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### EMBEDDED ANDROID

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#### PORTING, EXTENDING, AND CUSTOMIZING

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"O'Reilly Media, Inc." *Embedded Android is for Developers wanting to create embedded systems based on Android and for those wanting to port Android to new hardware, or creating a custom development environment. Hackers and moders will also find this an indispensable guide to how Android works.*

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### EMBEDDED PROGRAMMING WITH ANDROID

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#### BRINGING UP AN ANDROID SYSTEM FROM SCRATCH

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Addison-Wesley Professional *The First Practical, Hands-On Guide to Embedded System Programming for Android Today, embedded systems programming is a more valuable discipline than ever, driven by fast-growing, new fields such as wearable technology and the Internet of Things. In this concise guide, Roger Ye teaches all the skills you'll need to write the efficient embedded code necessary to make tomorrow's Android devices work. The first title in Addison-Wesley's new Android™ Deep Dive series for intermediate and expert Android developers, Embedded Programming with Android™ draws on Roger Ye's extensive experience with advanced projects in telecommunications and mobile devices. Step by step, he guides you through building a system with all the key components Android hardware developers must deliver to manufacturing. By the time you're done, you'll have the key programming, compiler, and debugging skills you'll need for real-world projects. First, Ye introduces the essentials of bare-metal programming: creating assembly language code that runs directly on hardware. Then, building on this knowledge, he shows how to use C to create hardware interfaces for booting a Linux kernel with the popular U-Boot bootloader. Finally, he walks you through using filesystem images to boot Android and learning to build customized ROMs to support any new Android device. Throughout, Ye provides extensive downloadable code you can run, explore, and adapt. You will Build a complete virtualized environment for embedded development Understand the workflow of a modern embedded systems project Develop assembly programs, create binary images, and load and run them in the Android emulator Learn what it takes to bring up a bootloader and operating system Move from assembler to C, and explore Android's goldfish hardware interfaces Program serial ports, interrupt controllers, real time clocks, and NAND flash controllers Integrate C runtime libraries Support exception handling and timing Use U-Boot to boot the kernel via NOR or NAND flash processes Gain in-depth knowledge for porting U-Boot to new environments Integrate U-Boot and a Linux kernel into an AOSP and CyanogenMod source tree Create your own Android ROM on a virtual Android device*

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### MODERN EMBEDDED COMPUTING

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#### DESIGNING CONNECTED, PERVASIVE, MEDIA-RICH SYSTEMS

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Elsevier *Modern embedded systems are used for connected, media-rich, and highly integrated handheld devices such as mobile phones, digital cameras, and MP3 players. All of these embedded systems require networking, graphic user interfaces, and integration with PCs, as opposed to traditional embedded processors that can perform only limited functions for industrial applications. While most books focus on these controllers, Modern Embedded Computing provides a thorough understanding of the platform architecture of modern embedded computing systems that drive mobile devices. The book offers a comprehensive view of developing a framework for embedded systems-on-chips. Examples feature the Intel Atom processor, which is used in high-end mobile devices such as e-readers, Internet-enabled TVs, tablets, and net books. Beginning with a discussion of embedded platform architecture and Intel Atom-specific architecture, modular chapters cover system boot-up, operating systems, power optimization, graphics and multi-media, connectivity, and platform tuning. Companion lab materials compliment the chapters, offering hands-on embedded design experience. Learn embedded systems design with the Intel Atom Processor, based on the dominant PC chip architecture. Examples use Atom and offer comparisons to other platforms Design embedded processors for systems that support gaming, in-vehicle infotainment, medical records retrieval, point-of-sale purchasing, networking, digital storage, and many more retail, consumer and industrial applications Explore companion lab materials online that offer hands-on embedded design experience*

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### PROGRAMMING ANDROID

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"O'Reilly Media, Inc." *Presents instructions for creating Android applications for mobile devices using Java.*

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### EMBEDDED C CODING STANDARD

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Createspace Independent Publishing Platform Barr Group's *Embedded C Coding Standard* was developed to help firmware engineers minimize defects in embedded systems. Unlike the majority of coding standards, this standard focuses on practical rules that keep bugs out - including techniques designed to improve the maintainability and portability of embedded software. The rules in this coding standard include a set of guiding principles, as well as specific naming conventions and other rules for the use of data types, functions, preprocessor macros, variables, and other C language constructs. Individual rules that have been demonstrated to reduce or eliminate certain types of defects are highlighted. The BARR-C standard is distinct from, yet compatible with, the MISRA C Guidelines for Use of the C Language in Critical Systems. Programmers can easily combine rules from the two standards as needed.

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### ANDROID SYSTEM PROGRAMMING

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Packt Publishing Ltd *Build, customize, and debug your own Android system About This Book Master Android system-level programming by integrating, customizing, and extending popular open source projects Use Android emulators to explore the true potential of your hardware Master key debugging techniques to create a hassle-free development environment Who This Book Is For This book is for Android system programmers and developers who want to use Android and create indigenous projects with it. You should know the important points about the operating system and the C/C++ programming language. What You Will Learn Set up the Android development environment and organize source code repositories Get acquainted with the Android system architecture Build the Android emulator from the AOSP source tree Find out how to enable WiFi in the Android emulator Debug the boot up process using a customized Ramdisk Port your Android system to a new platform using VirtualBox Find out what recovery is and see how to enable it in the AOSP build Prepare and test OTA packages In Detail Android system programming involves both hardware and software knowledge to work on system level programming. The developers need to use various techniques to debug the different components in the target devices. With all the challenges, you usually have a deep learning curve to master relevant knowledge in this area. This book will not only give you the key knowledge you need to understand Android system programming, but will also prepare you as you get hands-on with projects and gain debugging skills that you can use in your future projects. You will start by exploring the basic setup of AOSP, and building and testing an emulator image. In the first project, you will learn how to customize and extend the Android emulator. Then you'll move on to the real challenge—building your own Android system on VirtualBox. You'll see how to debug the init process, resolve the bootloader issue, and enable various hardware interfaces. When you have a complete system, you will learn how to patch and upgrade it through recovery. Throughout the book, you will get to know useful tips on how to integrate and reuse existing open source projects such as LineageOS (CyanogenMod), Android-x86, Xposed, and GApps in your own system. Style and approach This is an easy-to-follow guide full of hands-on examples and system-level programming tips.*

