

Bluetooth Low Energy The Developers Handbook 2012 345

*This open access book constitutes the refereed proceedings of the 18th International Conference on String Processing and Information Retrieval, ICOST 2020, held in Hammamet, Tunisia, in June 2020. * The 17 full papers and 23 short papers presented in this volume were carefully reviewed and selected from 49 submissions. They cover topics such as: IoT and AI solutions for e-health; biomedical and health informatics; behavior and activity monitoring; behavior and activity monitoring; and wellbeing technology. * This conference was held virtually due to the COVID-19 pandemic.*

Discover and reshape the limitless possibilities of networking and small-distance communication with BLE!About This Book Build exciting wireless tech projects that make your web or mobile apps smarter in terms of networking and communications* Leverage the best of IoT by combining with BLE in some of the most popular and emerging tech areas such as wearable tech and health monitors* Acquire key skills to harness the power of BLE to enhance security and build more aware apps for Android and iOSWho This Book Is ForThe book is for developers and enthusiasts who are passionate about learning new technologies and want to add BLE features and services to their new or existing products. They should be familiar with programming languages such as Swift, Java, and JavaScript. A knowledge of debugging skills would be an advantage. What you will learn* Implement Bluetooth Low Energy Communication (Central and Peripheral) using Android* Understand BLE Beacons with various examples implemented over EddyStone and Beacons* Build indoor navigation applications using Bluetooth beacons* Implement Internet gateways to control BLE devices on a Wi-Fi network* Understand BLE security mechanisms with a special focus on Bluetooth pairing, bonding, and key exchange to cover encryption, privacy, and user data integrity* Write Android BLE applications from the server and client sides DetailBluetooth Low Energy (BLE) is a wireless personal area network technology aimed at novel applications for smart devices. High-precision BLE information and services are being increasingly used by application developers and hardware enthusiasts to allow devices to interact with the surrounding world.This book will focus on a technical introduction to BLE and how it is reshaping small-distance communication. We will start with IoT, where many technologies such as BLE, Zigbee, and IEEE 802.15.4 Mesh will be introduced. You will get to know BLE from an engineering perspective where the protocol stack, architecture, and layers are discussed in detail. Further, the book explains the various cryptographic techniques and security models used by BLE. In the later part of the book, you will learn to implement BLE on Android and iOS. Finally, you will learn about the future of IoT and which technologies will be the center of attention going forward.*

This book provides an introduction to Bluetooth programming, with a specific focus on developing real code. The authors discuss the major concepts and techniques involved in Bluetooth programming, with special emphasis on how they relate to other networking technologies. They provide specific descriptions and examples for creating applications in a number of programming languages and environments including Python, C, Java, GNU/Linux, Windows XP, Symbian Series 60, and Mac OS X. No previous experience with Bluetooth is assumed, and the material is suitable for anyone with some programming background. The authors place special emphasis on the essential concepts and techniques of Bluetooth programming, starting simply and allowing the reader to quickly master the basic concepts before addressing advanced features.

Explore how Bluetooth Low Energy (LE) has transformed the audio landscape, from music streaming to voice recognition applications. This book describes the rationale behind moving to LE audio, the potential power savings, and how various specifications need to be linked together to develop a final end product. LE Audio is a natural development of the Bluetooth audio standard. The standard is spread across more than 40 different specifications, from application profiles, down to the core protocols and Controller part. You'll see how this new architecture of the Bluetooth audio stack defines a LE Audio stack from the Core Controller to the Host Protocols, and Profiles. You'll also learn how to free yourself from wires and charging. LE Audio introduces a new audio compression code called LC3 (Low Complexity Communication Codec), which covers sampling rates for the full range of voice and media application at high fidelity, low complexity and low bit-rate and is ideal for new applications – such as voice assistance and gaming. Unraveling Bluetooth Low Energy Audio provides full context to anyone who is curious to learn about the new LE Audio technology. What You'll Learn Understand the advantages of LE audio over current standards Describe the overall Bluetooth LE audio stack and its various blocks Enable LE audio with the Core Controller specification See how an end-to-end application works its through the LE audio ecosystem Examine how LE Audio addresses current and future trends in interoperable wireless audio Who This Book Is For The target audience for this book are developers, manufacturers, students, lecturers, teachers, technology geeks, platform integrators, and entrepreneurs.

This book is for those who want to learn how to build exciting Arduino projects by interfacing it with Android. You will need to have some basic experience in electronics and programming. However, you don't need to have any previous experience with the Arduino or Android platforms.

