

Analog And Digital Circuits For Electronic Control System Applications Using The Ti Msp430 Microcontroller

Packed full of real circuits to build and test, Hands-On Electronics is a unique introduction to analog and digital electronics theory and practice. Ideal both as a college textbook and for self-study, the friendly style, clear illustrations and construction details included in the book encourage rapid and effective learning of analog and digital circuit design theory. All the major topics for a typical one semester course are covered including RC circuits, diodes, transistors, op-amps, oscillators, TTL logic, counters, D/A converters and more. There are also chapters explaining how to use the equipment needed for the examples (oscilloscope, multimeter and breadboard) together with pin-out diagrams and manufacturers' specifications for all the key components referred to in the book.

Defect oriented testing is expected to play a significant role in coming generations of technology. Smaller feature sizes and larger die sizes will make ICs more sensitive to defects that can not be modeled by traditional fault modeling approaches. Furthermore, with increased level of integration, an IC may contain diverse building blocks. Such blocks include, digital logic, PLAs, volatile and non-volatile memories, and analog interfaces. For such diverse building blocks, traditional fault modeling and test approaches will become increasingly inadequate. Defect oriented testing methods have come a long way from a mere interesting academic exercise to a hard industrial reality. Many factors have contributed to its industrial acceptance. Traditional approaches of testing

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modern integrated circuits (ICs) have been found to be inadequate in terms of quality and economics of test. In a globally competitive semiconductor market place, overall product quality and economics have become very important objectives. In addition, electronic systems are becoming increasingly complex and demand components of highest possible quality. Testing, in general and, defect oriented testing, in particular, help in realizing these objectives. Defect Oriented Testing for CMOS Analog and Digital Circuits is the first book to provide a complete overview of the subject. It is essential reading for all design and test professionals as well as researchers and students working in the field. 'A strength of this book is its breadth. Types of designs considered include analog and digital circuits, programmable logic arrays, and memories. Having a fault model does not automatically provide a test. Sometimes, design for testability hardware is necessary. Many design for testability ideas, supported by experimental evidence, are included.' ... from the Foreword by Vishwani D. Agrawal

Troubleshooting Analog Circuits is a guidebook for solving product or process related problems in analog circuits. The book also provides advice in selecting equipment, preventing problems, and general tips. The coverage of the book includes the philosophy of troubleshooting; the modes of failure of various components; and preventive measures. The text also deals with the active components of analog circuits, including diodes and rectifiers, optically coupled devices, solar cells, and batteries. The book will be of great use to both students and practitioners of electronics engineering. Other professionals dealing with electronics will also benefit from the text, such as electric technicians.

Intuitive Analog Circuit Design outlines ways of thinking about analog circuits and systems that let you develop a feel for what a good, working analog circuit design should be. This

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book reflects author Marc Thompson's 30 years of experience designing analog and power electronics circuits and teaching graduate-level analog circuit design, and is the ideal reference for anyone who needs a straightforward introduction to the subject. In this book, Dr. Thompson describes intuitive and "back-of-the-envelope" techniques for designing and analyzing analog circuits, including transistor amplifiers (CMOS, JFET, and bipolar), transistor switching, noise in analog circuits, thermal circuit design, magnetic circuit design, and control systems. The application of some simple rules of thumb and design techniques is the first step in developing an intuitive understanding of the behavior of complex electrical systems. Introducing analog circuit design with a minimum of mathematics, this book uses numerous real-world examples to help you make the transition to analog design. The second edition is an ideal introductory text for anyone new to the area of analog circuit design. Design examples are used throughout the text, along with end-of-chapter examples Covers real-world parasitic elements in circuit design and their effects

This book introduces the basic mathematical tools used to describe noise and its propagation through linear systems and provides a basic description of the improvement of signal-to-noise ratio by signal averaging and linear filtering. The text also demonstrates how op amps are the keystone of modern analog signal conditioning systems design, and it

IS THE TOPIC ANALOG TESTING AND DIAGNOSIS TIMELY? Yes, indeed it is. Testing and Diagnosis is an important topic and fulfills a vital need for the electronic industry. The testing and diagnosis of digital electronic circuits has been successfully developed to the point that it can be automated. Unfortunately, its development for analog electronic circuits is still in its Stone Age. The engineer's intuition is still the most powerful tool used in the industry!