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### JAVA<sub>2</sub> FOR PROGRAMMERS

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#### JAVA FOR PROGRAMMERS \_P2

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Prentice Hall Professional *The professional programmer's Deitel® guide to Java™ development and the powerful Java platform Written for programmers with a background in high-level language programming, this book applies the Deitel signature live-code approach to teaching programming and explores the Java language and Java APIs in depth. The book presents concepts in the context of fully tested programs, complete with syntax shading, code highlighting, line-by-line code walkthroughs and program outputs. The book features 200+ complete Java programs with 18,000+ lines of proven Java code, and hundreds of tips that will help you build robust applications. Start with an introduction to Java using an early classes and objects approach, then rapidly move on to more advanced topics, including GUI, graphics, exception handling, generics, collections, JDBC™, web-application development with JavaServer™ Faces, web services and more. You'll enjoy the Deitels' classic treatment of object-oriented programming and the OOD/UML® ATM case study, including a complete Java implementation. When you're finished, you'll have everything you need to build object-oriented Java applications.*

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### MASTERING EMBEDDED LINUX PROGRAMMING

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Packt Publishing Ltd *Master the techniques needed to build great, efficient embedded devices on Linux About This Book Discover how to build and configure reliable embedded Linux devices This book has been updated to include Linux 4.9 and Yocto Project 2.2 (Morty) This comprehensive guide covers the remote update of devices in the field and power management Who This Book Is For If you are an engineer who wishes to understand and use Linux in embedded devices, this book is for you. It is also for Linux developers and system programmers who are familiar with embedded systems and want to learn and program the best in class devices. It is appropriate for students studying embedded techniques, for developers implementing embedded Linux devices, and engineers supporting existing Linux devices. What You Will Learn Evaluate the Board Support Packages offered by most manufacturers of a system on chip or embedded module Use Buildroot and the Yocto Project to create embedded Linux systems quickly and efficiently Update IoT devices in the field without compromising security Reduce the power budget of devices to make batteries last longer Interact with the hardware without having to write kernel device drivers Debug devices remotely using GDB, and see how to measure the performance of the systems using powerful tools such as perk, ftrace, and valgrind Find out how to configure*

Linux as a real-time operating system In Detail Embedded Linux runs many of the devices we use every day, from smart TVs to WiFi routers, test equipment to industrial controllers - all of them have Linux at their heart. Linux is a core technology in the implementation of the inter-connected world of the Internet of Things. The comprehensive guide shows you the technologies and techniques required to build Linux into embedded systems. You will begin by learning about the fundamental elements that underpin all embedded Linux projects: the toolchain, the bootloader, the kernel, and the root filesystem. You'll see how to create each of these elements from scratch, and how to automate the process using Buildroot and the Yocto Project. Moving on, you'll find out how to implement an effective storage strategy for flash memory chips, and how to install updates to the device remotely once it is deployed. You'll also get to know the key aspects of writing code for embedded Linux, such as how to access hardware from applications, the implications of writing multi-threaded code, and techniques to manage memory in an efficient way. The final chapters show you how to debug your code, both in applications and in the Linux kernel, and how to profile the system so that you can look out for performance bottlenecks. By the end of the book, you will have a complete overview of the steps required to create a successful embedded Linux system. *Style and approach* This book is an easy-to-follow and pragmatic guide with in-depth analysis of the implementation of embedded devices. It follows the life cycle of a project from inception through to completion, at each stage giving both the theory that underlies the topic and practical step-by-step walkthroughs of an example implementation.

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## **HANDS-ON MOBILE AND EMBEDDED DEVELOPMENT WITH QT 5**

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### **BUILD APPS FOR ANDROID, IOS, AND RASPBERRY PI WITH C++ AND QT**

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Packt Publishing Ltd Explore Qt framework and APIs for building cross-platform applications for mobile devices, embedded systems, and IoT Key Features Build cross-platform applications and deploy them across mobile and connected devices Design 2D and 3D UIs for embedded systems using Yocto and Qt Creator Build machine to machine automation solution using QtSensors, QtMQTT, and QtWebSockets Book Description Qt is a world-class framework, helping you to develop rich graphical user interfaces (GUIs) and multi-platform applications that run on all major desktop platforms and most mobile or embedded platforms. The framework helps you connect the dots across platforms and between online and physical experience. This book will help you leverage the fully-featured Qt framework and its modular cross-platform library classes and intuitive APIs to develop applications for mobile, IoT, and industrial embedded systems. Considerations such as screen size, device orientation changes, and small memory will be discussed. We will focus on various core aspects of embedded and mobile systems, such as connectivity, networking, and sensors; there is no IoT without sensors. You will learn how to quickly design a flexible, fast, and responsive UI that looks great. Going further, you will implement different elements in a matter of minutes and synchronize the UI elements with the 3D assets with high precision. You will learn how to create high-performance embedded systems with 3D/2D user interfaces, and deploy and test on your target hardware. The book will explore several new features, including Qt for WebAssembly. At the end of this book, you will learn about creating a full software stack for embedded Linux systems using Yocto and Boot to Qt for Device Creation. What you will learn Explore the latest features of Qt, such as preview for Qt for Python and Qt for WebAssembly Create fluid UIs with a dynamic layout for different sized screens Deploy embedded applications on Linux systems using Yocto Design Qt APIs for building applications for embedded and mobile devices Utilize connectivity for networked and machine automated applications Discover effective techniques to apply graphical effects using Qt Quick apps Who this book is for The book is ideal for mobile developers, embedded systems engineers and enthusiasts who are interested in building cross-platform applications with Qt. Prior knowledge of C++ is required.

