

Arduino Networking

Build your own distributed sensor network to collect, analyze, and visualize real-time data about our human environment—including noise level, temperature, and people flow. With this hands-on book, you'll learn how to turn your project idea into working hardware, using the easy-to-learn Arduino microcontroller and off-the-shelf sensors. Authors Alasdair Allan and Kipp Bradford walk you through the entire process, from prototyping a simple sensor node to performing real-time analysis on data captured by a deployed multi-sensor network. Demonstrated at recent O'Reilly Strata Conferences, the future of distributed data is already here. If you have programming experience, you can get started immediately. Wire up a circuit on a breadboard, and use the Arduino to read values from a sensor Add a microphone and infrared motion detector to your circuit Move from breadboard to prototype with Fritzing, a program that converts your circuit design into a graphical representation Simplify your design: learn use cases and limitations for using Arduino pins for power and grounding Build wireless networks with XBee radios and request data from multiple sensor platforms Visualize data from your sensor network with Processing or LabVIEW

So, you've created a few projects with Arduino, and now it's time to kick it up a notch. Where do you go next? With Pro Arduino, you'll learn about new tools, techniques, and frameworks to make even more ground-breaking, eye-popping projects. You'll discover how to make Arduino-based gadgets and robots interact with your mobile phone. You'll learn all about the changes in Arduino 1.0, you'll create amazing output with openFrameworks, and you'll learn how to make games with the Gameduino. You'll also learn advanced topics, such as modifying the Arduino to work with non-standard Atmel chips and Microchip's PIC32. Rick Anderson, an experienced Arduino developer and instructor, and Dan Cervo, an experienced Arduino gadgeteer, will give you a guided tour of advanced Arduino capabilities. If it can be done with an Arduino, you'll learn about it here.

Arduino board is a popular board for embedded development. This book helps you to get started with Arduino Uno development. Several scenario samples are provided to accelerate your learning process. The following is highlight topics: * Preparing Development Environment * Setting Up Arduino Uno * Writing and Reading Digital Data * Serial Communication (UART) * PWM and Analog Input * Working with I2C * Working with SPI * Accessing EEPROM * Arduino Networking

Arduino MKR WIFI 1010 is a new Arduino board with WiFi capability that enables to build IoT application. This book helps you to get started with Arduino MKR WIFI 1010. The following is a list of topics in this book. * Setting up Development Environment * Sketch Programming * Working with SPI * Working with I2C * Arduino WiFi Networking * Working with Internal RTC and Sleep Mode

Beginning Sensor Networks with Arduino and Raspberry Pi teaches you how to build sensor networks with Arduino, Raspberry Pi, and XBee radio modules, and even shows you how to turn your Raspberry Pi into a MySQL database server to store your sensor data! First you'll learn about the different types of sensors and sensor networks, including how to build a simple XBee network. Then you'll walk through building an Arduino-based temperature sensor and data collector, followed by building a Raspberry Pi-based sensor node. Next you'll learn different ways to store sensor data, including writing to an SD card, sending data to the cloud, and setting up a Raspberry Pi MySQL server to host your data. You even learn how to connect to and interact with a MySQL database server directly from an Arduino! Finally you'll learn how to put it all together by connecting your Arduino sensor node to your new Raspberry Pi database server. If you want to see how well Arduino and Raspberry Pi can get along, especially to create a sensor network, then Beginning Sensor Networks with Arduino and Raspberry Pi is just the book you need.

Arduino Projects to Save the World shows that it takes little more than a few tools, a few wires and sensors, an Arduino board, and a bit of gumption to build devices that lower energy bills, help you grow our own food, monitor pollution in the air and in the ground, even warn you about earth tremors. Arduino Projects to Save the World introduces the types of sensors needed to collect environmental data—from temperature sensors to motion sensors. You'll see projects that deal with energy sources—from building your own power strip to running your Arduino board on solar panels so you can actually proceed to build systems that help, for example, to lower your energy bills. Once you have some data, it's time to put it to good use by publishing it online as you collect it; this book shows you how. The core of this book deals with the Arduino projects themselves: Account for heat loss using a heat loss temperature sensor array that sends probes into every corner of your house for maximum measurement. Monitor local seismic activity with your own seismic monitor. Keep your Arduino devices alive in the field with a solar powered device that uses a smart, power-saving design. Monitor your data and devices with a wireless radio device; place your sensors where you like without worrying about wires. Keep an eye on your power consumption with a sophisticated power monitor that records its data wherever you like. Arduino Projects to Save the World teaches the aspiring green systems expert to build environmentally-sound, home-based Arduino devices. Saving the world, one Arduino at a time. Please note: the print version of this title is black & white; the eBook is full color.

