

Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

Hardware/Firmware Interface Design Best Practices for Improving Embedded Systems Development Newnes

Why care about hardware/firmware interaction? These interfaces are critical, a solid hardware design married with adaptive firmware can access all the capabilities of an application and overcome limitations caused by poor communication. For the first time, a book has come along that will help hardware engineers and firmware engineers work together to mitigate or eliminate problems that occur when hardware and firmware are not optimally compatible. Solving these issues will save time and money, getting products to market sooner to create more revenue. The principles and best practices presented in this book will prove to be a valuable resource for both hardware and firmware engineers. Topics include register layout, interrupts, timing and performance, aborts, and errors. Real world cases studies will help to solidify the principles and best practices with an aim towards cleaner designs, shorter schedules, and better implementation! Reduce product development delays with the best practices in

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

this book Concepts apply to ASICs, ASSPs, SoCs, and FPGAs Real-world examples and case studies highlight the good and bad of design processes. This book provides an overview of modern boot firmware, including the Unified Extensible Firmware Interface (UEFI) and its associated EFI Developer Kit II (EDKII) firmware. The authors have each made significant contributions to developments in these areas. The reader will learn to use the latest developments in UEFI on modern hardware, including open source firmware and open hardware designs. The book begins with an exploration of interfaces exposed to higher-level software and operating systems, and commences to the left of the boot timeline, describing the flow of typical systems, beginning with the machine restart event. Software engineers working with UEFI will benefit greatly from this book, while specific sections of the book address topics relevant for a general audience: system architects, pre-operating-system application developers, operating system vendors (loader, kernel), independent hardware vendors (such as for plug-in adapters), and developers of end-user applications. As a secondary audience, project technical leaders or managers may be interested in this book to get a feel for what their engineers are doing. The reader will find: An overview of UEFI and underlying Platform Initialization (PI) specifications How to create UEFI applications and drivers Workflow to design

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

the firmware solution for a modern platform Advanced usages of UEFI firmware for security and manageability

An introduction to the engineering principles of embedded systems, with a focus on modeling, design, and analysis of cyber-physical systems. The most visible use of computers and software is processing information for human consumption. The vast majority of computers in use, however, are much less visible. They run the engine, brakes, seatbelts, airbag, and audio system in your car. They digitally encode your voice and construct a radio signal to send it from your cell phone to a base station. They command robots on a factory floor, power generation in a power plant, processes in a chemical plant, and traffic lights in a city. These less visible computers are called embedded systems, and the software they run is called embedded software. The principal challenges in designing and analyzing embedded systems stem from their interaction with physical processes. This book takes a cyber-physical approach to embedded systems, introducing the engineering concepts underlying embedded systems as a technology and as a subject of study. The focus is on modeling, design, and analysis of cyber-physical systems, which integrate computation, networking, and physical processes. The second edition offers two new chapters, several new exercises, and other improvements. The book can be used as a textbook at the advanced

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

undergraduate or introductory graduate level and as a professional reference for practicing engineers and computer scientists. Readers should have some familiarity with machine structures, computer programming, basic discrete mathematics and algorithms, and signals and systems.

Provides information on writing a driver in Linux, covering such topics as character devices, network interfaces, driver debugging, concurrency, and interrupts.

This book thoroughly explains how computers work. It starts by fully examining a NAND gate, then goes on to build every piece and part of a small, fully operational computer. The necessity and use of codes is presented in parallel with the appropriate pieces of hardware. The book can be easily understood by anyone whether they have a technical background or not. It could be used as a textbook.

Why care about hardware/firmware interaction? These interfaces are critical, a solid hardware design married with adaptive firmware can access all the capabilities of an application and overcome limitations caused by poor communication. For the first time, a book has come along that will help hardware engineers and firmware engineers work together to mitigate or eliminate problems that occur when hardware and firmware are not optimally compatible.

