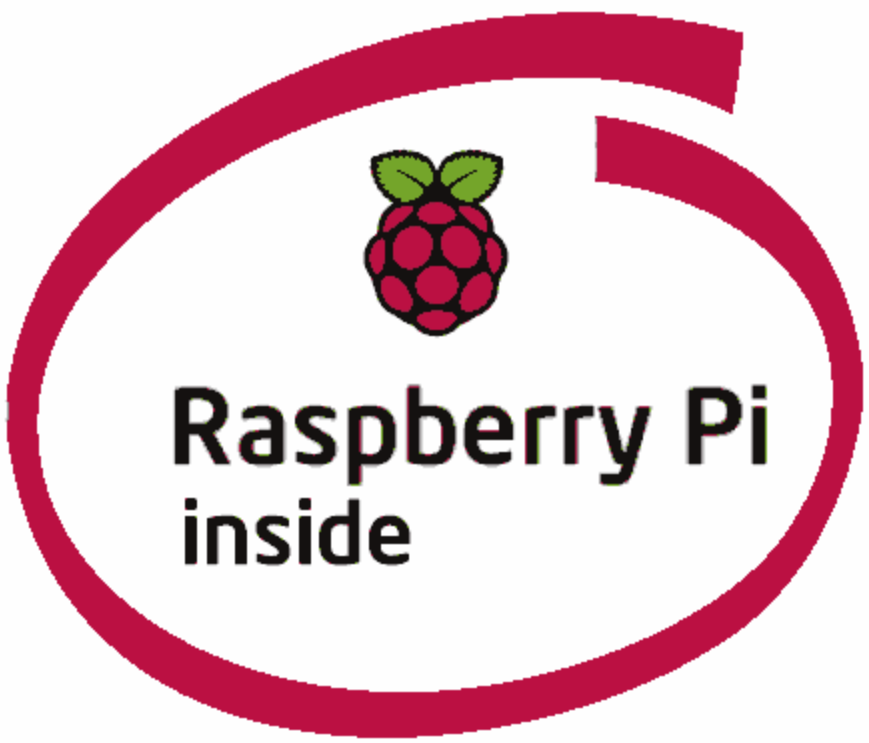
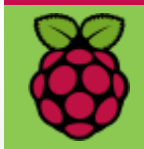


Raspberry Pi



WHY ARE YOU HERE?

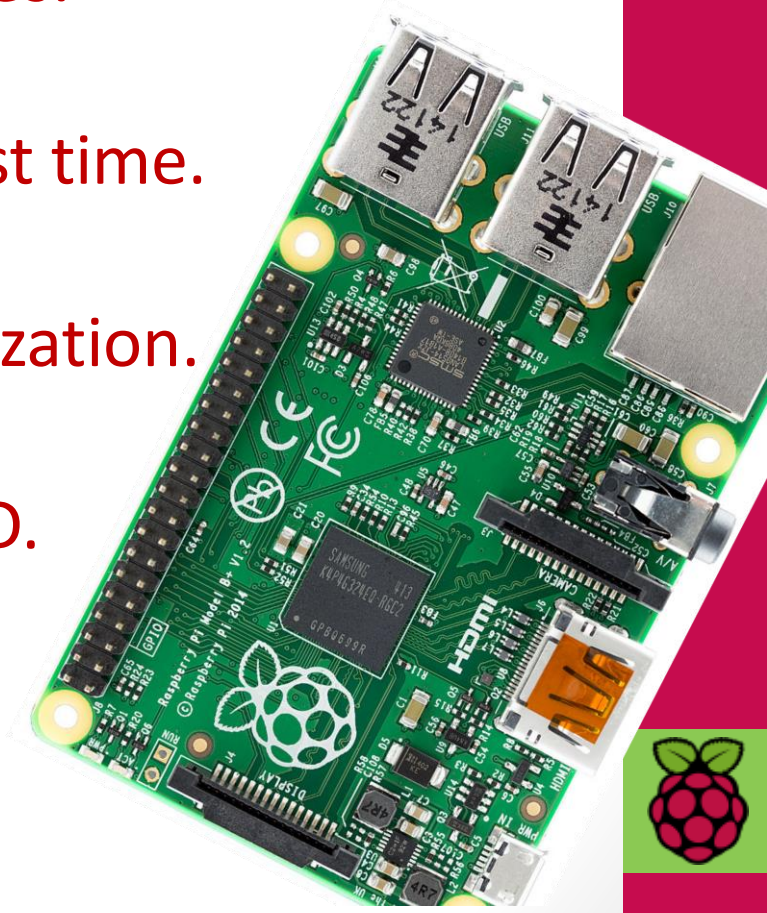
YOU:

- Enjoy “tinkering” with technology.
- Do not mind writing a little bit of code.
- Have experience in Linux, Robots, Sensors, etc.
- Recently announced you have an addiction to raspberry pi.

WHAT WILL I LEARN?

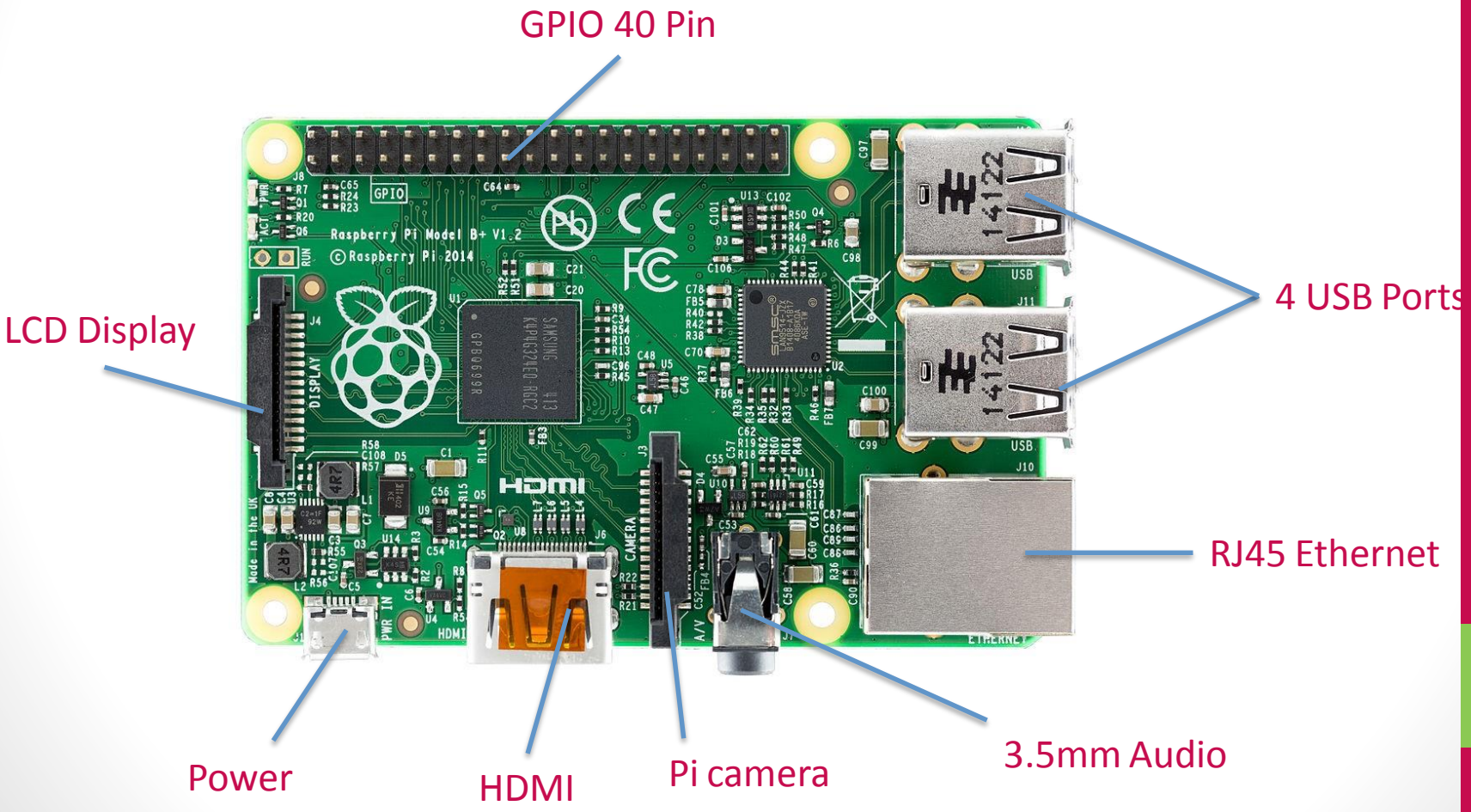
What a Raspberry Pi is and does.

