Digital Circuit Design For Computer Science Students An Introductory Textbook 1st Edition

This textbook for a one-semester course in Digital Systems Design describes the basic methods used to develop "traditional" Digital Systems, based on the use of logic gates and flip flops, as well as more advanced techniques that enable the design of very large circuits, based on Hardware Description Languages and Synthesis tools. It was originally designed to accompany a MOOC (Massive Open Online Course) created at the Autonomous University of Barcelona (UAB), currently available on the Coursera platform. Readers will learn what a digital system is and how it can be developed, preparing them for steps toward other technical disciplines, such as Computer Architecture, Robotics, Bionics, Avionics and others. In particular, students will learn to design digital systems of medium complexity, describe digital systems using high level hardware description languages, and understand the operation of computers at their most basic level. All concepts introduced are reinforced by plentiful illustrations, examples, exercises, and applications. For example, as an applied example of the design techniques presented, the authors demonstrate the synthesis of a simple processor, leaving the student in a position to enter the world of Computer Architecture and Embedded Systems.

Digital Computer Design: Logic, Circuitry, and Synthesis focuses on the logical structure, electronic realization, and application of digital information processors. The manuscript first offers information on numerical symbols, fundamentals of computing aids, quantization, representation of numbers in an electronic digital computer, and computer applications. The text then ponders on the nature of automatic computation and Boolean algebra. Discussions focus on the advantages of a Boolean algebraic description of a digital computer; clock pulse generators and timing circuits; sequential switching networks; elements of information processing systems and types of digital computers; and automatic sequencing methods. The book elaborates on circuit descriptions of switching and storage elements and large capacity storage systems. Topics include static magnetic storage, dynamic delay line storage, cathode-ray storage, vacuum tube systems of circuit logic, and magnetic core systems of circuit logic. The publication also examines the system design of GP computers, digital differential analyzer, and the detection and correction of errors. The text is a valuable source of data for mathematicians and engineers interested in digital computer design.

The modern world is overrun with electronic equipment, handling huge quantities of data. At the heart of this scenario lies the digital circuitry, which provides the powerful intelligence needed. Thus, there is an increasing need for design engineers in this expanding area. This text starts from basic ideas of logical gates, and progresses through to advanced concepts of digital systems. Each chapter comes with a wealth of illustrative examples and assignment questions for lecture-room use. Contents List of Digital Circuit Design Chapter 1 Introduction to Digital Systems and Logic Gates 1.1 The transition from analogue to digital signals 1.2 Digital logic levels 1.3 The concept of gates 1.4 The AND gate 1.5 The OR gate 1.6 The XOR gate (Exclusive-OR) 1.7 The NOT gate 1.8 Bubbled gates 1.9 The NOR gate 1.10 The NAND gate 1.11 The XNOR gate Chapter 2 Boolean Algebra 2.1 Introducing Boolean algebra 2.2 The AND operation in Boolean algebra 2.3 The OR operation in Boolean algebra 2.4 The XOR operation in Boolean algebra 2.5 The NOT function in Boolean algebra 2.6 Examples of Boolean calculations 2.7 Theorems of Boolean algebra Chapter 3 Combinational Logic 3.1 Illustrations of combinational logic 3.2 Developing Boolean expressions for combinational circuits 3.3 The importance of minimisation 3.4 Karnaugh maps (K-maps) 3.5 Summary of K-map looping rules 3.6 "Can't Happen" states 3.7 Static hazards Chapter 4 Number Systems 4.1 Types of numerical system 4.2 The Decimal number system 4.3 The Binary system 4.4 Binary-to-Decimal conversion 4.5 Decimal-to-binary conversion 4.6 Binary operations 4.7 The Hexadecimal number system Chapter 5 Adders, Subtractors and Multipliers 5.1 Arithmetic in digital circuits 5.2 The half adder 5.3 The full adder 5.4 The parallel binary adder (Ripple carry parallel adder) 5.5 The half subtractor 5.6 The full subtractor 5.7 Multipliers Chapter 6 Multiplexers and Decoders 6.1 Comparators 6.2 Multiplexers 6.3 Demultiplexers 6.4 Encoders 6.5 Decoders Chapter 7 Latches and Flip-Flops 7.1 Introducing time into logic circuits 7.2 The bistable multivibrator (Flip-flop) 7.3 The SR latch 7.4 The SR flip-flop 7.5 The T-type flip-flop 7.6 The D-type flip-flop (Data latch) 7.7 The JK flip-flop 7.8 The Master-Slave JK flip-flop 7.9 Preset and Clear inputs 7.10 Integrated circuit flip-flops Chapter 8 Shift Registers 8.1 Basic shift register functions 8.2 Serial-in serial-out shift registers 8.3 Serial-in parallel-out shift registers 8.4 Parallel-in serial-out shift registers 8.5 Parallel-in parallel-out shift registers 8.6 Bidirectional shift registers 8.7 Shift register counters Chapter 9 Multivibrators and Timers 9.1 What are multivibrators? 9.2 Astable multivibrators 9.3 The monostable multivibrator 9.4 The 555 timer 9.5 Applications of the 555 timer Chapter 10 Counters 10.1 Introducing counters 10.2 Asynchronous counter operation 10.3 Synchronous counter operation 10.4 Up/down synchronous counters 10.5 Cascaded counters 10.6 Counter decoding 10.7 Counter applications conversion Chapter 11 Memories and Data Storage 11.1 Memory types 11.2 Classification by fabrication technology 11.3 Memory terminology 11.4 ROM (Read-Only Memory) 11.5 RAM (Random-Access Memory) Chapter 12 Design of Digital Integrated Circuits (ICs) 12.1 Logic families 12.2 Electrical characteristics of digital ICs margin 12.3 RTL and DTL families 12.4 The TTL logic family 12.5 The ECL logic family 12.6 The I2L logic family 12.7 The MOSFET logic family 12.8 CMOS circuits gates

