NONVOLATILE MEMORY DESIGN

MAGNETIC, RESISTIVE, AND PHASE CHANGE

Hai Li • Yiran Chen

CRC Press
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Nonvolatile Memory Design Magnetic Resistive And Phase Change

Manuel Vázquez

Nonvolatile Memory Design Magnetic Resistive And Phase Change:

Nonvolatile Memory Design Hai Li,Yiran Chen,2011-12-19 The manufacture of flash memory which is the dominant nonvolatile memory technology is facing severe technical barriers So much so that some emerging technologies have been proposed as alternatives to flash memory in the nano regime Nonvolatile Memory Design Magnetic Resistive and Phase Changing introduces three promising candidates phase change memory magnetic random access memory and resistive random access memory The text illustrates the fundamental storage mechanism of these technologies and examines their differences from flash memory techniques Based on the latest advances the authors discuss key design methodologies as well as the various functions and capabilities of the three nonvolatile memory technologies Nonvolatile Memory Design Hai Li,Yiran Chen,2017-12-19 The manufacture of flash memory which is the dominant nonvolatile memory technology is facing severe technical barriers So much so that some emerging technologies have been proposed as alternatives to flash memory in the nano regime Nonvolatile Memory Design Magnetic Resistive and Phase Changing introduces three promising candidates phase change memory magnetic random access memory and resistive random access memory The text illustrates the fundamental storage mechanism of these technologies and examines their differences from flash memory techniques Based on the latest advances the authors discuss key design methodologies as well as the various functions and capabilities of the three nonvolatile memory technologies *Emerging Non-volatile Memory Technologies* Wen Siang Lew,Gerard Joseph Lim,Putu Andhita Dananjaya,2021-01-09 This book offers a balanced and comprehensive guide to the core principles fundamental properties experimental approaches and state of the art applications of two major groups of emerging non volatile memory technologies i e spintronics based devices as well as resistive switching devices also known as Resistive Random Access Memory RRAM The first section presents different types of spintronic based devices i e magnetic tunnel junction MTJ domain wall and skyrmion memory devices This section describes how their developments have led to various promising applications such as microwave oscillators detectors magnetic logic and neuromorphic engineered systems In the second half of the book the underlying device physics supported by different experimental observations and modelling of RRAM devices are presented with memory array level implementation An insight into RRAM desired properties as synaptic element in neuromorphic computing platforms from material and algorithms viewpoint is also discussed with specific example in automatic sound classification framework **VLSI Design and Test for Systems Dependability** Shojiro Asai,2018-07-20 This book discusses the new roles that the VLSI very large scale integration of semiconductor circuits is taking for the safe secure and dependable design and operation of electronic systems The book consists of three parts Part I as a general introduction to this vital topic describes how electronic systems are designed and tested with particular emphasis on dependability engineering where the simultaneous assessment of the detrimental outcome of failures and cost of their containment is made This section also describes the related research project Dependable VLSI Systems in which the

