

7th Annual IEEE International Conference on RFID

# IEEE RFID 2013

Orange County Convention Center, Orlando, FL • April 30 - May 2, 2013  
[www.ieee-rfid.org/2013](http://www.ieee-rfid.org/2013)



## IEEE RFID 2013 Program Brief – Tuesday, April 30

7:30 - 8:00	<b>MORNING COFFEE</b>	S331 A-B-C-D Hallway
8:00 - 8:30	<b>SPEAKER BRIEFING</b>	S331 A
8:30 - 10:00	<b>TUTORIAL SESSION (Part I)</b>	

Tutorial <b>5.8 GHz and Above for RFID and Sensors (Part I)</b>	S331 A
See description in conference program	
<b>Presenter:</b> Gregory D. Durgin, Georgia Tech	

10:00 - 10:15	<b>BREAK</b>	S331 A-B-C-D Hallway
10:15 - 12:00	<b>TUTORIAL SESSION (Part II)</b>	

Tutorial <b>5.8 GHz and Above for RFID and Sensors (Part II)</b>	S331 A
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12:00 - 13:00	<b>LUNCH</b>	S331 C-D
13:00 - 14:30	<b>WORKSHOP SESSIONS (Part I)</b>	

<b>Workshop 1</b> <b>Enhancing Near-Metal Performance of RFID (Part I)</b> See description in conference program <b>Organizer:</b> Isaac Ehrenberg, Auto-ID Labs, MIT  <b>Speakers:</b> Isaac Ehrenberg, Auto-ID Labs, MIT Jessica Ruyle, University of Oklahoma Cherish Bauer-Reich, NDSU, University of Minnesota Leena Ukkonen, Tampere University of Technology Blake Marshall, Georgia Tech	S331 A	<b>Workshop 2</b> <b>RFID for Bio-Medical Sensing Applications (Part I)</b> See description in conference program <b>Organizers:</b> Dr. Richard Fletcher, MIT Dr. Radislav Potyrailo, GE Global Research  <b>Speakers:</b> Richard Fletcher, Tagsense Tim Wortley, GE Healthcare Life Sciences Keat Ghee Ong, Michigan Technological University Zhongyang Chen, Auburn University Manos Tentzeris, Georgia Tech Ryan Westafer, Georgia Tech Research Institute	S331B
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14:30 - 14:45	<b>BREAK</b>	S331 A-B-C-D Hallway
14:30 - 14:45	<b>GS1 Next Generation Interoperability Demonstration</b>	S331 E
14:45 - 16:30	<b>WORKSHOP SESSIONS (Part II)</b>	

<b>Workshop 1</b> <b>Enhancing Near-Metal Performance of RFID (Part II)</b>	S331 B	<b>Workshop 2</b> <b>RFID for Bio-Medical Sensing Applications (Part II)</b>	S331B
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16:45 - 17:45	<b>RFID Journal Live! General Session</b>	S320 A-B-C-D
17:45 - 18:30	<b>RFID Journal Live! Keynote Session</b>	S320 A-B-C-D
18:30 - 20:30	<b>RFID Journal Live! Opening Reception</b>	Exhibit Hall
20:30	<b>IEEE RFID 2013 Reception</b>	Outside S331 A

# IEEE RFID 2013 Program Brief – Wednesday, May 1 (Morning)

7:30 - 8:00	<b>MORNING COFFEE</b>	S331 A-B-C-D Hallway
8:00 - 8:30	<b>SPEAKER BRIEFING</b>	S331 A
8:30 - 9:45	<b>OPENING PLENARY</b>	S330 E-F-G

<b>Welcome and Introduction</b> <b>Technical Program Overview</b> <b>Presentation of Best Paper Award</b> <b>Introduction of Keynote Speaker</b> <b>Keynote Speaker</b> <b>Poster Session Teaser Talks</b>	<b>Matthew Reynolds</b> , General Chair, IEEE RFID 2013 <b>Daniel Arnitz</b> , Technical Program Chair, IEEE RFID 2013 <b>Bernd Schoner</b> , ThingMagic, A Division of Trimble (Best Paper Award Patron) <b>Gregory Durgin</b> , General Vice Chair, IEEE RFID 2013 <b>Brian Otis</b> , University of Washington <b>Miguel Pardal</b> , Poster Session Chair and Poster authors
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9:45 - 10:00	<b>BREAK</b>	S330 E-F-G
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## 10:00 - 11:30 TECHNICAL SESSIONS

