IEEE
Wireless Power Transfer Conference 2014
May 8 ~ 9, 2014
Ramada Plaza Jeju Hotel, Jeju, Korea

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Wireless power transfer technology is becoming one of the most emerging and promising technology with most highly expected market impacts in mobile and automotive industries. It can be widely applied to commercial products including wireless charging for smart phone, note PC, home appliance, automotive vehicle, and implanted medical device. It will enable us to be free from inconvenient wiring and charging overheads in battery-based operating systems.

In order to provide a platform to share the research activities and visions as well as to build friendship among the colleagues in the wireless power transfer technology, we are organizing IEEE Wireless Power Transfer Conference (WPTC 2014) 2014, in Jeju Island, Korea from May 8th to 9th. By the great supports and dedications of the TPC, organizing committee, and international advisory board members, we have about 80 outstanding presentations from 19 different countries from all over the world.

May in Jeju Island is the most beautiful season in a year with lovely flowers, great atmosphere, and warm weather. Please join us to enjoy the technical sessions and meetings, as well as the delicious foods. I am looking forward to meeting you soon at the IEEE Wireless Power Transfer Conference (WPTC 2014) 2014.

Joungho Kim (KAIST)
Conference Chair, WPTC 2014
On behalf of Technical Program Committee (TPC), I am very pleased to welcome you to the 2nd IEEE MTT-S Wireless Power Transfer Conference (WPTC) 2014.

The TPC received 103 technical papers from 19 countries, and they are reviewed by qualified professionals. The final decisions regarding the technical papers and program were made at a TPC meeting held in Daejeon last February. Paper submissions for the WPTC 2014 covered a wide range of hot topics related with the wireless power transfer (WPT) and energy harvesting technologies. Strictly chosen papers on Automotive Applications, Microwave-based WPT, Mobile Applications, Circuits & Devices, System Design, and Resonating Coils will be presented.

In IEEE WPTC 2014, the TPC organized useful and helpful program for the researchers from all over the world. Especially, the exhibition program is newly arranged along with the technical session to shorten the distance between industry and academia.

We believe that WPTC 2014 will provide you of the good opportunity to exchange ideas and to communicate each other.

Please enjoy the WPTC 2014 in beautiful Jeju Island in Korea.

Seungyoung Ahn (KAIST)
TPC Chair, WPTC 2014
# Conference Committee Members

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- Joungho Kim (KAIST)

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- Seungyoung Ahn (KAIST)

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- Hai-Young Lee (Ajou University)
- Jenshan Lin (University of Florida)
- Andrea Massa (University of Trento)
- Milos Mazanek (University of Prague)
- Junji Miyakoshi (Kyoto University)
- Amir Mortazawi (University of Michigan)
- Kenjiro Nishikawa (Kagoshima University)
- Koichi Ogawa (Toyama University)
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- Chul Hun Seo (Soongsil University)
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- Naoki Shinohara (Kyoto University)
- Luca Roselli (University of Perugia)
- Zoya Popovic (University of Colorado)
# Conference at a Glance

## May 7 (Wed), 2014
- **18:00-20:00**: Welcome Reception

## May 8 (Thu), 2014
- **08:30-09:00**: Opening
- **09:00-09:30**: Keynote Speech 1
- **09:30-10:00**: Keynote Speech 2
- **10:00-10:20**: Break (20m)
- **10:20-10:40**: Technical Session (Th1)
  - T-Th1-1
  - T-Th1-2
  - T-Th1-3
  - T-Th1-4
  - T-Th1-5
- **11:00-11:20**: Automotive Applications of Wireless Power Transfer Technology
  - T-Th1-6
- **11:20-11:40**: Break (20m)
- **12:00-13:20**: Lunch (1h 20m)
- **13:20-13:40**: Technical Session (Th2)
  - T-Th2-1
  - T-Th2-2
  - T-Th2-3
  - T-Th2-4
- **14:00-14:20**: Microwave-based Wireless Power Transfer Technology
  - T-Th2-5
- **14:20-14:40**: Break (20m)
- **14:40-15:00**: Technical Session (Th3)
  - T-Th3-1
  - T-Th3-2
  - T-Th3-3
- **15:00-15:20**: Mobile Applications of Wireless Power Transfer Technology
  - T-Th3-4
- **15:20-15:40**: Break (20m)
- **15:40-16:00**: Technical Session (Th4)
  - T-Th4-1
  - T-Th4-2
  - T-Th4-3
- **16:00-16:20**: Mobile Applications of Wireless Power Transfer Technology
  - T-Th4-4
- **16:20-16:40**: Technical Session (Th5)
  - T-Th5-1
  - T-Th5-2
  - T-Th5-3
- **16:40-17:00**: Mobile Applications of Wireless Power Transfer Technology
  - T-Th5-4
- **17:00-17:20**: Break (20m)
- **17:20-18:40**: Poster Session I
- **19:00-21:00**: Banquet

