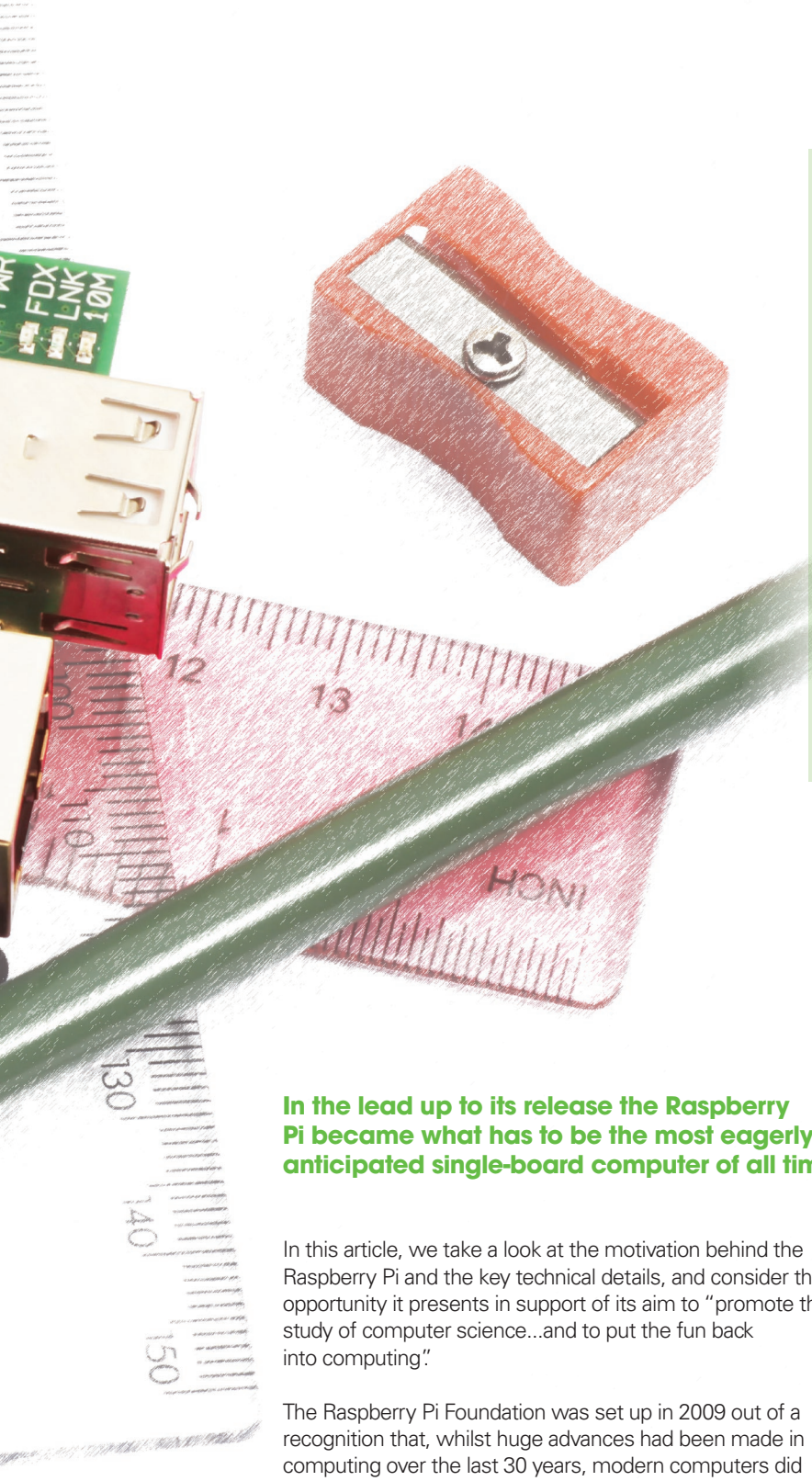
See page 3
for information

Raspberry™

An Investment in the Future of Engineering

By Andrew Back, AB Open Ltd



Pi

In the lead up to its release the Raspberry Pi became what has to be the most eagerly anticipated single-board computer of all time.

In this article, we take a look at the motivation behind the Raspberry Pi and the key technical details, and consider the opportunity it presents in support of its aim to "promote the study of computer science...and to put the fun back into computing".

The Raspberry Pi Foundation was set up in 2009 out of a recognition that, whilst huge advances had been made in computing over the last 30 years, modern computers did not typically provide the same valuable learning opportunities that those used in the 1980s did. According to the foundation's Eben Upton this was "undermining the supply of eighteen year olds who know how to program, so that's a problem for universities, and then it's undermining the supply of 21 year olds who know how to program, and that's causing problems for the industry."

Determined to do something about this, the Foundation set about designing a highly affordable single-board computer that would stimulate the teaching of basic computer science. A system-on chip (SoC) designer at Broadcom and a former academic, Upton was perfectly positioned to understand the problem at hand, and had the knowledge and contacts required to develop a solution.

