

# Raspberry Pi Report

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## **Abstract**

A brief description of what led to Raspberry Pi's innovation followed by its advantages and disadvantages. Also explaining the various components on the Raspberry Pi model.

## **1 Introduction to Raspberry Pi**

**Brief History** Eben , Rob, Jack and Alan, along with Pete Lomas, MD of hardware design and manufacture company Norcott Technologies, and David Braben, co-author of the seminal BBC Micro game Elite, collaborated to form the Raspberry Pi Foundation to make it a reality. The Raspberry Pi is a series of credit card-sized single-board computers developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools.

## **2 Hardware Specifications along with understanding**

The specifications of the Raspberry Hardware are as follows:

- HDMI + Composite video out
- Powered off 5V, 700ma(500ma on Model A)
- 700Mhz ARM v6 Broadcomm CPU+GPU.
- 512 MB RAM (256MB on Model A)

- Boots off SD card for filesystem
- Measures 85.60mm x 56mm x 21mm (or roughly 3.37 x 2.21 x 0.83), with a little overlap for the SD card and connectors which project over the edges. It weighs 45g.

## 2.1 Processor

The Raspberry Pi is based on the Broadcom BCM2835 system on a chip (SoC). Processor Specifications:

- It has a Level 1 cache of 16 KB and a Level 2 cache of 128 KB.
- The Level 2 cache is used primarily by the GPU.
- The SoC is kept underneath the RAM chip.

## 2.2 The concept of overclocking

The first generation Raspberry Pi chip operated at 700 MHz and the second generation operated at 900 MHz. Both did not become hot enough to need a heatsink or special cooling. Most Raspberry Pi's should be overclocked at 800 MHz or maximum at 1000 MHz. Still more a maximum limit of 1500 MHz can be achieved. The overclocking options on boot can be done by a software command running "sudo raspi-config". The Pi automatically shuts the overclocking down in case the chip reaches 85 C (185 F). The five known presets that can be used for this purpose are:

- none; 700 MHz ARM, 250 MHz core, 400 MHz SDRAM, 0 overvolt,
- modest; 800 MHz ARM, 250 MHz core, 400 MHz SDRAM, 0 overvolt,
- medium; 900 MHz ARM, 250 MHz core, 450 MHz SDRAM, 2 overvolt,
- high; 950 MHz ARM, 250 MHz core, 450 MHz SDRAM, 6 overvolt,
- turbo; 1000 MHz ARM, 500 MHz core, 600 MHz SDRAM, 6 overvolt

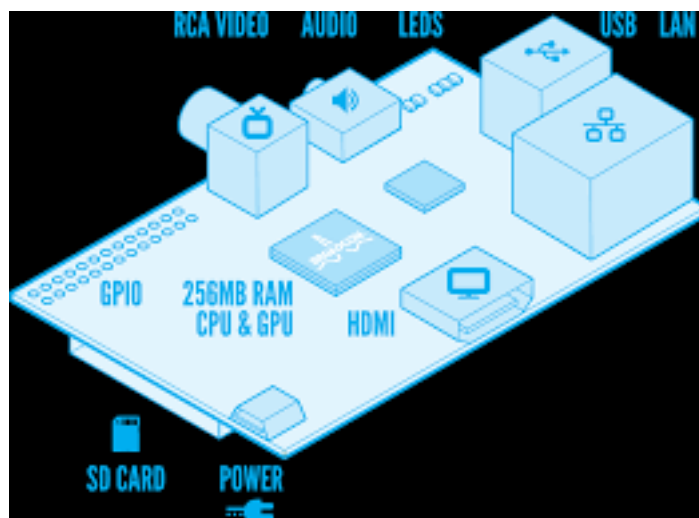


Figure 1:

## 2.3 RAM

On the older beta model B boards 128 MB was allocated by default to the GPU, leaving 128 MB for the CPU. On the first 256 MB release model B (and model A), three different splits were possible as follows:

- The default split was 192 MB (RAM for CPU), which should be sufficient for standalone 1080p video decoding, or for simple 3D, but probably not for both together.
- 224 MB was for Linux only, with just a 1080p framebuffer.
- 128 MB was for heavy 3D, possibly also with video decoding

## 2.4 Networking

The models A and A+ do not have an Ethernet port but they can be connected to a network using an external user-supplied USB Ethernet or Wi-Fi adapter. On the model B and B+ the Ethernet port is provided by a built-in USB Ethernet

### 3 Operating Systems

The Raspberry Pi primarily uses Linux-kernel-based operating systems. The ARM11 chip used by Pi is based on version 6 of the ARM. It is not possible to run Windows on the original Raspberry Pi, though the new Raspberry Pi 2 will be able to run Windows 10. The Raspberry Pi 2 currently only supports Ubuntu Snappy Core, Raspbian, OpenELEC and RISC OS. The install manager for the Raspberry Pi is NOOBS. The operating systems included with NOOBS are:

- Archlinux ARM
- OpenELEC
- Pidora (Fedora Remix)
- Puppy Linux
- Raspbmc and the XBMC open source digital media center.
- RISC OS The operating system of the first ARM-based computer

### 4 Advantages

Advantages:

- A large RAM + Storage which enables us to perform more advanced algorithms
- Easy to debug.
- Easy and quick change in programs possible.
- A large number of softwares available for linux that work on the Pi
- Successful with a large number of GUI
- Network connectivity and remote access

## 5 Disadvantages

- Not Real Time
- Not advisable for those not well versed with Linux .
- No analog inputs, not protected GPIO
- Not as many pins as Arduino Uno.
- Very low input voltage tolerance (4.8-5.2V)

## 6 References:

- "BCM2835 Media Processor; Broadcom". Broadcom.com.
- Cellan-Jones, Rory "A 15 computer to inspire young programmers". BBC News.
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- "Raspberry Pi Compute Module: new product!". raspberrypi.org.