## May 9 (Fri), 2014
- **08:30-09:00**: Keynote Speech 3
- **09:00-09:30**: Keynote Speech 4
- **09:30-10:00**: Technical Session (Fr1)
  - T-Fr1-1
  - T-Fr1-2
  - T-Fr1-3
- **10:00-10:20**: Break (20m)
- **10:30-11:10**: Technical Session (Fr2)
  - T-Fr2-1
  - T-Fr2-2
  - T-Fr2-3
  - T-Fr2-4
- **11:30-11:50**: Lunch (1h 20m)
- **12:10-12:30**: Technical Session (Fr3)
  - T-Fr3-1
  - T-Fr3-2
  - T-Fr3-3
  - T-Fr3-4
  - T-Fr3-5
  - T-Fr3-6
- **13:30-13:50**: Poster Session I
- **13:50-14:10**: Technical Session (Fr4)
  - T-Fr4-1
  - T-Fr4-2
  - T-Fr4-3
  - T-Fr4-4
  - T-Fr4-5
  - T-Fr4-6
- **14:30-14:50**: Technical Session (Th4)
  - T-Th4-1
  - T-Th4-2
  - T-Th4-3
  - T-Th4-4
  - T-Th4-5
  - T-Th4-6
- **14:50-15:10**: Technical Session (Th5)
  - T-Th5-1
  - T-Th5-2
  - T-Th5-3
  - T-Th5-4
  - T-Th5-5
  - T-Th5-6
- **15:10-15:30**: Technical Session (Fr5)
  - T-Fr5-1
  - T-Fr5-2
  - T-Fr5-3
  - T-Fr5-4
  - T-Fr5-5
  - T-Fr5-6
- **15:50-16:30**: Technical Session (Fr6)
  - T-Fr6-1
  - T-Fr6-2
  - T-Fr6-3
  - T-Fr6-4
  - T-Fr6-5
  - T-Fr6-6
- **16:30-16:50**: Technical Session (Fr7)
  - T-Fr7-1
  - T-Fr7-2
  - T-Fr7-3
  - T-Fr7-4
  - T-Fr7-5
  - T-Fr7-6
- **17:10-17:30**: Technical Session (Fr8)
  - T-Fr8-1
  - T-Fr8-2
  - T-Fr8-3
  - T-Fr8-4
  - T-Fr8-5
  - T-Fr8-6
- **17:30-17:50**: Technical Session (Fr9)
  - T-Fr9-1
  - T-Fr9-2
  - T-Fr9-3
  - T-Fr9-4
  - T-Fr9-5
  - T-Fr9-6
- **18:00-18:20**: Technical Session (Fr10)
  - T-Fr10-1
  - T-Fr10-2
  - T-Fr10-3
  - T-Fr10-4
  - T-Fr10-5
  - T-Fr10-6
- **18:20-18:40**: Technical Session (Fr11)
  - T-Fr11-1
  - T-Fr11-2
  - T-Fr11-3
  - T-Fr11-4
  - T-Fr11-5
  - T-Fr11-6
- **18:40-19:00**: Technical Session (Fr12)
  - T-Fr12-1
  - T-Fr12-2
  - T-Fr12-3
  - T-Fr12-4
  - T-Fr12-5
  - T-Fr12-6
- **19:00-20:00**: Closing Remark
  - International Advisory Committee Meeting (Mara Hall 2F)
Keynote Speech 1

KAIST On-line Electric Vehicle (OLEV) Wireless Charging Technology for Transportation Systems
Ramada Ballroom 1, 09:00 ~ 09:30 May 8 (Thu), 2014
Speaker : Prof. Dong-Ho Cho, KAIST, Korea
Session Chair: Prof. In Gwun Jang, KAIST, Korea

Abstract

In the keynote speech, first of all, OLEV project overview including motivation, necessity, problem solving strategy and project progress history are introduced. Also, shaped magnetic field in resonance (SMFIR) technology which is core technology shaping magnetic fluxes in resonance by using core structures is explained. Then, the basic structures of 20kHz or 60kHz resonant power line and pickup module are suggested. Moreover, bus application of SMFIR technology is presented in view of concept, configuration and operation principle. And, train application of SMFIR technology is explained with respect to concept, necessity, and wireless charging for tram and high speed train. In addition, commercialization of OLEV systems in Seoul Grand Park, KAIST campus and Gumi urban city is introduced. Finally, business competition analysis and application areas of SMFIR technology are illustrated.

Biography

Dong-Ho Cho, PhD, received the B.S. degree in electrical engineering from Seoul National University, Seoul, Korea, in 1979 and the M.S. and Ph.D. degrees in electrical engineering from the Korea Advanced Institute of Science and Technology (KAIST), Korea, in 1981 and 1985, respectively. From 1987 to 1997, he was a Professor in the Department of Computer Engineering at Kyunghee University, Korea. Since 1998, he has been a Professor in the Department of Electrical Engineering of KAIST, and he was a Director of KAIST Institute for Information Technology Convergence from 2007 to 2011. He has been a director of KAIST Online Electric Vehicle Project since 2009 and he is serving as a head of The Cho Chun Shik Graduate School for Green Transportation since 2010. He was also an ICC(IT Convergence Campus) vice president of KAIST from 2011 to 2013. His research interests include mobile communication, Online Electric Vehicle System based on Wireless Power Transfer, and bio informatics.
**Keynote Speech 2**

**Electric Road Systems for Commercial Vehicles**  
*Ramada Ballroom 1, 09:30 ~ 10:00 May 8 (Thu), 2014*  
Speaker: Dr. Håkan Gustavsson, Scania, Sweden  
Session Chair: Prof. In Gwun Jang, KAIST, Korea

**Abstract**

The challenge of the transport industry is to deliver its value sustainably – above all by decoupling transport growth from CO2 emissions. Electric power from the roadway for vehicle operations offers promising opportunities. With conductive power transfer through overhead lines or inductive power transfer from the road, heavy vehicles can be completely electrically powered on electrified road sections. Scania is therefore preparing for an electrified future, conducting extensive research and development into how electricity will be used in the trucks and buses of tomorrow and is positioned at the leading edge when it comes to research on future vehicle electrification. Dr. Gustavsson will present research results from vehicle tests using both conductive power transfer through overhead lines and inductive power transfer. He will also give an overview of the research activities within this field in Sweden where Scania is actively engaged in preparations to start full-scale demonstrations on selected electrified roads in Sweden. The aim is to open electrified segments of public roads next year.

**Biography**

Dr. Håkan Gustavsson is senior researcher and project manager within hybrid technology development at Scania. He is currently evaluating the concept of electric roads both Inductive Power Transfer and Conductive Power Transfer. He has been working with vehicle electronic systems integration and architecture since 2002. He received his B.Sc. in Electrical Engineering at the Royal Institute of Technology 2002 after completing his studies with a final year at Fachhochschule Zentral Schweiz. His research area is systems engineering of vehicle electronics. His licentiate thesis was accepted in 2008, where a method was presented on how to improve the decisions made during the early phases of E/E-system development. His PhD thesis investigates how Lean thinking can be applied to system architecting and was defended in March 2011.
Keynote Speech 3

Wireless Energy Transfer and Conversion: the Wireless Power in 21st Century
Ramada Ballroom 1, 08:30 ~ 09:00 May 9 (Fri), 2014
Speaker : Prof. Jenshan Lin, University of Florida, USA
Session Chair: Prof. Jonghoon Kim, KAIST, Korea

Abstract

In recent years, the interest in wireless power or wireless charging has been growing rapidly. Many researchers and engineers who used to work on different fields are now focusing on this topic. Because of the strong interest within the IEEE Microwave Theory and Techniques Society, the technical committee MTT-26 Wireless Energy Transfer and Conversion and the IEEE Wireless Power Transfer Conference were created to forward the growth in this area. As a result, we now see many new ideas being presented and published. In this talk, I will present an overview of wireless power technologies including far-field microwave power transmission, wireless energy harvesting, and near-field magnetic coupling. The advantages and disadvantages of different technologies as well as their applications will be discussed.

