

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

205

Editorial Board

Ozgur Akan

Middle East Technical University, Ankara, Turkey

Paolo Bellavista

University of Bologna, Bologna, Italy

Jiannong Cao

Hong Kong Polytechnic University, Hong Kong, Hong Kong

Geoffrey Coulson

Lancaster University, Lancaster, UK

Falko Dressler

University of Erlangen, Erlangen, Germany

Domenico Ferrari

Università Cattolica Piacenza, Piacenza, Italy

Mario Gerla

UCLA, Los Angeles, USA

Hisashi Kobayashi

Princeton University, Princeton, USA

Sergio Palazzo

University of Catania, Catania, Italy

Sartaj Sahni

University of Florida, Florida, USA

Xuemin Sherman Shen

University of Waterloo, Waterloo, Canada

Mircea Stan

University of Virginia, Charlottesville, USA

Jia Xiaohua

City University of Hong Kong, Kowloon, Hong Kong

Albert Y. Zomaya

University of Sydney, Sydney, Australia

More information about this series at <http://www.springer.com/series/8197>

Michele Magno · Fabien Ferrero
Vedran Bilas (Eds.)

Sensor Systems and Software

7th International Conference, S-Cube 2016
Sophia Antipolis, Nice, France, December 1–2, 2016
Revised Selected Papers

Editors

Michele Magno
ITET
ETH Zurich
Zurich
Switzerland

Vedran Bilas
Faculty of Electrical Engineering
University of Zagreb
Zagreb
Croatia

Fabien Ferrero
Laboratoire d'Electronique
Nice Sophia Antipolis University
Sophia Antipolis
France

ISSN 1867-8211 ISSN 1867-822X (electronic)
Lecture Notes of the Institute for Computer Sciences, Social Informatics
and Telecommunications Engineering
ISBN 978-3-319-61562-2 ISBN 978-3-319-61563-9 (eBook)
DOI 10.1007/978-3-319-61563-9

Library of Congress Control Number: 2017945727

© ICST Institute for Computer Sciences, Social Informatics and Telecommunications Engineering 2017

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, 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.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Printed on acid-free paper

This Springer imprint is published by Springer Nature
The registered company is Springer International Publishing AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

The 7th EAI International Conference on Sensor Systems and Software—S-CUBE 2016—an international conference in the field of sensors systems, hardware, software, and applications, was held during December 1–2, 2016, in Sophia Antipolis, Nice. The conference broadly focuses on the design, development, and optimization of sensor systems, and this international event provides the opportunity for researchers, technologists, and industry specialists in sensor systems and software to meet and to exchange ideas and information. The conference gave researchers an opportunity to discuss new technologies, interesting approaches, and hardware and software methods for sensing systems and their applications. The proceedings of S-CUBE 2016 are published by Springer in the series *Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering* (LNICST).

This seventh edition of the conference was very rich and varied. The Technical Program Committee accepted 15 high-quality technical papers, which were presented at the conference. Each paper had at least two reviews. This year we chose four invited speakers: Daniela De Venuto, associate professor at Politecnico di Bari, Italy; Matthieu Gautier, associate professor at IRISA, University of Rennes; Mojtaba Masoudinejad, research associate at University of Dortmund; and Stephan Mach, PhD student at ETH Zurich. Their excellent talks focus on hot topics of sensor systems and a related paper is published in this volume.

S-CUBE 2016 was organized by the European Alliance for Innovation (EAI), ETH Zurich, and University Nice Sophia-Antipolis. The conference would not be successful without the hard work of many persons. First, our thanks go to the members of the conference committees and the reviewers for their dedicated and passionate work. In particular, the local and program chairs, Prof. Fabien Ferrero and Prof. Leonardo Lizzi, and the general chair, Dr. Michele Magno, for their important support to make the conference a successful event. It is also important to mention the Technical Program Committee Co-chairs, Dr. Emanuel Popovici and Prof. Vedran Bilas, for their support and effort in attracting a large number of submissions from around the world. We also thank Ms. Anna Horvathova and Ms. Sinziana Vieriu of EAI for their hard work and dedication in taking great care of the conference organization. Last, but not the least, our sincere thanks to the Steering Committee member, Andrey Somov, for his steady guidance and help. We are grateful to all the authors who have submitted papers to the conference, for none of this would happen without their valuable contributions. We would also like to thank our sponsors for their support and University Nice Sophia Antipolis for hosting us in this wonderful location.