This proceedings book presents the latest research findings, and theoretical and practical perspectives on innovative methods and development techniques related to the emerging areas of Web computing, intelligent systems and Internet computing. The Web has become an important source of information, and techniques and methodologies that extract quality information are of paramount importance for many Web and Internet applications. Data mining and knowledge discovery play a key role in many of today's major Web applications, such as e-commerce and computer security. Moreover, Web services provide 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 builds intelligent systems and algorithms that work and react like humans. AI techniques and computational intelligence are powerful tools for learning, adaptation, reasoning and planning, and they have the potential to become enabling technologies for future intelligent networks. Research in the field of intelligent systems, robotics, neuroscience, artificial intelligence and cognitive sciences is vital for the future development and innovation of Web and Internet applications.

This book is intended for those who want to build their own network-connected projects using the Arduino platform. You will be able to build exciting projects that connect to your local network and the Web. You will need to have some basic experience in electronics and web programming languages. You will also need to know the basics of the Arduino platform as the projects mainly deal with the networking aspects of the Arduino Ethernet shield.

Get ready to create distributed sensor systems and intelligent interactive devices using the ZigBee wireless networking protocol and Series 2 XBee radios. By the time you're halfway through this fast-paced, hands-on guide, you'll have built a series of useful

projects, including a complete ZigBee wireless network that delivers remotely sensed data. Radio networking is creating revolutions in volcano monitoring, performance art, clean energy, and consumer electronics. As you follow the examples in each chapter, you'll learn how to tackle inspiring projects of your own. This practical guide is ideal for inventors, hackers, crafters, students, hobbyists, and scientists. Investigate an assortment of practical and intriguing project ideas Prep your ZigBee toolbox with an extensive shopping list of parts and programs Create a simple, working ZigBee network with XBee radios in less than two hours -- for under \$100 Use the Arduino open source electronics prototyping platform to build a series of increasingly complex projects Get familiar with XBee's API mode for creating sensor networks Build fully scalable sensing and actuation systems with inexpensive components Learn about power management, source routing, and other XBee technical nuances Make gateways that connect with neighboring networks, including the Internet

Presents an introduction to the open-source electronics prototyping platform.

Arduino and Genuino MKR1000 are IoT development board which is based on the Atmel ATSAMW25 SoC. This book helps you to get started with Arduino and Genuino MKR1000 development. The following is highlight topics in this book: * Setting up Development Environment * Sketch Programming * Working with SPI * Working with I2C * Arduino WiFi Networking * Building IoT Application * Working with Internal RTC and Sleep Mode * Controlling Arduino through Firmata Protocol * Working with Firmata Protocol over WiFi * Arduino Cloud

This book helps you to get started with Arduino UNO WiFi board. It explores how to upload the sketch program over WiFi. The following is highlight topics in this book: * Setting up Development Environment * Sketch Programming * Working with SPI * Working with I2C * Working with Arduino Firmata * Arduino WiFi Networking * Arduino Programming over WiFi (OTA)

This book discusses several exciting research topics and applications in the intelligent Heterogenous Networks (Het-Net) and Internet of Things (IoT) era. We are resolving significant issues towards realizing the future vision of the Artificial Intelligence (AI) in IoT-enabled spaces. Such AI-powered IoT solutions will be employed in satisfying critical conditions towards further advances in our daily smart life. This book overviews the associated issues and proposes the most up to date alternatives. The objective is to pave the way for AI-powered IoT-enabled spaces in the next generation Het-Net technologies and open the door for further innovations. The book presents the latest advances and research into heterogeneous networks in critical IoT applications. It discusses the most important problems, challenges, and issues that arise when designing real-time intelligent heterogeneous networks for diverse scenarios. Includes fundamentals and advances in intelligent heterogeneous network studies and practical applications; Presents important problems, challenges and issues that arise when designing real-time heterogeneous networks for diverse scenarios; Provides an overview of real-time performance issues in heterogeneous networks, specifically about multi-tasking, multi-level scheduling, localization and security issues. .