Biography

Jenshan Lin received PhD in Electrical Engineering from the University of California at Los Angeles (UCLA) in 1994. From 1994 to 2003, he worked for the AT&T/Lucent Bell Labs and its spin-off Agere Systems in New Jersey. In July 2003, he joined University of Florida, where he is now a Professor. His research interests include sensors and biomedical applications of microwave and millimeter-wave technologies, wireless energy transfer, RF system-on-chip integration, and integrated antennas. Dr. Lin has authored or co-authored over 230 technical publications in refereed journals and conference proceedings, and has graduated 17 PhD students. He holds 11 US patents. Dr. Lin is a Fellow of IEEE. He served as an elected IEEE Microwave Theory and Techniques Society (MTT-S) Administrative Committee (AdCom) member from 2006 to 2011, with the last two years serving as the Chair of Technical Coordinating Committee. He was an Associate Editor for the IEEE Transactions on Microwave Theory and Techniques 2006-2010, and is now the Transactions’ Editor-in-Chief. He has been serving on several conference steering committees and technical program committees. He was the General Chair of 2008 IEEE RFIC Symposium and the Technical Program Co-Chair of the same conference in 2006 and 2007. He was the General Co-Chair of 2012 Asia-Pacific Microwave Conference (APMC). He received 1994 UCLA Outstanding Ph.D. Award, 1997 ETA KAPPA NU Outstanding Young Electrical Engineer Honorable Mention Award, and 2007 IEEE MTT-S N. Walter Cox Award.
Keynote Speech 4

Smart Surfaces: An Example of Large Area Electronics (LAE) System Enabled by Concurrent WPT, Energy Harvesting and RFID Technologies

Ramada Ballroom 1, 09:00 ~ 09:30 May 9 (Fri), 2014
Speaker : Prof. Luca Roselli, University of Perugia, Italy
Session Chair: Prof. Jonghoon Kim, KAIST, Korea

Abstract

The presentation will deal with “Smart Surfaces”; first a brief historical introduction and an explanation of how smart surfaces can be seen as a particular evolutionary branch within the wider field of Large Area Electronics (LAE) for IoT development will be given. Then the presentation will focus on the technological implications behind Smart Surfaces and will show some proposals to cope with the most relevant challenges. Mostly three technologies will be considered and described (Wireless Power Transfer, Energy Harvesting and RFID) that, along with eco-friendly material adoption, concurrently provide solutions for Smart Surface development. Eventually some examples of Smart Surfaces (smart floors for instance) and Smart Surface elements, foreseeable at the present state of the development will be shown and discussed.

Biography

Luca Roselli graduated in electronic engineering at the University of Florence, Italy, in 1988. In 1991 he joined the University of Perugia, Italy, where he is currently teaching Applied Electronics. Since 2000 he has been coordinating the research activity of the High Frequency Electronics (HFE) Lab. He founded two spin-off companies (in 2000 and 2005); he chaired two IEEE conferences (CEM-TD 2007 and WPTC 2013).

He is currently member of several panels, committees and boards: list of experts of Italian Ministry of Research and University (MIUR), European Research Council (ERC) Panel PE7, IEEE Technical Committees MTT-24 – RFID Technologies (past chair); MTT-25 – RF nanotechnolgies; MTT-26 – Wireless Power Transfer; Sub Committee 32 – RFID of the TPRC of IEEE-IMS (past chair), Advisory Committee of IEEE-WPT Conference, Reviewing boards of several conferences (RWCOM, RFID-TA, EuCAP, MAREW, EuMC...), Reviewing boards of: Proceedings of the IEEE, IEEE–MTT, IEEE–MWCL, ACES Journal, Radioengineering Journal, Elsevier Organic Electronics, ASP Nanoscience and nanotechnology letters, Substitute Representative Member of Italy in the COST ACTION IC1301 WIPE (Wireless Power transmission for sustainable Electronics), PI of ENIAC projects EnLIGHT and IDEAS and Co-PI of ARTEMOS, and unit responsible of MIUR PRIN project GRETA.

His research interests are in the area of high frequency electronics, RFID-NFC systems, new materials for sustainable electronics and far field wireless power transfer. In these fields he published more than 220 contributions to international reviews and peer reviewed conferences, the interest in which is testified by an HF index of 20 (Scholar font) and more than 1350 citations.
Technical Session

Technical Session T-Th1 Automotive Applications of Wireless Power
Ramada Ballroom 1, 10:20-12:00
Session Chair: Chulhun Seo (Soongsil Univ., Korea) and Dongho Cho (KAIST, Korea)

10:20~10:40 | T-Th1-1
Analysis of Two-Coil Coupling Structures for WPT Charging of an Electric Vehicle
Kishore Naik Mude, Manuele Bertoluzzo, and Giuseppe Buja
University of Padova, Italy

10:40~11:00 | T-Th1-2
Electromagnetic Interference Reduction Method from Handheld Resonant Magnetic Field Charger (HH-RMFC) for Electrical Vehicle
Chiuk Song, Hongseok Kim, Eunseok Song, Yeonje Cho, Jonghoon Kim and Joungho Kim
Korea Advanced Institute of Science and Technology (KAIST), Korea

11:00~11:20 | T-Th1-3
Power Source Evaluation of a Wireless Power Transfer System
Guillaume Vigneau1,2,3, Mohamed Cheikh1, Rachid Benbouhout2, Said Bouguern1, and Alexandru Takacs2,3
1Continental Automotive SAS France, 2CNRS, France, 3Université de Toulouse, France

11:20~11:40 | T-Th1-4
Magnetic Field Emission Comparison at Different Quality Factors with Series-Series Compensation Network for Inductive Power Transfer to Vehicles
Tushar Batra and Erik Schaltz
Aalborg University, Denmark

11:40~12:00 | T-Th1-5
Magnetic Design of a Three-Phase Wireless Power Transfer System for EMF Reduction
Minho Kim, Hongseok Kim, and Seungyoung Ahn
Korea Advanced Institute of Science and Technology (KAIST), Korea

Technical Session T-Th2 Microwave-based Wireless Power Transfer
Ramada Ballroom 1, 13:20-15:20
Session Chair: Bomson Lee (Kyunghee Univ., Korea) and Shigeo Kawasaki (JAXA, Japan)

13:20~13:40 | T-Th2-1
The 20W C-Band Lightweight GaN HPA for Wireless Sensor and Power Transmission in a Spacecraft
Naoki Hasegawa1, Satoshi Yoshida2, Shigeki Furuta3, Yukio Moriguchi3, and Shigeo Kawasaki2
1Kyoto University, 2Japan Aerospace Exploration Agency, 3NEC Network and Sensor Systems, Ltd., Japan