editor and authors of the book were involved for 8 years Part II addresses various threats to the dependability of VLSIs as key systems components including time dependent degradations variations in device characteristics ionizing radiation electromagnetic interference design errors and tampering with discussion of technologies to counter those threats Part III elaborates on the design and test technologies for dependability in such applications as control of robots and vehicles data processing and storage in a cloud environment and heterogeneous wireless telecommunications This book is intended to be used as a reference for engineers who work on the design and testing of VLSI systems with particular attention to dependability It can be used as a textbook in graduate courses as well Readers interested in dependable systems from social and industrial economic perspectives will also benefit from the discussions in this book **Next Generation Spin Torque Memories** Brajesh Kumar Kaushik,Shivam Verma,Anant Aravind Kulkarni,Sanjay Prajapati,2017-04-07 This book offers detailed insights into spin transfer torque STT based devices circuits and memories Starting with the basic concepts and device physics it then addresses advanced STT applications and discusses the outlook for this cutting edge technology It also describes the architectures performance parameters fabrication and the prospects of STT based devices Further moving from the device to the system perspective it presents a non volatile computing architecture composed of STT based magneto resistive and all spin logic devices and demonstrates that efficient STT based magneto resistive and all spin logic devices can turn the dream of instant on off non volatile computing into reality **Storage Systems** Alexander Thomasian,2021-10-13 Storage Systems Organization Performance Coding Reliability and Their Data Processing was motivated by the 1988 Redundant Array of Inexpensive Independent Disks proposal to replace large form factor mainframe disks with an array of commodity disks Disk loads are balanced by striping data into strips with one strip per disk and storage reliability is enhanced via replication or erasure coding which at best dedicates k strips per stripe to tolerate k disk failures Flash memories have resulted in a paradigm shift with Solid State Drives SSDs replacing Hard Disk Drives HDDs for high performance applications RAID and Flash have resulted in the emergence of new storage companies namely EMC NetApp SanDisk and Purestorage and a multibillion dollar storage market Key new conferences and publications are reviewed in this book The goal of the book is to expose students researchers and IT professionals to the more important developments in storage systems while covering the evolution of storage technologies traditional and novel databases and novel sources of data We describe several prototypes FAWN at CMU RAMCloud at Stanford and Lightstore at MIT Oracle s Exadata AWS Aurora Alibaba s PolarDB Fungible Data Center and author s paper designs for cloud storage namely heterogeneous disk arrays and hierarchical RAID Surveys storage technologies and lists sources of data measurements text audio images and video Familiarizes with paradigms to improve performance caching prefetching log structured file systems and merge trees LSMs Describes RAID organizations and analyzes their performance and reliability Conserves storage via data compression deduplication compaction and secures data via encryption Specifies implications of storage technologies on performance and

power consumption Exemplifies database parallelism for big data analytics deep learning via multicore CPUs GPUs FPGAs and ASICs e g Google s Tensor Processing Units **Magnetic Nano- and Microwires** Manuel Vázquez,2015-05-27 Magnetic nanowires and microwires are key tools in the development ofenhanced devices for information technology memory and data processing andsensing Offering the combined characteristics of high density high speed andnon volatility they facilitate reliable control of the motion of magnetic domainwalls a key requirement for the development of novel classes of logic and storagedevices Part One introduces the design and synthesis of magnetic nanowires andmicrowires reviewing the growth and processing of nanowires and nanowireheterostructures using such methods as sol gel and electrodepositioncombinations focused electron ion beam induced deposition chemicalvapour transport quenching and drawing and magnetic interactions Magneticand transport properties alongside domain walls in nano and microwiresare then explored in Part Two before Part Three goes on to explore a widerange of applications for magnetic nano and microwire devices includingmemory microwave and electrochemical applications in addition to thermalspin polarization and configuration magnetocalorific effects and Bloch pointdynamics Detailed coverage of multiple key techniques for the growth and processing of nanowires and microwires Reviews the principles and difficulties involved in applying magnetic nano and microwires to a wide range of applications Combines the expertise of specialists from around the globe to give a broad overview of current and future trends Design Exploration of Emerging Nano-scale Non-volatile Memory Hao Yu,Yuhao Wang,2014-04-18 This book presents the latest techniques for characterization modeling and design for nano scale non volatile memory NVM devices Coverage focuses on fundamental NVM device fabrication and characterization internal state identification of memristic dynamics with physics modeling NVM circuit design and hybrid NVM memory system design space optimization The authors discuss design methodologies for nano scale NVM devices from a circuits systems perspective including the general foundations for the fundamental memristic dynamics in NVM devices Coverage includes physical modeling as well as the development of a platform to explore novel hybrid CMOS and NVM circuit and system design Offers readers a systematic and comprehensive treatment of emerging nano scale non volatile memory NVM devices Focuses on the internal state of NVM memristic dynamics novel NVM readout and memory cell circuit design and hybrid NVM memory system optimization Provides both theoretical analysis and practical examples to illustrate design methodologies Illustrates design and analysis for recent developments in spin toque transfer domain wall racetrack and memristors **AI-Enabled Electronic Circuit and System Design** Ali Iranmanesh,Hossein Sayadi,2025-01-27 As our world becomes increasingly digital electronics underpin nearly every industry Understanding how AI enhances this foundational technology can unlock innovations from smarter homes to more powerful gadgets offering vast opportunities for businesses and consumers alike This book demystifies how AI streamlines the creation of electronic systems making them smarter and more efficient With AI s transformative impact on various engineering fields this resource provides an up to date

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