

2015 APS/URSI Workshop Proposal

Proposed Workshop Title:

Chipless RFID System & Testbed:

Reader and Tag Antennas, Reader and Tag Design, Multi-Tag Scenarios, Modulation, Clutter Effects and Channel Estimation, Signaling and Real-world Testbed

Workshop Lead Instructors:

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2015 APS/URSI Technical Program Review Sub-Committee:

Workshop Abstract

RF-Barcode of the future: This workshop aims to construct a solid platform for interactive discussions between the researchers from RF, signal processing, communication and networking societies for sharing their objectives, challenges, experiences and future solutions for chipless RFID systems.

The requirements of the tag as well as the reader for chipless RFID systems would be proposed. The printability, nonlinearity and sufficient coding capacity of the tag will be introduced as optimum solutions to dethrone the barcode from item level labelling. Increasing the reading range using enhanced UWB, high gain, pencil beam and steering reader antenna will be illustrated.

Novel techniques for chipless RFID multi-tag detection and identification, enhancing the system latency and increasing encoding capacity would be introduced. The channel and environmental effects on the chipless RFID tag detection will be deeply discussed. Smart channel estimation and equalization algorithms in dense multipath propagation scenarios will be presented.

Workshop topics and suggested presenters

WORKSHOP TOPICS:

1. Chipless RFID systems: Future and real-world challenges.
2. Reader antenna: Reconfigurable, beam steering, multi-beam antenna array.
3. Tag design and guidelines: printability, coding capacity, polarization dependency, robustness against channel effects, compactness and ease of detection.
4. Multi-tag identification with enhanced latency: Protocol aspects, collision avoidance, error detection, bandwidth optimization and system latency.
5. Robustness against environmental influences: Channel estimation, detection, equalization and empty room deduction.
6. Detection techniques and localization aspects: Singular Value Decomposition (SVD), Adaptive Energy Detection (AED) and smart detection techniques.
7. System model and signaling schemes.
8. Chipless RFID System: Online Demo & Multi-Tag Scenario

WORKSHOP SPEAKERS:

- 1- Mohamed El-Hadidy
- 2- Thomas Kaiser
- 3- Maher Khaliel
- 4- Abdelfattah Fawky
- 5- Ahmed El-Awamry

Briefly describe why you believe that this workshop should be given during 2015 APS/URSI, highlighting the significance of the topic and the interest to the Antenna and Propagation Community.

- 1- Advanced passive chipless Radio Frequency Identification (RFID) systems are expected to provide highly accurate identification of objects with improved reliability and security while maintaining low cost. Moreover, the chipless RFID tag does not require chip charging to operate unlike their chipped counterpart, thus theoretically increase the reading range.
- 2- Chipless RFID System: Online Demo & Multi-Tag Scenario

Are you aware of this or a similar topic previously being presented as a workshop? If so, explain how this proposed workshop will be different.

Some workshops have addressed the topic of chipless RFID, since it is a blooming technology. In this workshop many real world challenges and solutions will be presented. Unlike previous workshops, realized novel anti-collision algorithms for chipless RFID will be discussed. In this workshop different approaches for increasing the tag coding capacity considering the physical constraints. Moreover and for the first time, smart beam-selection antennas will be discussed as a solution for increasing the number of readable tags in the integration zone.

Detailed information of proposed lead Instructors:

Name: Dr.-Ing. Mohamed El-Hadidy

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A brief biography:

Mohamed El-Hadidy received his PhD degree in June 2009 at the Institute of Communication Technology (IKT), Leibniz University of Hannover, Germany. He leads several research projects as a postdoc for two years and co-supervises several PhD students in the fields of UWB-MIMO, Cognitive Radios and Chipless RFID Technologies. Since July 2011, he has been with the Institute of Digital Signal Processing, University of Duisburg-Essen as the Leader of the Research Group Simulation and Measurements. His present research topics are mainly focused on Chipless RFID Systems, UWB-MIMO communications, Channel Modeling, Interference Alignment, Cognitive Radios, Coexistence and Test-beds Implementations. Mohamed has more than 3 years professional experience as a representative and consultant for several multi-national companies (ABB, CST, AWR, MA/COM, Satimo, MVG) in the Middle East area.

Name: Prof. Dr.-Ing. Thomas Kaiser

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A brief biography:

Thomas Kaiser received his PhD degree in 1995 and habilitation degree in 2001 and from 2002 to 2006 he co-lead Europe's largest MIMO research team at University of Duisburg-Essen. In 2005 and 2007, he was visiting professor in Stanford's Smart Antenna Research Group and Princeton's EE department, respectively, and from 2006 to 2011 he headed the Institute of Communication Technology at Leibniz University of Hannover. Since 2011 he leads the Institute of Digital Signal Processing at the University of Duisburg-Essen. Thomas is founder of mimoOn GmbH, a software defined radio company for cellular communications, and published more than 200 papers and book chapters.