13:40~14:00 | T-Th2-2
Harmonic Chipless Sensor Exploiting Wireless Autonomous Communication and Energy Transfer
Chiara Mariotti, Federico Alimenti, Marco Virili, Giulia Orecchini, Paolo Mezzanotte, and Luca Roselli
University of Perugia, Italy
14:00~14:20 | T-Th2-3
• Estimation of Beam Forming Accuracy for Satellite Experiment toward SPS
  Junki Yoshino, Naoki Shinohara, and Tomohiko Mitani
  Kyoto University, Japan

14:20~14:40 | T-Th2-4
• Efficient Transmitters and Receivers for High-Power Wireless Powering Systems
  Zoya Popovic, Tibault Reveyrand, Scott Schafer, Michael Litchfield, Ignacio Ramos, and Sean Korhummel
  University of Colorado, United States

14:40~15:00 | T-Th2-5
• Wireless Power Beam Device Using Microwave Power Transfer
  Toshio Ishizaki and Kenta Nishikawa
  Ryukoku University, Japan

15:00~15:20 | T-Th2-6
• Study and Development of an Intermittent Microwave Power Transmission System for a ZigBee Device
  Takuya Ichihara, Tomohiko Mitani, and Naoki Shinohara
  Kyoto University, Japan

Technical Session T-Th3 Mobile Applications of Wireless Power Transfer Technology
Ramada Ballroom 1, 15:40-17:20
Session Chair: Young Jin Park (KERI, Korea) and Heng-Ming Hsu (National Chung Hsing Univ., Taiwan)

15:40~16:00 | T-Th3-1
• Fast Charging Method for Wireless and Mobile Devices using Double-Pulse Charge Technique
  Nurcan Keskin and Huaping Liu
  Oregon State University, United States

16:00~16:20 | T-Th3-2
• Design of an Inductively Coupled Wireless Power System for Moving Receivers
  Bart Thoen, Stijn Wielandt, Jeroen De Baere, Jean-Pierre Goemaere, Lieven De Strycker, and Nobby Stevens
  KU Leuven, Belgium

16:20~16:40 | T-Th3-3
• Wireless Power Receiver for Mobile Devices Supporting Inductive and Resonant Operating Modes
  Anand Satyamoorthy¹, Patrick Riehl¹, Hasnain Akram¹, Yung-Chih Yen¹, J.-C. Yang², Brian Juan², Chi-Min Lee², and Fu-Chi Lin
  ¹MediaTek, United States, ²MediaTek, Taiwan

16:40~17:00 | T-Th3-4
• Microwave Near-Field Capacitive Coupling System for Wireless Powering Applications
  Chong-Yi Liou, Xi-Sheng Lin, Chun-Han Tai, and Shau-Gang Mao
  National Taiwan University, Taiwan

17:00~17:20 | T-Th3-5
• Free-Positioning Wireless Charging system for Hearing Aids using a Bowl-shaped Transmitting coil
  Jinwook Kim, Do-Hyeon Kim, Kwan-Ho Kim, and Young-Jin Park
  University of Science & Technology (UST) and Korea Electrotechnology Research Institute, Korea
Technical Session T-Fr1 High-power Transmitter and Receiver Circuits and Devices
Ramada Ballroom 1, 09:30-10:30
Session Chair: Kang Yoon Lee (Sungkyunkwan Univ., Korea) and Jenshan Lin (Univ. of Florida, USA)

09:30~09:50 | T-Fr1-1
• High Efficient Bridge Rectifiers in 100MHz and 2.4GHz bands
  Motoki Ito\textsuperscript{1}, Kohei Hosodani\textsuperscript{1}, Kenji Itoh\textsuperscript{1}, Shin-ichi Betsudan\textsuperscript{1}, Shigeru Makino\textsuperscript{1}, Tetsuo Hirota\textsuperscript{1}, Keisuke Noguchi\textsuperscript{1}, and Eiji Taniguchi\textsuperscript{2}
  \textsuperscript{1}Kanazawa Institute of Technology, \textsuperscript{2}Mitsubishi Electric Corporation, Japan

09:50~10:10 | T-Fr1-2
• Design of 57% Bandwidth Microwave Rectifier for Powering Application
  Defu Wang, Xuan Anh Nghiem, and Renato Negra
  RWTH Aachen University, Germany

10:10~10:30 | T-Fr1-3
• Integration of a Class-E Low dv/dt Rectifier in a Wireless Power Transfer System
  George Kkelis\textsuperscript{1}, James Lawson\textsuperscript{1}, David C. Yates\textsuperscript{1}, Manuel Pinuela\textsuperscript{2}, and Paul D. Mitcheson\textsuperscript{1}
  \textsuperscript{1}Imperial College London, \textsuperscript{2}Drayson Racing Technologies, United Kingdom

Technical Session T-Fr2 Design, Simulation, and Analysis of Wireless Power Transfer Systems
Ramada Ballroom 1, 10:50-12:10
Session Chair: In-Kui Cho (ETRI, Korea) and George Ponchak (NASA, USA)

10:50~11:10 | T-Fr2-1
• Performance Evaluation of Multilevel ASK Communication for a Multi-hop Wireless Resonance System
  Ryosuke Kobayashi, Yoshiaki Narusue, Wei Wei, Yoshihiro Kawahara, and Tohru Asami
  The University of Tokyo, Japan

11:10~11:30 | T-Fr2-2
• A Software-based Wireless Power Transfer Platform for Power Control Experimentation
  Sun-han Hwang, Yong-ho Son, and Byung-jun Jang
  Korea Communications Agency, Korea

11:30~11:50 | T-Fr2-3
• Optimal Load Analysis for a Two-Receiver Wireless Power Transfer System
  Tong Zhang, Minfan Fu, Chengbin Ma, and Xinen Zhu
  Shanghai Jiao Tong University, China

11:50~12:10 | T-Fr2-4
• Development of the Optimization Framework for Wireless Power Transfer Systems
  Seung Beop Lee, Seungyoung Ahn, and In Gwun Jang
  Korea Advanced Institute of Science and Technology (KAIST), Korea
13:30~13:50 | T-Fr3-1
• Experimental Investigation of 3D Metamaterial for Mid-range Wireless Power Transfer
A.L.A.K. Ranaweera, Thuc Phi Duong, Byoung-Suk Lee, and Jong-Wook Lee
Kyuunghee University, Korea