This is an up-to-date treatment of the analysis and design of CMOS integrated digital logic circuits. The self-contained book covers all of the important digital circuit design styles found in modern CMOS chips, emphasizing solving design problems using the various logic styles available in CMOS.

A Digital Circuit Design Environment

DIGITAL LOGIC DESIGN

Digital Circuit Design for Computer Science Students

In Deep Submicron Technology

Digital Circuits

This thesis effort outlines the design and implementation of a graphics oriented digital design environment. This graphics environment provides the user with the tools to design digital circuits and then interface the user's circuit design with other tools (i.e., the Logic Simulator (LOGSIM) and Interconnect Expert (ICE) programs) . This research paper presents the reasoning for the development of such a tool. The development of this tool involves reviewing database designs, specifically those oriented toward Computer Aided Design (CAD), and human-computer interface considerations. The paper also presents a recap of the features necessary of the graphics oriented environment. The detailed design of the program is presented along with the description of the file structures, which provide the underlying database. The limitations encountered and the results of the testing are addressed. In addition, a comprehensive user's manual is include for the operation of the graphics oriented interface. Finally, a listing of recommended follow-on efforts are presented with the conclusions of this thesis effort.

Digital Circuit Design for Computer Science StudentsAn Introductory TextbookSpringer Science & Business Media

This text includes the following chapters and appendices: Common Number Systems and Conversions Operations in Binary, Octal, and Hexadecimal Systems Sign Magnitude and Floating Point Arithmetic Binary Codes Fundamentals of Boolean Algebra Minterms and Maxterms Combinational Logic Circuits Sequential Logic Circuits Memory Devices Advanced Arithmetic and Logic Operations Introduction to Field Programmable Devices Introduction to the ABEL Hardware Description Language Introduction to VHDL Introduction to Verilog Introduction to Boundary-Scan Architecture. Each chapter contains numerous practical applications. This is a design-oriented text.