Inside Bluetooth Low Energy

18th International Conference, ICOST 2020, Hammamet, Tunisia, June 24-26, 2020, Proceedings

Securing Social Identity in Mobile Platforms

The Impact of Digital Technologies on Public Health in Developed and Developing Countries

Bluetooth Low Energy in iOS Swift

Make Bluetooth

Learn the key standards—iBeacon, Eddystone, Bluetooth 4.0, and AllBeacon—and how they work with other proximity technologies. Then build your understanding of the proximity framework and how to identify and deploy the best solutions for your own business, institutional, or consulting needs. Proximity technology—in particular, Bluetooth beacons—is a major source of business opportunity, and this book provides everything you need to know to architect a solution to capitalize on that opportunity. What You'll Learn Understand the disruptive implications of digital-physical convergence and the new applications it makes possible Review the key standards that solutions developers need to understand to capitalize on the business opportunity of proximity technology Discover the new phenomenon of beacon networks, which will be hugely significant in driving strategic decisions and creating wealth See other technologies in the proximity ecosystem catalyzed by and complementary to Bluetooth beacons, including visual light communication, magnetic resonance, and RFID Examine the Beecosystem framework for analyzing the proximity ecosystem Who This Book Is For Solutions architects of all types—venture capitalists, founders, CEOs, strategists, product managers, CTOs, business developers, and programmers Stephen Stalter is a writer, public speaker, and consultant working in the beacon ecosystem. He trains and advises retailers, venue owners, VCs, as well as makers of beacon software and hardware, and is a thought leader in the beecosystem community. Previously he was the Senior Director for Strategy and Solutions Management at Qualcomm's Retail Solutions Division, helping to incubate Google, one of the leading Bluetooth beacon players in the market. He is also the CEO of the beacon industry, creators of Google, democratizing philanthropy, enabling non-profit supporters to donate the change from charity branded debit cards, and developer of The Good Traveler program. Contributors: Anke Audenaert, CEO, Favrit John Coomb, CEO, Rover Labs Therapeutics, Mary Gordon, Co-Founder, tapCoconnect Phil Hendrix, Director, immr Kris Kolodziej, President, IndoorLS Patrick Leddy, CEO, Pulsate Ben Parker, VP Business Development, AccelerateIT Mario Proietti, CEO, Location Smart Ray Rotolo, SVP OOH, Gimbal Kjartan Slette, COO, Unacast Jarmo Vanto, Partner, Borenius Attorneys LLP David Young, Chief Engineer, Radius Networks Foreword by Asif Khan, President LBMA

This document provides info. to organizations on the security capabilities of Bluetooth and provide recommendations to organizations employing Bluetooth technologies on securing them effectively. It discusses Bluetooth technologies and security capabilities in technical detail. This document assumes that the readers have at least some operating system, wireless networking, and security knowledge. Because of the constantly changing nature of the wireless security industry and the threats and vulnerabilities to the technologies, readers are strongly encouraged to take advantage of other resources (including those listed in this document) for more current and detailed information.

ZigBee is a standard based on the IEEE 802.15.4 standard for wireless personal networks. This standard allows for the creation of very lost cost and low power networks - these applications run for years rather than months. These networks are created from sensors and actuators and can wireless control many electrical products such as remote controls, medical, industrial, and security sensors. Hundreds of companies are creating applications including Mitsubishi, Motorola, Freescale, and Siemens. This book is written for engineers who plan to develop ZigBee applications and networks, to understand how they work, and to evaluate this technology to see if it is appropriate to a particular project. This book does not simply state facts but explains what ZigBee can do through detailed code examples. *Details how to plan and develop applications and networks *ZigBee sensors have many applications including industrial automation, medical sensing, remote controls, and security *Hot topic for today's electrical engineer because it is low cost and low power

* Bluetooth (enable devices) will ship in the billions of units once it gains momentum. " - Martin Reynolds, Gartner Group Bluetooth is the most exciting development in wireless computing this decade! Bluetooth enabled devices can include everything from network servers, laptop computers and PDAs, to stereos and home security systems. Most Bluetooth products to hit the market in 2001 will be PC cards for laptop computers and access points, which allow up to seven Bluetooth devices to connect to a network. Reports indicate that by the end of 2003 there will be over 2 billion Bluetooth-enabled devices. Bluetooth-enabled devices communicate with each other through embedded software applications. Bluetooth Developer's Guide to Embedded Applications will provide embedded applications developers with advanced tutorials and code listings written to the latest Bluetooth 1.2b specification, version 1.1. Written by Bluetooth pioneers from market leaders in Bluetooth software development, Extended Systems and Cambridge Silicon Radio, this is the first advanced level Bluetooth developer title on the market. White Hot Topic While other books introduce readers to the possibilities of Bluetooth, this is the first comprehensive, advanced level programming book written specifically for embedded application developers Authors are responsible for SDK, the market-leading development tool for Bluetooth Comes with Syngress' revolutionary Credit Card CD containing a printable HTML version of the book, all of the source code and sample applications from Extended Systems and Cambridge Silicon Radio

