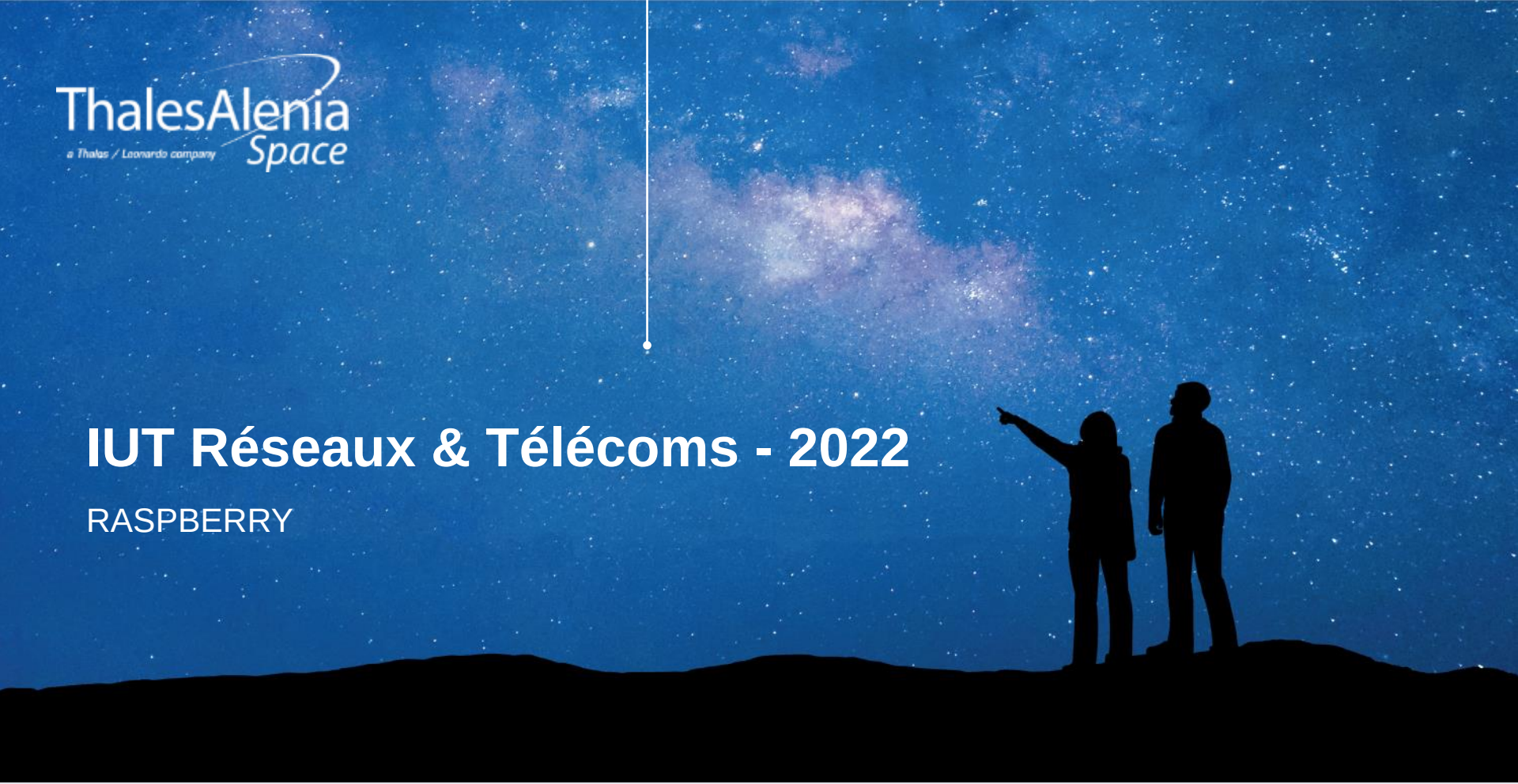


IUT Réseaux & Télécoms - 2022

RASPBERRY

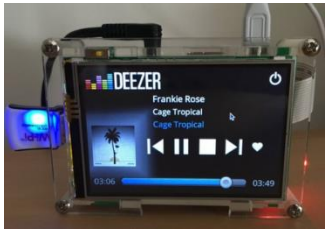
Date : 04/09/2020
Ref : xxxxx
Ref Modele : 83230347-DOC-TAS-FR-008

RASPBERRY

1. A quoi tu sers ?
2. Y a quoi dedans ?
3. Il était une fois …
4. Une famille qui s’agrandit …
5. Parlons logiciel & installation
6. La concurrence est féroce

Date : 02/02/2022
Ref : xxxxx
Ref Modele : 83230347-DOC-TAS-FR-008

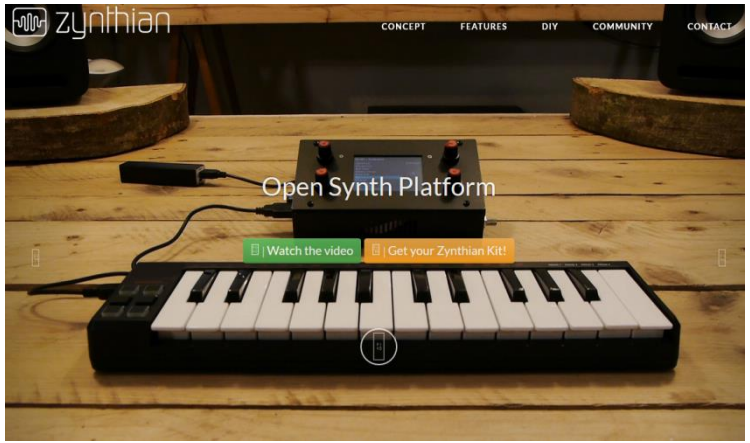
MUSIC PLAYER



Date : 02/02/2022
Ref : xxxxx
Ref Modele : 83230347-DOC-TAS-FR-008

MUSIC BOX & SYNTHETISEUR

https://projects.raspberrypi.org/en/projects/gpio-music-box



http://zynthian.org/#section-home

RECANTHA'S RASPBERRY PI MUSIC BOX

https://www.raspberrypi.org/blog/recanthas-raspberry-pi-music-box/

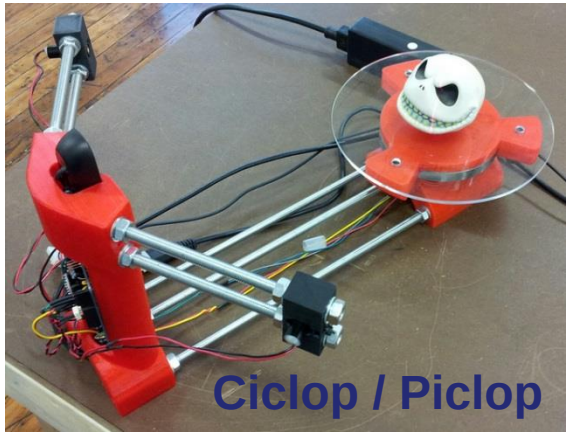
Date : 02/02/2022
Ref : xxxxx
Ref Modele : 83230347-DOC-TAS-FR-008

RETRO GAMING

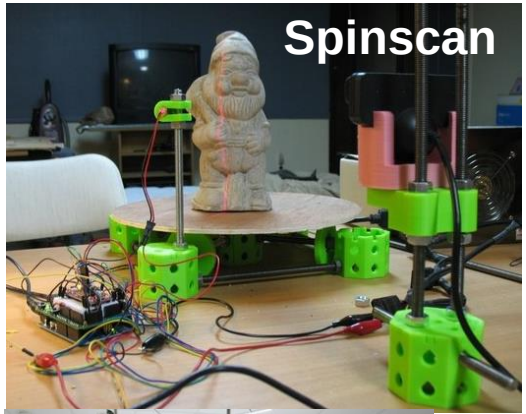
Date : 02/02/2022
Ref : xxxxx
Ref Modele : 83230347-DOC-TAS-FR-008

SCANNER 3D

https://www.thingiverse.com/thing:9972



http://hci.rwth-aachen.de/FabScan

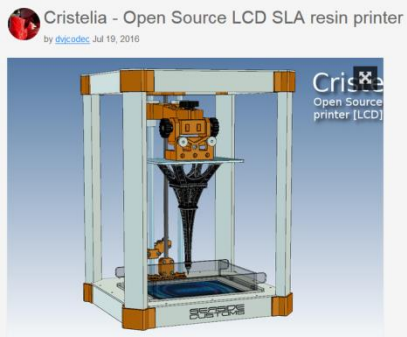


http://www.pi3dscan.com/

Date : 02/02/2022
Ref : xxxxx
Ref Modele : 83230347-DOC-TAS-FR-008

IMPRIMANTE 3D

CRISTELIA

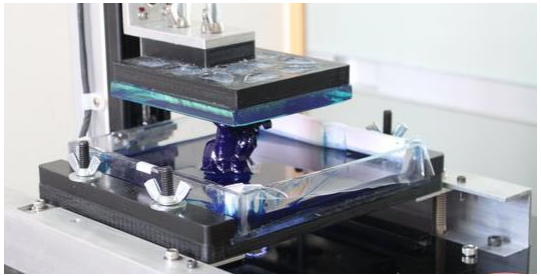


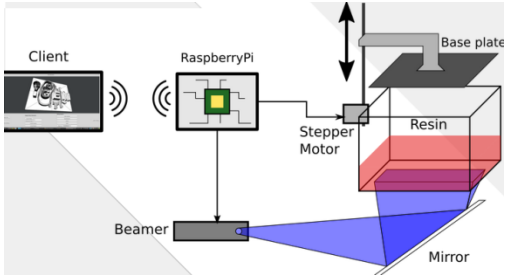
https://www.thingiverse.com/thing:1680172

