Building Blocks for IoT Analytics

Gain a strong foundation of Arduino-based device development, from which you can go in any direction according to your specific development needs and desires. You'll build Arduino-powered devices for everyday use, and then connect those devices to the Internet. You'll be introduced to the building blocks of IoT, and then deploy those principles to by building a variety of useful projects. Projects in the books gradually introduce the reader to key topics such as internet connectivity with Arduino, common IoT protocols, custom web visualization, and Android apps that receive sensor data on-demand and in realtime. IoT device enthusiasts of all ages will want this book by their side when developing Android-based devices. If you're one of the many who have decided to build your own Arduino-powered devices for IoT applications, then Building Arduino Projects for the Internet of Things is exactly what you need. This book is your single resource—a guidebook for the eager-to-learn Arduino
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enthusiast—that teaches logically, methodically, and practically how the Arduino works and what you can build with it. Written by a software developer and solution architect who got tired of hunting and gathering various lessons for Arduino development as he taught himself all about the topic. For Arduino enthusiasts, this book not only opens up the world of IoT applications, you will also learn many techniques that likely would not be obvious if not for experience with such a diverse group of applications What You'll Learn

Create an Arduino circuit that senses temperature Publish data collected from an Arduino to a server and to an MQTT broker Set up channels in Xively Using Node-RED to define complex flows Publish data visualization in a web app Report motion-sensor data through a mobile app Create a remote control for house lights Set up an app in IBM Bluematrix

Who This Book Is For IoT device enthusiasts of all ages will want this book by their side when developing Android-based devices.

Rethinking the Internet of Things

This book provides a simplified visionary approach about the future direction of IoT, addressing its wide-scale adoption in many markets, its interception with advanced technology, the explosive growth in data, and the emergence of data analytics. IoT business applications span multiple vertical markets. The objective is to inspire creative thinking and collaboration among startups and entrepreneurs which will breed innovation and deliver IoT solutions that will positively impact us by making business processes more efficient, and improving our quality of life. With increasing proliferation of smart-phones and social media, data generated by user wearable/mobile devices continue to be key sources of information about us and the markets around us. Better insights will be gained through cognitive computation coupled with business intelligence and visual analytics that are GIS-based.

Hands-On Internet of Things with MQTT

Discover how to build your own smart Internet of Things projects and bring a new degree of interconnectivity to your world About This Book Learn how to extract and analyse data from physical devices and build smart IoT projects Master the skills of building enticing projects such as a neural network autonomous car, computer vision through a camera, and cloud-based IoT applications This project-based guide leverages revolutionary computing chips such as Raspberry Pi, Arduino, and so on Who This Book Is For If you are hobbyist who is keen on making smart IoT projects, then this book is for you. You should have a basic knowledge of Python. What You Will Learn Implement data science in your IoT projects and build a smart temperature controller Create a simple machine learning application and implement decision system concepts Develop a vision machine using OpenCV Build a robot car with manual and automatic control
Implement speech modules with your own voice commands for IoT projects Connect IoT to a cloud-based server In Detail Internet of Things (IoT) is a groundbreaking technology that involves connecting numerous physical devices to the Internet and controlling them. Creating basic IoT projects is common, but imagine building smart IoT projects that can extract data from physical devices, thereby making decisions by themselves. Our book overcomes the challenge of analyzing data from physical devices and accomplishes all that your imagination can dream up by teaching you how to build smart IoT projects. Basic statistics and various applied algorithms in data science and machine learning are introduced to accelerate your knowledge of how to integrate a decision system into a physical device. This book contains IoT projects such as building a smart temperature controller, creating your own vision machine project, building an autonomous mobile robot car, controlling IoT projects through voice commands, building IoT applications utilizing cloud technology and data science, and many more. We will also leverage a small yet powerful IoT chip, Raspberry Pi with Arduino, in order to integrate a smart decision-making system in the IoT projects. Style and approach The book follows a project-based approach to building smart IoT projects using powerful boards such as the Raspberry Pi, Arduino, and the IoT chip.

The Internet of Things

The Internet of Things (IoT) is a global network that links physical objects using Cloud computing, web applications, and network communications. It allows devices to communicate with each other, access information on the Internet, store and retrieve data, and interact with users, creating smart, pervasive and always-connected environments. Despite the Internet of Things being a relatively new concept, there are already a few open platforms available that enable remote and seamless management and visualization of sensor data: Cosm, Nimbits, and ThingSpeak are just a few examples. And Arduino works with all of them. The Arduino is an incredibly flexible micro-controller and development environment that cannot only be used to control devices, but can also be used to read data from all kinds of sensors. Its simplicity and extensibility, in addition to its great success and adoption by users, has led to the development of a variety of hardware extensions and software libraries that enable wired and wireless communication with the Internet. Arduino is the ideal open hardware platform for experimenting with the world of the Internet of Things. Make your Arduino talk to the world! This book will provide you with all the information you need to design and create your own Internet of Things (IoT) applications using the Arduino platform. More specifically, you will learn: About the Internet of Things and Cloud Computing concepts About open platforms that allow you to store your sensor data on the Cloud (like Cosm, Nimbits and many more) The basic usage of Arduino environment for creating your own embedded
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projects at low cost How to connect your Arduino with your Android phone and send data over the Internet How to connect your Arduino directly to the Internet and talk to the Cloud How to reprogram your Arduino microcontroller remotely through the Cloud Detailed Table of Contents can be found at: http://www.buildinginternetofthings.com

Updated version (v1.1): Contains corrections, improvements and updates about IoT Platforms!

