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IFIP was founded in 1960 under the auspices of UNESCO, following the first World Computer Congress held in Paris the previous year. A federation for societies working in information processing, IFIP's aim is two-fold: to support information processing in the countries of its members and to encourage technology transfer to developing nations. As its mission statement clearly states:

*IFIP is the global non-profit federation of societies of ICT professionals that aims at achieving a worldwide professional and socially responsible development and application of information and communication technologies.*

IFIP is a non-profit-making organization, run almost solely by 2500 volunteers. It operates through a number of technical committees and working groups, which organize events and publications. IFIP's events range from large international open conferences to working conferences and local seminars.

The flagship event is the IFIP World Computer Congress, at which both invited and contributed papers are presented. Contributed papers are rigorously refereed and the rejection rate is high.

As with the Congress, participation in the open conferences is open to all and papers may be invited or submitted. Again, submitted papers are stringently refereed.

The working conferences are structured differently. They are usually run by a working group and attendance is generally smaller and occasionally by invitation only. Their purpose is to create an atmosphere conducive to innovation and development. Refereeing is also rigorous and papers are subjected to extensive group discussion.

Publications arising from IFIP events vary. The papers presented at the IFIP World Computer Congress and at open conferences are published as conference proceedings, while the results of the working conferences are often published as collections of selected and edited papers.

IFIP distinguishes three types of institutional membership: Country Representative Members, Members at Large, and Associate Members. The type of organization that can apply for membership is a wide variety and includes national or international societies of individual computer scientists/ICT professionals, associations or federations of such societies, government institutions/government related organizations, national or international research institutes or consortia, universities, academies of sciences, companies, national or international associations or federations of companies.

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Michail Maniatakos · Ibrahim (Abe) M. Elfadel ·  
Matteo Sonza Reorda · H. Fatih Ugurdag ·  
José Monteiro · Ricardo Reis (Eds.)

# VLSI-SoC: Opportunities and Challenges Beyond the Internet of Things

25th IFIP WG 10.5/IEEE International Conference  
on Very Large Scale Integration, VLSI-SoC 2017  
Abu Dhabi, United Arab Emirates, October 23–25, 2017  
Revised and Extended Selected Papers

*Editors*

Michail Maniatakos   
New York University Abu Dhabi  
Abu Dhabi, United Arab Emirates

Matteo Sonza Reorda   
Politecnico di Torino  
Turin, Italy

José Monteiro   
INESC-ID  
Lisbon, Portugal

Ibrahim (Abe) M. Elfadel   
Khalifa University  
Abu Dhabi, United Arab Emirates

H. Fatih Ugurdag   
Ozyegin University  
Istanbul, Turkey

Ricardo Reis   
Federal University of Rio Grande do Sul  
Porto Alegre, Brazil

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## Preface

This book contains extended and revised versions of the highest quality papers that were presented during the 25th edition of the IFIP/IEEE WG10.5 International Conference on Very Large Scale Integration (VLSI-SoC), a global System-on-Chip Design and CAD conference. The 25th edition (Silver Jubilee Edition) of the conference was held in the period of October 23–25, 2017, at the Yas Viceroy Hotel, Yas Island, Abu Dhabi, United Arab Emirates. Previous conferences have taken place in Edinburgh, Scotland (1981); Trondheim, Norway (1983); Tokyo, Japan (1985); Vancouver, Canada (1987); Munich, Germany (1989); Edinburgh, Scotland (1991); Grenoble, France (1993); Chiba, Japan (1995); Gramado, Brazil (1997); Lisbon, Portugal (1999); Montpellier, France (2001); Darmstadt, Germany (2003); Perth, Australia (2005); Nice, France (2006); Atlanta, GA, USA (2007); Rhodes Island, Greece (2008); Florianopolis, Brazil (2009); Madrid, Spain (2010); Kowloon, Hong Kong (2011); Santa Cruz, CA, USA (2012); Istanbul, Turkey (2013); Playa del Carmen, Mexico (2014); Daejeon, South Korea (2015); and Tallin, Estonia (2016).

The purpose of this conference, which was sponsored by IFIP TC 10 Working Group 10.5, the IEEE Council on Electronic Design Automation (CEDA), and the IEEE Circuits and Systems Society, with the In-Cooperation of ACM SIGDA, is to provide a forum for the presentation and discussion of the latest academic and industrial results and developments as well as the future trends in the field of system-on-chip (SoC) design, considering the challenges of nano-scale, state-of-the-art, and emerging manufacturing technologies. The down-scaling of feature sizes of modern semiconductor technologies imposes numerous new challenges on the physical and system-level design of SoCs. In particular, growing reliability challenges demand new concepts in fault-tolerant SoC design and testing. In the post-IoT era, these challenges are complicated by more pressure to reduce cost so as to achieve edge-node ubiquity and further reduce power to extend edge-node lifetime. The chapters by Copetti et al., Garwal and Kapoor, and Thiele et al. relate to the post-IoT reliability concerns, while the chapters by Kimiyoshi et al., Nautiyal et al., and Rizzo et al. address low-power concerns. Other pressures include tighter integration of analog, communication, and signal processing functions within edge nodes. They are addressed in the chapters by Saadeh and Bin Altaf, Muzaffar and Elfadel, and Aldgheri and Bombieri. Finally, system-level thermal management and security concerns are taken up in the chapters by Cesairini et al. and Wamser and Sigl. The chapters of this new book in the VLSI-SoC series continue its tradition of providing an internationally acknowledged platform for scientific contributions and industrial progress on this field.

