Internet of Things

The Internet of Things (IoT) refers to physical and virtual objects that have unique identities and are connected to the Internet to make intelligent applications that facilitate energy, logistics, industrial control, retail, agriculture and many other physical domain “smarter”. Internet of Things is a new revolution of the Internet that is rapidly gathering momentum driven by the advancements in sensor networks, mobile devices, wireless communications, networking and cloud technologies. Experts forecast that by the year 2020 there will be a total of 50 billion devices/things connected to the internet. This book is written as a textbook on Internet of Things for educational programs at colleges and universities, and also for IoT vendors and service providers who may be interested in offering a broader perspective of Internet of Things to accompany their own customer and developer training programs. The typical reader is expected to have completed a couple of courses in programming using a conventional computer and be pursuing graduate student in one of the science, technology, engineering or mathematics (STEM) field. The book is organized in a logical way comprising of a total of 12 chapters part I fundamental components and their characteristics. A taxonomy of IoT systems is proposed comprising of various IoT levels with increasing levels of complexity. Domain specific Internet of Things and their real-world applications are described. A generic design methodology for IoT is proposed. An IoT system management using WAMP-FAME is described. Part II introduces the reader to the programming aspects of Internet of Things with a view towards rapid prototyping of complex IoT applications. We chose Python as the primary programming language for this book, and an introduction to Python is also included within the text to bring readers to a common level of expertise. We describe packages, frameworks and cloud services including the WAMP-Autobahn, likley cloud and Amazon Web Services which can be used for developing IoT systems. We chose the Raspberry Pi device for the examples in this book. Reference architectures for different levels of IoT applications are examined in detail. Case studies with complete source code for various IoT domains including home automation, smart environment, smart cities, logistics, retail, smart energy, smart agriculture, industrial control and smart health, are described. Part III introduces the reader to advanced topics on IoT including IoT data analytics and Tools for IoT. Case studies on collecting and analyzing data generated by Internet of Things in the cloud are described. From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence

The term “Internet of Things” (IoT) refers to an ecosystem of interconnected physical devices and objects that are accessible through the Internet and can communicate with each other. The main strength of the IoT vision is the high impact it has created and will continue to do on several aspects of the everyday life and behavior of its potential users. This book presents some of the state-of-the-art research work in the field of the IoT, especially on the issues of communication protocols, privacy and security, trust security and privacy issues, reference architecture design, and standardization. It will be a valuable source of knowledge for researchers, engineers, practitioners, and graduate and doctoral students who are working in various fields of the IoT. It will be useful also for faculty members of graduate schools and universities.
Real-world service use cases studies provide the hands-on knowledge needed to successfully develop and implement M2M and IoT technologies sustainably and profitably. Finally, the future vision for M2M technologies is described, including prospective changes in the technology and business aspects of Machine-to-Machine and Internet of Things, and who have experience in implementing solutions. Standards included: ETSI M2M, ETSI 02 15 14, 3GPP (3GPP 36, 30, 40), Bluetooth Low Energy/Smart, ETSI E2EPM, ETSI CIAP, ETSI HIP, Power Line Communication, Open Geospatial Consortium (OGC) Sensor Web Enablement (SWE), ZigBee, ETSI 02 15 14, 3GPP, Broadband Forum TR-069, Open Mobile Alliance (OMA) Device Management (OMA DM), OMA IP Multimedia Subsystem (OMA IMS), IP Video over CoAx (iPVoCA), and OMA Device Management v2.0. The book provides software and hardware architectures and gateway, capability and M2M area networks, local and wide area networking, M2M Service Enablement, IoT data management and data warehousing, data analytics and big data, complex event processing and stream analytics, knowledge discovery and management, business intelligence and machine learning, and smart cities. It describes the use cases and provides insight on trust, security, and privacy in IoT environments.

The Internet of Things
This book provides a dual perspective on exploring the uses of their applications in healthcare and smart cities. It also offers other interdisciplinary aspects of the Internet of Things like big data, embedded systems and wireless sensor networks. Detailed coverage of the underlying architecture, framework, and state-of-the-art methodologies from the core of the book. Programming the Internet of Things
Most of the devices in the Internet of Things will be battery powered sensor devices. All the operations done on battery powered devices require minimal computation. Secure algorithms like RSA become useless in the Internet of Things environment. Elliptic curve based cryptography is a best solution for this problem because it provides higher security in smaller key size compared to RSA. This book focuses on the use of Elliptic Curve Cryptography with different authentication architectures and architecture schemes using various security algorithms. It also includes a review of the first required for security and understanding Elliptic Curve Cryptography.