Demystifying Internet of Things Security

Internet-of-Things (IoT) Analytics are an integral element of most IoT applications, as it provides the means to extract knowledge, drive actuation services and optimize decision making. IoT analytics will be a major contributor to IoT business value in the coming years, as it will enable organizations to process and fully leverage large amounts of IoT data, which are nowadays largely underutilized. The Building Blocks of IoT Analytics is devoted to the presentation the main technology building blocks that comprise advanced IoT analytics systems. It introduces IoT analytics as a special case of BigData analytics and accordingly presents leading edge technologies that can be deployed in order to successfully confront the main challenges of IoT analytics applications. Special emphasis is paid in the presentation of technologies for IoT streaming and semantic interoperability across diverse IoT streams. Furthermore, the role of cloud computing and BigData technologies in IoT analytics are presented, along with practical tools for implementing, deploying and operating non-trivial IoT applications. Along with the main building blocks of IoT analytics systems and applications, the book presents a series of practical applications, which illustrate the use of these technologies in the scope of pragmatic applications. Technical topics discussed in the book include: Cloud Computing and BigData for IoT analyticsSearching the Internet of ThingsDevelopment Tools for IoT Analytics ApplicationsIoT Analytics-as-a-ServiceSemantic Modelling and Reasoning for IoT AnalyticsIoT analytics for Smart BuildingsIoT analytics for Smart CitiesOperationalization of IoT analyticsEthical aspects of IoT analytics This book contains both research oriented and applied articles on IoT analytics, including several articles reflecting work undertaken in the scope of recent European Commission funded projects in the scope of the FP7 and H2020 programmes. These articles present results of these projects on IoT analytics platforms and applications. Even though several articles have been contributed by different authors, they are structured in a well thought order that facilitates the reader either to follow the evolution of the book or to focus on specific topics depending on his/her background and interest in IoT and IoT analytics technologies. The compilation of these articles in this edited volume has been largely motivated by the close collaboration of the co-authors in the scope of working groups and IoT events organized by the Internet-of-Things Research Cluster (IERC), which is
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Currently a part of EU’s Alliance for Internet of Things Innovation (AIOTI).

Getting Started with Python for the Internet of Things

The Internet of Things (IoT) networks have revolutionized the world and have innumerable real-time applications on automation. A few examples include driverless cars, remote monitoring of the elderly, remote order of tea or coffee of your choice from a vending machine, and home/industrial automation amongst others. Fundamentals of Internet of Things build the foundations of IoT networks by leveraging the relevant concepts from signal processing, communications, networks, and machine learning. The book covers two fundamental components of IoT networks, namely, the Internet and Things. In particular, the book focuses on networking concepts, protocols, clustering, data fusion, localization, energy harvesting, control optimization, data analytics, fog computing, privacy, and security including elliptic curve cryptography and blockchain technology. Most of the existing books are theoretical and without many mathematical details and examples. In addition, some essential topics of the IoT networks are also missing in the existing books.

Features:
• The book covers cutting-edge research topics
• Provides mathematical understanding of the topics in addition to relevant theory and insights
• Includes illustrations with hand-solved numerical examples for visualization of the theory and testing of understanding
• Lucid and crisp explanation to lessen the study time of the reader

The book is a complete package of the fundamentals of IoT networks and is suitable for graduate-level students and researchers who want to dive into the world of IoT networks.

Internet of Things with Raspberry Pi 3

Build clever, collaborative, and powerful automation systems with the Raspberry Pi and Python. Key Features
• Create your own Pi-Rover or Pi-Hexipod robots
• Develop practical applications in Python using Raspberry Pi
• Build your own Jarvis, a highly advanced computerized AI

Book Description
This Learning Path takes you on a journey in the world of robotics and teaches you all that you can achieve with Raspberry Pi and Python. It teaches you to harness the power of Python with the Raspberry Pi 3 and the Raspberry Pi zero to build superlative automation systems that can transform your business. You will learn to create text classifiers, predict sentiment in words, and develop applications with the Tkinter library. Things will get more interesting when you build a human face detection and recognition system and a home automation system in Python, where different appliances are controlled using the Raspberry Pi. With such diverse robotics projects, you'll grasp the basics of robotics and its functions, and understand the integration of robotics with the IoT environment. By the end of this Learning Path, you will have covered everything from configuring a robotic controller, to
Creating a self-driven robotic vehicle using Python. Raspberry Pi 3 Cookbook for Python Programmers - Third Edition by Tim Cox, Dr. Steven Lawrence Fernandes Python Programming with Raspberry Pi by Sai Yamanooor, Srihari Yamanooor Python Robotics Projects by Prof. Diwakar Vaish

What you will learn
- Build text classifiers and predict sentiment in words with the Tkinter library
- Develop human face detection and recognition systems
- Create a neural network module for optical character recognition
- Build a mobile robot using the Raspberry Pi as a controller
- Understand how to interface sensors, actuators, and LED displays work
- Apply machine learning techniques to your models
- Interface your robots with Bluetooth

Who this book is for
This Learning Path is specially designed for Python developers who want to take their skills to the next level by creating robots that can enhance people's lives. Familiarity with Python and electronics will aid understanding the concepts in this Learning Path.

