# Table of Contents

**Preface** .................................................................................................................................................. xv

**Chapter 1**
Current Challenges in Embedded Communication Systems .............................................................. 1
  *Jouni Isoaho, University of Turku, Finland*
  *Seppo Virtanen, University of Turku, Finland*
  *Juha Plosila, University of Turku, Finland*

**Section 1**
Technologies for Embedded Communication Systems

**Chapter 2**
Parallel Programming and Its Architectures Based on Data Access Separated Algorithm Kernels ........................................................................................................................................... 23
  *Dake Liu, Linköping University, Sweden*
  *Joar Sohl, Linköping University, Sweden*
  *Jian Wang, Linköping University, Sweden*

**Chapter 3**
Towards Sustainable Development of Energy-Aware Systems .............................................................. 43
  *Luigia Petre, Åbo Akademi University, Finland*
  *Kaisa Sere, Åbo Akademi University, Finland*

**Chapter 4**
A Multidimensional Software Cache for Scratchpad-Based Systems .................................................. 59
  *Arnaldo Azevedo, Delft University of Technology, The Netherlands*
  *Ben Juurlink, Technische Universität Berlin, Germany*
Chapter 5
Automatic Generation of Memory Interfaces for ASIPs
David Kammler, RWTH Aachen University, Germany
Ernst Martin Witte, RWTH Aachen University, Germany
Anupam Chattopadhyay, RWTH Aachen University, Germany
Bastian Bauwens, RWTH Aachen University, Germany
Gerd Ascheid, RWTH Aachen University, Germany
Rainer Leupers, RWTH Aachen University, Germany
Heinrich Meyr, RWTH Aachen University, Germany

Section 2
Mobile Communication Applications

Chapter 6
System Architecture for 3GPP-LTE Modem using a Programmable Baseband Processor
Di Wu, Linköping University, Sweden
Johan Eilert, Linköping University, Sweden
Rizwan Asghar, Linköping University, Sweden
Dake Liu, Linköping University, Sweden
Anders Nilsson, Coresonic AB, Sweden
Eric Tell, Coresonic AB, Sweden
Eric Alfredsson, Coresonic AB, Sweden

Chapter 7
Joint Uplink and Downlink Performance Profiling of LTE Protocol Processing on a Mobile Platform
David Szczesny, Ruhr-Universität Bochum, Germany
Sebastian Hessel, Ruhr-Universität Bochum, Germany
Anas Showk, Ruhr-Universität Bochum, Germany
Attila Bilgic, Ruhr-Universität Bochum, Germany
Uwe Hildebrand, Comneon GmbH, Germany
Valerio Frascolla, Comneon GmbH, Germany

Chapter 8
Embedded Networks in Mobile Devices
Sergey Balandin, Nokia Research Center, Finland
Michel Gillet, Nokia Devices, Finland

Chapter 9
Implementation of FFT on General-Purpose Architectures for FPGA
Fabio Garzia, Tampere University of Technology, Finland
Roberto Airoldi, Tampere University of Technology, Finland
Jari Nurmi, Tampere University of Technology, Finland
Section 3
On-Chip Communication

Chapter 10
Performance Analysis of On-Chip Communication Structures under Device Variability ............... 177
Faiz-ul Hassan, University of Glasgow, UK
Wim Vanderbauwhede, University of Glasgow, UK
Fernando Rodriguez-Salazar, University of Glasgow, UK

Chapter 11
Schedulability Analysis for Real Time On-Chip Communication with Wormhole Switching .......... 198
Zheng Shi, University of York, UK
Alan Burns, University of York, UK
Leandro Soares Indrusiak, University of York, UK

Chapter 12
Modeling Communication in Multi–Processor Systems–on–Chip Using Modular Connectors ........ 219
Leonidas Tsiopoulos, Åbo Akademi University, Finland
Kaisa Sere, Åbo Akademi University, Finland
Juha Plosila, University of Turku, Finland

Chapter 13
Generating Process Network Communication Infrastructure for Custom Multi-Core Platforms ....... 241
Peter Sørensen, Technical University of Denmark, Denmark
Jan Madsen, Technical University of Denmark, Denmark

Section 4
Formalisms and Methodologies for Embedded Communication Systems

Chapter 14
Joint Validation of Application Models and Multi-Abstraction Network-on-Chip Platforms ............ 263
Sanna Määttä, Tampere University of Technology, Finland
Leandro Möller, Technische Universität Darmstadt, Germany
Leandro Soares Indrusiak, University of York, UK
Luciano Ost, Catholic University of Rio Grande do Sul, Brazil
Manfred Glesner, Technische Universität Darmstadt, Germany
Jari Nurmi, Tampere University of Technology, Finland
Fernando Moraes, Catholic University of Rio Grande do Sul, Brazil
Chapter 15
Hierarchical Agent Monitored Parallel On-Chip System: A Novel Design Paradigm and its
Formal Specification .................................................................................................................. 278
Liang Guang, University of Turku, Finland
Juha Plosila, University of Turku, Finland
Jouni Isoaho, University of Turku, Finland
Hannu Tenhunen, University of Turku, Finland

Chapter 16
Service-Oriented Development of Fault Tolerant Communicating Systems: Refinement
Approach .................................................................................................................................. 297
Linas Laibinis, Åbo Akademi University, Finland
Elena Troubitsyna, Åbo Akademi University, Finland
Sari Leppänen, Nokia Research Center, Finland

Compilation of References ...................................................................................................... 320

About the Contributors ............................................................................................................ 341

Index ....................................................................................................................................... 350