Foreword by Massimo Banzi, co-founder of Arduino

Arduino®

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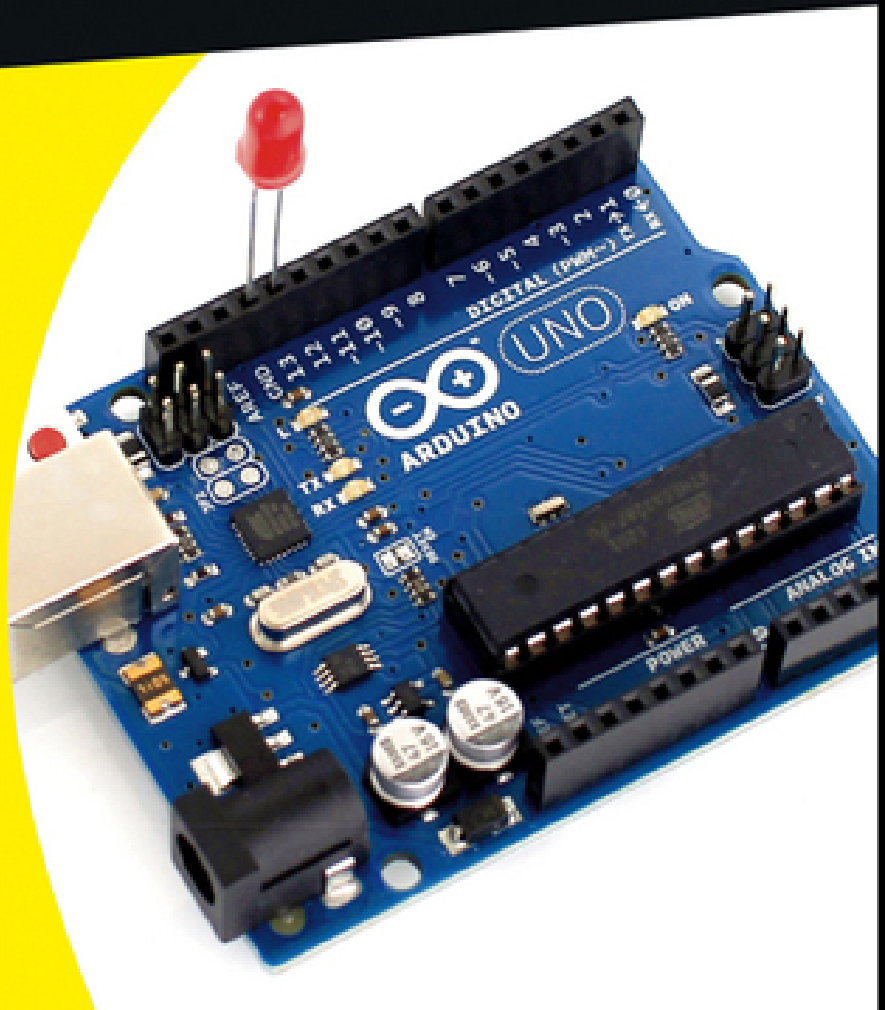
Learn to:

- Build exciting interactive projects using Arduino
- Integrate inputs, outputs, and existing hardware into your projects
- Construct robust prototypes to get your project out into the real world
- Communicate between hardware and software using Arduino and Processing



John Nussey

by John Nussey

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About the Author

John Nussey is a creative technologist based in London. His work involves using technology in new and interesting ways and covers many areas, including physical computing, creative coding, interaction design, and product prototyping.

During his career, he has worked on many varied projects with clients such as ARUP, the BBC, the Museum of Science and Industry, the National Maritime Museum, Nokia, and the Southbank Centre.

He is a proud advocate of the Arduino prototyping platform and has taught the craft of interaction design and prototyping to people of all ages, competencies, and abilities at a variety of establishments, including Goldsmiths College, the Bartlett School of Architecture, the Royal College of Art, and OneDotZero.

Dedication

To Avril, the love of my life (and only person I trust with a soldering iron), for providing encouragement when I was writing and distraction when I wished I wasn't; to Roanne and Oliver for our stimulating literary chats; to Craig for helping me bridge the trans-Atlantic gap; to all the guys and girls at Kin for still feigning interest and asking "How's the books going?" after 6 months; and to Alexandra for all the guidance that led me to such an enjoyable and inspiring career.

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A big thanks to all my friends, family, and loved ones for their encouragement and enthusiasm. I love making things, and I hope that this book inspires you to make things of your own and find the same enjoyment I have.

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Arduino For Dummies®

Visit www.dummies.com/cheatsheet/arduino to view this book's cheat sheet.

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Cheat Sheet

Foreword

The moment a *For Dummies* book comes out, it's definitely a milestone in the history of a product.

Programming embedded computers used to be a very difficult task, reserved only to experienced engineers willing to master the obscure assembly language. In recent years, however, many platforms have tried to make this task simpler and more accessible to everyday people. Arduino is one of the latest attempts at making technology less scary and more creative.

With John, this book's author, we watched this creative tool being adopted by designers and artists in London, making its way into many memorable projects. Now Arduino has escaped the lab of Arts & Design and spread like a virus, becoming the tool of choice for all kinds of people who have great ideas they want to realize.

