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*Low Power Design in Deep Submicron
Electronics - W. Nebel 2013-06-29*

Low Power Design in Deep Submicron
Electronics deals with the different aspects of

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low power design for deep submicron electronics at all levels of abstraction from system level to circuit level and technology. Its objective is to guide industrial and academic engineers and researchers in the selection of methods, technologies and tools and to provide a baseline for further developments. Furthermore the book has been written to serve as a textbook for postgraduate student courses. In order to achieve both goals, it is structured into different chapters each of which addresses a different phase of the design, a particular level of abstraction, a unique design style or technology. These design-related chapters are amended by motivations in Chapter 2, which presents visions both of future low power applications and technology advancements, and by some advanced case studies in Chapter 9. From the Foreword: `... This global nature of design for low power was well understood by Wolfgang Nebel and Jean Mermet when organizing the NATO workshop which is the origin of the book.

They invited the best experts in the field to cover all aspects of low power design. As a result the chapters in this book are covering deep-submicron CMOS digital system design for low power in a systematic way from process technology all the way up to software design and embedded software systems. Low Power Design in Deep Submicron Electronics is an excellent guide for the practicing engineer, the researcher and the student interested in this crucial aspect of actual CMOS design. It contains about a thousand references to all aspects of the recent five years of feverish activity in this exciting aspect of design.' Hugo de Man Professor, K.U. Leuven, Belgium Senior Research Fellow, IMEC, Belgium
Proceedings - 2004

Brutal - Uday Satpathy 2015

Carbon Nanotube Based VLSI Interconnects
- Brajesh Kumar Kaushik 2014-11-01

The brief primarily focuses on the performance analysis of CNT based interconnects in current research scenario. Different CNT structures are modeled on the basis of transmission line theory. Performance comparison for different CNT structures illustrates that CNTs are more promising than Cu or other materials used in global VLSI interconnects. The brief is organized into five chapters which mainly discuss: (1) an overview of current research scenario and basics of interconnects; (2) unique crystal structures and the basics of physical properties of CNTs, and the production, purification and applications of CNTs; (3) a brief technical review, the geometry and equivalent RLC parameters for different single and bundled CNT structures; (4) a comparative analysis of crosstalk and delay for different single and bundled CNT structures; and (5) various unique mixed CNT bundle structures and their equivalent electrical models.

Digital Integrated Circuits - Jan M. Rabaey

1996

Beginning with discussions on the operation of electronic devices and analysis of the nucleus of digital design, the text addresses: the impact of interconnect, design for low power, issues in timing and clocking, design methodologies, and the effect of design automation on the digital design perspective.

TENCON 2004 - 2004

Low Power Design Essentials - Jan Rabaey
2009-04-21

This book contains all the topics of importance to the low power designer. It first lays the foundation and then goes on to detail the design process. The book also discusses such special topics as power management and modal design, ultra low power, and low power design methodology and flows. In addition, coverage includes projections of the future and case studies.

Intelligent Energy Field Manufacturing - Wenwu

Zhang 2018-10-03

Edited by prominent researchers and with contributions from experts in their individual areas, *Intelligent Energy Field Manufacturing: Interdisciplinary Process Innovations* explores a new philosophy of engineering. An in-depth introduction to Intelligent Energy Field Manufacturing (EFM), this book explores a fresh engineering methodology that not only integrates but goes beyond methodologies such as Design for Six Sigma, Lean Manufacturing, Concurrent Engineering, TRIZ, green and sustainable manufacturing, and more. This book gives a systematic introduction to classic non-mechanical manufacturing processes as well as offering big pictures of some technical frontiers in modern engineering. The book suggests that any manufacturing process is actually a process of injecting human intelligence into the interaction between material and the various energy fields in order to transfer the material into desired configurations. It discusses

technological innovation, dynamic M-PIE flows, the generalities of energy fields, logic functional materials and intelligence, the open scheme of intelligent EFM implementation, and the principles of intelligent EFM. The book takes a highly interdisciplinary approach that includes research frontiers such as micro/nano fabrication, high strain rate processes, laser shock forming, materials science and engineering, bioengineering, etc., in addition to a detailed treatment of the so called "non-traditional" manufacturing processes, which covers waterjet machining, laser material processing, ultrasonic material processing, EDM/ECM, etc. Filled with illustrative pictures, figures, and tables that make technical materials more absorbable, the book cuts across multiple engineering disciplines. The majority of books in this area report the facts of proven knowledge, while the behind-the-scenes thinking is usually neglected. This book examines the big picture of manufacturing in depth before diving into the

details of an individual process, demonstrating how innovations are achieved. It lowers barriers to technical innovation, meets new engineering challenges, and systematically introduces manufacturing processes.

