia, R. Loeches-Sanchez, M. Sanchez-Soriano, University of Alcala, Madrid, Spain

**WE2B-2** Tunable Liquid-Crystal Millimeter-wave Bandpass Filter Using Periodical Structure
M. Yazdanpanahi, P. Deo, D. Missheka-Syakhkal, University of Essex, Colchester, United Kingdom

**WE2B-3** Transmission Line Replacement for a Lumped Element Reflectionless Filter
C. Jackson, Northrop Grumman Aerospace Systems, Redondo Beach, United States

**WE2B-4** A Compact Three-Bit Reconfigurable Resonator Consisting of Lumped Elements
R. Kobayashi, T. Kato, Y. Yamao, The University of Electro-Communications, Chofu-shi, Japan

**WE2B-5** The Analysis of Transit-Time Effect of Bipolar Base Collector Junction Breakdown
X. Bi1, D. Trombley2, T. Krakowski1, 1Texas Instruments, Santa Clara, United States, 2Texas Instruments, Dallas, United States

**WE2C-1** A TCAD-based Roadmap for High-speed SiGe HB Ts
M. Schroter1,2, T. Rosenbaum1, S. P. Voinigescu1, P. Chevalier1, 1Technical University Dresden, Dresden, Germany, 2University of California San Diego, La Jolla, United States, 3University of Toronto, Toronto, Canada, 4STMicroelectronics, Crolles, France

**WE2C-2** Modeling and Optimization of BICMOS Embedded Through-Silicon Vias for RF-Grounding
M. Wietstock2, M. Kaynak1, S. Marschmeyer1, C. Wipf1, I. Tekin2, K. Zoschke2, B. Tillack4, 1IHP, Frankfurt (Oder), Germany, 2Sabanci University, Istanbul, Turkey, 3Fraunhofer IZM, Berlin, Germany, 4Technische Universität Berlin, Berlin, Germany

**WE2C-3** An Investigation of the Temperature Dependent Linearity of Weakly-Saturated, Electrically-Matched SiGe NPN and PNP HB Ts
S. Jung1, P. Song1, I. Song1, R. L. Schmidt1, J. D. Cressler1, J. A. Babcock2, 1Georgia Institute of Technology, Atlanta, United States, 2Texas Instruments, Santa Clara, United States

**WE2C-4** Integration of a 50 V BVCEO SiGe:C HBT into a 0.25 µm SiGe:C BICMOS Platform
R. Sorge, J. Schmidt, C. Wipf, K. Schulz, R. Plücket, R. Barth, IHP, Frankfurt (Oder), Germany

**WE2D-1** Modeling and Characterization of a BiCMOS Embedded Microfluidic Platform for Biosensing Applications

**WE2D-2** Radio Frequency Detection and Analysis of Synthetic Particles
X. Hu1, G. Yu1, J. Sun1, D. Moline1,2, P. Wang1, 1Ohio State University, Columbus, United States, 2University of Findlay, Findlay, United States, 3Clemson University, Clemson, United States

**WE2D-3** An Inexpensive Backside-Sensing Coplanar Waveguide Sensor for Characterization of Liquids and Solids up to 40 GHz
S. Liu1,2, I. Ockel1,2, B. Nauwelaers1, D. Schreurs1, 1University of Leuven, Heverlee, Belgium, 2Interuniversity Microelectronics Center, Heverlee, Belgium

**WE2D-4** A Microstrip Resonant Biosensor for Aqueous Glucose Detection in Microfluidic Medical Applications
U. Schwerthoeffer, C. Warter, R. Weigel, D. Kissinger, University of Erlangen-Nuremberg, Erlangen, Germany
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<td>WE3A</td>
<td>Novel Sensors and Sensor Components</td>
<td>Christian Damm, Technische Universität Darmstadt</td>
<td>Grand Pacific Ballroom A/B</td>
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<td>WE3B</td>
<td>Software Defined Radios and Cognitive Radios</td>
<td>Abbas Omar, University of Akron</td>
<td>Grand Pacific Ballroom A/B</td>
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<tr>
<td>WE3C</td>
<td>Late News</td>
<td>Kevin Chuang, MIT Lincoln Laboratory</td>
<td>Baycliff</td>
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<tr>
<td>WE3D</td>
<td>Insight in Sensor Network Architectures and System Design</td>
<td>Rahul Khanna, Intel/NTU</td>
<td>Cardiff</td>
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### WE3A-1 Optimized Design of Multi-band and Solar Rectennas
K. Niotaki, S. Kim, F. Giuoppo, A. Colado, A. Georgiadis, M. M. Tentzeris, CTTC, Castelldefels, Spain

