

Internet Of Things A Hands On Approach

Design, secure, and protect the privacy of edge analytics applications using platforms and tools such as Microsoft's Azure IoT Edge, MicroPython, and Open Source Computer Vision (OpenCV) Key FeaturesBecome well-versed with best practices for implementing automated analytical computationsDiscover real-world examples to extend cloud intelligenceDevelop your skills by understanding edge analytics and applying it to research activitiesBook Description Edge analytics has gained attention as the IoT model for connected devices rises in popularity. This guide will give you insights into edge analytics as a data analysis model, and help you understand why it's gaining momentum. You'll begin with the key concepts and components used in an edge analytics app. Moving ahead, you'll delve into communication protocols to understand how sensors send their data to computers or microcontrollers. Next, the book will demonstrate how to design modern edge analytics apps that take advantage of the processing power of modern single-board computers and microcontrollers. Later, you'll explore Microsoft Azure IoT Edge, MicroPython, and the OpenCV visual recognition library. As you progress, you'll cover techniques for processing AI functionalities from the server side to the sensory side of IoT. You'll even get hands-on with designing a smart doorbell system using the technologies you've learned. To remove vulnerabilities in the overall edge analytics architecture, you'll discover ways to overcome security and privacy challenges. Finally, you'll use tools to audit and perform real-time monitoring of incoming data and generate alerts for the infrastructure. By the end of this book, you'll have learned how to use edge analytics programming techniques and be able to implement automated analytical computations. What you will learnDiscover the key concepts and architectures used with edge analyticsUnderstand how to use long-distance communication protocols for edge analyticsDeploy Microsoft Azure IoT Edge to a Raspberry PiCreate Node-RED dashboards with MQTT and Text to Speech (TTS)Use MicroPython for developing edge analytics appsExplore various machine learning techniques and discover how machine learning is related to edge analyticsUse camera and vision recognition algorithms on the sensory side to design an edge analytics appMonitor and audit edge analytics appsWho this book is for If you are a data analyst, data architect, or data scientist who is interested in learning and practicing advanced automated analytical computations, then this book is for you. You will also find this book useful if you're looking to learn edge analytics from scratch. Basic knowledge of data analytics concepts is assumed to get the most out of this book.

Internet of ThingsA Hand-on ApproachInternet of Things: A Hands-On ApproachVPT

Internet of Things with 8051 and ESP8266 provides a platform to get started with the Internet of Things (IoT) with 8051. This book describes programming basics and how devices interface within designed systems. It presents a unique combination of 8051 with ESP8266 and I/O devices for IoT applications supported by case studies to provide the solutions to real-time problems. The programs and circuits have been tested on real hardware and explore different areas in IoT applications. Divided into four sections, it explains the customized boards for IoT applications followed by the means by which 8051 and ESP8266 interface with I/O devices. It spans levels from basic to advanced interfacing with special devices, server design, and data logging with different platforms. Features: Covers how I/O devices interface with 8051 and ESP8266 Explains the basic concepts of interfacing complexity using applications with examples Provides hands-on practice exercises with 8051 and ESP8266 for IoT applications Discusses both case studies and programming tests on real hardware during industrial and student projects Reviews the integration of smart devices with IoT Internet of Things with 8051 and ESP8266 is intended for senior undergraduate and graduate students in electrical and electronics engineering, but anyone with an interest in the professional curriculum of electrical and electronics engineering will find this book a welcome addition to their collection.

A comprehensive overview of the Internet of Things' core concepts, technologies, and applications Internet of Things A to Z offers a holistic approach to the Internet of Things (IoT) model. The Internet of Things refers to uniquely identifiable objects and their virtual representations in an Internet-like structure. Recently, there has been a rapid growth in research on IoT communications and networks, that confirms the scalability and broad reach of the core concepts. With contributions from a panel of international experts, the text offers insight into the ideas, technologies, and applications of this subject. 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 great 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 academia, industry, and research Written for ICT researchers, industry professionals, and lifetime 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.

A Scalable Approach to Connecting Everything

A Practical Guide to Hacking the Internet of Things

The Internet of Things

MicroPython for the Internet of Things

Proceedings of the 14th International Conference on Remote Engineering and Virtual Instrumentation REV 2017, held 15-17 March 2017, Columbia University, New York, USA

Internet of Things: A Hands-On Approach

Designing the Internet of Things

Build a strong and efficient IoT infrastructure at industrial and enterprise level by mastering Industrial IoT network Key FeaturesGain hands-on experience working with industrial architectureExplore the potential of cloud-based Industrial IoT platforms, analytics, and protocolsImprove business models and transform your workforce with Industry 4.0Book Description We live in an era where advanced automation is used to achieve accurate results. To set up an automation environment, you need to first configure a network that can be accessed anywhere and by any device. This book is a practical guide that helps you discover the technologies and use cases for Industrial Internet of Things (IIOT). Hands-On Industrial Internet of Things takes you through the implementation of industrial processes and specialized control devices and protocols. You'll study the process of identifying and connecting to different industrial data sources gathered from different sensors. Furthermore, you'll be able to connect these sensors to cloud network, such as AWS IoT, Azure IoT, Google IoT, and OEM IoT platforms, and extract data from the cloud to your devices. As you progress through the chapters, you'll gain hands-on experience in using open source Node-Red, Kafka, Cassandra, and Python. You will also learn how to develop streaming and batch-based Machine Learning algorithms. By the end of this book, you will have mastered the features of Industry 4.0 and be able to build stronger, faster, and more reliable IoT infrastructure in your Industry. What you will learnExplore industrial processes, devices, and protocolsDesign and implement the I-IoT network flowGather and transfer industrial data in a secure wayGet to grips with popular cloud-based platformsUnderstand diagnostic analytics to answer critical workforce questionsDiscover the Edge device and understand Edge and Fog computingImplement equipment and process management to achieve business-specific goalsWho this book is for If you're an IoT architect, developer, or stakeholder working with architectural aspects of Industrial Internet of Things, this book is for you.