UV LCD DLP 3D PRINTER

UV LCD SLA 3D Printer - presentation

https://www.youtube.com/watch?v=UkXdtxqKLL0



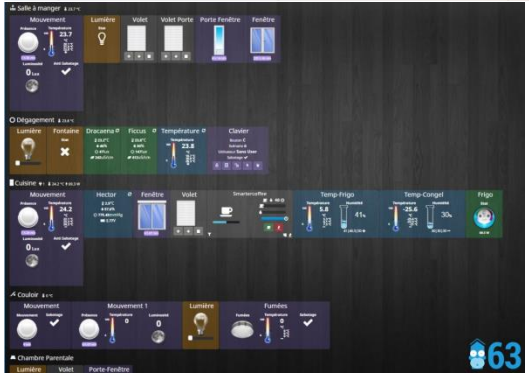


http://www.semageek.com/diy-une-imprimante-3d-haute-resolution-faite-maison/

Date : 02/02/2022
Ref : xxxxx
Ref Modele : 83230347-DOC-TAS-FR-008

DOMOTIQUE

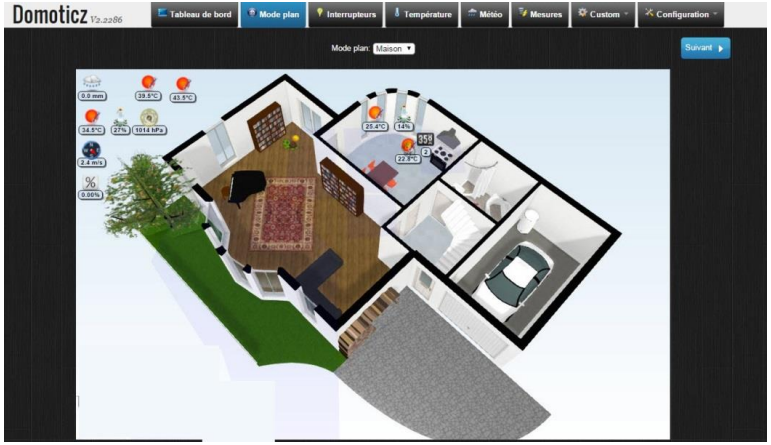
Jeedom
LA DOMOTIQUE INNOVANTE



https://www.jeedom.com/site/fr/

Domoticz
control at your fingertips.

https://domoticz.com/



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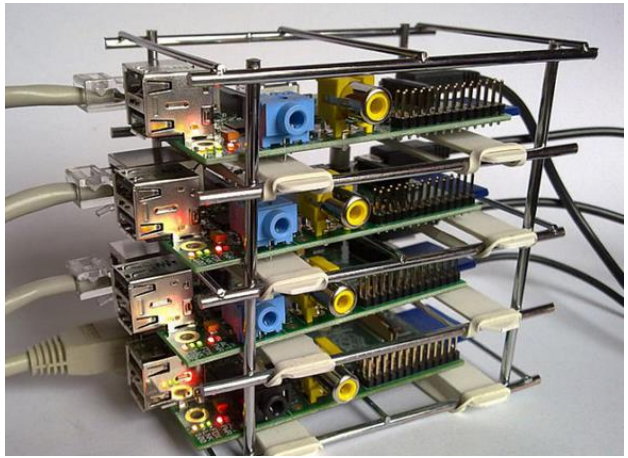
Ref : xxxxx
Ref Modele : 83230347-DOC-TAS-FR-008

CLUSTERING

Mise en parallèle de plusieurs Raspberry de 3 à plus de 100 ...

→ Pour des traitements massivement parallèles



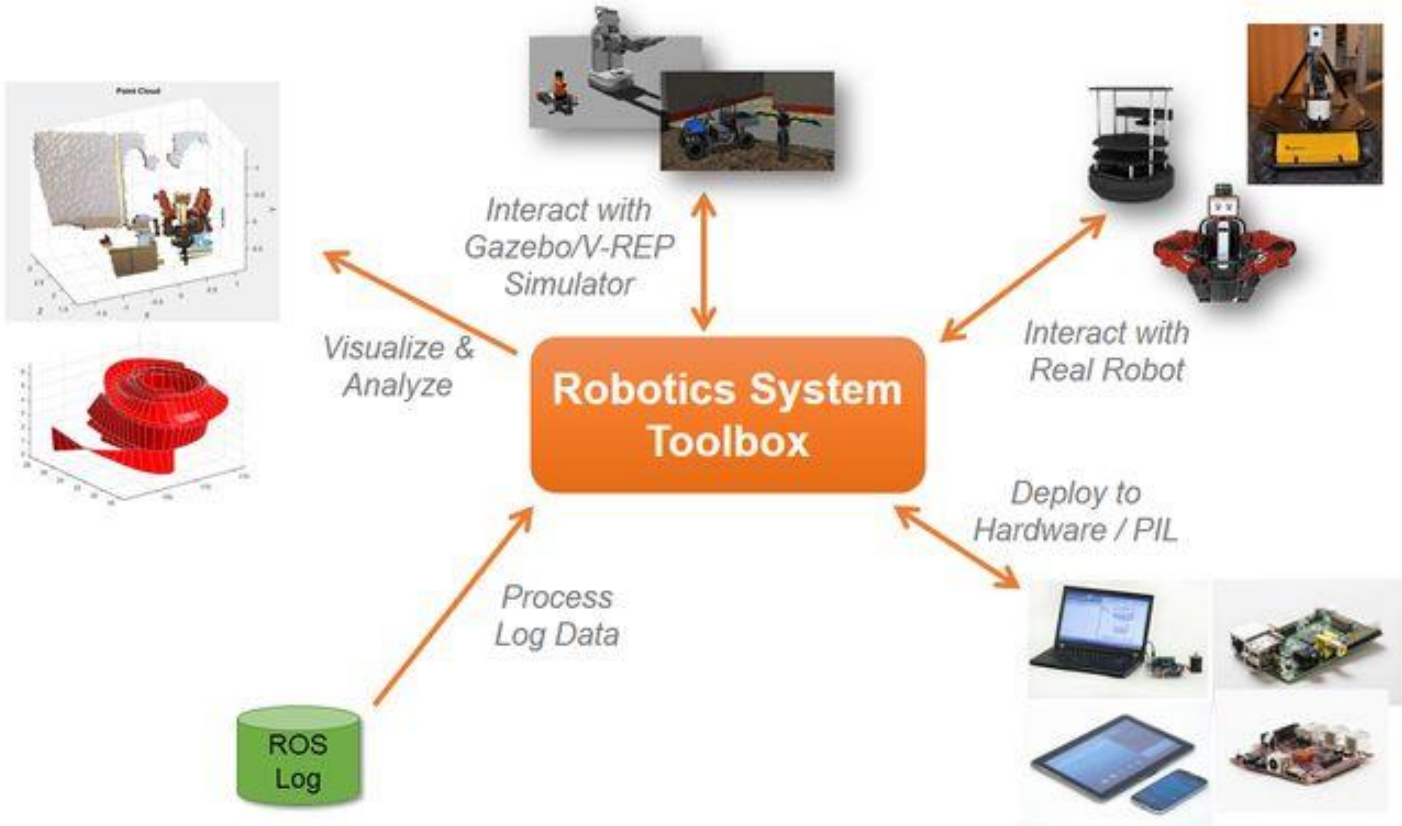
https://www.raspberrypi.org/magpi/cluster-computer-raspberry-pi-3/

https://www.framboise314.fr/un-cluster-de-raspberry-pi-avec-kubernetes/

https://raspberry-pi.fr/docker-swarm-raspberry-pi/

ROBOTIQUE (R.O.S.)

https://www.ros.org/
https://robots.ros.org/



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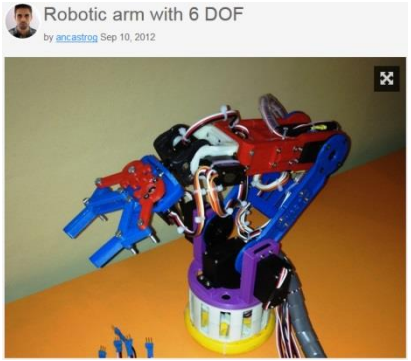
Ref : xxxxx
Ref Modele : 83230347-DOC-TAS-FR-008

BRAS ROBOTIQUE

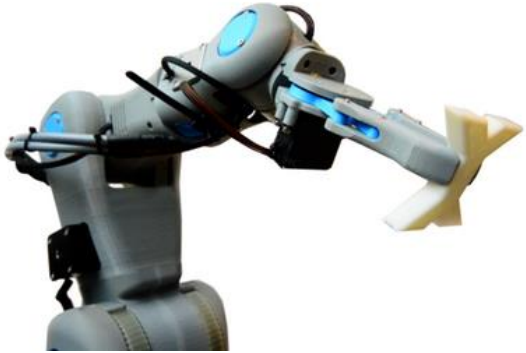
https://hackaday.io/project/12989-thor

https://thepihut.com/products/mearm-raspberry-pi-edition-pocket-sized-robot-arm

https://niryo.com/fr/



https://www.thingiverse.com/thing:30163



https://roboteurs.com/products/rbx1-remix-3d-printed-6-axis-robot-arm-kit

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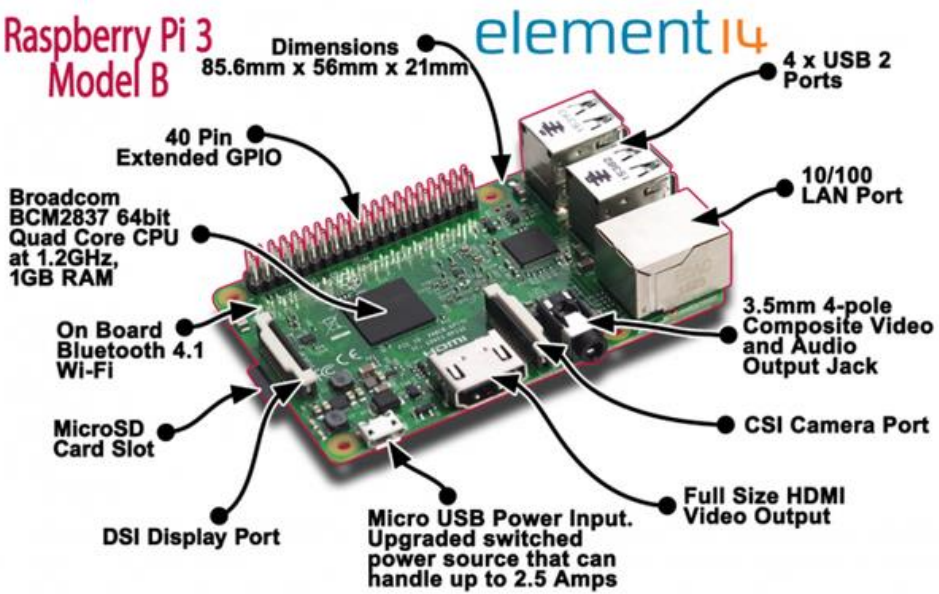
Y A QUOI DEDANS ?



Un ordinateur **complet** sur une seule carte de la taille d'une carte de crédit !