Proceedings of the ... Custom Integrated Circuits Conference - 1987

ZnO Thin-Film Transistors for Cost-Efficient Flexible Electronics - Fábio Fedrizzi Vidor
2017-12-28

This book describes the integration, characterization and analysis of cost-efficient thin-film transistors (TFTs), applying zinc oxide as active semiconductors. The authors discuss soluble gate dielectrics, ZnO precursors, and dispersions containing nanostructures of the material, while different transistor configurations are analyzed with respect to their integration, compatibility, and device performance. Additionally, simple circuits (inverters and ring oscillators) and a

complementary design employing (in)organic semiconducting materials are presented and discussed. Readers will benefit from concise information on cost-efficient materials and processes, applied in flexible and transparent electronic technology, such as the use of solution-based materials and dispersion containing nanostructures, as well as discussion of the physical fundamentals responsible for the operation of the thin-film transistors and the non-idealities of the device.

Ultra-Low-Voltage Design of Energy-Efficient Digital Circuits - Nele Reynders 2015-04-14
This book focuses on increasing the energy-efficiency of electronic devices so that portable applications can have a longer stand-alone time on the same battery. The authors explain the energy-efficiency benefits that ultra-low-voltage circuits provide and provide answers to tackle the challenges which ultra-low-voltage operation poses. An innovative design methodology is presented, verified, and validated by four

prototypes in advanced CMOS technologies. These prototypes are shown to achieve high energy-efficiency through their successful functionality at ultra-low supply voltages.

Crosstalk in Modern On-Chip Interconnects -

B.K. Kaushik 2016-04-06

The book provides accurate FDTD models for on-chip interconnects, covering most recent advancements in materials and design.

Furthermore, depending on the geometry and physical configurations, different electrical equivalent models for CNT and GNR based interconnects are presented. Based on the electrical equivalent models the performance comparison among the Cu, CNT and GNR-based interconnects are also discussed in the book.

The proposed models are validated with the HSPICE simulations. The book introduces the current research scenario in the modeling of on-chip interconnects. It presents the structure, properties, and characteristics of graphene based on-chip interconnects and the FDTD

modeling of Cu based on-chip interconnects. The model considers the non-linear effects of CMOS driver as well as the transmission line effects of interconnect line that includes coupling capacitance and mutual inductance effects. In a more realistic manner, the proposed model includes the effect of width-dependent MFP of the MLGNR while taking into account the edge roughness.

Recent Progress in the Boolean Domain - Bernd Steinbach 2014-04-23

In today's world, people are using more and more digital systems in daily life. Such systems utilize the elementariness of Boolean values. A Boolean variable can carry only two different Boolean values: FALSE or TRUE (0 or 1), and has the best interference resistance in technical systems. However, a Boolean function exponentially depends on the number of its variables. This exponential complexity is the cause of major problems in the process of design and realization of circuits. According to Moore's

Law, the complexity of digital systems approximately doubles every 18 months. This requires comprehensive knowledge and techniques to solve very complex Boolean problems. This book summarizes the recent progress in the Boolean domain in solving such issues. Part 1 describes the most powerful approaches in solving exceptionally complex Boolean problems. It is shown how an extremely rare solution could be found in a gigantic search space of more than 10^{195} (this is a number of 196 decimal digits) different color patterns. Part 2 describes new research into digital circuits that realize Boolean functions. This part contains the chapters "Design" and "Test", which present solutions to problems of power dissipation, and the testing of digital circuits using a special data structure, as well as further topics. Part 3 contributes to the scientific basis of future circuit technologies, investigating the need for completely new design methods for the atomic level of quantum computers. This section also

concerns itself with circuit structures in reversible logic as the basis for quantum logic. **Microelectronics** - Roger Thomas Howe 1997 Introduction to Electronics/ Microelectronics at Junior Level. This text describes device physics and circuit design in the context of modern microelectronics integrated circuit technology. It introduces approaches to learning the core device physics and analog/digital circuit concepts that make the subject more accessible to the current generation of students. The authors have designed a concise, concentrated presentation, limiting coverage to only those concepts necessary for the understanding of devices and circuits.

