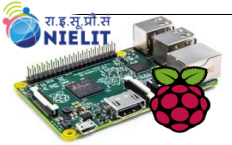
Raspberry Pi

an Introduction

Sarwan Singh

Assistant Director(S)

NIELIT Chandigarh



Agenda

- Introduction to the Raspberry Pi
  - Origin
  - Add-on boards
- Pi board drill - down
- 10 uses in 10 minutes

Why from the UK

- UK market long history of computer hobbyist - Sinclair computer – 1980's
- 1990's lack of computer hobbist in the young people
- 2000's start in micro-controller based computer
- 2006 first board level micro-controller kit

Origin

- Eben Upton founder – Foundation trustee
  - Academic project for UK students
  - Teaching aid
  - Motivate computer skills
- Aug 2011 50 Alpha boards released
- Initial sales Feb 29 2012, 6am
  - 2 million request for orders
  - First batch sold out in few minutes
  - 500,000 boards (Sep 2012)
- Now stand alone company, Cambridge, UK

Raspberry Pi model rev 2

- Single board computer
- ARM ARM1176JZF-S 32 bit 700mhz processor, SIMD, 64 bit data path
  - Same processor found on over 200 smart phones models
- GPU Broadcom Videocore IV
- HDMI
- Ethernet RJ-45
- USB 2.0
- $35

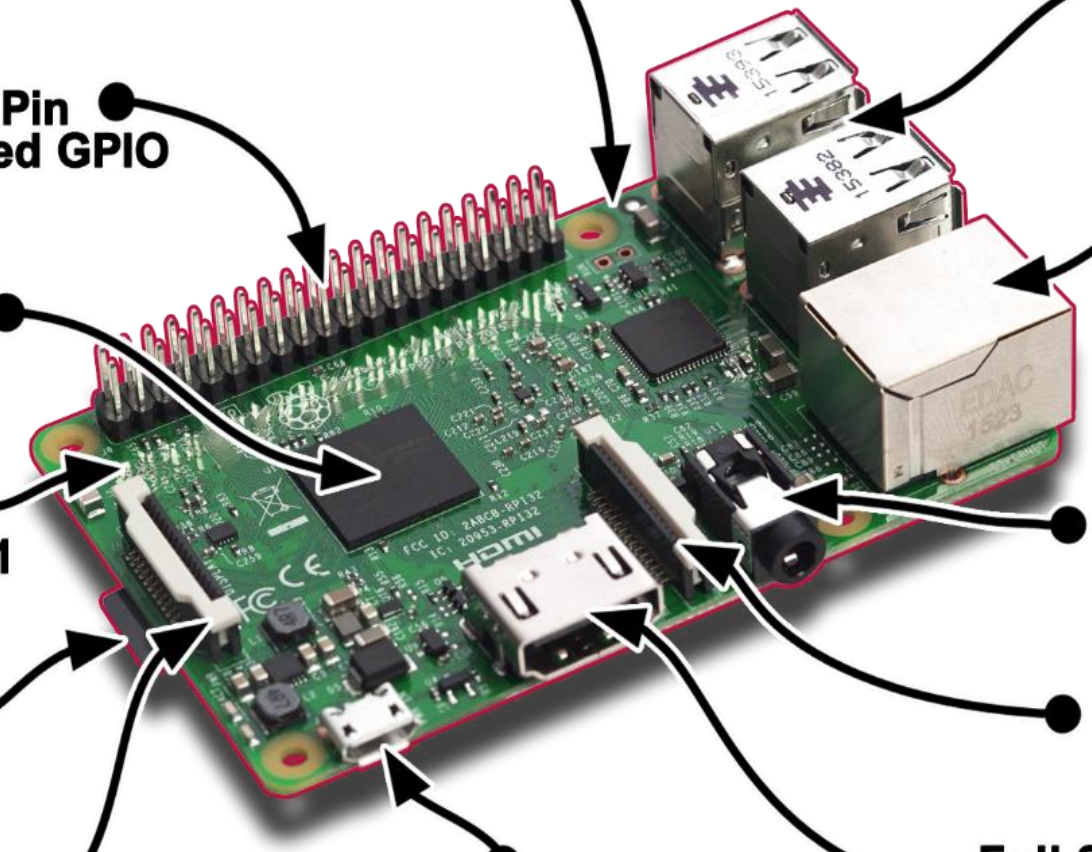
OS and software

- Raspbian, Debian, Fedora Arch Linux, RISC OS FreeBSD, NetBSD Plan 9, RSEv2.2
- Python, BBC Basic, C, Perl, Java

Can run any software which runs on

Raspberry Pi 3 Model B

element14



Dimensions
85.6mm x 56mm x 21mm

4 x USB 2 Ports

40 Pin Extended GPIO

10/100 LAN Port

Broadcom BCM2837 64bit Quad Core CPU at 1.2GHz, 1GB RAM

On Board Bluetooth 4.1 Wi-Fi

3.5mm 4-pole Composite Video and Audio Output Jack

MicroSD Card Slot

CSI Camera Port

DSI Display Port

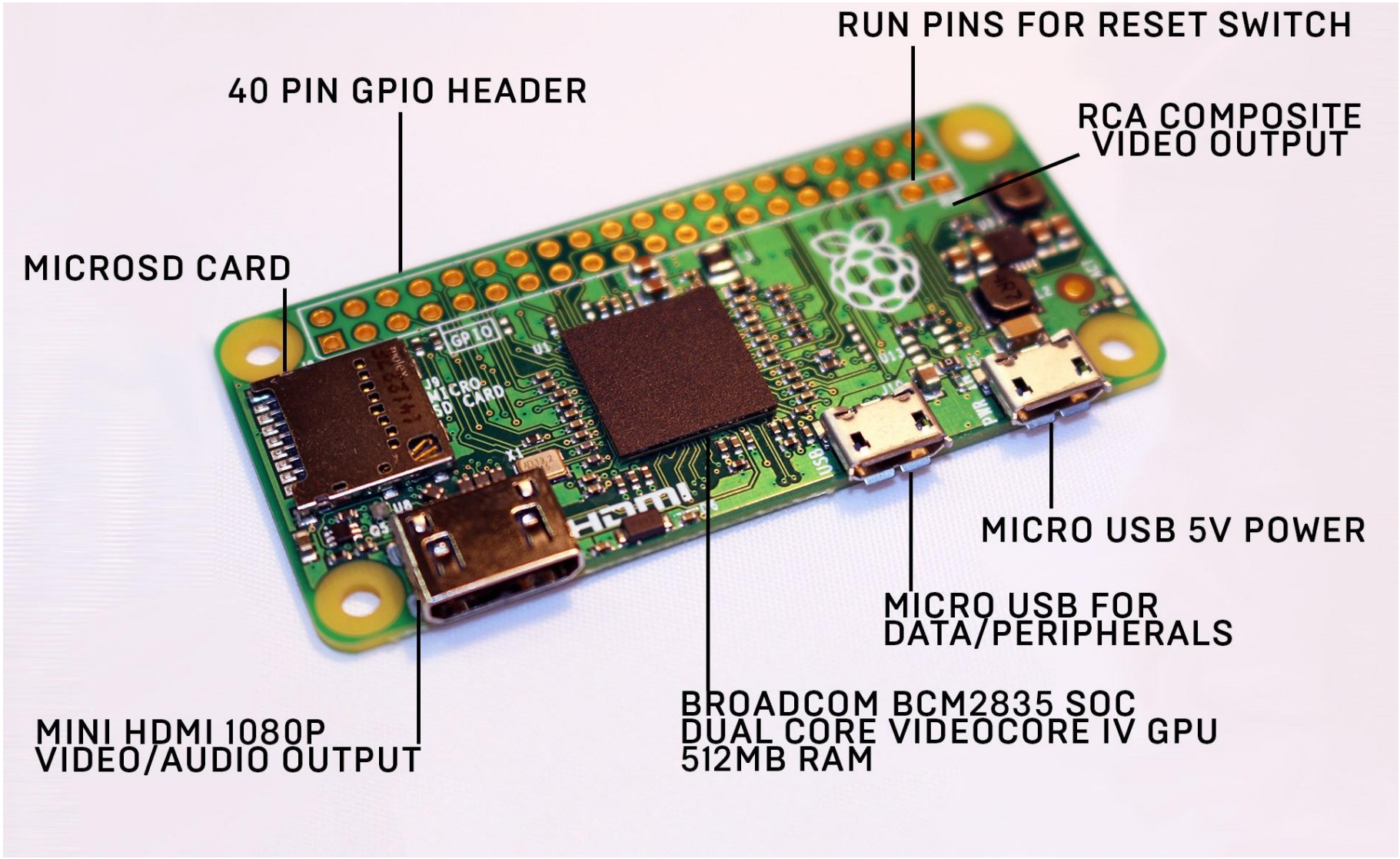
Micro USB Power Input. Upgraded switched power source that can handle up to 2.5 Amps

Full Size HDMI Video Output

Raspberry Pi 3

- quad-core Cortex-A53 CPU at 1.2GHz
- with a VideoCore IV GPU clocked at 300-400MHz (3D clocked at 300MHz, video at 400MHz)
- 1GB of RAM,
- 802.11n wireless
- power consumption of 4W.

