

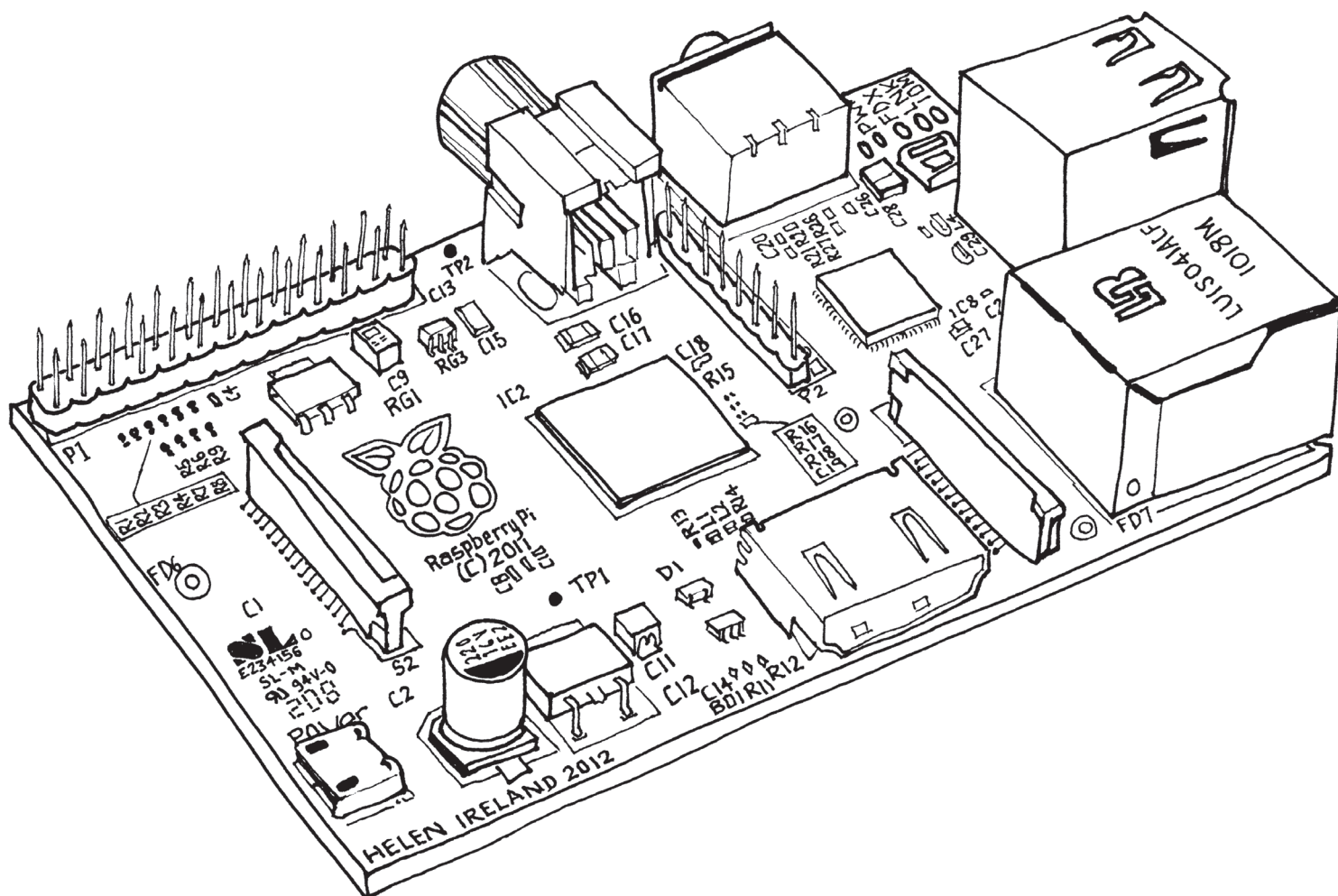
# The Raspberry Pi **Education Manual**

**COMPUTING AT SCHOOL**  
EDUCATE · ENGAGE · ENCOURAGE  
In collaboration with BCS, The Chartered Institute for IT



# The Raspberry Pi Education Manual

Version 1.0 December 2012



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### Where are the Greenfoot and GeoGebra chapters?