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

Solving these issues will save time and money, getting products to market sooner to create more revenue. The principles and best practices presented in this book will prove to be a valuable resource for both hardware and firmware engineers. Topics include register layout, interrupts, timing and performance, aborts, and errors. Real world cases studies will help to solidify the principles and best practices with an aim towards cleaner designs, shorter schedules, and better implementation! Reduce product development delays with the best practices in this book Concepts apply to ASICs, ASSPs, SoCs, and FPGAs Real-world examples and case studies highlight the good and bad of design processes Embedded computer systems literally surround us: they're in our cell phones, PDAs, cars, TVs, refrigerators, heating systems, and more. In fact, embedded systems are one of the most rapidly growing segments of the computer industry today. Along with the growing list of devices for which embedded computer systems are appropriate, interest is growing among programmers, hobbyists, and engineers of all types in how to design and build devices of their own. Furthermore, the knowledge offered by this book into the fundamentals of these computer systems can benefit anyone who has to evaluate and apply the systems. The second edition of Designing Embedded Hardware has been updated to include information on the latest generation of processors and

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

microcontrollers, including the new MAXQ processor. If you're new to this and don't know what a MAXQ is, don't worry--the book spells out the basics of embedded design for beginners while providing material useful for advanced systems designers. Designing Embedded Hardware steers a course between those books dedicated to writing code for particular microprocessors, and those that stress the philosophy of embedded system design without providing any practical information. Having designed 40 embedded computer systems of his own, author John Catsoulis brings a wealth of real-world experience to show readers how to design and create entirely new embedded devices and computerized gadgets, as well as how to customize and extend off-the-shelf systems. Loaded with real examples, this book also provides a roadmap to the pitfalls and traps to avoid. Designing Embedded Hardware includes:

- The theory and practice of embedded systems
- Understanding schematics and data sheets
- Powering an embedded system
- Producing and debugging an embedded system
- Processors such as the PIC, Atmel AVR, and Motorola 68000-series
- Digital Signal Processing (DSP) architectures
- Protocols (SPI and I2C) used to add peripherals
- RS-232C, RS-422, infrared communication, and USB
- CAN and Ethernet networking
- Pulse Width Monitoring and motor control

If you want to build your own embedded system, or tweak an existing one, this invaluable book

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

gives you the understanding and practical skills you need.

Most of the literature on product realization is scattered in blogs, individual chapters of books, and internal company documents. Until now, there has been no single text that covers the whole launch process from end-to-end. The challenge of product realization is the interactions between the various activities and deliverables. Product Realization is based on first-hand experience with many companies comprising different sizes, technologies, and product development timelines. This book brings together fundamental theories and product development tools with the reality of what it takes to work in industry. Includes examples and stories from industry to illustrate and bring the material alive.

Learn to design and develop safe and reliable embedded systems
Key Features
Identify and overcome challenges in embedded environments
Understand the steps required to increase the security of IoT solutions
Build safety-critical and memory-safe parallel and distributed embedded systems
Book Description
Embedded systems are self-contained devices with a dedicated purpose. We come across a variety of fields of applications for embedded systems in industries such as automotive, telecommunications, healthcare and consumer electronics, just to name a few. Embedded Systems Architecture begins with a

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

bird's eye view of embedded development and how it differs from the other systems that you may be familiar with. You will first be guided to set up an optimal development environment, then move on to software tools and methodologies to improve the work flow. You will explore the boot-up mechanisms and the memory management strategies typical of a real-time embedded system. Through the analysis of the programming interface of the reference microcontroller, you'll look at the implementation of the features and the device drivers. Next, you'll learn about the techniques used to reduce power consumption. Then you will be introduced to the technologies, protocols and security aspects related to integrating the system into IoT solutions. By the end of the book, you will have explored various aspects of embedded architecture, including task synchronization in a multi-threading environment, and the safety models adopted by modern real-time operating systems. What you will learn

Participate in the design and definition phase of an embedded product
Get to grips with writing code for ARM Cortex-M microcontrollers
Build an embedded development lab and optimize the workflow
Write memory-safe code
Understand the architecture behind the communication interfaces
Understand the design and development patterns for connected and distributed devices in the IoT
Master multitask parallel execution patterns and real-time operating systems
Who this

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

book is for If you're a software developer or designer wanting to learn about embedded programming, this is the book for you. You'll also find this book useful if you're a less experienced embedded programmer willing to expand your knowledge.

The first microcontroller textbook to provide complete and systemic introductions to all components and materials related to the ARM® Cortex®-M4 microcontroller system, including hardware and software as well as practical applications with real examples. This book covers both the fundamentals, as well as practical techniques in designing and building microcontrollers in industrial and commercial applications. Examples included in this book have been compiled, built, and tested Includes Both ARM® assembly and C codes Direct Register Access (DRA) model and the Software Driver (SD) model programming techniques and discussed If you are an instructor and adopted this book for your course, please email ieeeproposals@wiley.com to get access to the instructor files for this book.