Many interesting design trends are shown by the six papers on operational amplifiers (Op Amps). Firstly. there is the line of stand-alone Op Amps using a bipolar IC technology which combines high-frequency and high voltage. This line is represented in papers by Bill Gross and Derek Bowers. Bill Gross shows an improved high-frequency compensation technique of a high quality three stage Op Amp. Derek Bowers improves the gain and frequency behaviour of the stages of a two-stage Op Amp. Both papers also present trends in current-mode feedback Op Amps. Low-voltage bipolar Op Amp design is presented by leroen Fonderie. He shows how multipath nested Miller compensation can be applied to turn rail-to-rail input and output stages into high quality low-voltage Op Amps. Two papers on CMOS Op Amps by Michael Steyaert and Klaas Bult show how high speed and high gain VLSI building blocks can be realised. Without departing from a single-stage OT A structure with a folded cascode output, a thorough high frequency design technique and a gain-boosting technique contributed to the high-speed and the high-gain achieved with these Op Amps. . Finally. Rinaldo Castello shows us how to provide output power with CMOS buffer amplifiers. The combination of class A and AB stages in a multipath nested Miller structure provides the required linearity and bandwidth.

Digital Integrated Circuit Design Using Verilog and Systemverilog

Designing Embedded Hardware

Digital Logic Design and Computer Organization with Computer Architecture for Security

A Digital Computer Design Aid for Logic Circuit Design

Digital Systems

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As the costs of power and timing become increasingly difficult to manage in traditional synchronous systems, designers are being forced to look at asynchronous alternatives. Based on reworked and expanded papers from the VII Banff Higher Order Workshop, this volume examines asynchronous methods which have been used in large circuit design, ranging from initial formal specification to more standard finite state machine based control models. Written by leading practitioners in the area, the papers cover many aspects of current practice including practical design, silicon compilation, and applications of formal specification. It also includes a state-of-the-art survey of asynchronous hardware design. The resulting volume will be invaluable to anyone interested in designing correct asynchronous circuits which exhibit high performance or low power operation.

New, updated and expanded topics in the fourth edition include: EBCDIC, Grey code, practical applications of flip-flops, linear and shaft encoders, memory elements and FPGAs. The section on fault-finding has been expanded. A new chapter is dedicated to the interface between digital components and analog voltages. *A highly accessible, comprehensive and fully up to date digital systems text *A well known and respected text now revamped for current courses *Part of the Newnes suite of texts for HND/1st year modules

This practical introduction explains exactly how digital circuits are designed, from the basic circuit to the advanced system. It covers combinational logic circuits, which collect logic signals, to sequential logic circuits, which embody time and memory to progress through sequences of states. The primer also highlights digital arithmetic and the integrated circuits that implement the logic functions.Based on the author's extensive experience in teaching digital electronics to undergraduates, the book translates theory directly into practice and presents the essential information in a compact, digestible style. Worked problems and examples are accompanied by abbreviated solutions, with demonstrations to ensure that the design material and the circuits' operation are fully understood.This is essential reading for any electronic or electrical engineering student new to digital electronics and requiring a succinct yet comprehensive introduction.

CMOS Logic Circuit Design

Operational Amplifiers, Analog to Digital Convertors, Analog Computer Aided Design

Digital Design

Digital Circuit Design

A completely updated and expanded comprehensive treatment of VHDL and its applications to the design and simulation of real, industry-standard circuits. This comprehensive treatment of VHDL and its applications to the design and simulation of real, industry-standard circuits has been completely updated and expanded for the third edition. New features include all VHDL-2008 constructs, an extensive review of digital circuits, RTL analysis, and an unequaled collection of VHDL examples and exercises. The book focuses on the use of VHDL rather than solely on the language, with an emphasis on design examples and laboratory exercises. The third edition begins with a detailed review of digital circuits (combinatorial, sequential, state machines, and FPGAs), thus providing a self-contained single reference for the teaching of digital circuit design with VHDL. In its coverage of VHDL-2008, it makes a clear distinction between VHDL for synthesis and VHDL for simulation. The text offers complete VHDL codes in examples as well as simulation results and comments. The significantly expanded examples and exercises include many not previously published, with multiple physical demonstrations meant to inspire and motivate students. The book is suitable for undergraduate and graduate students in VHDL and digital circuit design, and can be used as a professional reference for VHDL practitioners. It can also serve as a text for digital VLSI in-house or academic courses.