Aussi appelé nano-ordinateur en raison de sa taille

Composants :

- Processeur ARM & RAM
- Carte vidéo
- Différents ports d'interface
- « Disque dur »
- Connectivité sans fil

Alimentation:

- 5 V

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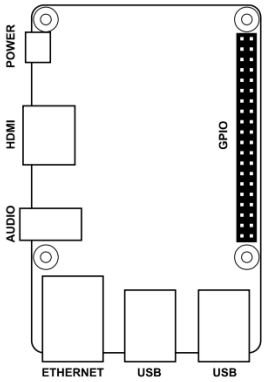
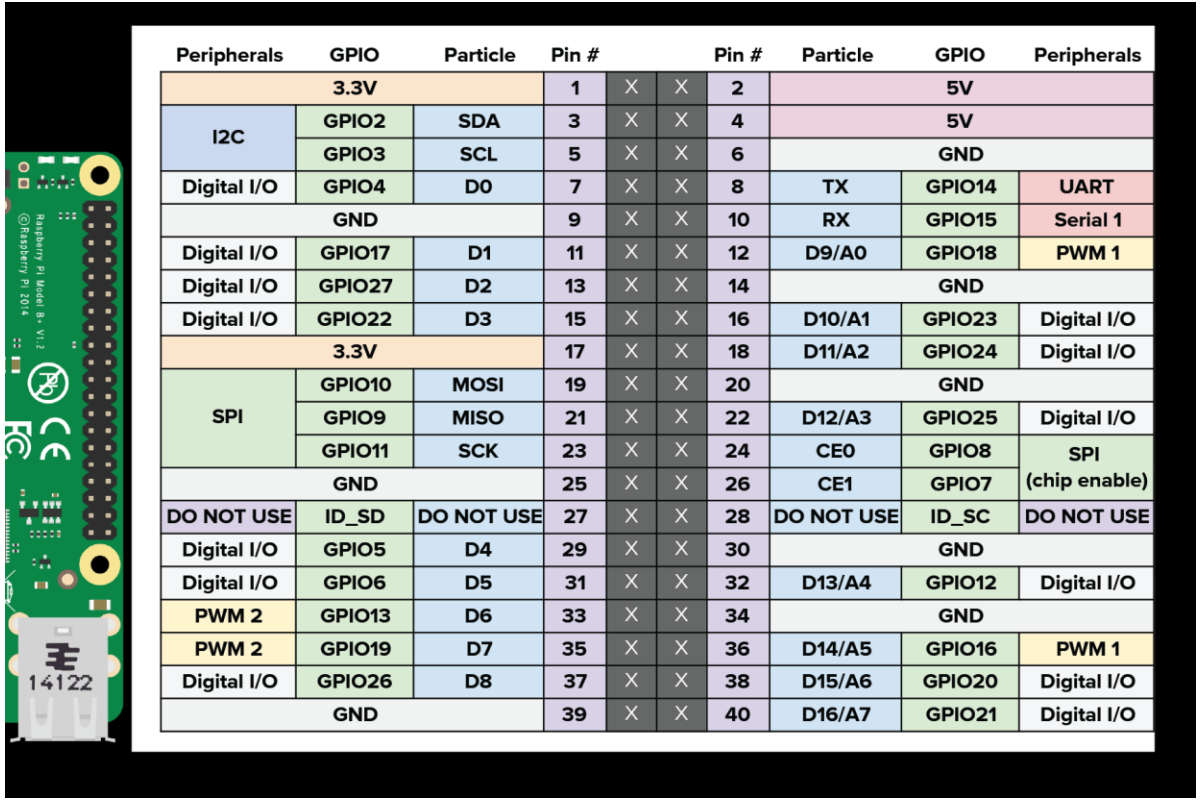
PORTS GPIO

General Purpose Input/Output

- Ajouter des extensions
- Chaque broche à un rôle spécifique (entrée, sortie, alimentation, masse, gestion de bus de données, …)



Power 3V3	1	2	Power 5V					
HotKey J1	3	4	Power 5V					
HotKey J2	5	6	GND					
Haut J1	7	8	Ⓛ / Btn3 J1					
GND	9	10	Ⓧ / Btn2 J1					
Bas J1	11	12	Ⓨ / Btn1 J1					
Gauche J1	13	14	GND					
Droite J1	15	16	Ⓡ / Btn6 J1					
Power 3V3	17	18	Ⓐ / Btn5 J1					
Start J1	19	20	GND					
Select J1	21	22	Ⓑ / Btn4 J1					
Haut J2	23	24	Ⓛ / Btn3 J2					
GND	25	26	Ⓧ / Btn2 J2					
Non utilisé	27	28	Non utilisé					
Bas J2	29	30	GND					
Gauche J2	31	32	Ⓨ / Btn1 J2					
Droite J2	33	34	GND					
Start J2	35	36	Ⓡ / Btn6 J2					
Select J2	37	38	Ⓐ / Btn5 J2					
GND	39	40	Ⓑ / Btn4 J2					



Peripherals	GPIO	Particle	Pin #			Pin #	Particle	GPIO	Peripherals
3.3V			1	X	X	2	5V		
I2C	GPIO2	SDA	3	X	X	4	5V		
	GPIO3	SCL	5	X	X	6	GND		
Digital I/O	GPIO4	D0	7	X	X	8	TX	GPIO14	UART
GND			9	X	X	10	RX	GPIO15	Serial 1
Digital I/O	GPIO17	D1	11	X	X	12	D9/A0	GPIO18	PWM 1
Digital I/O	GPIO27	D2	13	X	X	14	GND		
Digital I/O	GPIO22	D3	15	X	X	16	D10/A1	GPIO23	Digital I/O
3.3V			17	X	X	18	D11/A2	GPIO24	Digital I/O
SPI	GPIO10	MOSI	19	X	X	20	GND		
	GPIO9	MISO	21	X	X	22	D12/A3	GPIO25	Digital I/O
	GPIO11	SCK	23	X	X	24	CE0	GPIO8	SPI (chip enable)
GND			25	X	X	26	CE1	GPIO7	
DO NOT USE	ID_SD	DO NOT USE	27	X	X	28	DO NOT USE	ID_SC	DO NOT USE
Digital I/O	GPIO5	D4	29	X	X	30	GND		
Digital I/O	GPIO6	D5	31	X	X	32	D13/A4	GPIO12	Digital I/O
PWM 2	GPIO13	D6	33	X	X	34	GND		
PWM 2	GPIO19	D7	35	X	X	36	D14/A5	GPIO16	PWM 1
Digital I/O	GPIO26	D8	37	X	X	38	D15/A6	GPIO20	Digital I/O
GND			39	X	X	40	D16/A7	GPIO21	Digital I/O

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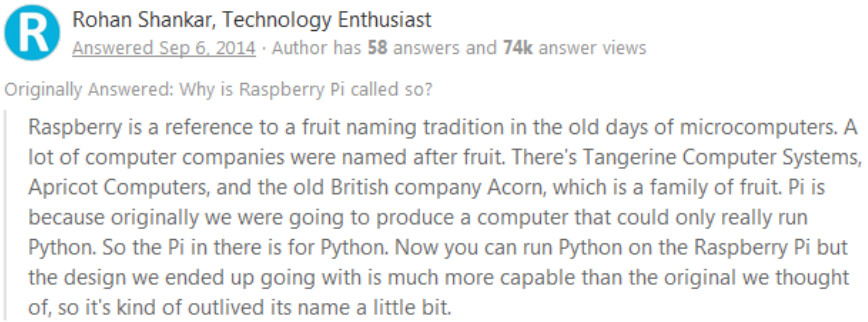
IL ÉTAIT UNE FOIS …

/// Après la bulle internet de 2000, baisse de l'engouement des étudiants pour l'informatique et matériel cher pour les habitants des pays émergents

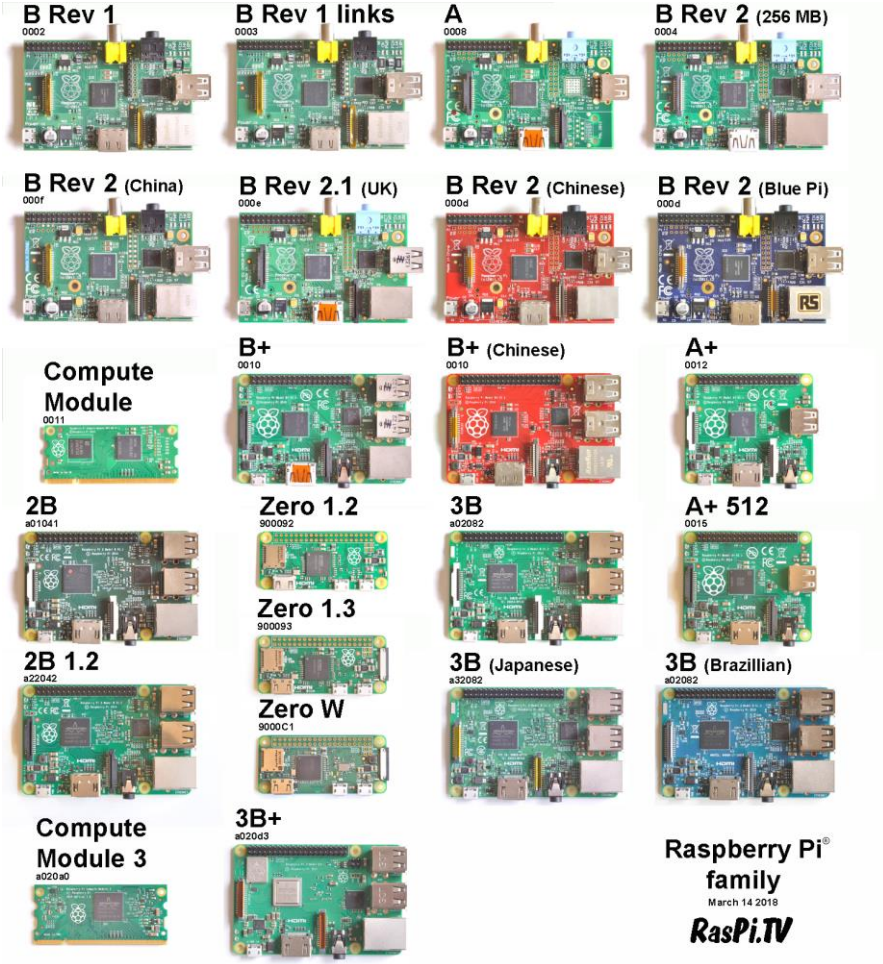
- → Développer une plateforme accessible financièrement pour un apprentissage facile de l'informatique personnelle (type PC)
- → Fournie nue pour baisser les coûts et permettre une personnalisation plus aisée et moins coûteuse
- → **Raspberry PI** = la framboise et le langage Python