Praise for the first edition: "This excellent text will be useful to every system engineer (SE) regardless of the domain. It covers ALL relevant SE material and does so in a very clear, methodical fashion. The breadth and depth of the author's presentation of SE principles and practices is outstanding." –Philip Allen This

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

textbook presents a comprehensive, step-by-step guide to System Engineering analysis, design, and development via an integrated set of concepts, principles, practices, and methodologies. The methods presented in this text apply to any type of human system -- small, medium, and large organizational systems and system development projects delivering engineered systems or services across multiple business sectors such as medical, transportation, financial, educational, governmental, aerospace and defense, utilities, political, and charity, among others. Provides a common focal point for “bridging the gap” between and unifying System Users, System Acquirers, multi-discipline System Engineering, and Project, Functional, and Executive Management education, knowledge, and decision-making for developing systems, products, or services Each chapter provides definitions of key terms, guiding principles, examples, author’s notes, real-world examples, and exercises, which highlight and reinforce key SE&D concepts and practices Addresses concepts employed in Model-Based Systems Engineering (MBSE), Model-Driven Design (MDD), Unified Modeling Language (UML™) / Systems Modeling Language (SysML™), and Agile/Spiral/V-Model Development such as user needs, stories, and use cases analysis; specification development; system architecture development; User-Centric System Design (UCSD); interface definition & control;

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

system integration & test; and Verification & Validation (V&V) Highlights/introduces a new 21st Century Systems Engineering & Development (SE&D) paradigm that is easy to understand and implement. Provides practices that are critical staging points for technical decision making such as Technical Strategy Development; Life Cycle requirements; Phases, Modes, & States; SE Process; Requirements Derivation; System Architecture Development, User-Centric System Design (UCSD); Engineering Standards, Coordinate Systems, and Conventions; et al. Thoroughly illustrated, with end-of-chapter exercises and numerous case studies and examples, Systems Engineering Analysis, Design, and Development, Second Edition is a primary textbook for multi-discipline, engineering, system analysis, and project management undergraduate/graduate level students and a valuable reference for professionals. Gain the knowledge and skills necessary to improve your embedded software and benefit from author Jacob Beningo's more than 15 years developing reusable and portable software for resource-constrained microcontroller-based systems. You will explore APIs, HALs, and driver development among other topics to acquire a solid foundation for improving your own software. Reusable Firmware Development: A Practical Approach to APIs, HALs and Drivers not only explains critical concepts, but also provides a plethora of examples, exercises,

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

and case studies on how to use and implement the concepts. What You'll Learn

- Develop portable firmware using the C programming language
- Discover APIs and HALs, explore their differences, and see why they are important to developers of resource-constrained software
- Master microcontroller driver development concepts, strategies, and examples
- Write drivers that are reusable across multiple MCU families and vendors
- Improve the way software documented
- Design APIs and HALs for microcontroller-based systems

Who This Book Is For Those with some prior experience with embedded programming. Take a practioner's approach in analyzing the Internet of Things (IoT) devices and the security issues facing an IoT architecture. You'll review the architecture's central components, from hardware communication interfaces, such as UART and SPI, to radio protocols, such as BLE or ZigBee. You'll also learn to assess a device physically by opening it, looking at the PCB, and identifying the chipsets and interfaces. You'll then use that information to gain entry to the device or to perform other actions, such as dumping encryption keys and firmware. As the IoT rises to one of the most popular tech trends, manufactures need to take necessary steps to secure devices and protect them from attackers. The IoT Hacker's Handbook breaks down the Internet of Things, exploits it, and reveals how these devices can be built securely. What You'll

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

Learn Perform a threat model of a real-world IoT device and locate all possible attacker entry points Use reverse engineering of firmware binaries to identify security issues Analyze, assess, and identify security issues in exploited ARM and MIPS based binaries Sniff, capture, and exploit radio communication protocols, such as Bluetooth Low Energy (BLE), and ZigBee Who This Book is For Those interested in learning about IoT security, such as pentesters working in different domains, embedded device developers, or IT people wanting to move to an Internet of Things security role.

Nowadays, embedded systems - computer systems that are embedded in various kinds of devices and play an important role of specific control functions, have permeated various scenes of industry. Therefore, we can hardly discuss our life or society from now onwards without referring to embedded systems. For wide-ranging embedded systems to continue their growth, a number of high-quality fundamental and applied researches are indispensable. This book contains 13 excellent chapters and addresses a wide spectrum of research topics of embedded systems, including parallel computing, communication architecture, application-specific systems, and embedded systems projects. Embedded systems can be made only after fusing miscellaneous technologies together. Various technologies condensed in this book as well as in the complementary

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

book "Embedded Systems - Theory and Design Methodology", will be helpful to researchers and engineers around the world.