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There are two reasons for this. One is that there has been no pressing need from the industry. Analog circuits are usually small in size. Sometimes, the engineer's experience and intuition are sufficient to fulfill the need. The other reason is that there are no breakthrough results from academic research to provide the industry with critical ideas to develop tools. This is not because of a lack of effort. Both academic and industrial research groups have made major efforts to look into this problem. Unfortunately, the problem for analog circuits is fundamentally different from and much more difficult than its counterpart for digital circuits. These efforts have led to some important findings, but are still not at the point of being practically useful. However, these situations are now changing. The current trend for the design of VLSI chips is to use analog/digital hybrid circuits, instead of digital circuits from the past. Therefore, even though the analog circuit may be small, the total circuit under testing is large. Electronics: Basic, Analog, and Digital with PSpice does more than just make unsubstantiated assertions about electronics. Compared to most current textbooks on the subject, it pays significantly more attention to essential basic electronics and the underlying theory of semiconductors. In discussing electrical conduction in semiconductors, the author addresses the important but often ignored fundamental and unifying concept of electrochemical potential of current carriers, which is also an instructive link between semiconductor and ionic systems at a time when electrical engineering students are increasingly being exposed to biological systems. The text presents the background and tools necessary for at least a qualitative understanding of new and projected advances in microelectronics. The author provides helpful PSpice simulations and associated procedures (based on schematic capture, and using OrCAD® 16.0 Demo software), which are available for download. These simulations are explained in

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considerable detail and integrated throughout the book. The book also includes practical, real-world examples, problems, and other supplementary material, which helps to demystify concepts and relations that many books usually state as facts without offering at least some plausible explanation. With its focus on fundamental physical concepts and thorough exploration of the behavior of semiconductors, this book enables readers to better understand how electronic devices function and how they are used. The book's foreword briefly reviews the history of electronics and its impact in today's world. ***Classroom Presentations are provided on the CRC Press website. Their inclusion eliminates the need for instructors to prepare lecture notes. The files can be modified as may be desired, projected in the classroom or lecture hall, and used as a basis for discussing the course material.***

This revised edition of the bestselling text contains updated coverage of Gallium Arsenide, instrumentation amplifiers and active filters and the 55 tuner.

Optical Biosensors, 2ed describes the principles of successful systems, examples of applications, and evaluates the advantages and deficiencies of each. It also addresses future developments on two levels: possible improvements in existing systems and emerging technologies that could provide new capabilities in the future. The book is formatted for ease of use and is therefore suitable for scientists and engineers, students and researcher at all levels in the field. *

Comprehensive analysis and review of the underlying principles by optical biosensors * Updates and informs on all the latest developments and hot topic areas * Evaluates current methods showing the advantages and disadvantages of various systems involved

The primary purpose of this book is to explain the fundamentals of data converters for students and engineers involved in this fascinating field as a newcomer.

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The second edition of this book has been updated and enlarged, especially the chapters on digital electronics. In the analog part, several additions have been made wherever necessary. Also, optical devices and circuits have been introduced. Analog electronics spans semiconductors, diodes, transistors, small and large-signal amplifiers, OPAMPs and their applications. Both BJT and JFET, and MOSFET are treated parallelly so as to highlight their similarities and dissimilarities for thorough understanding of their parameters and specifications. The digital electronics covers logic gates, combinational circuits, IC families, number systems codes, adders/subtractors, flip-flops, registers and counters. Sequential circuits, memories and D/A and A/D convertor circuits are especially stressed. Fabrication technology of integrated devices and circuits have also been dealt with. Besides, many new examples and problems have been added section-wise. The text is written in simple yet rigorous manner with profusion of illustrative examples as an aid to clear understanding. The student can self-study several portions of the book with minimal guidance. A solution manual is available for the teachers.