Collaborative Internet of Things (C-IoT)

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 smartphones 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.

Building Arduino Projects for the Internet of Things

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) 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 radios, 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 specific challenges and state-of-the-art solutions for IoT, as well as their evolution in the foreseeable future. The book provides non-experts with a comprehensive introduction to integrated circuit design for IoT, and serves as an excellent starting point for further learning, thanks 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).

Rethinking the Internet of Things

The Internet of Things Primer is your definitive source to understand how to build an IoT Business from a Technology idea. It covers how to strategically extend an existing business using Internet of Things and to create a new businesses. It offers a methodical discussion of challenges and best practices in building and launching IoT Applications including wearables, smart cities, connected cars, and Industrial IoT. This book is the first of its kind where a Product Manager or Entrepreneur can learn how to build the optimal Customer Experience for IoT Products across multi-device customer touch points. This book includes case studies from global businesses and entrepreneurs and Sudha Jamthe's futurist ideas about the evolution and Business disruptions from IoT impacting future jobs, Human Machine Interface and its immediate impact on Retail, Healthcare and Education. Sudha Jamthe's no-nonsense approach to IoT is refreshing, informative, and thorough. Read The Internet of
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Things Business Primer If you want to succeed in the IoT ecosystem. --Ben Parr, Author of Captivology and one of Inc.'s Top 10 IoT Experts There are times when gut feeling, a clear head and deep knowledge of your area of expertise are plenty to succeed. These times are quite different. You can have all of the above and still be baffled. That is why you are here reading this book by Sudha Jamthe. --Rob Van Kranenburg, Founder EU IoT Council

Building the 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 architectures.

Build Your Own IoT Platform

Get started programming Rust applications for the Internet of Things (IoT). This book is a programming skills migration book that teaches you the Rust programming techniques most useful for IoT applications. You'll step through from server to board development in creating a set of IoT applications. In Rust for the IoT, you'll learn how to build a modern server side application using Rust on the backend. Then you'll use docker and Kubernetes to deploy these to a managed cloud. Finally you will use a Raspberry Pi with a SenseHat and Camera to capture the world around you and send that information to the cloud. While you will be able to follow along without any cloud or hardware, to make the most of it we recommend a few cloud pieces and hardware that is designed to integrate with the software in this book. After reading and using this book, you'll see how to apply Rust to the Internet of Things. What You Will Learn
Create a modern Rust backend complete with handling eventual consistency and interacting via a GraphQL interface Use the Raspberry PI to serve as a cheap IoT device that one can easily deploy around the house Capture temperature, video, and use the interactive joystick to interact with the software you’ve created Use OpenCV to perform facial detection from the PI’s camera and save that information to the cloud. Create deployable helm charts for the cloud, and for the device create complete ISOs that allow you to easily deploy the Pi’s OS + custom software Who This Book Is For You will need to have a basic understanding of cloud application development at a minimum and the basics of Rust coding. This book is for those interested in or working with the IoT and the Raspberry Pi who want to learn how Rust can work for them.
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 Learn
Design 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.

The Internet of Things

Create and program Internet of Things projects using the Espressif ESP32. Key Features
Getting to know the all new powerful ESP32 boards and build interesting Internet of Things projects
Configure your ESP32 to the cloud technologies and explore the networkable modules that will be utilised in your IoT projects
A step-by-step guide that teaches you the basic to advanced IoT concepts with ESP32
Book Description
ESP32 is a low-cost MCU with integrated Wi-Fi and BLE. Various modules and development boards-based on ESP32 are available for building IoT applications easily. Wi-Fi and BLE are a common network stack in the Internet of Things application. These network modules can leverage your business and projects needs for cost-effective benefits. This book will serve as a fundamental guide for developing an ESP32 program. We will start with GPIO programming involving some sensor devices. Then we will study ESP32 development by building a number of IoT projects, such as weather stations, sensor loggers, smart homes, Wi-Fi cams and Wi-Fi wardriving.
Lastly, we will enable ESP32 boards to execute interactions with mobile applications and cloud servers such as AWS. By the end of this book, you will be up and running with various IoT project-based ESP32 chip. What you will learn
Understand how to build a sensor monitoring logger
Create a weather station to sense temperature and humidity using ESP32
Build your own Wi-Fi wardriving with ESP32
Use BLE to make interactions between ESP32 and Android
Understand how to
Programming the Internet of Things

Break down the misconceptions of the Internet of Things by examining the different security building blocks available in Intel Architecture (IA) based IoT platforms. This open access book reviews the threat pyramid, secure boot, chain of trust, and the SW stack leading up to defense-in-depth. The IoT presents unique challenges in implementing security and Intel has both CPU and Isolated Security Engine capabilities to simplify it. This book explores the challenges to secure these devices to make them immune to different threats originating from within and outside the network. The requirements and robustness rules to protect the assets vary greatly and there is no single blanket solution approach to implement security. Demystifying Internet of Things Security provides clarity to industry professionals and provides an overview of different security solutions. What You’ll Learn Secure devices, immunizing them against different threats originating from inside and outside the network Gather an overview of the different security building blocks available in Intel Architecture (IA) based IoT platforms Understand the threat pyramid, secure boot, chain of trust, and the software stack leading up to defense-in-depth Who This Book Is For Strategists, developers, architects, and managers in the embedded and Internet of Things (IoT) space trying to understand and implement the security in the IoT devices/platforms.