The new RISC-V Edition of Computer Organization and Design features the RISC-V open source instruction set architecture, the first open source architecture designed to be used in modern computing environments such as cloud computing, mobile devices, and other embedded systems. With the post-PC era now upon us, Computer Organization and Design moves forward to explore this generational change with examples, exercises, and material highlighting the emergence of mobile computing and the Cloud. Updated content featuring tablet computers, Cloud infrastructure, and the x86 (cloud computing) and ARM (mobile computing devices) architectures is included. An online companion Web site provides advanced content for further study, appendices, glossary, references, and recommended reading. Features RISC-V, the first such architecture designed to be used in modern computing environments, such as cloud computing, mobile devices, and other embedded systems Includes relevant examples, exercises, and material highlighting the emergence of mobile computing and the cloud

This chapter discusses the interface that hardware provides for the embedded software. It discusses the registers and interrupts that provide that interface. But

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

there is more; there are the human aspects of getting the hardware team and the embedded software team to collaborate on the project. Collaboration is needed during the design phase, the co-development phase, the integration phase, and the debugging phase and this chapter discusses those concepts. Several hardware design aspects are discussed that improve the quality of the product and software design aspects are discussed to help support hardware versions. Wireless networking is poised to have a massive impact on communications, and the 802.11 standard is to wireless networking what Ethernet is to wired networking. There are already over 50 million devices using the dominant IEEE 802.11 (essentially wireless Ethernet) standard, with astronomical growth predicted over the next 10 years. New applications are emerging every day, with wireless capability being embedded in everything from electric meters to hospital patient tracking systems to security devices. This practical reference guides readers through the wireless technology forest, giving them the knowledge, the hardware and the software necessary to design a wireless embedded device rapidly, inexpensively, and effectively. Using off-the-shelf microcontrollers from Microchip and Atmel, the author provides step-by-step instructions for designing the hardware and firmware for a fully operational wireless networking device. The book gives a thorough introduction to 802.11 technology and puts it into

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

perspective against the other wireless standard options. Just enough theory and mathematics is provided to give the depth of understanding needed for practical design work. The book thoroughly covers:

- * Laptop wireless Ethernet card introduction and theory
- * Introduction to CompactFlash-to-microcontroller interfacing
- * Implementing the laptop wireless Ethernet card in an embedded environment

Covers the hottest new embedded market area- wireless networking Shows designers how to save money and time by using microcontrollers in their embedded wireless designs instead of expensive, complex prefab boards

Focusing on the use of the UEFI Shell and its recently released formal specification, this book unlocks a wide range of usage models which can help people best utilize the shell solutions. This text also expands on the obvious intended utilization of the shell and explains how it can be used in various areas such as security, networking, configuration, and other anticipated uses such as manufacturing, diagnostics, etc. Among other topics, Harnessing the UEFI Shell demonstrates how to write Shell scripts, how to write a Shell application, how to use provisioning options and more. Since the Shell is also a UEFI component, the book will make clear how the two things interoperate and how both Shell developers as well as UEFI developers can dip into the other's field to further expand the power of their solutions.

Harnessing the UEFI Shell is authored by the three chairs of the UEFI working sub-teams, Michael Rothman (Intel, chair of the UEFI Configuration and UEFI Shell sub-teams), Vincent Zimmer (Intel, chair of the UEFI networking sub-team and security sub-team), and Tim Lewis

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

(Insyde Software, chair of the UEFI security sub-team). This book is perfect for any OEMs that ship UEFI-based solutions (which is all of the MNCs such as IBM, Dell, HP, Apple, etc.), software developers who are focused on delivering solutions targeted to manufacturing, diagnostics, hobbyists, or stand-alone kiosk environments.

The book's aim is to highlight all the complex issues, tasks and techniques that must be mastered by a SoC Architect to define and architect SoC for an embedded application. This book is primary focused on real problems with emphasis on architectural techniques across various aspects of chip-design, especially in context to embedded systems. The book covers aspects of embedded systems in a consistent way, starting with basic concepts that provides introduction to embedded systems and gradually increasing the depth to reach advanced concepts, such as power management and design consideration for maximum power efficiency and higher battery life. Theoretical part has been intentionally kept to the minimum that is essentially required to understand the subject. The guidelines explained across various chapters are independent of any CAD tool or silicon process and are applicable to any SoC architecture targeted for embedded systems.