13:50~14:10 | T-Fr3-2
• Lightweight Coil for Efficient Wireless Power Transfer
S. Prengel, M. Helwig, and N. Modler
Technische Universität Dresden, Germany

14:10~14:30 | T-Fr3-3
• The Feasibility of Using Resonant Inductive Power Transfer to Recharge Wireless Sensor Network Nodes
Gerhard P Hancke and Nicolaas A Vorster
University of Pretoria, South Africa

14:30~14:50 | T-Fr3-4
• Choice of Resonators for a WPT System in Lossy Materials
Ikuo Awai¹, Yuichi Sawahara², and Toshio Ishizaki²
¹Ryutech Corporation, Japan, ²Ryukoku Univ., Japan

14:50~15:10 | T-Fr3-5
• A New Configuration of Coil Antennas for Efficient Wireless Power Transmission Systems Compatible with Different Loads
Shi Pu¹,², Hon Tat Hui², Cheng-Guo Liu¹, and Zhi-Peng Wu¹,³
¹Wuhan University of Technology, China, ²National University of Singapore, Singapore, ³The University of Manchester, United Kingdom

15:10~15:30 | T-Fr3-6
• Application of a Novel Disk Repeater
Ikuo Awai¹, Yuya Ikuta², Yuichi Sawahara², Yangjun Thang², and Toshio Ishizaki²
¹Ryutech Corporation, ²Ryukoku University, Japan

16:30~16:50 | T-Fr4-1
• Behavior of Resonant Electrical Coupling in Terms of Range and Relative Orientation
Ricardo Dias Fernandes, Joao Nuno Matos, and Nuno Borges Carvalho
Instituto de Telecomunicacoes, Portugal

16:50~17:10 | T-Fr4-2
• Capacitor Connected Grids for Wireless Power Transfer
Yue Li and Christopher J. Stevens
University of Oxford, United Kingdom
17:10~17:30 | T-Fr4-3
• Spatial Visualization of Inductive Coupling Parameter for Optimization of Wireless Power Transfer Coils
  Sangyeong Jeong¹, Seungyoung Ahn², and Jingook Kim¹,
  ¹Ulsan National Institute of Science and Technology, ²Korea Advanced Institute of Science and Technology (KAIST), Korea

17:30~17:50 | T-Fr4-4
• Study on a Purely Electric-field Coupled Resonator for WPT Systems
  Yuichi Sawahara¹, Toshio Ishizaki¹, and Ikuo Awai²
  ¹Ryukoku University, Japan, ²Ryutech Corporation, Japan

17:50~18:10 | T-Fr4-5
• Wireless Power Transfer System Applied to an Active Implantable Medical Device
  Tommaso Campi¹, Silvano Cruciani¹, Mauro Feliziani¹, and Akimasa Hirata²
  ¹University of L'Aquila, Italy, ²Nagoya Institute of Technology, Japan

18:10~18:30 | T-Fr4-6
• Electromagnetic Radiated Emissions from a Repeating-Coil Wireless Power Transfer System using a Resonant Magnetic Field Coupling
  Sunkyu Kong, Bumhee Bae, Jonghoon J. Kim, Sukjin Kim, Daniel H. Jung, and Joungho Kim
  Korea Advanced Institute of Science and Technology (KAIST), Korea
P-Th-1
Mobile Wireless Power Transfer System for Electric Vehicles
Toshio Ishizaki, Genta Kitano, and Keisuke Mikami
Ryukoku University, Japan

P-Th-2
Study on Direction Detection in a Microwave Power Transmission System for a Mars Observation Airplane
Masashi Iwashimizu¹, Tomohiko Mitani¹, Naoki Shinohara¹, Gaku Sasaki², Kei Hiraoka², Koyo Matsuzaki², and Koichi Yonemoto²
¹Kyoto University, ²Kyushu Institute of Technology, Japan

P-Th-3
Study on Microwave Power Transfer to Sensors in Car Engine Compartment
Hiroaki Goto¹, Naoki Shinohara¹, Tomohiko Mitani¹, Hiroyuki Dosho², and Mitsuhiro Mizuno²
¹Kyoto University, ²Denso, Japan

P-Th-4
A Design of Wide Input Range, High Efficiency Rectifier for Mobile Wireless Charging Receiver
Ji-Hun Kang, Hyung-Gu Park, Jae-Hyeong Jang, and Kang-Yoon Lee
Sungkyunkwan University, Korea

P-Th-5
Optimization of the wireless power transfer system in an electric railway
Seung Beop Lee¹, Seungyoung Ahn¹, Jun Ho Lee², and In Gwun Jang¹
¹Korea Advanced Institute of Science and Technology (KAIST), ²Korea Railroad Research Institute, Korea

P-Th-6
Wireless Power Transfer Techniques for Cell Balancing of Battery Management Systems
Heecheol Yang and Jungwoo Lee
Seoul National University, Korea

P-Th-7
A Proposal on Wireless Power Transfer for Medical Implantable Applications Based on Reviews
Je-Dok Kim, Chuanbowen Sun, and In-Soo Suh
Korea Advanced Institute of Science and Technology (KAIST), Korea

P-Th-8
Subsystem-Level Efficiency Analysis of a Wireless Power Transfer System
Minfan Fu, Tong Zhang, Chengbin Ma, and Xinen Zhu
Shanghai Jiao Tong University, China

P-Th-9
Wireless Power Transfer System Suitable for Wristwatch Type Equipment
Dong-Su Lee¹, Dong-Nam Lim¹, Seong-Geub Jeon¹, and Kwang Seob Lee²
¹Pukyong National University, ²Hanla IMS, Korea
P-Th-10
- Reductions in Power Noise and System Area Burden using Wireless Power Transfer Scheme in 3D Package
Eunseok Song, Hongseok Kim, Jonghoon J. Kim, Chiuk Song, Hyunsuk Lee, and Joungho Kim
Korea Advanced Institute of Science and Technology (KAIST), Korea

P-Th-11
- Design and Performance of Wireless Power Transfer with High Temperature Superconducting Resonance Antenna
Yoon Do Chung1, Dae Wook Kim2, and Seong Woo Yim3
1Suwon Science College, 2Yonsei University, 3Korea Electric Power Corporation Research Institute, Korea

P-Th-12
- Contactless Power and Data Transfer for Variable Distributed Loads
Andreas Fuchs and Hans-Peter Schmidt
Technical University of Applied Sciences, Germany

P-Th-13
- An Analysis on Power Variance of SMFIR Structure
Hyung-Wook Shim, Jong-Woo Kim, and Dong-Ho Cho
Korea Advanced Institute of Science and Technology (KAIST), Korea

