Guide#raspiSerie_01_PI_TOUR

Meet the Raspberry Pi!!! - 01 #raspiSerie

After doing a quick experiment with Raspi, we will examine it thoroughly !!! Lets get to work!!
The credit card-size Raspberry Pi microcomputer has been one of the most talked-about devices since it first hit the scene in early 2012. Originally intended to teach students about computer science, the device has sold more than 2 million units and has become a must-have for tech hobbyists.

The Raspberry Pi can be used for a variety of do-it-yourself projects. Enthusiasts have built it into a media-streaming platform, a home automation hub, or even a retro game console, among other things.

Why PI?

-Big difference in price - between 20 and 35 US$; ones gets something this cheap that does most of the things your main machine can do;
-A combination of design decisions to balance features with cost that makes it a fantastic platform;
-Its an ARM-based CPU that drawn less power than Intel/AMD at its core;
-ARM really came from the embedded hardware industry where power usage and heat generation are a really big deal... think about those huge cooling fan for any Intel or AMD CPU!
-ARM is in almost every modern cellphone including the iPhone 4s and Samsung Galaxy S3. In fact they are one of the most widely used processors in the world and can be found in all manner of devices such as DVD players, appliances, and even cars;
-Microsoft announced that Windows 8 would support ARM processors. This is not overly surprising
as ARM is present in practically every modern mobile device; it probably won’t be long before we start to see more
powerful desktops being powered by these beasts.
-The Pi has a very modest power footprint. In fact, the Model A Pi only draws 300ma, which means you can power the
whole thing from your USB port. According to Apple, a iMac draws 94 watts at idle and up to 241 watts when the
CPU is maxed out. The Model A Pi draws at most 1.4 watts, and the Model B draws at most 3.5. That’s an awful lot of
power saved;
-The last benefit is really a cost-to-performance ratio; the real bottleneck is not CPU power but how fast data can be fed to it; all the computer components together can’t keep up with even a modest CPU. So what do you get out of this? A low-cost processor that almost certainly will do everything you need without the cost penalty.
-Remember, the Pi is meant as an experimentation platform, not as a general PC replacement.

Two Flavous

Pi is available in two flavours: Model A e Model B.
These boards are priced between 20 and 35 US$. A cut down "compute" model was released in April 2014, and a Pi Zero with smaller size and limited input/output (I/O),
general-purpose input/output (GPIO), abilities released in November 2015 for 5 US$.

Making yourself Familiar w/ Connectors & Raspi Capabilities

Before you start the Raspberry Pi for the first time, you should make yourself familiar with its connectors and its capabilities.
Let’s start with a quick tour of what you’re looking at when you take it out of the box.

1. The Processor. At the heart of the Raspberry Pi is the same processor you would have found in the iPhone 3G and the Kindle 2, so you can think of the capabilities of the Raspberry Pi as comparable to those powerful little devices. This chip is a 32 bit , 700 MHz System on a Chip - SoCs, which is built on the ARM11 architecture.
ARM arch?
ARM chips come in a variety of architectures with different cores configured to provide different capabilities at different price points. The Model B has 512MB of RAM and the Model A has 256 MB. (The first batch of Model Bs had only 256MB of RAM.)

Broadcom chip?
All models feature a Broadcom system on a chip (SoC), which includes an ARM compatible central processing unit (CPU) and an on chip graphics processing unit (GPU, a VideoCore IV). CPU speed ranges from 700 MHz to 1.2 GHz for the Pi 3 and on board memory range from 256 MB to 1 GB RAM.

What is a SoC?
SoC is short for System on a Chip, an integrated circuit that combines all the primary components of a computer into a single chip. Think of your CPU, graphics card, memory controller and other components all rolled into a single chip, that’s essentially an SoC. This way, handset manufactures can simply drop this chip in their device and reap the benefits of the chipset straight away, rather than having to implement the CPU, GPU, etc. manually. Below, we have two popular SoCs, the first being an Nvidia Tegra 3 and the second, a Qualcomm Snapdragon S4 SoC.

2. The USB port. On the Model B there are two USB 2.0 ports, but only one on the Model A. Some of the early Raspberry Pi boards were limited in the amount of current that they could provide. Some USB devices can draw up 500mA. The original Pi board supported 100mA or so, but the newer revisions are up to the full USB 2.0 spec. You can use a powered external hub if you have a peripheral that needs more power.

3. Power input. On of the first things you’ll realize is that there is no power switch on the Pi. This microUSB connector is used to supply power (this isn’t an additional USB port; it’s only for power). MicroUSB was selected because the connector is cheap USB power supplies are easy to find.

4. Ethernet port. The model B has a standard RJ45 Ethernet port. The Model A does not, but can be connected to a wired network by a USB
Ethernet adapter (the port on the Model B is actually an onboard USB to Ethernet adapter). WiFi connectivity via a USB dongle is another option.

5. HDMI connector. The HDMI port provides digital video and audio output. 14 different video resolutions are supported, and the HDMI signal can be converted to DVI / RCA (used by many monitors), composite (analog video signal usually carried over a yellow RCA connector), or SCART (a European standard for connecting audio-visual equipment) with external adapters.

6. The Display Serial Interface (DSI) connector. This connector accepts a 15 pin flat ribbon cable that can be used to communicate with a LCD or OLED display screen.

7. The Camera Serial Interface (CSI) connector. This port allows a camera module to be

connected directly to the board.

