

WHAT EXACTLY IS A RASPBERRY PI?

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Анотація

У цій роботі розглядається плата Raspberry Pi, описується її призначення і основні структурні елементи.

Ключові слова: Raspberry Pi, Linux, комп'ютер, плата, пристрій, програмування, електроніка.

Abstract

In this paper the Raspberry Pi board is examined, also its purpose and main structural elements are described.

Keywords: Raspberry Pi, Linux, computer, board, device, programming, electronics.

In recent years, computer education has focused largely on office skills, and not on understanding how computers work, or how you can use them to create new programs and inventions. Raspberry Pi redresses the balance. It can be used for games, music, photo editing, and word processing, like any computer. But it can do so much more, providing a gateway into programming, electronics, and the mysterious world of Linux, the technically powerful (and free) rival to Windows and Mac OS [1].

Although Raspberry Pi presents new opportunities to everyone, it can also be a daunting prospect. It comes as a bare circuit board, so to do anything with it, you'll need to add an operating system on an microSD card and connect it up to a screen, mouse, and keyboard. To get started, you need to learn a few basics of Linux, or at least get acquainted with LXDE (Lightweight X11 Desktop Environment), the graphical desktop. You might be a geek who relishes learning new technologies, or you might be someone who wants a new family computer to use with the children. If you are new to electronics, but comfortable using computers, then Raspberry Pi is going to be the familiar device. The Raspberry Pi board (shown in Figure 1) really is a very small version of a regular computer running Linux [1 – 3].

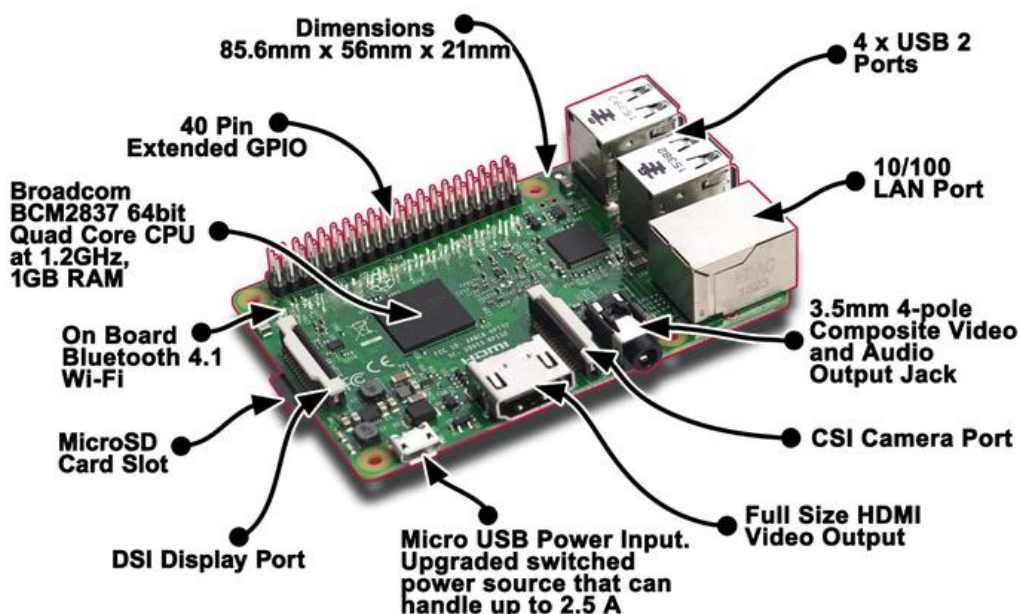


Figure 1 – The Raspberry Pi 3 Model B board [4]

Raspberry Pi was created in the UK, primarily to serve as a low-cost computer to help with teaching computer basics, particularly Python programming, to school kids. Since its launch in 2011, Raspberry Pi has found a role both as a very low-cost Linux-based computer and as a platform for embedded computing. It has proven popular with educators and hobbyists alike, with over 12,5 million units sold since its release. The

world of Raspberry Pi is one that moves quickly. There are actually a few variations on Raspberry Pi, some historic and no longer manufactured. With a large active community, new interface boards and software libraries are being developed all the time [3, 5].