Analog Circuits Cookbook is a collection of tried and tested recipes from the masterchef of analog and RF design. Based on articles from Electronics World, this book provides a diet of high quality design techniques and applications, and proven circuit designs, all concerned with the analog, RF and interface fields of electronics. Ian Hickman uses illustrations and examples rather than tough mathematical theory to present a wealth of ideas and tips based on his own workbench experience. This second edition includes 10 of Hickman's latest articles, alongside 20 of his most popular classics. The new material includes articles on power supplies, filters using negative resistance, phase noise and video surveillance systems. Essential reading for all circuit design professionals

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and advanced hobbyists Contains 10 of Ian Hickman's latest articles, alongside 20 of his most popular classics

This book contains the extended and revised editions of all the talks of the ninth AACD Workshop held in Hotel Bachmair, April 11 - 13 2000 in Rottach-Egem, Germany. The local organization was managed by Rudolf Koch of Infineon Technologies AG, Munich, Germany. The program consisted of six tutorials per day during three days. Experts in the field presented these tutorials and state of the art information is communicated. The audience at the end of the workshop selects program topics for the following workshop. The program committee, consisting of Johan Huijsing of Delft University of Technology, Willy Sansen of Katholieke Universiteit Leuven and Rudy van de Plassche of Broadcom Netherlands BV Bunnik elaborates the selected topics into a three-day program and selects experts in the field for presentation. Each AACD Workshop has given rise to publication of a book by Kluwer entitled "Analog Circuit Design". A series of nine books in a row provides valuable information and good overviews of all analog circuit techniques concerning design, CAD, simulation and device modeling. These books can be seen as a reference to those people involved in analog and mixed signal design. The aim of the workshop is to brainstorm on new and valuable design ideas in the area of analog circuit design. It is the hope of the program committee that this ninth book continues the tradition of emerging contributions to the design of analog and mixed signal systems in Europe and the rest of the world.

A reference volume of analog electronic circuits based on the op-amp, containing practical detail and technical advice.

A comprehensive and in-depth review of analog circuitlayout, schematic architecture, device, power network and ESDdesign This book will provide a

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balanced overview of analog circuit design layout, analog circuit schematic development, architecture of chips, and ESD design. It will start at an introductory level and will bring the reader right up to the state-of-the-art. Two critical design aspects for analog and power integrated circuits are combined. The first design aspect covers analog circuit design techniques to achieve the desired circuit performance. The second and main aspect presents the additional challenges associated with the design of adequate and effective ESD protection elements and schemes. A comprehensive list of practical application examples is used to demonstrate the successful combination of both techniques and any potential design trade-offs. Chapter One looks at analog design discipline, including layout and analog matching and analog layout design practices. Chapter Two discusses analog design with circuits, examining: single transistor amplifiers; multi-transistor amplifiers; active loads and more. The third chapter covers analog design layout (also MOSFET layout), before Chapters Four and Five discuss analog design synthesis. The next chapters introduce the reader to analog-digital mixed signal design synthesis, analog signal pin ESD networks, and analog ESD power clamps. Chapter Nine, the last chapter, covers ESD design in analog applications. Clearly describes analog design fundamentals (circuit fundamentals) as well as

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outlining the various ESD implications Covers a large breadth of subjects and technologies, such as CMOS, LDMOS, BCD, SOI, and thick body SOI Establishes an “ESD analog design” discipline that distinguishes itself from the alternative ESD digital design focus Focuses on circuit and circuit design applications Assessible, with the artwork and tutorial style of the ESD book series PowerPoint slides are available for university faculty members Even in the world of digital circuits, analog and power circuits are two very important but under-addressed topics, especially from the ESD aspect. Dr. Voldman’s new book will serve as an essential and practical guide to the greater IC community. With high practical and academic values this book is a “bible” for professionals, graduate students, device and circuit designers for investigating the physics of ESD and for product designs and testing. In PSpice for Analog Communications Engineering we simulate the difficult principles of analog modulation using the superb free simulation software Cadence Orcad PSpice V10.5. While use is made of analog behavioral model parts (ABM), we use actual circuitry in most of the simulation circuits. For example, we use the 4-quadrant multiplier IC AD633 as a modulator and import real speech as the modulating source and look at the trapezoidal method for measuring the modulation index. Modulation is the process of relocating signals to