- How to setup the Pi for the first time.
- Basic Commands and Familiarization.
- Setup your first sensor and LED.
- Pi Resources & Tutorials

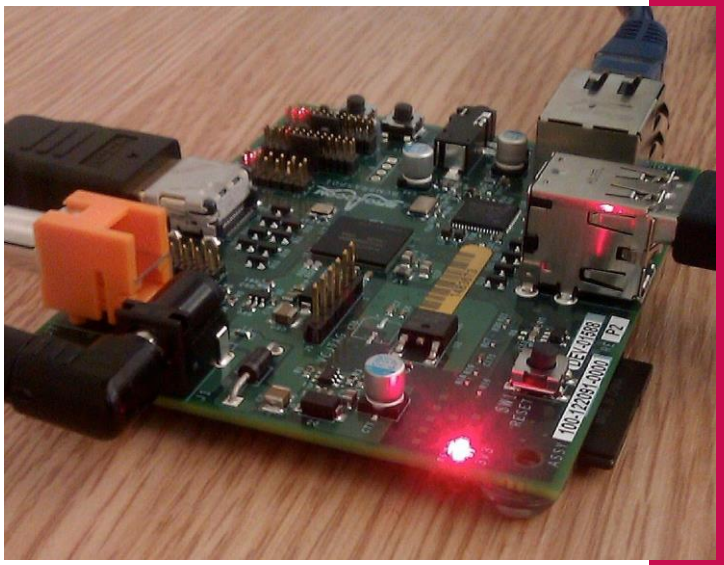


WHAT IS A RASPBERRY PI?

A low cost, **credit--card sized computer**



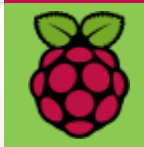
THE HISTORY OF PI



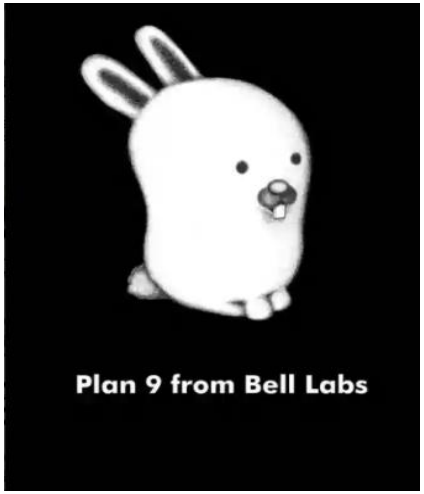
- Early concepts started in 2006.
- Based on Atmel ATmega644.
- Officially launched in 2012.
- Inspired by Acorn's BBC Micro from 1981.
- Original concept was to inspire and educate children in computers.

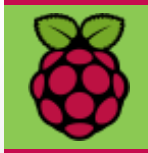
Raspberry Pi Model-A and B

	Model A	Model A+	Model B	Model B+
Price	US $25	US $20	US $35	
CPU:	700 MHz 32-bit single-core ARM1176JZF-S			
GPU:	Broadcom VideoCore IV			
Memory (SDRAM):	256 MB (shared with GPU)		512 MB (shared with GPU)	
USB 2.0 ports:	1		2	4
Onboard storage:	SD	MicroSD	SD	MicroSD
Onboard network:	None		10/100 Mbps Ethernet	
Power ratings:	1.5 W	1 W	3.5 W	3.0 W