Written as a practical Packt book brimming with engaging examples, C Programming for Arduino will help those new to the amazing open source electronic platform so that they can start developing some great projects from the very start. This book is great for people who want to learn how to design & build their own electronic devices. From interaction design art school students to the do-it-yourself hobbyist, or even simply people who want to learn electronics, this book will help by adding a new way to design autonomous but connected devices.

Effective networking isn't a result of luck - it requires hard work and persistence. Personal relationships are always the key to good business. One of the most powerful networking practices is to provide immediate value to a new connection. Learning networking basics is only a gateway to career ... A network connects computers, mobile phones, peripherals, and even IoT devices. Switches, routers, and wireless access points are the essential networking basics. Through them, devices connected to your network can communicate with one another and with other networks, like the Internet.

Leverage your Arduino skills in the Raspberry Pi world and see how to cross the two platforms into sophisticated programs. The Arduino and Raspberry Pi communities overlap more than you might think. Arduinos can be expanded to have network capabilities with a variety of "shields," all of which increase the cost and complexity of the system. By contrast, Raspberry Pis all run Linux, which is a very network-competent platform. The newest Pi, the Raspberry Pi Zero W, is WiFi and Bluetooth capable, and costs around \$10 U.S. For network enabled gadgets, it makes far more sense to cross to the Raspberry Pi platform, if only someone would make it easy to do. That's what this book is about. You'll learn some survival level Linux system administration, so you know how to set the machine up and how to establish at least minimal security for your gadget. You'll set up and learn the Geany IDE on your Pi, which is fairly similar to the Arduino IDE. Where the two platforms overlap the most is the GPIO system. You'll see that several projects use and explain the WiringPi system. This is is deliberately similar to the Arduino's 'Wiring' functionality, which is how sketches interact with GPIO pins. You'll learn the differences between the GPIO pins of the two devices, and how the Pi has some limitations on those pins that the Arduino does not. As a final project, in an effort to escape some of those limitations, you'll attach an AtMEGA 328P to the Raspberry Pi and configure it as a real, 8MHz Arduino with the Arduino IDE running on the Pi, and learn how to have the two platforms communicate, giving you the best of both worlds. What You'll Learn Establish security with Linux system administration Set up the Apache webserver Write CGI programs so other computers can connect to your Pi and pull data in from it. Use C/C++ from Arduino sketches to write programs for the Pi Who This Book Is For The Arduino user who's been through all the tutorials and is comfortable writing sketches and connecting hardware to their Arduino.

This is the book for you if you are a student, hobbyist, developer, or designer with little or no programming and hardware prototyping experience, and you want to develop IoT applications. If you are a software developer or a hardware designer and want to create connected devices applications, then this book will help you get started.

All of the information you need, in one place. The Arduino Ethernet Shield is a powerful device for connecting Arduinos to local area networks and to the Internet. But despite its popularity, few authors have attempted to explain how to use this shield to its full potential - leaving new users and less-experienced programmers to piece together fragments of information. In Connecting Arduino, Bob Hammell guides the reader through the processes and key concepts involved in writing projects that use the Ethernet Shield. More than just a recipe book, this in-depth series of tutorials explores all aspects of the Ethernet library, and discusses how to work with Internet protocols such as HTTP and DNS. You don't need a computer science degree to understand it, only a basic knowledge of how to write Arduino sketches. Using clear, easy-to-follow examples, you will learn how to: - Connect your Arduino to your network router - Work with the SD card reader built-in to the Ethernet Shield - Download files and webpages from the Internet to your Arduino - Serve files and

make the information contained in a sketch available to the world - Create a web-based user interface and API to control your projects - Build a local DNS server - Design and implement application protocols for Internet and network communication This is the definitive guide to the Arduino Ethernet Shield - the documentation everyone else wishes they'd had; the best starting point for creating standalone, Internet-enabled devices; and your gateway to the Internet of Things.