This book introduces a new approach to embedded development, grounded in modern, industry-standard JavaScript. Using the same language that powers web browsers and Node.js, the Moddable SDK empowers IoT developers to apply many of the same tools and techniques used to build sophisticated websites and mobile apps. The Moddable SDK enables you to unlock the full potential of inexpensive microcontrollers like the ESP32 and ESP8266. Coding for these microcontrollers in C or C++ with the ESP-IDF and Arduino SDKs works for building basic products but doesn't scale to handle the increasingly complex IoT products that customers expect. The Moddable SDK adds the lightweight XS JavaScript engine to those traditional environments, accelerating development with JavaScript while keeping the performance benefits of a native SDK. Building user interfaces and communicating over the network are two areas where JavaScript really shines. IoT Development for ESP32 and ESP8266 with JavaScript shows you how to build responsive touch screen user interfaces using the Piu framework. You'll learn how easy it is to securely send and receive JSON data over Wi-Fi with elegant JavaScript APIs for common IoT protocols, including HTTP/HTTPS, WebSocket, MQTT, and mDNS. You'll also learn how to integrate common sensors and actuators. Bluetooth Low Energy (BLE), file systems, and more into your projects, and you'll see firsthand how JavaScript makes it easier to combine these diverse technologies. If you're an embedded C or C++ developer who has never worked in JavaScript, don't worry. This book includes an introduction to the JavaScript language just for embedded developers experienced with C or C++ who are looking to install and debug JavaScript projects on the ESP32 and ESP8266 Using modern JavaScript for all aspects of embedded development with the Moddable SDK Developing IoT products with animated user interfaces, touch input, networking, BLE sensors, actuators, and more Who This Book Is For Professional embedded developers who want the speed, flexibility, and power of web development in their embedded software work Makers who want a faster, easier way to build their hobby projects Web developers working in JavaScript who want to extend their skills to hardware products

Select Proceedings of ICAECT 2020

Selected Proceedings of IEEE'S 17

With Examples in Node.js and Raspberry Pi

Essentials of Short-Range Wireless

Design, Protocol and Specifications for BLE - Bluetooth Low Energy 4.0 and Bluetooth 5

IoT Development for ESP32 and ESP8266 with JavaScript

Use the power of BLE to create exciting IoT applicationsAbout This Book* Build hands-on IoT projects using Bluetooth Low Energy and learn about Bluetooth 5 and its features.* Build a health tracking system, and indoor navigation and warehouse weather monitoring projects using smart devices.* Build on a theoretical foundation and create a practice-based underp

Book Is For If you're an application developer, a hardware enthusiast, or just curious about the Internet of Things and how to convert it into hands-on projects, then this book is for you. Having some knowledge of writing mobile applications will be advantageous.What You Will Learn* Learn about the architecture and IoT uses of BLE, and in which domains it is being used across various development platforms (Android, iOS, Firebase, Raspberry Pi, Beacons, and GitHub)* Create an Explorer App (Android/iOS) to diagnose a Fitness Tracker* Design a Beacon with the Raspberry Pi and write an app to detect the Beacon* Write a mobile app to periodically poll the BLE tracking sensor* Compose an app to read data periodically from temperature and humidity sensors* Build an IoT Design projects for both Android and iOS mobile platforms In Detail Bluetooth Low Energy, or Bluetooth Smart, is Wireless Personal Area networking aimed at smart devices and IoT applications. BLE has been increasingly adopted by application developers and IoT enthusiasts to establish connections between smart devices. This book initiates BLE, before you start working on IoT projects. In the initial stages of the book, you will learn about the basic aspects of Bluetooth Low Energy—such as discovering devices, services, and characteristics—that will be helpful for advanced-level projects. This book will guide you through building hands-on projects using BLE and IoT. These projects include tracking health data available for health practitioners: Indoor navigation: creating beacons using the Raspberry Pi; and warehouse weather Monitoring. This book also covers aspects of Bluetooth 5 (the latest release) and its effect on each of these projects.By the end of this book, you will have hands-on experience of using Bluetooth Low Energy to integrate with smart devices and IoT. This guide that will help you promote yourself into an expert by building and exploring practical applications of Bluetooth Low Energy.

The First Practical Guide to Advanced Wireless Development with ZigBee Technologies Supported by more than a hundred companies, the new ZigBee standard enables powerful new wireless applications for safety, security, and control, ranging from smart energy to home automation and medical care to advanced remote control. ZigBee Wireless Sensor and Control professionals need to start building effective ZigBee solutions. The only simple, concise guide to ZigBee architecture, concepts, networking, and applications, this book thoroughly explains the entire ZigBee protocol stack and covers issues ranging from routing to security. It also presents detailed, practical coverage of ZigBee features for home automation, smart energy, and more.