Building Arduino Projects for the Internet of Things

Radio frequency identification (RFID) is a technology that is rapidly gaining popularity due to its several benefits in a wide area of applications like inventory tracking, supply chain management, automated manufacturing, healthcare, etc. The benefits of implementing RFID technologies can be seen in terms of efficiency (increased speed in production, reduced shrinkage, lower error rates, improved asset tracking etc.) or effectiveness (services that companies provide to the customers). Leading to considerable operational and strategic benefits, RFID technology continues to bring new levels of intelligence and information, strengthening the experience of all participants in this research domain, and serving as a valuable authentication technology. We hope this book will be useful for engineers, researchers and industry personnel, and provide them with some new ideas to address current and future issues they might be facing.
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Internet of Things with ESP8266

A practical, indispensable security guide that will navigate you through the complex realm of securely building and deploying systems in our IoT-connected world About This Book Learn to design and implement cyber security strategies for your organization Learn to protect cyber-physical systems and utilize forensic data analysis to beat vulnerabilities in your IoT ecosystem Learn best practices to secure your data from device to the cloud Gain insight into privacy-enhancing techniques and technologies Who This Book Is For This book targets IT Security Professionals and Security Engineers (including pentesters, security architects and ethical hackers) who would like to ensure security of their organization's data when connected through the IoT. Business analysts and managers will also find it useful. What You Will Learn Learn how to break down cross-industry barriers by adopting the best practices for IoT deployments Build a rock-solid security program for IoT that is cost-effective and easy to maintain Demystify complex topics such as cryptography, privacy, and penetration testing to improve your security posture See how the selection of individual components can affect the security posture of the entire system Use Systems Security Engineering and Privacy-by-design principles to design a secure IoT ecosystem Get to know how to leverage the burdgening cloud-based systems that will support the IoT into the future. In Detail With the advent of Internet of Things (IoT), businesses will be faced with defending against new types of threats. The business ecosystem now includes cloud computing infrastructure, mobile and fixed endpoints that open up new attack surfaces, a desire to share information with many stakeholders and a need to take action quickly based on large quantities of collected data. It therefore becomes critical to ensure that cyber security threats are contained to a minimum when implementing new IoT services and solutions. The interconnectivity of people, devices, and companies raises stakes to a new level as computing and action become even more mobile, everything becomes connected to the cloud, and infrastructure is strained to securely manage the billions of devices that will connect us all to the IoT. This book shows you how to implement cyber-security solutions, IoT design best practices and risk mitigation methodologies to address device and infrastructure threats to IoT solutions. This book will take readers on a journey that begins with understanding the IoT and how it can be applied in various industries, goes on to describe the security challenges associated with the IoT, and then provides a set of guidelines to architect and deploy a secure IoT in your Enterprise. The book will showcase how the IoT is implemented in early-adopting industries and describe how lessons can be learned and shared across diverse industries to support a secure IoT. Style and approach This book aims to educate readers on key areas in IoT security. It walks readers through engaging with security challenges and then provides answers on how to successfully manage IoT security and build a safe infrastructure for smart devices. After reading this book, you will
Practical Internet of Things Security

McKinsey Global Institute predicts Internet of Things (IoT) could generate up to $11.1 trillion a year in economic value by 2025. Gartner Research Company expects 20 billion inter-connected devices by 2020 and, as per Gartner, the IoT will have a significant impact on the economy by transforming many enterprises into digital businesses and facilitating new business models, improving efficiency and increasing employee and customer engagement. It’s clear from above and our research that the IoT is a game changer and will have huge positive impact in foreseeable future. In order to harvest the benefits of IoT revolution, the traditional software development paradigms must be fully upgraded. The mission of our book, is to prepare current and future software engineering teams with the skills and tools to fully utilize IoT capabilities. The book introduces essential IoT concepts from the perspectives of full-scale software development with the emphasis on creating niche blue ocean products. It also: Outlines a fundamental full stack architecture for IoT Describes various development technologies in each IoT layer Explains IoT solution development from Product management perspective Extensively covers security and applicable threat models as part of IoT stack The book provides details of several IoT reference architectures with emphasis on data integration, edge analytics, cluster architectures and closed loop responses.

Enabling Things to Talk

Develop a variety of projects and connect them to microcontrollers and web servers using the lightweight messaging protocol MQTT Key Features Leverage the power of MQTT to build a pet food dispenser, e-ink to-do list, and a productivity cube Learn about technologies like laser cutting, 3D printing, and PCB production for building robust prototypes Explore practical uses cases to gain an in-depth understanding of MQTT Book 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
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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 learn Explore MQTT programming with Arduino Discover how to make your prototypes talk to each other Send MQTT messages from your smartphone to your prototypes Discover how you can make websites interact with your prototypes Learn about MQTT servers, libraries, and apps Explore tools such as laser cutting and 3D printing in order to build robust prototype cases

Who 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.