This textbook is intended to introduce the student of electronics to the fundamentals of digital circuits, both combinational and sequential, in a reasonable and systematic manner. It proceeds from basic logic concepts to circuits and designs.

In today's digital design environment, engineers must achieve quick turn-around time with ready accesses to circuit synthesis and simulation applications. This type of productivity relies on the principles and practices of computer aided design (CAD). Digital Design: Basic Concepts and Principles addresses the many challenging issues critical to today's digital design practices such as hazards and logic minimization, finite-state-machine synthesis, cycles and races, and testability theories while providing hands-on experience using one of the industry's most popular design application, Xilinx Web PACKTM. The authors begin by discussing conventional and unconventional number systems, binary coding theories, and arithmetic as well as logic functions and Boolean algebra. Building upon classic theories of digital systems, the book illustrates the importance of logic minimization using the Karnaugh map technique. It continues by discussing implementation options and examining the pros and cons of each method in addition to an assessment of tradeoffs that often accompany design practices. The book also covers testability, emphasizing that a good digital design must be easy to verify and test with the lowest cost possible. Throughout the text, the authors analyze combinational and sequential logic elements and illustrate the designs of these components in structural, hierarchical, and behavior VHDL descriptions. Coveringfundamentals and best practices, Digital Design: Basic Concepts and Principles provides you with critical knowledge of how each digital component ties together to form a system and develops the skills you need to design and simulate these digital components using modern CAD software.

The third edition of Hodges and Jacksonâ€™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.

Electronic Circuit Design and Application

Computer-aided Design of Microelectronic Circuits and Systems: Digital-circuit aspects and state of the art

Digital Logic and Computer Design

High-Performance Digital VLSI Circuit Design

Digital Logic Circuit Analysis and Design

An Introduction to Logic Circuit Testing provides a detailed coverage of techniques for test generation and testable design of digital electronic circuits/systems. The material covered in the book should be sufficient for a course, or part of a course, in digital circuit testing for senior-level undergraduate and first-year graduate students in Electrical Engineering and Computer Science. The book will also be a valuable resource for engineers working in the industry. This book has four chapters. Chapter 1 deals with various types of faults that may occur in very large scale integration (VLSI)-based digital circuits. Chapter 2 introduces the major concepts of all test generation techniques such as redundancy, fault coverage, sensitization, and backtracking. Chapter 3 introduces the key concepts of testability, followed by some ad hoc design-for-testability rules that can be used to enhance testability of combinational circuits. Chapter 4 deals with test generation and response evaluation techniques used in BIST (built-in self-test) schemes for VLSI chips. Table of Contents: Introduction / Fault Detection in Logic Circuits / Design for Testability / Built-in Self-Test / References

The author is the leading programming language designer of our time and in this book, based on a course for 2nd-year students at, he closes the gap between hardware and software design. He encourages students to put the theory to work in exercises that include lab work culminating in the design of a simple yet complete computer. In short, a modern introduction to designing circuits using state-of-the-art technology and a concise, easy to master hardware description language (Lola).

A COMPREHENSIVE GUIDE TO THE DESIGN & ORGANIZATION OF MODERN COMPUTING SYSTEMS Digital Logic Design and Computer Organization with Computer Architecture for Security provides practicing engineers and students with a clear understanding of computer hardware technologies. The fundamentals of digital logic design as well as the use of the Verilog hardware description language are discussed. The book covers computer organization and architecture, modern design concepts, and computer security through hardware. Techniques for designing both small and large combinational and sequential circuits are thoroughly explained. This detailed reference addresses memory technologies, CPU design and techniques to increase performance, microcomputer architecture, including "plug and play" device interface, and memory hierarchy. A chapter on security engineering methodology as it applies to computer architecture concludes the book. Sample problems, design examples, and detailed diagrams are provided throughout this practical resource. COVERAGE INCLUDES: Combinational circuits: small designs Combinational circuits: large designs Sequential circuits: core modules Sequential circuits: small designs Sequential circuits: large designs Memory Instruction set architecture Computer architecture: interconnection Memory system Computer architecture: security