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### **LEARNING EMBEDDED ANDROID N PROGRAMMING**

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Packt Publishing Ltd Create the perfectly customized system by unleashing the power of Android OS on your embedded device About This Book Understand the system architecture and how the source code is organized Explore the power of Android and customize the build system Build a fully customized Android version as per your requirements Who This Book Is For If you are a Java programmer who wants to customize, build, and deploy your own Android version using embedded programming, then this book is for you. What You Will Learn Master Android architecture and system design Obtain source code and understand the modular organization Customize and build your first system image for the Android emulator Level up and build your own Android system for a real-world device Use Android as a home automation and entertainment system Tailor your system with optimizations and add-ons Reach for the stars: look at the Internet of Things, entertainment, and domotics In Detail Take a deep dive into the Android build system and its customization with Learning Embedded Android Programming, written to help you master the steep learning curve of working with embedded Android. Start by exploring the basics of Android OS, discover Google's "repo" system, and discover how to retrieve AOSP source code. You'll then find out to set up the build environment and the first AOSP system. Next, learn how to customize the boot sequence with a new animation, and use an Android "kitchen" to "cook" your custom ROM. By the end of the book, you'll be able to build customized Android open source projects by developing your own set of features. *Style and approach* This step-by-step guide is packed with various real-world examples to help you create a fully customized Android system with the most useful features available.

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### **ANDROID A PROGRAMMERS GUIDE**

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McGraw Hill Professional Master the Android mobile development platform Build compelling Java-based mobile applications using the Android SDK and the Eclipse open-source software development platform. Android: A Programmer's Guide shows you, step-by-step, how to download and set up all of the necessary tools, build and tune dynamic Android programs, and debug your results. Discover how to provide web and chat functions, interact with the phone dialer and GPS devices, and access the latest Google services. You'll also learn how to create custom Content Providers and database-enable your applications using SQLite. Install and configure Java, Eclipse, and Android plugin Create Android projects from the Eclipse UI or command line Integrate web content, images, galleries, and sounds Deploy menus, progress bars, and auto-complete functions Trigger actions using Android Intents, Filters, and Receivers Implement GPS, Google Maps, Google Earth, and GTalk Build interactive SQLite databases, calendars, and notepads Test applications using the Android Emulator and Debug Bridge

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### **INTRODUCTION TO EMBEDDED SYSTEMS, SECOND EDITION**

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#### **A CYBER-PHYSICAL SYSTEMS APPROACH**

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MIT Press 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 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.

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### **PRACTICAL UML STATECHARTS IN C/C++**

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#### **EVENT-DRIVEN PROGRAMMING FOR EMBEDDED SYSTEMS**

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CRC Press Practical UML Statecharts in C/C++ Second Edition bridges the gap between high-level abstract concepts of the Unified Modeling Language (UML) and the actual programming aspects of modern hierarchical state machines (UML statecharts). The book describes a lightweight, open source, event-driven infrastructure, called QP that enables direct manual coding UML statecharts and concurrent event-driven applications in C or C++ without big tools. This book is presented in two parts. In Part I, you get a practical description of the relevant state machine concepts starting from traditional finite state automata to modern UML state machines followed by state machine coding techniques and state-machine design patterns, all illustrated with executable examples. In Part II, you find a detailed design study of a generic real-time framework indispensable for combining concurrent, event-driven state machines into robust applications. Part II begins with a clear explanation of the key event-driven programming concepts such as inversion of control ( Hollywood Principle ), blocking versus non-blocking code, run-to-completion (RTC) execution semantics, the importance of event queues, dealing with time, and the role of state machines to maintain the context from one event to the next. This background is designed to help software developers in making the transition from the traditional sequential to the modern event-driven programming, which can be one of the trickiest paradigm shifts. The lightweight QP event-driven infrastructure goes several steps beyond the traditional real-time operating system (RTOS). In the simplest configuration, QP runs on bare-metal microprocessor, microcontroller, or DSP completely replacing the RTOS. QP can also work with almost any OS/RTOS to take advantage of the existing device drivers, communication stacks, and other middleware. The accompanying website to this book contains complete open source code for QP, ports to popular processors and operating systems, including 80x86, ARM Cortex-M3, MSP430, and Linux, as well as all examples described in the book.

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### **GUI DESIGN FOR ANDROID APPS**

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Apress GUI Design for Android Apps is the perfect—and concise—introduction for mobile app developers and designers. Through easy-to-follow tutorials, code samples, and case studies, the book shows the must-know principles for user-interface design for Android apps running on the Intel platform, including smartphones, tablets and embedded devices. This book is jointly developed for individual learning by Intel Software College and China Shanghai JiaoTong University, and is excerpted from Android Application Development for the Intel® Platform.