Topics include • Fundamental wireless concepts: OSI Model, error detection, the ISM Band, modulation, WLAN, FHSS, DSSS, Wireless MANs, Bluetooth, and more • ZigBee essentials: applications, characteristics, device types, topologies, protocol architecture, and expanded ZigBee PRO features • Physical layer: includes frequency bands, data rate, channels, data/messaging, receiver sensitivity • MAC layer: data/management services, MAC layer information base, access methods, and frames • Network layer: data entities, NBIS, device configuration, starting network, addressing, discovery, channel scanning, and more • Application support sublayer and application layer: includes profiles, cluster format, attributes, device discovery, and binding

With this book, you'll learn how to use ZigBee for security management, address assignment and routing techniques • Alternative technologies: GLoPan, WirelessHART, and Z-wave This volume of Advances in Intelligent Systems and Computing highlights papers presented at the 12th International Conference on Genetic and Evolutionary Computing (ICEC 2018). Held from 14 to 17 December 2018 in Changzhou, Jiangsu, China, the conference was co-sponsored by Springer, Changzhou College of Information Technology, Fujian Provincial Key Laboratory of Intelligent Information Processing, Fujian University of Technology, National University of Kaohsiung, and Shandong University of Science and Technology, China. The conference is intended as an international forum for the researchers and professors in the field of evolutionary computing.

Use the power of BLE to create exciting IoT applications About This Book Build hands-on IoT projects using Bluetooth Low Energy and learn about Bluetooth 5 and its features. Build a health tracking system, and indoor navigation and warehouse weather monitoring projects using smart devices. Build on a theoretical foundation and create a practice-based underp

Book Is For If you're an application developer, a hardware enthusiast, or just curious about the Internet of Things and how to convert it into hands-on projects, then this book is for you. Having some knowledge of writing mobile applications will be advantageous. What You Will Learn Learn about the architecture and IoT uses of BLE, and in which domains it is being used across various development platforms (Android, iOS, Firebase, Raspberry Pi, Beacons, and GitHub)* Create an Explorer App (Android/iOS) to diagnose a Fitness Tracker* Design a Beacon with the Raspberry Pi and write an app to detect the Beacon* Write a mobile app to periodically poll the BLE tracking sensor* Compose an app to read data periodically from temperature and humidity sensors* Build an IoT Design projects for both Android and iOS mobile platforms In Detail Bluetooth Low Energy, or Bluetooth Smart, is Wireless Personal Area networking aimed at smart devices and IoT applications. BLE has been increasingly adopted by application developers and IoT enthusiasts to establish connections between smart devices. This book initiates BLE, before you start working on IoT projects. In the initial stages of the book, you will learn about the basic aspects of Bluetooth Low Energy—such as discovering devices, services, and characteristics—that will be helpful for advanced-level projects. This book will guide you through building hands-on projects using BLE and IoT. These projects include tracking health data available for health practitioners: Indoor navigation: creating beacons using the Raspberry Pi; and warehouse weather Monitoring. This book also covers aspects of Bluetooth 5 (the latest release) and its effect on each of these projects. By the end of this book, you will have hands-on experience of using Bluetooth Low Energy to integrate with smart devices and IoT. This guide that will help you promote yourself into an expert by building and exploring practical applications of Bluetooth Low Energy.

The First Complete Guide to Bluetooth Low Energy: How It Works, What It Can Do, and How to Apply It A radical departure from conventional Bluetooth technology, Bluetooth low energy (BLE) enables breakthrough wireless applications in industries ranging from healthcare to transportation. Running on a coin-sized battery, BLE can operate reliably for years, connect to a wide range of devices, and use less power than traditional Bluetooth. This book provides a comprehensive, accessible introduction to BLE for every system developer, designer, and engineer. Robin Heydon, a member of the Bluetooth SIG Hall of Fame, has brought together essential information previously scattered through multiple books and articles. This book includes expert insights needed to implement high-performance working systems. He first reviews BLE's design goals, explaining how they drove key architectural decisions, and introduces BLE's innovative usage models. Next, he thoroughly covers how the two main parts of BLE, the controller and host, work together, and then addresses key issues from security and privacy to power management. This book also includes practical knowledge has enabled the creation of Bluetooth Smart and Bluetooth Smart Ready devices. This guide is an indispensable companion to the official BLE standards documents and is for every technical professional and decision-maker considering BLE, planning BLE products, or transforming plans into working systems. Topics include BLE device types, design goals, and practical applications. Architecture: controller, host, applications, and stack splits Usage models: presence detection, data broadcasting, connectionless models, and gateways Physical Layer: modulation, frequency band, radio channels, power, tolerance, and range Direct Test Mode: transceiver testing, hardware interfaces, and HCI Link Layer: state machine, packets, channels, broadcasting, physical/logical interfaces, controller setup, and connection management L2CAP: channels and packet structure, and LE signaling channels Attributes: grouping, services, characteristics, and protocols Security: pairing, bonding, and data signing Generic Access Profiles: roles, modes, procedures, security modes, data advertising, and services Applications, devices, services, and use cases