Learning Internet of Things
Internet of Things (IoT) for Automated and Smart Applications
The Internet of Things (IoT) enhances customer experience, increases the amount of data gained through connected devices, and widens the scope of analytics. This provides a range of exciting marketing possibilities such as selling existing products and services more efficiently, delivering truly personalized customer experiences, and potentially creating new products and services. Smart Marketing with the Internet of Things is an essential reference source that discusses the use of the Internet of Things as its leading concept to enhance the customer experience. Featuring research on topics such as augmented reality, sensor networks, and wearable technology, this book is ideally designed for business professionals, marketing managers, marketing strategists, academicians, researchers, and graduate-level students seeking coverage on the use of IoT in enhancing customer marketing outcomes.

Fundamentals of Internet of Things
This book addresses researchers and graduate students at the forefront of study/research on the Internet of Things (IoT) by presenting state-of-the-art research together with the current and future challenges in building new smart applications (e.g., Smart Cities, Smart Buildings, and Industrial IoT) in an efficient, scalable, and sustainable way. It covers the main pillars of the IoT world (Connectivity, Interoperability, Discoverability, and Security/Privacy), providing a comprehensive look at the current technologies, procedures, and architecture.

Internet of Things
The term IoT, which was first proposed by Kevin Ashton, a British technologist, in 1999, has the potential to impact everything from new product opportunities to shop floor optimization to factory worker efficiency gains, that will power top-line and bottom-line gains. Music, television, and media technology is being put to diversified use; the current technology needs to be improved to enhance privacy and built secure devices by adopting a security-focused approach, reducing the amount of data collected, increasing transparency and providing consumers with a choice to opt out. Therefore, the current volume has been compiled, in an effort to draw the various issues in IoT, challenges faced and existing solutions so far. Key Points: • Provides an overview of basic concepts of IoT and the current state of the art in IoT with communication technologies ranging from 4G to 5G and its architecture. • Discusses recent security and privacy studies and social behavior of human beings over IoT. • Covers the issues related to sensors, business model, principles, paradigms, green IoT and solutions to handle relevant challenges. • Presents the readers with practical ideas of using IoT, how it deals with human dynamics, the ecosystem, the social objects and their relation. • Deals with the challenges involved in surpassing diversified architecture, protocol, communications, integrity and security.

Challenges of the Internet of Things
A guided tour through the Internet of Things, a networked world of connected devices, objects, and people. It is changing the way we live and work. We turn on the lights in our house from a desk in an office miles away. Our refrigerator alerts us to the fact that our milk is running low. We can turn on the air conditioner so that it’s toasty or bracing, whichever we prefer. This is the Internet of Things—a networked world of connected devices, objects, and people. In this book, Samuel Greengard offers a guided tour through this emerging world and shows how it can change our lives.

Demystifying Internet of Things Security
Internet of Things: Technologies and Applications for a New Age of Intelligence outlines the background and overall vision for the Internet of Things (IoT) and Cyber-Physical Systems (CPS), as well as associated emerging technologies. Key technologies are described including device communication and interactions, connectivity of devices to cloud-based infrastructures, distributed and edge computing, data collection, and methods to derive information and knowledge from connected devices. The book provides a comprehensive overview of the end-to-end system requirements for successful IoT solutions. It provides a robust framework for analyzing the technology and market requirements for a broad variety of IoT solutions and discusses the use cases that give examples of real-world implementation.

Getting Started with the Internet of Things
Internet of Things: Principles and Paradigms captures the state-of-the-art research in Internet of Things, its applications, architectures, and technologies. This book identifies potential future directions and technologies that facilitate insight into the Internet of Things. With this book, readers can gain a better understanding of the technical challenges in machine learning, device networking, and software systems. It presents a comprehensive overview of the end-to-end system requirements for successful IoT solutions. It provides a robust framework for analyzing the technology and market requirements for a broad variety of IoT solutions. It covers in-depth security solutions for IoT systems, including security architecture, frameworks, and protocols. It also provides real-world case studies and discusses the challenges and opportunities in the Internet of Things.