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different parts of the radio frequency spectrum by modifying certain parameters of the carrier in accordance with the modulating/information signals. In amplitude modulation, the modulating source changes the carrier amplitude, but in frequency modulation it causes the carrier frequency to change (and in phase modulation it's the carrier phase). The digital equivalent of these modulation techniques are examined in PSpice for Digital communications Engineering where we examine QAM, FSK, PSK and variants. We examine a range of oscillators and plot Nyquist diagrams showing the marginal stability of these systems. The superhetrodyne principle, the backbone of modern receivers is simulated using discrete components followed by simulating complete AM and FM receivers. In this exercise we examine the problems of matching individual stages and the use of double-tuned RF circuits to accommodate the large FM signal bandwidth. Foundations of Analog and Digital Electronic Circuits Elsevier

Electronic Circuits covers all important aspects and applications of modern analog and digital circuit design. The basics, such as analog and digital circuits, on operational amplifiers, combinatorial and sequential logic and memories, are treated in Part I, while Part II deals with applications. Each chapter offers solutions that enable the reader to understand ready-made circuits or to proceed quickly from an

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idea to a working circuit, and always illustrated by an example. Analog applications cover such topics as analog computing circuits. The digital sections deal with AD and DA conversion, digital computing circuits, microprocessors and digital filters. This editions contains the basic electronics for mobile communications. The accompanying CD-ROM contains PSPICE software, an analog-circuit-simulation package, plus simulation examples and model libraries related to the book topics.

Engineers and scientists frequently find themselves having to get involved in electronic circuit design even though this may not be their specialty. This book is specifically designed for these situations, and has two major advantages for the inexperienced designer: it assumes little prior knowledge of electronics and it takes a modular approach, so you can find just what you need without working through a whole chapter. The first three parts of the book start by refreshing the basic mathematics and physics needed to understand circuit design. Part four discusses individual components (resistors, capacitors etc.), while the final and largest section describes commonly encountered circuit elements such as differentiators, oscillators, filters and couplers. A major bonus and learning aid is the inclusion of a CD-ROM with the student edition of the PSpice simulation software, together with models of most of the circuits described in the book.

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Virtual Manufacturing presents a novel concept of combining human computer interfaces with virtual reality for discrete and continuous manufacturing systems. The authors address the relevant concepts of manufacturing engineering, virtual reality, and computer science and engineering, before embarking on a description of the methodology for building augmented reality for manufacturing processes and manufacturing systems. Virtual Manufacturing is centered on the description of the development of augmented reality models for a range of processes based on CNC, PLC, SCADA, mechatronics and on embedded systems. Further discussions address the use of augmented reality for developing augmented reality models to control contemporary manufacturing systems and to acquire micro- and macro-level decision parameters for managers to boost profitability of their manufacturing systems. Guiding readers through the building of their own virtual factory software, Virtual Manufacturing comes with access to online files and software that will enable readers to create a virtual factory, operate it and experiment with it. This is a valuable source of information with a useful toolkit for anyone interested in virtual manufacturing, including advanced undergraduate students, postgraduate students and researchers. The latest edition of this classic work on practical electronics contains improved coverage of

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microprocessors and microcomputers as well as interfacing components, such as D/A and A/D converters and multiplexers. The book also includes expanded treatment of equivalent circuits, Kirschoff's laws, and Nyquist and Bode diagrams and updated sections on transducers and digital circuitry.

Practical Digital Electronics for Technicians covers topics on analog and digital signals, logic gates, combinational logic, and Karnaugh mapping. The book discusses the characteristics and types of logic families; sequential systems including latch, bistable circuits, counters and shift registers; Schmitt triggers and multivibrators; and MSI combinational logic systems. Display devices, including LED, LCD and dot matrix display; analog and digital conversion; and examples of and equipment for digital fault finding are also considered. The book concludes by providing answers to the questions from each chapter. Electronics technicians and students engaged in electronics courses will find the book useful.