What exactly is a Raspberry Pi? A Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games [6].

A Raspberry Pi 3 Model B is a single-board computer, complete with Linux operating system, Wi-Fi adapter, USB connections for keyboard and mouse, and an HDMI connector for attaching a monitor. Now let's move on and explore our board hardware in more detail and see what we have (see Figure 1).

On the righthand side of the board you will find four USB ports. These are useful for attaching a keyboard and mouse, as well as other peripherals, such as printers, scanners, and Flash drives. Below the USB ports, you will find an RJ-45 Ethernet socket that allows you to connect your Raspberry Pi to your home router via cable. You will need to get your Raspberry Pi connected to your network so that you can access the Internet and install software onto Raspberry Pi. It can be more convenient to cut out the cable and use the integrated Wi-Fi adapter.

Working our way clockwise around Raspberry Pi, we come to the stereo audio and composite video connector. This socket will mostly have headphones or an aux lead connected to powered speakers plugged into it, but the connector does also include an extra connection to allow you to connect composite video monitors using a special lead. Generally, the HDMI video connector is more likely to be used to connect a monitor or TV as it is much better quality than composite video. Between the HDMI and audio sockets is a flat cable connector to which a camera specially designed for Raspberry Pi can be attached.

Next to the HDMI socket is a microUSB connector. This is only used to supply power to Raspberry Pi using a 5 V adapter.

Above the microUSB connector, on the underside of the board, is a slot that takes a microSD card. Raspberry Pi does not have a conventional hard disk; instead, the operating system and all the files will be contained on a microSD card.

On the top side of the board, you will find a set of header pins. These are called the general-purpose input/output (GPIO) pins; they can be used to connect Raspberry Pi to various electronic circuits to allow it to control different devices.

Before Raspberry Pi B+ was released, Raspberry Pi boards only had 26 pins on the GPIO connector rather than the 40 shown in Figure 1.

Setting up a Raspberry Pi is very simple. You'll just need to connect a keyboard, mouse, and monitor to your Raspberry Pi in order to set it up. Once set up, you can unplug the keyboard, mouse, and monitor, and instead connect to your Raspberry Pi using Secure Socket Shell (SSH) from another computer. However, until you get to that stage, you will need to keep those things connected to set up your Raspberry Pi.

To set up your Raspberry Pi, you need the following items:

- A USB keyboard and mouse (standard PC peripherals are just fine);
- A monitor or TV with an HDMI input and an HDMI cable;
- A 5 V microUSB power supply (at least 1 A);
- An Ethernet cable to reach to your router (or use the built-in Wi-Fi adapter);
- A microSD card (16 GB OK but 32 GB will give you more room for your own files and any programs that you download; choose a microSD card described as class 10, as this will help with performance);
- A second computer and microSD card adapter to set up the SD card (alternatively, you can buy a microSD card with NOOBS – that is, New Out Of the Box Software – preinstalled).

At least while you are installing the operating system, you should set up your Raspberry Pi where you can connect it directly to your router so that it has an Internet connection. Once the operating system is installed, you can configure the integrated Wi-Fi adapter and switch over to wireless if you prefer [3, 7, 8].

Raspberry Pi is perhaps the most inspiring computer available today. Although most of the computing devices we use (including phones, tablets, and games consoles) are designed to stop us from tinkering with them, Raspberry Pi is exactly the opposite [1, 3]. From the moment you see its shiny green circuit board, it invites you to prod it, play with it, and create with it. It comes with the tools you need to start making your own software (or programming), and you can connect your own electronic inventions to it. It's cheap enough that if you break it, it's not going to break the bank, so you can experiment with confidence.

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