# Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering

82

## **Editorial Board**

Ozgur Akan

Middle East Technical University, Ankara, Turkey

Paolo Bellavista

University of Bologna, Italy

Jiannong Cao

Hong Kong Polytechnic University, Hong Kong

Falko Dressler

University of Erlangen, Germany

Domenico Ferrari

Università Cattolica Piacenza, Italy

Mario Gerla

UCLA, USA

Hisashi Kobayashi

Princeton University, USA

Sergio Palazzo

University of Catania, Italy

Sartaj Sahni

University of Florida, USA

Xuemin (Sherman) Shen

University of Waterloo, Canada

Mircea Stan

University of Virginia, USA

Jia Xiaohua

City University of Hong Kong, Hong Kong

Albert Zomaya

University of Sydney, Australia

Geoffrey Coulson

Lancaster University, UK

Matías Liñán Reyes José M. Flores Arias Juan J. González de la Rosa Josef Langer Francisco J. Bellido Outeiriño Antonio Moreno-Muñoz (Eds.)

# IT Revolutions

Third International ICST Conference Córdoba, Spain, March 23-25, 2011 Revised Selected Papers



#### Volume Editors

Matías Liñán Reyes Universidad de Córdoba, Spain E-mail: mlinan@uco.es

José M. Flores Arias Universidad de Córdoba, Spain E-mail: jmflores@uco.es

Juan J. González de la Rosa University of Cádiz, Spain E-mail: juanjogdelarosa@ieee.org

Josef Langer Fachhochschule Hagenberg, Austria E-mail: josef.langer@fh-hagenberg.at

Francisco J. Bellido Outeiriño Universidad de Córdoba, Spain E-mail: fjbellido@uco.es

Antonio Moreno-Muñoz Universidad de Córdoba, Spain E-mail: amoreno@uco.es

ISSN 1867-8211 e-ISSN 1867-822X ISBN 978-3-642-32303-4 e-ISBN 978-3-642-32304-1 DOI 10.1007/978-3-642-32304-1 Springer Heidelberg Dordrecht London New York

Library of Congress Control Number: 2012943169

CR Subject Classification (1998): K.3.1, J.2, H.5, H.4, C.2, K.4.2, I.2

© ICST Institute for Computer Science, Social Informatics and Telecommunications Engineering 2012 This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

The use of general descriptive names, registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

## Preface

IT Revolutions, through its three editions, provides a forum for researchers, system developers, and service providers to share ideas, designs, and experiences in the emerging technologies related to consumer electronics, eHealth, ambient-assisted living, energy sustainability, smart environments, smart grids, and eLearning applications and practices.

The conference addresses current and future trends in the state of the technology for solving and managing daily practices, and fosters interdisciplinary collaborative research in this area. The conference focuses on all aspects of the role and deployment of the new information and communications technologies in the twenty-first century lifestyle, paying special attention to the newest emerging wireless technologies and their integration in daily life scenarios.

IT Revolutions 2011 was held in Cordoba, Spain, during March 23–25.

Thanks to all authors for their hard work and for sending these high-quality papers, which were presented and discussed at the conference. Also, our thanks go to the sponsors, ICST, EAI, CreateNET, MITRA, University of Cordoba and Higher Engineering School of Cordoba, and to the TPC members, reviewers, and other colleagues and volunteers from the Organizing Committee whose work made this International Conference a reality.

The keynote speakers shared their experience with us covering different hot topics such as:

- "Sensor Networks in Sports, Wellness and Medicine," by Horst Schwetlick
   -University of Applied Sciences, HTW Berlin
- "Impact of Distributed Generation on Distribution System Protection Schemes," by Juan Carlos Gómez, National University of Rio Cuarto, Argentina

From 66% to 83% papers were accepted in each topic track. Clearly, eGreen energy, smart grids eLearning, and smart buildings were the main topics discussed at the conference. But IT Revolutions 2011 also covered other very interesting topics, like eHealth, AAL, smart environments or grid and cloud computing.

We are convinced that we had – and will have in future editions – a fruitful and enjoyable time together.

March 2011 Francisco J. Bellido

# Organization

## Steering Committee

Chair

Imrich Chlamtac President, CREATE-NET

Organizing Committee

General Chair

Francisco José Bellido

Outeiriño Cordoba University, Spain

General Co-chair

Antonio Moreno Muñoz Cordoba University, Spain

Horst Schwetlick University of Applied Sciences, HTW-Berlin,

Germany

Technical Program Committee Chair

Juan José González de la Rosa Cadiz University, Spain

Josef Langer University of Applied Sciences of Upper

Austria, Hagenberg, Austria

José M. Flores Arias Cordoba University, Spain

**Publicity Chair** 

Miguel González Redondo Cordoba University, Spain

**Publications Chair** 

Víctor Pallarés López Cordoba University, Spain Isabel Santiago Chiquero Cordoba University, Spain

Workshops Chair

Juan J. Luna Rodríguez Cordoba University, Spain

Local Committee Chair

Rafael Real Calvo Cordoba University, Spain Francisco Domingo Pérez Cordoba University, Spain Aurora del Rocio Gil de Castro Cordoba University, Spain Isabel Moreno García Cordoba University, Spain Joaquín Serrano Porras Cordoba University, Spain

#### Web Chair

Matías Liñán Reyes Cordoba University, Spain

#### Conference Coordinator

Gabriella Magyar Institute for Computer Sciences,

Social Informatics and Telecommunications

Engineering (ICST)

Elena Jane Fezzardi Institute for Computer Sciences,

Social Informatics and Telecommunications

Engineering (ICST)