https://www.quora.com/What-is-the-story-behind-the-name-Raspberry-Pi

UNE FAMILLE QUI S'AGRANDIT …

https://raspi.tv/2018/raspberry-pi-3b-plus-family-photo-update-march-2018



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PERFORMANCES DES RASPBERRY

http://socialcompare.com/fr/comparison/raspberrypi-models-comparison

	Raspberry Pi 3 B+	Raspberry Pi Zero WH	Raspberry Pi Zero W	Raspberry Pi 3	Raspberry Pi Zero	Raspberry Pi 2	Raspberry Pi A+	Raspberry Pi B
Image								
Date de sortie	14 mars 2018	12 janv. 2018	28 févr. 2017	29 févr. 2016	30 nov. 2015	1 févr. 2015	10 nov. 2014	15 févr. 2012
Description		Même carte que Raspberry Pi Zero W mais avec un connecteur GPIO déjà soudé						model B mostly w/some model A detail
Caractéristiques								
Prix	35,00 $US	15,00 $US	10,00 $US	35,00 $US	5,00 $US	35,00 $US	20,00 $US	
SOC								
SOC Type	Broadcom BCM2837B0	Broadcom BCM2835	Broadcom BCM2835	Broadcom BCM2837	Broadcom BCM2835	Broadcom BCM2836	Broadcom BCM2835	Broadcom BCM2835
Core Type	Cortex-A53 64-bit	ARM1176JZF-S	ARM1176JZF-S	Cortex-A53 64-bit	ARM1176JZF-S	Cortex-A7	ARM1176JZF-S	ARM1176JZF-S
No. Of Cores	4	1	1	4	1	4	1	1
GPU	VideoCore IV	VideoCore IV	VideoCore IV	VideoCore IV 1080p@30	VideoCore IV	VideoCore IV	VideoCore IV	VideoCore IV 1080p@30
CPU Clock	1,4 GHz	1 GHz	1 GHz	1,2 GHz	1 GHz	900 MHz	700 MHz	700 MHz
Mémoire vive	1 GB	512 MB	512 MB	1 GB DDR2	512 MB	1 GB	256 MB	512 MB
Wired Connectivity								
USB Ports	✓ 4xUSB 2.0	✓ micro & micro OTG	✓ micro & micro OTG	✓ 4	✓ micro + micro OTG	✓ 4	✓ 1	− 2
Ethernet	✓ Gigabit - Over USB 2.0	✗	✗	✓	✗	✓ 10/100M	✗	✓
SATA Ports	✗	✗	✗	✗	✗	✗	✗	✗
Port HDMI	✓ 1	✓ mini	✓ mini	✓	✓ mini	✓	✓	✓ 1.3
Analog Video Out	✓ shared with audio jack	✓ via unpopulated pin	✓ via unpopulated pin	✓ shared with audio jack	✓ via unpopulated pin	✓ shared with audio jack	✓ shared with audio jack	✓ Composite
Analog Audio Out	✓ 3.5mm jack	− HDMI audio	− HDMI audio	✓	− HDMI audio	✓	✓	✓
Analog Audio In	✗	✗	✗	✗	✗	✗	✗	✗ USB mic or sound-card could be added
SPI	✓	✓	✓	✓	✓	✓	✓	✓
I2C	✓	✓	✓	✓	✓	✓	✓	✓
GPIO	✓ 40-pin	✓	✓	✓ 40-pin	✓	✓	✓	− 26-pins
LCD Panel	✓	✗	✗	✓	✗	✓	✓	✓ DSI
Camera	✓	✓	✓	✓	✓ latest version include a camera connector	✓	✓	✓ DSI
SD/MMC	✓ micro-SD	✓ microSD	✓ microSD	✓ microSD	✓ microSD	✓ microSD	✓ microSD	− SD
Serial	✓ RX/TX UART	−	−	−	−	−	−	− Through Expansion Connector, needs level shifting
Wireless Connectivity (On-Board)								
Wi-Fi	✓ 2.4GHz and 5GHz 802.11 b/g/n/ac	✓ 802.11n	✓ 802.11n	✓ 802.11n	✗	✗	✗	✗
Bluetooth®	✓ 4.2, BLE	✓ 4.1	✓ 4.1	✓ 4.1 LE	✗	✗	✗	✗
Dimensions								

RASPBERRY PI 1 (2012)

/// Processeur : ARM1176JZF-S (ARMv6) 700 MHz Broadcom 28351

- dispose d'un décodeur Broadcom VideoCore IV, permettant le décodage H.264 FullHD 1080P et d'un VFPv2 pour le calcul des opérations à virgule

/// RAM : 256 Mo

/// 2 Sorties vidéo : Composite et HDMI

/// 1 Sortie audio stéréo Jack 3,5 mm (sortie son 5.1 sur la prise HDMI)

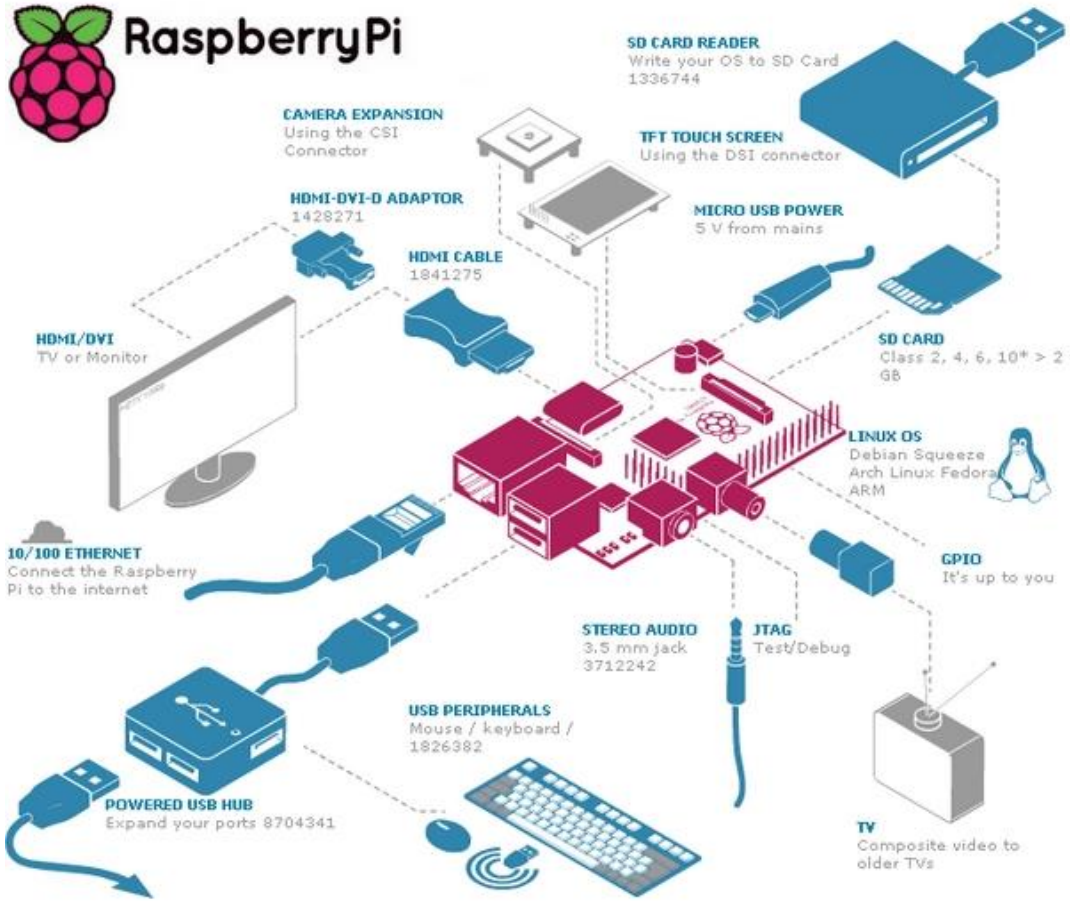
/// Unité de lecture-écriture de carte mémoire : SDHC / MMC / SDIO

/// 1 Port USB 2.0

/// Prise pour alimentation Micro-USB (consommation : 400 mA + périphériques)

/// Des entrées / sorties supplémentaires sont accessibles directement sur la carte mère via des pins 3v364 : GPIO, S2C, I2C, SPI