Arduino Leonardo and Arduino/Genuino Micro are development boards which runs ATmega32U4. This book helps you to get started with Arduino Leonardo and Arduino/Genuino Micro development. Several case samples are provided to accelerate your learning. The following is highlight topics in this books: * Preparing Development Environment * Setting Up Arduino Leonardo and Arduino Micro * Writing and Reading Digital Data * PWM and Analog Input * Working with I2C * Working with SPI * Accessing EEPROM * Arduino Networking * Keyboard and Mouse HID

Master programming Arduino with this hands-on guide Arduino Sketches is a practical guide to programming the increasingly popular microcontroller that brings gadgets to life. Accessible to tech-lovers at any level, this book provides expert instruction on Arduino programming and hands-on practice to test your skills. You'll find coverage of the various Arduino boards, detailed explanations of each standard library, and guidance on creating libraries from scratch – plus practical examples that demonstrate the everyday use of the skills you're learning. Work on increasingly advanced programming projects, and gain more control as you learn about hardware-specific libraries and how to build your own. Take full advantage of the Arduino API, and learn the tips and tricks that will broaden your skillset. The Arduino development board comes with an embedded processor and sockets that allow you to quickly attach peripherals without tools or solders. It's easy to build, easy to program, and requires no specialized hardware. For the hobbyist, it's a dream come true – especially as the popularity of this open-source project inspires even the major tech companies to develop compatible products. Arduino Sketches is a practical, comprehensive guide to getting the most out of your Arduino setup. You'll learn to: Communicate through Ethernet, WiFi, USB, Firmata, and Xbee Find, import, and update user libraries, and learn to create your own Master the Arduino Due, Esplora, Yun, and Robot boards for enhanced communication, signal-sending, and peripherals Play audio files, send keystrokes to a computer, control LED and cursor movement, and more This book presents the Arduino fundamentals in a way that helps you apply future additions to the Arduino language, providing a great foundation in this rapidly-growing project. If you're looking to explore Arduino programming, Arduino Sketches is the toolbox you need to get started.

This book looks at how to integrate iOS devices into distributed sensors network, both to make use of its own on-board sensors in such networks, but also as a hub. Beyond the discussion of basic client-server architectures, and making use of the existing wireless capabilities, this book examines how to connect iOS devices to microcontroller platforms via serial connections.

Leverage .NET and Sketch in your Arduino development implementation and integrate it into your .NET program. There are many Arduino models and compatible shields that can be used in Arduino boards. Integrating between an Arduino platform and .NET technology or Sketch can produce more advantages. Arduino Programming using .NET and Sketch shows readers how to do so with practical Arduino projects, such as preparing a development environment, performing sensing and actuating with external devices, implementing Windows Remote Arduino and building a simple IoT program. Use this quick reference to learn the basics of the Arduino platform for multiple models and start your Arduino programming in .NET and Sketch today. What You'll Learn: Learn the basics of the Arduino platform Prepare and set up an Arduino development environment Develop an Arduino program using .NET and Sketch Implement Windows Remote Arduino Build a simple IoT program Who This Book Is For: .NET and Sketch developers who want to learn Arduino programming.