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### **MODELING AND OPTIMIZATION OF PARALLEL AND DISTRIBUTED EMBEDDED SYSTEMS**

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John Wiley & Sons This book introduces the state-of-the-art in research in parallel and distributed embedded systems, which have been enabled by developments in silicon technology, micro-electro-mechanical systems (MEMS), wireless communications, computer networking, and digital electronics. These systems have diverse applications in domains including military and defense, medical, automotive, and unmanned autonomous vehicles. The emphasis of the book is on the modeling and optimization of emerging parallel and distributed embedded systems in relation to the three key design metrics of performance, power and dependability. Key features: Includes an embedded wireless sensor networks case study to help illustrate the modeling and optimization of distributed embedded systems. Provides an analysis of multi-core/many-core based embedded systems to explain the modeling and optimization of parallel embedded systems. Features an application metrics estimation model; Markov modeling for fault tolerance and analysis; and queueing theoretic modeling for performance evaluation. Discusses optimization approaches for distributed wireless sensor networks; high-performance and energy-efficient techniques at the architecture, middleware and software levels for parallel multicore-based embedded systems; and dynamic optimization methodologies. Highlights research challenges and future research directions. The book is primarily aimed at researchers in embedded systems; however, it will also serve as an invaluable reference to senior undergraduate and graduate students with an interest in embedded systems research.

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## LINUX FOR EMBEDDED AND REAL-TIME APPLICATIONS

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Elsevier The open source nature of Linux has always intrigued embedded engineers, and the latest kernel releases have provided new features enabling more robust functionality for embedded applications. Enhanced real-time performance, easier porting to new architectures, support for microcontrollers and an improved I/O system give embedded engineers even more reasons to love Linux! However, the rapid evolution of the Linux world can result in an eternal search for new information sources that will help embedded programmers to keep up! This completely updated second edition of noted author Doug Abbott's respected introduction to embedded Linux brings readers up-to-speed on all the latest developments. This practical, hands-on guide covers the many issues of special concern to Linux users in the embedded space, taking into account their specific needs and constraints. You'll find updated information on: • The GNU toolchain • Configuring and building the kernel • BlueCat Linux • Debugging on the target • Kernel Modules • Devices Drivers • Embedded Networking • Real-time programming tips and techniques • The RTAI environment • And much more The accompanying CD-ROM contains all the source code from the book's examples, helpful software and other resources to help you get up to speed quickly. This is still the reference you'll reach for again and again! \* 100+ pages of new material adds depth and breadth to the 2003 embedded bestseller. \* Covers new Linux kernel 2.6 and the recent major OS release, Fedora. \* Gives the engineer a guide to working with popular and cost-efficient open-source code.

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## EMBEDDED SOFTWARE

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### THE WORKS

Elsevier 1. What Makes an Embedded Application Tick? -- 2. Memory in Embedded Systems -- 3. Memory Architectures -- 4. How Software Influences Hardware Design -- 5. Migrating your Software to a New Processor Architecture -- 6. Embedded Software for Transportation Applications -- 7. How to Choose a CPU for Your SoC Design -- 8. An Introduction to USB Software -- 9. Towards USB 3.0.

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## A PRACTICAL INTRODUCTION TO HUMAN-IN-THE-LOOP CYBER-PHYSICAL SYSTEMS

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John Wiley & Sons The first book focusing on one of the hottest new topics in Internet of Things systems research and development Studies estimate that by 2020 we will have a vast Internet of Things (IoT) network comprising 26 billion connected devices, including everything from light bulbs to refrigerators, coffee makers to cars. From the beginning, the concept of cyber-physical systems (CPS), or the sensing and control of physical phenomena through networks of devices that work together to achieve common goals, has been implicit in the IoT enterprise. This book focuses on the increasingly hot topic of Human-in-the-loop Cyber-Physical Systems (HiTLCPs)—CPSs that incorporate human responses in IoT equation. Why have we not yet integrated the human component into CPSs? What are the major challenges to achieving HiTLCPs? How can we take advantage of ubiquitous sensing platforms, such as smartphones and personal devices to achieve that goal? While mature HiTLCPs designs have yet to be achieved, or a general consensus reached on underlying HiTLCPs requirements, principles, and theory, researchers and developers worldwide are on the cusp of realizing them. With contributions from researchers at the cutting edge of HiTLCPs R&D, this book addresses many of these questions from the theoretical and practical points of view. An essential primer on a rapidly emerging Internet-of-Things concept, focusing on human-centric applications Discusses new topics which, until now, have only been available in research papers scattered throughout the world literature Addressed fundamental concepts in depth while providing practical insights into the development of complete HiTLCPs systems Includes a companion website containing full source-code for all of the applications described This book is an indispensable resource for researchers and app developers eager to explore HiTL concepts and include them into their designs. It is also an excellent primer for advanced undergraduates and graduate students studying IoT, CPS, and HiTLCPs.