Through Silicon Vias - Brajesh Kumar Kaushik 2016-11-30

Recent advances in semiconductor technology offer vertical interconnect access (via) that extend through silicon, popularly known as through silicon via (TSV). This book provides a comprehensive review of the theory behind TSVs

while covering most recent advancements in materials, models and designs. Furthermore, depending on the geometry and physical configurations, different electrical equivalent models for Cu, carbon nanotube (CNT) and graphene nanoribbon (GNR) based TSVs are presented. Based on the electrical equivalent models the performance comparison among the Cu, CNT and GNR based TSVs are also discussed.

Embedded SoPC Design with Nios II Processor and Verilog Examples - Pong P. Chu 2012-05-14

Explores the unique hardware programmability of FPGA-based embedded systems, using a learn-by-doing approach to introduce the concepts and techniques for embedded SoPC design with Verilog An SoPC (system on a programmable chip) integrates a processor, memory modules, I/O peripherals, and custom hardware accelerators into a single FPGA (field-programmable gate array) device. In addition to

the customized software, customized hardware can be developed and incorporated into the embedded system as well—allowing us to configure the soft-core processor, create tailored I/O interfaces, and develop specialized hardware accelerators for computation-intensive tasks. Utilizing an Altera FPGA prototyping board and its Nios II soft-core processor, Embedded SoPC Design with Nios II Processor and Verilog Examples takes a "learn by doing" approach to illustrate the hardware and software design and development process by including realistic projects that can be implemented and tested on the board. Emphasizing hardware design and integration throughout, the book is divided into four major parts: Part I covers HDL and synthesis of custom hardware Part II introduces the Nios II processor and provides an overview of embedded software development Part III demonstrates the design and development of hardware and software of several complex I/O peripherals, including a PS2 keyboard and

mouse, a graphic video controller, an audio codec, and an SD (secure digital) card Part IV provides several case studies of the integration of hardware accelerators, including a custom GCD (greatest common divisor) circuit, a Mandelbrot set fractal circuit, and an audio synthesizer based on DDFS (direct digital frequency synthesis) methodology While designing and developing an embedded SoPC can be rewarding, the learning can be a long and winding journey. This book shows the trail ahead and guides readers through the initial steps to exploit the full potential of this emerging methodology.

Building Embedded Systems - Changyi Gu
2016-05-26

Develop the software and hardware you never think about. We're talking about the nitty-gritty behind the buttons on your microwave, inside your thermostat, inside the keyboard used to type this description, and even running the monitor on which you are reading it now. Such

stuff is termed embedded systems, and this book shows how to design and develop embedded systems at a professional level. Because yes, many people quietly make a successful career doing just that. Building embedded systems can be both fun and intimidating. Putting together an embedded system requires skill sets from multiple engineering disciplines, from software and hardware in particular. Building Embedded Systems is a book about helping you do things in the right way from the beginning of your first project: Programmers who know software will learn what they need to know about hardware. Engineers with hardware knowledge likewise will learn about the software side. Whatever your background is, Building Embedded Systems is the perfect book to fill in any knowledge gaps and get you started in a career programming for everyday devices. Author Changyi Gu brings more than fifteen years of experience in working his way up the ladder in the field of embedded systems. He brings knowledge of numerous

approaches to embedded systems design, including the System on Programmable Chips (SOPC) approach that is currently growing to dominate the field. His knowledge and experience make *Building Embedded Systems* an excellent book for anyone wanting to enter the field, or even just to do some embedded programming as a side project. What You Will Learn Program embedded systems at the hardware level Learn current industry practices in firmware development Develop practical knowledge of embedded hardware options Create tight integration between software and hardware Practice a work flow leading to successful outcomes Build from transistor level to the system level Make sound choices between performance and cost Who This Book Is For Embedded-system engineers and intermediate electronics enthusiasts who are seeking tighter integration between software and hardware. Those who favor the System on a Programmable Chip (SOPC) approach will in particular benefit

from this book. Students in both Electrical Engineering and Computer Science can also benefit from this book and the real-life industry practice it provides.