For the VLSI-SoC 2017 conference, 33 papers out of 112 submissions were selected for presentation, and out of these 33 full papers presented at the conference, 11 papers were chosen by a special selection committee to have an extended and revised version included in this book. The selection process of these papers considered the evaluation

scores during the review process as well as the review forms provided by members of the Technical Program Committee and session chairs as a result of the presentations.

The chapters of this book have authors from Brazil, China, Germany, India, Italy, Japan, Pakistan, Switzerland, United Arab Emirates and USA. The Technical Program Committee for the regular tracks comprised 107 members from 25 countries.

This book also includes a special chapter that presents the history of the VLSI-SoC series of conferences and its relation with VLSI-SoC evolution since the early 1980s up to the present.

VLSI-SoC 2017 was the culmination of the work of many dedicated volunteers: authors, reviewers, session chairs, invited speakers, and various committee chairs. We thank them all for their contributions.

This book is intended for the VLSI community at large, and in particular the many colleagues who did not have the chance to attend the conference. We hope you enjoy reading this book and that you will find it useful in your professional life and for the development of the VLSI community as a whole.

October 2018

Michail Maniatakos  
Ibrahim (Abe) M. Elfadel  
Matteo Sonza Reorda  
H. Fatih Ugurdag  
José Monteiro  
Ricardo Reis

# Organization

The IFIP/IEEE International Conference on Very Large Scale Integration System-on-Chip (VLSI-SoC) 2017 took place during October 23–25, 2017, at the Yas Viceroy, Yas Island, Abu Dhabi, United Arab Emirates. VLSI-SoC 2017 was the 25th in a series of international conferences, sponsored by IFIP TC 10 Working Group 10.5 (VLSI), IEEE CEDA and ACM SIGDA.

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# Contents

Level-Shifter-Less Approach for Multi- $V_{DD}$ SoC Design to Employ Body Bias Control in FD-SOI . . . . .	1
<i>Kimiyoshi Usami, Shunsuke Kogure, Yusuke Yoshida, Ryo Magasaki, and Hideharu Amano</i>	
Evaluating the Impact of Resistive Defects on FinFET-Based SRAMs . . . . .	22
<i>Thiago S. Copetti, Guilherme C. Medeiros, Leticia M. B. Poehls, and Tiago R. Balen</i>	
Lifetime Enhancement of Non-Volatile Caches by Exploiting Dynamic Associativity Management Techniques . . . . .	46
<i>Sukarn Agarwal and Hemangee K. Kapoor</i>	
A Wearable Neuro-Degenerative Diseases Classification System Using Human Gait Dynamics . . . . .	72
<i>Wala Saadeh and Muhammad Awais Bin Altaf</i>	
Self-timed Power-on Reset Circuit for Pseudo Dual/Two Port SRAM Used in Low-Voltage IoT Applications . . . . .	92
<i>Vivek Nautiyal, Lalit Gupta, Gaurav Singla, Jitendra Dasani, Sagar Dwivedi, and Martin Kinkade</i>	
Pulsed Decimal Encoding for IoT Single-Channel Dynamic Signaling . . . . .	112
<i>Shahzad Muzaffar and Ibrahim (Abe) M. Elfadel</i>	
Electromigration Analysis of VLSI Circuits Using the Finite Element Method . . . . .	133
<i>Matthias Thiele, Steve Bigalke, and Jens Lienig</i>	
On the Efficiency of Early Bird Sampling (EBS) an Error Detection-Correction Scheme for Data-Driven Voltage Over-Scaling . . . . .	153
<i>Roberto G. Rizzo, Valentino Peluso, Andrea Calimera, and Jun Zhou</i>	
Integrating Simulink, OpenVX, and ROS for Model-Based Design of Embedded Vision Applications . . . . .	178
<i>Stefano Aldegheri and Nicola Bombieri</i>	
Modeling and Evaluation of Application-Aware Dynamic Thermal Control in HPC Nodes . . . . .	198
<i>Daniele Cesarini, Andrea Bartolini, and Luca Benini</i>	
Pushing the Limits Further: Sub-Atomic AES . . . . .	220
<i>Markus Stefan Wamser and Georg Sigl</i>	

<b>VLSI-SoC: An Enduring Tradition</b> .....	240
<i>Ricardo Reis and Manfred Glesner</i>	
<b>Author Index</b> .....	257