Enabling the Internet of Things

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 Internet of Things

Build amazing Internet of Things projects using the ESP8266 Wi-Fi chip About This Book Get to know the powerful and low cost ESP8266 and build interesting projects in the field of Internet of Things Configure your ESP8266 to the cloud and explore the networkable
Internet of Things

The Internet Of Things
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modules that will be utilized in the IoT projects. This step-by-step guide teaches you the basics of IoT with ESP8266 and makes your life easier. Who This Book Is For This book is for those who want to build powerful and inexpensive IoT projects using the ESP8266 WiFi chip, including those who are new to IoT, or those who already have experience with other platforms such as Arduino. What You Will Learn Control various devices from the cloud. Interact with web services, such as Twitter or Facebook. Make two ESP8266 boards communicate with each other via the cloud. Send notifications to users of the ESP8266, via email, text message, or push notifications. Build a physical device that indicates the current price of Bitcoin. Build a simple home automation system that can be controlled from the cloud. Create your own cloud platform to control ESP8266 devices.

In Detail

The Internet of Things (IoT) is the network of objects such as physical things embedded with electronics, software, sensors, and connectivity, enabling data exchange. ESP8266 is a low-cost WiFi microcontroller chip that has the ability to empower IoT and helps the exchange of information among various connected objects. ESP8266 consists of networkable microcontroller modules, and with this low-cost chip, IoT is booming. This book will help deepen your knowledge of the ESP8266 WiFi chip platform and get you building exciting projects. Kick-starting with an introduction to the ESP8266 chip, we will demonstrate how to build a simple LED using the ESP8266. You will then learn how to read, send, and monitor data from the cloud. Next, you'll see how to control your devices remotely from anywhere in the world. Furthermore, you'll get to know how to use the ESP8266 to interact with web services such as Twitter and Facebook. In order to make several ESP8266s interact and exchange data without the need for human intervention, you will be introduced to the concept of machine-to-machine communication. The latter part of the book focuses more on projects, including a door lock controlled from the cloud, building a physical Bitcoin ticker, and doing wireless gardening. You'll learn how to build a cloud-based ESP8266 home automation system and a cloud-controlled ESP8266 robot. Finally, you'll discover how to build your own cloud platform to control ESP8266 devices. With this book, you will be able to create and program Internet of Things projects using the ESP8266 WiFi chip.

Style and approach

This is a step-by-step guide that provides great IOT projects with ESP8266. All the key concepts are explained in detail, with the help of examples and demonstrations of the projects.
fit into and interact with the rest of the system. This is especially important since IoT is a multidisciplinary area that requires diverse skills and knowledge including: sensors, embedded systems, real-time systems, control systems, communications, protocols, Internet, cloud computing, large-scale distributed processing and storage systems, AI and ML, (preferably) coupled with domain experience in the area where it is to be applied, such as building or manufacturing automation. Written in a reader-minded approach that starts by describing the problem (why should I care?), placing it in context (what does this do and where/how does it fit in the great scheme of things?) and then describing salient features of solutions (how does it work?), this book covers the existing body of knowledge and design practices, but also offers the author’s insights and articulation of common attributes and salient features of solutions such as IoT information modeling and platform characteristics.

Internet of Things

This book describes the building blocks and introductory business models for Internet of Things (IoT). The author provide an overview of the entire IoT architecture and constituent layers, followed by detail description of each block. Various inter-connecting technologies and sensors are discussed in context of IoT networks. In addition to this, concepts of Big Data and Fog Computing are presented and characterized as per data generated by versatile IoT applications. Smart parking system and context aware services are presented as an hybrid model of cloud and Fog Afterwards, various IoT applications and respective business models are discussed. Finally, author summarizes the IoT building blocks and identify research issues in each, and suggest potential research projects worthy of pursuing.

Smart Internet of Things Projects

End to end solutions for IoT enthusiasts and web developers About This Book Leverage the capability of IoT with the combination of Raspberry Pi 3 and JavaScript (ES5/ES6) Develop a health monitoring device along with some cool projects like Smart Agriculture & Raspberry Pi 3 based surveillance. A practical book which will help you build Mobile/Web/Desktop apps that will show how to manage and monitor data from sensors and actuators in real time. Who This Book Is For This book targets IoT enthusiasts and web developers who would like to build IoT-based applications with Raspberry Pi, Arduino and JavaScript. Some knowledge about electronics and familiarity with programming concepts (JavaScript - ES5/ES6) is expected. What You Will Learn Integrate sensors and actuators with the cloud and control them for your Smart Weather Station. Develop your very own Amazon Alexa integrating with your IoT solution Define custom rules and execute jobs on certain data events using IFTTT
Build a simple surveillance solution using Amazon Recognition & Raspberry Pi 3. Design a fall detection system and build a notification system for it. Use Amazon Rekognition for face detection and face recognition in your Surveillance project.