High-Performance Digital VLSI Circuit Design is the first book devoted entirely to the design of digital high-performance VLSI circuits. CMOS, BiCMOS and bipolar ciruits are covered in depth, including state-of-the-art circuit structures. Recent advances in both the computer and telecommunications industries demand high-performance VLSI digital circuits. Digital processing of signals demands high-speed circuit techniques for the GHz range. The design of such circuits represents a great challenge; one that is amplified when the power supply is scaled down to 3.3 V. Moreover, the requirements of low-power/high-performance circuits adds an extra dimension to the design of such circuits. High-Performance Digital VLSI Circuit Design is a self-contained text, introducing the subject of high-performance VLSI circuit design and explaining the speed/power tradeoffs. The first few chapters of the book discuss the necessary background material in the area of device design and device modeling, respectively. High-performance CMOS circuits are then covered, especially the new all-N-logic dynamic circuits. Propagation delay times of high-speed bipolar CML and ECL are developed analytically to give a thorough understanding of various interacting process, device and circuit parameters. High-current phenomena of bipolar devices are also addressed as these devices typically operate at maximum currents for limited device area. Different, new, high-performance BiCMOS circuits are presented and compared to their conventional counterparts. These new circuits find direct applications in the areas of high-speed adders, frequency dividers, sense amplifiers, level-shifters, input/output clock buffers and PLLs. The book concludes with a few system application examples of digital high-performance VLSI circuits. Audience: A vital reference for practicing IC designers. Can be used as a text for graduate and senior undergraduate students in the area.

Analog Circuit Design

Analysis and Design of Digital Integrated Circuits

An Introductory Textbook

Logic, Circuitry, and Synthesis

An Introduction to Logic Circuit Testing

Fundamentals of Digital Logic and Microcomputer Design, haslong been hailed for its clear and simple presentation of theprinciples and basic tools required to design typical digitalsystems such as microcomputers. In this Fifth Edition, the authorfocuses on computer design at three levels: the device level, thelogic level, and the system level. Basic topics are covered, suchas number systems and Boolean algebra, combinational and sequentiallogic design, as well as more advanced subjects such as assemblylanguage programming and microprocessor-based system design.Numerous examples are provided throughout the text. Coverage includes: Digital circuits at the gate and flip-flop levels Analysis and design of combinational and sequentialcircuits Microcomputer organization, architecture, and programmingconcepts Design of computer instruction sets, CPU, memory, and I/O System design features associated with popular microprocessorsfrom Intel and Motorola Future plans in microprocessor development An instructor's manual, available upon request Additionally, the accompanying CD-ROM, contains step-by-stepprocedures for installing and using Altera Quartus II software,MASM 6.11 (8086), and 68asmsim (68000), provides valuablesimulation results via screen shots. Fundamentals of Digital Logic and Microcomputer Design is anessential reference that will provide you with the fundamentaltools you need to design typical digital systems.

Digital Design and Computer Architecture: ARM Edition covers the fundamentals of digital logic design and reinforces logic concepts through the design of an ARM microprocessor. Combining an engaging and humorous writing style with an updated and hands-on approach to digital design, this book takes the reader from the fundamentals of digital logic to the actual design of an ARM processor. By the end of this book, readers will be able to build their own microprocessor and will have a top-to-bottom understanding of how it works. Beginning with digital logic gates and progressing to the design of combinational and sequential circuits, this book uses these fundamental building blocks as the basis for designing an ARM processor. SystemVerilog and VHDL are integrated throughout the text in examples illustrating the methods and techniques for CAD-based circuit design. The companion website includes a chapter on I/O systems with practical examples that show how to use the Raspberry Pi computer to communicate with peripheral devices such as LCDs, Bluetooth radios, and motors. This book will be a valuable resource for students taking a course that combines digital logic and computer architecture or students taking a two-quarter sequence in digital logic and computer organization/architecture. Covers the fundamentals of digital logic design and reinforces logic concepts through the design of an ARM microprocessor. Features side-by-side examples of the two most prominent Hardware Description Languages (HDLs)—SystemVerilog and VHDL—which illustrate and compare the ways each can be used in the design of digital systems. Includes examples throughout the text that enhance the reader's understanding and retention of key concepts and techniques. The Companion website includes a chapter on I/O systems with practical examples that show how to use the Raspberry Pi computer to communicate with peripheral devices such as LCDs, Bluetooth radios, and motors. The Companion website also includes appendices covering practical digital design issues and C programming as well as links to CAD tools, lecture slides, laboratory projects, and solutions to exercises.