The Dark Side of Silicon - Amir M. Rahmani
2016-12-31

This book presents the state-of-the art of one of the main concerns with microprocessors today, a phenomenon known as "dark silicon". Readers will learn how power constraints (both leakage and dynamic power) limit the extent to which large portions of a chip can be powered up at a given time, i.e. how much actual performance and functionality the microprocessor can provide. The authors describe their research toward the future of microprocessor development in the dark silicon era, covering a variety of important aspects of dark silicon-aware architectures including design, management, reliability, and test. Readers will benefit from specific recommendations for mitigating the dark silicon phenomenon,

including energy-efficient, dedicated solutions and technologies to maximize the utilization and reliability of microprocessors.

Secure Smart Embedded Devices, Platforms and Applications - Konstantinos Markantonakis
2013-09-14

New generations of IT users are increasingly abstracted from the underlying devices and platforms that provide and safeguard their services. As a result they may have little awareness that they are critically dependent on the embedded security devices that are becoming pervasive in daily modern life. *Secure Smart Embedded Devices, Platforms and Applications* provides a broad overview of the many security and practical issues of embedded devices, tokens, and their operation systems, platforms and main applications. It also addresses a diverse range of industry/government initiatives and considerations, while focusing strongly on technical and practical security issues. The

benefits and pitfalls of developing and deploying applications that rely on embedded systems and their security functionality are presented. A sufficient level of technical detail to support embedded systems is provided throughout the text, although the book is quite readable for those seeking awareness through an initial overview of the topics. This edited volume benefits from the contributions of industry and academic experts and helps provide a cross-discipline overview of the security and practical issues for embedded systems, tokens, and platforms. It is an ideal complement to the earlier work, *Smart Cards Tokens, Security and Applications* from the same editors.

Forthcoming Books - Rose Arny 2003

Digital Signal Processing Applications - 2004

Berkshire Encyclopedia of Sustainability

7/10 - Ray C. Anderson 2012-11-01

China, India, and East and Southeast Asia:

Assessing Sustainability provides unprecedented analyses by regional experts and scholars elsewhere in the world on China, India, and their neighbors. Despite growing demands internally on their natural resources (China and India alone are home to more than one-third of the world's population), the expanding global economic influence of this region makes these countries vital players in a sustainable future for all citizens of the Earth. Regional coverage includes topics such as business and commerce, environmental and corporate law, and lifestyles and values.

Toward Quantum FinFET - Weihua Han

2013-11-23

This book reviews a range of quantum phenomena in novel nanoscale transistors called FinFETs, including quantized conductance of 1D transport, single electron effect, tunneling transport, etc. The goal is to create a fundamental bridge between quantum FinFET and nanotechnology to stimulate readers'

interest in developing new types of semiconductor technology. Although the rapid development of micro-nano fabrication is driving the MOSFET downscaling trend that is evolving from planar channel to nonplanar FinFET, silicon-based CMOS technology is expected to face fundamental limits in the near future. Therefore, new types of nanoscale devices are being investigated aggressively to take advantage of the quantum effect in carrier transport. The quantum confinement effect of FinFET at room temperatures was reported following the breakthrough to sub-10nm scale technology in silicon nanowires. With chapters written by leading scientists throughout the world, Toward Quantum FinFET provides a comprehensive introduction to the field as well as a platform for knowledge sharing and dissemination of the latest advances. As a roadmap to guide further research in an area of increasing importance for the future development of materials science,

nanofabrication technology, and nano-electronic devices, the book can be recommended for Physics, Electrical Engineering, and Materials Science departments, and as a reference on micro-nano electronic science and device design. Offers comprehensive coverage of novel nanoscale transistors with quantum confinement effect Provides the keys to understanding the emerging area of the quantum FinFET Written by leading experts in each research area Describes a key enabling technology for research and development of nanofabrication and nanoelectronic devices

12th International Symposium on System Synthesis - 1999

These proceedings cover: real-time and low power system design; performance issues in system design; memory design for embedded systems; architectural synthesis; and system design methodologies."

Materials for Information Technology - Ehrenfried Zschech 2006-07-02

This book provides an up to date survey of the state of the art of research into the materials used in information technology, and will be bought by researchers in universities, institutions as well as research workers in the semiconductor and IT industries.