In detail, in this world of technology upgrades, IoT is currently leading with its promise to make the world a more smarter and efficient place. This book will show you how to build simple IoT solutions that will help you to understand how this technology works. We would not only explore the IoT solution stack, but we will also see how to do it with the world's most misunderstood programming language – JavaScript. Using Raspberry Pi 3 and JavaScript (ES5/ES6) as the base to build all the projects, you will begin with learning about the fundamentals of IoT and then build a standard framework for developing all the applications covered in this book. You will then move on to build a weather station with temperature, humidity and moisture sensors and further integrate Alexa with it. Further, you will build a smart wearable for understanding the concept of fall detection. You will then extend it with the "If This Then That" (IFTTT) rules engine to send an email on fall detection. Finally, you will be working with the Raspberry Pi 3 camera module and surveillance with a bit of facial detection using Amazon Rekognition platform. At the end of the book, you will not only be able to build standalone exciting IoT applications but also learn how you can extend your projects to another level. Style and Approach This book will follow a project based approach where each chapter will teach the readers to build a standalone project. It will not only guide you to build exciting projects but will also teach you to extend your project to another level.

Commercial and Industrial Internet of Things Applications with the Raspberry Pi

"If we had computers that knew everything there was to know about things—using data they gathered without any help from us—we would be able to track and count everything, and greatly reduce waste, loss, and cost. We would know when things needed replacing, repairing or recalling, and whether they were fresh or past their best. The Internet of Things has the potential to change the world, just as the Internet did. Maybe even more so." —Kevin Ashton, originator of the term, Internet of Things An examination of the concept and unimagined potential unleashed by the Internet of Things (IoT) with IPv6 and MIPv6. What is the Internet of Things? How can it help my organization? What is the cost of deploying such a system? What are the security implications? Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications answers these questions and many more. This essential book explains the concept and potential that the IoT presents, from mobile applications that allow home appliances to be programmed remotely, to solutions in manufacturing and energy conservation. It features a tutorial for implementing the IoT using IPv6 and Mobile IPv6 and offers complete
Online Library Building The Internet Of Things Implement New Business Models Disrupt Competitors Transform Your Industry

Chapter coverage that explains: What is the Internet of Things? Internet of Things definitions and frameworks Internet of Things application examples Fundamental IoT mechanisms and key technologies Evolving IoT standards Layer 1/2 connectivity: wireless technologies for the IoT Layer 3 connectivity: IPv6 technologies for the IoT IPv6 over low power WPAN (6lowpan) Easily accessible, applicable, and not overly technical Building the Internet of Things with IPv6 and MIPv6 is an important resource for Internet and ISP providers, telecommunications companies, wireless providers, logistics professionals, and engineers in equipment development, as well as graduate students in computer science and computer engineering courses.

Internet of Things Projects with ESP32

The Internet of Things (IoT) is an emerging network superstructure that will connect physical resources and actual users. It will support an ecosystem of smart applications and services bringing hyper-connectivity to our society by using augmented and rich interfaces. Whereas in the beginning IoT referred to the advent of barcodes and Radio Frequency Identification (RFID), which helped to automate inventory, tracking and basic identification, today IoT is characterized by a dynamic trend toward connecting smart sensors, objects, devices, data and applications. The next step will be “cognitive IoT,” facilitating object and data re-use across application domains and leveraging hyper-connectivity, interoperability solutions and semantically enriched information distribution. The Architectural Reference Model (ARM), presented in this book by the members of the IoT-A project team driving this harmonization effort, makes it possible to connect vertically closed systems, architectures and application areas so as to create open interoperable systems and integrated environments and platforms. It constitutes a foundation from which software companies can capitalize on the benefits of developing consumer-oriented platforms including hardware, software and services. The material is structured in two parts. Part A introduces the general concepts developed for and applied in the ARM. It is aimed at end users who want to use IoT technologies, managers interested in understanding the opportunities generated by these novel technologies, and system architects who are interested in an overview of the underlying basic models. It also includes several case studies to illustrate how the ARM has been used in real-life scenarios. Part B then addresses the topic at a more detailed technical level and is targeted at readers with a more scientific or technical background. It provides in-depth guidance on the ARM, including a detailed description of a process for generating concrete architectures, as well as reference manuals with guidelines on how to use the various models and perspectives presented to create a concrete architecture. Furthermore, best practices and tips on how system engineers can use the ARM to develop specific IoT architectures for dedicated IoT solutions are...
Illustrated and exemplified in reverse mapping exercises of existing standards and platforms.

Internet of Things: A Hands-On Approach

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

Internet of Things: Concepts and System Design

Connect your organization to the Internet of Things with solid strategy and a proven implementation plan Building Internet of Things provides front-line business decision makers with a practical handbook for capitalizing on this latest transformation. Focusing on the business implications of Internet of Things (IoT), this book describes the sheer impact, spread, and opportunities arising every day, and how business leaders can implement IoT today to realize tangible business advantages. The discussion delves into IoT from a business, strategy and organizational standpoint, and includes use-cases that illustrate the ripple effect that this latest disruption brings; you'll learn how to fashion a viable IoT plan that works with your organization's strategy and direction, and how to implement that strategy successfully by integrating IoT into your organization tomorrow. For business managers, the biggest question surrounding the Internet of Things is what to do with it. This book examines the way IoT is being used today—and will be used in the future—to help you craft a robust plan for your organization. Grasp the depth and breadth of the Internet of Things Create a secure IoT recipe that aligns with your company's strategy Capitalize on advances while avoiding disruption from others Leverage the technical, organizational, and social impact of IoT In the past five years, the Internet of Things has become the new frontier of technology that has everyone talking. It seems that almost every week a major vendor announces a new IoT strategy or division; is your company missing the boat? Learn where IoT fits into your
organization, and how to turn disruption into profit with the expert guidance in Building the Internet of Things.