I'm really glad that John decided to write this book, because he's an early user of the Arduino platform from back in the days when it was still quite experimental. Having taught Arduino classes for many years, he has the ability to introduce the subject to all audiences.

Any newcomer to Arduino will, with the right tools and teaching — such as those found in this book — show true genius in no time.

Massimo Banzi

Introduction

Arduino is a tool, a community, and a way of thinking that is affecting how we use and understand technology. It has rekindled a love and understanding for electronics for many people, including myself, who felt that electronics was something that they had left behind at school.

Arduino is tiny circuit board that has huge potential. It can be used to blink a Morse-code signal using a single LED or to control every light in a building, depending on how far you take it. Its capabilities are limited only by your imagination.

Arduino is also providing a new, practical approach to technical education, lowering the entry level for those wanting to use electronics to complete small projects and, I hope, encouraging you to read further to take on big ones.

A huge and ever-growing community of Arduin-ists has emerged — users and developers who learn from each other and contribute to the open source philosophy by sharing the details of their projects. Arduin-ists and their supporters with their open source attitude are responsible for the huge popularity of Arduino.

Arduino is more than just a “bit of kit”; it’s a tool. A piece of technology that makes understanding and using today’s technology easier.

So if the prospect of understanding the limitless possibilities of technology doesn’t sound interesting to you, please put this book down and back away.

Otherwise, read on!

About This Book

This is a technical book, but it's not for technical people only. Arduino is designed to be usable by anyone, whether they're technical, creative, crafty, or just curious. All you need is an open mind or a problem to fix and you'll soon find ways that using Arduino can benefit you.

Arduino has rekindled my love of electronics and opened many avenues for my career. I wrote this book to share that experience. When I first went to an Arduino workshop, I had no experience in programming and could only vaguely remember which end of a soldering iron to hold (don't worry, I cover soldering, too). Now the mainstay of my work involves building interactive installations, prototyping products, and generally finding new ways to play with technology using Arduino.

I think it is an excellent platform that lowers the entry level into electronics and coding, allowing people who may not have had the attention span or interest at school to dive straight into the areas that interest them and explore them from there.

Foolish Assumptions

This book assumes nothing about your technical knowledge. Arduino is an easy-to-use platform for learning about electronics and programming. It is for people from all walks of life, whether you're a designer, an artist, or a hobbyist.

It can also be a great platform for people who are already technical. Maybe you've done a bit of coding but want to bring your projects into the physical world in

some way, or maybe you've worked with electronics and want to see what Arduino can bring to the table.

But whoever you are, you'll find that Arduino has great potential. It's really up to you to decide what to make of it.

This book starts on the most basic level to get you started with using and understanding Arduino. At times throughout the book, I may refer to a number of very technical things that will, like anything, take time to understand. I guide you through all the basics and then on to more advanced activities.

Much of what is in this book is based on my learning and teaching experiences. I learned all about Arduino from scratch, but have always found that the best way to learn is in practice, by making your own projects. The key is to learn the basics that I cover in this book and then build on that knowledge by thinking about how you can apply it to solve problems, create things, or just entertain yourself.

How This Book Is Organized

Arduino For Dummies is organized in a way that allows you to jump around the book as you like. If you've dabbled in Arduino before, you might want to skip to the later chapters, or if you've forgotten some of the basics, consider starting at the beginning.

Part I: Getting to Know Arduino

In Part I, I introduce you to Arduino, outlining a variety of other practices and circumstances that created a need for Arduino and that have influenced its development.

Then I look at Arduino in more detail, both as a physical board and software environment, and I walk you through uploading your first sketch.

Part II: Getting Physical with Arduino

In this part, you find out how to do some basic prototyping using breadboards and other components to give your Arduino more reach into the physical world. Using just a few simple components, you can explore a variety of applications for Arduino and form a base on which you can build your own projects. The chapters in this part cover a variety of inputs and outputs, including light, motion, and sound that you can build on and combine to form your own projects.

Part III: Building on the Basics

After you have covered the basics, you'll be itching to do more. In Part III, I tell you about some real-world projects and how they work. You find out how to solder your own circuit board to get your project out into the world for others to see. You also learn how to choose the correct sensor for the job and how to use code to fine-tune or change the behavior of your circuits.

Part IV: Unlocking Your Arduino's Potential

This part pushes the possibilities of your Arduino project further. You learn about using shields to add specific functionality to your Arduino, using hardware and techniques to allow you project to grow, and hacking existing hardware. You also find out how to communicate with Processing, Arduino's sister project, to combine open source hardware with software.

Part V: Sussing Out Software

If you work through the book to this part, you should have a good understanding of how you can use electronics and hardware in your own projects. In this part, you learn how to combine this knowledge of the physical world with the digital world of software. I introduce you to a few open source programming environments and then more specifically to Processing, which is a digital sketchbook that you can use for a huge variety of applications to enhance your Arduino project.

Part VI: The Part of Tens

The Part of Tens is a *For Dummies* standard that breaks down useful information into groups of ten bite-sized chunks. This part covers where to learn more about Arduino, where to shop for Arduino-specific parts, and where to shop for electronics in general.

Icons Used in This Book

Arduino For Dummies uses icons to highlight important points for you. Keep an eye out for these:

This icon highlights a bit of helpful information. That info may be a technique to help you complete a project more easily or the answer to common problems.