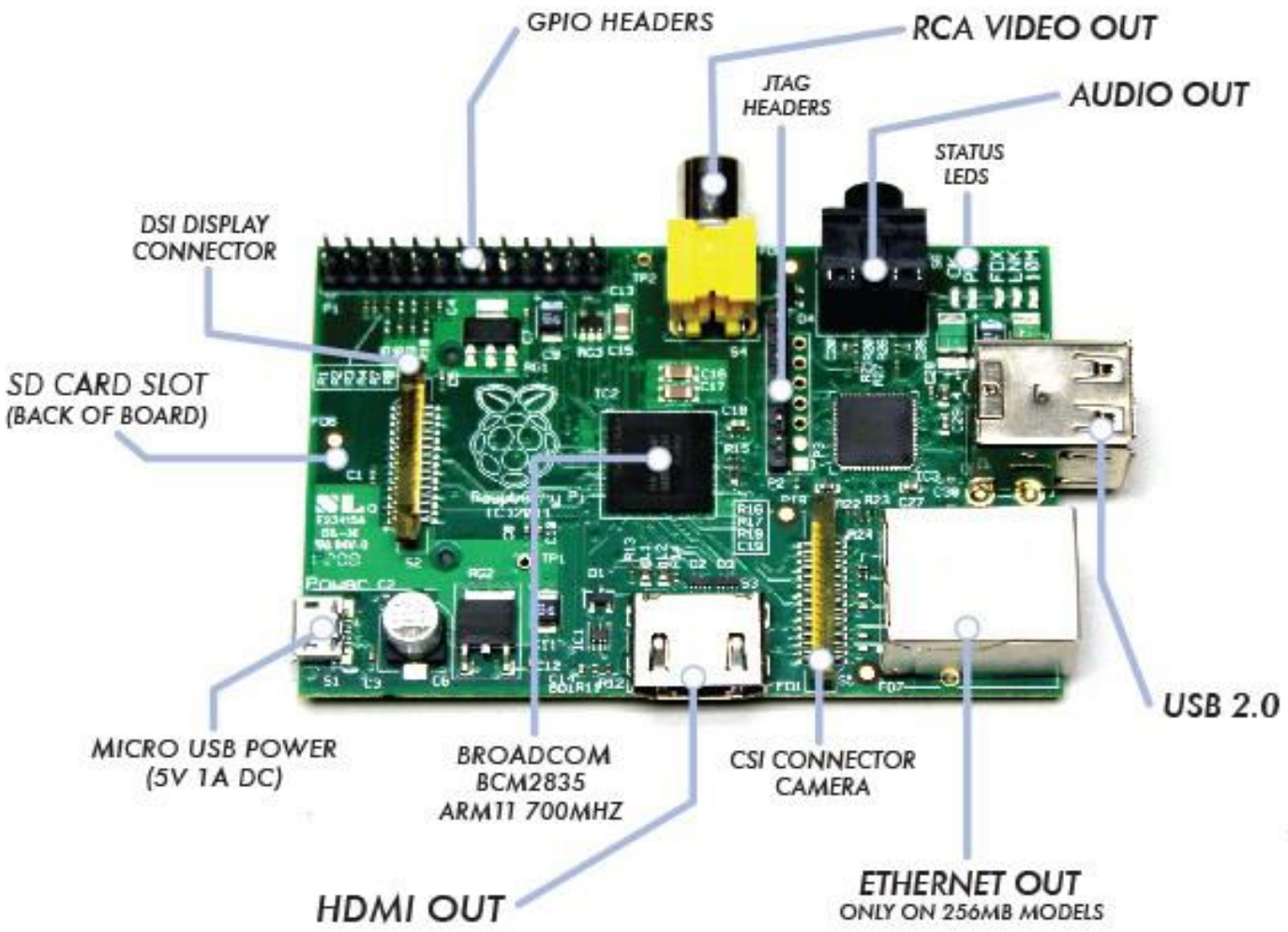


Operating Systems





Raspberry Pi hardware

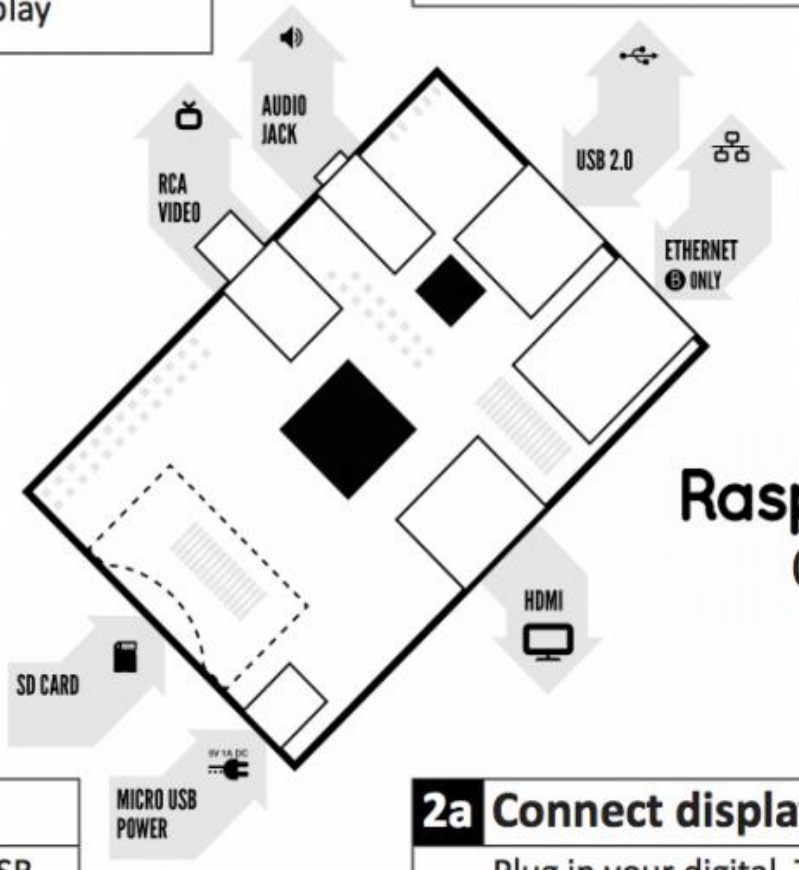


2b Connect display

If *not* using HDMI, plug in your analogue TV or display

3 Connect input

Plug in a USB keyboard and mouse



4 Connect network

Connect to your wired network [optional]