<p>Session 1A S331 A</p> <p><b>RFID in BioMed I</b></p> <p><b>A Wearable UHF RFID-Based EEG System</b> Artem Dementyev, Joshua R. Smith University of Washington, US</p> <p><b>Analysis of Wireless Powering of mm-Size Neural Recording Tags in RFID-inspired Wireless Brain-Machine Interface Systems</b> Elham Moradi<sup>1</sup>, Toni Björninen<sup>1</sup>, Lauri Tapio Sydänheimo<sup>1</sup>, Leena Ukkonen<sup>1</sup>, Jan Rabaey<sup>2</sup> <sup>1</sup>Tampere University of Technology, FI <sup>2</sup>UC Berkeley, US</p> <p><b>Battery-Free Multichannel Digital ECG Biotelemetry using UHF RFID Techniques</b> Jordan Besnoff<sup>1</sup>, Travis Deyle<sup>2</sup>, Reid Harrison<sup>3</sup>, Matthew Reynolds<sup>1</sup> <sup>1</sup>Duke University, US <sup>2</sup>Georgia Institute of Technology, US <sup>3</sup>Intan Technologies LLC, US</p> <p><b>RFID Technologies applied to the Design and Implementation of Electro-Mechanical Systems for the Simulation of Medical Scenarios in Neonatal Patients</b> Yury Estepa Avellaneda, Edward Julián Ramos Ballesteros, Rubén Stevinson Flechas Lozano, Nicolás Cuervo Benavides, Luis Carlos Méndez Córdoba, Jan Bacca Rodríguez, Gloria Margarita Varón Durán Universidad Nacional de Colombia, CO</p> <p><b>Session Chair:</b> Rahul Bhattacharyya, MIT, US</p>	<p>Session 1B S 331 B</p> <p><b>Antennas and Propagation I</b></p> <p><b>Staggered Pattern Charge Collection: Antenna Technique to Improve RF Energy Harvesting</b> Blake Marshall, Gregory Durgin Georgia Institute of Technology, US</p> <p><b>Wide-Coverage Array Antenna Using a Dual-Beam Switching for UHF RFID Applications</b> Wang-Sang Lee<sup>1</sup>, Seung-Tae Khang<sup>1</sup>, Won-Seok Lee<sup>1</sup>, Hyunsung Tae<sup>1</sup>, Moon-Que Lee<sup>2</sup>, Jong-Won Yu<sup>1</sup> <sup>1</sup>Korea Advanced Institute of Science and Technology (KAIST), KR <sup>2</sup>University of Seoul, KR</p> <p><b>Ultra Low-Profile Metal Tag Antenna Design with an Emphasis on Radiation Efficiency</b> Jingtian Xi, Terry Ye Hong Kong R&amp;D Centre for Logistics and Supply Chain Management, HK</p> <p><b>Malevolent Object Detection Using Microwave RFID Tags</b> Marcin Morys, Muhammad Akbar, Gregory Durgin Georgia Institute of Technology, US</p> <p><b>Session Chair:</b> Joshua R. Smith, University of Washington, US</p>
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11:30 - 13:00	<b>LUNCH</b>	Exhibit Hall
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# IEEE RFID 2013 Program Brief – Wednesday, May 1 (Afternoon)