Today, billions of devices are Internet-connected, IoT standards and protocols are stabilizing, and technical professionals must increasingly solve real problems with IoT technologies. Now, five leading Cisco IoT experts present the first comprehensive, practical reference for making IoT work. IoT Fundamentals brings together knowledge previously available only in white papers, standards documents, and other hard-to-find sources—or nowhere at all. The authors begin with a high-level overview of IoT and introduce key concepts needed to successfully design IoT solutions. Next, they walk through each key technology, protocol, and technical building block that combine into complete IoT solutions. Building on these essentials, they present several detailed use cases, including manufacturing, energy, utilities, smart+connected cities, transportation, mining, and public safety. Whatever your role or existing infrastructure, you'll gain deep insight what IoT applications can do, and what it takes to deliver them. Fully covers the principles and components of next-generation wireless networks built with Cisco IOT solutions such as IEEE 802.11 (Wi-Fi), IEEE 802.15.4-2015 (Mesh), and LoRaWAN Brings together real-world tips, insights, and best practices for designing and implementing next-generation wireless networks Presents start-to-finish configuration examples for common deployment scenarios Reflects the extensive first-hand experience of Cisco experts

Break through the hype and learn how to extract actionable intelligence from the flood of IoT data About This Book 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 Uncover the business potential generated by data from IoT devices and bring down business costs Who This Book Is For This book targets developers, IoT professionals, and those in the field of data science who are trying to solve business problems through IoT devices and would like to analyze IoT data. IoT enthusiasts, managers, and entrepreneurs who would like to make the most of IoT will find this equally useful. A prior knowledge of IoT would be helpful but is not necessary. Some prior programming experience would be useful What You Will Learn Overcome the challenges IoT data brings to analytics Understand the variety of transmission protocols for IoT along with their strengths and weaknesses Learn how data flows from the IoT device to the final data set Develop techniques to wring value from IoT data Apply geospatial analytics to IoT data Use machine learning as a predictive method on IoT data Implement best strategies to get the most from IoT analytics Master the economics of IoT analytics in order to optimize business value In Detail We start with the perplexing task of extracting value from huge amounts of barely intelligible data. The data takes a convoluted route just to be on the servers for analysis, but insights can emerge through visualization and statistical modeling techniques. You will learn to extract value from IoT big data using multiple analytic techniques. Next we review how IoT devices generate data and how the information travels over networks. You'll get to know strategies to collect and store the data to optimize the potential for analytics, and strategies to handle data quality concerns. Cloud resources are a great match for IoT analytics, so Amazon Web Services, Microsoft Azure, and PTC ThingWorx are reviewed in detail next. Geospatial analytics is then introduced as a way to leverage location information. Combining IoT data with environmental data is also discussed as a way to enhance predictive capability. We'll also review the economics of IoT analytics and you'll discover ways to optimize business value. By the end of the book, you'll know how to handle scale for both data storage and analytics, how Apache Spark can be leveraged to handle scalability, and how R and Python can be used for analytic modeling. Style and approach This book follows a step-by-step, practical approach to combine the power of analytics and IoT and help you get results quickly

Use the Raspberry Pi and modern computing techniques to build industrial Internet of Things systems. Principles and theoretical aspects of IoT technologies combine with hands-on projects leading to detailed descriptions of several industrial IoT applications. This book presents real-life IoT applications based on the Raspberry Pi, beyond the relatively simplistic demos built for educational purposes or hobbyists. You'll make the transition from tinkering with a couple of sensors and simple devices to building fully developed products for commercial use and industrial systems. You'll also work with sensors and actuators, web technologies used for communications in IoT networks, and the large-scale deployment of IoT software solutions. And see how to design these systems as well as maintain them long term. See the Raspberry Pi in a new light that highlights the true industrial potential of the device. Move beyond connecting an LED to the Raspberry Pi and making it blink to actually managing a network of IoT devices. What You'll LearnDesign industrial and large scale professional Internet of Things systems Extend your basic IoT knowledge by building advanced products Learn how large scale IoT systems are deployed and maintained Who This Book Is For Advanced hobbyists who want to stretch their abilities into the professional sector. Also professional industrial engineers looking for low-cost solutions to basic IoT needs.

Developing IoT Projects with ESP32

Internet of Things

Hands-On Internet of Things with MQTT

A Beginner's Guide to Programming with Python on Microcontrollers

How Smart TVs, Smart Cars, Smart Homes, and Smart Cities are Changing the World

Enabling Technologies, Platforms, and Use Cases

Introduction to IoT

Internet of Things (IoT) refers to physical and virtual objects that have unique identities and are connected to the internet to facilitate intelligent applications that make energy, logistics, industrial control, retail, agriculture and many other domains "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 traditional high-level languages at the college-level, and is either a senior or a beginning graduate student in one of the science, technology, engineering or mathematics (STEM) fields. Like our companion book on Cloud Computing, we have tried to write a comprehensive book that transfers knowledge through an immersive "hands on" approach, where the reader is provided the necessary guidance and knowledge to develop working code for real-world IoT applications. Additional support is available at the book's website: www.internet-of-things-book.com The book is organized into 3 main parts, comprising of a total of 11 chapters. Part I covers the building blocks of Internet of Things (IoTs) 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 approach using NETCONF-YANG 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, Xively 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.

Quickly learn to program for microcontrollers and IoT devices without a lot of study and expense. MicroPython and controllers that support it eliminate the need for programming in a C-like language, making the creation of IoT applications and devices easier and more accessible than ever. MicroPython for the Internet of Things is ideal for readers new to electronics and the world of IoT. Specific examples are provided covering a range of supported devices, sensors, and MicroPython boards such as Pycom's WiPy modules and MicroPython's pyboard. Never has programming for microcontrollers been easier. The book takes a practical and hands-on approach without a lot of detours into the depths of theory. The book: Shows a faster and easier way to program microcontrollers and IoT devices Teaches MicroPython, a variant of one of the most widely used scripting languages Is friendly and accessible to those new to electronics, with fun example projects What You'll Learn Program in MicroPython Understand sensors and basic electronics Develop your own IoT projects Build applications for popular boards such as WiPy and pyboard Load MicroPython on the ESP8266 and similar boards Interface with hardware breakout boards Connect hardware to software through MicroPython Explore the easy-to-use Adafruit IO connecting your microcontroller to the cloud Who This Book Is For Anyone interested in building IoT solutions without the heavy burden of programming in C++ or C. The book also appeals to those wanting an easier way to work with hardware than is provided by the Arduino and the Raspberry Pi platforms.