Internet of Things
Securing the Internet of Things provides network and cybersecurity researchers and practitioners with both the theoretical and practical knowledge they need to regard security in the Internet of Things (IoT). This booming field, moving from Page 2/5
strictly research to the marketplace, is advancing rapidly, yet security issues abound. This book explains the fundamental concepts of IoT security, describing practical solutions that account for resource limitations at IoT end-node, hybrid network architectures, as well as the network’s protocols, application characteristics, and authentication, highlighting the most important potential IoT security risks and threats. The book covers both the general theory and practical implications for people working in security in the Internet of Things. Helps researchers and practitioners understand the security architecture in IoT and the state-of-the-art in IoT security countermeasures. Explore how the threats in IoT are different from traditional ad hoc or infrastructural networks. Provides a comprehensive discussion on the security challenges and solutions in RFID, WMN, and IoT Contributed material by Dr. Daeed Roudhani

Internet of Things (IoT)

Take your idea from concept to production with this unique guide! Whether it’s called physical computing, ubiquitous computing, or the Internet of Things, it’s a hot topic in technology: how to channel your inner Steve Jobs and successfully combine hardware, embedded software, web services, and electronic hardware to design cutting-edge devices that are fun, interactive, and practical. If you’d like to create the next must-have product, this unique book is the perfect place to start. Both a creative and practical primer, it explores how you can use to develop hardware or software, discusses design concepts that will make your products eye-catching and appealing, and shows you ways to scale up from a single prototype to mass producing products, where the Internet of Things provides a unique means to combine parts, sensors, processors, circuits, and batteries, and various networks or the Internet, to create interactive, cutting-edge devices. Provides an overview of the necessary steps to take your idea from concept through production if you’d like to design for the future. Designing the Internet of Things is a great start.

Internet of Things (IoT)

What is the Internet of Things? It’s billions of embedded computers, sensors, and actuators all connected online. If you have basic programming skills, you can use these powerful little devices to create a variety of useful systems—such as a device that automatically opens your home door when you enter. The book explores different security building blocks available in Internet of Things (IoT) platforms. It opens access book reviews the threat pyramid, secure boot, chain of trust, and the 5W attack leading up to defense-in-depth. The IoT presents unique challenges in implementing security and IoT has both OW and Isolated Security Engine capabilities to simplify it. This book explores the challenges to secure these devices to make them secure and emerging technologies to protect the assets variably and there is no single blanket solution approach to implement security. Simplifying the Internet of Things security provides clarity to industry professionals and provides overview of different security solutions. What You’ll Learn Describe devices, demystifying them against different threat originating from inside and outside the network. The authors discuss recent developments in the field and the most current and emerging trends in IoT. In addition, the text is filled with examples of innovative applications and real-world case studies. Internet of Things A to Z fills the need for an up-to-date volume on the topic. This important book: Covers in detail the core concepts, enabling technologies, and implications of the Internet of Things Addresses the business, social, and legal aspects of the Internet of Things Explores the critical topic of security and privacy challenges for both individuals and organizations Includes a discussion of advanced topics such as the need for standards and interoperability Contains contributions from an international group of experts in technology, industry, and research. Written for IoT researchers, industry professionals, and lifelong IT learners as well as academics and students, Internet of Things A to Z provides a much-needed and comprehensive resource to this burgeoning field.

Integration and Implementation of the Internet of Things Through Cloud Computing

Break down the misconceptions of the Internet of Things by examining the different security building blocks available in IoT Architecture (IA) based IoT platforms. This offers access book reviews the threat pyramid, secure boot, chain of trust, and the 5W attack leading up to defense-in-depth. It presents unique challenges in implementing security and IoT has both OW and Isolated Security Engine capabilities to simplify it. The book explores the challenges to secure these devices to make them secure and emerging technologies to protect the devices variably and there is no single blanket solution approach to implement security. Simplifying the Internet of Things security provides clarity to industry professionals and provides overview of different security solutions. What You’ll Learn Describe devices, demystifying them against different threat originating from inside and outside the network. The authors discuss recent developments in the field and the most current and emerging trends in IoT. In addition, the text is filled with examples of innovative applications and real-world case studies. Internet of Things A to Z fills the need for an up-to-date volume on the topic. This important book: Covers in detail the core concepts, enabling technologies, and implications of the Internet of Things Addresses the business, social, and legal aspects of the Internet of Things Explores the critical topic of security and privacy challenges for both individuals and organizations Includes a discussion of advanced topics such as the need for standards and interoperability Contains contributions from an international group of experts in technology, industry, and research. Written for IoT researchers, industry professionals, and lifelong IT learners as well as academics and students, Internet of Things A to Z provides a much-needed and comprehensive resource to this burgeoning field.