### WE3A-2 Wireless Capacitive Pressure Sensor Operating up to 400 °C from 0 to 100 psi Utilizing Power Scavenging
M. C. Scardelletti, G. E. Ponchak, K. Harash, J. A. Mackey, R. D. Meredith, C. A. Zorman, G. M. Beheim, F. W. Durney, G. W. Hunter, NASA Glenn Research Center, Cleveland, United States, Sporian Microsystems Inc., Lafayette, United States, Case Western Reserve University, Cleveland, United States

### WE3A-3 Linear-Frequency-Modulated Continuous-Wave Radar for Vital-Sign Monitoring
G. Wang, J. Muñoz-Ferreras, C. Gu, C. Li, R. Gómez-García, Texas Tech University, Lubbock, United States, University of Alcalá, Alcalá de Henares, Spain

### WE3B-1 Adaptive RF Canceller for Transmit-Receive Isolation Improvement
K. E. Kolodziej, J. G. McMichael, B. T. Perry, MIT Lincoln Laboratory, Lexington, United States

### WE3B-2 Energy Efficiency of Cooperative Cognitive Radio Network with Outage Constraints
M. Naem, K. Illanko, A. Kamokar, A. Anpalagan, M. Jaseemuddin, Ryerson University, Toronto, Canada

### WE3B-3 SDR for SRD: ADC Specifications for Reconfigurable Gateways in Urban Sensor Networks
M. Vallerian, G. Villemaud, B. Misco-pelin, T. Risset, F. Hutri, Orange-Labs, Meylan, France, Université de Lyon, INRIA, INSA de Lyon, CITI-INRIA, Villeurbanne, France

### WE3B-4 Highly Flexible Cognitive Radio Spectrum Sensing Front-End
P. Lohmiller, A. Elsokary, S. Chartier, H. Schumacher, Ulm University, Ulm, Germany, Cassidyian, Ulm, Germany

### WE3B-5 Analysis of Phase Sampling Noise of Switched Injection-locked Oscillators
A. Strobelt, M. Schulz, F. Ellinger, C. Carlowitz, M. Vossiek, Technische Universität Dresden, Dresden, Germany, Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany

### WE3C-1 Phase Noise Reduction and Spurious Suppression in Microwave Oscillators Utilizing Self-Injection Loops
L. Zhang, A. K. Poddar, U. L. Rohde, A. S. Daycough, Drexel University, Philadelphia, United States, Synergy Microwave Corp., Paterson, United States

### WE3C-2 Optimized Design of Harmonic-Injection Dividers
F. Ramirez, A. Suarez, University of Cantabria, Santander, Spain

### WE3C-3 High Speed SAR ADC Using Fast Conversion Loop
M. Ensaadfaran, W. Namgoong, The University of Texas at Dallas, Richardson, United States

### WE3C-4 Design and Fabrication of CPW to Dielectric Image-Guide Transitions at 60 GHz on SOI
M. A. Basha, B. Biglarbegian, S. Gigoyan, S. Safavi-Naeini, Zewail City of Science and Technology, 8th of October City, Egypt, University of Waterloo, Waterloo, Canada

### WE3C-5 Low-loss, Wideband SPDT Switches and Switched-Line Phase Shifter in 180-nm RF CMOS on SOI Technology
A. S. Cardoso, P. Saha, P. S. Chakraborty, D. M. Fleischhauer, J. D. Cressler, Georgia Institute of Technology, Atlanta, United States

### WE3D-1 Broadcast of Things – A Thought Experiment

U. Yildiz, K. Bicakci, B. Tavli, TOBB University of Economics and Technology, Ankara, Turkey

### WE3D-3 Enhanced Accuracy for a Complex Image Theory Position Estimator using Frequency Diversity
M. S. Trotter, J. D. Griffin, D. S. Rickelt, Disney Research, Pittsburgh, United States, North Carolina State University, Raleigh, United States

### WE3D-4 System and Signal Design for an Energy-efficient Multi-frequency Localization System
WE3P-1 A 12.1 mW 50–67 GHz Up-Conversion Mixer with 6 dB Conversion Gain and 30.7 dB LO-RF Isolation in 90 nm CMOS Technology Y. Lin, C. Wang, W. Wen, T. Tsai, National Chi Nan University, Puli, Taiwan

WE3P-2 A 5.5 GHz Low-Power PLL Using 0.18 µm CMOS Technology J. Tsai, H. Huang, J. Chou, National Taiwan Normal University, Taipei, Taiwan

WE3P-3 A 9.96 mW 3.2±0.5 dB NF 1.9–22.5 GHz Wideband Low-Noise Amplifier Using 90 nm CMOS Technology Y. Lin, C. Wang, J. Lee, National Chi Nan University, Puli, Taiwan