/// Décodage vidéo : 1080p30 H.264 high-profile



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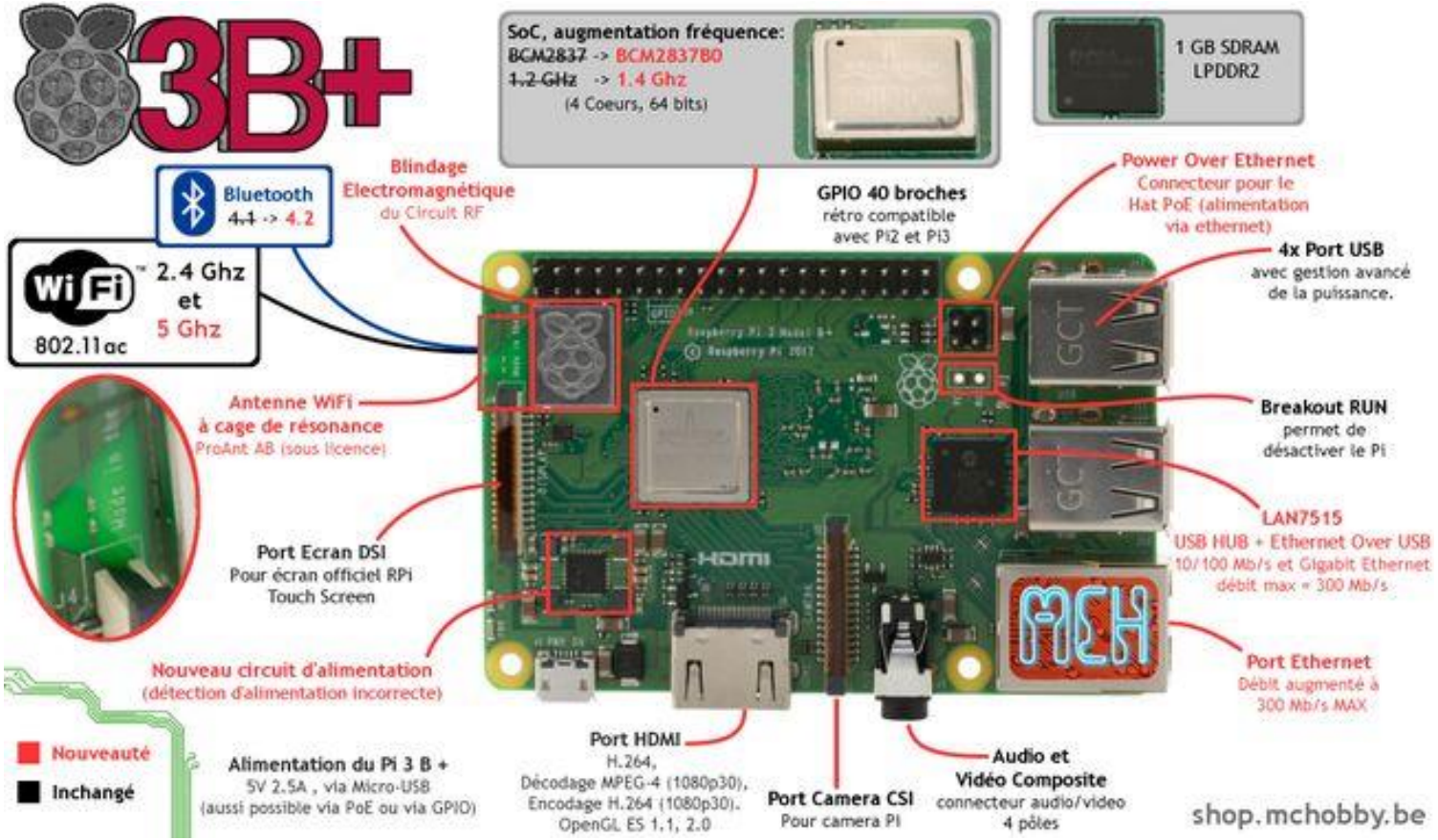
RASPBERRY PI 3 (2016)



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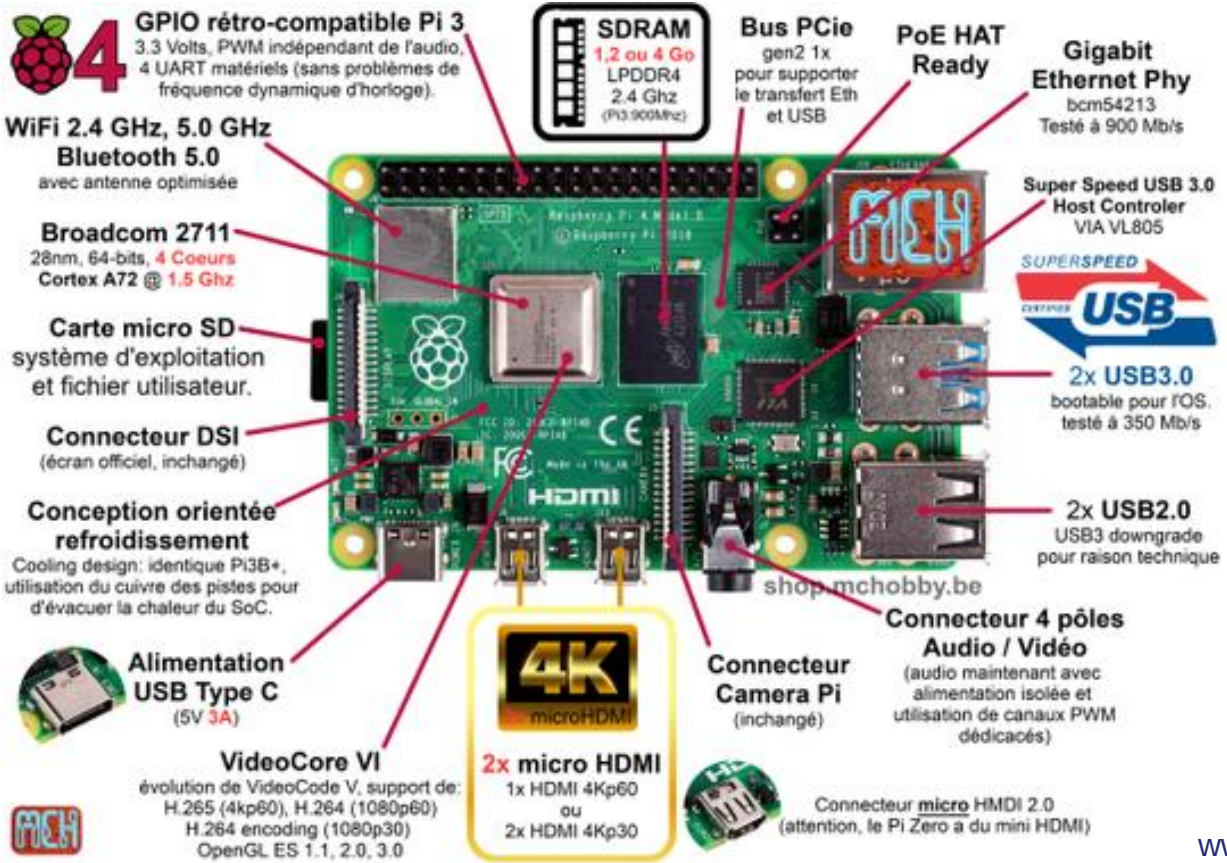
Ref : xxxxx
Ref Modele : 83230347-DOC-TAS-FR-008

RASPBERRY PI 4 (2019)



www.framboise314.fr

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Ref : xxxxx
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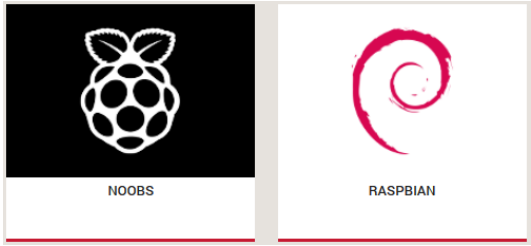
PARLONS LOGICIEL

/// Le Raspberry PI est un ordinateur personnel qui a besoin

- D'un système d'exploitation
- De pour pouvoir installer d'autres applications



/// Originellement développé dans l'esprit logiciel libre ➔ solution LINUX

- Le premier OS : RASPBERRY DEBIAN ➔ RASPBIAN
- Pour démarrer facilement: NOOBS qui comporte plusieurs choix au démarrage

/// Pour télécharger les OS:

https://www.raspberrypi.org/downloads/

/// Connection internet recommandée pour mise à jour de l'OS juste après installation

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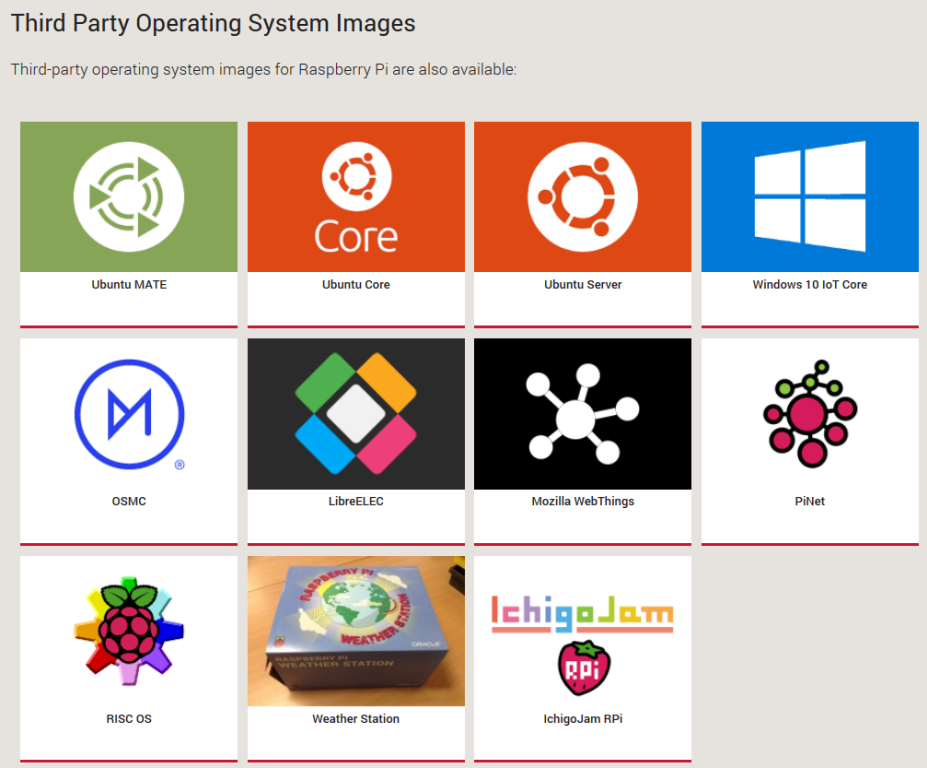
PLUSIEURS AUTRES DISTRIBUTIONS POSSIBLES



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Ref : xxxxx
Ref Modele : 83230347-DOC-TAS-FR-008

INSTALLATION SYSTÈME

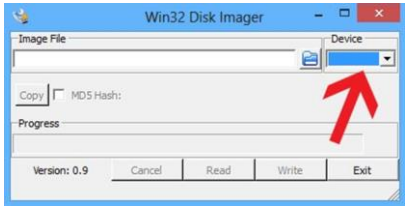
/// Installer un système exploitation sur la carte Micro-SD :

- Télécharger l'image de l'OS que vous voulez installer
- Télécharger & installer le logiciel SDFormater
- Télécharger & installer le logiciel Win32DiskManager

/// Connecter la carte SD à l'ordinateur

/// Formater la carte avec SDFormater

/// Installer l'image avec Win32DiskManager



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Ref : xxxxx
Ref Modele : 83230347-DOC-TAS-FR-008

CONFIGURATION RASPBERRY

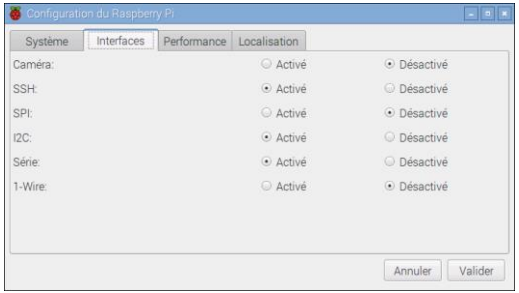
/// Installer la carte SD dans la raspberry