Create your own toys, remote controllers, alarms, detectors, robots, and many other projects with the Arduino device. This simple microcontroller board lets artists and designers build a variety of amazing objects and prototypes that interact with the physical world. With this cookbook you can dive right in and experiment with more than a hundred tips and techniques, no matter what your skill level is. The recipes in this book provide solutions for most common problems and questions Arduino users have, including everything from programming fundamentals to working with sensors, motors, lights, and sound, or communicating over wired and wireless networks. You'll find the examples and advice you need to begin, expand, and enhance your projects right away. Get to know the Arduino development environment Understand the core elements of the Arduino programming language Use common output devices for light, motion, and sound Interact with almost any device that has a remote control Learn techniques for handling time delays and time measurement Use simple ways to transfer digital information from sensors to the Arduino device Create complex projects that incorporate shields and external modules Use and modify existing Arduino libraries, and learn how to create your own Create your own Arduino-based designs, gain in-depth knowledge of the architecture of Arduino, and learn the user-friendly Arduino language all in the context of practical projects that you can build yourself at home. Get hands-on experience using a variety of projects and recipes for everything from home automation to test equipment. Arduino has taken off as an incredibly popular building block among ubicomp (ubiquitous computing) enthusiasts, robotics hobbyists, and DIY home automation developers. Authors Jonathan Oxer and Hugh Blemings provide detailed instructions for building a wide range of both practical and fun Arduino-related projects, covering areas such as hobbies, automotive, communications, home automation, and instrumentation. Take Arduino beyond "blink" to a wide variety of projects from simple to challenging Hands-on recipes for everything from home automation to interfacing with your car engine management system Explanations of techniques and references to handy resources for ubiquitous computing projects Supplementary material includes a circuit schematic reference, introductions to a range of electronic engineering principles and general hints & tips. These combine with the projects themselves to make Practical Arduino: Cool Projects

for Open Source Hardware an invaluable reference for Arduino users of all levels. You'll learn a wide variety of techniques that can be applied to your own projects.

While the Arduino is not widely considered an industrial-strength solution, it provides, due to its low price and ease of programming, the perfect prototyping platform for all kinds of Controller Area Network (CAN) applications. This book, written by a leading expert on CAN technologies, guides the reader through the process of acquiring all necessary hardware and software components, the implementation of the CAN driver, and the implementation of programs (Arduino Sketches) to read, send, process, and display data from and to a CAN network. The collection of programming examples cumulates into a full-fledged USB-to-CAN Gateway communicating with a Windows/Linux PC. This book will enable you to achieve CAN functionality literally within only a few hours.

Create your own LoRa wireless projects for non-industrial use and gain a strong basic understanding of the LoRa technology, LoRa WAN, and LPWAN. You'll start by building your first LoRa wireless channel and then move on to various interesting projects such as setting up networks with a LoRa gateway, communicating with IoT servers using RESTful API and MQTT protocol, and real-time GPS tracking. With LoRa wireless and LoRaWAN, you can build a wide array of applications in the area of smart agriculture, smart cities, smart environment, smart healthcare, smart homes and buildings, smart industrial control, smart metering, smart supply chain and logistics. Beginning LoRa Radio Networks with Arduino provides a practical introduction and uses affordable and easy to obtain hardware to build projects with the Arduino development environment. What You'll Learn Understand the hardware need to build LoRaWAN Use the Arduino development environment to write code Connect to Arduino hardware and upload programs and communicate with them Setup networks with LoRa gateway Show real time track with tail, and path history Who This Book Is For Inventors, hackers, crafters, students, hobbyists, and scientists Intel has released Intel Curie which deployed on Arduino and Genuino 101. This book helps you to get started with Arduino and Genuino 101 development using Sketch. The following is highlight topics: * Setting up Development Environment * Sketch Programming: Digital and Analog I/O * Working with SPI * Working with I2C * BLE Programming * Working with Accelerator and Gyroscope * Working with RTC * Accessing EEPROM * Working with Arduino Firmata * Arduino Networking

Provides instructions for building thirty-three projects that interact with the physical world, including a stuffed monkey video game controller and a battery powered GPS that reports its location over Bluetooth.

Are you ready to take your programming to the next level? Are you already using Arduino and like the way it works? Do you want to be able to build more powerful projects and applications? Arduino is one of those programming languages that offers you much more than you expected at every stage you reach. It provides effective tools that really work and can have you doing complex tasks quickly with its hands-on approach. Now, with Arduino Programming: The Ultimate Intermediate Guide to Learn Arduino Programming Step by Step, you can take the next step on your Arduino journey and increase your knowledge and skills further, with chapters on: • Getting the most from Arduino • Functions, calculations and tables • Linking the physical to the virtual • Coupling and multiplexing • How to digitalize sound • Advanced techniques • Networking • And more... With its combination of theory and practical advice, Arduino Programming is the stand-out book when it comes to building on your basic understanding of this fantastic programming resource. Get a copy today and enhance your knowledge while building ever more complex applications for your computer!