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

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

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.

Most software project problems are sociological, not technological. *Peopeware* is a book on managing software projects.

This book provides semester-length coverage of electronics for embedded systems, covering most common analog and digital circuit-related issues encountered while designing embedded system hardware. It is written for students and young professionals who have basic circuit theory background and want to learn more about passive circuits, diode and bipolar transistor circuits, the state-of-the-art CMOS logic family and its interface with older logic families such as TTL, sensors and sensor physics, operational amplifier circuits to condition sensor signals, data converters and various circuits used in electro-mechanical device control in embedded systems. The book also provides numerous hardware design examples by integrating the topics learned in earlier chapters. The last chapter extensively reviews the combinational and

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

sequential logic design principles to be able to design the digital part of embedded system hardware.

Covers the significant embedded computing technologies—highlighting their applications in wireless communication and computing power. An embedded system is a computer system designed for specific control functions within a larger system—often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. Presented in three parts, *Embedded Systems: Hardware, Design, and Implementation* provides readers with an immersive introduction to this rapidly growing segment of the computer industry. Acknowledging the fact that embedded systems control many of today's most common devices such as smart phones, PC tablets, as well as hardware embedded in cars, TVs, and even refrigerators and heating systems, the book starts with a basic introduction to embedded computing systems. It hones in on system-on-a-chip (SoC), multiprocessor system-on-chip (MPSoC), and network-on-chip (NoC). It then covers on-chip integration of software and custom hardware accelerators, as well as fabric flexibility, custom architectures, and the multiple I/O standards that facilitate PCB integration. Next, it focuses on the technologies associated with embedded computing systems, going over the basics of field-programmable gate array (FPGA), digital signal processing (DSP) and application-specific integrated circuit (ASIC) technology, architectural support for on-chip integration of custom accelerators with processors, and O/S support for these systems. Finally, it offers full details on architecture, testability, and computer-aided design (CAD) support for embedded systems, soft processors, heterogeneous resources, and on-chip storage before concluding with coverage of software support—in particular, O/S Linux. *Embedded Systems: Hardware, Design,*

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

and Implementation is an ideal book for design engineers looking to optimize and reduce the size and cost of embedded system products and increase their reliability and performance. The Newnes Know It All Series takes the best of what our authors have written to create hard-working desk references that will be an engineer's first port of call for key information, design techniques and rules of thumb. Guaranteed not to gather dust on a shelf! Circuit design using microcontrollers is both a science and an art. This book covers it all. It details all of the essential theory and facts to help an engineer design a robust embedded system. Processors, memory, and the hot topic of interconnects (I/O) are completely covered. Our authors bring a wealth of experience and ideas; this is a must-own book for any embedded designer. *A 360 degree view from best-selling authors including Jack Ganssle, Tammy Noergard, and Fred Eady *Key facts, techniques, and applications fully detailed *The ultimate hard-working desk reference: all the essential information, techniques, and tricks of the trade in one volume Quick Boot is designed to give developers a background in the basic architecture and details of a typical boot sequence. More specifically, this book describes the basic initialization sequence that allows developers the freedom to boot an OS without a fully featured system BIOS. Various specifications provide the basics of both the code bases and the standards. This book also provides insights into optimization techniques for more advanced developers. With proper background information, the required specifications on hand, and diligence, many developers can create quality boot solutions using this text. Pete Dice is Engineering Director of Verifone, where he manages OS Engineering teams in Dublin, Ireland and Riga Latvia. Dice successfully launched Intel(R) Quark(TM), Intel's first generation SoC as well as invented the Intel(R) Galileo(TM) development board and developed a freemium SW strategy to scale Intel

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

IoT gateway features across product lines. He is also credited with architecting the "Moon Island" software stack and business model.

Whether you are a student, a newly-minted engineer entering the field of power electronics, a salesperson needing to understand a customer's needs, or a seasoned power supply designer desiring to track down a forgotten equation, this book will be a significant aid. Beginning with the basic definition of a power supply, we will traverse through voltage regulation techniques and the components necessary for their implementation, and then move on to the myriad of circuit topologies and control algorithms prevalent in modern-day design solutions. Separate chapters on feedback-loop compensation and magnetic design principles will build on this foundation, along with in-depth descriptions for dealing with regulations for electromagnetic compatibility, human safety, and energy efficiency issues. Additional chapters will describe the value proposition for digital control and the practical aspects power supply construction.