P-Th-14
- System Level Power Control Algorithm in Wireless Power Transmission for Reducing EMF
Electronics and Telecommunication Research Institute, Korea

P-Th-15
- Improve the Efficiency-Load Characteristic of Rectifying Circuit Using a Self-Powered DC-DC Converter
Yong Huang, Naoki Shinohara, and Tomohiko Mitani
Kyoto University, Japan

P-Th-16
- Implementation of V-band Power Amplifier with High Linearity in 90nm CMOS Technology
Heng-Ming Hsu, and Meng-Syun Chen
National Chung-Hsing University, Taiwan

P-Th-17
- High efficiency GaN Class E Power Amplifier at 5.8GHz with Harmonic Control Network
Wenli Fu, Shiwei Dong, Chaoyue Yang, Ying Wang, and Yazhou Dong
China Academy of Space Technology, China

P-Th-18
- Performance of 5.8-GHz Multi-Polarization Rectenna for Linearly/Circularly Polarized Wave Reception
Ryuichi Nakashima, Eisuhe Nishiyama, and Ichihiko Toyoda
Saga University, Japan

P-Th-19
- Optimization of a 5.8-GHz Rectifier Considering Ripple Amplitude and Dc-voltage Pattern
Hyunwook Lee and Jong-Chul Lee
Kwangwoon University, Korea

P-Th-20
- Numerical Analysis of Human Exposure to Electromagnetic Fields from Wireless Power Transfer Systems
Seon-eui Hong1, In-Kui Cho1, Hyung-Do Choi1, and Jeong-Ki Pack2
1Electronics and Telecommunications Research Institute, 2Chungnam National University, Korea
P-Fr-1
• Design of a Novel Resonant Reactive Shield for Wireless Charging System in Electric Vehicle
  Hwansoo Moon¹, Seungyoung Ahn¹, and Yangbae Chun²
  ¹Korea Advanced Institute of Science and Technology (KAIST), ²Dongwon OLEV, Korea

P-Fr-2
• Multi-Band Design of Matched Wireless Power Transfer Links
  Marco Dionigi, Mauro Mongiardo, and Luca Roselli
  University of Perugia, Italy

P-Fr-3
• Angular Expression of Maximum Power Transfer Efficiency in Reciprocal Two-Port Systems
  Takashi Ohira
  Toyohashi University of Technology, Japan

P-Fr-4
• Analysis of Magnetically Coupled Wireless Power Transfer between Two Resonators Based on Power
  Conservation
  Gunyoung Kim and Bomson Lee
  Kyunghee University, Korea

P-Fr-5
• A Novel Shielding Coil for Electromagnetic Field (EMF) Reduction of Wireless Power Transfer in Laptop
  Computer
  Jaehyoung Park¹, Seungyoung Ahn²
  ¹Ajou University, ²Korea Advanced Institute of Science and Technology (KAIST), Korea

P-Fr-6
• Analysis and Performance Improvement of Independent Electric Coupled Resonance WPT System with
  Impedance Transformer
  Cheng Yang and Koichi Tsunekawa
  Chubu University, Japan

P-Fr-7
• Study of Wireless Power Systems with Two-Dimensionally Moving Receivers
  Stijn Wielandt, Jean-Pierre Goemaere, Lieven De Strycker, and Nobby Stevens
  KU Leuven, Belgium

P-Fr-8
• Investigation of Near-Field Wireless Energy Transfer for Through Metal-Wall Applications
  Sai Kiran Oruganti and Franklin Bien
  Ulsan National Institute of Science and Technology, Korea

P-Fr-9
• Modeling Method of Coil Module for Wireless Power Transfer System by Two-port S-parameter
  Measurement in Frequency Domain
  Justine Jihyun Kim¹ and Jonghoon Kim²
  ¹Duke University, United States, ²Korea Advanced Institute of Science and Technology (KAIST), Korea
P-Fr-10
• Analysis on Number and Adaptive Ranges of Resonators for Efficient Resonant Coupling Wireless Power Transmission
Ching-Wen Yang and Chin-Lung Yang
National Cheng Kung University, Taiwan

P-Fr-11
• Power Transfer via Magnetic Resonant Coupling for Implantable Mice Telemetry Devices
Basem M. Badr, Robert Somogyi-Gsizmazia, Nikolai Dechev, and Kerry R. Delaney
University of Victoria, Canada

P-Fr-12
• Investigation of Dual-band Coil Module for Near-Field Wireless Power Transfer Systems
Ming-Lung Kung and Ken-Huang Lin
National Sun Yat-sen University, Taiwan

P-Fr-13
• Polarization Modulation RF Power Transport for Sensor Network
Soo-Ji Lee, Dong-Jin Lee, In-June, Hwang, Duk-Soo Kwon, and Jong-won Yu
Korea Advanced Institute of Science and Technology (KAIST), Korea

P-Fr-14
• Modeling of Electromagnetic Interference Shielding Materials in Wireless Power Transfer for Board-to-Board Level Interconnections
Sukjin Kim, Daniel H. Jung, Jonghoon J. Kim, Bumhee Bae, Sunkyu Kong, and Joungho Kim
Korea Advanced Institute of Science and Technology (KAIST), Korea

P-Fr-15
• A New Design of Wireless Power Transfer System Using Helical Resonators Applicable to Multi-Channel Power Transmission
Young-do Kim, Hee-Jin Lee, Jin-Young Bang, and Chin-Wook Chung
Hanyang University, Korea

P-Fr-16
• Optimization of Geometric Parameters for Circular Loop Antenna in Magnetic Coupled Wireless Power Transfer
Hyo-Jin Choi¹, Sangbin Lee¹, and Cheolung Cha²
¹Korea University, ²Korea Electronics Technology Institute, Korea

P-Fr-17
• High Q Inductor Design Using Modified Magnetic Substrate Structure
Chia-Chu Wu, Hung-Wei Chiu, Da-Sheng Lee, Min-Hsiang Chang, Chien-Chi Lu, and Chao-Ning Chang
National Taipei University of Technology, Taiwan

P-Fr-18
• Efficiency Enhancement using Beam Forming Array Antenna for Microwave-based Wireless Energy Transfer
Jin-Hyoun Kim¹, Hyon-Youn Yu¹, and Cheolung Cha²
¹Korea University, ²Korea Electronics Technology Institute, Korea
Ramada Plaza Jeju
Website : http://www.ramadajeju.co.kr/
Address : 1255 Samdo 2-dong, Jeju City, Jeju-do, Korea
Tel : 82-64-729-8100, Fax : 82-64-729-8554

The Ramada Plaza Jeju Hotel was established on July 1, 2003. This internationally renowned deluxe resort-style business hotel was opened to raise management and its accommodation facilities to world class standards. The hotel is located within five minutes ride from both Jeju harbor and Jeju international airport. It can be reached within an hour wherever you are on the Jeju Island. Visitors from home and abroad can experience the essence of Jeju culture enjoying the nearby spectacles of Chilsung-Ro street, Tap-dong outdoor performance hall, Sanjicheon, Yongduam, and Yongyeon bridge especially during the night time.