Implement popular deep learning techniques to make your IoT applications smarter Key FeaturesUnderstand how deep learning facilitates fast and accurate analytics in IoTBuild intelligent voice and speech recognition apps in TensorFlow and ChainerAnalyze IoT data for making automated decisions and efficient predictionsBook Description Artificial Intelligence is growing quickly, which is driven by advancements in neural networks(NN) and deep learning (DL). With an increase in investments in smart cities, smart healthcare, and industrial Internet of Things (IoT), commercialization of IoT will soon be at peak in which massive amounts of data generated by IoT devices need to be processed at scale. Hands-On Deep Learning for IoT will provide deeper insights into IoT data, which will start by introducing how DL fits into the context of making IoT applications smarter. It then covers how to build deep architectures using TensorFlow, Keras, and Chainer for IoT. You'll learn how to train convolutional neural networks(CNN) to develop applications for image-based road faults detection and smart garbage separation, followed by implementing voice-initiated smart light control and home access mechanisms powered by recurrent neural networks(RNN). You'll master IoT applications for indoor localization, predictive maintenance, and locating equipment in a large hospital using autoencoders, DeepFi, and LSTM networks. Furthermore, you'll learn IoT application development for healthcare with IoT security enhanced. By the end of this book, you will have sufficient knowledge need to use deep learning efficiently to power your IoT-based applications for smarter decision making. What you will learnGet acquainted with different neural network architectures and their suitability in IoTUnderstand how deep learning can improve the predictive power in your IoT solutionsCapture and process streaming data for predictive maintenanceSelect optimal frameworks for image recognition and indoor localizationAnalyze voice data for speech recognition in IoT applicationsDevelop deep learning-based IoT solutions for healthcareEnhance security in your IoT solutionsVisualize analyzed data to uncover insights and perform accurate predictionsWho this book is for If you're an IoT developer, data scientist, or deep learning enthusiast who wants to apply deep learning techniques to build smart IoT applications, this book is for you. Familiarity with machine learning, a basic understanding of the IoT concepts, and some experience in Python programming will help you get the most out of this book.

The old Internet typically connected personal computers. But a radically new Internet is emerging. Some call it an "Internet of Things" (IoT) or "Internet of Everything" (IoE). The IoT won't just connect people: it'll connect "smart" homes, appliances, cars, aircraft (a.k.a. drones)... offices, factories, cities... the world. By some estimates, the IoE will explode into a \$19 trillion market in just a few years. If that happens... when that happens... it will transform your life. ¿ You need to know what's coming. But, until now, most guides to the Internet of Everything have been written for technical experts. Now, the world's #1 author of beginning technology books has written the perfect introduction for every consumer and citizen. In The Internet of Things, Michael Miller reveals how a new generation of autonomously connected smart devices is emerging, and how it will enable people and devices to do more things, more intelligently, and more rapidly. ¿ Miller demystifies every type of smart device, both current and future. Each chapter ends with a special "...and You" section, offering up-to-the-minute advice for using today's IoE technologies or preparing for tomorrow's. ¿ You'll also discover the potential downsides and risks associated with intelligent, automatic interaction. When all your devices can communicate with each other (and with the companies that sell and monitor them), how private is your private life? Do the benefits outweigh the risks? And what does a connected world do when the connections suddenly go down? Packed with scenarios and insider interviews,The Internet of Things makes our future utterly, vividly real.

Fundamentals of IoT Communication Technologies

Create a powerful Industrial IoT infrastructure using Industry 4.0

Hands-On Industrial Internet of Things

Internet of Things, for Things, and by Things

Connecting Sensors and Microcontrollers to the Cloud

The IoT Hacker's Handbook

Programming the Internet of Things

Master the technique of using ESP32 as an edge device in any IoT application where wireless communication can make life easier Key FeaturesGain practical experience in working with ESP32Learn to interface various electronic devices such as sensors, integrated circuits (ICs), and displaysApply your knowledge to build real-world automation projectsBook Description Developing IoT Projects with ESP32 provides end-to-end coverage of secure data communication techniques from sensors to cloud platforms that will help you to develop production-grade IoT solutions by using the ESP32 SoC. You'll learn how to employ ESP32 in your IoT projects by interfacing with different sensors and actuators using different types of serial protocols. This book will show you how some projects require immediate output for end-users, and cover different display technologies as well as examples of driving different types of displays. The book features a dedicated chapter on cybersecurity packed with hands-on examples. As you progress, you'll get to grips with BLE technologies and BLE mesh networking and work on a complete smart home project where all nodes communicate over a BLE mesh. Later chapters will show you how IoT requires cloud connectivity most of the time and remote access to smart devices. You'll also see how cloud platforms and third-party integrations enable endless possibilities for your end-users, such as insights with big data analytics and predictive maintenance to minimize costs. By the end of this book, you'll have developed the skills you need to start using ESP32 in your next wireless IoT project and meet the project's requirements by building effective, efficient, and secure solutions. What you will learnExplore advanced use cases like UART communication, sound and camera features, low-energy scenarios, and scheduling with an RTOSAdd different types of displays in your projects where immediate output to users is requiredConnect to Wi-Fi and Bluetooth for local network communicationConnect cloud platforms through different IoT messaging protocolsIntegrate ESP32 with third-party services such as voice assistants and IFTTTDiscover best practices for implementing IoT security features in a production-grade solutionWho this book is for If you are an embedded software developer, an IoT software architect or developer, a technologist, or anyone who wants to learn how to use ESP32 and its applications, this book is for you. A basic understanding of embedded systems, programming, networking, and cloud computing concepts is necessary to get started with the book.