Testing/qualification: starting projects, selecting features, planning, testing, compliance, and more Beacon Technologies The Handbook of Personal Area Networking Technologies and Protocols The Hitchhiker's Guide to the Bluetooth System Computational Intelligence, Communications, and Business Analytics Web, Artificial Intelligence and Network Applications The Developer's Handbook With Bluetooth Low Energy (BLE), smart devices are about to become even smarter. This practical guide demonstrates how this exciting wireless technology helps developers build mobile apps that share data with external hardware, and how hardware engineers can gain easy and reliable access to mobile operating systems. This book provides a solid, high-level overview of how devices use BLE to communicate with each other. You'll learn useful low-cost tools for developing and testing BLE-enabled mobile apps and embedded firmware and get examples using various development platformsincluding iOS and Android for app developers and embedded platforms for product designers and hardware engineers. Understand how data is organized and transferred by BLE devices Explore BLE's concepts, key limitations, and network topology Dig into the protocol stack to grasp how and why BLE operates Learn how BLE devices discover each other and establish secure connections Set up the tools and infrastructure for BLE application development Get examples for connecting BLE to iPhones, iPads, Android devices, and sensors Develop code for a simple device that transmits heart rate data to a mobile device

This book comprises select proceedings of the International Conference on Advances in Electrical and Computer Technologies 2020 (ICAECT 2020). The papers presented in this book are peer-reviewed and cover latest research in electrical, electronics, communication and computer engineering. Topics covered include smart grids, soft computing techniques in power systems, smart energy and smart systems, power systems, renewable energy, grid control systems, biomedical engineering, gas turbine systems, image and signal processing, computer vision, pattern recognition, cloud computing, pervasive computing, intelligent systems, artificial intelligence, neural network and fuzzy logic, broad band communication, mobile and optical communication, network security, VLSI, embedded systems, optical networks and wireless communication. The volume can be useful for students and researchers working in the different overlapping areas of electrical, electronics and communication engineering. This book is a practical guide to programming Bluetooth Low Energy for Arduino 101. In this book, you will learn the basics of how to program an Arduino 101 to communicate with any Central or Peripheral device over Bluetooth Low Energy. Each chapter of the book builds on the previous one, culminating in three projects: - A Beacon and Scanner - An Echo Server and Client - A Remote Controlled Device Through the course of the book you will learn important concepts that relate to: - How Bluetooth Low Energy works - How data is sent and received - Common paradigms for handling data This book is excellent for anyone who has basic or advanced knowledge of Arduino programming or C++.

With Bluetooth Low Energy (BLE), smart devices are about to become even smarter. This practical guide demonstrates how this exciting wireless technology helps developers build mobile apps that share data with external hardware, and how hardware engineers can gain easy and reliable access to mobile operating systems. This book provides a solid, high-level overview of how devices use BLE to communicate with each other. You'll(2019) learn useful low-cost tools for developing and testing BLE-enabled mobile apps and embedded firmware and get examples using various development platforms(2014)including iOS and Android for app developers and embedded platforms for product designers and hardware engineers. Understand how data is organized and transferred by BLE devices Explore BLE(2019) concepts, key limitations, and network topology Dig into the protocol stack to grasp how and why BLE operates Learn how BLE devices discover each other and establish secure connections Set up the tools and infrastructure for BLE application development Get examples for connecting BLE to iPhones, iPads, Android devices, and sensors Develop code for a simple device that transmits heart rate data to a mobile device.

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 Internet of Things. 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 protocol 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 (USON-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 Václav Trnka pioneered the Web of Things and cofounded EVERYTHING, 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! World 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

13th EAI International Conference on Body Area Networks

Digital Cities

The Easiest Way to Learn BLE

Taking you to the limit in Concurrency, OOP, and the most advanced capabilities of C

IoT Projects with Bluetooth Low Energy

Bluetooth Low Energy in Android Java

Bluetooth Low Energy (BLE) is an exciting new technology that was introduced in 2010. It targets applications in the Internet of Things (IoT) space. With the recent release of Bluetooth 5 in late 2016 and Bluetooth mesh in mid-2017 (which builds on top of BLE), Bluetooth is now more capable than ever of becoming the standard wireless protocol used in many IoT applications including: smart homes, smart cities, medical devices, wearables, and sensor connectivity. Learning a new technology is always challenging and usually comes with a learning curve. Some technologies are easier to learn than others. Unfortunately, Bluetooth Low Energy (BLE) can be one of those hard ones. The lack of good resources including blogs, tutorials, and up-to-date books that help a beginner to learn BLE, makes the task even more difficult. That is, in fact, the primary goal of this book: to provide you with a complete understanding of the basics and core concepts of BLE that you can learn in a single weekend. Here's a tiny list of the benefits this book will help you achieve: Understand what Bluetooth Low Energy is and how it compares to Bluetooth Classic. Become better informed about the use cases where BLE makes the most sense. Learn all about Bluetooth 5 and the new features it brought us. Understand how two BLE devices discover and connect with each other. Understand how BLE devices exchange and transfer data between each other. Fully grasp concepts such as Peripherals, Centrals, Advertising, Connections, GATT, GAP, and many others. Learn about the newly released Bluetooth mesh standard. This book is a must-read for anyone who is interested in BLE. I am an iOS developer and your material helped me understand some of the finer points of BLE - Alex Carrizo, Senior iOS Developer, iOS SME at Mobile Apps Company Topics include: The basics of Bluetooth energy & Bluetooth 5.0. The difference between BLE and Bluetooth Classic (the one used for streaming audio and connecting headsets). The benefits and limitations of using BLE and which use cases make the most sense for BLE. The difference between a BLE Central and a BLE Peripheral. All about GATT (Generic Attribute Profile) and GAP (Generic Access Profile). How Bluetooth 5 achieves double the speed, four times the range, and eight times the advertising capacity - How BLE devices advertise and discover each other. How two BLE devices connect to each other. Profiles, Services, and Characteristics. How secure BLE is, and how BLE devices secure the communication channel between them. The different connection and advertising parameters and what each of them means. An introduction to Bluetooth mesh. About the Author Mohammad Afaneh has been an embedded engineer for over 10 years. Since 2014, he has focused solely on learning and developing Bluetooth Low Energy applications. He even spent days and weeks reading through the 2,800+ page Bluetooth specification document looking for answers to questions he couldn't find answers to in other books and resources. He shares everything he knows about development for BLE technology at his website www.btlearning.com by training classes around the world.