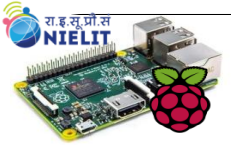
Raspberry Pi Zero

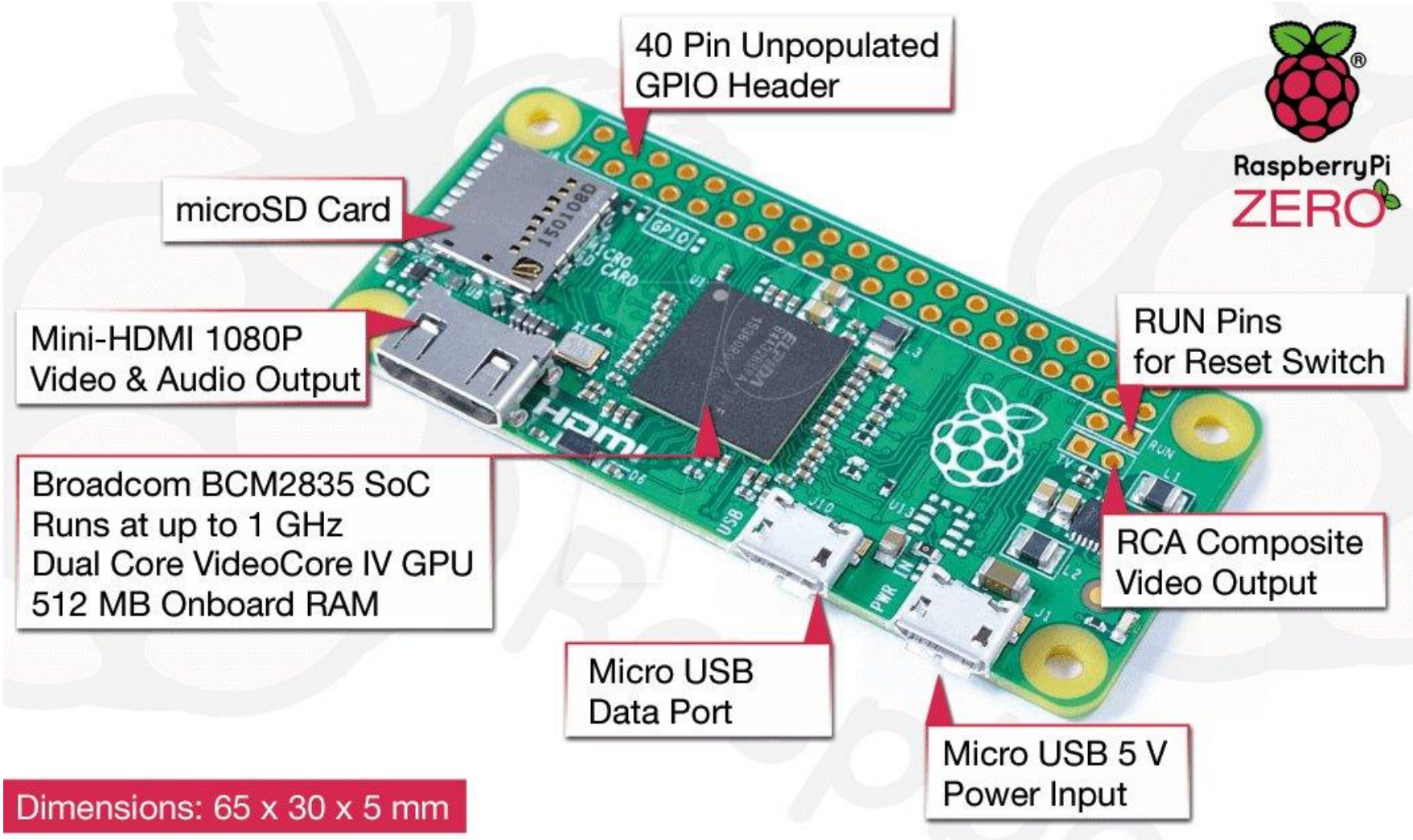


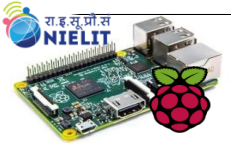
Raspberry Pi Zero

Features

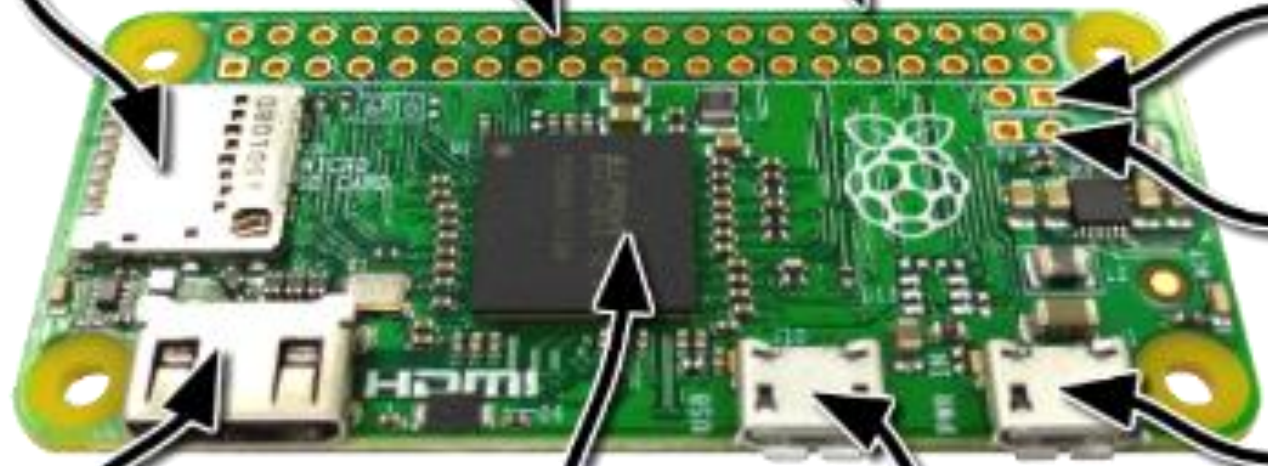
- **CPU:** Broadcom BCM2835, which can run at up to 1GHz.
- **RAM:** 512MB
- **Power:** 5V, supplied via micro USB connector, drawing 160mA (even when connected to an HD display).
- **Dimensions:** 65mm x 30mm x 5mm
- **Video & Audio:** 1080P HD video output. Audio output via mini-HDMI connector.
- **Storage:** MicroSD card.
- **Operating System:** Linux, installed via NOOBS.




40 Pin Unpopulated
GPIO Header
microSD Card
Mini-HDMI 1080P
Video & Audio Output
Broadcom BCM2835 SoC
Runs at up to 1 GHz
Dual Core VideoCore IV GPU
512 MB Onboard RAM
RUN Pins
for Reset Switch
RCA Composite
Video Output
Micro USB
Data Port
Micro USB 5 V
Power Input
RaspberryPi
ZERO
Dimensions: 65 x 30 x 5 mm



Raspberry Pi Zero



40 Pin Unpopulated GPIO Header

Dimensions: 65mm x 30mm x 5mm

microSD Card

RUN Pins for Reset Switch

RCA Composite Video Output

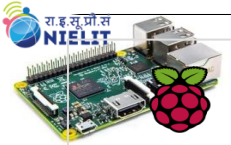
Micro USB 5V Power Input

Mini-HDMI 1080P Video & Audio Output

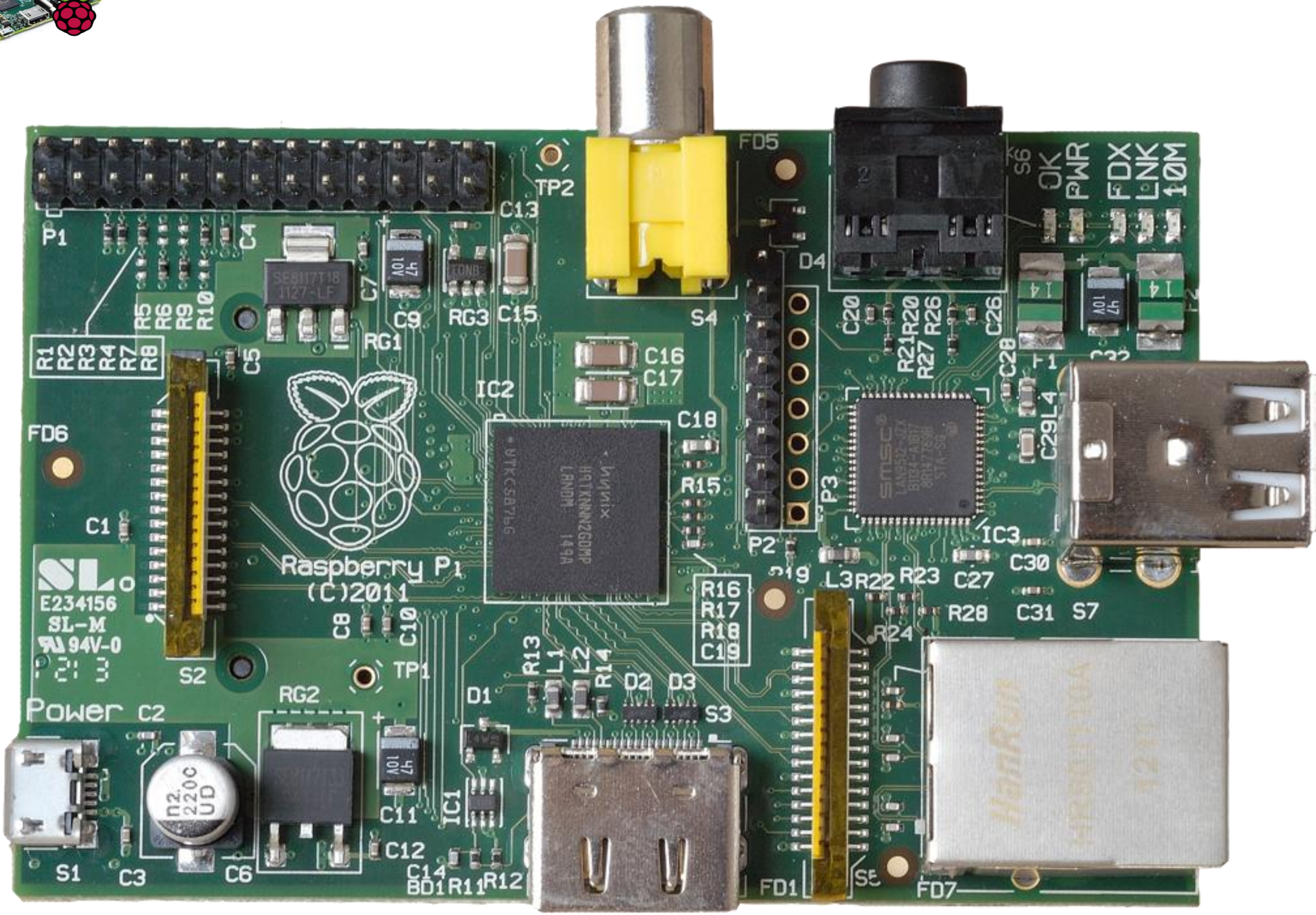
Broadcom BCM2835 SoC
Runs at up to 1GH2
Dual Core VideoCore IV GPU
512MB Onboard RAM