Raspberry Pi Quick start

1 Insert SD card

See page 3 for how to prepare the SD card

5 Power up

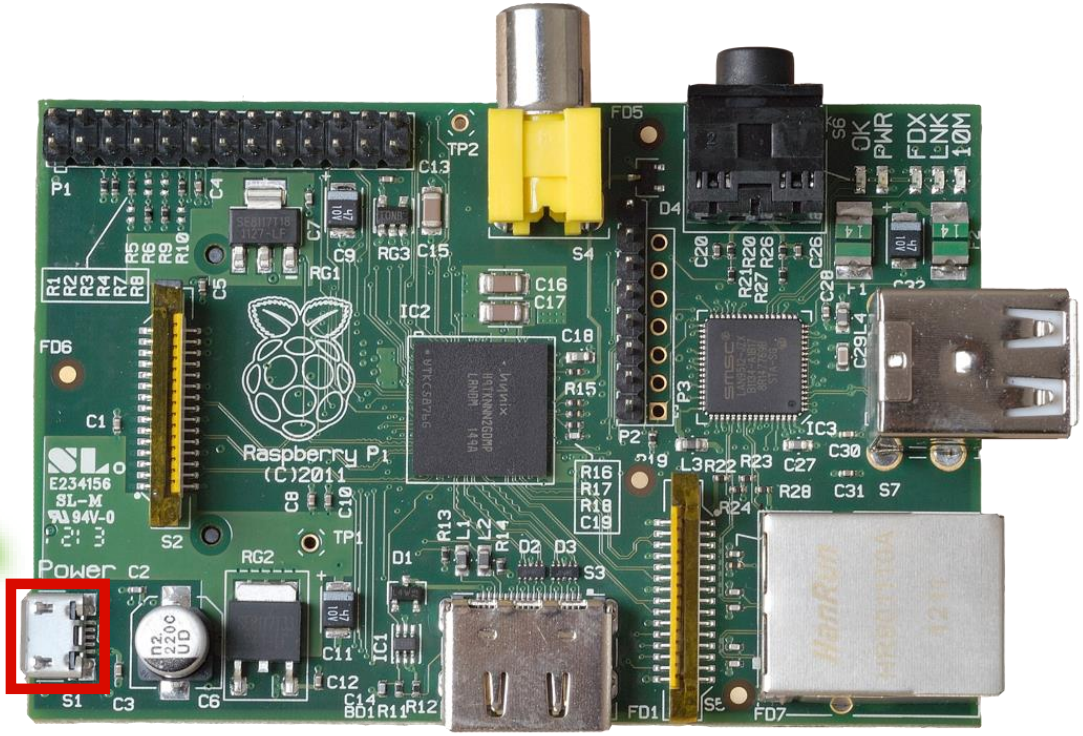
Plug in the micro USB power supply

2a Connect display

Plug in your digital TV or monitor

Power

5v micro USB connector

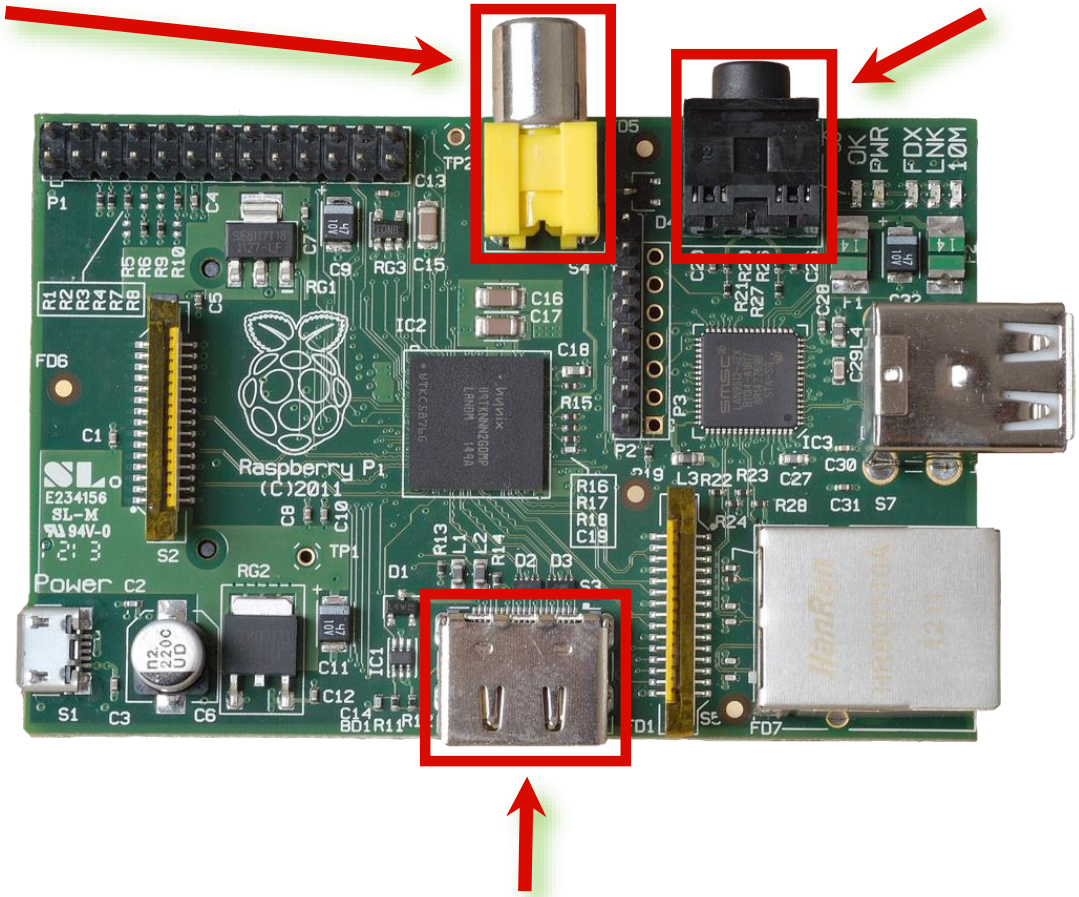


(Similar to the one on a lot of mobile phones!)

A/V (Audio/Video)

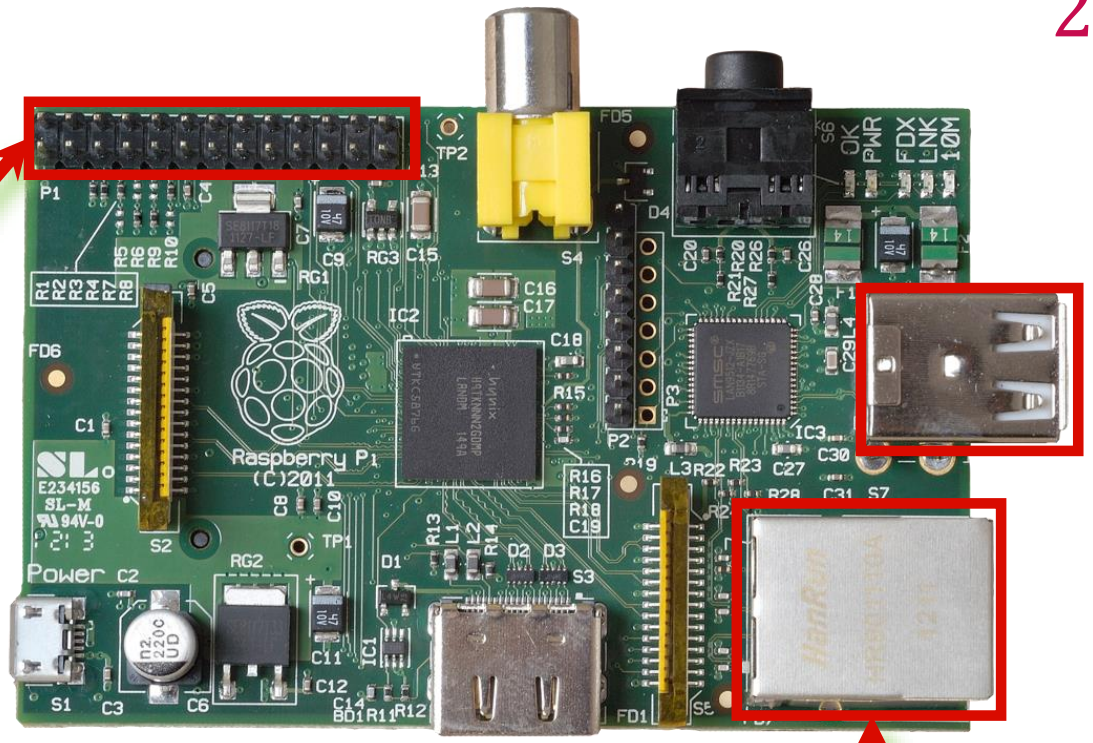
3.5mm Audio Standard headphone socket

RCA Video (works with most older TVs)



HDMI Audio & Video
(works with modern TVs and DVI monitors)

Connectivity



GPIO (General Purpose Input & Output)