Develop a variety of projects and connect them to microcontrollers and web servers using the lightweight messaging protocol MQTT Key FeaturesLeverage the power of MQTT to build a pet food dispenser, e-ink to-do list, and a productivity cubeLearn about technologies like laser cutting, 3D printing, and PCB production for building robust prototypesExplore practical uses cases to gain an in-depth understanding of MQTTBook Description MQ Telemetry Transport (MQTT) is a lightweight messaging protocol for smart devices that can be used to build exciting, highly scalable Internet of Things (IoT) projects. This book will get you started with a quick introduction to the concepts of IoT and MQTT and explain how the latter can help you build your own internet-connected prototypes. As you advance, you ' ll gain insights into how microcontrollers communicate, and you'll get to grips with the different messaging protocols and techniques involved. Once you are well-versed with the essential concepts, you ' ll be able to put what you ' ve learned into practice by building three projects

from scratch, including an automatic pet food dispenser and a smart e-ink to-do display. You ' ll also discover how to present your own prototypes professionally. In addition to this, you'll learn how to use technologies from third-party web service providers, along with other rapid prototyping technologies, such as laser cutting, 3D printing, and PCB production. By the end of this book, you ' ll have gained hands-on experience in using MQTT to build your own IoT prototypes. What you will learnExplore MQTT programming with ArduinoDiscover how to make your prototypes talk to each otherSend MQTT messages from your smartphone to your prototypesDiscover how you can make websites interact with your prototypesLearn about MQTT servers, libraries, and appsExplore tools such as laser cutting and 3D printing in order to build robust prototype casesWho this book is for If you are an IoT developer or enthusiast who wants to start building IoT prototypes using MQTT, this book is for you. Basic knowledge of programming with Arduino will be useful.

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, electronics, and cool design to create 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 the platforms 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 production. Helps software engineers, web designers, product designers, and electronics engineers start designing products using the Internet-of-Things approach Explains how to combine sensors, servos, robotics, Arduino chips, and more with 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 place to start.

This book explains IoT technology, its potential applications, the security and privacy aspects, the key necessities like governance, risk management, regulatory compliance needs, the philosophical aspects of this technology that are necessary to support an ethical, safe and secure digitally enhanced environment in which people can live smarter. It describes the inherent technology of IoT, the architectural components and the philosophy behind this emerging technology. Then it shows the various potential applications of the Internet of Things that can bring benefits to the human society. Finally, it discusses various necessities to provide a secured and trustworthy IoT service.

Prototyping IoT Solutions

Cloud Computing: A Hands-On Approach

Hands-On Artificial Intelligence for IoT

A practitioner's guide to securing connected industries

A Hand-on Approach

IoT Fundamentals

A Middleware Perspective

This book discusses online engineering and virtual instrumentation, typical working areas for today's engineers and inseparably connected with areas such as Internet of Things, cyber-physical systems, collaborative networks and grids, cyber cloud technologies, and service architectures, to name just a few. It presents the outcomes of the 14th International Conference on Remote Engineering and Virtual Instrumentation (REV2017), held at Columbia University in New York from 15 to 17 March 2017. The conference addressed fundamentals, applications and experiences in the field of online engineering and virtual instrumentation in the light of growing interest in and need for teleworking, remote services and collaborative working environments as a result of the globalization of education. The book also discusses guidelines for education in university-level courses for these topics.

Skillfully navigate through the complex realm of implementing scalable, trustworthy industrial systems and architectures in a hyper-connected business world. Key Features Gain practical insight into security concepts in the Industrial Internet of Things (IIoT) architecture Demystify complex topics such as cryptography and blockchain Comprehensive references to industry standards and security frameworks when developing IIoT blueprints Book Description Securing connected industries and autonomous systems is a top concern for the Industrial Internet of Things (IIoT) community. Unlike cybersecurity, cyber-physical security is an intricate discipline that directly ties to system reliability as well as human and environmental safety. Practical Industrial Internet of Things Security enables you to develop a comprehensive understanding of the entire spectrum of securing connected industries, from the edge to the cloud. This book establishes the foundational concepts and tenets of IIoT security by presenting real-world case studies, threat models, and reference architectures. You'll work with practical tools to design risk-based security controls for industrial use cases and gain practical know-how on the multi-layered defense techniques including Identity and Access Management (IAM), endpoint security, and communication infrastructure. Stakeholders, including developers, architects, and business leaders, can gain practical insights in securing IIoT lifecycle processes, standardization, governance and assess the applicability of emerging technologies, such as blockchain, Artificial Intelligence, and Machine Learning, to design and implement resilient connected systems and harness significant industrial opportunities. What you will learn Understand the crucial concepts of a multi-layered IIoT security framework Gain insight on securing identity, access, and configuration management for large-scale IIoT deployments Secure your machine-to-machine (M2M) and machine-to-cloud (M2C) connectivity Build a concrete security program for your IIoT deployment Explore techniques from case studies on industrial IoT threat modeling and mitigation approaches Learn risk management and mitigation planning Who this book is for Practical Industrial Internet of Things Security is for the IIoT community, which includes IIoT researchers, security professionals, architects, developers, and business stakeholders. Anyone who needs to have a comprehensive understanding of the unique safety and security challenges of connected industries and practical methodologies to secure industrial assets will find this book immensely helpful. This book is uniquely designed to benefit professionals from both IT and industrial operations backgrounds.

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 Use MQTT, CoAP, and other protocols to connect IoT devices and services Create a custom JSON-based data format that's consumable across a range of platforms and services Use cloud services to support your IoT ecosystem and provide business value for stakeholders

This textbook explores all of the protocols and technologies essential to IoT communication mechanisms. Geared towards an upper-undergraduate or graduate level class, the book is presented from a perspective of the standard layered architecture with special focus on protocol interaction and functionality. The IoT protocols are presented and classified based on physical, link, network, transport and session/application layer functionality. The author also lets readers understand the impact of the IoT mechanisms on network and device performance with special emphasis on power consumption and computational complexity. Use cases – provided throughout – provide examples of IoT protocol stacks in action. The book is based on the author's popular class "Fundamentals of IoT" at Northeastern University. The book includes examples throughout and slides for classroom use. Also included is a 'hands-on' section where the topics discussed as theoretical content are built as stacks in the context of an IoT network emulator so readers can experiment.