Micro USB Data Port

element14



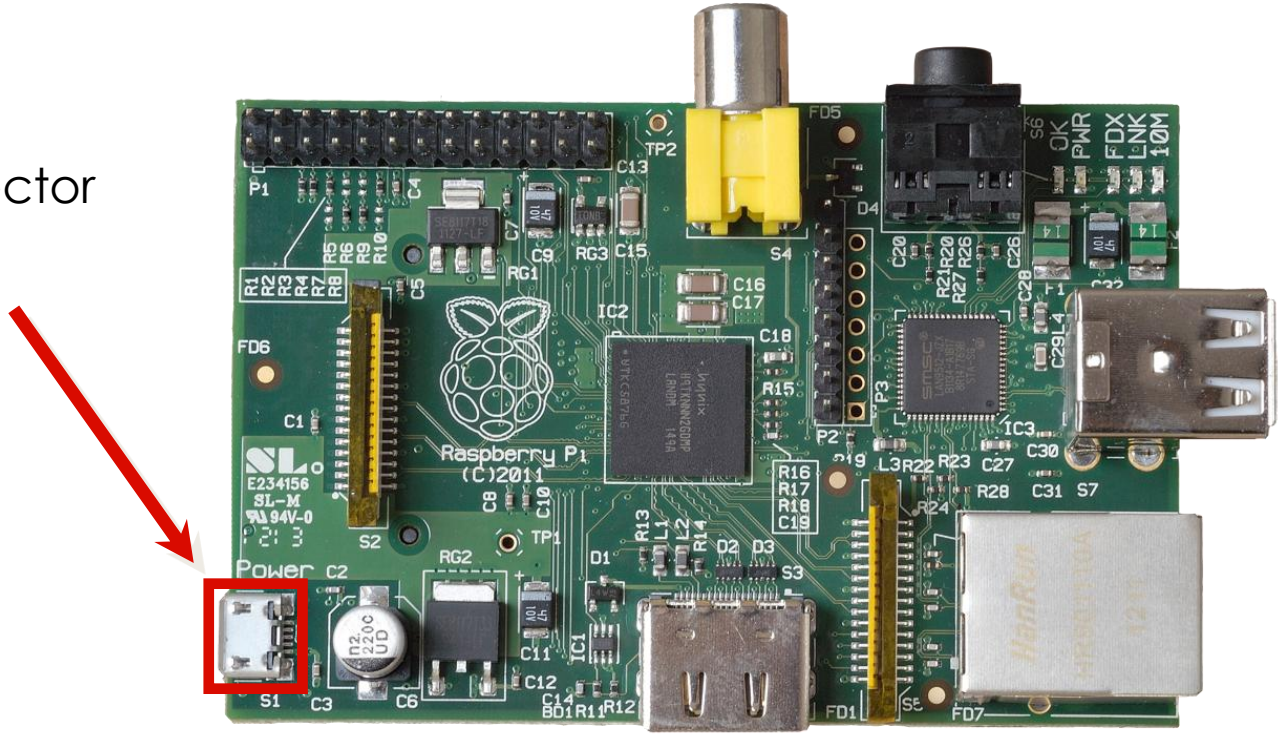
	Raspberry Pi 3 Model B	Raspberry Pi 2 Model B	Raspberry Pi Model B+	Raspberry Pi Model A+
Processor Chipset	Broadcom BCM2837 64Bit Quad Core Processor powered Single Board Computer running at 1.2GHz	Broadcom BCM2836 32Bit Quad Core Processor powered Single Board Computer running at 900MHz	Broadcom BCM2835 32Bit SoC full HD multimedia applications processor	Broadcom BCM2835 32Bit SoC full HD multimedia applications processor
GPU	Videocore IV	Videocore IV	Videocore IV	Videocore IV
Processor Speed	QUAD Core @1.2 GHz	QUAD Core @900 MHz	Single Core @700 MHz	Single Core @700 MHz
RAM	1GB SDRAM @ 400 MHz	1GB SDRAM @ 400 MHz	512 MB SDRAM @ 400 MHz	256 MB SDRAM @ 400 MHz
Storage	MicroSD	MicroSD	MicroSD	MicroSD
USB 2.0	4x USB Ports	4x USB Ports	4x USB Ports	1x USB Port
Max Power Draw/voltage	2.5A @ 5V	1.8A @ 5V	1.8A @ 5V	1.8A @ 5V
GPIO	40 pin	40 pin	40 pin	40 pin
Ethernet Port	Yes	Yes	Yes	No
WiFi	Built in	No	No	No
Bluetooth LE	Built in	No	No	No



Raspberry Pi
(C)2011
P1
P2
P3
S1
S2
S3
S4
S5
S6
S7
TP1
TP2
FD1
FD5
FD6
FD7
IC1
IC2
IC3
RG1
RG2
RG3
D1
D2
D3
D4
L1
L2
L3
L4
F1
Power
OK
PWR
FDX
LNK
10M
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
C26
C27
C28
C29
C30
C31
R1 R2 R3 R4 R7 R8
R5 R6 R9 R10
R11 R12 R13 R14 R15
R16 R17 R18
R20 R21 R22 R23 R24 R26 R27 R28
BD1
E234156
SL-M
94V-0