Embedded Firmware Solutions is the perfect introduction and daily-use field guide--for the thousands of firmware designers, hardware engineers, architects, managers, and developers--to Intel's new firmware direction (including Quark coverage), showing how to integrate Intel® Architecture designs into their plans. Featuring hands-on examples and exercises using Open Source codebases, like Coreboot and EFI Development Kit (tianocore) and Chromebook, this is the first book that combines a timely and thorough overview of firmware solutions for the rapidly evolving embedded ecosystem with in-depth coverage of requirements and optimization.

Authored by two of the leading authorities in the field, this guide offers readers the

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

knowledge and skills needed to achieve proficiency with embedded software. Use this book to build secure firmware. As operating systems and hypervisors have become successively more hardened, malware has moved further down the stack and into firmware. Firmware represents the boundary between hardware and software, and given its persistence, mutability, and opaqueness to today's antivirus scanning technology, it represents an interesting target for attackers. As platforms are universally network-connected and can contain multiple devices with firmware, and a global supply chain feeds into platform firmware, assurance is critical for consumers, IT enterprises, and governments. This importance is highlighted by emergent requirements such as NIST SP800-193 for firmware resilience and NIST SP800-155 for firmware measurement. This book covers the secure implementation of various aspects of firmware, including standards-based firmware—such as support of the Trusted Computing Group (TCG), Desktop Management Task Force (DMTF), and Unified Extensible Firmware Interface (UEFI) specifications—and also provides code samples and use cases. Beyond the standards, alternate firmware implementations such as ARM Trusted Firmware and other device firmware implementations (such as platform roots of trust), are covered. What You Will learn Get an overview of proactive security development for firmware, including firmware threat modeling Understand the details of architecture, including protection, detection, recovery, integrity measurement, and access control Be familiar with best practices for secure firmware development,

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

including trusted execution environments, cryptography, and language-based defenses. Know the techniques used for security validation and maintenance. Who This Book Is For: Given the complexity of modern platform boot requirements and the threat landscape, this book is relevant for readers spanning from IT decision makers to developers building firmware.

The fourth edition of Embedded Systems takes a big leap from the fundamentals of hardware to Edge Computing, Embedded IoT & Embedded AI. The book discusses next generation embedded systems topics, such as embedded SoC, Exascale computing systems and embedded systems' tensor processing units. This thoroughly updated edition serves as a textbook for engineering students and reference book for students of software-training institutions and embedded-systems-design professionals. Salient Features: 1. New chapters on IoT system architecture and design & Embedded AI 2. Case studies, such as, of Automatic Chocolate Vending Machine and Automobile Cruise Control 3. Bloom's Taxonomy-based chapter structure 4. Rich Pedagogy o 1000+ Self-assessment questions o 150+ MCQs o 220+ Review questions o 200+ Practice exercises

Explore embedded systems pentesting by applying the most common attack techniques and patterns. Key Features: Learn various pentesting tools and techniques to attack and secure your hardware infrastructure. Find the glitches in your hardware that can be a possible entry point for attacks. Discover best practices for securely designing

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

products Book Description Hardware pentesting involves leveraging hardware interfaces and communication channels to find vulnerabilities in a device. Practical Hardware Pentesting will help you to plan attacks, hack your embedded devices, and secure the hardware infrastructure. Throughout the book, you will see how a specific device works, explore the functional and security aspects, and learn how a system senses and communicates with the outside world. You will start by setting up your lab from scratch and then gradually work with an advanced hardware lab. The book will help you get to grips with the global architecture of an embedded system and sniff on-board traffic. You will also learn how to identify and formalize threats to the embedded system and understand its relationship with its ecosystem. Later, you will discover how to analyze your hardware and locate its possible system vulnerabilities before going on to explore firmware dumping, analysis, and exploitation. Finally, focusing on the reverse engineering process from an attacker point of view will allow you to understand how devices are attacked, how they are compromised, and how you can harden a device against the most common hardware attack vectors. By the end of this book, you will be well-versed with security best practices and understand how they can be implemented to secure your hardware. What you will learn Perform an embedded system test and identify security critical functionalities Locate critical security components and buses and learn how to attack them Discover how to dump and modify stored information Understand and exploit the relationship between the firmware and hardware Identify

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

and attack the security functions supported by the functional blocks of the device
Develop an attack lab to support advanced device analysis and attacks Who this book is for This book is for security professionals and researchers who want to get started with hardware security assessment but don't know where to start. Electrical engineers who want to understand how their devices can be attacked and how to protect against these attacks will also find this book useful.