Building the Web of Things

Mastering Internet of Things

Commercial and Industrial Internet of Things Applications with the Raspberry Pi

Build on the power of Blynk to configure smart devices and build exciting IoT projects

Hands-On Deep Learning for IoT

Introduction to a New Age of Intelligence

Technologies and Applications

Summary A hands-on guide that will teach how to design and implement scalable, flexible, and open IoT solutions using web technologies. This book focuses on providing the right balance of theory, code samples, and practical examples to enable you to successfully connect all sorts of devices to the web and to expose their services and data over REST APIs. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the Technology Because the Internet of Things is still new, there is no universal application protocol. Fortunately, the IoT can take advantage of the web, where IoT protocols connect applications thanks to universal and open APIs. About the Book Building the Web of Things is a guide to using cutting-edge web technologies to build the IoT. This step-by-step book teaches you how to use web protocols to connect real-world devices to the web, including the Semantic and Social Webs. Along the way you'll gain vital concepts as you follow instructions for making Web of Things devices. By the end, you'll have the practical skills you need to implement your own web-connected products and services. What's Inside Introduction to IoT protocols and devices Connect electronic actuators and sensors (GPIO) to a Raspberry Pi Implement standard REST and Pub/Sub APIs with Node.js on embedded systems Learn about IoT protocols like MQTT and CoAP and integrate them to the Web of Things Use the Semantic Web (JSON-LD, RDFa, etc.) to discover and find Web Things Share Things via Social Networks to create the Social Web of Things Build a web-based smart home with HTTP and WebSocket Compose physical mashups with EVERYTHING, Node-RED, and IFTTT About the Reader For both seasoned programmers and those with only basic programming skills. About the Authors Dominique Guinard and Vlad Trifa pioneered the Web of Things and cofounded EVRYTHING, a large-scale IoT cloud powering billions of Web Things. Table of Contents PART 1 BASICS OF THE IOT AND THE WOT From the Internet of Things to the Web of Things Hello, World Wide Web of Things Node.js for the Web of Things Getting started with embedded systems Building networks of Things PART 2 BUILDING THE WOT Access: Web APIs for Things Implementing Web Things Find: Describe and discover Web Things Share: Securing and sharing Web Things

Augment your IoT skills with the help of engaging and enlightening tutorials designed for Raspberry Pi 3 Key Features Design and implement state-of-the-art solutions for the Internet of Things Build complex projects using motions detectors, controllers, sensors, and Rasperry Pi 3 A hands-on guide that provides interoperable solutions for sensors, actuators, and controllers Book Description The Internet of Things (IoT) is the fastest growing technology market. Industries are embracing IoT technologies to improve operational expenses, product life, and people's well-being. Mastering Internet of Things starts by presenting IoT fundamentals and the smart city. You will learn the important technologies and protocols that are used for the Internet of Things, their features, corresponding security implications, and practical examples on how to use them. This book focuses on creating applications and services for the Internet of Things. Further, you will learn to create applications and services for the Internet of Things. You will discover various interesting projects and understand how to publish sensor data, control devices, and react to asynchronous events using the XMPP protocol. The book also introduces chat, to interact with your devices. You will learn how to automate your tasks by using Internet of Things Service Platforms as the base for an application. You will understand the subject of privacy, requirements they should be familiar with, and how to avoid violating any of the important new regulations being introduced. At the end of the book, you will have mastered creating open, interoperable and secure networks of things, protecting the privacy and integrity of your users and their information. What you will learn Create your own project, run and debug it Master different communication patterns using the MQTT, HTTP, CoAP, LWM2M and XMPP protocols Build trust-based as hoc networks for open, secure and interoperable communication Explore the IoT Service Platform Manage the entire product life cycle of devices Understand and set up the security and privacy features required for your system Master interoperability, and how it is solved in the realms of HTTP,CoAP, LWM2M and XMPP Who this book is for If you're a developer or electronic engineer and are curious about the Internet of Things, this is the book for you. With only a rudimentary understanding of electronics and Rasperry Pi 3, and some programming experience using managed code, such as C# or Java, you will be taught to develop state-of-the-art solutions for the Internet of Things.

Take a practioner's approach in analyzing the Internet of Things (IoT) devices and the security issues facing an IoT architecture. You'll review the architecture's central components, from hardware communication interfaces, such as UARTand SPI, to radio protocols, such as BLE or ZigBee. You'll also learn to assess a device physically by opening it, looking at the PCB, and identifying the chipsets and interfaces. You'll then use that information to gain entry to the device or to perform other actions, such as dumping encryption keys and firmware. As the IoT rises to one of the most popular tech trends, manufacturers need to take necessary steps to secure devices and protect them from attackers. The IoT Hacker's Handbook breaks down the Internet of Things, exploits it, and reveals how these devices can be built securely. What You'll LearnPerform a threat model of a real-world IoT device and locate all possible attacker entry points Use reverse engineering of firmware binaries to identify security issues Analyze,assess, and identify security issues in exploited ARM and MIPS based binariesSniff, capture, and exploit radio communication protocols, such as Bluetooth Low Energy (BLE), and ZigBee Who This Book is For Those interested in learning about IoT security, such as pentesters working in different domains, embedded device developers, or IT people wanting to move to an Internet of Things security role.

Learn to design, implement and secure your IoT infrastructure Key Features Build a complete IoT system that is the best fit for your organization Learn about different concepts, technologies, and tradeoffs in the IoT architectural stack Understand the theory, concepts, and implementation of each element that comprises IoT design—from sensors to the cloud Implement best practices to ensure the reliability, scalability, robust communication systems, security, and data analysis in your IoT infrastructure Book Description The Internet of Things (IoT) is the fastest growing technology market. Industries are embracing IoT technologies to improve operational expenses, product life, and people's well-being. An architectural guide is necessary if you want to traverse the spectrum of technologies needed to build a successful IoT system, whether that's a single device or millions of devices. This book encompasses the entire spectrum of IoT solutions, from sensors to the cloud. We start by examining modern sensor systems and focus on their power and functionality. After that, we dive deep into communication theory, paying close attention to near-range PAN, including the new Bluetooth® 5.0 specification and mesh networks. Then, we explore IP-based communication in LAN and WAN, including 802.11ah, 5G LTE cellular, SigFox, and LoRaWAN. Next, we cover edge routing and gateways and their role in fog computing, as well as the messaging protocols of MQTT and CoAP. With the data now in internet form, you'll get an understanding of cloud and fog architectures, including the OpenFog standards. We wrap up the analytics portion of the book with the application of statistical analysis, complex event processing, and deep learning models. Finally, we conclude by providing a holistic view of the IoT security stack and the anatomical details of IoT exploits while countering them with software defined perimeters and blockchains. What you will learn Understand the role and scope of architecting a successful IoT deployment, from sensors to the cloud Scan the landscape of IoT technologies that span everything from sensors to the cloud and everything in between See the trade-offs in choices of protocols and communications in IoT deployments Build a repertoire of skills and the vernacular necessary to work in the IoT space Broaden your skills in multiple engineering domains necessary for the IoT architect Who this book is for This book is for architects, system designers, technologists, and technology managers who want to understand the IoT ecosphere, various technologies, and tradeoffs and develop a 50,000-foot view of IoT architecture.