13:00 - 14:30 **TECHNICAL SESSIONS** Exhibit Hall

<p>Session 2A</p> <p style="text-align: right;">S331 A</p> <p><b>RFID in BioMed II</b></p> <p><b>High-Frequency RFID Tag Survivability in Harsh Environments</b>          Alfonso Gutierrez<sup>1</sup>, Clive Hohberger<sup>2</sup>, F. Daniel Nicolalde<sup>1</sup>, Atul Ingle<sup>1</sup>, William Hochschild<sup>3</sup>, Rodeina Davis<sup>2</sup>, Raj Veeramani<sup>1</sup>  <sup>1</sup> University of Wisconsin – Madison, US  <sup>2</sup> Blood Center of Wisconsin, US  <sup>3</sup> University of Wisconsin – Madison &amp; Generac Power Systems, US</p> <p><b>Sensors</b></p> <p><b>An Analytical Model for Electromagnetically Coupled UHF RFID Sensor Tags</b>          Jinlan Gao, Johan Sidén, Hans-Erik Nilsson          Mid-Sweden University, SE</p> <p><b>Hybrid Analog-Digital Backscatter: A New Approach for Battery-Free Sensing</b>          Vamsi Talla, Joshua R. Smith          University of Washington, US</p> <p><b>A Novel EM Barcode for Humidity Sensing</b>          Emran Amin<sup>1</sup>, Md. Shakil Bhuiyan<sup>1</sup>, Bjorn Winther-Jensen<sup>2</sup>, Nemai Karmakar<sup>1</sup>  <sup>1</sup> Monash University, AU  <sup>2</sup> Monash University, US</p> <p><b>Session Chair:</b> Leena Ukkonen, Tampere University of Technology, FI</p>	<p>Session 2B</p> <p style="text-align: right;">S331 B</p> <p><b>Antennas and Propagation II</b></p> <p><b>A UHF RFID Antenna for a Wireless Sensor Platform with a Near-Isotropic Radiation Pattern</b>          Layne Berge, Michael Reich          North Dakota State University, US</p> <p><b>Localization</b></p> <p><b>An Active Position Sensing Tag for Sports Visualization in American Football</b>          Darmindra D. Arumugam<sup>1</sup>, Michael Sibley<sup>2</sup>, Joshua D. Griffin<sup>3</sup>, Daniel Stancil<sup>4</sup>, David Ricketts<sup>5</sup>  <sup>1</sup> Jet Propulsion Laboratory, California Institute of Technology, US  <sup>2</sup> Tait Towers, US  <sup>3</sup> Disney Research Pittsburgh, US  <sup>4</sup> North Carolina State University, US  <sup>5</sup> Carnegie Mellon University, US</p> <p><b>Inverse SAR Approach for Localization of Moving RFID Tags</b>          Andreas Parr, Robert Miesen, Martin Vossiek          University of Erlangen-Nuremberg, DE</p> <p><b>A battery-free RFID-based indoor acoustic localization platform</b>          Yi Zhao, Joshua R. Smith          University of Washington, US</p> <p><b>Session Chair:</b> Jukka Voutilainen, Voyantic, FI</p>
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14:30 - 15:00 **BREAK** S331 A-B-C-D Hallway

15:00 - 17:00 **POSTER AND DEMO SESSION** S331 C-D

See conference program for a list of poster titles, authors and affiliations, and summaries  
**Session Chair:** Miguel Pardal, IST – Technical University of Lisbon, PT

17:00 - 18:30 **Student Competition** S330 E

**Rectenna Shootout!**  
 See conference program for details

18:45 - 21:00 **IEEE RFID 2013 Networking Dinner** Bahama Breeze  
 Meet in Hilton Lobby for bus pickup

# IEEE RFID 2013 Program Brief – Thursday, May 2 (Morning)

7:30 - 8:00 **MORNING COFFEE** S331 A-B-C-D Hallway

8:00 - 8:30 **SPEAKER BRIEFING** S331 A

8:30 – 9:45 **PLENARY** S331 E-F-G

<b>Welcome</b>	<b>Matthew Reynolds</b> , General Chair, IEEE RFID 2013
<b>CRFID Update</b>	<b>William Lumpkins</b> , Chair, IEEE Technical Committee on RFID (CRFID)
<b>Best Poster Award</b>	<b>Miguel Pardal</b> , Poster Session Chair