Micro-Relay Technology for Energy-Efficient Integrated Circuits - Hei Kam 2014-10-16

This volume describes the design of relay-based circuit systems from device fabrication to circuit micro-architectures. This book is ideal for both device engineers as well as circuit system designers, and highlights the importance of co-design across design hierarchies when trying to optimize system performance (in this case, energy-efficiency). The book will also appeal to researchers and engineers focused on semiconductor, integrated circuits, and energy efficient electronics.

CMOS Digital Integrated Circuits - Sung-Mo Kang 2002

The fourth edition of CMOS Digital Integrated

Circuits: Analysis and Design continues the well-established tradition of the earlier editions by offering the most comprehensive coverage of digital CMOS circuit design, as well as addressing state-of-the-art technology issues highlighted by the widespread use of nanometer-scale CMOS technologies. In this latest edition, virtually all chapters have been re-written, the transistor model equations and device parameters have been revised to reflect the significant changes that must be taken into account for new technology generations, and the material has been reinforced with up-to-date examples. The broad-ranging coverage of this textbook starts with the fundamentals of CMOS process technology, and continues with MOS transistor models, basic CMOS gates, interconnect effects, dynamic circuits, memory circuits, arithmetic building blocks, clock and I/O circuits, low power design techniques, design for manufacturability and design for testability.

Integrated Circuit Design - Neil H. E. Weste 2011

This edition presents broad and in-depth coverage of the entire field of modern CMOS VLSI Design. The authors draw upon extensive industry and classroom experience to introduce today's most advanced and effective chip design practices.

Efficient Design of Variation-Resilient Ultra-Low Energy Digital Processors - Hans Reyserhove 2019-03-27

This book enables readers to achieve ultra-low energy digital system performance. The author's main focus is the energy consumption of microcontroller architectures in digital (sub)-systems. The book covers a broad range of topics extensively: from circuits through design strategy to system architectures. The result is a set of techniques and a context to realize minimum energy digital systems. Several prototype silicon implementations are discussed, which put the proposed techniques to the test.

The achieved results demonstrate an extraordinary combination of variation-resilience, high speed performance and ultra-low energy.

Processor Design - Jari Nurmi 2007-07-26

Here is an extremely useful book that provides insight into a number of different flavors of processor architectures and their design, software tool generation, implementation, and verification. After a brief introduction to processor architectures and how processor designers have sometimes failed to deliver what was expected, the authors introduce a generic flow for embedded on-chip processor design and start to explore the vast design space of on-chip processing. The authors cover a number of different types of processor core.

FPGA Prototyping by VHDL Examples - Pong P. Chu 2011-09-20

This book uses a "learn by doing" approach to introduce the concepts and techniques of VHDL and FPGA to designers through a series of

hands-on experiments. FPGA Prototyping by VHDL Examples provides a collection of clear, easy-to-follow templates for quick code development; a large number of practical examples to illustrate and reinforce the concepts and design techniques; realistic projects that can be implemented and tested on a Xilinx prototyping board; and a thorough exploration of the Xilinx PicoBlaze soft-core microcontroller.

Modern VLSI Design - Wayne Wolf 2002-01-14

For Electrical Engineering and Computer Engineering courses that cover the design and technology of very large scale integrated (VLSI) circuits and systems. May also be used as a VLSI reference for professional VLSI design engineers, VLSI design managers, and VLSI CAD engineers. Modern VLSI Design provides a comprehensive "bottom-up" guide to the design of VLSI systems, from the physical design of circuits through system architecture with focus on the latest solution for system-on-chip (SOC) design. Because VLSI system designers face a

variety of challenges that include high performance, interconnect delays, low power, low cost, and fast design turnaround time, successful designers must understand the entire design process. The Third Edition also provides a much more thorough discussion of hardware description languages, with introduction to both Verilog and VHDL. For that reason, this book presents the entire VSLI design process in a single volume.

A Computer-Aided Design and Synthesis Environment for Analog Integrated Circuits - Geert Van der Plas 2002-04-30

This text addresses the design methodologies and CAD tools available for the systematic design and design automation of analogue integrated circuits. Two complementary approaches discussed increase analogue design productivity, demonstrated throughout using design times of the different design experiments undertaken.