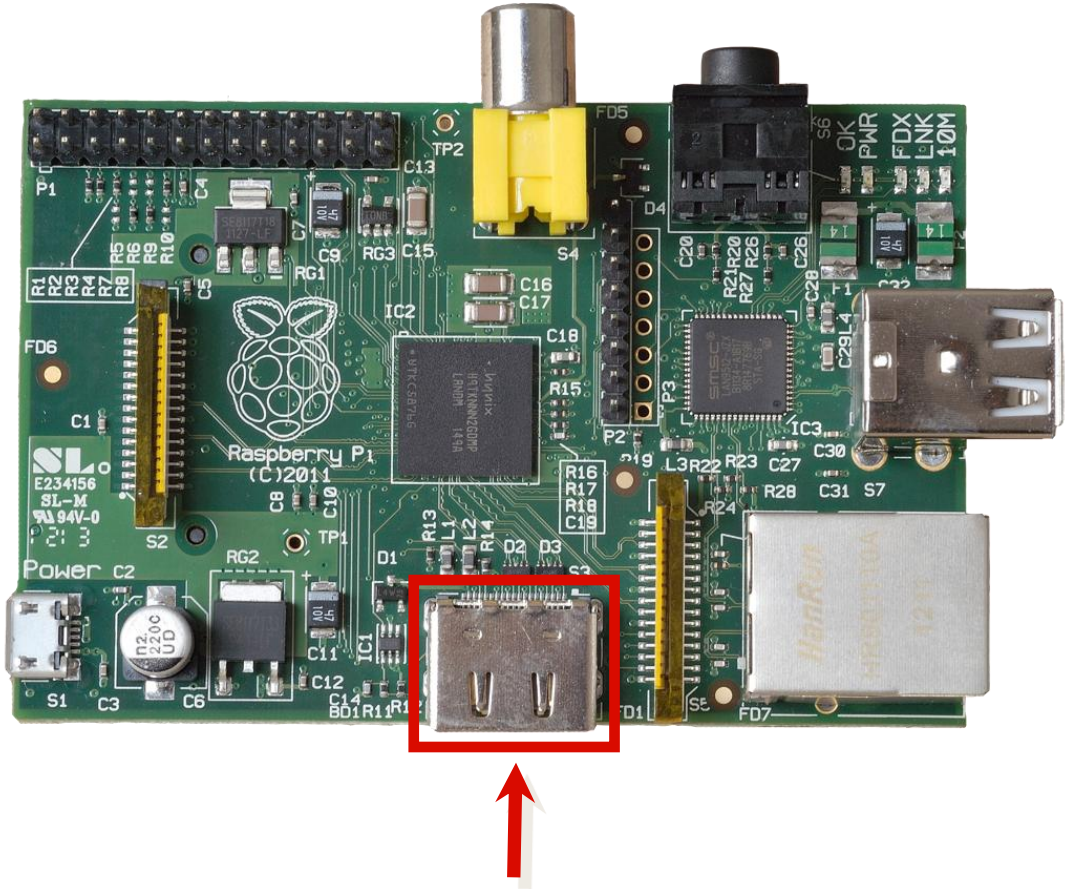
Power

5v micro
USB connector



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

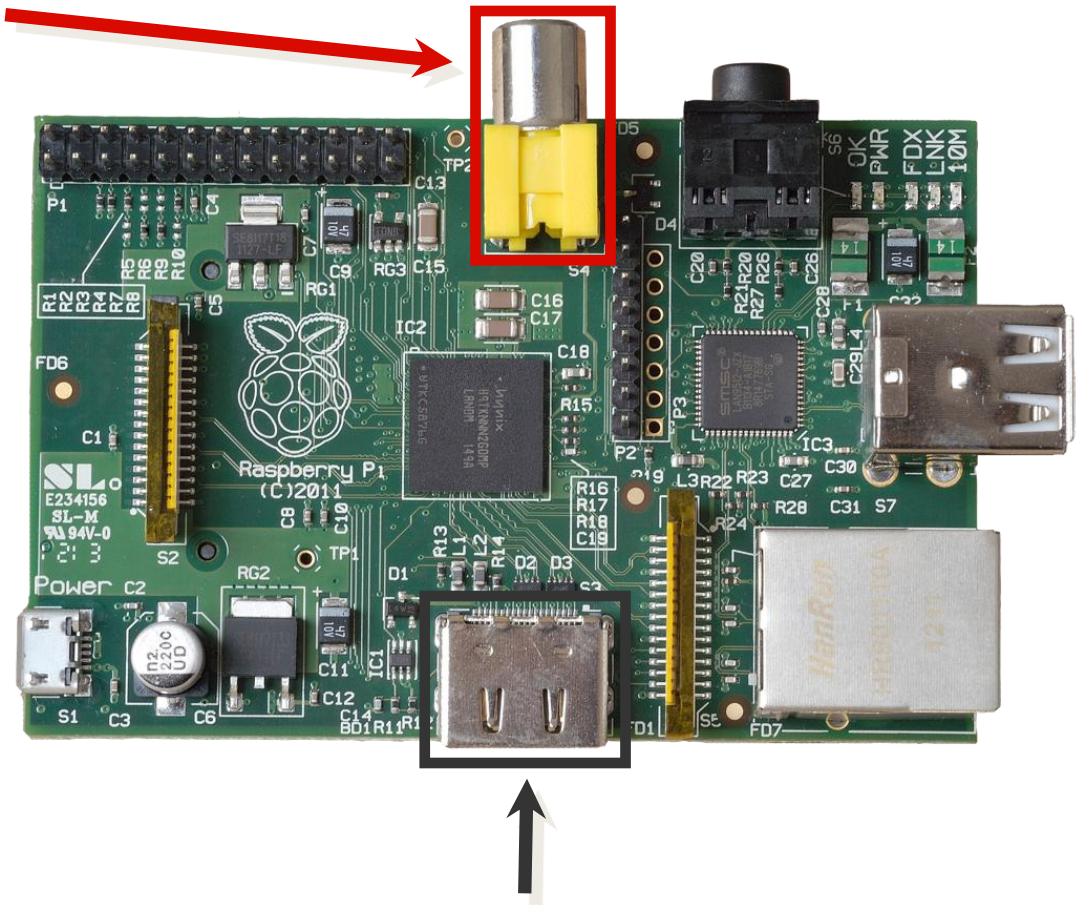
A/V (Audio/ViDeo)



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

A/V (Audio/ViDeo)

RCA Video
(works with most older TVs)



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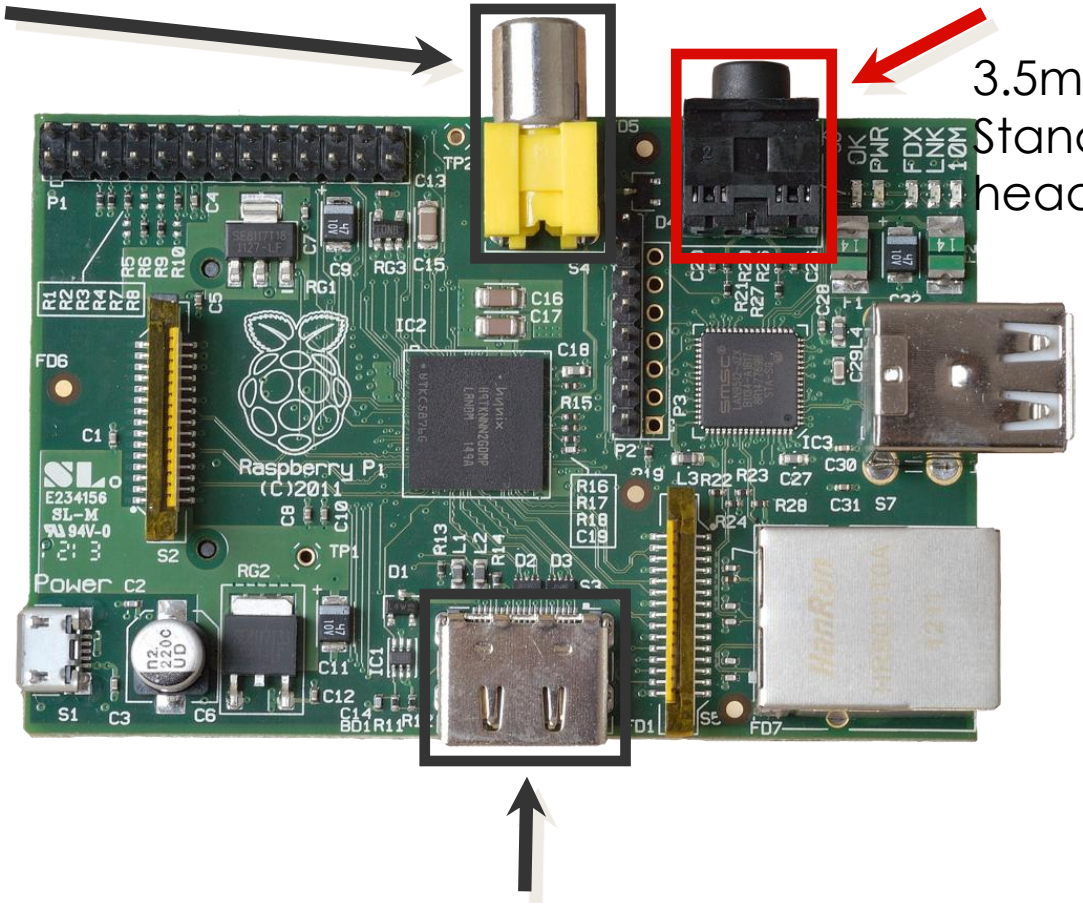
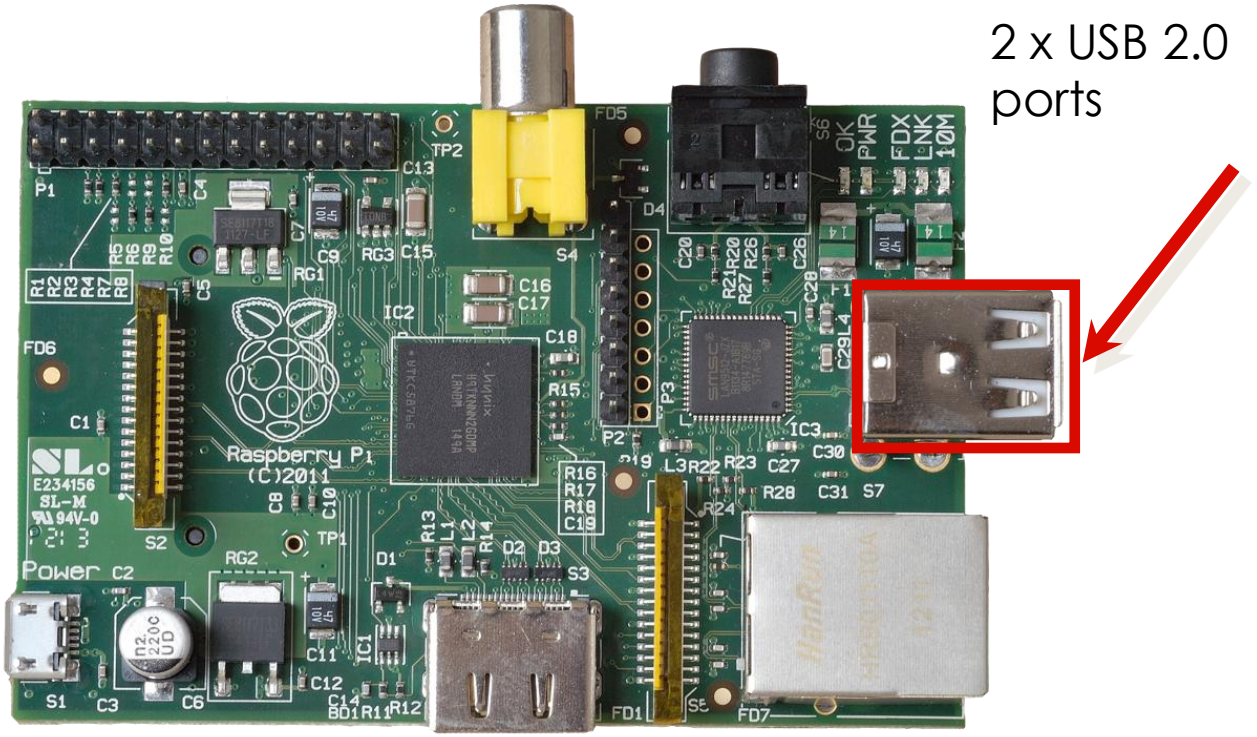