In the real world, most signals are analog, spanning continuously varying values. Circuits that interface with the physical environment need to be able to process these signals. Principles of Analog Electronics introduces the fascinating world of analog electronics, where fields, circuits, signals and systems, and semiconductors meet. Drawing on the author's teaching experience, this richly illustrated, full-color textbook expertly blends theory with practical examples to give a clear understanding of how real electronic circuits work. Build from the Essentials of Math, Physics, and Chemistry to Electronic Components, Circuits, and Applications Building a solid foundation, the book first explains the mathematics, physics, and chemistry that are essential for grasping the principles behind the operation of electronic devices. It then examines the theory of circuits

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through models and important theorems. The book describes and analyzes passive and active electronic devices, focusing on fundamental filters and common silicon-based components, including diodes, bipolar junction transistors, and metal–oxide–semiconductor field-effect transistors (MOSFETs). It also shows how semiconductor devices are used to design electronic circuits such as rectifiers, power suppliers, clamper and clipper circuits, and amplifiers. A chapter explores actual applications, from audio amplifiers and FM radios to battery chargers. Delve Deeper into Analog Electronics through Curiosities, Key Personalities, and Practical Examples Each chapter includes helpful summaries with key points, jargon, and terms, as well as exercises to test your knowledge. Practical tables illustrate the coding schemes to help identify commercial passive and active components. Throughout, sidebars highlight "curiosities," interesting observations, and examples that make the subject more concrete. This textbook offers a truly comprehensive introduction to the fundamentals of analog electronics, including essential background concepts. Taking a fresh approach, it connects electronics to its importance in daily life, from music to medicine and more.

In system design (in particular, industrial control systems), there is, and has been, a continuous need to sense real-world analog quantities (such as temperature, pressure, or humidity), make computations with them, and then perform some action with the result. In today's systems, the computations need to be made at increased speeds and the accuracy with which the computations must be made, even as the speed increases, must be the same or higher as time progresses. The advent of the microcontroller, and its extensive use in all types of control applications, many of them battery powered, has led to new control system design approaches. Rather than computing using analog quantities,

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the analog quantities are sensed, conditioned, and converted to digital, processed digitally, and then converted back to an analog output, which is then used to perform the necessary output action. This practical textbook covers the latest techniques in microcontroller-based control system design. It is aimed at engineering students and engineers new to working with microcontrollers. It covers the fundamentals of:

1. Sensors and the electrical signals they output.
2. The design and application of the electronic circuits that receive and condition (change or modify) the sensor analog signals.
3. The design and application of the circuits that convert analog signals to digital and digital signals to analog.
4. The makeup and operation of a microcontroller and how to program it.
5. The application of electronic circuits for system power control.

The book, written by an experienced microcontroller engineer and textbook author, is suitable for community college students, technical school students, technicians and engineers just being introduced to microcontroller system design. It is an introductory book, focusing on real-world implementation of a basic control system, with real-world circuit examples. Readers will find clearly written discussion coupled with lots of illustrations. They will also find worked-out examples that illustrate principles within each chapter and quizzes to aid understanding. Besides these specifics, a hands-on project, suitable for an electronics microcontroller laboratory course, using the popular and low-cost TI MSP430 microcontroller, is discussed in detail. The accompanying CD-ROM contains microcontrollers application notes, code for the software examples, and problem solutions. * Seasoned Texas Instruments designer provides a ground-up perspective on embedded control systems * Pedagogical style provides a self-learning approach with examples, quizzes and review features * CD-ROM contains source code and more!