"The world of Raspberry Pi is evolving quickly, with many new interface boards and software libraries becoming available all the time. In this cookbook, prolific hacker and author Simon Monk provides more than 200 practical recipes for running this tiny low-cost computer with Linux, programming it with Python, and hooking up sensors, motors and other hardware--including Arduino. You'll also learn basic principles to help you use new technologies with Raspberry Pi as its ecosystem develops. Python and other code examples from the book are available on GitHub. This cookbook is ideal for programmers and hobbyists familiar with the Pi through resources such as Getting Started with Raspberry Pi (O'Reilly)."

CD-ROM contains: Source code in 'C' for patterns and examples -- Evaluation version of the industry-standard Keil 'C' compiler and hardware simulator.

Discover how to apply software engineering patterns to develop more robust firmware faster than traditional embedded development approaches. In the authors' experience, traditional embedded software projects tend towards monolithic applications that are

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

optimized for their target hardware platforms. This leads to software that is fragile in terms of extensibility and difficult to test without fully integrated software and hardware. Patterns in the Machine focuses on creating loosely coupled implementations that embrace both change and testability. This book illustrates how implementing continuous integration, automated unit testing, platform-independent code, and other best practices that are not typically implemented in the embedded systems world is not just feasible but also practical for today's embedded projects. After reading this book, you will have a better idea of how to structure your embedded software projects. You will recognize that while writing unit tests, creating simulators, and implementing continuous integration requires time and effort up front, you will be amply rewarded at the end of the project in terms of quality, adaptability, and maintainability of your code.

What You Will Learn

- Incorporate automated unit testing into an embedded project
- Design and build functional simulators for an embedded project
- Write production-quality software when hardware is not available
- Use the Data Model architectural pattern to create a highly decoupled design and implementation
- Understand the importance of defining the software architecture before implementation starts and how to do it
- Discover why documentation is essential for an embedded project
- Use finite state machines in embedded projects

Who This Book Is For Mid-level or higher embedded systems (firmware) developers, technical leads, software architects, and development managers.

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

This Expert Guide gives you the techniques and technologies in software engineering to optimally design and implement your embedded system. Written by experts with a solutions focus, this encyclopedic reference gives you an indispensable aid to tackling the day-to-day problems when using software engineering methods to develop your embedded systems. With this book you will learn: The principles of good architecture for an embedded system Design practices to help make your embedded project successful Details on principles that are often a part of embedded systems, including digital signal processing, safety-critical principles, and development processes Techniques for setting up a performance engineering strategy for your embedded system software How to develop user interfaces for embedded systems Strategies for testing and deploying your embedded system, and ensuring quality development processes Practical techniques for optimizing embedded software for performance, memory, and power Advanced guidelines for developing multicore software for embedded systems How to develop embedded software for networking, storage, and automotive segments How to manage the embedded development process Includes contributions from: Frank Schirrmeister, Shelly Gretlein, Bruce Douglass, Erich Styger, Gary Stringham, Jean Labrosse, Jim Trudeau, Mike Brogioli, Mark Pitchford, Catalin Dan Udma, Markus Levy, Pete Wilson, Whit Waldo, Inga Harris, Xinxin Yang, Srinivasa Addepalli, Andrew McKay, Mark Kraeling and Robert Oshana. Road map of key problems/issues and references to their solution in the text Review of core methods in

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

the context of how to apply them Examples demonstrating timeless implementation details Short and to- the- point case studies show how key ideas can be implemented, the rationale for choices made, and design guidelines and trade-offs

Accurate determination of the mobile position constitutes the basis of many new applications. This book provides a detailed account of wireless systems for positioning, signal processing, radio localization techniques (Time Difference Of Arrival), performances evaluation, and localization applications. The first section is dedicated to Satellite systems for positioning like GPS, GNSS. The second section addresses the localization applications using the wireless sensor networks. Some techniques are introduced for localization systems, especially for indoor positioning, such as Ultra Wide Band (UWB), WIFI. The last section is dedicated to Coupled GPS and other sensors. Some results of simulations, implementation and tests are given to help readers grasp the presented techniques. This is an ideal book for students, PhD students, academics and engineers in the field of Communication, localization