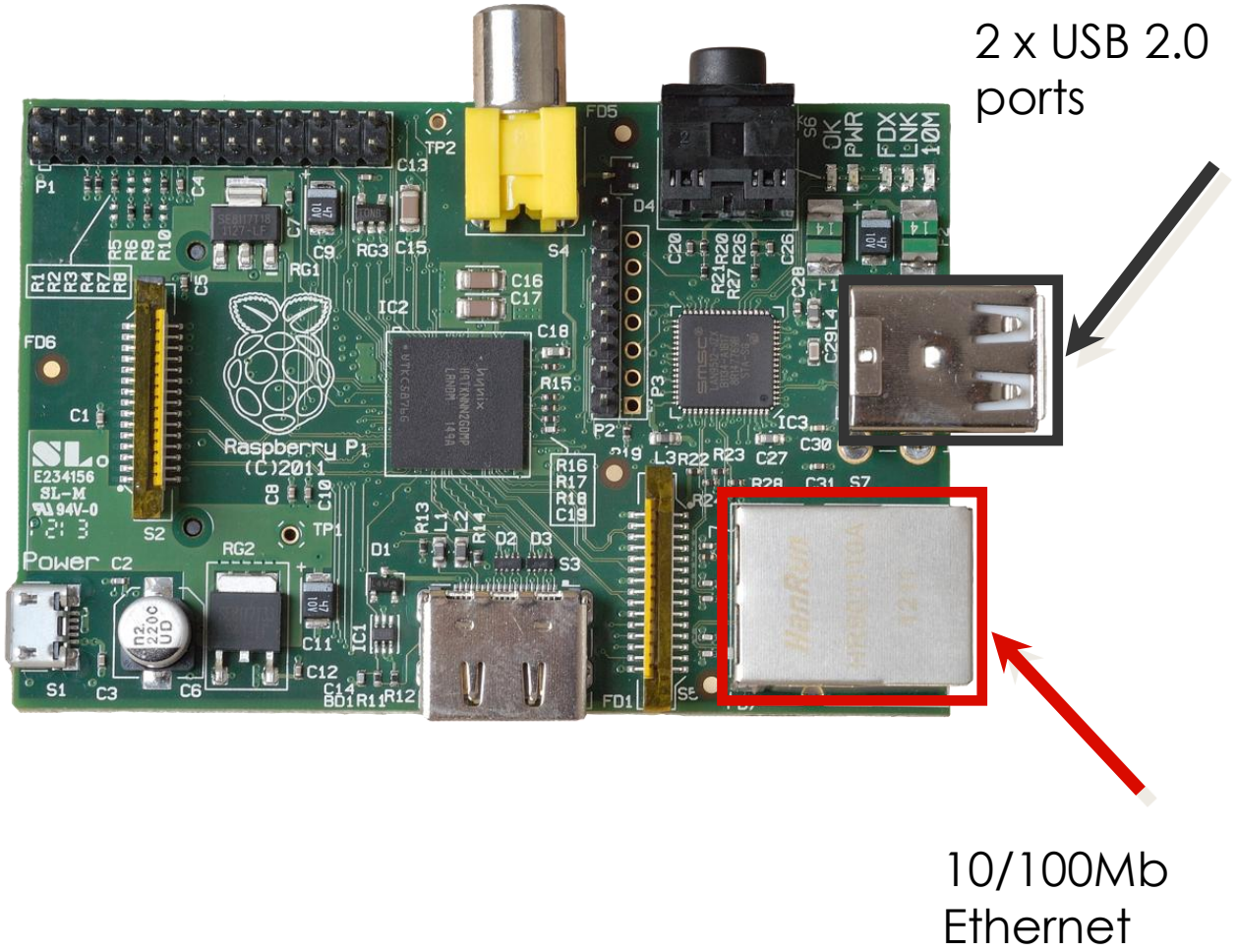
3.5mm Audio
Standard
headphone socket

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

Connectivity

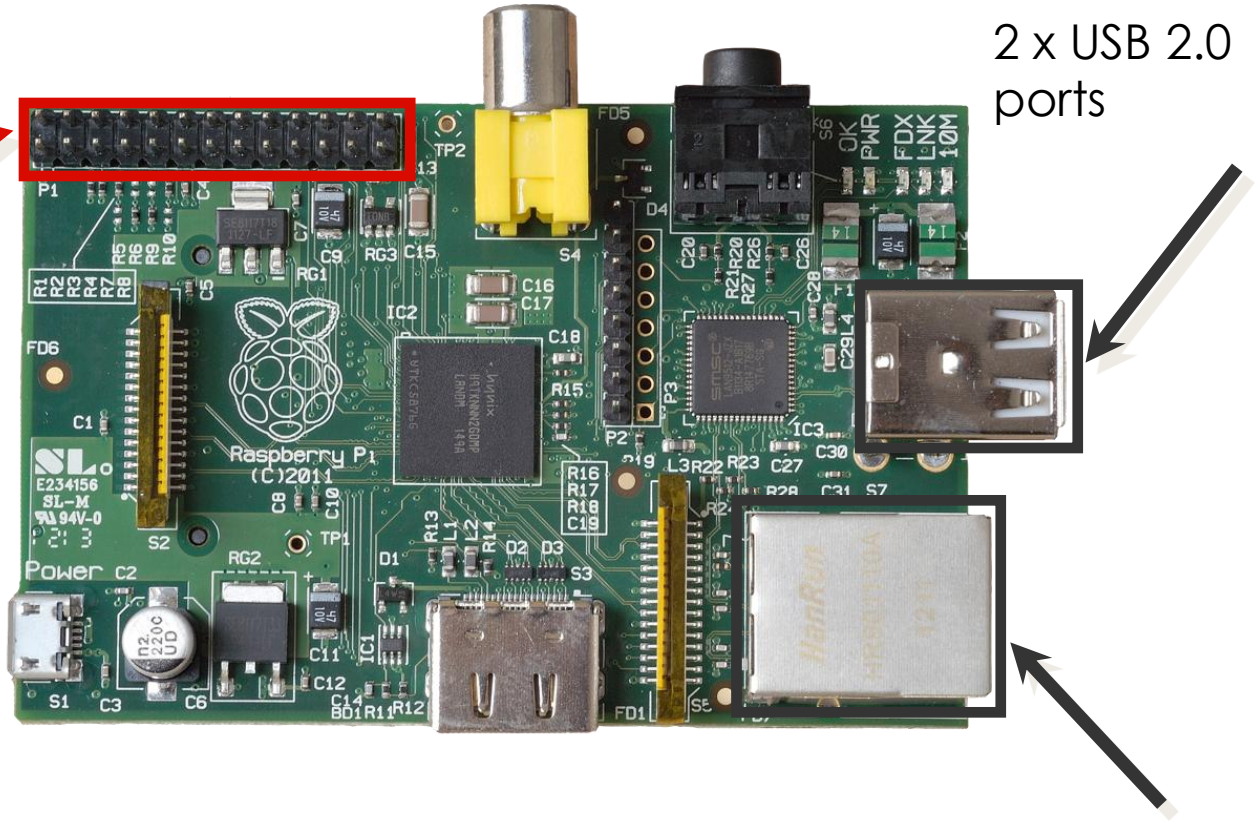


Connectivity



Connectivity

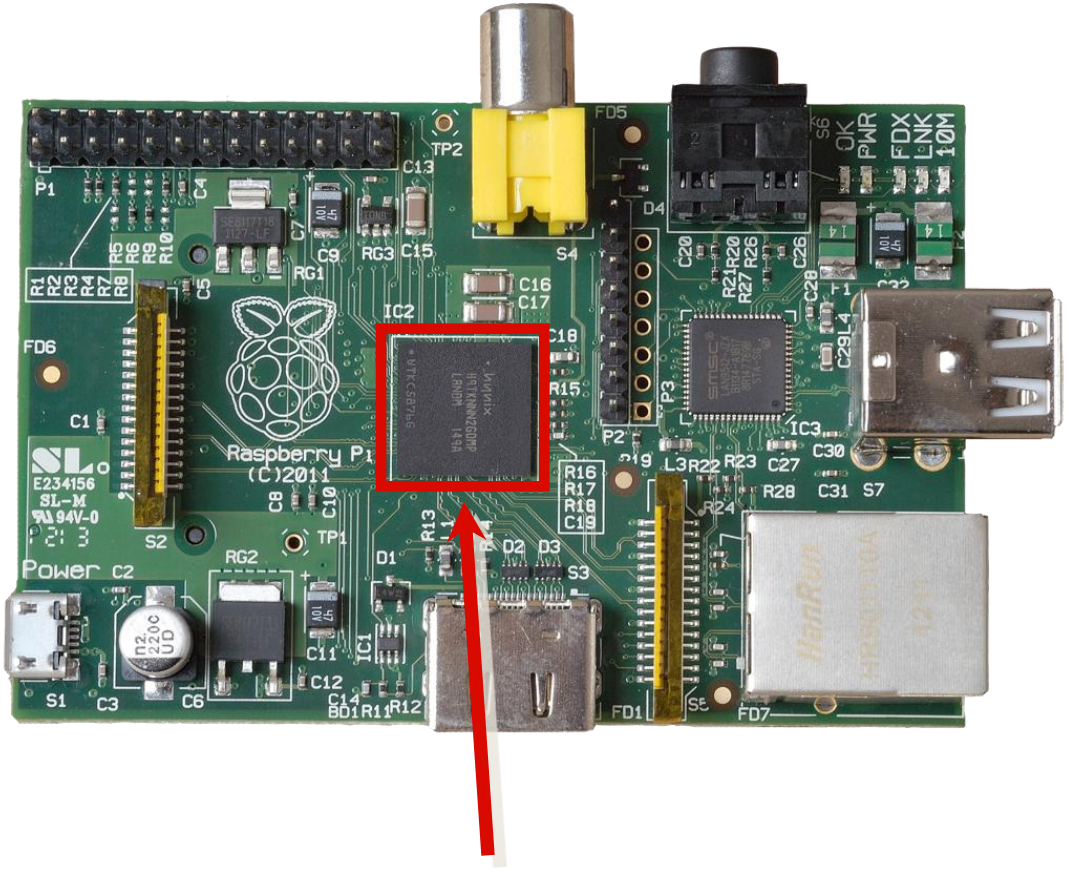
GPIO (General Purpose Input & Output)