Arduino Internals guides you to the heart of the Arduino board. Author Dale Wheat shares his intimate knowledge of the Arduino board—its secrets, its strengths and possible alternatives to its constituent parts are laid open to scrutiny in this book. You'll learn to build new, improved Arduino boards and peripherals, while conforming to the Arduino reference design. Arduino Internals begins by reviewing the current Arduino hardware and software landscape. In particular, it offers a clear analysis of how the ATmega8 board works and when and where to use its derivatives. The chapter on the "hardware heart" is vital for the rest of the book and should be studied in some detail. Furthermore, Arduino Internals offers important information about the CPU running the Arduino board, the memory contained within it and the peripherals mounted on it. To be able to write software that runs optimally on what is a fairly small embedded board, one must understand how the different parts interact. Later in the book, you'll learn how to replace certain parts with more powerful alternatives and how to design Arduino peripherals and shields. Since Arduino Internals addresses both sides of the Arduino hardware-software boundary, the author analyzes the compiler toolchain and again provides suggestions on how to replace it with something more suitable for your own purposes. You'll also learn about how libraries enable you to change the way Arduino and software interact, and how to write your own library implementing algorithms you've devised yourself. Arduino Internals also suggests alternative programming environments, since many Arduino hackers have a background language other than C or Java. Of course, it is possible to optimize the way in which hardware and software interact—an entire chapter is dedicated to this field. Arduino Internals doesn't just focus on the different parts of Arduino architecture, but also on the ways in which example projects can take advantage of the new and improved Arduino board. Wheat employs example projects to exemplify the hacks and algorithms taught throughout the book. Arduino projects straddling the hardware-software boundary often require collaboration between people of different talents and skills which cannot be taken for granted. For this reason, Arduino Internals contains a whole chapter dedicated to collaboration and open source cooperation to make those tools and skills explicit. One of the crowning achievements of an Arduino hacker is to design a shield or peripheral residing on the Arduino board, which is the focus of the following chapter. A later chapter takes specialization further by examining Arduino protocols and communications, a field immediately relevant to shields and the communication between peripherals and the board. Finally, Arduino Internals integrates different skills and design techniques by presenting several projects that challenge you to put your newly-acquired skills to the test! Please note: the print version of this title is black & white; the eBook is full color.

The implementation of wireless sensor networks has wide-ranging applications for monitoring various physical and environmental settings. However, certain limitations with these technologies must be addressed in order to effectively utilize them. The Handbook of Research on Advanced Wireless Sensor Network Applications, Protocols, and Architectures is a pivotal reference source for the latest research on recent innovations and developments in the field of wireless sensors. Examining the advantages and challenges presented by the application of these networks in various areas, this book is ideally designed for academics, researchers, students, and IT developers.

Build sensor networks with Python and MicroPython using XBee radio modules, Raspberry Pi, and Arduino boards. This revised and updated edition will put all of these together to form a sensor network, and show you how to turn your Raspberry Pi into a MySQL database server to store your sensor data! You'll review the different types of sensors and sensor networks, along with new technology, including how to build a simple XBee network. You'll then walk through building an sensor nodes on the XBee, Raspberry Pi, and Arduino, and also learn how to collect data from multiple sensor nodes. The book also explores different ways to store sensor data, including writing to an SD card, sending data to the cloud, and setting up a Raspberry Pi MySQL server to host your data. You'll even learn how to connect to and interact with a MySQL database server directly from an Arduino! Finally you'll see how to put it all together by connecting your sensor nodes to your new Raspberry Pi database server. If you want to see how well XBee, Raspberry Pi, and Arduino can get along, especially to create a sensor network, then Beginning Sensor Networks with XBee, Raspberry Pi, and Arduino is just the book you need. What You'll Learn Code your sensor nodes with Python and MicroPython Work with new XBee 3 modules Host your data on Raspberry Pi Get started with MySQL Create sophisticated sensor networks Who This Book Is For Those interested in building or experimenting with sensor networks and IoT solutions, including those with little or no programming experience. A secondary target includes readers interested in using XBee modules with Raspberry Pi and Arduino, those interested in controlling XBee modules with MicroPython.

