

Preface

Up to now the driving force of the development of most information technology (IT) devices and systems has mainly been performance-cost ratio boosting, but this has already begun to change. For some time energy consumption will occupy a growing portion in the design objective function of a large number of IT devices, especially in mobile, health, and ubiquitous applications. Using even the most energy-wise frugal technology, the energy we are spending for logic switching is still at least six orders of magnitude larger than the theoretical limit. The task of reducing that energy gap is not an easy one, but it can be quite effectively carried out if accompanied by a nicely coordinated effort of energy reduction among various design stages in the design process and among various components in the system.

A number of books have already been published that focus on low-energy design in one aspect, i.e., limited to an individual functional block such as on-chip networks, algorithms, processing cores, etc. Instead of merely enumerating various energy-reducing technologies, architectures, and algorithms, this book tries to explain the concepts of the most important functional blocks in typical information processing devices, e.g., memory blocks and systems, on-chip networks, and energy sources, such as batteries and fuel cells.

The most important market for low-energy devices, after the current booming smart phone, is probably energy-aware smart sensors. The variety of applications in the market is truly huge and expanding every year. With more and more traffic (both people and data) on the move, the planet is becoming more dangerous, as well as more exciting. The demand for installing smart sensors on various locations in our society as well as our bodies, i.e., on/in/outside the human body, obviously will grow. The scale and variety of threats against our society and each individual has never been so overwhelming, and this will probably escalate unless we carry out a systematic and coordinated effort toward building a safe society. We believe that the energy-aware smart sensor is one such attempt.

This book tries to show how the design of each functional block and algorithm can be changed by an addition of a new component: energy. Besides explanations of each functional block in early chapters, three application examples are given at the end: data/file storage systems, an artificial cochlea and retina, and a battery-operated surveillance camera. We understand that the coverage is far from complete

in terms of the variety of functional blocks, algorithms, and applications. Despite these imperfections, we sincerely hope, through this book, that the readers will gain some perspective and insights into energy-aware IT system design, which will lead us all toward a better, i.e., cleaner and safer society.

Daejeon, Republic of Korea
Pohang, Republic of Korea

Chong-Min Kyung
Sungjoo Yoo



<http://www.springer.com/978-94-007-1678-0>

Energy-Aware System Design
Algorithms and Architectures

Kyung, C.; Yoo, S. (Eds.)

2011, IX, 291 p., Hardcover

ISBN: 978-94-007-1678-0