Digital Integrated Circuits - Jan M. Rabaey 1996

designer for new challenges that might be waiting around the corner. Design-oriented perspectives are advocated throughout. Design challenges and guidelines are h... The publisher, Prentice-Hall

Engineering/Science/Mathematics Progressive in content and form, this practical text successfully bridges the gap between the circuit perspective and system perspective of digital integrated circuit design. Beginning with solid discussions on the operation of electronic devices and in-depth analysis of the nucleus of digital design, the text maintains a consistent, logical flow of subject matter throughout, addressing today's most significant and compelling industry topics: the impact of interconnect, design for low power, issues

CMOS - R. Jacob Baker 2008

This edition provides an important contemporary view of a wide range of analog/digital circuit blocks, the BSIM model, data converter architectures, and more. The authors develop

design techniques for both long- and short-channel CMOS technologies and then compare the two.

Process Variations and Probabilistic Integrated Circuit Design - Manfred Dietrich
2011-11-20

Uncertainty in key parameters within a chip and between different chips in the deep sub micron area plays a more and more important role. As a result, manufacturing process spreads need to be considered during the design process.

Quantitative methodology is needed to ensure faultless functionality, despite existing process variations within given bounds, during product development. This book presents the technological, physical, and mathematical fundamentals for a design paradigm shift, from a deterministic process to a probability-orientated design process for microelectronic circuits.

Readers will learn to evaluate the different sources of variations in the design flow in order to establish different design variants, while

applying appropriate methods and tools to evaluate and optimize their design.

[Embedded SoPC Design with Nios II Processor and VHDL Examples](#) - Pong P. Chu 2011-09-26

The book is divided into four major parts. Part I covers HDL constructs and synthesis of basic digital circuits. Part II provides an overview of embedded software development with the emphasis on low-level I/O access and drivers. Part III demonstrates the design and development of hardware and software for several complex I/O peripherals, including PS2 keyboard and mouse, a graphic video controller, an audio codec, and an SD (securedigital) card. Part IV provides three case studies of the integration of hardware accelerators, including a custom GCD (greatest common divisor) circuit, a Mandelbrot set fractal circuit, and an audio synthesizer based on DDFS (direct digital frequency synthesis) methodology. The book utilizes FPGA devices, Nios II soft-core processor, and development platform from Altera

Co., which is one of the two main FPGA manufacturers. Altera has a generous university program that provides free software and discounted prototyping boards for educational institutions (details at <http://www.altera.com/university>). The two main educational prototyping boards are known as DE1 (\$99) and DE2 (\$269). All experiments can be implemented and tested with these boards. A board combined with this book becomes a “turn-key” solution for the SoPC design experiments and projects. Most HDL and C codes in the book are device independent and can be adapted by other prototyping boards as long as a board has similar I/O configuration.

[Software Engineering Perspectives in Intelligent Systems](#) - Radek Silhavy 2020-12-15

This book constitutes the refereed proceedings of the 4th Computational Methods in Systems and Software 2020 (CoMeSySo 2020)

proceedings. Software engineering, computer science and artificial intelligence are crucial topics for the research within an intelligent systems problem domain. The CoMeSySo 2020 conference is breaking the barriers, being held online. CoMeSySo 2020 intends to provide an international forum for the discussion of the latest high-quality research results.

Single-chip Bluetooth Solutions - Sudepto Chakraborty 2001

Analysis and Design of Digital Integrated Circuits - David A. Hodges 2003

The third edition of Hodges and Jackson's Analysis and Design of Digital Integrated Circuits has been thoroughly revised and updated by a new co-author, Resve Saleh of the University of British Columbia. The new edition combines the approachability and concise nature of the Hodges and Jackson classic with a complete overhaul to bring the book into the 21st century. The new edition has replaced the

emphasis on BiPolar with an emphasis on CMOS. The outdated MOS transistor model used throughout the book will be replaced with the now standard deep submicron model. The material on memory has been expanded and updated. As well the book now includes more on SPICE simulation and new problems that reflect recent technologies. The emphasis of the book is

on design, but it does not neglect analysis and has as a goal to provide enough information so that a student can carry out analysis as well as be able to design a circuit. This book provides an excellent and balanced introduction to digital circuit design for both students and professionals.