

# Raspberry Pi a Tiny Computer

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**Abstract** - The computer is now a luxury but a necessary in today's world the computer has now become a personal computer with the introduction of microcontrollers and integrated circuits. raspberry pi is a credit-card sized computer aimed at providing a computer to every one on the planet. it is aimed at teaching computer concept while being low at price. raspberry pi is intended to provide a base on which kids can learn programming while enthusiasts can make various projects. it serves as an efficient base due to its low cost and number of interfaces available.

The main aim of this seminar is to study raspberry pi and its applications. this seminar is carry as a part of subject in the curriculum of computer science of calicut university. this seminar is limited to study of the raspberry pi from the various source without a practical implementation.

**Index Terms:** History behind pi, Technical features of pi, System on chip, Graphic processing unit, Memory unit, How it helps us to get into action, raspberry pi software support, raspberry pi hardware support

## I. INTRODUCTION

I have gathered more information about the raspberry pi. Which 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 that enables people of all ages to explore computing, and to learn how to program in languages like. What's more the raspberry pi has the ability to interact with the outside world and has been used in a wide array of digital maker project's ,from music machines and parent deteters to whether stations and tweeting birdhouse with infrared cameras, we went to see the raspberry pi being used by kids all over the world to learn to program and understand how computers work.

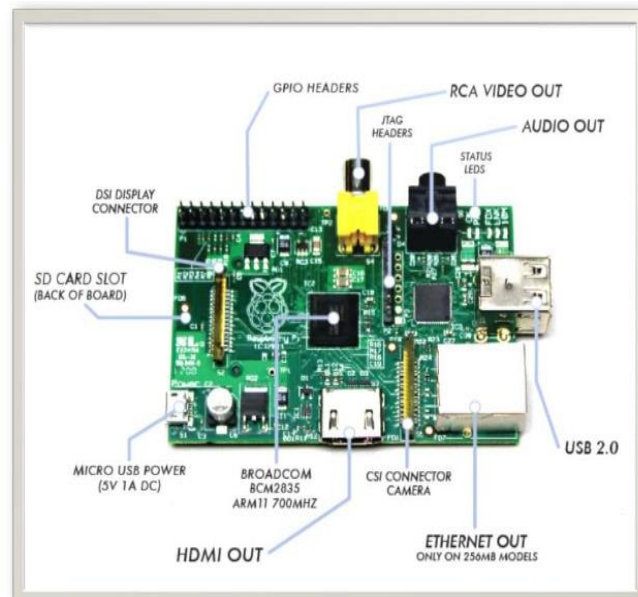


Figure 1:Motherboard of Rasberry Pi

## II. HISTORY BEHIND PI

- A. Eben upton first came up with the idea for raspberry pi in 2006,when he and his colleagues at the university of Calicut computer laboratory were frustrated by the dwindling number of students, and the poor skill levels of those students, entering the program.
- B. Upton wanted to create a cheap, easily programmable computer that would bring back the experimental spirit of an earlier era of computing, by making a device cheap enough so anyone could tamper with it without fear of expensive mistakes.

## III. TECHNICAL FEATURES OF PI

Dimensions 8.6cm x 5.4cm x 1.7cm chip Broad com BCM2835 SoC full HD multimedia applications processor CPU 700MHz Low Power ARM1176JZ-F applications processor GPU dual core video core IV multimedia co-processor memory 512MB SDRAM Ethernet on-board 10/100 ethernet RJ45 jack USB 2.0 dual USB connector video output HDMI(rev 1.3&1.4)composite RCA(PAL and NTSC)audio output 3.5mm jack, HDMI on board storage SD,MMC,SDIO card slot PI is available in two modules A and B

## Technical features of PI:-

PI is available in two modules A and B



Dimensions	8.6cm x 5.4cm x 1.7cm
Chip	Broadcom BCM2835 SoC full HD multimedia applications processor
CPU	700 MHz Low Power ARM1176JZ-F Applications Processor
GPU	Dual Core VideoCore IV® Multimedia Co-Processor
Memory	512MB SDRAM
Ethernet	on-board 10/100 Ethernet RJ45 jack
USB 2.0	Dual USB Connector
Video output	HDMI (rev 1.3 & 1.4) Composite RCA (PAL and NTSC)
Audio output	3.5mm jack, HDMI
Onboard Storage	SD, MMC, SDIO card slot

Figure 2: Technical Features of PI

### IV. SYSTEM ON CHIP

- The raspberry pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor
- The SoC is a Broadcom BCM2835, this contains an ARM1176JZFS, with floating point, running at 700MHz; and a video core 4 GPU.
- The GPU is capable of blu-ray quality playback, using H.264 at 40MBits/s. it has a fast 3D core accessed using the supplied OpenGL ES2.0 and open VG libraries.