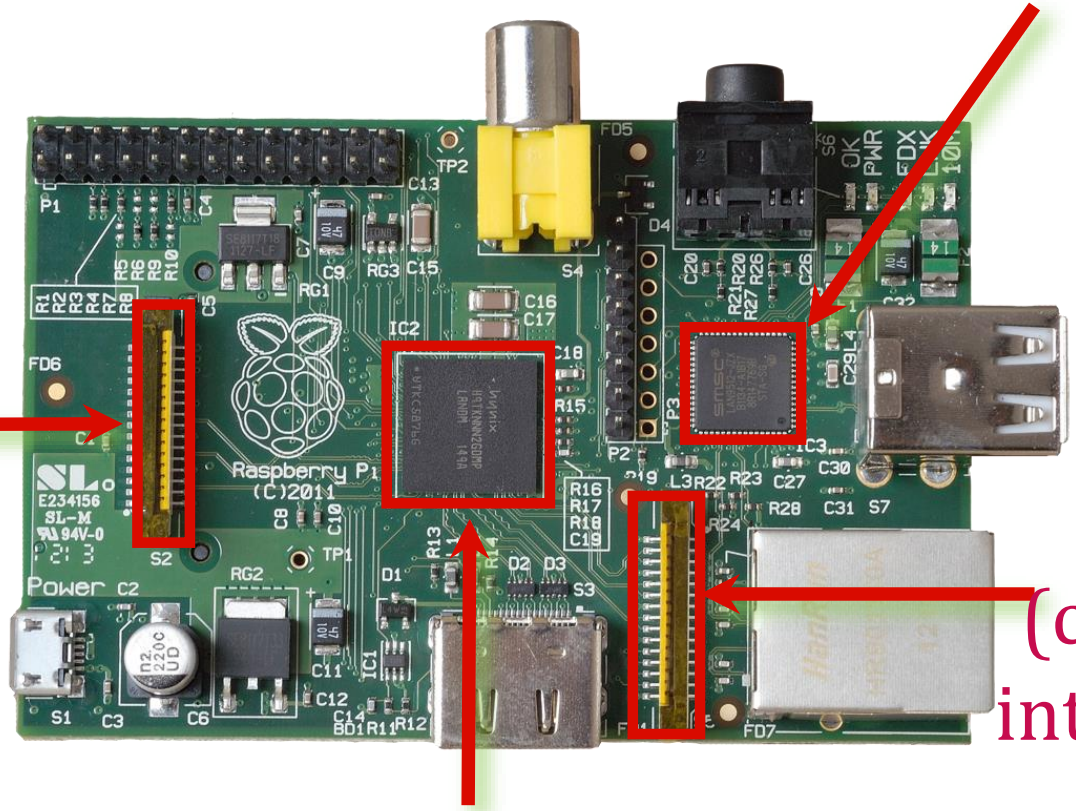
2 x USB ports

10/100Mb Ethernet

Internals

LAN Controller

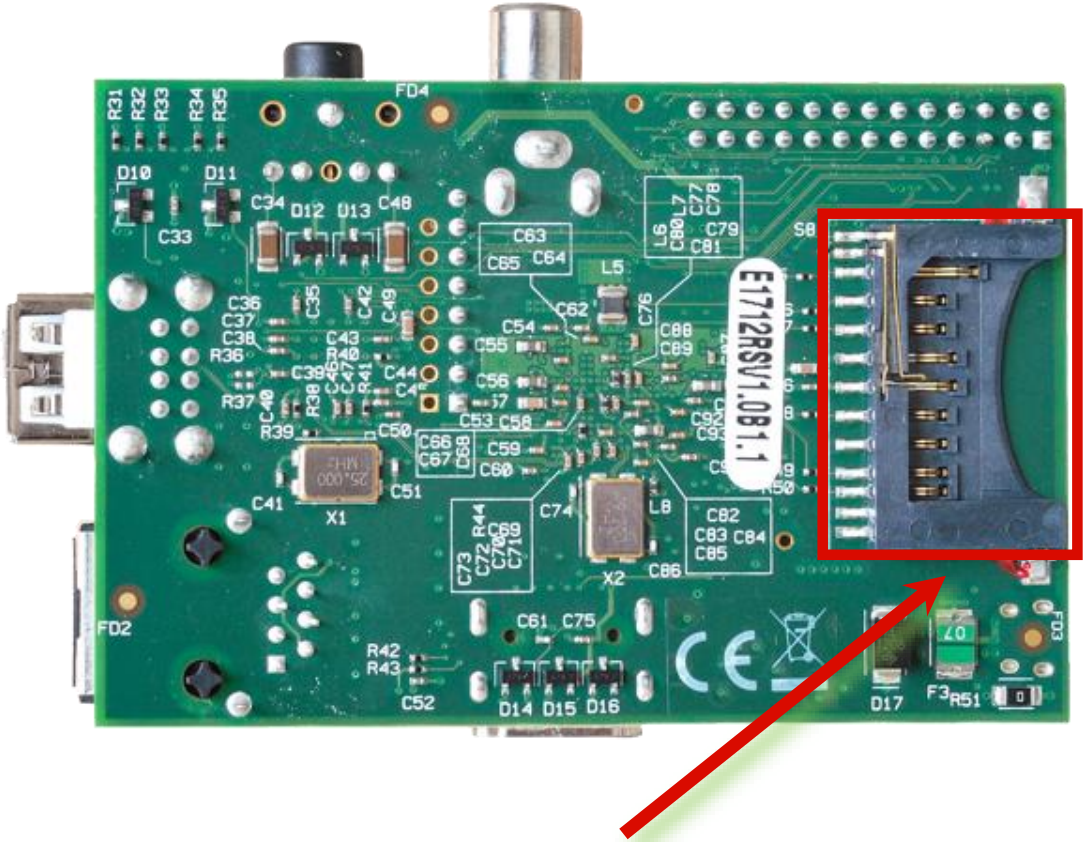
DSI (display interface)



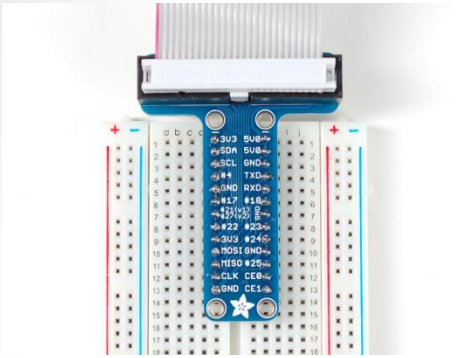
CSI (camera interface)

SOC (System On a Chip)
Broadcom BCM2835 700Mhz

Storage

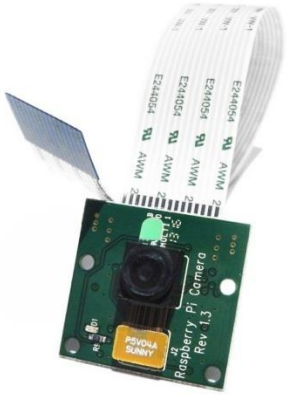


SD Card Slot
(supports SD cards up to 32GB)