On the way towards the information society, global networks such as the Internet, together with mobile computing, have made wide-area computing over virtual communities a reality. Digital city projects, with the goal of building platforms to support community networking, are going on worldwide. This is the first book devoted to digital cities. It is based on an international symposium held in Kyoto, Japan, in September 1999. The 34 revised full papers presented were carefully selected for inclusion in the book; they reflect the state of the art in this exciting new field of interdisciplinary research and development. The book is divided into parts on design and analysis, digital city experiments, community network experiments, applications, visualization technologies, mobile technologies, and social interaction and communityware.

The two volume set CCIS 1030 and 1031 constitutes the refereed proceedings of the Second International Conference on Computational Intelligence, Communications, and Business Analytics, CICBA 2018, held in Kalyani, India, in July 2018. The 76 revised full papers presented in the two volumes were carefully reviewed and selected from 240 submissions. The papers are organized in topical sections on computational intelligence: signal processing and communications; microelectronics, sensors, and intelligent networks; data science & advanced data analytics; intelligent data mining & data warehousing; and computational forensics (privacy and security).

About the Authors C Bala Kumar is a Distinguished Member of the Technical Staff at Motorola. He chaired the industry expert group that defined the Java APIs for Bluetooth wireless technology. He currently leads the systems software team for wireless platforms in Motorola's Semiconductor Products Sector. Paul J. Kline is a Distinguished Member of the Technical Staff at Motorola and the maintenance lead for the JAWBT specification. He currently works on the System Software Architecture team in Motorola's Semiconductor Products Sector. Timothy J. Thompson is a Senior Software Engineer on the System Software Architecture team in Motorola's Semiconductor Products Sector. He was the OBEX architect on the JAWBT specification team at Motorola.

This book addresses topics related to the Internet of Things (IoT), machine learning, cyber-physical systems, cloud computing, and autonomous vehicles in Industry 4.0. It investigates challenges across multiple sectors and industries and considers Industry 4.0 for operations research and supply chain management. Cyber-Physical, IoT, and Autonomous Systems in Industry 4.0 encourages readers to develop novel theories and enrich their knowledge to foster sustainability. It examines the recent research trends and the future of cyber-physical systems, IoT, and autonomous systems as they relate to Industry 4.0. This book is intended for undergraduates, postgraduates, academics, researchers, and industry individuals to explore new ideas, techniques, and tools related to Industry 4.0.

Bluetooth LE Projects with Arduino, Raspberry Pi, and Smartphones

A Practical Guide to XS and the Moddable SDK

Extreme C

Bluetooth Low Energy in C++ with nRF Microcontrollers

Developing IoT Projects with ESP32

Cyber-Physical, IoT, and Autonomous Systems in Industry 4.0

Bluetooth Low Energy (LE) is one of the latest enhancements to Bluetooth technology and, as the name suggests, it is aimed at ultra low power devices, such as heart rate monitors, thermometers, and laboratory sensors. Due to very low power consumption, devices compliant with this standard can operate for months or even years on coin cell batteries without the need for recharging. This cutting-edge book helps you understand the whats, whys, and hows of Bluetooth LE. It includes a broad view of the technology, identifies the various building blocks and explains how they come together. The book explains the architecture of Bluetooth LE stack and the functionality provided by each of the layers. You find expert guidance in setting up your own system in a quick and efficient manner with inexpensive, easily available hardware and just a couple of PCs running Linux. Additionally, this practical volume features exercises and sample programs to help you get a first-hand feel for how the technology works.

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.

This book is a practical guide to programming Bluetooth Low Energy for nRFx Bluetooth-enabled programmable microcontrollers. In this book, you will learn the basics of how to program an nRF microcontroller to communicate with any Central device over Bluetooth Low Energy. Each chapter of the book builds on the previous one, culminating in three projects: - An iBeacon - An Echo Server - A Remote Controlled Device Through the course of the book you will learn important concepts that relate to: - How Bluetooth Low Energy works - How data is sent and received - Common paradigms for handling data Skill Level This book is excellent for anyone who has basic or advanced knowledge of nRFx, microcontroller programming, or C++.

