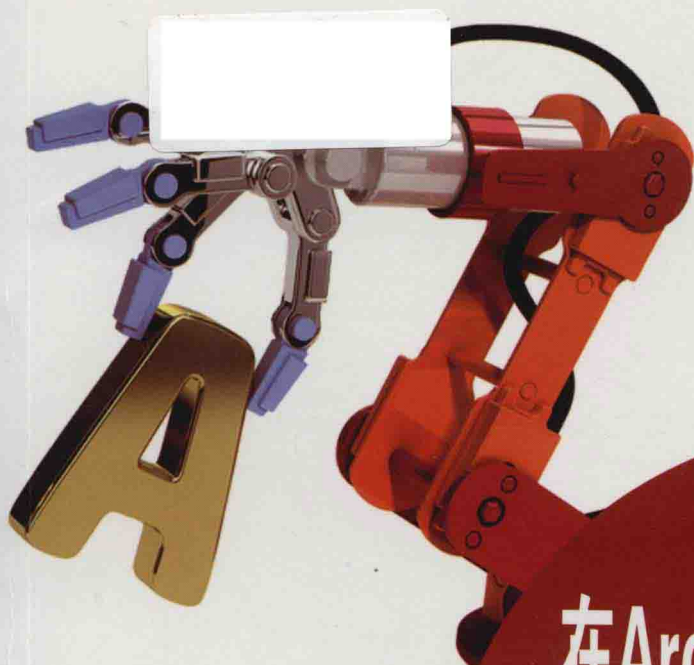


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在Arduino帮助下 掌握微控制器

第2版（影印版）

Mastering Microcontrollers:
Helped By Arduino, Second Edition

Clemens Valens 著



东南大学出版社
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本书内容

- 1.快速入门指南
- 2.介绍
- 3.了解你的对手
- 4.快速原型化之意大利风格
- 5.第一次进攻
- 6.数字信号：有或者没有
- 7.模拟信号：非黑非白
- 8.通信：艺术与科学的结晶
- 9.时钟嘀嗒
- 10.中断：潘多拉的盒子
- 11.电路和练习

本书特点

- 1.双重目标
理论：学习如何对微控制器进行编程；
实践：使用Arduino开发环境把理论应用到Arduino硬件上
- 2.原始应用
- 3.低成本硬件；免费和开源软件

本书的目的不仅是让你进入Arduino的世界，而且它也试图让你获得成功，从而继续获取Arduino学习经验。在本书中理论知识通过Arduinio编程环境与Arduino单板的实践融为一体。通过完成这些有趣和好玩的课程，你将能够为任何微控制器编程，处理和掌握I/O、内存、中断、通信（串口、I2C、SPI、单总线、系统管理总线）、模数转换器等。本书将是你的第一本有着美好结局的有关微控制器的书籍。所有本书中出现的例子都可以免费下载。

Clemens Valens，出生于荷兰，从1997年起定居法国。他是Elektor实验室的主管和Elektor.Labs网站的管理员。他非常喜爱电子，出于兴趣而开发微控制器，有时也会为雇主去开发。Clemens通晓多种语言，C、C++、PASCAL、BASIC和多种汇编语言，他花了大量的时间在计算机上，而他的妻子、两个孩子和两只猫则试图吸引他的注意力（目前只有猫获得成功）。

本书适合于以下读者：

- ★微控制器新手
- ★希望深化自己知识的Arduino用户
- ★电子方向的研究生或者本科生
- ★寻求灵感的教师

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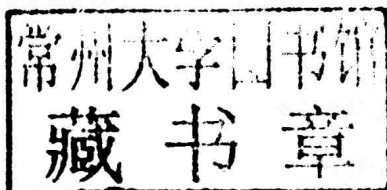
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1. Quick Start Guide

Because most people, including myself, lack the patience to read ten pages or so before connecting an Arduino board (or any other device for that matter) to a computer, here is how to see quickly if things work or not. What follows is a simple quick start guide. If, after reading this guide, you did not succeed in making the on-board LED flash, I advise you to read quietly at least the first few chapters to familiarize yourself with the Arduino platform and try again later.

1.1 Software Installation

Download the latest version of the Arduino software, you can find it on the *Download* page of the Arduino website (www.arduino.cc). Versions for Windows, Mac OS X and Linux are available, pick the one that suits you best. There is no point in downloading the source code or earlier versions, in this book I assume that you are using the Arduino software version 1.0.x where x is a number. Version 1.5.x can also be used, but while I was finishing this book (May 2013) it was still in the beta testing phase. We do not intend to modify the software, and so its source code does not interest us.

The Arduino software is provided in the form of a huge archive. To install it, unpack it somewhere on a hard drive (internal or external) or a USB key, using the standard method for your operating system. That's all; there is no nice graphical installer.

It may be necessary to install Java too if it is not available on your computer. Your operating system will let you know if you have to do this.

1.2 Installing the Hardware

The Arduino hardware installation is a bit more complicated than the software installation because of the diversity of the boards and the serial ports they offer. To facilitate reading this guide, I will limit myself here to Arduino boards equipped with a USB serial port. This family has two branches: boards with a USB serial port based on a chip manufactured by FTDI and boards with a USB serial port managed by a device of the brand Atmel. These last boards are the most recent, but all work very well.