Transportation : Shuttle Bus

During the Conference, free shuttle bus services will be provided for participants to commute between the Jeju Airport and Ramada Plaza Jeju Hotel (Conference Venue.)

*Required time : 10~15 min

Shuttle Bus Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
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<tbody>
<tr>
<td>5.7(Wed)</td>
<td>14:00</td>
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<tr>
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<td></td>
<td>17:00</td>
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<tr>
<td></td>
<td>09:00</td>
</tr>
<tr>
<td>5.8(Thu)</td>
<td>18:20</td>
</tr>
<tr>
<td></td>
<td>19:00</td>
</tr>
<tr>
<td>5.9(Fri)</td>
<td>10:00</td>
</tr>
<tr>
<td>5.10(Sat)</td>
<td></td>
</tr>
</tbody>
</table>
Venue Plans

Ramada Hotel, 1<sup>st</sup> Floor

Ramada Hotel, 2<sup>nd</sup> Floor

Ramada Hotel, 2<sup>nd</sup> Floor
Hotels & Rates

As all rooms will be booked on a first come, first served basis, once the room blocks at these hotels have been filled, we may not be able to secure further rooms with the hotels at the special rates quoted. Therefore, early reservation through the online procedure is highly recommended.

For further enquiries of hotel reservation, please contact to WPTC 2014 Secretariat: Sejong Convention Services Ltd.
E-mail: secretariat@wptc2014.org

### Ramada Plaza Jeju Hotel ★★★★★ (Main Hotel) [https://www.ramadajeju.co.kr/index.asp](https://www.ramadajeju.co.kr/index.asp)
Tel: +82-64-729-8100

<table>
<thead>
<tr>
<th>Hotel</th>
<th>Room Type</th>
<th>Special Rate (KRW)</th>
<th>Breakfast (KRW)</th>
<th>Distance From Venue</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Weekdays</td>
<td>Weekend</td>
<td></td>
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<tr>
<td></td>
<td>Superior (Mountain View)</td>
<td>Double</td>
<td>140,000</td>
<td>170,000</td>
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<td></td>
<td></td>
<td>Twin</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Deluxe (Ocean View)</td>
<td>Double</td>
<td>160,000</td>
<td>190,000</td>
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<td></td>
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</tr>
</tbody>
</table>

### Jeju Oriental Hotel ★★★★★ (Sub Hotel) [http://english.oriental.co.kr](http://english.oriental.co.kr)
Tel: +82-64-752-8222

<table>
<thead>
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<th>Hotel</th>
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<td>Weekdays</td>
<td>Weekend</td>
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<tr>
<td></td>
<td>Superior</td>
<td>Double</td>
<td>110,000</td>
<td>140,000</td>
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<td></td>
<td>Twin</td>
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</tbody>
</table>

### Ocean Suites Hotel ★★★★★ (Sub Hotel) [http://www.oceansuites.kr/eng](http://www.oceansuites.kr/eng)
Tel: +82-64-720-6000

<table>
<thead>
<tr>
<th>Hotel</th>
<th>Room Type</th>
<th>Special Rate (KRW)</th>
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<td>140,000</td>
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<td>Twin</td>
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</tr>
</tbody>
</table>
Jeju Palace Hotel ★★★★★ (Sub Hotel) [http://www.cjpalace.co.kr/](http://www.cjpalace.co.kr/)
Tel: +82-64-753-8811

<table>
<thead>
<tr>
<th>Hotel</th>
<th>Room Type</th>
<th>Special Rate (KRW)</th>
<th>Breakfast (KRW)</th>
<th>Distance From Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Twin</td>
<td>Twin</td>
<td>80,000</td>
<td>10,000</td>
</tr>
</tbody>
</table>

- **Weekdays:** Sunday, Monday, Tuesday, Wednesday, Thursday
- **Weekend:** May 2, 3, 4, 5, 6, 9, 10, 2014 (Friday, Saturday, and National Holiday)

- All room rates above are per room per night and do not include breakfasts.
- 10% service charges and 10% taxes are included in the room rates.
- Please note that all room rates are fixed in Korean Won (KRW).
- In case of payment by credit card, it will not be charged until Check-out.
- To secure your reservation, your credit card information (card number, expiry date, card holder’s name) is required.

### Cancellation Policy

<table>
<thead>
<tr>
<th>Cancellation Condition</th>
<th>Penalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 days before check-in</td>
<td>50% of one night will be charged</td>
</tr>
<tr>
<td>1 day before check-in</td>
<td>70% of one night will be charged</td>
</tr>
<tr>
<td>On check-in date</td>
<td>100% of one night will be charged</td>
</tr>
<tr>
<td>No-Show</td>
<td>100% of one night will be charged</td>
</tr>
</tbody>
</table>

- Any cancellation or charge must be received and confirmed by the Conference Secretariat in official written notice via letter, fax or e-mail.
- Please let Secretariat know cancellation of your hotel reservation at least three days in advance.
On-line registration is available on website. (www.wptc2014.org)
Registrations without appropriate payment will not be honored until the full payment is received.
A confirmation of registration will be sent upon full payment.

### Registration Fee

<table>
<thead>
<tr>
<th>Category</th>
<th>By Apr 11, 2014</th>
<th>After Apr 12, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IEEE Members</td>
<td>Non IEEE Members</td>
</tr>
<tr>
<td>Full Registration</td>
<td>$380 KRW 418,000</td>
<td>$440 KRW 484,000</td>
</tr>
<tr>
<td>Accompanying Person(s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional Welcome Reception</td>
<td>$70 x (   ) person(s)</td>
<td>KRW 77,000 x (   ) person(s)</td>
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<tr>
<td>Ticket</td>
<td></td>
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</tr>
<tr>
<td>Additional Banquet Ticket</td>
<td>$80 x (   ) person(s)</td>
<td>KRW 88,000 x (   ) person(s)</td>
</tr>
</tbody>
</table>

▶ **Full-Registration Fee** includes Technical Session, Proceeding USB, Final Program Book, Welcome Reception, Banquet, 2-days lunch, and Coffee Break.