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The text of the first edition has been extensively revised and supplemented to bring it up to date

Analog circuit and system design today is more essential than ever before. With the growth of digital systems, wireless communications, complex industrial and automotive systems, designers are challenged to develop sophisticated analog solutions. This comprehensive source book of circuit design solutions will aid systems designers with elegant and practical design techniques that focus on common circuit design challenges. The book's in-depth application examples provide insight into circuit design and application solutions that you can apply in today's demanding designs. Covers the fundamentals of linear/analog circuit and system design to guide engineers with their design challenges Based on the Application Notes of Linear Technology, the foremost designer of high performance analog products, readers will gain practical insights into design techniques and practice Broad range of topics, including power management tutorials, switching regulator design, linear regulator design, data conversion, signal conditioning, and high frequency/RF design Contributors include the leading lights in analog design, Robert Dobkin, Jim Williams and Carl Nelson, among others

High-speed, power-efficient analog integrated circuits can be used as standalone devices or to interface modern digital signal processors and micro-controllers in various applications, including multimedia, communication, instrumentation, and control systems. New architectures and low device geometry of complementary metaloxidesemiconductor (CMOS) technologies have accelerated the movement toward system on a chip design, which merges analog circuits with digital, and radio-frequency components.

This book is an undergraduate textbook for students of

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electrical and electronic engineering. It is written with second year students particularly in mind, and discusses analogue circuits used in various fields.

This book introduces the foundations and fundamentals of electronic circuits. It broadly covers the subjects of circuit analysis, as well as analog and digital electronics. It features discussion of essential theorems required for simplifying complex circuits and illustrates their applications under different conditions. Also, in view of the emerging potential of Laplace transform method for solving electrical networks, a full chapter is devoted to the topic in the book. In addition, it covers the physics and technical aspects of semiconductor diodes and transistors, as well as discrete-time digital signals, logic gates, and combinational logic circuits. Each chapter is presented as complete as possible, without the reader having to refer to any other book or supplementary material.

Featuring short self-assessment questions distributed throughout, along with a large number of solved examples, supporting illustrations, and chapter-end problems and solutions, this book is ideal for any physics undergraduate lecture course on electronic circuits. Its use of clear language and many real-world examples make it an especially accessible book for students unfamiliar or unsure about the subject matter.

Analog and Digital Electronics is designed specifically to cater to the needs of third Semester students of B.Tech. in Computer Science and Engineering, JNTU. The book has a perfect blend of focused content and complete coverage as per the syllabus. Simple, easy-to-understand and difficult-jargon-free text elucidates the fundamentals of analog and digital electronics. Several solved examples, including circuit diagrams and adequate questions further help students understand and apply the concepts. Few Highlights: • Comprehensive syllabus coverage as per latest pattern •

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Lucid presentation style • Rich pool of pedagogy: Illustrative Examples and Review Questions

Improve your circuit-design potential with this expert guide to the devices and technology used in mixed analog-digital VLSI chips for such high-volume applications as hard-disk drives, wireless telephones, and consumer electronics. The book provides you with a critical understanding of device models, fabrication technology, and layout as they apply to mixed analog-digital circuits. You will learn about the many device-modeling requirements for analog work, as well as the pitfalls in models used today for computer simulators such as Spice. Also included is information on fabrication technologies developed specifically for mixed-signal VLSI chips, plus guidance on the layout of mixed analog-digital chips for a high degree of analog-device matching and minimum digital-to-analog interference. This reference book features an intuitive introduction to MOSFET operation that will enable you to view with insight any MOSFET model ? besides thorough discussions on valuable large-signal and small-signal models. Filled with practical information, this first-of-its-kind book will help you grasp the nuances of mixed-signal VLSI-device models and layout that are crucial to the design of high-performance chips.

Unlike books currently on the market, this book attempts to satisfy two goals: combine circuits and electronics into a single, unified treatment, and establish a strong connection with the contemporary world of digital systems. It will introduce a new way of looking not only at the treatment of circuits, but also at the treatment of introductory coursework in engineering in general. Using the concept of "abstraction," the book attempts to form a bridge between the world of physics and the world of large computer systems. In particular, it attempts to unify electrical engineering and computer science as the art of creating and exploiting

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successive abstractions to manage the complexity of building useful electrical systems. Computer systems are simply one type of electrical systems. +Balances circuits theory with practical digital electronics applications. +Illustrates concepts with real devices. +Supports the popular circuits and electronics course on the MIT OpenCourse Ware from which professionals worldwide study this new approach. +Written by two educators well known for their innovative teaching and research and their collaboration with industry. +Focuses on contemporary MOS technology.

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