9:45 - 10:00 **BREAK** S331 A-B-C-D Hallway

10:00 – 11:30 **TECHNICAL SESSIONS**

Session 3A S331 A	Session 3B S331 B
<p><b>Circuits, Devices and Interrogators I</b></p> <p><b>A Passive UHF-RFID Tag with Inkjet-Printed Electrochromic Paper Display</b> Jue Shen<sup>1</sup>, Li Xie<sup>1</sup>, Jia Mao<sup>1</sup>, Lirong Zheng<sup>2</sup> <sup>1</sup>KTH Royal Institute of Technology, SE <sup>2</sup>Fudan University, CN</p> <p><b>Modulation and Sensitivity Limits for Backscatter Receivers</b> Gregory Durgin, Christopher Valenta, Muhammad Akbar, Marcin Morys, Blake Marshall, Yanpao Lu Georgia Institute of Technology, US</p> <p><b>Bulk Acoustic Wave True Time Delay for UWB Passive Backscatter RFID</b> Ryan Westafer, Kyle Davis, James Maloney, William Hunt Georgia Tech Research Institute, US</p> <p><b>Passive UHF RFID Interrogation System Using Wireless RFID Repeater Nodes</b> Sithamparanathan Sabesan, Michael J. Crisp, Richard Penty, Ian White University of Cambridge (GB)</p> <p><b>Session Chair:</b> Stewart Thomas, Duke University, US</p>	<p><b>Protocols and Security I</b></p> <p><b>On Security with the New Gen2 RFID Security Framework</b> Daniel W. Engels<sup>1</sup>, You Sung Kang<sup>2</sup>, Junyu Wang<sup>3</sup> <sup>1</sup>Southern Methodist University, US <sup>2</sup>ETRI, KR <sup>3</sup>Fudan University, CN</p> <p><b>LLCPS and SIS0: A TLS-Based Framework with RFID for NFC P2P Retail Transaction Processing</b> Pascal Urien<sup>1</sup>, Selwyn PIRAMUTHU<sup>2</sup> <sup>1</sup>Télécom ParisTech, FR <sup>2</sup>University of Florida, US</p> <p><b>Nested Error Correcting Code Based Highly Reliable Data Reading for UHF RFID</b> Yong Yuan<sup>1</sup>, Dan Yu<sup>2</sup> <sup>1</sup>Siemens, CN <sup>2</sup>Siemens AG, DE</p> <p><b>Cloud-based RFID Authentication</b> Wei Xie<sup>1</sup>, Lei Xie<sup>2</sup>, Chen Zhang<sup>1</sup>, Quan Zhang<sup>1</sup>, Chaojing Tang<sup>1</sup> <sup>1</sup>National University of Defense Technology, CN <sup>2</sup>Nanjing University, CN</p> <p><b>Session Chair:</b> Yuki Sato, Keio University, JP</p>