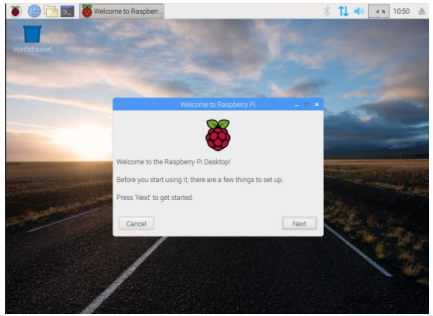
/// Connecter écran + clavier + souris

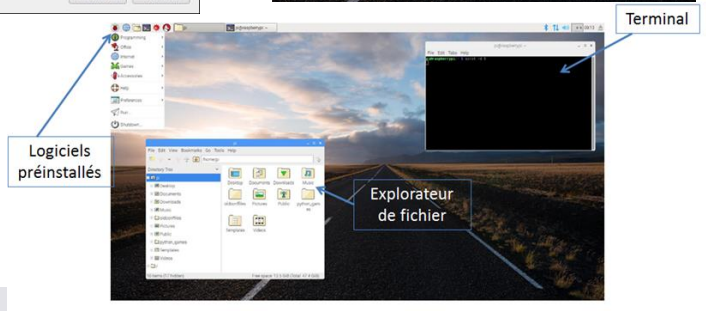
/// Brancher l'alimentation

/// Lancer un terminal et exécuter la commande : sudo raspi-config

- Passer le clavier QWERTY en AZERTY
- Passer le Raspberry en français
- Changer le mot de passe si nécessaire
- Configurer le wifi
- Activer les interfaces nécessaire pour votre projet







/// Mise à jour du système

- Exécution des commandes: sudo apt update puis sudo apt upgrade
- Installer package gpio: sudo apt install rpi.gpio

/// Installation des librairies et logiciels dont vous avez besoin

- Commande sudo apt install xxx

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UTILISATION RASPBERRY

/// En direct

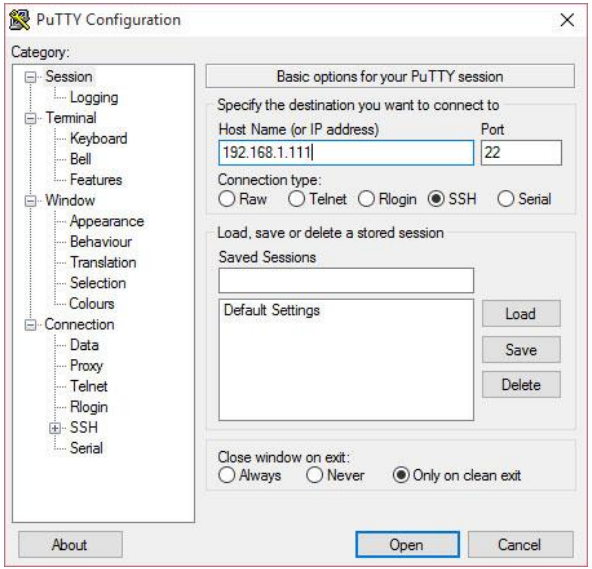
- Connecter écran + clavier + souris

/// Déport d'écran

- Avec VNC (https://raspberry-pi.fr/vnc-raspberry-pi/)

/// En mode remote

- Avec mobaXterm ou putty



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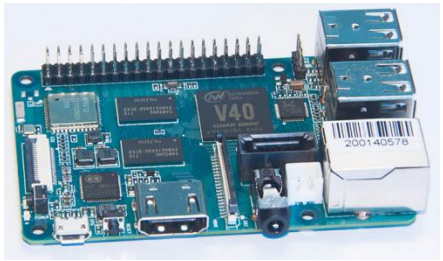
LA CONCURRENCE EST FÉROCE …

https://www.lemonpi.io/

http://www.orangepi.org/

BANANA PI



http://www.banana-pi.org/

ODROID PI

https://www.hardkernel.com/

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BANANA PI

Banana Pi BPI-R1

A dual-core open source router that has 4GbE LAN and wireless n.

LEARN MORE

Banana Pi BPI-M1+

The classic M1 upgraded with a WiFi chip onboard. Compatible with the same OS.

LEARN MORE

Banana Pi BPI-M1

The classic Banana Pi. This original board wtih SATA 3Gbps and GbE never gets old.

LEARN MORE

Banana Pi BPI-D1

An open source IP camera perfect for DIY projects.

LEARN MORE

Banana Pi BPI-G1

The next generation of IoT hub with WiFi, Zigbee, and BT support.

LEARN MORE

BPI-F2

Industrial grade,2G DDR,8G eMMC,Mini PCI-e,DVP&MIP ...

LEARN MORE

BPI-R64

Cortex-A53,MTK7615 4x4ac WiFi,5 Ethernet ports ...

LEARN MORE

BPI-P2ZERO

H2+ Quad-core Cortex-A7,512M DDR3,PoE power ...

LEARN MORE

BPI-W2

Quad-Core A53,2GB RAM,8G eMMC,HDMI in/out,type C...

LEARN MORE

BPI-M2 Berry

Quad Core Board with 1GB RAM, WiFi&Bluetooth,Gigb Ethernet ...

LEARN MORE

BPI-ZERO

Quad Core Cortex-A7 with 512B RAM, WiFi&Bluetooth,mini HDMI...

LEARN MORE

Banana Pi BPI-M2U

Quad Core Board with 2GB RAM, onboard 8GB eMMC, WiFi&Bluetooth ...

LEARN MORE

Banana Pi BPI-R2

MT7623N,Quad-core ARM Cortex-A7, 2GB RAM,4 Gigb Ethernet, Wifi&Bluetooth ...

LEARN MORE

Banana Pi BPI-M2M

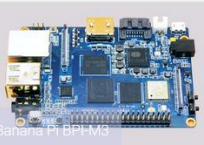
quad-core Cortex-A7, 512MB, WIFI & Bluetooth ...

LEARN MORE

Banana Pi BPI-M64

64 Bit Quad Core ARM Cortex A53with 2GB RAM, 8GB eMMC, WiFi&Bluetooth...

LEARN MORE



Banana Pi BPI-M3

Octa-core single board computer,2GB RAM,8G eMMC,Wifi & Bluetooth...

LEARN MORE

Banana Pi BPI-M2+

Quad-core mini single board computer family with options of WiFi and BT,eMMC...

LEARN MORE

http://www.banana-pi.org/

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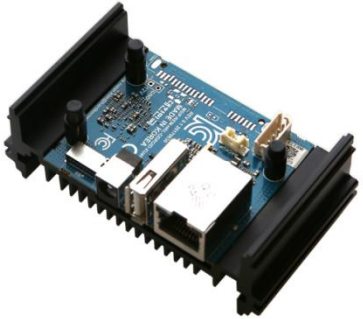
ODROID PI