Rethinking the Internet of Things

A Systematic Approach to Learn the Principles, Paradigms and Applications of the Internet of Things DESCRIPTION In this book, Principles, Paradigms and Applications of Internet of Things describes the integration of the Internet of Things with Internet of Things and application areas and network. A key objective of this book is to provide a systematic source of reference for all aspects of IoT. This book comprises nine chapters with close co-operation and contributions from four different authors, spanning across four countries and providing a global, broad perspective on major topics on the Internet of Things. KEY FEATURES - Provides a guide to the Internet of Things - Discusses various sectors like Education, Smart City, Blockchain, Healthcare, Agriculture and various sectors - To present case studies and innovative applications of the IoT - To analyze and present the state of the art of the IoT and related technologies and methodologies - To propose new models, practical solutions and technological advances of the IoT WHAT YOU WILL LEARN - Become aware of the Internet of Things components, their connectivity to form the Internet of Things altogether, and future possibilities with IoT - Understand how the various components of cloud computing work together to form the basic architecture of cloud computing. - Examine the relationship between the various layers in the IoT architecture. - Understand the programming framework for the Internet of Things (IoT) applications. - Tools and techniques. - Contributions from an international group of experts in technology, industry, and research. Written for researchers and practitioners in the field of IoT, this book is intended for professionals, researchers, instructors, and designers of a smart system, who will benefit from reading this book TABLE OF CONTENTS 1. IoT Introduction 2. IoT Concepts and Applications 3. Internet of Things Development 4. Virtualisation and the Internet of Things 5. Security, Privacy and Challenges 6. Internet of Things Applications 7. IoT and Cloud 8. Smart City: Using IoT in the Smart City 9. Case Studies: Important Key Terms: 11. References

Internet of Things, for Things, and by Things

The Internet of Things (IoT) is one of the core technologies of current and future information and communications technology (ICT) sectors. IoT technology will be deployed in numerous industries, including healthcare, transport, smart cities, utility, and energy sectors. In many instances, IoT technology will be used in combination with other technologies such as sensors, robotics, and wireless communications. IoT is a technology that gathers and processes data from sensors or other devices to enable new services or functions. IoT is a technology that enables new services or functions by gathering and processing data from sensors or other devices.

Enabling the Internet of Things

Break through the hype and learn how to extract actionable intelligence from the flood of IoT data. How to Make Better Business Decisions and Acquire Greater Control of Your IoT Infrastructure Learn techniques to solve unique problems associated with IoT and examine and analyze data from your IoT devices. The book explores the potential of IoT in various sectors such as healthcare, smart cities, transportation, and energy. It presents IoT system design techniques, international IoT standards, and recent research outcome relevant to the IoT systems development and provides existing and emerging solutions to the design and development of IoT platforms for multi-sector industries, particularly for industry 4.0. The book also addresses some of the regulatory issues and design challenges related to IoT system deployments and proposes guidelines for possible future applications.
best strategies to get the most from IoT analytics. Master the economics of IoT analytics in order to optimize business value. Details the tools and skills needed to analyze IoT generated data. Explores the many factors that can affect the performance of IoT analytics strategies. Finally, introduces the latest IoT analytics solutions and how they can be applied to real-world problems.

Beyond the Internet of Things

The Internet of Things (IoT) has drawn great attention from both academia and industry, since it offers a challenging notion of creating a world where all things around us are connected to the internet and communicate with each other in a more human-like manner. Another component for helping IoT to succeed is cloud computing. The combination of cloud computing and IoT will enable new monitoring services and powerful processing of sensory data streams. This book introduces the problems facing Internet of Things developers and explores current technologies and techniques to help you manage, mine, and make sense of the data being collected through the use of the world's most popular database on the Internet of Things. This book is intended for IT specialists, technologists, practitioners, researchers, academics, and students who are interested in the next era of IoT through cloud computing.