## **Technical Program Committee**

Larry Zhang IEEE Consumer Electronics Society

Horst Schwetlick University of Applied Sciences, HTW-Berlin,

Germany

Ing. Alex Huhn University of Applied Sciences, HTW-Berlin,

Germany

Petre Dini President of IARIA, Concordia University,

Montreal, Canada

Chris G.Guy University of Reading, UK

Hans L. Cycon University of Applied Sciences HTW-Berlin,

Germany

Josef Langer University of Applied Sciences of Upper

Austria, Hagenberg, Austria

José Bravo Rodríguez University of Castilla La Mancha, Spain

Miguel A. Gómez-Nieto Cordoba University, Spain
Irene Luque Cordoba University, Spain
Julio Barros University of Cantabria, Spain
Enrique Romero University of Extremadura, Spain

Rafael Medina Cordoba University, Spain
José L. de la Cruz Cordoba University, Spain
Ing. Manuel Torres Cordoba University, Spain
José E. Meroño Cordoba University, Spain
Cordoba University, Spain

José Carlos Metrôlho Instituto Politécnico de Castelo Branco,

Portugal

Francisco J. Bellido Cordoba University, Spain Antonio Moreno Cordoba University, Spain Juan J. González University of Cadiz, Spain

#### Session Chairs

Aurora Gil de Castro Antonio Moreno Muñoz Alexander Huhn Horst Schwetlick Pilar Castro Garrido José M. Flores Arias

## Reviewers

Agustín Agüera Pérez University of Cadiz, Spain

Alexander Huhn University of Applied Sciences, HTW-Berlin,

Germany

Antonio Illana Martos University of Cadiz, Spain Antonio Moreno Muñoz Cordoba University, Spain Chris G. Guy University of Reading, UK

Enrique Romero Cadaval University of Extremadura, Spain

Francisco J. Bellido Outeiriño Cordoba University, Spain

Hans L. Cycon University of Applied Sciences, HTW-Berlin,

Germany

Horst Schwetlick University of Applied Sciences, HTW-Berlin,

Germany

Irene Luque Ruiz Cordoba University, Spain Isidro Lloret Galiana University of Cadiz, Spain

José Bravo Castilla-La Mancha University, Spain Jose Carlos Metrôlho Instituto Politécnico de Castelo Branco,

Portugal

José Carlos Palomares Salas
Jose Emilio Meroño
José Gabriel Ramiro Leo
José Luis de la Cruz
José M. Flores
University of Cadiz, Spain
Cordoba University, Spain
Cordoba University, Spain
Cordoba University, Spain
Cordoba University, Spain
University of Cadiz, Spain
University of Cadiz, Spain

Josef Langer University of Applied Sciences of Upper

Austria, Hagenberg, Austria

Juan Jose Gonzalez de la Rosa University of Cadiz, Spain Manuel Torres Cordoba University, Spain Miguel Angel Gomez Nieto Cordoba University, Spain Cordoba University, Spain Cordoba University, Spain

## Sponsored by:







http://www.create-net.org/





http://www.icst.org



www.eai.eu

www.mitraingenieria.es

Latest information at http://www.itrevolutions.org/2011

# **Table of Contents**

Track 1: eGreeen Energy	
HOS-Based Virtual Instrument for Power Quality Assessment	1
Intelligent Techniques for Identification of Zones with Similar Wind Patterns	10
Power Quality Analysis Using Higher-Order Statistical Estimators: Characterization of Electrical Sags and Swells	22
Virtual Instrumentation Applied to Electromagnetic Compatibility Testing	30
Track 2: Smart Buildings	
Towards a Normalized Reference System in Building Construction Planning for Automated Quantitative Assessment and Optimization of Energy and Cost Efficiency	39
Evaluation of a New Proposal for Efficient Multicast Transmission in HomePlug AV Based In-Home Networks	58
Routing Protocols for 6LoWPAN	71

Upgrading of Traditional Electric Meter into Wireless Electric Meter Using ZigBee Technology	84
Berhanu Regassa, Ana Verónica Medina, Isabel M. Gómez, Octavio Rivera, and José A. Gómez	
Health and Ambient Assisted Living	
RFID Multi-target Tracking Using the Probability Hypothesis Density Algorithm for a Health Care Application  Jiandan Chen, Iyeyinka Damilola Olayanju, Olabode Paul Ojelabi, and Wlodek Kulesza	95
A Standard-Based Body Sensor Network System Proposal  Enrique Dorronzoro, Ana Verónica Medina, Isabel Gómez, José Antonio Gómez, and Manuel Merino Monge	106
Smart Environments and User Experience	
Support for Visually Impaired through Mobile and NFC Technology Pilar Castro Garrido, Irene Luque Ruiz, and Miguel Ángel Gómez-Nieto	116
Indoor Position System Based on BitCloud Stack for Ambient Living and Smart Buildings	127
Evolving Presentity-Based Context Schemas by Estimating Context Proximity	137
Grid and Cloud Computing	
Distributed Context Space (DCS) – Foundation of Semantic P2P Systems	153
Many-Core Processor Bioinformatics and Next-Generation	
Sequencing	172
eLearning	
An E-tool for Assessing Undergraduate Students' Learning of Surveying Concepts and Practices	189

simARQ, An Automatic Repeat Request Simulator for Teaching Purposes	202
A Process for Solving Ill-Structured Problem Supported by Ontology and Software Tools	212
Learning Science in an Intuitive and Fun Way Using Multi-touch Technology	227
Convolution Computation in FPGA Based on Carry-Save Adders and Circular Buffers	237
Author Index	249

Table of Contents

XIII