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## ANDROID ON X86

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### AN INTRODUCTION TO OPTIMIZING FOR INTEL® ARCHITECTURE

Apress Android on x86: an Introduction to Optimizing for Intel® Architecture serves two main purposes. First, it makes the case for adapting your applications onto Intel's x86 architecture, including discussions of the business potential, the changing landscape of the Android marketplace, and the unique challenges and opportunities that arise from x86 devices. The fundamental idea is that extending your applications to support x86 or creating new ones is not difficult, but it is imperative to know all of the technicalities. This book is dedicated to providing you with an awareness of these nuances and an understanding of how to tackle them. Second, and most importantly, this book provides a one-stop detailed resource for best practices and procedures associated with the installation issues, hardware optimization issues, software requirements, programming tasks, and performance optimizations that emerge when developers consider the x86 Android devices. Optimization discussions dive into native code, hardware acceleration, and advanced profiling of multimedia applications. The authors have collected this information so that you can use the book as a guide for the specific requirements of each application project. This book is not dedicated solely to code; instead it is filled with the information you need in order to take advantage of x86 architecture. It will guide you through installing the Android SDK for Intel Architecture, help you understand the differences and similarities between processor architectures available in Android devices, teach you to create and port applications, debug existing x86 applications, offer solutions for NDK and C++ optimizations, and introduce the Intel Hardware Accelerated Execution Manager. This book provides the most useful information to help you get the job done quickly while utilizing best practices. What you'll learnThe development-relevant differences between Android on ARM and Android on Intel x86 How to set up the SDK for an emulated Intel Android device How to build the Android OS for the Intel Mobile Processor How to create new x86 based Android applications, set up testing and performance tuning, and port existing Android applications to work with the x86 processor How to debug problems they encounter when working on the x86 Android test platform Intricacies of the Intel Hardware Accelerated Execution Manager. The reader will also gain significant insight into the OpenGL Android support. Who this book is for Android developers Hardware designers who need to understand how Android will work on their processorsCIOs and CEOs of technology-based companies IT staff who may encounter or need to understand the issues New startup founders and entrepreneurs Computer science students Table of ContentsChapter 1: History & Evolution of Android OS Chapter 2: Mobile Device Applications – Uses and Trends Chapter 3: Why x86 on Android? Chapter 4: Android Development – Business Overview and Considerations Chapter 5: Android Devices with Intel Processors Chapter 6: Installing the Android SDK for IntelApplication Development Chapter 7: The Intel Mobile Processor Chapter 8: Creating and Porting NDK-based AndroidApplications Chapter 9: Debugging Android Chapter 10: Performance Optimization for AndroidApplications on x86 Chapter 11: x86 NDK and C++ Optimizations Chapter 12: Intel Hardware Accelerated Execution Manager Appendix: References

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## PROGRAMMING EMBEDDED SYSTEMS

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### WITH C AND GNU DEVELOPMENT TOOLS

"O'Reilly Media, Inc." Authored by two of the leading authorities in the field, this guide offers readers the knowledge and skills needed to achieve proficiency with embedded software.

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## EMBEDDED SYSTEM DESIGN

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### EMBEDDED SYSTEMS FOUNDATIONS OF CYBER-PHYSICAL SYSTEMS

Springer Science & Business Media 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 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>.

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## SECURITY IN COMPUTING AND COMMUNICATIONS

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### 5TH INTERNATIONAL SYMPOSIUM, SSCC 2017, MANIPAL, INDIA, SEPTEMBER 13-16, 2017, PROCEEDINGS

Springer This book constitutes the refereed proceedings of the 5th International Symposium on Security in Computing and Communications, SSCC 2017, held in Manipal, India, in September 2017. The 21 revised full papers presented together with 13 short papers were carefully reviewed and selected from 84 submissions. The papers focus on topics such as cryptosystems, algorithms, primitives; security and privacy in networked systems; system and network security; steganography, visual cryptography, image forensics; applications security.

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## ADVANCES AND APPLICATIONS IN MOBILE COMPUTING

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BoD – Books on Demand Advances and Applications in Mobile Computing offers guidelines on how mobile software services can be used in order to simplify the mobile users' life. The main contribution of this book is enhancing mobile software application development stages as analysis, design, development and test. Also, recent mobile network technologies such as algorithms, decreasing energy consumption in mobile network, and fault tolerance in distributed mobile computing are the main concern of the first section. In the mobile software life cycle section, the chapter on human computer interaction discusses mobile device handset design strategies, following the chapters on mobile application testing strategies. The last section, mobile applications as service, covers different mobile solutions and different application sectors.

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## INTELLIGENT TECHNIQUES IN RECOMMENDATION SYSTEMS: CONTEXTUAL ADVANCEMENTS AND NEW METHODS

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### CONTEXTUAL ADVANCEMENTS AND NEW METHODS

IGI Global Although recommendation systems have become a vital research area in the fields of cognitive science, approximation theory, information retrieval and management sciences, they still require

improvements to make recommendation methods more effective and intelligent. *Intelligent Techniques in Recommendation Systems: Contextual Advancements and New Methods* is a comprehensive collection of research on the latest advancements of intelligence techniques and their application to recommendation systems and how this could improve this field of study.

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## WEB INFORMATION SYSTEMS AND TECHNOLOGIES

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### 8TH INTERNATIONAL CONFERENCE, WEBIST 2012, PORTO, PORTUGAL, APRIL 18-21, 2012, REVISED SELECTED PAPERS

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Springer This book contains the thoroughly refereed and revised best papers from the 8th International Conference on Web Information Systems and Technologies, WEBIST 2012, held in Porto, Portugal, in April 2012, and organized by the Institute for Systems and Technologies of Information, Control and Communication (INSTICC), in collaboration with ACM SIGMIS. The 23 papers presented in this book were carefully reviewed and selected from 184 submissions. The papers were selected from those with the best reviews also taking into account the quality of their presentation at the conference. The papers are grouped into parts on Internet Technology; Web Interfaces and Applications; Society, e-Business, and e-Government; Web Intelligence; and Mobile Information Systems.

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## LINUX: EMBEDDED DEVELOPMENT