Internet of Things (IoT)

With the rise of mobile and wireless technologies, more sustainable networks are necessary to support such communications. These next generation networks can now be utilized to strengthen the growing era of the Internet of Things. Powering the Internet of Things With 5G Networks is a comprehensive reference source for the latest scholarly research on the progression and design of fifth generation networks and their role in supporting the Internet of Things. Including a range of perspectives on topics such as privacy and security, large scale monitoring, and scalable architectures, this book is ideally designed for technology developers, academics, researchers, and practitioners interested in the convergence of the Internet of Things and 5G networks.

The Real Internet of Things

Internet of Things (IoT) products and cyber-physical systems (CPS) are being utilized in almost every discipline and domain and these systems continue to grow in complexity and scale of applications. This practical text provides an introduction to IoT that can be understood by every engineering discipline and discusses detailed applications of IoT. Developed to help engineers navigate this increasingly important and cross-disciplinary topic, this text offers research-based examples and case studies to facilitate the understanding of each IoT primitive into the blockchain. Provides and understanding of benefits and challenges of engaging with and designing CPS. This book provides an introduction to IoT and its applications and discusses detailed applications of IoT. This book is intended for IT specialists, technologists, practitioners, researchers, academics, and students who are interested in the next era of IoT through cloud computing.

Smart Marketing With the Internet of Things

Provides comprehensive coverage of the current state of IoT, focusing on data processing infrastructure and techniques written by experts in the field, this book addresses the IoT technology stack, from connectivity through data platforms to end-user case studies, and considers the tradeoffs between business needs and data security and privacy throughout. There is a particular emphasis on data processing technologies that enable the extraction of actionable insights from data to inform improved decision making. The book covers design patterns for IoT and artificial intelligence, as well as data interoperability and the collection of data from physical objects. The book also covers the use of cloud computing to facilitate the process and storage of data.

The Internet of Things - MySQL

This book introduces the problems facing Internet of Things developers and explores current technologies and techniques to help you manage, mine, and make sense of the data being collected through the use of the world's most popular database on the Internet of Things - MySQL. The IoT is poised to change how we interact with and perceive the world around us, and the possibilities are nearly boundless. As more and more connected devices generate data, we will need to solve the problem of how to collect, store, and analyze that data by leveraging the power of database systems. This book begins with an introduction of the database system and shows how the cases of data mining and analysis are provided to show how to add databases to IoT solutions including how to leverage MySQL's high availability, including examples of how to protect data from node outages using advanced features of MySQL. The book closes with a comparison of raw and transformed data showing how transformed data can improve understandability and help you out through a clutter of superfluous data toward the goal of mining nuggets of useful knowledge. In this book, you'll learn to: Understand the crisis of vast volumes of data from connected devices and what it takes to deliver them. Fully cover the design, implementation, and lifecycle of Internet of Things applications in MySQL. This book is intended for IT specialists, technologists, practitioners, researchers, and students who are interested in the next era of IoT through cloud computing.
Internet of Things and the Law

Internet of Things (IoT) is a recent technology paradigm that creates a global network of machines and devices that are capable of communicating with each other. Security cameras, sensors, vehicles, buildings, and software are examples of devices that can exchange data between each other. IoT is recognized as one of the most important areas of future technologies and is gaining vast recognition in a wide range of applications and fields related to smart homes and cities, military, education, hospitals, homeland security systems, transportation and autonomous connected cars, agriculture, intelligent shopping systems, and other modern technologies. This book explores the most important IoT automated and smart applications to help the reader understand the principle of using IoT in such applications.

Internet of Things A to Z

Learn how to program the Internet of Things with this hands-on guide. By breaking down IoT programming complexities in step-by-step, building-block fashion, author and educator Andy King shows you how to design and build your own full-stack, end-to-end IoT solution—from device to cloud. This practical book walks you through tooling, development environment setup, solution design, and implementation. You’ll learn how a typical IoT ecosystem works, as well as how to tackle integration challenges that crop up when implementing your own IoT solution. Whether you’re an engineering student learning the basics of the IoT, a tech-savvy executive looking to better understand the nuances of IoT technology stacks, or a programmer building your own smart house solution, this practical book will help you get started. Design an end-to-end solution that implements an IoT use case. Set up an IoT-centric development and testing environment. Organize your software design by creating abstractions in Python and Java using MQTT, CoAP, and other protocols to connect IoT devices and services. Create a custom JSON-based data format that’s consumeable across a range of platforms and services. Use cloud services to support your IoT ecosystem and provide business value for stakeholders.