https://www.hardkernel.com/

ODROID-MC1

ODROID-MC1 solo



ODROID-XU4

ODROID-C0

ODROID-C1+

ODROID-HC2

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ORANGE PI

https://www.orangepi.org/

ORANGE PI ONE

ORANGE PI ONE+

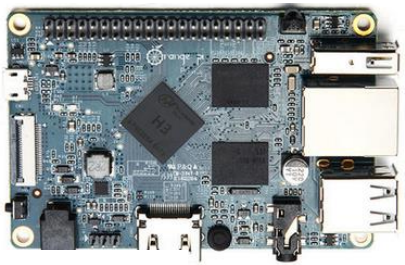
ORANGE PI i96

ORANGE PI R1

ORANGE PI LITE

ORANGE PI LITE2

ORANGE PI PC



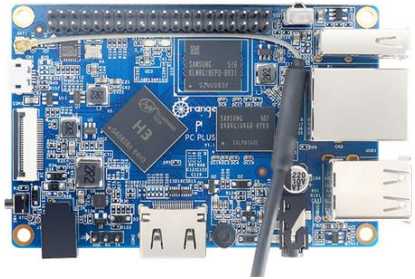
ORANGE PI PC2

ORANGE PI ZERO+ 2

ORANGE PI+

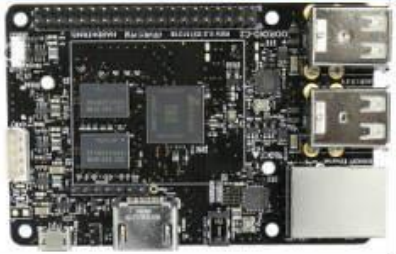
ORANGE PI+ 2

ORANGE PI PC+



ORANGE PI+ 2E

PLUS DE PERFORMANCES QUE RASPBERRY …

	Banana pi BPI-M64	Raspberry Pi 3	ODROID-C2	Pine A64 Plus
Photo				
Processor	Allw inner A64 64bit quad core Cortex A53 processor @ 1.2 GHz	Broadcom BCM2837 quad core Cortex A53 processor @ 1.2 GHz(4x ~2760 DMIPS)	Amlogic S905 quad core Cortex A53 processor @ 2.0 GHz(4x ~4600 DMIPS)	Allw inner A64 quad core Cortex A53 processor @ 1.2 GHz
GPU	ARM Mali-400MP2	VideoCore IV @ 300/400 MHz	Penta core (3+2) ARM Mali-450	ARM Mali-400MP2
Video Decoding	H.265/HEVC @ up to 4K @ 30 fps, H.264, VP8, AVS/AVS+ & MPEG1/2/2 @ 1080p60 , VC1 and MJPEG up to 1080p @ 30 fps	1080p30 for H.264, MPEG2* and VC1* 1080p video encoding (H.264) * Extra licenses required	8-/10-bit H.265 up to 4K @ 60fps, H.264 up to 4K @ 30 fps, H.263, VC1, Mpeg1/2, AVS, Realvideo up to 1080p60	H.265/HEVC @ up to 4K @ 30 fps, H.264, VP8, AVS/AVS+ & MPEG1/2/2 @ 1080p60 , VC1 and MJPEG up to 1080p @ 30 fps
Video Encoding	H.264 up to 1080p@60fps	Full HD H.264 video encoding	H.264 up to 1080p@60fps	H.264 up to 1080p@60fps
RAM	2GB DDR3	1GB LPDDR2	2GB DDR3	1 or 2GB DDR3
Storage	micro SD card slot & eMMC 8GB	micro SD card slot, non EMMC 8GB	micro SD card slot, non EMMC 8GB	micro SD card slot, non EMMC 8GB
Ethernet	Gigabit Ethernet	10/100M Ethernet via USB bridge	Gigabit Ethernet	Gigabit Ethernet
Wireless Connectivity	WiFi 802.11 b/g/n (2.4GHz) and BT 4.0 LE	WiFi 802.11 b/g/n (2.4GHz) and BT 4.1 LE	Non WIFI_BT	optional WiFi 802.11 b/g/n & BT
USB	2x USB 2.0 host ports 1x micro USB OTG port	4x USB 2.0 host ports 1x micro USB port	4x USB 2.0 host ports 1 x micro USB OTG port	2x USB 2.0 host ports 1x micro USB port
Disply	MIPI DSI	MIPI DSI	Non DSI	MIPI DSI
Camera	MIPI CSI	MIPI CSI	Non CSI	MIPI CSI
Video	HDMI 1.4 w ith CEC and 3.5mm composite	HDMI 1.4 w ith CEC and 3.5mm composite	HDMI 2.0 w ith CEC	HDMI 1.4
Audio	HDMI and 3.5mm audio jack	HDMI and 3.5 mm audio jack (Shared w ith composite video)	HDMI, non 3.5mm audio jack	HDMI and 3.5mm audio jack
GPIO	40-PIN: PWM,GPIO,UART,I²C bus,I²S bus,SPI bus,+3.3v,+5v,ground.	40-pin header w ith 26 –GPIOs, 1x UART (debugging), 1x SPI, 2x I2C, PCMI2S, 2x PWM	40-pin header w ith GPIO, I2C, UART, PWM, 1-w ire, and ADC	40-pin Raspberry Pi 2 compatible header w ith up to 27x GPIOs, 1x I2C, 1x SPI, 1x UART.
Button	Reset button, Power button, Uboot button	Non Reset, Pow er and Uboot button	Non Reset, Pow er and Uboot button	Non Reset, Pow er and Uboot button
LED	User define LED (red/power, blue, green)	LED (red/power & green)	LED (pow er & status)	
Dimensions	90 x 62 mm	85 x 56 mm	85 x 56mm	127mm x 79mm
	Official: Ubuntu 16.04 64-bit w ith Kernel 3.10		Official: Ubuntu 16.04 32-bit and 64-bit images	Official: Ubuntu 16.04 64-bit w ith Kernel 3.10 (No

MAIS LA COMPARAISON N'EST PAS ÉVIDENTE …

Brand	Raspberry Pi	Raspberry Pi	Raspberry Pi	Banana Pi	Banana Pi	Orange Pi	Orange Pi	Orange Pi	Orange Pi	ODROID	ODROID	ODROID
Board	Zero	2 Model B	3 Model B	M2	M3	One	PC	Plus	Plus 2	C1+	C2	XU4
SoC Vendor	Broadcom	Broadcom	Broadcom	Allwinner	Allwinner	Allwinner	Allwinner	Allwinner	Allwinner	Amlogic	Amlogic	Samsung
SoC Chip	BCM2835	BCM2836	BCM2837	A31s	A83T	H3	H3	H3	H3	S805	S905	Exynos 5422
SoC Process	40nm	40nm	40nm	40nm	28nm	28nm	28nm	28nm	28nm	28nm	28nm	28nm
CPU Cores	1	4	4	4	8	4	4	4	4	4	4	4+4
CPU Design	ARM1176JZF-S	Cortex A7	Cortex A53	Cortex A7	Cortex A7	Cortex A7	Cortex A7	Cortex A7	Cortex A7	Cortex A5	Cortex A53	Cortex A15/A7
CPU Freq	1GHz	0.9GHz	1.2GHz	1GHz	1.8GHz	1.5GHz	1.5GHz	1.5GHz	1.5GHz	1.5GHz	2GHz	2.1GHz/1.5GHz
CPU Instruction	ARMv6	ARMv7	ARMv8	ARMv7	ARMv7	ARMv7	ARMv7	ARMv7	ARMv7	ARMv7	ARMv8	ARMv7
GPU Vendor	Broadcom	Broadcom	Broadcom	PowerVR	PowerVR	ARM	ARM	ARM	ARM	ARM	ARM	ARM
GPU Design	VideoCore IV	VideoCore IV	VideoCore IV	SGX544MP2	SGX544MP(1/2?)	Mali 400MP2	Mali 400MP2	Mali 400MP2	Mali 400MP2	2x Mali 450	3x Mali 450	Mali T628 MP6
GPU Freq	250MHz	250MHz	400MHz	355MHz	700MHz	600MHz	600MHz	600MHz	600MHz	600MHz	700Mhz	600MHz
H264 Dec	1080P30	1080P30	1080P30	1080P60	1080P60	1080P60	1080P60	1080P60	1080P60	1080P60	1080P60	1080P60
H264 Enc	1080P30	1080P30	1080P30	1080P30	1080P60	1080P30	1080P30	1080P30	1080P30	1080P30	1080P60	1080P60
H265 Dec	None	None	None	None	1080P30	4KP30	4KP30	4KP30	4KP30	1080P60	4K60	None
Memory	512MB DDR2	1GB DDR2	1GB DDR2	1GB DDR3	2GB DDR3	512MB DDR3	1GB DDR3	1GB DDR3	2GB DDR3	1GB DDR3	2GB DDR3	2GB DDR3
Memory Freq	400MHz	400MHz	400MHz	432MHz	672MHz	672MHz	672MHz	672MHz	672MHz	792MHz	912MHz	750MHz
Storage	MicroSD	MicroSD	MicroSD	MicroSD	MicroSD/USB SATA 2.0	MicroSD	MicroSD	MicroSD/USB SATA 2.0	MicroSD/USB SATA 2.0	MicroSD/eMMC	MicroSD/eMMC	MicroSD/eMMC
Storage Onboard	None	None	None	None	8GB eMMC	None	None	8GB eMMC	16GB eMMC	None	None	None
Storage	SD2.0	SD2.0	SD2.0	SD3.0	SD2.0/eMMC 4.4	SD3.0	SD3.0	SD3.0/eMMC 4.5	SD3.0/eMMC 4.5	SD3.0/eMMC 4.5	SD3.0/eMMC 5.0	SD3.0/eMMC 5.0
USB 2.0	1 OTG	4	4	4 + 1 OTG	2 + 1 OTG	1 + 1 OTG	3 + 1 OTG	4 + 1 OTG	4 + 1 OTG	4 + 1 OTG	4 + 1 OTG	1
USB 3.0	0	0	0	0	0	0	0	0	0	0	0	2
Ethernet	None	100Mb	100Mb	1Gb RTL8211E	1Gb RTL8211E	100Mb	100Mb	1Gb	1Gb	1Gb	1Gb RTL8211F	1Gb
Wireless	None	None	802.11N BCM43438	802.11N AP6181	802.11N AP6212	None	None	802.11N RTL8189ETV	802.11N RTL8189ETV	None	None	None
Bluetooth	None	None	Bluetooth 4.1	None	Bluetooth 4.0 AP6212	None	None	None	None	None	None	None
IrDA	None	None	None	Yes	Yes	None	Yes	Yes	Yes	Yes	Yes	None
HDMI	1200P60	1200P60	1200P60	1200P60	1200P60	4KP30	4KP30	4KP30	4KP30	1200P60	4K60	1600P60
RTC	No	No	No	No	No	No	No	No	No	Yes	No	Yes
Power Req	5V1A	5V2A	5V2.5A	5V2A	5V2A	5V2A	5V2A	5V2A	5V2A	5V2A	5V2A	5V4A
Power Plug uUSB	Yes	Yes	Yes	No	Some Boards	No	No	No	No	Yes	Yes	No
Power Plug Barrel	No	No	No	4/1.7mm	4/1.7mm Some Boards	4/1.7mm	4/1.7mm	4/1.7mm	4/1.7mm	2.5/0.8mm	2.5/0.8mm	5.5/2.1mm Barrel
Android	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Linux Mainline	Yes	Yes	Yes	Yes	4.6	Yes	Yes	Yes	Yes	No	No	Yes

➔Bien définir son besoin pour trouver la bonne solution matériel

➔Se tenir au courant des évolutions car l'évolution est très rapide

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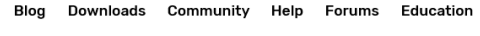
OÙ TROUVER DES INFOS