11:30 - 13:00 **LUNCH** Exhibit Hall

# IEEE RFID 2013 Program Brief – Thursday, May 2 (Afternoon)

13:00 – 14:30

## TECHNICAL SESSIONS

<p>Session 4A <span style="float: right;">S331 A</span></p> <p><b>Circuits, Devices and Interrogators II</b></p> <p><b>Design and Realization of Stretchable Sewn Chipless RFID Tags and Sensors for Wearable Applications</b>          Arnaud Vena<sup>1</sup>, Elham Moradi<sup>1</sup>, Karoliina Koski<sup>1</sup>, Abdul Ali Babar<sup>2</sup>, Lauri Tapio Sydänheimo<sup>1</sup>, Leena Ukkonen<sup>1</sup>, Manos M. Tentzeris<sup>3</sup>  <sup>1</sup>Tampere University of Technology, FI  <sup>2</sup>Tampere University of Technology, Rauma Research Unit, FI  <sup>3</sup>Georgia Institute of Technology, US</p> <p><b>Applications and Software</b></p> <p><b>A Network Architecture for Fast Retrieval of User Memory Data from sensor RF tags</b>          Yuki Igarashi, Keita Miyazaki, Yuki Sato, Jin Mitsugi          Keio University, JP</p> <p><b>Sensor Enabled Wearable RFID Technology for Mitigating the Risk of Falls Near Beds</b>          Roberto Luis Shinmoto Torres<sup>1</sup>, Qinfen Shi<sup>1</sup>, Alanson Sample<sup>2</sup>, Damith C. Ranasinghe<sup>1</sup>  <sup>1</sup>The University of Adelaide, AU  <sup>2</sup>Intel Labs, US</p> <p><b>Expressive RFID Data Access Policies for the Pharmaceuticals Supply Chain</b>          Miguel L. Pardal<sup>1</sup>, Mark Harrison<sup>2</sup>, Sanjay Sarma<sup>3</sup>, José Alves Marques<sup>1</sup>  <sup>1</sup>IST – Technical University of Lisbon, PT  <sup>2</sup>Cambridge University, GB  <sup>3</sup>MIT Auto-ID Center, US</p> <p><b>Session Chair:</b> Joshua Griffin, Disney Research, US</p>	<p>Session 4B <span style="float: right;">S331 B</span></p> <p><b>Protocols and Security II</b></p> <p><b>Minimum Energy Source Coding for Asymmetric Modulation with Application to RFID</b>          Farzad Hessar, Sumit Roy          University of Washington, US</p> <p><b>A Novel Paradigm to Exchange Data in RFID Piconets</b>          Ivan Farris, Antonio Iera, Silverio Carlo Spinella          University Mediterranea of Reggio Calabria, IT</p> <p><b>Hybrid ARQ Improvements for RFID Systems</b>          Colby Boyer, Sumit Roy          University of Washington, US</p> <p><b>Next-Generation Physical Layer I</b></p> <p><b>Rich-Media Tags: Battery-Free Wireless Multichannel Digital Audio and Image Transmission with UHF RFID Techniques</b>          Stewart Thomas<sup>1</sup>, Travis Deyle<sup>2</sup>, Reid Harrison<sup>3</sup>, Matthew Reynolds<sup>1</sup>  <sup>1</sup>Duke University, US  <sup>2</sup>Georgia Institute of Technology, US  <sup>3</sup>Intan Technologies LLC, US</p> <p><b>Session Chair:</b> Daniel Arnitz, Duke University, US</p>
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14:30 – 14:45

## BREAK

S331 A-B-C-D Hallway

14:45 – 16:15

## TECHNICAL SESSIONS

<p>Session 5A <span style="float: right;">S331 A</span></p> <p><b>Power Harvesting</b></p> <p><b>Rectenna Performance Under Power-Optimized Waveform Excitation</b>          Christopher Valenta, Gregory Durgin          Georgia Institute of Technology, US</p> <p><b>Wireless Power Transfer Optimization for Nonlinear Passive Backscatter Devices</b>          Daniel Arnitz, Matthew Reynolds          Duke University, US</p> <p><b>Session Chair:</b> Rich Fletcher, Tagsense, US</p>	<p>Session 5B <span style="float: right;">S 331B</span></p> <p><b>Next-Generation Physical Layer II</b></p> <p><b>Precise Ranging and Simultaneous High Speed Data Transfer Using Active mm-Wave Backscatter Tags</b>          Christian Carlowitz<sup>1</sup>, Axel Strobel<sup>2</sup>, Frank Ellinger<sup>2</sup>, Martin Vossiek<sup>1</sup>  <sup>1</sup>University of Erlangen-Nuremberg, DE  <sup>2</sup>Technische Universität Dresden, DE</p> <p><b>THID, the Next Step of Chipless RFID</b>          Etienne Perret<sup>1</sup>, Maher Hamdi<sup>2</sup>, Guy Eymin Petot Tourtollet<sup>3</sup>, Raji Nair<sup>4</sup>, Frederic Garet<sup>2</sup>, Anastasia Delattre<sup>5</sup>, Arnaud Vena<sup>6</sup>, Lionel Duvillearet<sup>7</sup>, Phillippe Martinez<sup>5</sup>, Smail Tedjini<sup>1</sup>, Yann Boutant<sup>8</sup>  <sup>1</sup>Grenoble-inp, FR  <sup>2</sup>University of Savoy, FR  <sup>3</sup>Centre Technique du Papier, FR  <sup>4</sup>Grenoble-INP/LCIS, FR  <sup>5</sup>CTP Grenoble, FR  <sup>6</sup>Tampere University of Technology, FI  <sup>7</sup>KAPTEOS, FR  <sup>8</sup>Signoptic, FR</p> <p><b>Session Chair:</b> Gisele Bennett, Georgia Tech Research Institute, US</p>
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16:15

CONFERENCE ENDS