Powering the Internet of Things With 5G Networks

This book offers the first comprehensive view on integrated circuit and system design for the Internet of Things (IoT), and in particular for the tiny nodes at its edge. The authors provide a fresh perspective on how the IoT will evolve based on recent and foreseeable trends in the semiconductor industry, highlighting the key challenges, as well as the opportunities for circuit and system innovation to address them. This book describes what the IoT really means from the design point of view, and how the constraints imposed by applications translate into integrated circuit requirements and design guidelines. Chapter contributions equally come from industry and academia. After providing a system perspective on IoT nodes, this book focuses on state-of-the-art design techniques for IoT applications, encompassing the fundamental sub-systems encountered in Systems on Chip for IoT: ultra-low power digital architectures and circuits, low- and zero-leakage memories (including emerging technologies) circuits for hardware security and authentication, system on Chip design methodologies on-chip power management and energy harvesting, ultra-low power analog interfaces and analog-digital conversion, short-range radio interface, miniaturized battery technologies, packaging and assembly of IoT integrated systems (on silicon and non-silicon substrates). As a common thread, all chapters conclude with a prospective view on the foreseeable evolution of the related technologies for IoT. The concepts developed throughout the book are exemplified by two IoT node system demonstrations from industry. The unique balance between breadth and depth of this book enables expert readers quickly to develop an understanding of the spectrum of challenges and state-of-the-art solutions for IoT, as well as their evolution in the foreseeable future provides non-expert readers with a comprehensive introduction to integrated circuit design for IoT, and serves as an excellent starting point for further learning due to the broad coverage of topics and selected references makes it very well suited for practicing engineers and scientists working in the hardware and chip design for IoT, and as textbook for senior undergraduate, graduate and postgraduate students (familiar with analog and digital circuits).

The Internet of Things, revised and updated edition

This book will examine the issues of IoT according to three complementary axes: technique, use, ethics. The techniques used to produce artefacts (physical objects, infrastructures), programs (algorithms, software) and data (big data, linked data, metadata, ontologies) are the subject of many innovations as the field of IoT is rich and stimulating. Along with this technological boom, IoT uses colonize new fields of application in the fields of transport, administration, housing, maintenance, health, sports, well-being. Privileged interface with digital ecosystems now at the heart of social exchanges, the IoT develops a power to act whose consequences both good and bad make it difficult to assess a fair business.

The Internet of Things

The major subjects of the book cover modeling, analysis and efficient management of information in Internet of Everything (IoE) applications and architectures. As the first book of its kind, it addresses the major new technological developments in the field and will reflect current research trends, as well as industry needs. It comprises of a good balance between theoretical and practical issues, covering case studies, experience and evaluation reports and best practices in utilizing IoE applications. It also provides technical/scientific information about various aspects of IoE technologies, ranging from basic concepts to research grade material, including future directions.

The Internet of Things

The Internet of Things (IoT) is the notion that nearly everything we use, from gym shorts to streetlights, will soon be connected to the Internet; the Internet of Everything (IoE) encompasses not just objects, but the social connections, data, and processes that the IoT makes possible. Industry and financial analysts have predicted that the number of Internet-enabled devices will increase from 11 billion to upwards of 75 billion by 2020. Regardless of the number, the end result looks to be a world where everything is connected; a ubiquitous Internet of Everything enables us to be more efficient, empowered, and reliant on the Internet than ever before—improving our daily lives in ways we often don’t even realize.

The major new developments in the field are emerging not only from the traditional IT industry but also from new industries—such as the Internet of Things (IoT), the Internet of Medical Things (IoMT), and the Internet of Urban Things (IoUT) —that are changing the way we think about the Internet. This book aims to provide a comprehensive guide to these developments and their implications for business and society, from the perspective of IT decision makers and practitioners.

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