/// Le site officiel https://www.raspberrypi.org/



/// Presque le même en français http://www.raspberrypi-france.fr/

/// Le Magazine gratuit https://www.raspberrypi.org/magpi/

/// Et des milliers d'autres sites

https://raspi.tv/category/raspberry-pi

https://www.framboise314.fr/

…

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MISE EN OEUVRE

/// Faire clignoter une LED

/// Lire l’état d’un bouton poussoir

/// Allumer une LED avec un bouton

/// Afficher un mot sur un LCD

/// Afficher l’heure et la date

/// Détecter un mouvement avec un capteur IR

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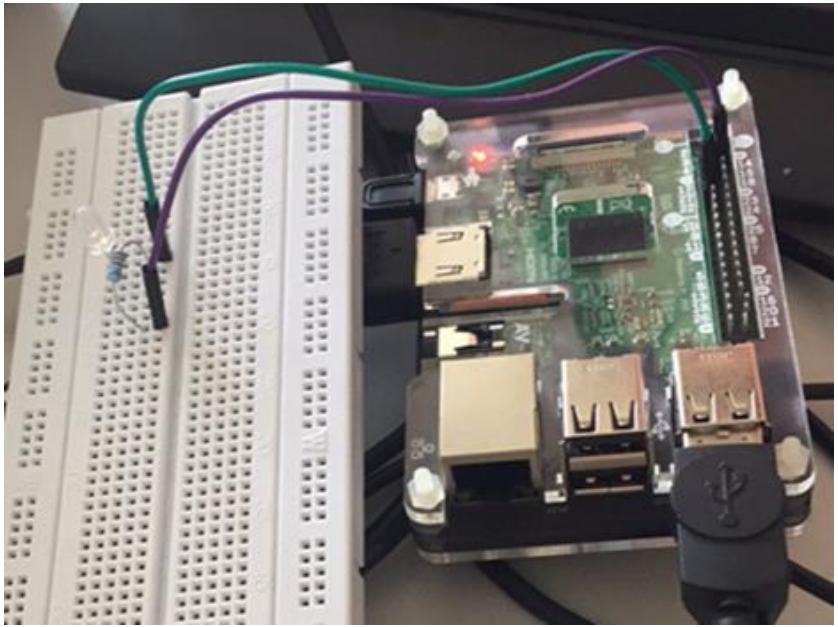
MISE EN ŒUVRE: FAIRE CLIGNOTER LED



```python
import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BCM)

#declaration des emplacements
control_pin = 18

#Parametrages pour des pins
GPIO.setup(control_pin, GPIO.OUT)

try:

    while True:
        GPIO.output(control_pin, True) #LED s'allume
        time.sleep(2)
        GPIO.output(control_pin, False) #LED s'eteint
        time.sleep(2)

finally:
    print("Cleaning up")
    GPIO.cleanup()
```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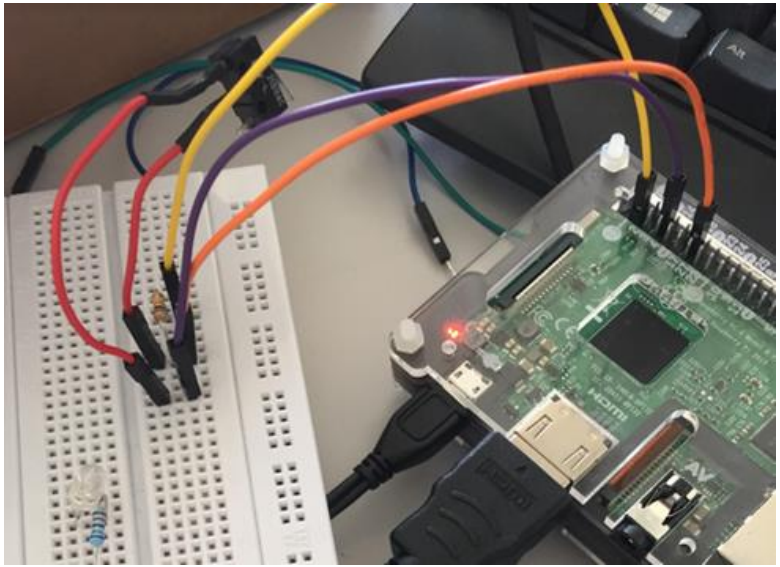
MISE EN ŒUVRE: LIRE ÉTAT D'UN BOUTON POUSSOIR



```
import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BCM)

#declaration des emplacements
BoutonPin = 18

#Parametrages pour des pins

GPIO.setup(BoutonPin, GPIO.IN)

try:
    while True:
        input_value = GPIO.input(BoutonPin) #lecture de etat du bouton
        if input_value == False: #appuie sur le bouton
            print ("On a appuye sur le bouton")
            while input_value == False: #Verifie l'etat de la broche 18
                input_value = GPIO.input(BoutonPin)
finally:
    print("Cleaning up")
GPIO.cleanup()
```

```
ile  Edit  Shell  Debug  Options  Window  Help
ython 2.7.13 (default, Nov 24 2017, 17:33:09)
GCC 6.3.0 20170516] on linux2
ype "copyright", "credits" or "license()" for more
>>>
========== RESTART: /home/pi/etatbouton
On a appuyé sur le bouton
On a appuyé sur le bouton
On a appuyé sur le bouton
On a appuyé sur le bouton
On a appuyé sur le bouton
```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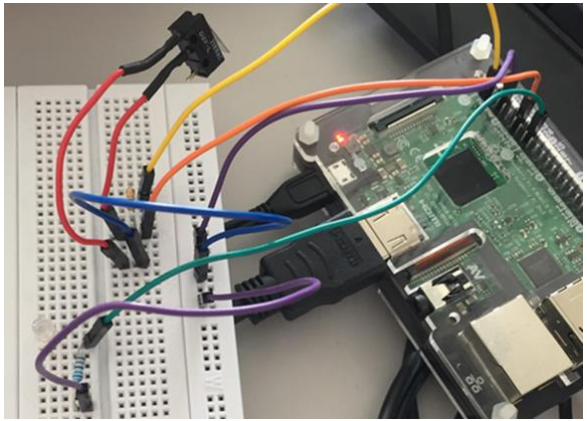
MISE EN ŒUVRE: ALLUMER UNE LED AVEC UN BOUTON



```python
import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BCM)

#declaration des emplacements
BoutonPin = 18
LEDR = 23
#Parametrages pour des pins

GPIO.setup(BoutonPin, GPIO.IN, pull_up_down=GPIO.PUD_UP)
GPIO.setup(LEDR, GPIO.OUT, initial = GPIO.LOW)

try:

    while True:

        input_value = GPIO.input(BoutonPin) #Lecture de etat du bouton

        if input_value == False: #appuie sur le bouton
            print ("On a appuyÃ© sur le bouton")
            GPIO.output(LEDR, True) #Led s'allume
            while input_value == False: #Verifie l'etat de la broche 18
                input_value = GPIO.input(BoutonPin)
        else:
            GPIO.output(LEDR, False) #Led s'eteint


finally:
    print("Cleaning up")
    GPIO.cleanup()
```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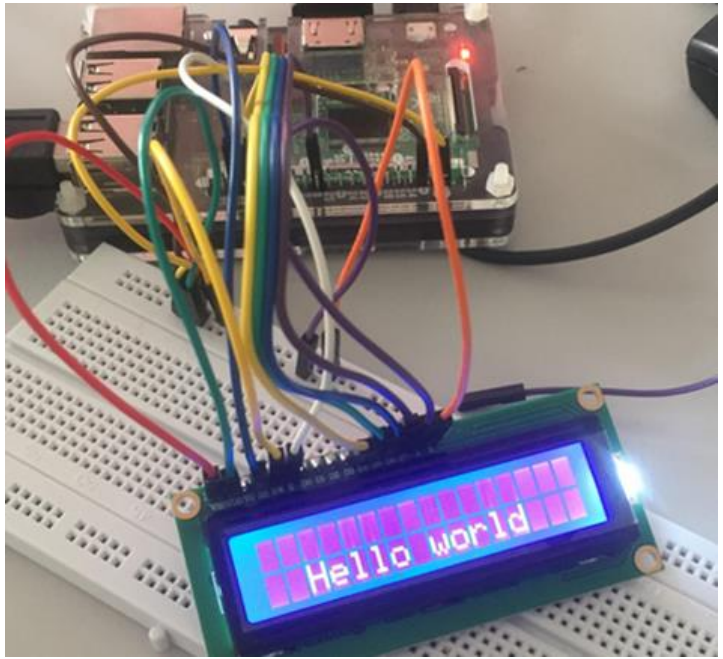
Ref : xxxxx
Ref Modele : 83230347-DOC-TAS-FR-008

MISE EN ŒUVRE: AFFICHER UN MOT SUR UN LCD




```
import RPi.GPIO as GPIO
import time
from RPLCD.gpio import CharLCD

GPIO.setwarnings (False) #enlever les warnings

#definition de l'ecran utilise
lcd = CharLCD(cols=16, rows=2, pin_rs=37, pin_e=35,
              pins_data=[33,31,29,23])

while True:

    lcd.cursor_pos = (0,0) # positionner le texte(ligne,colonne)
    lcd.write_string("Hello world")#ecrire le texte (\n\r=passer une ligne)
    time.sleep(2) #afficher pendant 2 sec
    lcd.clear() #effacer le texte
    time.sleep(1) #rien afficher pendant 1 sec
```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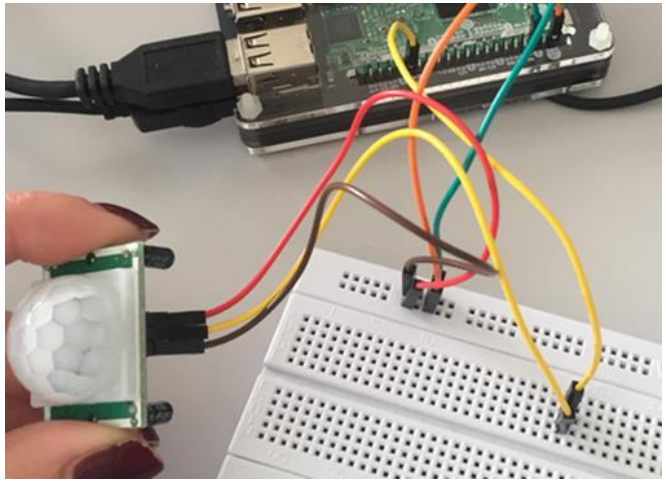
Ref : xxxxx
Ref Modele : 83230347-DOC-TAS-FR-008

MISE EN ŒUVRE: AFFICHER L'HEURE ET LA DATE


```
import RPi.GPIO as GPIO
import time
from RPLCD.gpio import CharLCD

GPIO.setwarnings (False) #enlever les warnings

#definition de l'ecran utilise
lcd = CharLCD(cols=16, rows=2, pin_rs=37, pin_e=35,
              pins_data=[33,31,29,23])

while True:

    lcd.cursor_pos = (0,0)
    lcd.write_string("Date: %s"%time.strftime("%d/%m/%Y")) #ecrire la date
    lcd.cursor_pos = (1,0)
    lcd.write_string("Heure: %s"%time.strftime("%H:%M:%S"))#ecrire l'heure
```

MISE EN ŒUVRE: DÉTECTER MOUVEMENTS AVEC CAPTEUR IR

```
Prêt
0
0
0
0
0
1
Mouvement detecte !
```



```python
#Detecter les mouvements avec un capteur infrarouge

#Importation des librairies
import RPi.GPIO as GPIO
import time
import os
import urllib #recuperation de donnees dune page PHP

GPIO.setmode(GPIO.BCM)

#Pin GPIO utilisee
GPIO_IRF = 12

#Configuration de la pin entree
GPIO.setup(GPIO_IRF,GPIO.IN)

#Initialisation des variables
current_state = 0
previous_state = 0

try:

    print("Attente detection..")
    #Attend que la sortie du capteur passe a 0
    while GPIO.input(GPIO_IRF)==1:
        current_state = 0
    print("PrÃªt")

    while True:
        #Lire l'etat du capteur
        current_state = GPIO.input(GPIO_IRF)
        print(current_state)#Ecriture de l'etat

        if current_state == 1 and previous_state==0:
            #Le detecteur a envoye un signal
            print ("Mouvement detecte !")
            #On attend 3 sec
            time.sleep(3)
            #On enregistre l'ancien etat
            previous_state=1
        elif current_state==0 and previous_state==1:
            #Le capteur est a nouveau pret
            print("PrÃªt")
            previous_state=0
        time.sleep(1)

except KeyboardInterrupt:
    print("QUIT")
#Reinitialisation des parametres GPIOs
GPIO.cleanup()
```


Date : 02/02/2022
Ref : xxxxx
Ref Modele : 83230347-DOC-TAS-FR-008