The Greenfoot and GeoGebra chapters have been left out of this edition of the manual. These programs rely on software called a Java virtual machine, which is currently being optimised for the Raspberry Pi to improve performance. You can look forward to enjoying these chapters once we are happy that your user experience will be of the same high quality as the chapters themselves!

## This manual was brought to you by...

This manual is a bit different. It was written entirely by unpaid volunteers, all of whom are keen to share their expertise and enthusiasm for computing with as many people as possible.

What all of these contributors have in common, apart from a youth spent mainly indoors in front of ZX Spectrums and Commodore 64s, is that they're all members of the organisation **Computing at School (CAS)**. To find out more about CAS and its work promoting the teaching of computer science, head over to <http://www.computingschool.org.uk>

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*Caesar Cipher* by Brian Starkey  
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## Special Thanks

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# Hello, Raspberry Pi users

Chapter 0

Congratulations! You have in your possession a Raspberry Pi. A small but powerful computer designed to help you understand and explore the almost-magical world of computing. Use it wisely; it's an object of great power.

## What is the Raspberry Pi?

**The Raspberry Pi is a computer**, very like the computers with which you're already familiar. It uses a different kind of processor, so you can't install Microsoft Windows on it. But you can install several versions of the Linux operating system that look and feel very much like Windows. If you want to, you can use the Raspberry Pi to surf the internet, send an email or write a letter using a word processor. But you can also do so much more.

**Easy to use but powerful**, affordable and (as long as you're careful) difficult to break, the Raspberry Pi is the perfect tool for aspiring computer scientists. What do we mean by computer science? We mean learning how computers work so you can make them do what you want them to do, not what someone else thinks you should do with them.

**And who do we mean by computer scientists? We mean you.** You may finish this manual and decide you want to be next Tim Berners Lee, but even if you don't, we hope you have fun, learn something new and get a feel for how computers work. Because no matter what you do in life, computers are bound to be part of it.

*Notes:*

## What am I going to learn?

**This user manual is different.** Don't expect a dry-as-dust description of how to plug things in or where to find your serial number. And you certainly won't learn how to create a spreadsheet or a presentation. That's really not computer science, it's something else entirely.

**Instead, think of this manual, along with your Raspberry Pi, as a "computer science set".** Have you ever been given a chemistry set? With a chemistry set, you can make lots of bangs, smells and odd-coloured goop to learn all about elements, molecules and compounds.

**We're not going to make odd-coloured goop,** but we will use experiments to discover how to program a computer to create your own games and animations, how to make graphics appear on screen just by typing in the right code (just like the developers of your favourite games do), how to get a cat to do your maths homework for you, and much more.

**By doing all this, you will learn the basic principles of computer science.** And that's your first step on the journey to becoming a real computer programmer, a games developer, an über-hacker just like in the movies (only cooler and staying strictly within the law) and many other things besides. Exactly what, depends on you.

## Who is this manual for?

**When we wrote this manual,** our aim was for it to be suitable for most people of eight years and older. But that doesn't mean it's for eight year olds. This book is for anyone and everyone who is curious to know more about computing and creating computer programs. If you don't have computer-programming experience but you want to get some and you're looking for a place to start, this is it.

We begin the manual with some relatively easy experiments in computer science. Things then get progressively more challenging with each successive exercise. Try to spend time with each experiment and, once you've got an exercise doing what the manual says it should, feel free to change the code to see what happens: it's one of the best ways to learn.

## Will I break it?

**You can't break your Raspberry Pi** by doing any of the experiments in this book, but you might just surprise yourself with what you can achieve. You will be working through and learning genuinely difficult but exciting concepts, and laying the foundations for even more exciting discoveries in the future.

So, without further delay, have everyone in the room stand back: we're going to do computer science!