Kevin Murrell
The National Museum of Computing

"An understanding of how applications come into being is important. Many young visitors to The National Museum of Computing have no idea that someone with a bright idea simply sits down and writes an app for their phone"

Kevin Murrell is Director of the UK's National Museum of Computing based at Bletchley Park.

A Credit Card-sized Computer

The Raspberry Pi takes the form of a credit card-sized PCB, employs a Broadcom SoC and provides:

- 700MHz ARMv6 processor
- 256M RAM
- 1080p-capable GPU with HDMI and composite video outputs
- 3.5 mm audio out
- 26 way header with GPIO, UART, I2C and SPI
- Headers for JTAG, DSI (LCD display) and CSI (camera)
- SD card slot
- USB

Available in two versions, the Model A has a single USB port, whilst the Model B has two and also adds Ethernet. All it takes to get up and running with a Raspberry Pi is a USB keyboard and mouse, a power supply, an SD card for the operating system, and a computer monitor or a TV for a display.

The compact form factor means that the computer is perfect for transporting between home and school, and at a cost of $25 for the Model A and $35 for the Model B it drastically lowers the barrier to experimentation. Through use of an SD card as a storage medium, it means the system is easy to upgrade and reinstall via another computer, and cards can be quickly swapped out to provide different software environments. By providing headers for an assortment of I/O it encourages hardware-based experimentation, and the low price means that a serious mistake would not be as costly as it may be if using a typical PC.

Continued on page 08 >

< Continued from page 07

Benefiting from 20+ Years of Software Development

The Raspberry Pi Foundation has chosen Linux for the operating system, and this enables users of the computer to benefit from over 20 years of software development, an extensive ecosystem of complementary open source tools and applications, and a vibrant global community. At the time of writing, support is available for the Debian and Fedora distributions, amongst others, and Raspberry Pi-specific kernel source code has been made available at GitHub2.

Although virtually any programming language could be used with the Raspberry Pi, the Foundation has decided to support Python as the educational language of choice.

Well regarded in programming circles, the language puts an emphasis on readability, is powerful and has a rich selection of pre-written tools and modules available, and its interactive interpreter provides a great learning environment for the novice programmer that is just starting out.

A Call to Action

The Raspberry Pi represents a significant opportunity to inspire and nurture tomorrow's engineers and computer scientists, but the support of today's engineering and academic communities is going to be vital in order to realise the full potential of this opportunity.

Dr Jeremy Bennett
Embecosm

"There is a desperate lack of graduates coming through who have the skills necessary for physical computing — the ability to get close to the hardware. All too many degree courses are only about programming applications on a PC with 4GB of RAM, yet more and more of our computing is embedded"

Dr Jeremy Bennett is Chief Executive of Embecosm, a provider of embedded development tools and services, and former Champion for Embedded systems at the Technology Strategy Board's ESP KTN.

Miles Berry
Naace
"Raspberry Pi offers a wonderful opportunity for the iPhone generation to learn to develop, rather than merely use, the software themselves. The biggest potential is, I think, as a tool for independent, autonomous learning through experiment and discovery, within, but more importantly, beyond the school."

Miles Berry is Chair of the National Association of Advisors for Computers in Education, and Subject Leader for ICT Education at the University of Roehampton.

Jeremy Ruston
Federatial
"The Raspberry Pi represents a substantial lowering of the financial barriers to experimentation with computing. The emphasis on hardware also gently nudges people to explore the fascinating zone where custom hardware and custom software meet"

Jeremy Ruston is the inventor of TiddlyWiki and founder of software consultancy, Federatial Ltd, and whilst still a teenager in the 1980s he became a published author, writing popular titles on the BBC Micro.

Alex van Someren
Amadeus Capital
"This is the best opportunity since the BBC Micro to realign the curriculum around a platform everyone can afford so as to stimulate better understanding of real computer science."

Alex van Someren is a partner at Amadeus Capital and previously founded security technology company, nCipher. In the 1980s he left school to join Acorn Computers, where he was extensively involved with the BBC Microcomputer project, and he went on to author the first book on the ARM microprocessor.

See a Raspberry Pi Powered Media Centre.
For information on using the RS Auras app see page 3

Support could take many forms and need not necessarily be through, for example, working directly with educational institutions. Assisting in the development of complementary hardware, software and documentation that increases the usefulness of the Raspberry Pi, however simple, is one way of contributing towards the goals of the Foundation. As is providing guidance and basic help to individuals and groups that may be less technical and express an interest in using Raspberry Pi.

Dr Sue Black
The goto Foundation

"Software plays a major role in our everyday lives: from ATMs to mobile phones, to embedded software in our cars and washing machines. It is all around us, how would we now live without it? It is surprising therefore that the general public are not knowledgeable about software and know little of its history and fundamental contribution to our everyday lives"

Dr Sue Black is an award-winning computer scientist, campaigner and founder of The goto Foundation, an organisation set up to change public perception of, and increase participation in, computer science.

BUY IT:
Pre-order your Raspberry Pi from RS at www.rs-components.com/raspberrypi

Share your views...
www.designspark.com/theme/raspberrypi