GPIO

DSI LCD with connector



CSI camera with connector

SD

MicroSD

3.5mm audio jack

USB 2.0

Micro USB

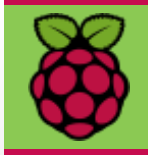
HDMI connector

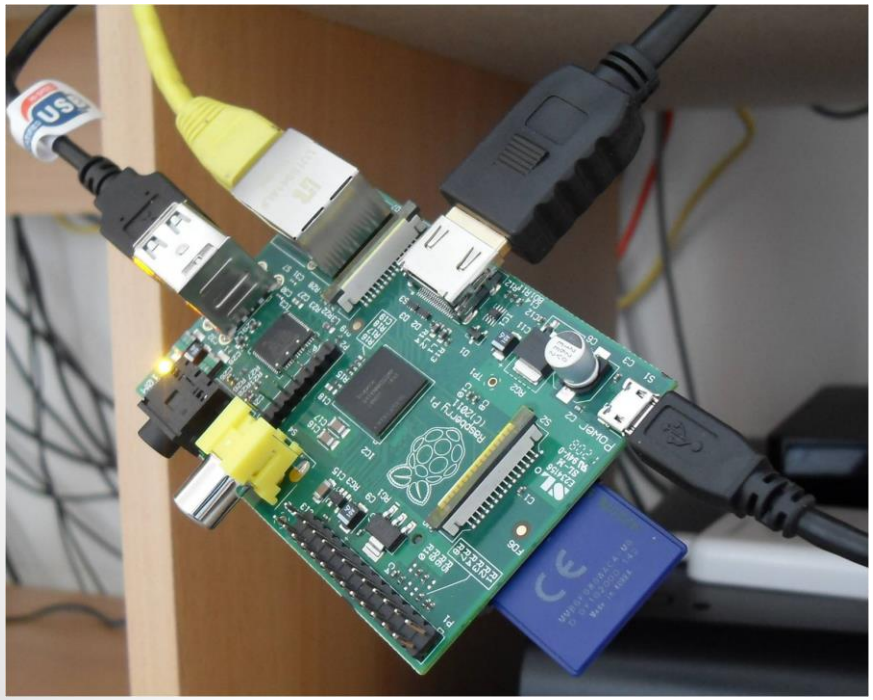
Ethernet connector

RCA video connector

Set up your Raspberry Pi

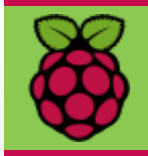
- SD card (Minimum size 4 Gb, recommended 8 Gb)
- HDMI to HDMI / DVI lead
- RCA video lead (If you are not using the HDMI output)
- Keyboard and mouse (USB 2.0)
- Ethernet network cable (optional)
- Power adapter (Micro USB)
- Audio lead





Booting of Raspberry Pi

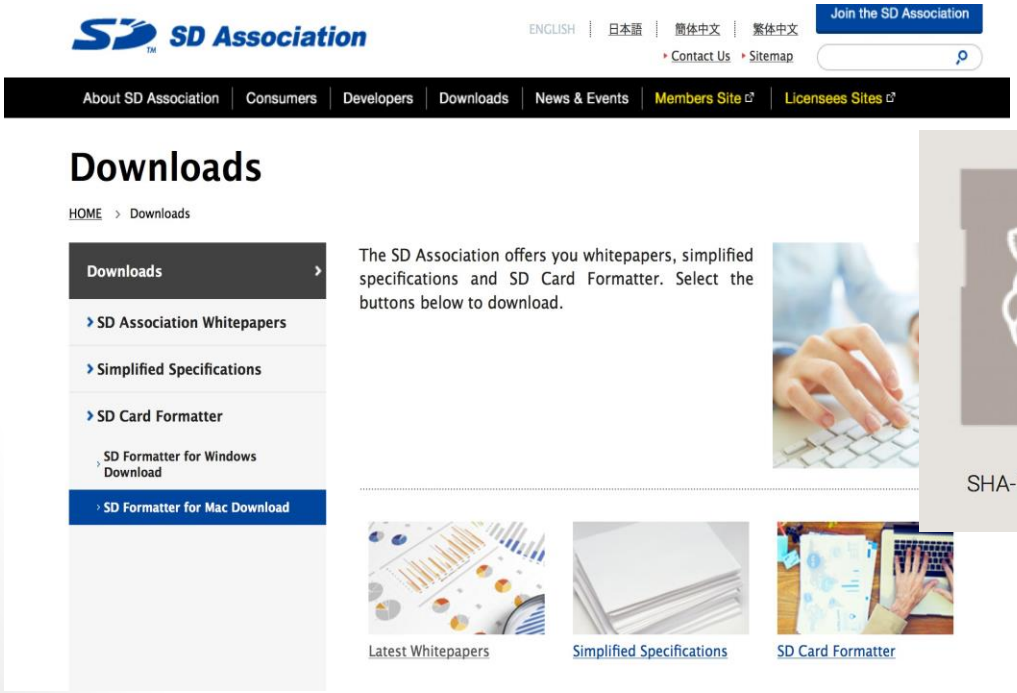
- Download NOOBS
- Format the SD card and copy the NOOBS to SD card
- Setup the Raspberry Pi device
- Install the OS
- raspi-config
- Log in
- startx
- Now system reboots normally