Despite widespread interest in virtual reality, research and development efforts in synthetic environments (SE)--the field encompassing virtual environments, teleoperation, and hybrids--have remained fragmented. Virtual Reality is the first integrated treatment of the topic, presenting current knowledge along with thought-provoking vignettes about a future where SE is commonplace. This volume discusses all aspects of creating a system that will allow human operators to see, hear, smell, taste, move about, give commands, respond to conditions, and manipulate objects effectively in a real or virtual environment. The committee of computer scientists, engineers, and psychologists on the leading edge of SE development explores the potential applications of SE in the areas of manufacturing, medicine, education, training,

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

scientific visualization, and teleoperation in hazardous environments. The committee also offers recommendations for development of improved SE technology, needed studies of human behavior and evaluation of SE systems, and government policy and infrastructure. The overwhelming majority of a software system's lifespan is spent in use, not in design or implementation. So, why does conventional wisdom insist that software engineers focus primarily on the design and development of large-scale computing systems? In this collection of essays and articles, key members of Google's Site Reliability Team explain how and why their commitment to the entire lifecycle has enabled the company to successfully build, deploy, monitor, and maintain some of the largest software systems in the world. You'll learn the principles and practices that enable Google engineers to make systems more scalable, reliable, and efficient—lessons directly applicable to your organization. This book is divided into four sections: Introduction—Learn what site reliability engineering is and why it differs from conventional IT industry practices Principles—Examine the patterns, behaviors, and areas of concern that influence the work of a site reliability engineer (SRE) Practices—Understand the theory and practice of an SRE's day-to-day work: building and operating large distributed computing systems Management—Explore Google's best practices for training, communication, and meetings that your organization can use

Until the late 1980s, information processing was associated with large mainframe computers and huge tape drives. During the 1990s, this trend shifted toward information processing with personal computers, or PCs. The trend toward miniaturization continues and in the future the majority of information processing systems will be small mobile computers, many of which will be embedded into larger products and interfaced to the physical environment. Hence, these

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

kinds of systems are called embedded systems. Embedded systems together with their physical environment are called cyber-physical systems. Examples include systems such as transportation and fabrication equipment. It is expected that the total market volume of embedded systems will be significantly larger than that of traditional information processing systems such as PCs and mainframes. Embedded systems share a number of common characteristics. For example, they must be dependable, efficient, meet real-time constraints and require customized user interfaces (instead of generic keyboard and mouse interfaces). Therefore, it makes sense to consider common principles of embedded system design. Embedded System Design starts with an introduction into the area and a survey of specification models and languages for embedded and cyber-physical systems. It provides a brief overview of hardware devices used for such systems and presents the essentials of system software for embedded systems, like real-time operating systems. The book also discusses evaluation and validation techniques for embedded systems. Furthermore, the book presents an overview of techniques for mapping applications to execution platforms. Due to the importance of resource efficiency, the book also contains a selected set of optimization techniques for embedded systems, including special compilation techniques. The book closes with a brief survey on testing. Embedded System Design can be used as a text book for courses on embedded systems and as a source which provides pointers to relevant material in the area for PhD students and teachers. It assumes a basic knowledge of information processing hardware and software. Courseware related to this book is available at <http://ls12-www.cs.tu-dortmund.de/~marwedel>.

With Bluetooth Low Energy (BLE), smart devices are about to become even smarter. This

Get Free Hardware Firmware Interface Design Best Practices For Improving Embedded Systems Development

practical guide demonstrates how this exciting wireless technology helps developers build mobile apps that share data with external hardware, and how hardware engineers can gain easy and reliable access to mobile operating systems. This book provides a solid, high-level overview of how devices use BLE to communicate with each other. You'll learn useful low-cost tools for developing and testing BLE-enabled mobile apps and embedded firmware and get examples using various development platforms—including iOS and Android for app developers and embedded platforms for product designers and hardware engineers. Understand how data is organized and transferred by BLE devices Explore BLE's concepts, key limitations, and network topology Dig into the protocol stack to grasp how and why BLE operates Learn how BLE devices discover each other and establish secure connections Set up the tools and infrastructure for BLE application development Get examples for connecting BLE to iPhones, iPads, Android devices, and sensors Develop code for a simple device that transmits heart rate data to a mobile device

[Copyright: 47a6ae6e0e9c7c507a104c3dd804882b](https://www.amazon.com/47a6ae6e0e9c7c507a104c3dd804882b)