Automate your home or business with inexpensive Wi-Fi devices

Expert machine learning and deep learning techniques for developing smarter IoT systems

With examples in Node.js and Raspberry Pi

Rethinking the Internet of Things

Internet of Things- Architecture, Implementation, and Security

Practical Industrial Internet of Things Security

Today we live in an era of internet where there are more connected devices than humans. The ecosystem of these interrelated computing devices, over the internet, for data sharing, communication and automation is called Internet of Things (IoT). Internet of Things not only exposes the learners to the world of IoT but also takes them deep into implementation, security and testing. The text is supplemented with case studies and real-world examples to enable the learners efficiently to implement the concepts discussed. Table of Contents: Chapter 1. Internet of Things—An Answer to the Next Generation Automated World Chapter 2. IoT Frameworks Chapter 3. Design Patterns for IoT Chapter 4. IoT Architecture Choices Chapter 5. IoT Core Modules Chapter 6. Essential Elements for Designing IoT Architecture Chapter 7. IoT Implementation Strategies Chapter 8. Types of Testing in IoT Chapter 9. Artificial Intelligence for IoT Chapter 10. Data Analytics and Machine Learning for IoT Chapter 11. Security Challenges for IoT Chapter 12. Holistic View on IoT Security Chapter 13. Hands-On Examples of IoT Experiments Chapter 14. IoT Project Ideas

A guided tour through the Internet of Things, a networked world of connected devices, objects, and people that 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 buy milk on the way home. A package of cookies on the supermarket shelf suggests that we buy it, based on past purchases. The cookies themselves are on the shelf because of a "smart" supply chain. When we get home, the thermostat has already adjusted the temperature 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 how it will change the way we live and work. Greengard explains that the Internet of Things (IoT) is still in its early stages. Smart phones, cloud computing, RFID (radio-frequency identification) technology, sensors, and miniaturization are converging to make possible a new generation of embedded and immersive technology. Greengard traces the origins of the IoT from the early days of personal computers and the Internet and examines how it creates the conceptual and practical framework for a connected world. He explores the industrial Internet and machine-to-machine communication, the basis for smart manufacturing and end-to-end supply chain visibility; the growing array of smart consumer devices and services—from Fitbit fitness wristbands to mobile apps for banking; the practical and technical challenges of building the IoT; and the risks of a connected world, including a widening digital divide and threats to privacy and security. Finally, he considers the long-term impact of the IoT on society, narrating an eye-opening "Day in the Life" of IoT connections circa 2025.

Although the Internet of Things (IoT) is a vast and dynamic territory that is evolving rapidly, there has been a need for a book that offers a holistic view of the technologies and applications of the entire IoT spectrum. Filling this void, The Internet of Things in the Cloud: A Middleware Perspective provides a comprehensive introduction to the IoT and its development worldwide. It gives you a panoramic view of the IoT landscape—focusing on the overall technological architecture and design of a tentatively unified IoT framework underpinned by Cloud computing from a middleware perspective. Organized into three sections, it: Describes the many facets of Internet of Things—including the four pillars of IoT and the three layer value chain of IoT Focuses on middleware, the glue and building blocks of a holistic IoT system on every layer of the architecture Explores Cloud computing and IoT as well as their synergy based on the common background of distributed processing The book is based on the author's two previous bestselling books (in Chinese) on IoT and Cloud computing and more than two decades of hands-on software/middleware programming and architecting experience at organizations such as the Oak Ridge National Laboratory, IBM, BEA Systems, and Silicon Valley startup Doubletivist. Tapping into this wealth of knowledge, the book categorizes the many facets of the IoT and proposes a number of paradigms and classifications about Internet of Things' mass and niche markets and technologies.

Apress is proud to announce that Rethinking the Internet of Things was a 2014 Jolt Award Finalist, the highest honor for a programming book. And the amazing part is that there is no code in the book. Over the next decade, most devices connected to the Internet will not be used by people in the familiar way that personal computers, tablets and smart phones are. Billions of interconnected devices will be monitoring the environment, transportation systems, factories, farms, forests, utilities, soil and weather conditions, oceans and resources. Many of these sensors and actuators will be networked into autonomous sets, with much of the information being exchanged machine-to-machine directly and without human involvement. Machine-to-machine communications are typically terse. Most sensors and actuators will report or act upon small pieces of information - "chirps". Burdening these devices with current network protocol stacks is inefficient, unnecessary and unduly increases their cost of ownership. This must change. The architecture of the Internet of Things must evolve now by incorporating simpler protocols toward at the edges of the network, or remain forever inefficient. Rethinking the Internet of Things describes reasons why we must rethink current approaches to the Internet of Things. Appropriate architectures that will coexist with existing networking protocols are described in detail. An architecture comprised of integrator functions, propagator nodes, and end devices, along with their interactions, is explored.

A Hands-On Approach

Internet of Things with 8051 and ESP8266

Getting Started with the Internet of Things

Hands-On Edge Analytics with Azure IoT

Online Engineering & Internet of Things

From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence

The IoT Framework for Mechanical Engineers

The concept of Internet of Things has silently existed since the late nineteenth century but in the current decade expectations and excitement has peaked. However not many have understood the profound change that it can usher in. How big this change can be and how it can transform our working!! This book aims to bring in this realization with illustrative and practical case studies with comprehensive concepts. From beginners to practitioners in the field of academics or industry, it serves as a comprehensive yet easy to comprehend source of information on the multiple facets of IoT. Simplistic but comprehensive introduction of the facets of primarily the industrial IoT Practical adoption cases explaining the Core technology stack and business applications Comprehensive view of current technologies which complete the IoT delivery ecosystem, followed by overview of IoT enabled new business models. Realistic view of how industrial firms can evolve into the next stage of maturity along with determinants influencing this transformation since manufacturing is envisioned to be a key segment to adopt and benefit from IoT. Detailed analysis of IoT benefits for the universal triad- energy management, logistics optimization and distribution channel management. A full-fledged case study on Adoption of Green manufacturing using IoT. Real world example of gauging End User perception using different models which is important for a successful adoption of IoT. A futuristic visionary view of IoT as comprehended based on evolution of technology and platforms, and finally analysis of the extremely crucial concepts of security, privacy and governance.