8. General Purpose Input and Output (GPIO) and other pins. We will show you in the next installments of #piSeries how to use these pins to read buttons and switches and control actuators like LEDs, relays, or motors. Be patient, please!!!

9. Status LEDs. The Pi has five indicator LEDs that provide visual feedback.
The five status LEDs:
ACT Green Lights when the SD card is accessed (marked OK on earlier boards)
PWR Red Hooked up to 3.3V power
FDX Green On if network adapter is full duplex
LNK Green Network activity light
100 Yellow On if the network connection is 100Mbps (some early boards have a 10M misprint)

10. GTAG - P2 and P3 headers. These two rows of headers are the JTAG testing headers for the Broadcom chip (P2) and the LAN9512 networking chip (P3). Because of the proprietary nature of the Broadcom chipset, these headers probably won't be of much use to you.

11. Analog Audio output. This is a standard 3.5mm mini analog audio jack, intended to drive high impedance loads (like amplified speakers). Headphones or unpowered speakers won't sound very good; in fact, as of this writing the quality of the analog output is much less than the HDMI audio output you'd get by connecting to a TV over HDMI. Some of this has to do with the audio driver software, which is still evolving.

The Proper Peripherals:

12. An SD Card. You'll need at least 4GB, and it should be a Class 4 card. Class 4 cards are capable of transferring at least 4MB/sec. Some of the earlier Raspberry Pi boards had problems with Class 6 or higher cards, which are capable of faster speeds but are less stable. A microSD card in an adapter is perfectly usable as well. The Secure Digital (SD) Card slot. You'll notice there's no hard drive on the Pi; everything is stored on an SD Card. One reason you'll want some sort of protective case sooner than later is that the solder joints on the SD socket may fail if the SD card is accidentally bent.

13. A power supply. This is the most important peripheral to get right; you should use a microUSB adapter that can provide 5V and at least 700mA of current (500mA for the Model A). A cell phone charger won't cut it, even if it has the correct connector. A typical cell phone charger only provides 400mA of current or less, but check the rating marked on the back. An underpowered Pi may still seem to work but will be flaky and may fail unpredictably.

14. An HDMI cable. If you're connecting to a monitor you'll need this, or an appropriate adapter for a DVI monitor. You can also run the Pi headless, as described later in our next experiments. HDMI cables can vary wildly in price. If you're just running a cable three to six feet to a monitor, there's no need to spend more than $3 USD on an HDMI cable. If you are running long lengths, you should definitely research the higher quality cables and avoid the cheap generics.

15. Ethernet cable. Your home may not have as many wired Ethernet jacks as it did five years ago. Since everything is wireless these days, you might find the wired port to be a bit of a hurdle, but we do during our experiments the wire removal to rid the cables and wires very soon.

16. Composite video out. This is a standard RCA-type jack that provides composite NTSC or PAL video signals. This video format is extremely low-resolution compared to HDMI. If you

have a HDMI television or monitor, use it rather than a composite television.

17. Power input. On of the first things you'll realize is that there is no power switch on the Pi. This microUSB connector is used to supply power (this
isn't an additional USB port; it's only for power). MicroUSB was selected because the connector is cheap USB power supplies are easy to find.

Others Peripherals:

A Powered USB Hub A USB 2.0 hub is recommended.

Heatsink A heatsink is a small piece of metal, usually with fins to create a lot of surface area to dissipate heat efficiently. Heatsinks can be attached to chips that get hot. The Pi's chipset was designed for mobile applications, so a heatsink isn't necessary most of the time. However, as we'll see later there are cases where you may want to run the Pi at higher speeds, or crunch numbers over an extended period and the chip may heat up a bit. Some people have reported that the network chip can get warm as well.

Real Time Clock
You may want to add a Real Time Clock chip (like the DS1307) for logging or keeping time when offline.

Camera module
An official 5 megapixel Raspberry Pi camera module are available since 2013. Until then you can use a USB web cam

LCD display
Many LCDs can be used via a few connections on the GPIO header. LCDs that use the DSI interface will be available in 2013.

WiFi USB dongle
Many WiFi USB dongles work with the Pi; look for one that doesn't draw too much power.

Laptop dock
Several people have modified laptop docks intended for cell phones (like the Atrix lapdock) to work as a display/base for the Raspberry Pi.

The Case

You'll quickly find that you'll want a case for your Raspberry Pi. The stiff cables on all sides make it hard to keep flat, and some of the components like the SD card slot can be mechanically damaged even through normal use.

Distributions:

Raspbian
The "officially recommended" official distribution from the Foundation, based on Debian. Note that raspbian.org is a community site, not operated by the Foundation. If you're looking for the official distribution, visit the downloads page at raspberrypi.org.

Adafruit Raspberry Pi Educational Linux (Occidentalis)
This is Adafruit's Raspbian-based distribution that includes tools and drivers useful for teaching electronics.

Arch Linux

Arch Linux specifically targets ARM-based computers, so they supported the Pi very early on.

Xbian
This is a distribution based on Raspbian for users who want to use the Raspberry Pi as a media center (see also OpenELEC and Raspbmc).

QtonPi
A distribution based on the Qt 5 framework. In this work we will concentrate on the official Raspbian distribution.

Next Steps
In this page, you learned what all the connectors on the Pi are for, and you learned what additional devices you need and how to choose the right
ones. In the next page, we'll learn how to install the operating system and required configurations settings. Do not miss this next page!!! Bye!!! Thanks for reading this first settlement!!! Be sure to play the video!!!