2 x USB 2.0 ports

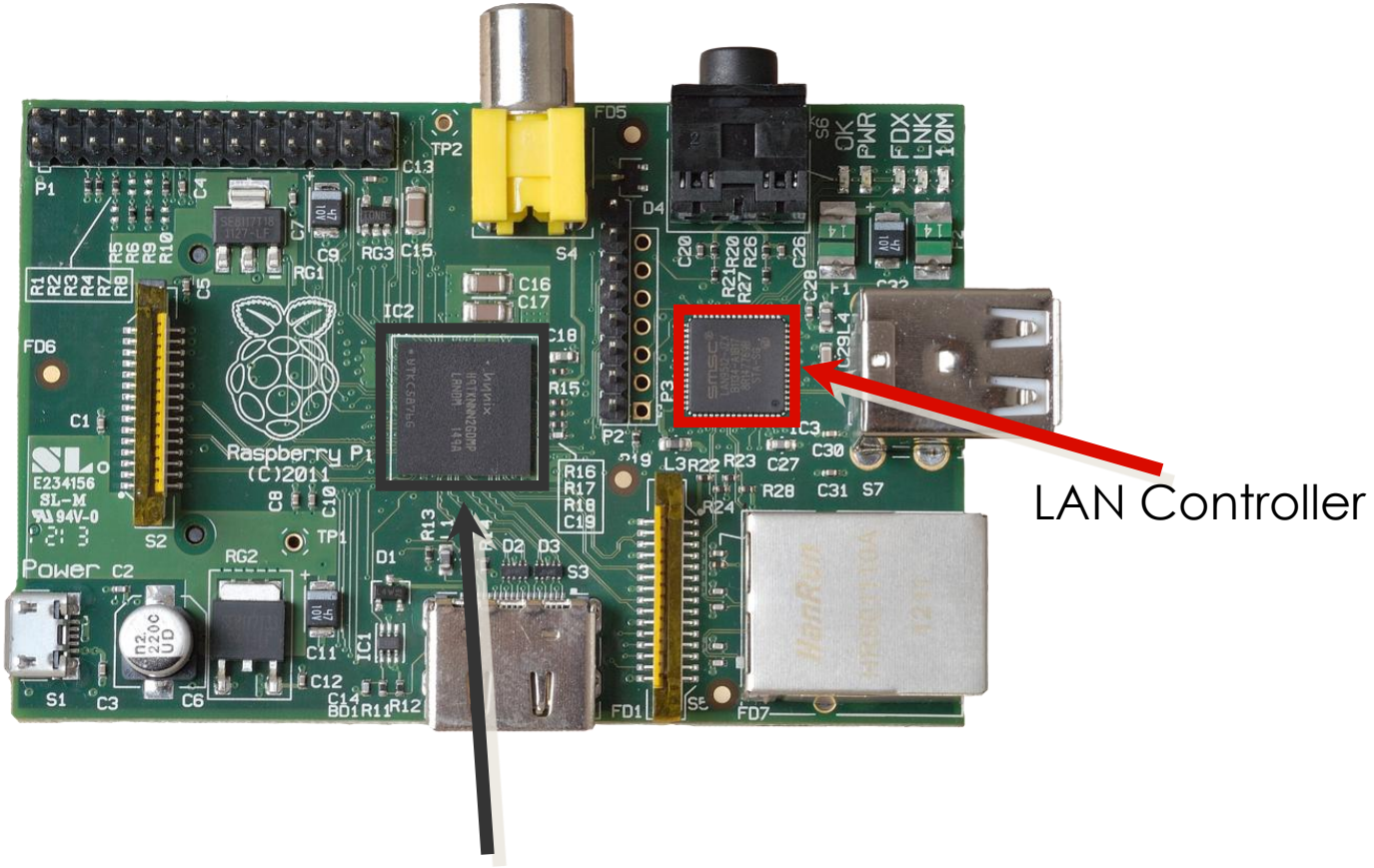
10/100Mb Ethernet

Internals



SOC (System On a Chip)
Broadcom BCM2835 700Mhz & 256Mb / 512Mb RAM

Internals



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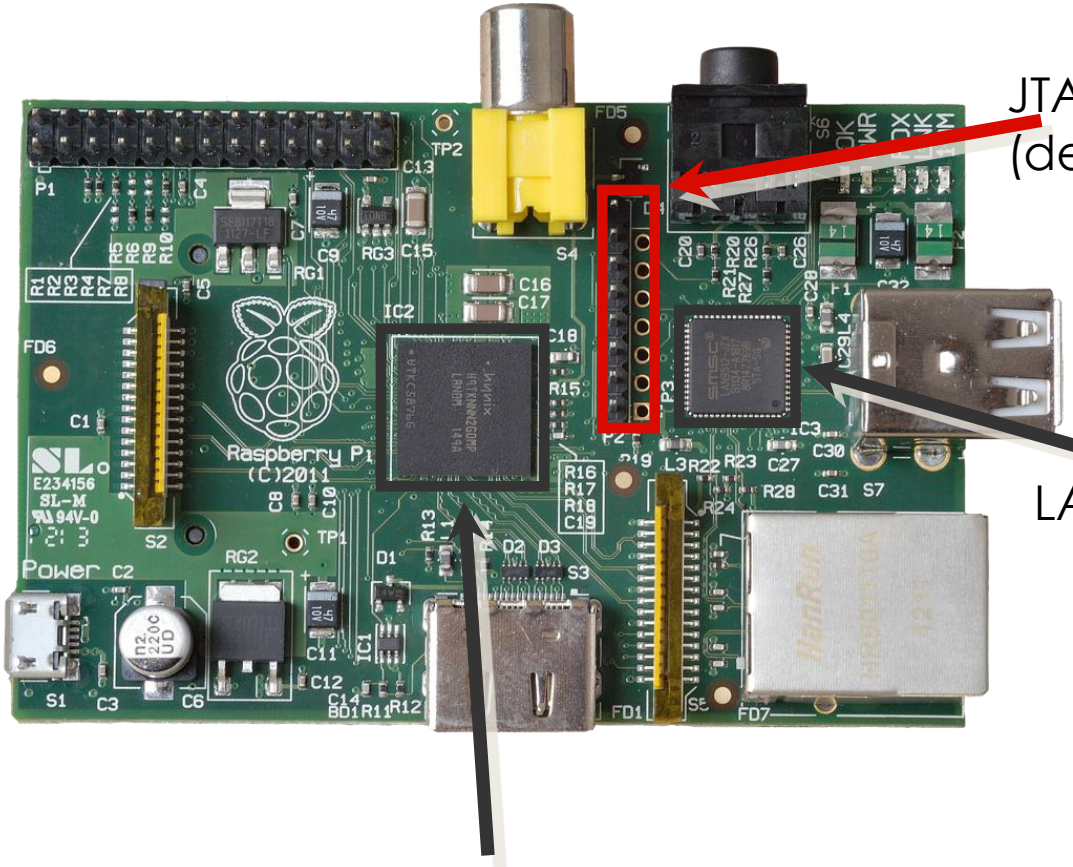
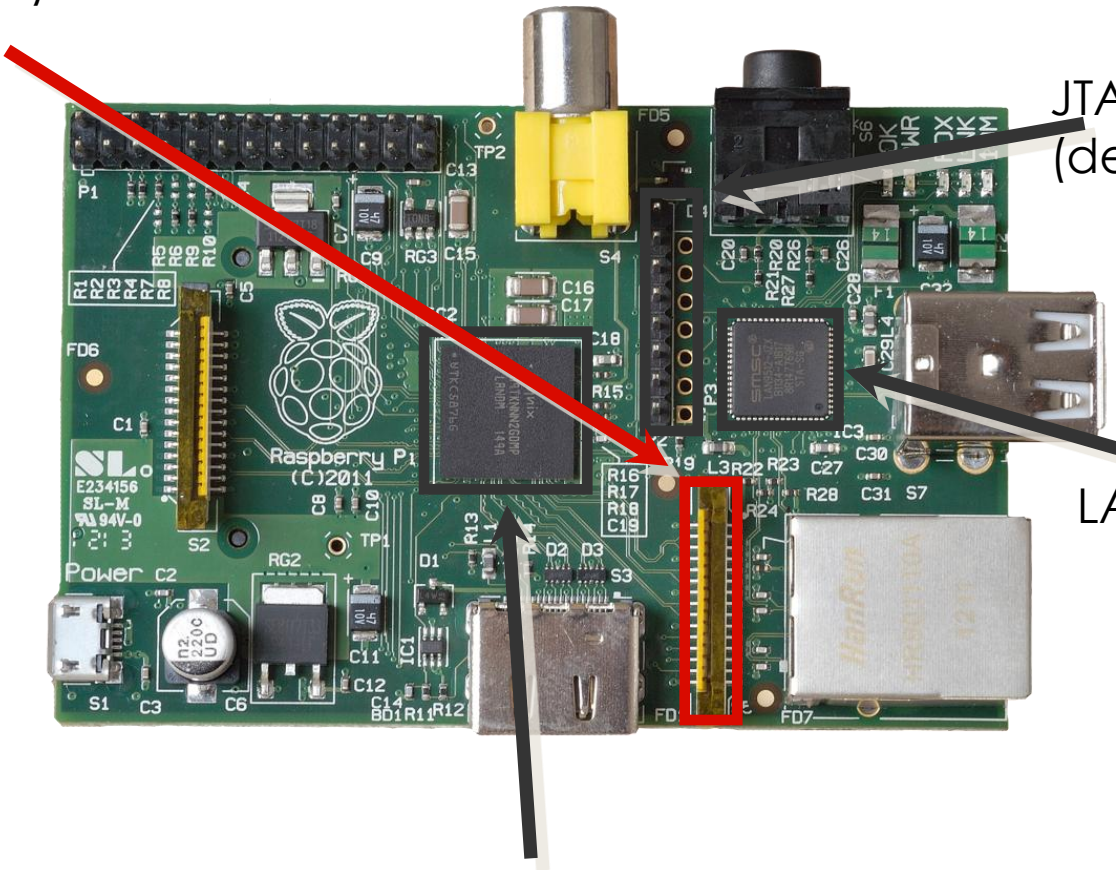