A valuable guide for new and experienced readers, featuring the complex and massive world of IoT and IoT-based solutions.

This book outlines the background and overall vision for the Internet of Things (IoT) and Machine-to-Machine (M2M) communications and services, including major standards. Key technologies are described, and include everything from physical instrumentation of devices to the cloud infrastructures used to collect data. Also included is how to derive information and knowledge, and how to integrate it into enterprise processes, as well as system architectures and regulatory requirements. Real-world service use case 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 relevant standards. This book is written by experts 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, IEEE 802.15.4, 3GPP (GPRS, 3G, 4G), Bluetooth Low Energy/Smart, IETF 6LoWPAN, IETF CoAP, IETF RPL, Power Line Communication, Open Geospatial Consortium (OGC) Sensor Web Enablement (SWE), ZigBee, 802.11, Broadband Forum TR-069, Open Mobile Alliance (OMA) Device Management (DM), ISA100.11a, WirelessHART, M-BUS, Wireless M-BUS, KNX, RFID, Object Management Group (OMG) Business Process Modelling Notation (BPMN) Key technologies for M2M and IoT covered: Embedded systems hardware and software, devices and gateways, capillary 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 process and enterprise integration, Software as a Service and cloud computing Combines both technical explanations together with design features of M2M/IoT and use cases. Together, these descriptions will assist you to develop solutions that will work in the real world Detailed description of the network architectures and technologies that form the basis of M2M and IoT Clear guidelines and examples of M2M and IoT use cases from real-world implementations such as Smart Grid, Smart Buildings, Smart Cities, Participatory Sensing, and Industrial Automation A description of the vision for M2M and its evolution towards 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 waters plants when the soil

becomes dry. This hands-on guide shows you how to start building your own fun and fascinating projects. Learn to program embedded devices using the .NET Micro Framework and the Netduino Plus board. Then connect your devices to the Internet with Pachube, a cloud platform for sharing real-time sensor data. All you need is a Netduino Plus, a USB cable, a couple of sensors, an Ethernet connection to the Internet—and your imagination. Develop programs with simple outputs (actuators) and inputs (sensors) Learn about the Internet of Things and the Web of Things Build client programs that push sensor readings from a device to a web service Create server programs that allow you to control a device over the Web Get the .NET classes and methods needed to implement all of the book's examples

Analytics for the Internet of Things (IoT)

The Internet of Mechanical Things

Train neural network models to develop intelligent IoT applications

Design and develop IoT applications with edge analytical solutions including Azure IoT Edge

The Internet of Things in the Cloud

From Machine-to-Machine to the Internet of Things

Internet of Things A to Z

"This book provides knowledge, skills, and strategies an engineer requires to effectively integrate Internet of Things (IoT) into the field of mechanical engineering. Divided into three sections named IoT Strategies, IoT Foundation topics, and IoT system development, the volume covers introduction to IoT framework, its components, advantages, challenges, and practical process for effective implementation of IoT from mechanical engineering perspective. Further, it explains IoT systems and hands-on training modules, implementation, and execution of IoT Systems. Features: Presents exclusive material on application of IoT in mechanical engineering. Combines theory and practice including relevant terminologies and hands-on. Emphasis on use of IoT to streamline operations, reduce costs, and increased profits. Focuses on development and implementation of Raspberry Pi and Arduino based IoT systems. Illustrates use IoT data to improve performance of robots, machines, and systems. This book aims at Researchers, Graduate students in Mechanical Engineering, Computer Programming, Automobile, Robotics, and Industry 4.0/automation"--

Build smarter systems by combining artificial intelligence and the Internet of Things—two of the most talked about topics today Key FeaturesLeverage the power of Python libraries such as TensorFlow and Keras to work with real-time IoT dataProcess IoT data and predict outcomes in real time to build smart IoT modelsCover practical case studies on industrial IoT, smart cities, and home automationBook Description There are many applications that use data science and analytics to gain insights from terabytes of data. These apps, however, do not address the challenge of continually discovering patterns for IoT data. In Hands-On Artificial Intelligence for IoT, we cover various aspects of artificial intelligence (AI) and its implementation to make your IoT solutions smarter. This book starts by covering the process of gathering and preprocessing IoT data gathered from distributed sources. You will learn different AI techniques such as machine learning, deep learning, reinforcement learning, and natural language processing to build smart IoT systems. You will also leverage the power of AI to handle real-time data coming from wearable devices. As you progress through the book, techniques for building models that work with different kinds of data generated and consumed by IoT devices such as time series, images, and audio will be covered. Useful case studies on four major application areas of IoT solutions are a key focal point of this book. In the concluding chapters, you will leverage the power of widely used Python libraries, TensorFlow and Keras, to build different kinds of smart AI models. By the end of this book, you will be able to build smart AI-powered IoT apps with confidence. What you will learnApply different AI techniques including machine learning and deep learning using TensorFlow and KerasAccess and process data from various distributed sourcesPerform supervised and unsupervised machine learning for IoT dataImplement distributed processing of IoT data over Apache Spark using the MLlib and H2O.ai platformsForecast time-series data using deep learning methodsImplementing AI from case studies in Personal IoT, Industrial IoT, and Smart CitiesGain unique insights from data obtained from wearable devices and smart devicesWho this book is for If you are a data science professional or a machine learning developer looking to build smart systems for IoT, Hands-On Artificial Intelligence for IoT is for you. If you want to learn how popular artificial intelligence (AI) techniques can be used in the Internet of Things domain, this book will also be of benefit. A basic understanding of machine learning concepts will be required to get the best out of this book.

