

Duration: 08:30 - 17:50

Room: Budapest

WM-03

Far-Field and Near-Field Techniques for Wireless Energy Transfer

Organisers:

Alessandra Costanzo, University of Bologna, Italy

Nuno Borges Carvalho, IT Aveiro, Portugal

Abstract

Providing energy without wires has undoubtedly achieved a tremendous interest in the last period. In many different environments, such as industrial plants, smart ambients and transportations, different needs are emerging with respect to either the operating frequency or the power level involved or the EM mechanism to be exploited, namely far-field or near-field. This full-day workshop is aimed at providing an overview of the most recent results in this area.

In the first part theoretical aspects for the circuit-level and system-level design of a re-charging system are analysed in the near-field and both capacitive and inductive coupling are considered. Then a walk through all the aspects of designing, realising and testing rectifying antennas (rectennas) will be followed to exploit far-field for recharging.

In the second part a number of application-driven systems adopting 3D structures for recharging mobile and implantable devices are presented. From the technological point of view, Inkjet printing and 3D printing are analysed as low cost, high performance technologies for RF electronics. Furthermore, additive manufacturing is considered as a platform for heterogeneous integration of complex circuit structures, including metals, dielectrics and semiconductors and packages. 3D printed microwave antenna array structures and lenses, with application to wireless power transfer and energy harvesting will be presented and implanted electronic systems will be addressed.

Finally signals solutions for minimising the power needed for sensor operations are considered and proofs-of-concept are provided. Lecturers presentations will be alternated with periods of open discussions to engage the audience and to discuss next exploitable research areas in this field.

This workshop is supported by the COST action IC1301 WiPE "Wireless Power transmission for sustainable Electronics".

Programme

08:30 - 08:35 Welcome

A. Costanzo, N. Carvalho

08:35 - 09:20 Resonant Inductive WPT: Possible Operative Regimes

G. Monti, M. Mongiardo, F. Mastri, A. Costanzo, M. Dionigi, L. Tarricone, R. Sorrentino, University of Salento, Italy

09:20 - 10:05 Rigorous Description of Capacitive Wireless Power Transfer Chain

Jan Kracek, Milan Svanda, Milos Mazanek, Jan Machac, Czech Technical University in Prague, Czech Republic

10:10 - 10:50 Break

10:50 - 11:30 Rectenna Realization: A Practical Step by Step Approach

H. Visser, TNO, The Netherlands

11:30 - 12:10 Inkjet and 3D Printed Circuits for Wireless Power Transfer, Energy Harvesting, Communication and Sensing

Apostolos Georgiadis, Ana Collado, Herriot-Watt University, UK

Manos Tentzeris, Georgia Tech, USA

12:10 - 12:20 Discussion

12:30 - 13:50 Break

13:50 - 14:35 THz Rectennas: Rectification Prospects and Challenges

M. Shanawani, D. Masotti, A. Costanzo, University of Bologna, Italy

14:35 - 15:20 Cooperative Hybrid and Ambient Power Harvesting for Future Wireless System Applications

Ke Wu, Simon Hemour, and Xiaoqiang Gu, Polytechnic Montreal, Canada

15:30 - 16:10 Break

16:10 - 16:50 Harmonic RFID: A Way to Exploit Each Drop of Available Energy to Wirelessly Interrogate a Sensor Tag
Luca Roselli, Federico Alimenti, Paolo Mezzanotte, Giulia Orecchini, Valentina Palazzi, Luca Roselli, University of Perugia, Italy

16:50 - 17:30 Wireless Power Transmitters on Demand
N. Carvalho, Daniel Belo, Ricardo Correia, Nuno Borges Carvalho, IT Aveiro, Portugal

17:30 - 17:50 Open Discussion and Concluding Remarks