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Packt Publishing Ltd Leverage the power of Linux to develop captivating and powerful embedded Linux projects About This Book Explore the best practices for all embedded product development stages Learn about the compelling features offered by the Yocto Project, such as customization, virtualization, and many more Minimize project costs by using open source tools and programs Who This Book Is For If you are a developer who wants to build embedded systems using Linux, this book is for you. It is the ideal guide for you if you want to become proficient and broaden your knowledge. A basic understanding of C programming and experience with systems programming is needed. Experienced embedded Yocto developers will find new insight into working methodologies and ARM specific development competence. What You Will Learn Use the Yocto Project in the embedded Linux development process Get familiar with and customize the bootloader for a board Discover more about real-time layer, security, virtualization, CGL, and LSB See development workflows for the U-Boot and the Linux kernel, including debugging and optimization Understand the open source licensing requirements and how to comply with them when cohabiting with proprietary programs Optimize your production systems by reducing the size of both the Linux kernel and root filesystems Understand device trees and make changes to accommodate new hardware on your device Design and write multi-threaded applications using POSIX threads Measure real-time latencies and tune the Linux kernel to minimize them In Detail Embedded Linux is a complete Linux distribution employed to operate embedded devices such as smartphones, tablets, PDAs, set-top boxes, and many more. An example of an embedded Linux distribution is Android, developed by Google. This learning path starts with the module Learning Embedded Linux Using the Yocto Project. It introduces embedded Linux software and hardware architecture and presents information about the bootloader. You will go through Linux kernel features and source code and get an overview of the Yocto Project components available. The next module Embedded Linux Projects Using Yocto Project Cookbook takes you through the installation of a professional embedded Yocto setup, then advises you on best practices. Finally, it explains how to quickly get hands-on with the Freescale ARM ecosystem and community layer using the affordable and open source Wandboard embedded board. Moving ahead, the final module Mastering Embedded Linux Programming takes you through the product cycle and gives you an in-depth description of the components and options that are available at each stage. You will see how functions are split between processes and the usage of POSIX threads. By the end of this learning path, your capabilities will be enhanced to create robust and versatile embedded projects. This Learning Path combines some of the best that Packt has to offer in one complete, curated package. It includes content from the following Packt products: Learning Embedded Linux Using the Yocto Project by Alexandru Vaduva Embedded Linux Projects Using Yocto Project Cookbook by Alex Gonzalez Mastering Embedded Linux Programming by Chris Simmonds Style and approach This comprehensive, step-by-step, pragmatic guide enables you to build custom versions of Linux for new embedded systems with examples that are immediately applicable to your embedded developments. Practical examples provide an easy-to-follow way to learn Yocto project development using the best practices and working methodologies. Coupled with hints and best practices, this will help you understand embedded Linux better.

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## PROGRAMMING EMBEDDED SYSTEMS IN C AND C++

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"O'Reilly Media, Inc." An introduction to embedding systems for C and C++ programmers encompasses such topics as testing memory devices, writing and erasing Flash memory, verifying nonvolatile memory contents, and much more. Original. (Intermediate).

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## HELLO, ANDROID

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### INTRODUCING GOOGLE'S MOBILE DEVELOPMENT PLATFORM

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Pragmatic Bookshelf Google Android dominates the mobile market, and by targeting Android, your apps can run on most of the phones and tablets in the world. This new fourth edition of the #1 book for learning Android covers all modern Android versions from Android 4.1 through Android 5.0. Freshly added material covers new Android features such as Fragments and Google Play Services. Android is a platform you can't afford not to learn, and this book gets you started. Android is a software toolkit for mobile phones and tablets, created by Google. It's inside more than a billion devices, making Android the number one platform for application developers. Your own app could be running on all those devices! Getting started developing with Android is easy. You don't even need access to an Android phone, just a computer where you can install the Android SDK and the emulator that comes with it. Within minutes, Hello, Android gets you creating your first working application: Android's version of "Hello, World." From there, you'll build up a more substantial example: an Ultimate Tic-Tac-Toe game. By gradually adding features to the game, you'll learn about many aspects of Android programming, such as creating animated user interfaces, playing music and sound effects, building location-based services (including GPS and cell-tower triangulation), and accessing web services. You'll also learn how to publish your applications to the Google Play Store. This fourth edition of the bestselling Android classic has been revised for Android 4.1-4.3 (Jelly Bean), 4.4 (KitKat), and Android 5.0 (Lollipop). Topics have been streamlined and simplified based on reader feedback, and every page and example has been reviewed and updated for compatibility with the latest versions of Android. If you'd rather be coding than reading about coding, this book is for you.

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## ANDROID NDK: BEGINNER'S GUIDE - SECOND EDITION

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Packt Publishing Ltd Are you an Android Java programmer who needs more performance? Are you a C/C++ developer who doesn't want to bother with the complexity of Java and its out-of-control garbage collector? Do you want to create fast intensive multimedia applications or games? If you've answered yes to any of these questions then this book is for you. With some general knowledge of C/C++ development, you will be able to dive headfirst into native Android development.

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## PATTERNS FOR TIME-TRIGGERED EMBEDDED SYSTEMS

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### BUILDING RELIABLE APPLICATIONS WITH THE 8051 FAMILY OF MICROCONTROLLERS

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

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## HANDS-ON EMBEDDED PROGRAMMING WITH C++17

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### CREATE VERSATILE AND ROBUST EMBEDDED SOLUTIONS FOR MCUS AND RTOSes WITH MODERN C++

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Packt Publishing Ltd Build safety-critical and memory-safe stand-alone and networked embedded systems Key Features Know how C++ works and compares to other languages used for embedded development Create advanced GUIs for embedded devices to design an attractive and functional UI Integrate proven strategies into your design for optimum hardware performance Book Description C++ is a great choice for embedded development, most notably, because it does not add any bloat, extends maintainability, and offers many advantages over different programming languages. Hands-On Embedded Programming with C++17 will show you how C++ can be used to build robust and concurrent systems that leverage the available hardware resources. Starting with a primer on embedded programming and the latest features of C++17, the book takes you through various facets of good programming. You'll learn how to use the concurrency, memory management, and functional programming features of C++ to build embedded systems. You will understand how to integrate your systems with external peripherals and efficient ways of working with drivers. This book will also guide you in testing and optimizing code for better performance and implementing useful design patterns. As an additional benefit, you will see how to work with Qt, the popular GUI library used for building embedded systems. By the end of the book, you will have gained the confidence to use C++ for embedded programming. What you will learn Choose the correct type of embedded platform to use for a project Develop drivers for OS-based embedded systems Use concurrency and memory management with various microcontroller units (MCUs) Debug and test cross-platform code with Linux Implement an infotainment system using a Linux-based single board computer Extend an existing embedded system with a Qt-based GUI Communicate with the FPGA side of a hybrid FPGA/SoC system Who this book is for If you want to start developing effective embedded programs in C++, then this book is for you. Good knowledge of C++ language constructs is required to understand the topics covered in the book. No knowledge of embedded systems is assumed.