Connect things to create amazing IoT applications in minutes Key Features Use Blynk cloud and Blynk server to connect devices Build IoT applications on Android and iOS platforms A practical guide that will show how to connect devices using Blynk and Raspberry Pi 3 Book Description Blynk, known as the most user-friendly IoT platform, provides a way to build mobile applications in minutes. With the Blynk drag-n-drop mobile app builder, anyone can build amazing IoT applications with minimal resources and effort, on hardware ranging from prototyping platforms such as Arduino and Raspberry Pi 3 to industrial-grade ESP8266, Intel, Sierra Wireless, Particle, Texas Instruments, and a few others. This book uses Raspberry Pi as the main hardware platform and C/C++ to write sketches to build projects. The first part of this book shows how to set up a development environment with various hardware combinations and required software. Then you will build your first IoT application with Blynk using various hardware combinations and connectivity types such as Ethernet and Wi-Fi. Then you'll use and configure various widgets (control, display, notification, interface, time input, and some advanced widgets) with Blynk App Builder to build applications. Towards the end, you will learn how to connect with and use built-in sensors on Android and iOS mobile devices. Finally you will learn how to build a robot that can be controlled with a Blynk app through the Blynk cloud and personal server. By the end of this book, you will have hands-on experience building IoT applications using Blynk. What you will learn Build devices using Raspberry Pi and various sensors and actuators Use Blynk cloud to connect and control devices through the Blynk app builder Connect devices to Blynk cloud and server through Ethernet and Wi-Fi Make applications using Blynk app builder on Android and iOS platforms Run Blynk personal server on the Windows, MAC, and Raspberry Pi platforms Who this book is for This book is targeted at any stakeholder working in the IoT sector who wants to understand how Blynk works and build exciting IoT projects. Prior understanding of Raspberry Pi, C/C++, and electronics is a must.

About the Book Recent industry surveys expect the cloud computing services market to be in excess of \$20 billion and cloud computing jobs to be in excess of 10 million worldwide in 2014 alone. In addition, since a majority of existing information technology (IT) jobs is focused on maintaining legacy in-house systems, the demand for these kinds of jobs is likely to drop rapidly if cloud computing continues to take hold of the industry. However, there are very few educational options available in the area of cloud computing beyond vendor-specific training by cloud providers themselves. Cloud computing courses have not found their way (yet) into mainstream college curricula. This book is written as a textbook on cloud computing for educational programs at colleges. It can also be used by cloud service providers who may be interested in offering a broader perspective of cloud computing to accompany their own customer and employee training programs. The typical reader is expected to have completed a couple of courses in programming using traditional high-level languages at the college-level, and is either a senior or a beginning graduate student in one of the science, technology, engineering or mathematics (STEM) fields. We have tried to write a comprehensive book that transfers knowledge through an immersive "hands-on approach", where the reader is provided the necessary guidance and knowledge to develop working code for real-world cloud applications. Additional support is available at the book's website: www.cloudcomputingbook.info Organization The book is organized into three main parts. Part I covers technologies that form the foundations of cloud computing. These include topics such as virtualization, load balancing, scalability & elasticity, deployment, and replication. Part II introduces the reader to the design & programming aspects of cloud computing. Case studies on design and implementation of several cloud applications in the areas such as image processing, live streaming and social networks analytics are provided. Part III introduces the reader to specialized aspects of cloud computing including cloud application benchmarking, cloud security, multimedia applications and big data analytics. Case studies in areas such as IT, healthcare, transportation, networking and education are provided.

Design and create your own IoT applications using Raspberry Pi 3

Architecting IoT solutions by implementing sensors, communication infrastructure, edge computing, analytics, and security

Hands-On Internet of Things with Blynk

Networking Technologies, Protocols, and Use Cases for the Internet of Things

Build connected IoT devices with Arduino and MQ Telemetry Transport (MQTT)

Internet of Things for Architects

Approach and Applicability in Manufacturing

Internet of Things (IoT) refers to physical and virtual objects that have unique identities and are connected to the internet to facilitate intelligent applications that make energy, logistics, industrial control, retail, agriculture and many other domains "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 traditional high-level languages at the college-level, and is either a senior or a beginning graduate student in one of the science, technology, engineering or mathematics (STEM) fields. Like our companion book on Cloud Computing, we have tried to write a comprehensive book that transfers knowledge through an immersive "hands on" approach, where the reader is provided the necessary guidance and knowledge to develop working code for real-world IoT applications. Additional support is available at the book's website: www.internet-of-things-book.com Organization The book is organized into 3 main parts, comprising of a total of 11 chapters. Part I covers the building blocks of Internet of Things (IoT) 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 approach using NETCONF-YANG 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, Xively 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.

As more and more devices become interconnected through the Internet of Things (IoT), there is an even greater need for this book, which explains the technology, the internetworking, and applications that are making IoT an everyday reality. The book begins with a discussion of IoT "ecosystems" and the technology that enables them, which includes: Wireless Infrastructure and Service Discovery Protocols Integration Technologies and Tools Application and Analytics Enablement Platforms A chapter on next-generation cloud infrastructure explains hosting IoT platforms and applications. A chapter on data analytics throws light on IoT data collection, storage, translation, real-time processing, mining, and analysis, all of which can yield actionable insights from the data collected by IoT applications. There is also a chapter on edge/fog computing. The second half of the book presents various IoT ecosystem use cases. One chapter discusses smart airports and highlights the role of IoT integration. It explains how mobile devices, mobile technology, wearables, RFID sensors, and beacons work together as the core technologies of a smart airport. Integrating these components into the airport ecosystem is examined in detail, and use cases and real-life examples illustrate this IoT ecosystem in operation. Another in-depth look is on envisioning smart healthcare systems in a connected world. This chapter focuses on the requirements, promising applications, and roles of cloud computing and data analytics. The book also examines smart homes, smart cities, and smart governments. The book concludes with a chapter on IoT security and privacy. This chapter examines the emerging security and privacy requirements of IoT environments. The security issues and an assortment of surmounting techniques and best practices are also discussed in this chapter.

Internet of Things is a textbook designed for students of computer science, information technology and electronics & communication engineering to understand the interconnection and integration of the physical world with the cyber space and begin designing and developing simple IoT devices. Divided in to five parts, the book in nineteen chapters takes the reader through the foundations of the subject before moving onto discussing the essential components of an IoT system, including the sensor and actuators, open hardware, middleware, and software platforms with sound illustrations for better understanding. It also dedicates a complete module comprising four chapters on IoT and its relevance to Big Data. The last two parts of the book focuses on data management and use cases finally ending with the chapter on futuristic outlook of this technology.