A text developed from a previous work, An Introduction to Computer Logic (1974) by Nagle, Carroll, and Irwin, which was a widely adopted text on the fundamentals of combinational and sequential logic circuit analysis and synthesis. The present text retains its predecessor's strong coverage of fundamental theory. To address practical design issues, over half of the text is new material that reflects the many changes which have occurred in recent years, including modular design, CAD methods, and the use of programmable logic, as well as such practical issues as device timing characteristics and standard logic symbols. Annotation copyright by Book News, Inc., Portland, OR

Description:The book is an attempt to make Digital Logic Design easy and simple to understand. The book covers various features of Logic Design using lots of examples and relevant diagrams. The complete text is reviewed for its correctness. This book is an outcome of sincere effort and hard work to bring concepts of Digital Logic Design close to the audience of this book.The salient features of the book:--Easy explanation of Digital System and Binary Numbers with lots of solved examples-Detailed covering of Boolean Algebra and Gate-Level Minimization with proper examples and diagrammatic -representation.-Detailed analysis of different Combinational Logic Circuits-Complete Synchronous sequential Logic understanding-Deep understanding of Memory and Programmable Logic-Detailed analysis of different Asynchronous Sequential LogicTable Of Contents:Unit 1 : Digital System and Binary Numbers;Part 1: Digital System and Binary NumbersPart 2 : Boolean Algebra and Gate Level MinimizationUnit 2 : Combinational LogicUnit 3: Sequential CircuitsUnit 4 : Memory, Programmable Logic and DesignUnit 5 : Asynchronous Sequential Logic

From Logic Gates to Processors

Digital Computer Design

Logic and Design

On the Design of a Computer-aided Design System for Digital Circuits

Digital Circuit Analysis and Design with Simulink Modeling and Introduction to CPLDs and FPGAs

This book focuses on the basic principles of digital electronics and logic design. It is designed as a textbook for undergraduate students of electronics, electrical engineering, computer science, physics, and information technology. The text covers the syllabi of several Indian and foreign universities. It depicts the comprehensive resources on the recent ideas in the area of digital electronics explored by leading experts from both industry and academia. A good number of diagrams are provided to illustrate the concepts related to digital electronics so that students can easily comprehend the subject. Solved examples within the text explain the concepts discussed and exercises are provided at the end of each chapter.

Intelligent readers who want to build their own embedded computer systems-- installed in everything from cell phones to cars to handheld organizers to refrigerators-- will find this book to be the most in-depth, practical, and up-to-date guide on the market. Designing Embedded Hardware carefully steers between the practical and philosophical aspects, so developers can both create their own devices and gadgets and customize and extend off-the-shelf systems. There are hundreds of books to choose from if you need to learn programming, but only a few are available if you want to learn to create hardware. Designing Embedded Hardware provides software and hardware engineers with no prior experience in embedded systems with the necessary conceptual and design building blocks to understand the architectures of embedded systems. Written to provide the depth of coverage and real-world examples developers need, Designing Embedded Hardware also provides a road-map to the pitfalls and traps to avoid in designing embedded systems. Designing Embedded Hardware covers such essential topics as: The principles of developing computer hardware Core hardware designs Assembly language concepts Parallel I/O Analog-digital conversion Timers (internal and external) UART Serial Peripheral Interface Inter-Integrated Circuit Bus Controller Area Network (CAN) Data Converter Interface (DCI) Low-power operation This invaluable and eminently useful book gives you the practical tools and skills to develop, build, and program your own application-specific computers.