### V. GRAPHIC PROCESSING UNIT

- Video core is a low-power mobile multimedia processor architecture originally developed by alphasoic Ltd and now owned by Broadcom.
- Its two-dimensional DSP architecture makes it flexible and efficient enough to decode as well as encode a number of multimedia codecs in software, while maintaining low power usage.
- The video core I-based VC01 provides video and multimedia capabilities to various Samsung phones.
- The VC02/BCM2722 processor provides video capabilities for apple's 5<sup>th</sup> generation i pod.
- The video core III-based BCM2727 processor provides video, still and 3D graphics capabilities for the Nokia N8.6. the video core IV BCM2763 processor improves on the video core III with support for 1080p encode and decode, along with higher resolution camera support and faster 2D and 3D graphics, all at very low power.

### VI. MEMORY UNIT

Synchronous dynamic random access memory (SDRAM) is dynamic random access memory (DRAM) that is synchronized with the system bus.

- The module-A has 256 megabytes of SDRAM, module-B later upgraded to 512MB.
- It does not include a built-in hard disk, but uses an SD card for booting and long-term storage.
- All the files necessary for booting are installed in a FAT32 partition of the SD card. the raspberry pi has to have an SD card installed to boot from, but a USB HD can "take over" after the initial boot. you cannot

### VII. HOW IT HELPS US TO GET INTO ACTION

- once we got this board, we can connect the accessories which is necessary for us, so here we will get the clear picture inside the CPU, because we are only assembling the computer, no one else.
- Normal motherboard cost around 6K to 7K without the processor but PI gives us board with processor within 2K to 3K, so obviously it's very cheap, we don't have to bother about the cost, the cost problem is solved.
- We only need USB TO MICRO USB cable for power up the PI, no need of SMPS anymore, HARD DISK DRIVE is optional because it support SD card as a secondary storage device.
- If the users bored with one operating system they can shift to another OS only by changing the SD card, it boots directly from SD card.

### VIII. RASPBERRY PI SOFTWARE SUPPORT

There are several official distributions available on official downloads page. New users will find the NOOBS installer the easiest to work with, as it walks you through the download and installation of a specific distro. The recommended distro is raspbian, which is specially designed for the raspberry pi and which our engineers are always optimizing; but it is a straightforward process to replace the root partition on the SD card with another ARM Linux Distro, so we encourage you to try out several distro to see which one you like the most. the OS is stored on the SD something had changed the way kids were interacting with computer. There isn't much any small group of people can do to address problems like an inadequate school curriculum or the end of a financial bubble.

### IX. RASPBERRY PI HARDWARE SUPPORT

The model B and model B+ version of the device have built in 10/100 wired Ethernet. there is no Ethernet on the model A version. no model of the raspberry pi has built in Wi-Fi, but all three can support a USB Wi-Fi dongle. the SoC does not support native Wi-Fi, and adding an addition built in Wi-Fi chip would greatly increase the cost of the

raspberry pi .the Ethernet is attached via the USB 2.0 bus, so the upstream bandwidth would not support gigabit.



Figure 3: Raspberry Pi Motherboard

#### X. APPLICATION

Can be used for making supper computers.

#### XI. ADVANTAGES

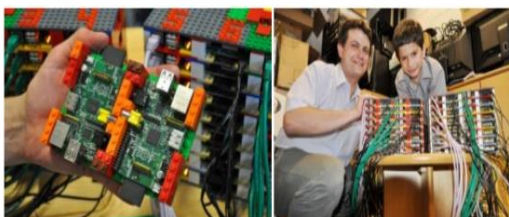
- A. This microcomputer is useful for small or home based businesses that run on a smaller budget than bigger companies for you are not required to purchase any special licenses from the raspberry pi foundation to use their product or if you invent new technology that embeds the product.
- B. The product does not require the user to have extensive programming experience since it is aimed for the younger generation to learn about programming.
- C. The product is energy efficient and provides a greener ethical alternative to small businesses. this small credit card sized product makes it easy to recycle and does.

#### XII. DISADVANTAGES

#### Applications



- Can be used for making super computers



Raspberry Pi Medical Device Input Shield



Figure 4: Applications

- A. It does not have a hard disk associated with it for permanent storage pi files, we have to connect one externally or have to use SD card for the pupose.
- B. The RAM is a POP package on top of the SoC ,so it's not removable or swappable.
- C. There is no real time clock associated with the board .adding an RTC is expensive .you can add one yourself using the GPIO pins.

#### XIII. CONCLUSION

Raspberry pi is an innovative product. the sheer number of users and fan base support the fact that the device can see a great future ahead. the device can sureiy help anyone who really wants to lean electronics and computers.

Increasing the processing power can surrely help the product in the future. also supplying a case and a proper instruction manual will improve the product. Also currently windows operating systems are not compatible because of the ARM processor is improved or any workaround is found to run windows directly on the raspberry pi , then it can be a great step for the pi.

The raspberry pi is an amazing piece of hardware because of the combination of the features of traditional computer and an embedded device. finally it can be said that raspberry pi can be effectively used if it's processing power is kept in mind. it can work as a personal computer but cannot replace it.

#### REFERENCE

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