WE3P-4 A K-band BiCMOS Low Duty-cycle Resistive Mixer A. Magnani1, C. Viallon1, I. Buciu1, T. Eper2, M. Gorgarino2, T. Parra3, University of Modena and Reggio Emilia, Modena, Italy, 2AXESS Europe, Toulouse, France

WE3P-5 Planar Antipodal Linearly Tapered Slot Antenna using Grounded Coplanar Waveguide-to-Substrate Integrated Waveguide Transition for Passive Millimeter-Wave Imaging W. Wang1, X. Wang2, A. E. Fathy3, 1Beijing Institute of Technology, Beijing, China, 2University of Tennessee, Knoxville, United States

WE3P-6 A Wideband Phase Modulation Technique Adopting Fractional-N Direct Digital Frequency Synthesizer B. Zhang, F. You, R. Tong, S. He, University of Electronic Science and Technology of China, Chengdu, China

WE3P-7 Full Duplex Prototype of OFDM on GNURadio and USRP W. Zhou, G. Villemaud, T. Risset, Université de Lyon, INRIA, INSA-Lyon, Villeurbanne, France

WE3P-8 Analysis and Reduction of the Impact of Thermal Noise on the Full-Duplex OFDM Radio Z. Zhan, G. Villemaud, J. Gorce, Université de Lyon, INRIA, INSA-Lyon, CITI-INRIA, Villeurbanne, France


WE3P-10 A Dual Six-Port with two-Angle Resolution and Compact Size for Mobile Terminals R. Hussain, M. S. Sharawi, KFUPM, Dhahran, Saudi Arabia

WE3P-11 Energy Harvesting with a Low-Cost and High Efficiency Rectenna for Low-Power Input S. D. Assimonis, A. Bletsas, Technical University of Crete, Chania, Greece

WE3P-12 Using OFDM Pilot Tones for Spectrum Sensing with Applications to Mobile WIMAX A. G. Termtam, D. C. Popescu, Old Dominion University, Norfolk, United States

WE3P-13 Dielectric Load in Short Standard Conical Horns for Satellite Applications M. Reyes-Ayala1,2, H. Jardon-Aguilar1, 1CINVESTAV-IPN, Gustavo A. Madero, Mexico, 2Metropolitan Autonomous University, Azcapotzalco, Mexico

WE3P-14 GPU Accelerated Channel Modeling Ray Tracing Tool A. S. Abdelatif, S. Safavi-Naeini, University of Waterloo, Waterloo, Canada

WE3P-15 Towards Low Power Consumption MMIC UWB Localization System E. Elkholy1, M. Kuhn1, D. Lin2, A. E. Fathy3, 1University of Tennessee, Knoxville, United States, 2Im University, Ulm, Germany

WE3P-16 Enhancing Open Loop Beamsteering Performance for the Uplink of UMTS/HSPA+ under Discontinuous Transmission S. Schroeter, S. Riess, R. Weigel, G. Fischer, University of Erlangen-Nuremberg, Erlangen, Germany

WE3P-17 A Dynamic Power Allocation and Relay Selection Scheme for Energy-Harvesting Wireless Networks G. Li1, S. Zhu2, P. Ren1, H. Hui2, 1Xi’an Jiaotong University, Xi’an, China, 2X’ian University of Technology, Xi’an, China

WE3P-18 Charging Mechanisms in Nanostructured Dielectric for MEMS Capacitive Switches G. Papaiannou1, L. Michalas1, M. Koutsourel1, S. Banerji2, A. Gantzi1, A. Ziaei1, 1University of Athens, Athens, Greece, 2Thales Research and Technology France, Palaiseau, Paris, France


WE3P-20 Electrothermal Modeling of PIN Diode Protection Circuits in MRI Surface Coils R. H. Caverly, Villanova University, Villanova, United States

Industry Forum - Characterization of High Power Devices Wednesday 9:00-17:00

Organizer: Steve Dudkiewicz

Speakers: David Ballo, Stephane Dellier, Tony Gasseling, Al Lorona, Gary Simpson

Room: Grand Pacific Ballroom E

Abstract: Device characterization is an essential process in many aspects of research, development and testing of RF and microwave devices. To the inexperienced, this might seem intimidating or even scary. In this course, we will explore various interconnected topics of device characterization that form the amplifier design flow. Topics include pulsed IV and S-parameters for compact model extraction, load pull for model validation and measurement, amplifier design and IC stability analysis, X-parameter modeling and system-level simulations.

The Industrial Forum includes an Exhibit, Wireless Apps (similar to uApps) and special hardware demonstrations given by researchers


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