Discover and implement a system of your choice using Bluetooth Low Energy. About This Book Learn the basics of Bluetooth Low Energy with its exciting new protocol stack and security. Build customized Bluetooth Low Energy projects that make your web or mobile apps smarter in terms of networking and communications. Using Android, iOS, and the Web, acquire key skills to harness the power of Bluetooth Low Energy in your IoT applications. Who This Book Is For The book is for developers and enthusiasts who are passionate about learning Bluetooth Low Energy technologies and want to add new features and services to their new or existing products. They should be familiar with programming languages such as Swift, Java, and JavaScript. Knowledge of debugging skills would be an advantage. What You Will Learn Bluetooth Low Energy in theory. Bluetooth Low Energy Hardware and Software Development Kits. Implement Bluetooth low energy communication (central and peripheral) using Android. Master BLE Beacons with examples implemented over Eddystone and Beacons.

Implement indoor navigation using Estimote Beacons on iOS. Implement Internet gateways to control BLE devices on a Wi-Fi network. Understand BLE security mechanisms with a special focus on Bluetooth pairing, bonding, and key exchange to cover encryption, privacy, and user data integrity. Implement Bluetooth Mesh using CSRMesh Technology. In Detail Bluetooth Low Energy (BLE) is a Wireless Personal Area network technology aimed at novel applications for smart devices. High-tech BLE profiles and services are being increasingly used by application developers and hardware enthusiasts to allow devices to interact with the surrounding world. This book will focus on a technical introduction to BLE and how it is reshaping small-distance communication. We will start with IoT, where many technologies such as BLE, Zigbee, and IEEE 802.15.4 Mesh will be introduced. The book will present BLE from an engineering perspective, from which the protocol stack, architecture, and layers are discussed. You will learn to implement customized projects for Peripheral/Central communication, BLE Beacons, indoor navigation using triangulation, and the Internet gateway for Bluetooth, all using various code samples and APIs on Android, iOS, and the Web. Finally, the book will conclude with a glimpse into future technologies destined to be prominent in years to come. Style and approach The book is a practical tutorial that will help you understand the background and technicalities of BLE and offers a friendly environment to build and create robust BLE projects. This hands-on approach will give you a clear vision of Bluetooth Low Energy and how it can be used in IoT.

This definitive handbook demystifies personal-area networking technologies and protocols and explores their application potential in a unique real-world context.

Intelligent and Efficient Electrical Systems

Technologies, Experiences, and Future Perspectives

Stretching the Limits of Interoperable Wireless Audio with Bluetooth Next-Generation Low Energy Audio Standards

Technologies for Security, Privacy and Identity Management

Bluetooth Low Energy in Arduino 101

Recommendations of the National Institute of Standards and Technology

The book presents novel research in the areas of social identity and security when using mobile platforms. The topics cover a broad range of applications related to securing social identity as well as the latest advances in the field, including the presentation of novel research methods that are in the service of all citizens using mobile devices. More specifically, academic, industry-related and government (law enforcement, intelligence and defence) organizations, will benefit from the research topics of this book that cover the concept of identity management and security using mobile platforms from various perspectives, i.e. whether a user navigates to social media, accesses their own phone devices, access their bank accounts, uses online shopping services, accesses their personal documents or accounts with valuable information, surfs the internet, or even becomes a victim of cyberattacks. In all of the aforementioned cases, there is a need for mobile related technologies that protect the users' social identity and well-being in the digital world, including the use of biometrics, cybersecurity software and tools, active authentication and identity anti-spoofing algorithms and more.

The aim of the book is to provide latest research findings, innovative research results, methods and development techniques from both theoretical and practical perspectives related to the emerging areas of Web Computing, Intelligent Systems and Internet Computing. As the Web has become a major source of information, techniques and methodologies that extract quality information are of paramount importance for any Web and Internet applications. Data mining and knowledge discovery play key roles in many of today's prominent Web applications such as e-commerce and computer security. Moreover, the outcome of Web Services delivers a new platform for enabling service-oriented systems. The emergence of large scale distributed computing paradigms, such as Cloud Computing and Mobile Computing Systems, has opened many opportunities for collaboration services, which are at the core of any information System. Artificial Intelligence (AI) is an area of computer science that build intelligent systems and algorithms that work and react like humans. The AI techniques and computational intelligence are powerful tools for learning, adaptation, reasoning and planning. They have the potential to become enabling technologies for the future intelligent networks. Recent research in the field of intelligent systems, robotics, neuroscience, artificial intelligence and cognitive sciences are very important for the future development and innovation of Web and Internet applications.