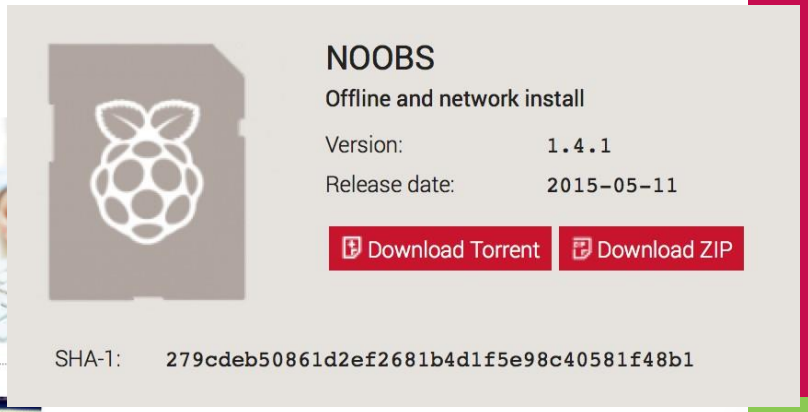


GETTING STARTED -

1. Download NOOBS – visit "www.raspberrypi.org" clicking on downloads.

2. Download SD Formatter – visit "www.sdcard.org" clicking on downloads.

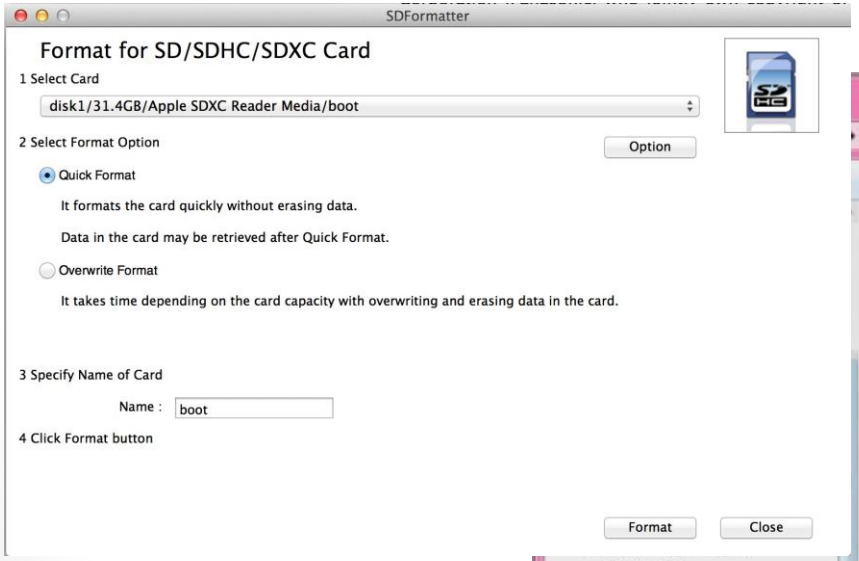


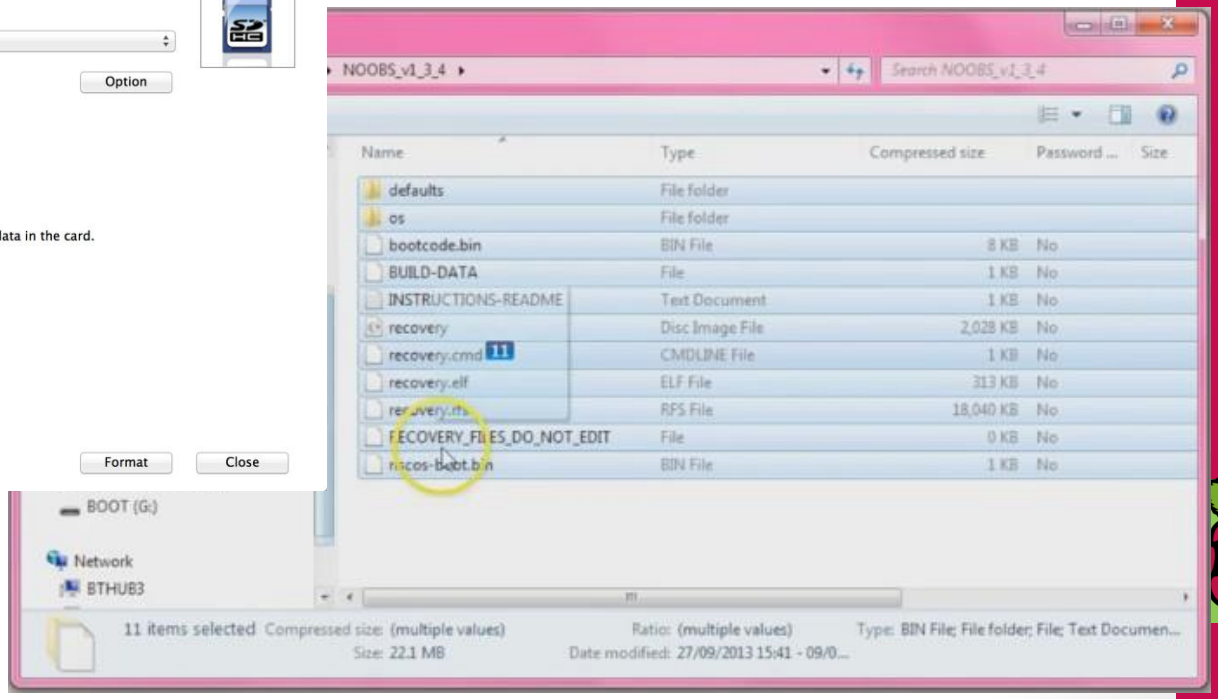


GETTING STARTED - EXTRACT & COPY

1. Format your SD Card using the SD Formatter – More instructions found online.

2. Extract NOOBS to a folder and drag and drop onto your newly formatted SD Card.





GETTING STARTED - BOOTUP & INSTALL

1. Once your Raspberry Pi is powered and booting up it will ask you to install an Operating System.

2. Check the box for Raspbian and click Install. This can take quite a bit of time.

GETTING STARTED - CONFIGURATION

1. When booting up for the first time you will get the blue “raspi--config” screen. Here you can configure your Pi with language and keyboard settings for your desired region of the world. Use tab and arrow keys to browse.

2. Once configured to your liking go to <Finish> and hit enter. This will take you to the command prompt where you will need to type in “startx” to start up the GUI (Graphical User Interface)

BASIC PI COMMAND LINE - 1

Useful commands to run from a terminal or command line.

rasp--config
Change your pi configuration settings.

startx
Start the GUI (Graphical User Interface)

ifconfig
Get the details of your Ethernet or wireless network adapter.

rpi--update
Updates your Raspberry Pi firmware.

lsusb
Shows a list of usb devices.

apt--get update & apt--get upgrade
Update or upgrade your pi sorware

ssh
Connect your pi to other computers.

sudo
Run commands as super user.

shutdown
This will shutdown your pi.

nano
This is your text editor for changing or adding files. Save, edit, create.

cat
Read out files at the command line.

passwd
Change your user password.

BASIC PI COMMAND LINE - 2

Useful commands to run from a terminal or command line.

ls
List out the current directory files.

cd
Go to directory or folder.

find
Searches whole system for files or directories.

clear
Clears the terminal screen.

mv
Move files or folders.

rm & rmdir
Remove files and remove directories.

touch
Create a blank file.

mkdir
Create a directory.

ping
Test connectivity between two devices.

df -h
Shows disk space.

iwconfig
Wireless configuration tool.

cp
Copy files and folders.

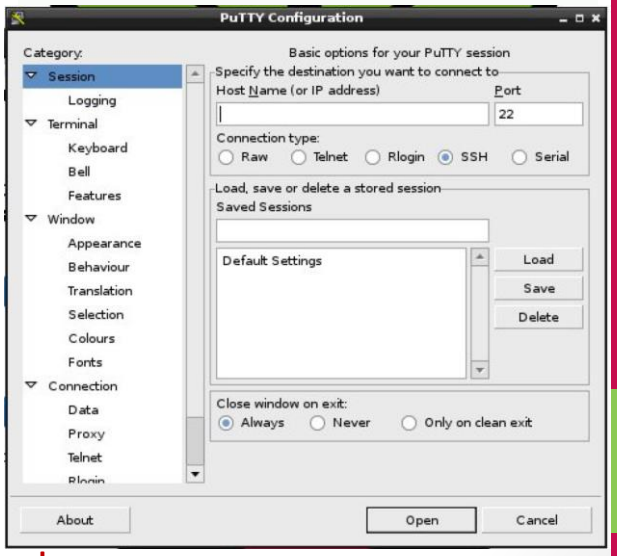
ADDING OTHER FEATURES

WIFI Configuration (GUI)

1. Launch “Wifi Config” from the desktop.
2. Click “Scan”
3. Double click your desired network.
4. In “PSK” field enter your wifi password.
5. When done click “Add” and it will connect.

