A GUIDE TO THE CE INNERVERSE

Consumer Consumer Electronics

VOL. 5, NO. 2, April 2016

MAGAZINE





Next-Gen Biometrics

Smartphone Security Gets Wise





THE THE PARTY OF T

Vol. 5, No. 2 April 2016 ISSN 2162-2248 http:ewh.ieee.org/soc/ces

Electronics MAGAZINE

FEATURES

- 28 The IEEE in Ireland Initiative
 An update on progress and activities.

 By Rob Reilly
- FCC: Oppressing the "Maker" or Helping to Make the World a Safer Place for All?
 FCC 14-30 and a safe RF environment.
 By William Lumpkins (Sanitate)
- The Quest for the Quality of Things
 Can the Internet of Things deliver a promise of
 the quality of things?
 By David Park
- 38 Enabling 360° Visual Communications
 Next-level applications and connections.
 By Louis Brun and Alessandro Gasparini
- 44 Hacking the House Chapter 2
 The Boston VoIP doorbell.
 By Stuart Lipoff
- 49 The IoT: Exciting Possibilities for Bettering Lives

Special application scenarios. By S.M. Riazul Islam, M. Nazim Uddin, and Kyung Sup Kwak

- Design Flow of a Digital IC

 The role of digital IC/SOC design in CE products.

 By Anirban Sengupta
- 63 Wireless Sensor Network Simulation Frameworks: A Tutorial Review

MATLAB/Simulink bests the rest. By Madhupreetha L. Rajaram, Elias Kougianos, Saraju P. Mohanty, and Uma Choppali

- 70 **Biometric Technology and Smartphones**A consideration of the practicalities of a broad adoption of biometrics and the likely impacts.
 By Peter Corcoran and Claudia Costache
- 79 IEDs on the Road to Fingerprint Authentication
 Biometrics have vulnerabilities that PINs and passwords don't.
 By Greig Paul and James Irvine



87 User Authentication on Smartphones

Focusing on iris biometrics.

By Shejin Thavalengal and Peter Corcoran

94 The Changing Ethics of Mediated Looking

Wearables, veillances, and power.

By Joseph Ferenbok, Steve Mann, and Katina Michael

103 The Best Part of Ringly Is When It Does Nothing

The lure of a (smart) gemstone cocktail ring. By Ramona Pringle

106 The Rise of Social Machines

The development of a human/digital ecosystem. By Nigel Shadbolt, Max Van Kleek, and Reuben Binns

112 Counterfeit Electronics: Coming to a Store Near You

How bad is it, and what can be done? By Karl David Stephan

ABOUT THE COVER

Biometrics are beginning to affect the world of smartphones.

PHONE—@ISTOCKPHOTO/LUCADP.
EYE—IMAGE LICENSED BY INGRAM PUBLISHING.



COLUMNS & DEPARTMENTS

- 3 NOTES FROM THE EDITOR
- 10 SOCIETY NEWS
- 12 CONFERENCE REPORTS
- 21 PUBLICATIONS ROUND-UP
- 23 FUTURE DIRECTIONS
- 114 BITS VERSUS ELECTRONS
- 119 THE ART OF STORAGE
- 123 HARDWARE MATTERS
- 127 MARKET-BASED ANALYSES
- 130 PRODUCT REVIEWS

IEEE Consumer Electronics Magazine (ISSN 2162-2248) (ICEMCQ) is published quarterly by the Institute of Electrical and Electronics Engineers, Inc. Headquarters: 3 Park Avenue, 17th Floor, New York, NY 10016-5997 USA, Telephone: +1 212 419 7900. Responsibility for the content rests upon the authors and not upon the IEEE, the Society or its members. IEEE Service Center (for orders, subscriptions, address changes): 445 Hoes Lane, Piscataway, NJ 08855-1331 USA. Telephone: +1 732 981 0060. Individual copies: IEEE members US\$20.00 (first copy only), nonmembers US\$96.00 per copy. Subscription rates: Annual subscription rates included in IEEE Consumer Electronics Society member dues. Subscription rates available on request. Copyright and reprint permission: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limits of U.S. Copyright law for the private use of patrons 1) those post-1977 articles that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923 USA; 2) pre-1978 articles without a fee. For other copying, reprint, or republication permission, write Copyrights and Permissions Department, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. Copyright © 2016 by the Institute of Electrical and Electronics Engineers Inc. All rights reserved. Periodicals postage pending at New York and additional mailing offices. Postmaster: Send address changes to IEEE Consumer Electronics Magazine, IEEE, 445 Hoes Lane, Piscataway, NJ 08854 USA. Canadian GST #125634188 PRINTED IN THE U.S.A.