This textbook covers latest topics in the field of digital logic design along with tools to design the digital logic circuits. It is designed for the undergraduate students pursuing courses in areas of engineering disciplines such as Electrical and Electronics, Electronics and Communication, Electronics and Instrumentation, Telecommunications, and Computer Science and Engineering. It is also useful as a text for MCA, M.Sc. (Electronics) and M.Sc. (Computer Science) students. The contents of this book have been organized in a systematic manner so as to inculcate sound knowledge and concepts amongst its readers. It covers basic concepts in combinational and sequential circuit design such as digital electronics, digital signal processing, number system, data and information representation and, computer arithmetic. Besides this, advanced topics in digital logic design such as various types of counter design, register design, ALU design, threshold circuit and, digital computer design are also discussed in the book. Key features Question Bank containing numerous multiple choice questions with their answers Short answer questions, long answer questions and multiple choice questions at the end of each chapter Extensive use of graphs and diagrams for better understanding of the subject

This thesis effort documents the design, development, implementation, and test of an expert system which decomposes digital circuits into subproblems in order to detect wiring errors, which consist of improperly connected gates, missing connections, and violation of fanout or race conditions. Information needed to connect chips together is viewed as knowledge base information for the expert system. Information such type as number of pins, value of each pin (input, output, power, ground, clock), fanout for a particular type of chip are retrieved from a central database where they are represented. Implementation was done in the C programming language, which although is not design specially for dealing with problems in the Artificial Intelligence (AI) field could be used with success. An integration with a graphics package and a central database was achieved. Tests conducted with the system running in a personal computer Zenith 248 and compatible microcomputers under the Disk Operational System (DOS) version 3.2 proved the portability and efficiency of the expert system. A user's manual is included for the operation of the InterConnect Expert system (ICE). (jhd).

ARM Edition

AN INTRODUCTION TO DIGITAL COMPUTER DESIGN

RISC-V Edition

Foundation of Digital Electronics and Logic Design

Basic Concepts and Principles

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 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.

This textbook for core courses in Electronic Circuit Design teaches students the design and application of a broad range of analog electronic circuits in a comprehensive and clear manner. Readers will be enabled to design complete, functional circuits or systems. The authors first provide a foundation in the theory and operation of basic electronic devices, including the diode, bipolar junction transistor, field effect transistor, operational amplifier and current feedback amplifier. They then present comprehensive instruction on the design of working, realistic electronic circuits of varying levels of complexity, including power amplifiers, regulated power supplies, filters, oscillators and waveform generators. Many examples help the reader quickly become familiar with key design parameters and design methodology for each class of circuits. Each chapter starts from fundamental circuits and develops them step-by-step into a broad range of applications of real circuits and systems. Written to be accessible to students of varying backgrounds, this textbook presents the design of realistic, working analog electronic circuits for key systems; Includes worked examples of functioning circuits, throughout every chapter, with an emphasis on real applications; Includes numerous exercises at the end of each chapter; Uses simulations to demonstrate the functionality of the designed circuits; Enables readers to design important electronic circuits including amplifiers, power supplies and oscillators.

For those with a basic understanding of digital design, this book teaches the essential skills to design digital integrated circuits using Verilog and the relevant extensions of SystemVerilog. In addition to covering the syntax of Verilog and SystemVerilog, the author provides an appreciation of design challenges and solutions for producing working circuits. The book covers not only the syntax and limitations of HDL coding, but deals extensively with design problems such as partitioning and synchronization, helping you to produce designs that are not only logically correct, but will actually work when turned into physical circuits. Throughout the book, many small examples are used to validate concepts and demonstrate how to apply design skills. This book takes readers who have already learned the fundamentals of digital design to the point where they can produce working circuits using modern design methodologies. It clearly explains what is useful for circuit design and what parts of the languages are only software, providing a non-theoretical, practical guide to robust, reliable and optimized hardware design and development. Produce working hardware: Covers not only syntax, but also provides design know-how, addressing problems such as synchronization and partitioning to produce working solutions Usable examples: Numerous small examples throughout the book demonstrate concepts in an easy-to-grasp manner Essential knowledge: Covers the vital design topics of synchronization, essential for producing working silicon; asynchronous interfacing techniques; and design techniques for circuit optimization, including partitioning