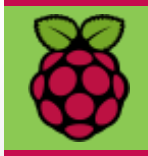
SSH Configuration (command line)

1. Run “sudo apt–get install ssh” in command line.
2. Run “sudo /etc/init.d/ssh/ start” to start ssh.
3. To have SSH start always at boot, run:
   “sudo update–rc.d ssh defaults”
4. Now reboot: “sudo reboot”
5. You should now be able to connect SSH to your pi via the IP Address using PuTTy or similar SSH client.



Programming in Raspberry Pi

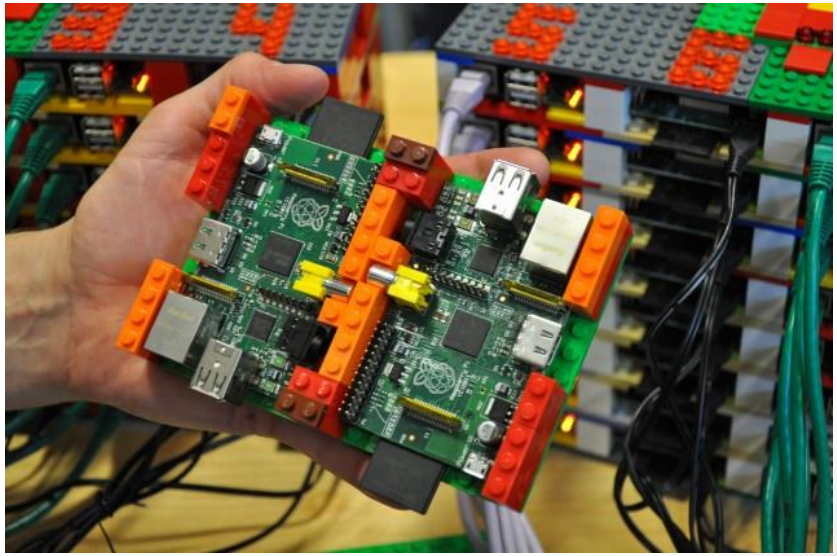
- Python (Primary programming language)
- Java
- C/C++
- HTML5
- JavaScript
- Scratch (Mathematical and computational concepts)
- JQuery (JavaScript library)
- Perl
- Erlang



Application of Raspberry Pi

Iridis-Pi

- Supercomputer
- Developed by Prof Simon Cox of the University of Southampton
- Calculating Pi was the first test
- System has 64 processors and 1TB of memory
- Each Raspberry Pi has 16 Gb of SD card



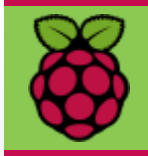
Jasper

- Developed by Charlie Marsh and Shubhro Saha
- Open-source platform
- Control anything with your voice
- Always listening

Robots and Drones

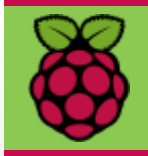
Other Applications

- VS-Pi server
- Media streamer
- Home automation
- Cosmic computer
- Tablet computer
- Game stations



What's makes it special?

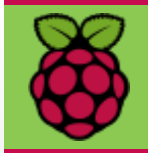
- Low price
- Open-source
- Low power consumption
- Small size
- Over clocking
- No need of heat-sink
- Connect to old analogue TV
- Supports 1080p HD video



What's new?

Raspberry Pi 2 Model B

- 900 MHz quad-core ARM Cortex-A7 processor
- 1 Gb SDRAM
- 4.5 W power
- Sopports OS same as for Raspberry Pi 1, plus Windows 10, Ubuntu and Android



References

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- www.slideshare.net/ltg_oxford/raspberry-pie-an-introduction
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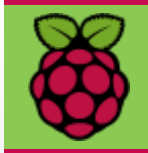
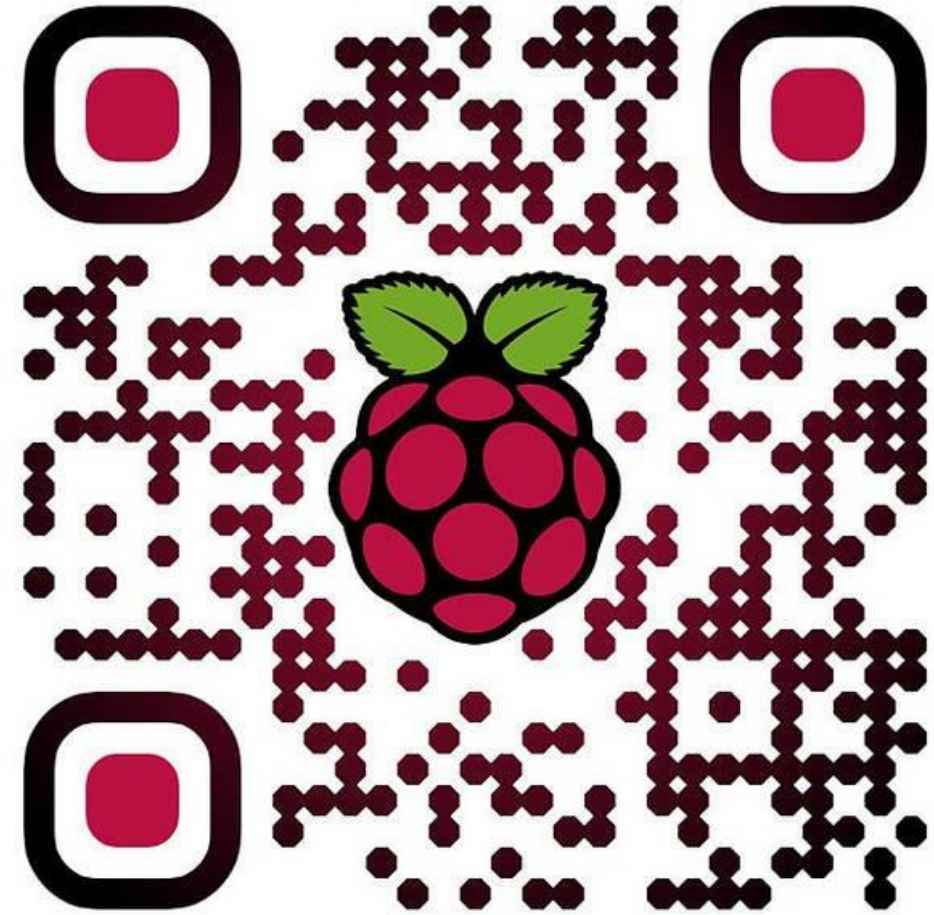
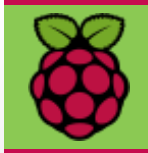
- www.techrepublic.com
- www.paw.princeton.edu
- www.jasperproject.github.io



Any Questions?

Thank you





By SANDEEP B KADAM