The papers in this proceeding discuss current and future trends in wearable communications and personal health management through the use of wireless body area networks (WBAN). The authors post new technologies that can provide trustworthy communications mechanisms from the user to medical health databases. The authors discuss not only on-body devices, but also technologies providing the demand for mobile and wireless access to LANs, Internet over mobile and other existing networks, where the backbone is wired but the interface is free to move. This not only makes the network easier to use but also extends its reach. What is inside Overview on Wireless Technologies, Usage Scenarios and related Taxonomy Bluetooth Architecture: Protocol Stack, Baseband, Link

Manager Protocol, Logical Link Control and Adaptation, Service Discovery, Cable Replacement, Telephony Bluetooth Adapted Protocols: PPP, TCP/UDP/IP, OBEX, Content Formats, WAP Bluetooth Usage Models: File Transfer, Synchronization, Three-in-One Phone, Ultimate Headset Bluetooth Specifications: Bluetooth 1.0 and 1.0B, Bluetooth 1.1, Bluetooth 1.2, Bluetooth 2.0 + EDR, Bluetooth 2.1 + EDR, Bluetooth 2.0 + HS, Bluetooth 4.0 + LE (Bluetooth Low Energy), Bluetooth 4.1, Bluetooth 4.2, Bluetooth 5 Bluetooth Connection Establishment, Bluetooth Security Zigbee: Architecture, Zigbee Device Types, Zigbee Network Model

Getting Started with Bluetooth Low Energy

Tools and Techniques for Low-Power Networking

Bluetooth Tutorial

Proceedings of the Workshops of the 33rd International Conference on Advanced Information Networking and Applications (WAINA-2019)

Unraveling Bluetooth LE Audio

This book is where your adventures with Bluetooth LE begin. You'll start your journey by getting familiar with your hardware options: Arduino, BLE modules, computers (including Raspberry Pi), and mobile phones. From there, you'll write code and wire circuits to connect off-the-shelf sensors, and even go all the way to writing your own Bluetooth Services. Along the way you'll look at lightbulbs, locks, and Apple's iBeacon technology, as well as get an understanding of Bluetooth security-- both how to beat other people's security, and how to make your hardware secure.

For engineers, product designers, and technical marketers who need to design a cost-effective, easy-to-use, short-range wireless product that works, this practical guide is a must-have. It explains and compares the major wireless standards - Bluetooth, Wi-Fi, 802.11abgn, ZigBee, and 802.15.4 - enabling you to choose the best standard for your product. Packed with practical insights based on the author's 10 years of design experience, and highlighting pitfalls and trade-offs in performance and cost, this book will ensure you get the most out of your chosen standard by teaching you how to tailor it for your specific implementation. With information on intellectual property rights and licensing, production test, and regulatory approvals, as well as analysis of the market for wireless products, this resource truly provides everything you need to design and implement a successful short-range wireless product.

Bluetooth Low EnergyThe Developer's HandbookPrentice Hall

This book presents selected papers from International Conference on Intelligent and Efficient Electrical Systems (ICIEES'17). The volume brings together content from both industry and academia. The book focuses on energy efficiency in electrical systems and covers en trendy topics such as control of renewable energy systems. The collaborative industry-academia perspective of the conference ensures that equal emphasis is laid on novel topics and practical applications. The contents of this volume will prove useful to researchers and practicing engineers alike.

This book is a practical guide to programming Bluetooth Low Energy in iPhones and iPads. In this book, you will learn the basics of how to program an iOS device to communicate with any Central or Peripheral device over Bluetooth Low Energy. Each chapter of the book builds on the previous one, culminating in three projects: - A Beacon and Scanner - A Echo Server and Client - A Remote Controlled Device Through the course of the book you will learn important concepts that relate to: - How Bluetooth Low Energy works - How data is sent and received - Common paradigms for handling data This book is excellent for anyone who has basic or advanced knowledge of iOS programming in SWIFT.

Intro to Bluetooth Low Energy

Building the Web of Things

Arduino Android Blueprints

Bluetooth Application Developer's Guide

Building Bluetooth Low Energy Systems

Bluetooth Essentials for Programmers

This book is a practical guide to programming Bluetooth Low Energy for Android phones and Tablets In this book, you will learn the basics of how to program an Android device to communicate with any Central or Peripheral device over Bluetooth Low Energy. Each chapter of the book builds on the previous one, culminating in three projects: - A Beacon and Scanner - An Echo Server and Client - A Remote Controlled Device Through the course of the book you will learn important concepts that relate to: - How Bluetooth Low Energy works - How data is sent and received - Common paradigms for handling data Skill Level This book is excellent for anyone who has basic or advanced knowledge of Java programming on Android.

Building Bluetooth Low Energy (BLE) Systems

Bluetooth Application Programming with the Java APIs

Genetic and Evolutionary Computing

Advances in Electrical and Computer Technologies

Automate your home or business with inexpensive Wi-Fi devices

Second International Conference, CICBA 2018, Kalyani, India, July 27-28, 2018, Revised Selected Papers, Part I