February 2017

Michele Magno
Fabien Ferrero
Vedran Bilas

Organization

Steering Committee

Steering Committee Chair

Imrich Chlamtac Create-Net, Italy

Steering Committee Member

Andrey Somov University of Exeter, UK

Organizing Committee

General Chair

Michele Magno ETH Zurich, Switzerland

Program Chairs

Fabien Ferrero University of Nice Sophia Antipolis, France
Emanuel Popovici University of College Cork, Ireland
Verdan Bilas University of Zagreb, Croatia

Publicity and Social Media Chair

Lukas Cavigelli ETH Zurich, Switzerland

Posters Chair

Leonardo Lizzi University of Nice, France

Web Chair

Andres Gomez ETH Zurich, Switzerland

Local Chair

Fabien Ferrero University of Nice Sophia Antipolis, France

Conference Manager

Anna Horvathova EAI - European Alliance for Innovation

Technical Program Committee

David Boyle Imperial College London, UK
Matteo Ceriotti University of Duisburg-Essen, Germany
Amir-Mohammad Rahmani University of Turku, Finland

Alena Simalatsar	EPFL, Switzerland
Stefano Basagni	Northeastern University
Andrei Popleteev	University of Luxembourg, Luxembourg
Simone Silvestri	Missouri University of Science and Technology, USA
Corinna Schmitt	University of Zurich, Switzerland
Jason Hallstrom	Florida Atlantic University, USA
Andrey Somov	University of Exeter, UK
Cormac Sreenan	CONNECT, UCC
Alain Pegatoquet	University of Nice-Sophia Antipolis, France
Marius Marcu	Politehnica University of Timisoara, Romania
Trinh Le Huy	University of Information Technology, Ho Chi Minh City, Vietnam
Francillon Aurelien	Eurecom
Lizzi Leonardo	University Nice-Sophia Antipolis, France

Contents

Invited Papers

SNW-MAC: An Asynchronous Protocol Leveraging Wake-Up Receivers for Data Gathering in Star Networks	3
<i>Fayçal Ait Aoudia, Matthieu Gautier, Michele Magno, Olivier Berder, and Luca Benini</i>	
Towards P300-Based Mind-Control: A Non-invasive Quickly Trained BCI for Remote Car Driving	15
<i>Daniela De Venuto, Valerio F. Annese, and Giovanni Mezzina</i>	
A Dual Processor Energy-Efficient Platform with Multi-core Accelerator for Smart Sensing	29
<i>Antonio Pullini, Stefan Mach, Michele Magno, and Luca Benini</i>	
Smart Sensing Devices for Logistics Application.	41
<i>Mojtaba Masoudinejad, Aswin Karthik Ramachandran Venkatapathy, Jan Emmerich, and Andreas Riesner</i>	

Presented Paper

SHelmet: An Intelligent Self-sustaining Multi Sensors Smart Helmet for Bikers.	55
<i>Michele Magno, Angelo D'Aloia, Tommaso Polonelli, Lorenzo Spadaro, and Luca Benini</i>	
iHouse: A Voice-Controlled, Centralized, Retrospective Smart Home	68
<i>Benjamin Völker, Tobias Schubert, and Bernd Becker</i>	
PackSens: A Condition and Transport Monitoring System Based on an Embedded Sensor Platform	81
<i>Marc Pfeifer, Tobias Schubert, and Bernd Becker</i>	
Smart LED Lights Control Using Nano-Power Wake Up Radios.	93
<i>Tommaso Polonelli and Michele Magno</i>	
Monitoring Approach of Cyber-Physical Systems by Quality Measures	105
<i>Pedro Merino Laso, David Brosset, and John Puentes</i>	
Energy Consumption and Data Amount Reduction Using Object Detection on Embedded Platform	118
<i>Boris Snajder, Zoran Kalafatic, and Vedran Bilas</i>	

Reconfigurable and Long-Range Wireless Sensor Node for Long Time Operation.	130
<i>Nabil Islam, Fabien Ferrero, Leonardo Lizzi, Christophe Danchesi, and Stephane Boudaud</i>	
Comparative Analysis of Simulation and Real-World Energy Consumption for Battery-Life Estimation of Low-Power IoT (Internet of Things) Deployment in Varying Environmental Conditions Using Zolertia Z1 Motes.	137
<i>Ashutosh Bandekar, Akshay Kotian, and Ahmad Y. Javaid</i>	
Comparison of Power-Efficiency of Asthmatic Wheezing Wearable Sensor Architectures	149
<i>Dinko Oletic and Vedran Bilas</i>	
Miniaturised Flame Ionisation Detector for Explosion Protection in Civil Sewerage Networks	163
<i>Jan Förster, Winfred Kuipers, Christian Koch, Christian Lenz, Steffen Ziesche, and Dominik Jurkow</i>	
Relative Translation and Rotation Calibration Between Optical Target and Inertial Measurement Unit	175
<i>Manthan Pancholi, Svilen Dimitrov, Norbert Schmitz, Sebastian Lampe, and Didier Stricker</i>	
Smart-Bike as One of the Ways to Ensure Sustainable Mobility in Smart Cities	187
<i>Irina Makarova, Ksenia Shubenkova, Anton Pashkevich, and Aleksey Boyko</i>	
Author Index	199