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## EURO-PAR 2013: PARALLEL PROCESSING WORKSHOPS

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### BIGDATA CLOUD, DIHC, FEDICI, HETEROPAR, HIBB, LSDVE, MHPC, OMHI, PADABS, PROPER, RESILIENCE, ROME, UCHPC 2013, AACHEN, GERMANY, AUGUST 26-30, 2013. REVISED SELECTED PAPERS

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Springer This book constitutes thoroughly refereed post-conference proceedings of the workshops of the 19th International Conference on Parallel Computing, Euro-Par 2013, held in Aachen, Germany in August 2013. The 99 papers presented were carefully reviewed and selected from 145 submissions. The papers include seven workshops that have been co-located with Euro-Par in the previous years: - Big Data Cloud (Second Workshop on Big Data Management in Clouds) - Hetero Par (11th Workshop on Algorithms, Models and Tools for Parallel Computing on Heterogeneous Platforms) - HiBB (Fourth Workshop on High Performance Bioinformatics and Biomedicine) - OMHI (Second Workshop on On-chip Memory Hierarchies and Interconnects) - PROPER (Sixth Workshop on Productivity and Performance) - Resilience (Sixth Workshop on Resiliency in High Performance Computing with Clusters, Clouds, and Grids) - UCHPC (Sixth Workshop on Unconventional High Performance Computing) as well as six newcomers: - DIHC (First Workshop on Dependability and Interoperability in Heterogeneous Clouds) - Fed ICI (First Workshop on Federative and Interoperable Cloud Infrastructures) - LSDVE (First Workshop on Large Scale Distributed Virtual Environments on Clouds and P2P) - MHPC (Workshop on Middleware for HPC and Big Data Systems) - PADABS (First Workshop on Parallel and Distributed Agent Based Simulations) - ROME (First Workshop on Runtime and Operating Systems for the Many core Era) All these workshops focus on promotion and advancement of all aspects of parallel and distributed computing.

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## EMBEDDED FIRMWARE SOLUTIONS

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### DEVELOPMENT BEST PRACTICES FOR THE INTERNET OF THINGS

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*Apres 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.*

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### MASTERING EMBEDDED LINUX PROGRAMMING

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#### CREATE FAST AND RELIABLE EMBEDDED SOLUTIONS WITH LINUX 5.4 AND THE YOCTO PROJECT 3.1 (DUNFELL)

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*Packt Publishing Ltd Harness the power of Linux to create versatile and robust embedded solutions Key FeaturesLearn how to develop and configure robust embedded Linux devicesExplore the new features of Linux 5.4 and the Yocto Project 3.1 (Dunfell)Discover different ways to debug and profile your code in both user space and the Linux kernelBook Description If you're looking for a book that will demystify embedded Linux, then you've come to the right place. Mastering Embedded Linux Programming is a fully comprehensive guide that can serve both as means to learn new things or as a handy reference. The first few chapters of this book will break down the fundamental elements that underpin all embedded Linux projects: the toolchain, the bootloader, the kernel, and the root filesystem. After that, you will learn how to create each of these elements from scratch and automate the process using Buildroot and the Yocto Project. As you progress, the book will show you how to implement an effective storage strategy for flash memory chips and install updates to a device remotely once it's deployed. You'll also learn about the key aspects of writing code for embedded Linux, such as how to access hardware from apps, the implications of writing multi-threaded code, and techniques to manage memory in an efficient way. The final chapters demonstrate how to debug your code, whether it resides in apps or in the Linux kernel itself. You'll also cover the different tracers and profilers that are available for Linux so that you can quickly pinpoint any performance bottlenecks in your system. By the end of this Linux book, you'll be able to create efficient and secure embedded devices using Linux. What you will learnUse Buildroot and the Yocto Project to create embedded Linux systemsTroubleshoot BitBake build failures and streamline your Yocto development workflowUpdate IoT devices securely in the field using Mender or balenaPrototype peripheral additions by reading schematics, modifying device trees, soldering breakout boards, and probing pins with a logic analyzerInteract with hardware without having to write kernel device driversDivide your system up into services supervised by BusyBox runitDebug devices remotely using GDB and measure the performance of systems using tools such as perf, ftrace, eBPF, and CallgrindWho this book is for If you're a systems software engineer or system administrator who wants to learn how to implement Linux on embedded devices, then this book is for you. It's also aimed at embedded systems engineers accustomed to programming for low-power microcontrollers, who can use this book to help make the leap to high-speed systems on chips that can run Linux. Anyone who develops hardware that needs to run Linux will find something useful in this book – but before you get started, you'll need a solid grasp on POSIX standard, C programming, and shell scripting.*

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### ARM® CORTEX® M4 COOKBOOK