MISSION STATEMENT: To educate, inform, and entertain our community of IEEE Consumer Electronics Society members on technology, events, industry news, and general topics relating to consumer electronics and to further serve and support our Members in professional career development through tutorials and raising awareness of engineering tools and technologies.



IEEE CONSUMER ELECTRONICS MAGAZINE EDITORIAL BOARD

Peter Corcoran College of Engineering and Informatics, National University of Ireland, cesmagazine@gmail.com

SENIOR EDITORS

CE Societal Impacts Katina Michael Faculty of Engineering and Information Sciences, University of Wollongong katina@uow.edu.au

Future-Directions Activities

Tom Coughlin Coughlin Associates, Data Storage Consulting tom@tomcoughlin.com

Emerging CE Technology & Industry Linkages Pallab Chatterjee Media & Entertainment Technologies pallab@mandetech.com

EXECUTIVE EDITORS

CE Conferences Editor & Internet-of-Things
Soumya Kanti Datta
EURECOM Research Center
soumya-kanti.datta@eurecom.fr

CE Chapter Activities & Events Editor Robin Bradbeer rsbradbeer@gmail.com

ASSOCIATE EDITORS

Innovation &

Entreprenneurship
Tom Wilson
Entrepreneur in Residence,
TandemLaunch Inc., Montreal
tomwilson@ieee.org

User Interaction and Augmented Reality Fabrizio Lamberti Department of Control and Computer Engineering, Politecnico di Torino fabrizio.lamberti@polito.it

Standards Yu Yuan CATE Global Corp. y.yuan@ieee.org

Consumer Audio Technologies
Vincent Wang
DTS Inc., Singapore
Technology Center
vincent.wang@dts.com

Video & Multimedia Technologies
Euee S. Jang
Computer Science and Engineering, Hanyang University,

INCOMING EDITOR

Department of Computer Science and Engineering, University of North Texas Saraju.mohanty@unt.edu

CE Products & Technologies

Will Lumpkins L-3 Communications (Mission Integration), Sr. Systems Engineer xillia@ieee.org

CE Conferences & Industry

Linkages Stephen Dukes President, Imaginary Universes LLC. stephendukes@ieee.org

Home Automation & Networking

Stu Lipoff IP Action Partners LLC, Consulting for the Communications IT and Electronics Industries stu@inaction.com

CE Conferences Editor

CE Conferences Editor
(Asia)
Bernard Fong
Automotive Parts and Accessory
Systems R&D Centre
bfong@ieee.org

Seoul, Korea profjang@gmail.com

Security & Privacy Hyoungshick Kim College of Information and Communication Engineering, Sungkyunkwan University hyoung@skku.edu

Digital Imaging

Technologies Petronel Bigioi General Manager, FotoNation Ltd., Galway pbigioi@fotonation.com

Societal Impacts of CE

Societal Impacts of CE Sally Applin Centre for Social Anthropology and Computing (CSAC), University of Kent sally@sally.com

CE Hardware Technology

(IP Cores)
Anirban Sengupta
Discipline of Computer
Science and Engineering at
Indian Institute of Technology

ADVERTISING SALES

Mark David Senior Manager Advertising and Business Development Tel: +1 732 465 6473 m.david@ieee.org

IEEE PERIODICALS MAGAZINES DEPARTMENT

445 Hoes Lane, Piscataway, NJ 08854 USA

Craig Causer Managing Editor

Geraldine Krolin-Taylor Senior Managing Editor Janet Dudar Senior Art Director

Gail A. Schnitzer Associate Art Director

Mark Morrissey Associate Art Director

Theresa L. Smith Production Coordinator

Felicia Spagnoli Advertising Production Manager

Peter M. Tuohy Production Director Dawn M. Melley Editorial Director

Fran Zappulla Staff Director, Publishing Operations