▶ **Accompanying Person Fee** only includes Welcome Reception and Banquet.

### Registration Hours

Admission to all session and hosted functions requires identification.
Please wear your name badge at all times.
Registration Desk is composed Pre-Registration Desk and On-Site Registration Desk in front of Ramada Ballroom.

- Wednesday, May 7 15:00~18:00
- Thursday, May 8 08:00~18:00
- Friday, May 9 08:00~15:00

▶ **Conference Kit**

The conference kit will be served when you are registered. Please swap conference kit which contains a final program book and proceeding (USB Flash Memory). Welcome reception, Banquet and Lunch Coupon will be in the name badge.

▶ **Name Badges**

You are kindly requested to wear your name badge during all the session. Please note that admission to the all session rooms is strictly restricted to the registered participants wearing their badges. If you lose your badge, ask the registration desk for a new one.
Keynote Speech

Place: Ramada Ballroom 1

K-Th1 - Time & Date: 09:00~09:30, Thursday, May 8, 2014 Speaker: Prof. Dong-Ho Cho
K-Th2 - Time & Date: 09:30~10:00, Thursday, May 8, 2014 Speaker: Dr. Håkan Gustavsson
K-Fr1 - Time & Date: 08:30~09:00, Friday, May 9, 2014 Speaker: Prof. Jenshan Lin
K-Fr2 - Time & Date: 09:00~09:30, Friday, May 9, 2014 Speaker: Prof. Luca Roselli

Welcome Reception

Place: Ramada Ballroom 2,3,4, 2F / Time & Date: 18:00~20:00, Wednesday, 7 May, 2014
Conference participants are invited to mingle while enjoying the light food and drinks during the opening welcome reception.

Lunch

Place: Ramada Ballroom 2,3,4, 2F
Time & Date: 12:00~13:20, Thursday, May 8, 2014 / 12:10~13:30, Friday, May 9, 2014

Coffee Break

Place: Convention Lobby, 2F
Time & Date: 10:00~10:20, Thursday, May 8, 2014 / 15:20~15:40, Thursday, May 8, 2014
10:30~10:50, Friday, May 9, 2014

Banquet & Awards

Place: Ramada Ballroom 1 / Time & Date: 19:00~21:00, Thursday, May 8, 2014
The highlight of the official & social program will be “Banquet”. Also, the awards will be presented during the banquet.
Speaker Guide

Oral Presentation

1. Prepare your Presentation
1) All oral presentation materials should be prepared in English.
2) Each oral presentation is limited to 20 minutes including Q&A’s and changeover to the next speaker.
3) Power Point format or Adobe Acrobat format (PDF) is highly recommended.
4) Each oral presentation materials should be uploaded to the equipped computer of each session room before the session starts. (USB memory stick is acceptable)
5) All presentation materials will be deleted after the session finishes.

2. Equipments in the session room
1) 1-Screen, 1-LCD Projector, 1-Window-based Laptop Computer, and 1-Laser Pointer
2) MS Windows 7 OS and MS Office 2010 are installed in the computer.
3) Private Laptop computers are not recommended for keeping each allocated time.

Poster Presentation

1. Prepare your poster
1) Available poster board size for each poster speaker is 110cm (height) x 90cm (width).
2) Each poster should have the title, all author names, and corresponding author’s contact information of your paper.
3) There is no poster template, but it is recommended that ‘IEEE WPTC 2014’ is included in your poster.

2. Mount and demount your poster
1) Poster boards will be prepared at the convention lobby (2F) in front of Registration desk.
2) Each poster should be mounted and demounted following the designated times.
3) Your paper ID number will be posted on Poster boards.
4) The designated times are referred to the below time table.

3. Prepared materials for mounting your poster
1) Cellular tapes, pushpins, scissors, and etc.
2) Staffs around Poster board and Registration desk will help you if you are in trouble during mounting your poster.
3) After demounting time, all posters on poster boards will be discarded without notice.

<table>
<thead>
<tr>
<th>Session</th>
<th>Session Day</th>
<th>Mounting time</th>
<th>Presentation time</th>
<th>Demounting Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poster Session II</td>
<td>May 9, 2014</td>
<td>12:30 – 15:30</td>
<td>15:30 – 16:30</td>
<td>16:30 – 17:00</td>
</tr>
</tbody>
</table>
The exhibition will be held in the 2F Ramada Ballroom Lobby in Ramada Plaza Jeju Hotel.

Exhibition Hours
09:00 ~ 18:00 | Thursday, May 8
09:00 ~ 18:00 | Friday, May 9
Exhibitor & Sponsor Profiles

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Tel: +1 617-926-2700
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Started as ISU Ceramics in 1987, and in April of 2008, current TODAISU was founded with joint venture of ISU Co, LTD which is a holding company of ISU group and TODA Industry of Japan with 150 years of history. A kind of Soft ferrites made by TODAISU are Mn-Zn Ferrite, Metal Powder and high current of SMD Inductor that was applied to Converter, Inverter, Filter for Display and Home appliance, Electronic products. We have grand scale production line to manufacture from coil to assembly and provide WPC transmitters and receivers to Nokia, Nexus and Made4. The Research & Development and Market field of TODAISU will have expanded to Renewable Energy, Eco Car, Environment, Telecommunication, Medical care.

**Hanrim Postech**
http://www.hanrim.com
Tel: +82 31-259-5136
Address: 59, Omokcheon-ro 152beon-gil, Gwonseon-gu, Suwon-si, Gyeonggi-do, Korea
We, at Hanrim Postech have been involved in an energy-related business for more than 30 years and expects that clean energy-based business will lead the other industries in the near future. Base on this expectation we were able to attain a small success by focusing on research and development of wireless power technology and its application since 2002. We have joined the WPC (Wireless Power Consortium) in 2011, and the following year we have been elevated to a regular member for the first in Korea. The company, having its original wireless power technology, has been the one of 4 companies which design and lead standards and regulations in the WPC. This kind of leadership comes from more than 10 year-long investment on the new technology and the world class intellectual properties which are now registered worldwide. Also, in collaboration with Toshiba, Hanrim has recently developed three system ICs which is complied to WPC Qi standards. Now ICs are beging under mass production in Toshiba since 2012, using Hanrim's non-contact charging technology.

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Agilent
http://www.agilent.com
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