The newest addition to the Harris and Harris family of Digital Design and Computer Architecture books, this RISC-V Edition covers the fundamentals of digital logic design and reinforces logic concepts through the design of a RISC-V microprocessor. Combining an engaging and humorous writing style with an updated and hands-on approach to digital design, this book takes the reader from the fundamentals of digital logic to the actual design of a processor. By the end of this book, readers will be able to build their own RISC-V microprocessor and will have a top-to-bottom understanding of how it works. Beginning with digital logic gates and progressing to the design of combinational and sequential circuits, this book uses these fundamental building blocks as the basis for designing a RISC-V processor. SystemVerilog and VHDL are integrated throughout the text in examples illustrating the methods and techniques for CAD-based circuit design. The companion website includes a chapter on I/O systems with practical examples that show how to use SparkFun's RED-V RedBoard to communicate with peripheral devices such as LCDs, Bluetooth radios, and motors. This book will be a valuable resource for students taking a course that combines digital logic and computer architecture or students taking a two-quarter sequence in digital logic and computer organization/architecture. Covers the fundamentals of digital logic design and reinforces logic concepts through the design of a RISC-V microprocessor Gives students a full understanding of the RISC-V instruction set architecture, enabling them to build a RISC-V processor and program the RISC-V processor in hardware simulation, software simulation, and in hardware Includes both SystemVerilog and VHDL designs of fundamental building blocks as well as of single-cycle, multicycle, and pipelined versions of the RISC-V architecture Features a companion website with a bonus chapter on I/O systems with practical examples that show how to use SparkFun's RED-V RedBoard to communicate with peripheral devices such as LCDs, Bluetooth radios, and motors The companion website also includes appendices covering practical digital design issues and C programming as well as links to CAD tools, lecture slides, laboratory projects, and solutions to exercises See the companion EdX MOOCs ENGR85A and ENGR85B with video lectures and interactive problems

Digital Logic Circuit Analysis and Design (second Edition)

Circuit Design with VHDL, third edition

Principles and Practice

Asynchronous Digital Circuit Design

Digital Electronics: A Primer - Introductory Logic Circuit Design

This highly acclaimed, well established, book now in its fifth edition, is intended for an introductory course in digital computer design for B.Sc. students of computer science, B.Tech. students of computer science and engineering, and BCA/MCA students of computer applications. A knowledge of programming in C or Java would be useful to give the student a proper perspective to appreciate the development of the subject. The first part of the book presents the basic tools and developes procedures suitable for the design of digital circuits and small digital systems. It equips students with a firm understanding of logic principles before they study the intricacies of logic organization and architecture of computers in the second part. Besides discussing data representation, arithmetic operations, Boolean algebra and its application in designing combinatorial and sequential switching circuits, the book introduces the Algorithmic State Machines which are used to develop a hardware description language for the design of digital systems. The organization of a small hypothetical computer is described to illustrate how instruction sets are evolved. Real computers (namely, Pentium and MIPs machines) are described and compared with the hypothetical computer. After discussing the features of a CPU, I/O devices and I/O organization, cache and virtual memory, the book concludes with a new chapter on the use of parallelism to enhance the speed of computers. Besides, the fifth edition has new material in CMOS gates, MSI/ALU and Pentium5 architecture. The chapter on Cache and Virtual Memory has been rewritten.

This book presents the basic concepts used in the design and analysis of digital systems and introduces the principles of digital computer organization and design.

For sophomore courses on digital design in an Electrical Engineering, Computer Engineering, or Computer Science department. & Digital Design, fourth edition is a modern update of the classic authoritative text on digital design.& This book teaches the basic concepts of digital design in a clear, accessible manner. The book presents the basic tools for the design of digital circuits and provides procedures suitable for a variety of digital applications.

Foundations of Analog and Digital Electronic Circuits

An Expert System in C for Computer-Aided Digital Circuit Design

Digital CMOS Circuit Design

Fundamentals of Digital Logic and Microcomputer Design

Digital Logic & Computer Design