Internet of Things

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

IoT Inc: How Your Company Can Use the Internet of Things to Win in the Outcome Economy

This is a book about building Arduino-powered devices for everyday use, and then connecting those devices to the Internet. If you're one of the many who have decided to build your own Arduino-powered devices for IoT applications, you've probably wished you could find a single resource--a guidebook for the eager-to-learn Arduino enthusiast--that teaches logically, methodically, and practically how the Arduino works and what you can build with it. Building Arduino Projects for the Internet of Things: Experiments with Real-World Applications is exactly what you need. Written by a software developer and solution architect who got tired of hunting and gathering various lessons for Arduino development as he taught himself all about the topic, this book gives you an incredibly strong foundation of Arduino-based device development, from which you can go in any direction according to your specific development needs and desires. Readers are introduced to the building blocks of IoT, and then deploy those principles to by building a variety of useful projects. Projects in the books gradually introduce the reader to key topics such as internet connectivity with Arduino, common IoT protocols, custom web visualization, and Android apps that receive sensor data on-demand and in realtime. IoT device enthusiasts of all ages will want this book by their side when
Getting Started with the Internet of Things

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. What you’ll learn Discusses the difference between the "normal" Internet and the Internet of Things. Describes a new architecture and its components in the "chirp" context. Explains the shortcomings of IP for IoT. Describes the anatomy of the IoT. Describes how to build a suitable network to maximize the amazing potential of the IoT. Who this book is for Thought leaders, executives, architectural, standards and development leaders in the evolving IoT industry. Corporations and organizations whose commercial products could be adapted simply to be functioning devices on the IOT while saving billions of dollars in unnecessary costs or proprietary designs. Those who wish to capitalize on technology change and those interested in the Internet, its capabilities and the need to improve it. Table of Contents

Foreword
Preface Chapter Goal: The reader will understand the new demands and opportunities of the Internet of Things (IoT). The preface introduces the idea of a new, simplified architectural approach that draws on nature. Chapter 1: It's Different Out Here Chapter Goal: Reader should understand the difference between traditional Internet networking and the Internet of Things. What are the unique characteristics of the IoT that demand a new architecture? Why traditional architectures such as IP are a poor fit. Characteristics of an IoT-optimized architecture. Chapter 2: Anatomy of the Internet of Things Chapter Goal: Reader will understand the underlying principles of the emerging IoT architecture. Fundamental concepts are: the division of networking complexity among different devices; the make-up of the "Chirp" and how they are propagated; distinctions between transport and functional topologies; the concept of neighborhoods or zones of interest. Chapter 3: On the Edge Chapter Goal: Reader will learn the principles and characteristics of the End Devices in the IoT and how these will often differ from our present understanding of the Smartphone, tablet, and laptop. How the minimal networking needs of many IoT devices dictate elements of the architecture. Chapter 4: Building a Web of Things Chapter Goal: Reader will learn the characteristics and functionality of the Propagator node in the IoT Architecture. Some communications principles are introduced which will be more fully explored in Chapter 6. Chapter 5: Small Data, Big Data, and Human Interaction Chapter Goal: Reader will understand the role of Integrator functions in the IoT, the point in the IoT where humans interact to gain information from IoT data and to set parameters and control end devices. An explanation of zones of interest and neighborhoods, with a discussion of incorporating "small data" from chirps into big data analysis. Chapter 6: An Architecture for the Frontier Chapter Goal: Reader will gain an understanding of the challenges inherent in a communications architecture for the massive scale of the IoT. Exploiting the opportunities inherent in a machine-to-machine environment, a much simpler architecture is described in detail that readily scales to the required scope. This chapter adds technical depth to ideas introduced in Chapters 3-5. Chapter 7: IoT Examples and Applications Chapter Goal: Reader will learn about current and emerging applications in the Internet of Things. Reference made to new applications enabled by the simpler architecture described in this book that are difficult or not possible with traditional networking protocols. Chapter 8: Blueprint to the Internet of Things Chapter Goal: Exploring the steps to IoT deployment. Standards based versus ad hoc approaches, call for industry cooperation and consortia. Intermediate incremental steps to broader adoption.

Building the Web of Things

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 EVRYTHNG, 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 EVRYTHNG, 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 Practical Internet of Things with JavaScript Discover how every solution in some way related to the IoT needs a platform and how to create that platform. This book is about being agile and reducing time to market without breaking the bank. It is about designing something that you can scale incrementally without having to do a lot of rework and potentially disrupting your current state of the work. So the key questions are: what does it take, how long does it take, and how much does it take to build your own IoT platform? Build Your Own IoT Platform answers these questions and provides you with step-by-step guidance on how to build your own IoT platform. The author bursts the bubble of IoT platforms and highlights what the core of an IoT platform looks like. There are must-haves and there are nice-to-haves; this book will distinguish the two and focus on how to build the must-haves. Building your own
IoT platform is not only the biggest cost saver, but also can be a satisfying learning experience, giving you control over your project. What You Will Learn Architect an interconnected system Develop a flexible architecture Create a redundant communication platform Prioritize system requirements with a bottom-up approach

Who This Book Is For IoT developers and development teams in small- to medium-sized companies. Basic to intermediate programming skills are required.