1. Quick Start Guide

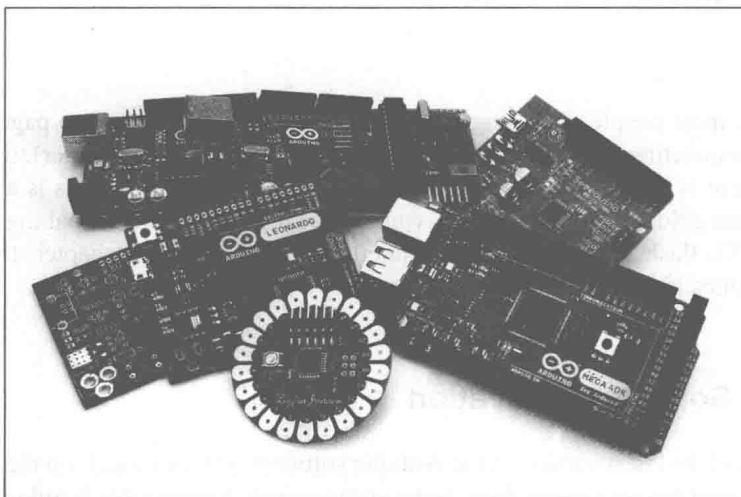


Figure 1-1 - A selection of Arduino boards.

- ♦ Identify your board. This should not pose too many problems, since it is written on it in large characters.
- ♦ Connect the board to a free USB port of your computer. The computer may now emit a sound, display a message or do both (or do nothing at all) to inform you that it noticed that something was connected to it. An LED on the board should come on. If it doesn't, verify that the board is powered from the USB port. On some boards, like the Diecimila, you need to set a jumper to power the board from the USB port.

The next step depends on the operating system on your PC.

1.2.1 Windows (XP or Later)

Just as there are many roads that lead to Rome, there are several ways to install a driver in Windows. The techniques described below have been successfully tested by me on three different computers.

1.2.1.1 Board without FTDI chip (Uno, Mega 2560 or later)

Windows XP

After connecting the board, Windows will open the *Found New Hardware Wizard*. If you try to install the software automatically, Windows will not succeed, because you have to *Install from a list or specific location (Advanced)*. Click *Next*, check

Search for the best driver in these locations, check the box *Include this location in the search* and navigate to the subdirectory of the Arduino installation that holds the drivers. (The exact method to browse depends on the version of Windows on your PC.) Click *Next* again, Windows starts searching, finds a *Communications Port* and displays a message saying that the driver has not been signed. Ignore this warning by clicking *Continue*, then click *Finish*. If all goes well Windows displays a message informing you that the hardware has been installed correctly.

Windows Vista

A window entitled *New Hardware Wizard* will open. Click *Locate and install driver software (recommended)*. Windows now goes off looking for a driver, but, after a while, will return empty-handed and ask you for a disc with the driver on it. Since you do not have such a disc, click *I don't have the disc. Show me other options* and then click *Browse my computer for driver software (advanced)*. In the window that opens click *Browse* and navigate to the subdirectory of the Arduino installation that contains the board drivers. Click *Next* and then, in the warning window that appears, click *Install this driver software anyway*. Now wait for the message that indicates that Windows has completed the installation of a *Communications Port* and click *Close* to complete the process.

Windows 7

Connecting the board causes no visible or audible reaction of Windows. To install the board open the *Control Panel*, and then click *Device Manager*. Normally, in the list of devices, a small yellow warning triangle indicates that the Arduino driver has not been installed. Double-clicking the icon of the board will display its properties; click on the button *Update Driver*. In the next window, click on *Browse my computer for driver software* and navigate to the subdirectory of the Arduino installation that contains the board drivers. Click *Next*, and then, in the warning window that pops up, click *Install this driver software anyway* and wait for the message indicating that Windows has finished installing a *Communications Port*. Click *Close* and finish by clicking a second time on *Close*. Since the *Device Manager* is still open, use it to write down the number of the serial port assigned to the board.

1.2.1.2 Board with FTDI chip (Duemilanove, Nano, Diecimila, etc.)

After connecting the board to the computer, Windows either manages to install the driver all by itself (Windows Vista and 7, it may take several minutes for each driver and there are two; remember to write down the number of the USB serial port) or it proposes to have look on the internet. Refuse this proposal without cancelling the wizard and continue by selecting *Install from a list or specific location (Advanced)*. Select *Search for the best driver in these locations*, check *Include this*

1. Quick Start Guide

location in the search, navigate to the subdirectory *drivers\FTDI USB Drivers* of the Arduino installation and let Windows complete the installation. Two drivers are to be installed, so repeat these steps for each driver.

1.2.1.3 Finding the board's serial port number in Windows



Figure 1-2 - The Windows Device Manager showing the serial ports.

Depending on the version of Windows and your configuration, there are at least two ways to find the number of the serial port that Windows has assigned to your board. Here is my preferred method:

Open the *Control Panel* and

Windows XP:

Launch *System*. A window entitled *System Properties* will open. Click the *Hardware* tab, and then click *Device Manager*.

Windows Vista:

Click *System and Maintenance*, and then click *Device Manager*.