# Raspberry Pi

## What Does it do? – Introduction

A Raspberry Pi is a state of the art low-cost single-board computer, typically the size of a credit card. It includes all the features needed to perform similarly to a desktop computer, to allow for electronical prototyping and development, and for any other general computing purposes. The device is feature packed, including video output (HDMI), USB with KB/mouse support and WiFi / ethernet. One particularly unique feature is the Raspberry Pi’s set of general-purpose input/output (GPIO) pins, allowing for connection to all kinds of external devices such as sensors, LEDs or motors.

## What Does it do – Specifications

The newest model, the Raspberry Pi 3 Model B+, contains a Cortex-A53 (ARMv8) 64-BIT SoC running at 1.4GHz. This is coupled with 1GB of LPDDR2 RAM and a BroadCom VideoCore IV GPU running at 400MHz (Raspberry Pi Foundation). The Model 3 B+ is a very capable machine, with specifications allowing for fullHD video playback, web browsing and light gaming. This device retails for around $50-60.

The Raspberry Pi Zero is a budget model Raspberry Pi, including only the bare minimum features and hardware. This device is aimed for use in end-user products or low-cost IoTs, though can be used for development (albeit not ideal). The device is state of the art as it allows developers to create a prototype using a fully featured Pi, then transfer the code directly to a Pi Zero for use in end-user products/devices. These devices cost around $10-20.

## What Does it do? – Desktop Computer

Using Raspbian (a Debian-based computer operating system) the device can function similarly to a standard desktop computer. Raspbian includes a user interface with all the standard capabilities one would expect from an operating system. It contains pre-installed applications for browsing the web, word-processing, playing high-definition video and even various applications for programming and development. With just the addition of a keyboard, mouse and screen, a Raspberry Pi can serve as a very capable first computer, without the typical costs involved.

## What Does it do? – Development / Electronics / IoTs

The Raspberry Pi includes a set of general-purpose input/output (GPIO) pins – 26 on older models and 40-pin on the later. GPIO pins are very diverse, limited only by electrical, timing and software limitations. Third party add-ons can be used to increase the electrical and timing capabilities, such as motor controllers or power supplies. Features of this kind are state of the art for development and prototyping of electronical devices, such as IoTs. Using a Raspberry Pi, a developer can begin coding the software and prototyping electrical circuits right away, without the need for dedicating timing chips, SoCs or other parts. This is beneficial in reducing time, effort and cost(s).

Once a prototype is created and customisations are made, further cost saving measures can then be made. This may include switching to a Raspberry Pi Zero for use in the final product, keeping the cost of the final product down.

## What Does it do – The future?

Over recent years we’ve seen the Raspberry Pi creep into new markets previously held by only full desktop computers or specialty equipment/devices. A great example of this is the wide-spread adaption of Raspberry Pi’s as media PCs – eliminating the need of a dedicated desktop computer for this purchase. This is all thanks to the technology advancements in system on chips (SoC), allowing for more processing power at a heavily reduced cost.

Into the future these performance increases will continue – we’ll see higher CPU clock speeds, faster GPUs and more RAM. Much faster processors are already seen in some mobile devices, showing the technology is available, though is currently price and supply limited. As further advancements are made, the price of these currently high-end chips will fall, allowing for them to be used for lower-cost applications such as Raspberry Pi’s. The use scenarios as performance increases are almost never-ending. In the future we could see consumers using Raspberry Pi’s to power laptop-like devices, serving as a stand-alone replacement to a traditional laptop.

## What Impact Does the Raspberry Pi Have?

The main impact Raspberry Pi has had is increasing both education and interest in computers and electronic development. In current times, Raspberry Pi’s are often seen as part of advanced computing classes in schools. The Raspberry Pi Foundation themselves believe their biggest impact is the ‘tinker-friendly’ nature of the product. They state this encourages more people to experiment with computers once again, something which was lost slightly with how simplistic and user-friendly computers are today (Richardson, 2016). In the future I believe Raspberry Pi will become available in more schools and as part of more IT courses. This will allow an increased number of students to gain further interests in the tinkering and hacking side of information technology, development and electronics.

In terms of specific use scenarios, the Raspberry Pi is slowly creeping into the home media space. Using programs like Kodi (a media center application), Raspberry Pi’s can serve as fully functional media centers, all at a very reasonable price. This use scenario could potentially impact the media player market, specifically things like ChromeCast, AndroidTV, etc. Raspberry Pi’s are also commonly used as game console emulators, allowing for a variety of games to be played on the one device. In this scenario, the Raspberry Pi typically costs less than even a single console, let alone all which it emulates. This use scenario appears to be very popular, with searches for RetroPie (the software typically used) peaking each time a new Raspberry Pi is released. (Google Trends, 2019)

## How Will Raspberry Pi Affect Me?

Currently I own a Raspberry Pi 3 B+ which is used as a media PC, running Kodi. For my family/friends this serves as a more user-friendly and faster media center when compared to other options such as AndroidTV or TV USB Ports. Playing to the device is as simple as right-clicking a media file in Windows and clicking **cast-to: *Kodi***. For me personality, my Raspberry Pi has reignited an interest in tinkering and programming/development, especially development involving electronics. The GPIO pins have been wonderful for use with various electronics such as LEDs, small motors and sensors. In the future Raspberry Pi and similar technology will be greatly helpful to me when developing *Internet of Things* (IoTs) and other small electronical devices, allowing me to experiment with the development and programming of such devices. In the future, as more powerful Raspberry Pi’s become available, the technology will further impact other areas of my life by replacing existing technologies. This may include things like gaming consoles, various typical desktop computer applications and possibly even server-like/cloud hosting use applications, replacing existing servers at a reduced running cost.

# References

Raspberry Pi Foundation, R*aspberry Pi 3 Model B+ Specifications, viewed 03 April 2019 <*https://www.raspberrypi.org/products/raspberry-pi-3-model-b-plus/>

Google Trends, 2019. *Google Trends - Searches for retropie, viewed 04 April 2019* <https://trends.google.com/trends/explore?date=2016-01-06%202019-04-02&q=retropie>

Richardson, M 2016. MagPi Magazine. *The Impact of Ten Million*, October, p. 96. viewed 7 April 2019 <https://www.raspberrypi.org/magpi-issues/MagPi50.pdf/>