SOC (System On a Chip)
Broadcom BCM2835 700Mhz & 256Mb / 512Mb RAM

Internals

CSI
(camera interface)



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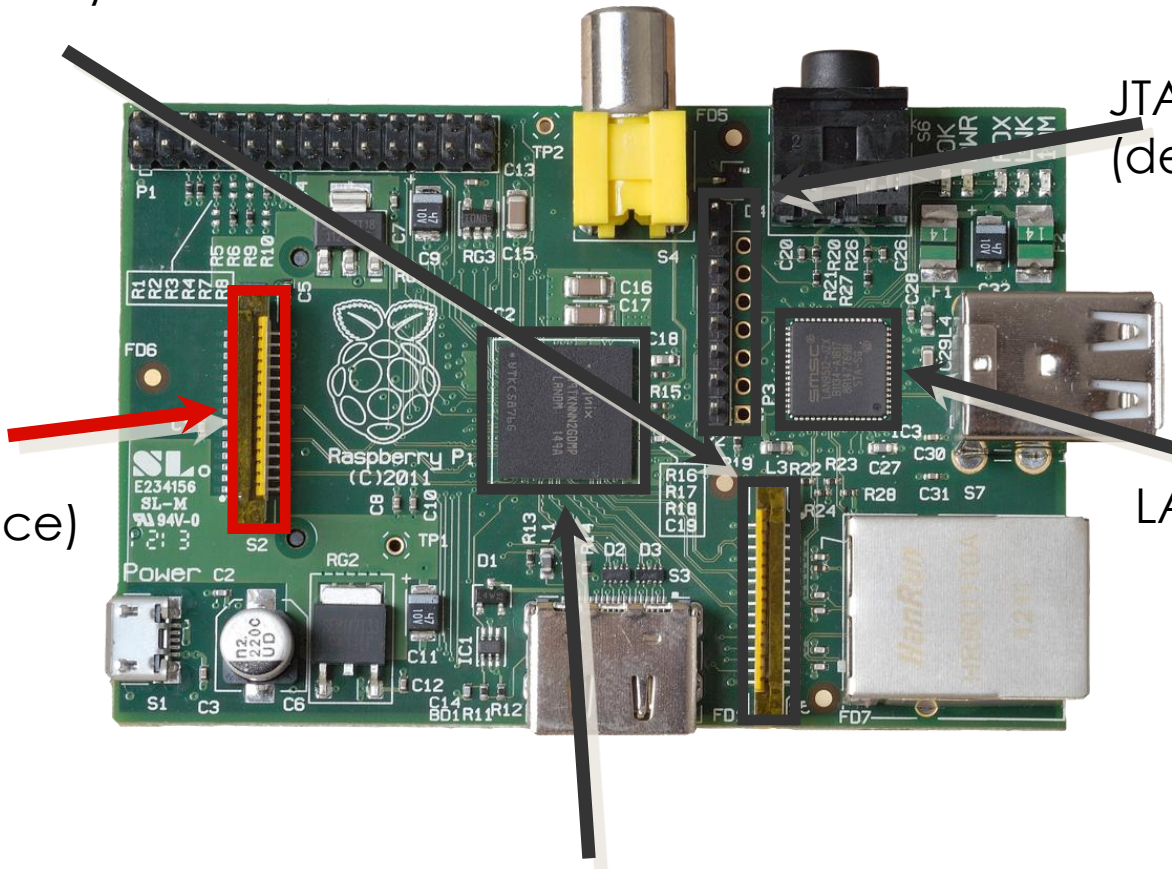
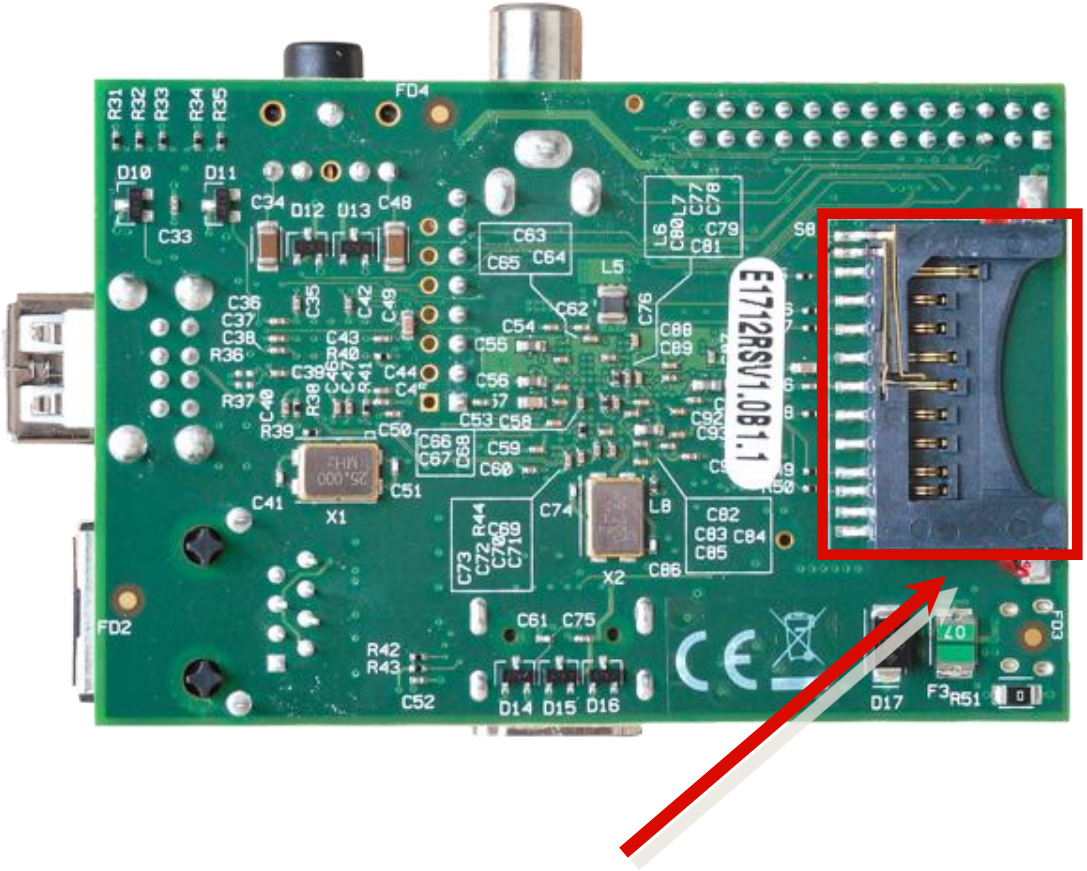
(camera interface)

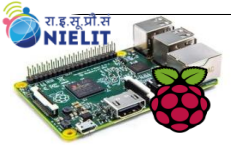


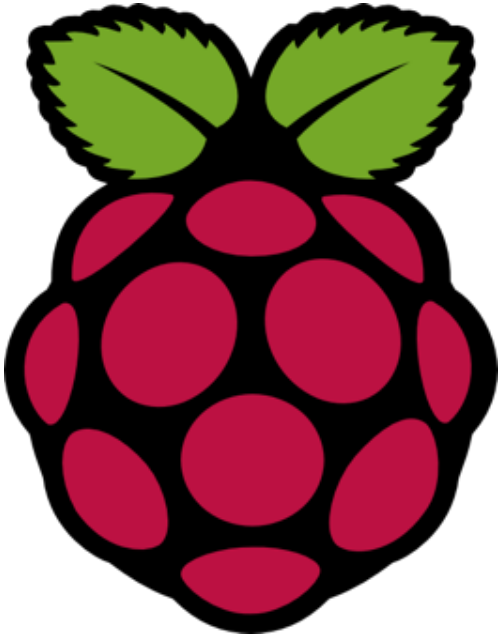
SOC (System On a Chip)
Broadcom BCM2835 700Mhz & 256Mb / 512Mb RAM

Storage



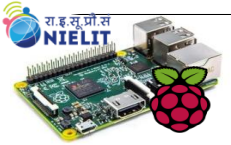
SD Card Slot
(supports SD cards up to 32GB)





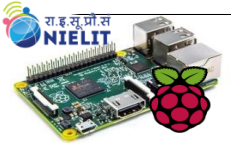
10 uses for a Raspberry Pi in *about* 10 minutes

(give or take)



10 Office

9 8 7 6 5 4 3 2 1



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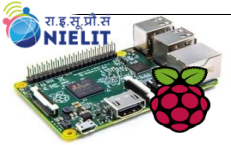
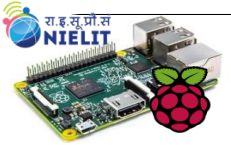