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*Packt Publishing Ltd Over 50 hands-on recipes that will help you develop amazing real-time applications using GPIO, RS232, ADC, DAC, timers, audio codecs, graphics LCD, and a touch screen About This Book This book focuses on programming embedded systems using a practical approach Examples show how to use bitmapped graphics and manipulate digital audio to produce amazing games and other multimedia applications The recipes in this book are written using ARM's MDK Microcontroller Development Kit which is the most comprehensive and accessible development solution Who This Book Is For This book is aimed at those with an interest in designing and programming embedded systems. These could include electrical engineers or computer programmers who want to get started with microcontroller applications using the ARM Cortex-M4 architecture in a short time frame. The book's recipes can also be used to support students learning embedded programming for the first time. Basic knowledge of programming using a high level language is essential but those familiar with other high level languages such as Python or Java should not have too much difficulty picking up the basics of embedded C programming. What You Will Learn Use ARM's uVision MDK to configure the microcontroller run time environment (RTE), create projects and compile download and run simple programs on an evaluation board. Use and extend device family packs to configure I/O peripherals. Develop multimedia applications using the touchscreen and audio codec beep generator. Configure the codec to stream digital audio and design digital filters to create amazing audio effects. Write multi-threaded programs using ARM's real time operating system (RTOS). Write critical sections of code in assembly language and integrate these with functions written in C. Fix problems using ARM's debugging tool to set breakpoints and examine variables. Port uVision projects to other open source development environments. In Detail Embedded microcontrollers are at the core of many everyday electronic devices. Electronic automotive systems rely on these devices for engine management, anti-lock brakes, in car entertainment, automatic transmission, active suspension, satellite navigation, etc. The so-called internet of things drives the market for such technology, so much so that embedded cores now represent 90% of all processor's sold. The ARM Cortex-M4 is one of the most powerful microcontrollers on the market and includes a floating point unit (FPU) which enables it to address applications. The ARM Cortex-M4 Microcontroller Cookbook provides a practical introduction to programming an embedded microcontroller architecture. This book attempts to address this through a series of recipes that develop embedded applications targeting the ARM-Cortex M4 device family. The recipes in this book have all been tested using the Keil MCBSTM32F400 board. This board includes a small graphic LCD touchscreen (320x240 pixels) that can be used to create a variety of 2D gaming applications. These motivate a younger audience and are used throughout the book to illustrate particular hardware peripherals and software concepts. C language is used predominantly throughout but one chapter is devoted to recipes involving assembly language. Programs are mostly written using ARM's free microcontroller development kit (MDK) but for those looking for open source development environments the book also shows how to configure the ARM-GNU toolchain. Some of the recipes described in the book are the basis for laboratories and assignments undertaken by undergraduates. Style and approach The ARM Cortex-M4 Cookbook is a practical guide full of hands-on recipes. It follows a step-by-step approach that allows you to find, utilize and learn ARM concepts quickly.*

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### ANDROID APPS FOR ABSOLUTE BEGINNERS

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#### COVERING ANDROID 7

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*Apres Get your first Android apps up and running with the help of plain English and practical examples. If you have a great idea for an Android app, but have never programmed before, then this book is for you. Android Apps for Absolute Beginners cuts through the fog of jargon and mystery that surrounds Android app development, and gives you simple, step-by-step instructions to get you started. This book teaches Android application development in language anyone can understand, giving you the best possible start in Android development. It provides clean, straightforward examples that make learning easy, allowing you to pick up the concepts without fuss. It offers clear code descriptions and layout so that you can get your apps running as soon as possible Although this book covers what's new in Android 7, it is also backwards compatible to cover some of the previous Android releases. What You'll Learn Download, install, and configure the latest software needed for Android app development Work efficiently using an integrated development environment (IDE) Build useful, attractive applications and get them working immediately Create apps with ease using XML markup and drag-and-drop graphical layout editors Use new media and graphics to skin your app so that it has maximum appeal Create advanced apps combining XML, Java and new media content Who This Book Is For If you have a great idea for an Android app, but have never programmed before, then this book is for you. You don't need to have any previous computer programming skills — as long as you have a desire to learn and you know which end of the mouse is which, the world of Android apps development awaits.*

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### TRANSITIONING FROM GLOBALIZED TO LOCALIZED AND SELF-RELIANT ECONOMIES

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*IGI Global The outbreak of COVID-19 had a profound impact on global economic growth. Global trade has transformed drastically and will only continue to do so as countries vote on export and import decisions based on global competition. Many countries would be compelled to reconsider multi-country trade deals as internal interests will push and dictate them. More important than ever, it is imperative that self-reliant economies be investigated specifically in the post-COVID-19 era in order to understand the impacts made on international ties and trade agreements. Transitioning From Globalized to Localized and Self-Reliant Economies is a comprehensive reference source that looks at how economies are now moving towards becoming self-reliant, especially in the wake of the COVID-19 pandemic. Covering topics such as digitalization, technological innovation, and personal finance, this is a beneficial resource for economists, executives, managers, government officials, policymakers, entrepreneurs, IT departments, human resource managers, CEOs, students, researchers, and academicians.*

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### ANDROID COOKBOOK

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*"O'Reilly Media, Inc." Provides instruction on building Android apps, including solutions to working with web services, multitouch gestures, location awareness, and device features.*

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### GUI DESIGN FOR ANDROID APPS

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*Apres GUI Design for Android Apps is the perfect—and concise—introduction for mobile app developers and designers. Through easy-to-follow tutorials, code samples, and case studies, the book shows the must-know principles for user-interface design for Android apps running on the Intel platform, including smartphones, tablets and embedded devices. This book is jointly developed for individual learning by Intel Software College and China Shanghai JiaoTong University, and is excerpted from Android Application Development for the Intel® Platform. What you'll learn Key aspects of why UI and UX design for embedded systems is different than for desktops Troubleshooting UI design issues Understanding how key concepts such as state transition, context class, and intent work How to use the interface app design tools provided by Android Planning for complex apps (apps with multiple activities) Optimizing app design for touch screen input Who this book is for The book is primarily for app developers, software engineers and open-source programming enthusiasts, but can also be used by for training programs and Codecademy-style programs. Table of ContentsForeword/Preface Chapter 1. General Overview Chapter 2. The Android-Specific GUI Chapter 3. Designing Complex Applications Chapter 4. Self-Drawing Graphics and Touch Screen Input Conclusion*

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### THE COMPLETE ANDROID GUIDE

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3ones Inc