The Internet of Things Business Primer

Grab the top spot in your industry by seizing the power of IoT Smart products are everywhere. They’re in our companies, in our homes, in our pockets. People love these products. But what they love more is what these products do—and for anyone running a business today, outcomes are the key. The Internet of Things (IoT) is the point of connection between products and the results they deliver—it’s where products become software. IoT Inc. explains everything you need to know to position your company within this powerful new network. And once you do, you’ll leave the competition in the dust. Founder and president of today’s leading IoT business consulting firm, Bruce Sinclair has been helping companies develop IoT strategies for a decade—far longer than the term has even existed. This essential guide provides an in-depth look into IoT—how it works and how it is transforming business; methods for seeing your own business, customers, and competitors through the lens of IoT, and a deep dive into how to develop and implement a powerful IoT strategy. IoT isn’t a new business trend. It’s the new way of business. Period. The IoT wave is heading for your industry. You can either meet it head-on, and ride it to success, or you can turn your back and let it swamp you. This is your playbook for transforming your company into a major player in the IoT Outcome economy.

Analytics for the Internet of Things (IoT)

This book explains the key feature to develop a complex and stable network that helps to gather the data to optimize the asset performance and maximize the production in the Industries leveraging on the cloud infrastructure and services. By the end, you can design the Industrial IoT network and the architecture for processing its data in the cloud.

Rust for the 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 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 (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.

Building Enterprise IoT Applications

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.

Deploying RFID

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
Implement New Business Models Disrupt Competitors Transform Your Industry

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.

Hands-On Industrial Internet of Things

Connect your organization to the Internet of Things with solid strategy and a proven implementation plan Building Internet of Things provides front-line business decision makers with a practical handbook for capitalizing on this latest transformation. Focusing on the business implications of Internet of Things (IoT), this book describes the sheer impact, spread, and opportunities arising every day, and how business leaders can implement IoT today to realize tangible business advantages. The discussion delves into IoT from a business, strategy and organizational standpoint, and includes use-cases that illustrate the ripple effect that this latest disruption brings; you'll learn how to fashion a viable IoT plan that works with your organization's strategy and direction, and how to implement that strategy successfully by integrating IoT into your organization tomorrow. For business managers, the biggest question surrounding the Internet of Things is what to do with it. This book examines the way IoT is being used today—and will be used in the future—to help you craft a robust plan for your organization. Grasp the depth and breadth of the Internet of Things Create a secure IoT recipe that aligns with your company's strategy Capitalize on advances while avoiding disruption from others Leverage the technical, organizational, and social impact of IoT In the past five years, the Internet of Things has become the new frontier of technology that has everyone talking. It seems that almost every week a major vendor announces a new IoT strategy or division; is your company missing the boat? Learn where IoT fits into your organization, and how to turn disruption into profit with the expert guidance in Building the Internet of Things.

Building the Internet of Things with IPv6 and MIPv6
Unleash the power of the Raspberry Pi 3 board to create interesting IoT projects. Key Features:

- Learn how to interface various sensors and actuators with the Raspberry Pi 3 and send this data to the cloud.
- Explore the possibilities offered by the IoT by using the Raspberry Pi to upload measurements to Google Docs. A practical guide that will help you create a Raspberry Pi robot using IoT modules.

Book Description:

This book is designed to introduce you to IoT and Raspberry Pi 3. It will help you create interesting projects, such as setting up a weather station and measuring temperature and humidity using sensors; it will also show you how to send sensor data to cloud for visualization in real-time. Then we shift our focus to leveraging IoT for accomplishing complex tasks, such as facial recognition using the Raspberry Pi camera module, AWS Rekognition, and the AWS S3 service. Furthermore, you will master security aspects by building a security surveillance system to protect your premises from intruders using Raspberry Pi, a camera, motion sensors, and AWS Cloud. We'll also create a real-world project by building a Wi-Fi - controlled robot car with Raspberry Pi using a motor driver circuit, DC motor, and a web application. This book is a must-have as it provides a practical overview of IoT's existing architectures, communication protocols, and security threats at the software and hardware levels—security being the most important aspect of IoT. What you will learn:

- Understand the concept of IoT and get familiar with the features of Raspberry Pi.
- Learn to integrate sensors and actuators with the Raspberry Pi using communication protocols such as HTTP and MQTT.
- Build DIY projects using Raspberry Pi, JavaScript/node.js and cloud (AWS).
- Explore the best practices to ensure the security of your connected devices.

Who this book is for:

If you're a developer or electronics engineer and are curious about the Internet of Things, then this is the book for you. With only a rudimentary understanding of electronics, the Raspberry Pi, or similar credit-card sized computers, and some programming experience, you will be taught to develop state-of-the-art solutions for the Internet of Things in an instant.