9 Programming

10 8 7 6 5 4 3 2 1

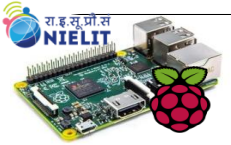


Programming

python

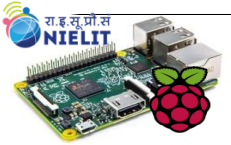
SCRATCH

10 9 8 7 6 5 4 3 2 1

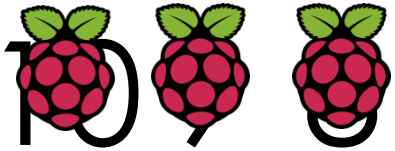


8 Games Console

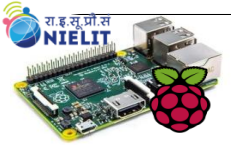
10 7 6 5 4 3 2 1



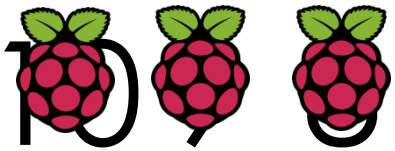
Games Console



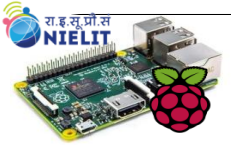
7 6 5 4 3 2 1



7 Minecraft



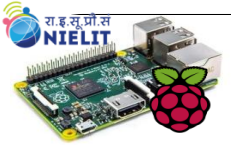
6 5 4 3 2 1



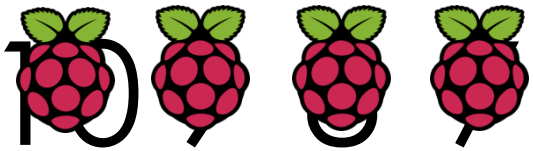
Minecraft

MINECRAFT

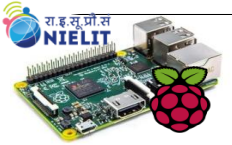
10 9 8 7 6 5 4 3 2 1



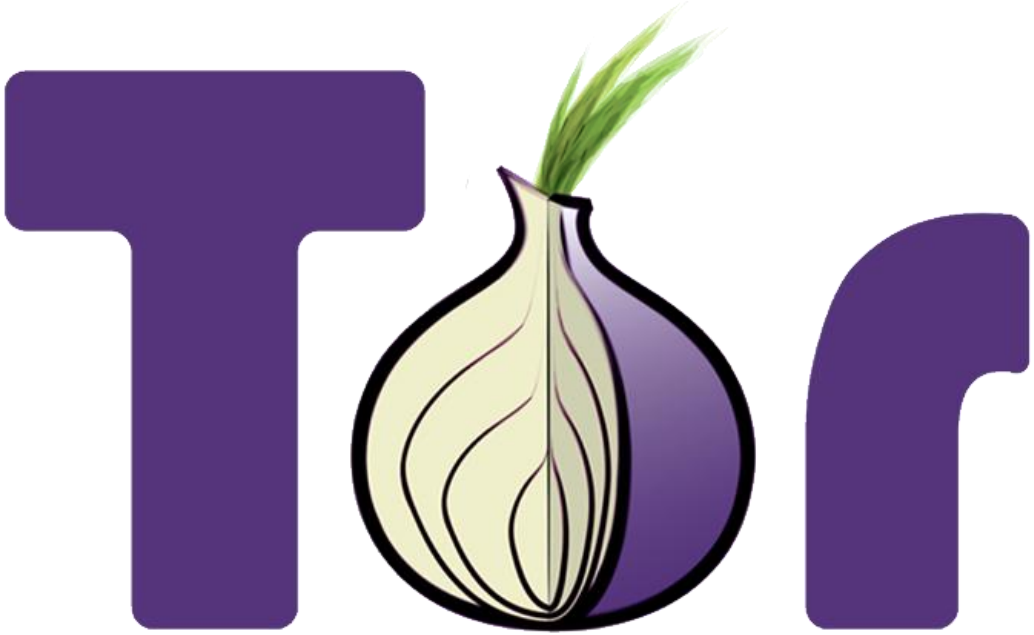
6 Tor Router



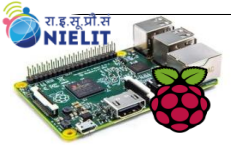
5 4 3 2 1



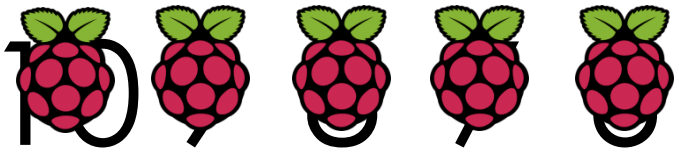
Tor Router



10 9 8 7 6 5 4 3 2 1



5 HTPC



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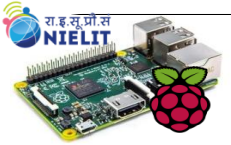


HTPC

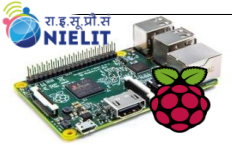
xbmc MEDIA CENTER

BBC iPlayer

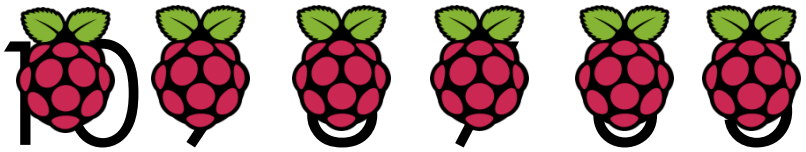
NETFLIX

4OD

10 9 8 7 6 5 4 3 2 1



4 Bartender



3 2 1

Bartender

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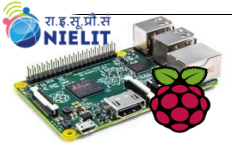
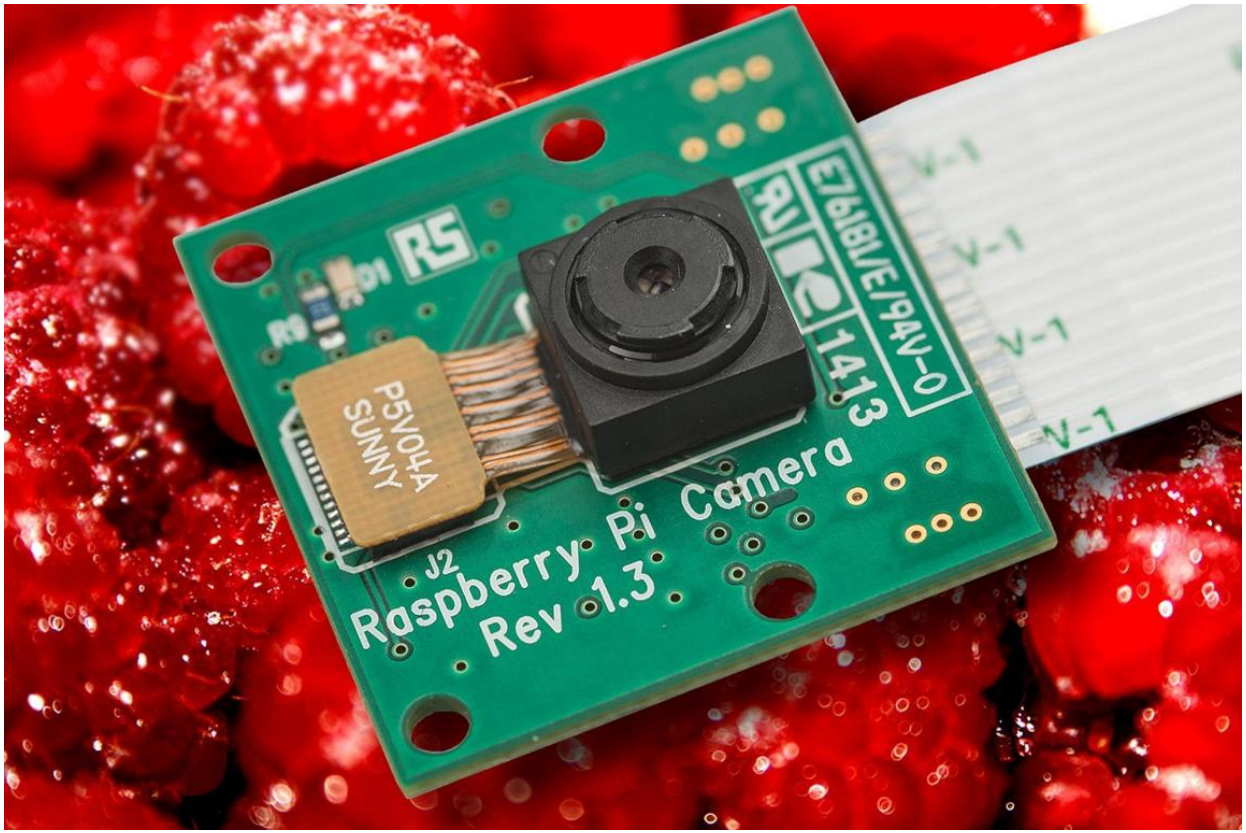
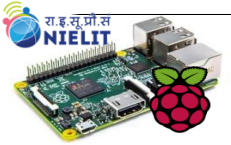


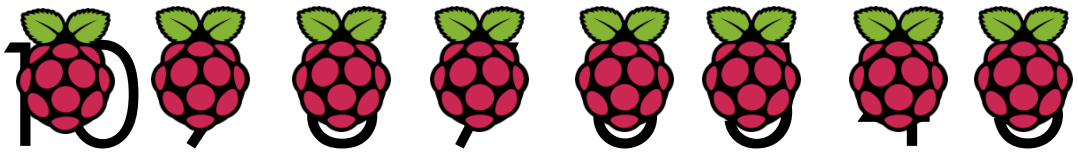
3 Camera

Camera

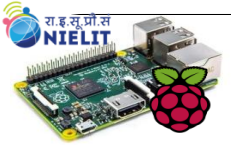

P5V04A
SUNNY
J2
Raspberry Pi Camera
Rev 1.3
E76181VE/94V-0
1413



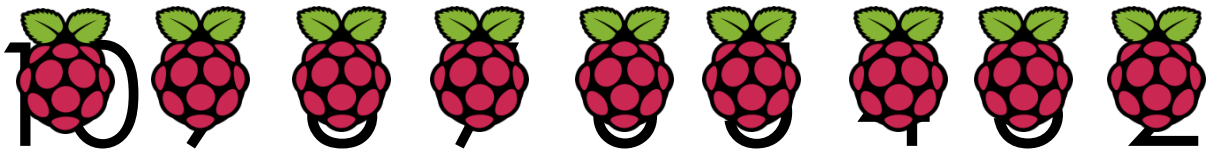
2 Clock



Clock



1 PiBot!



PiBot!