Python para RPi

Parte III: Introduction a la Raspberry PI

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Alexandre.Perera@upc.edu Manel.Velasco@upc.edu

Introduction to Python and Raspberry Pi
July, 2013

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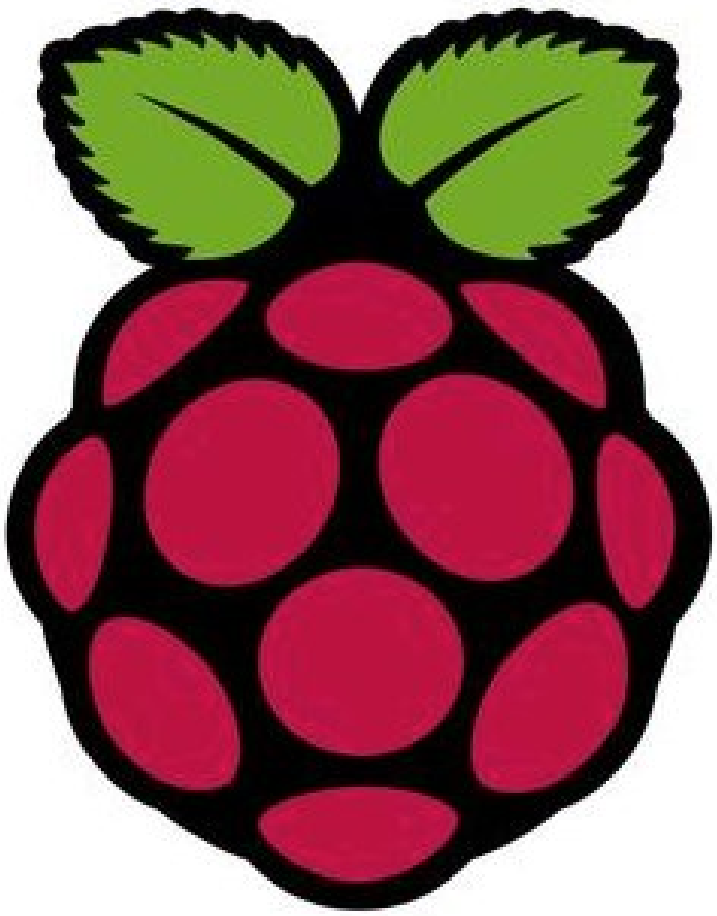
Raspberry Pi

RPI Foundation

- La Raspberry Pi Foundation es una organización sin ánimo de lucro establecida como fundación en 2008.
- En 2011 desarrolló la Raspberry Pi como ordenador de bajo coste para facilitar la enseñanza de la informática en los colegios.
- Entró en producción el 2012. La fundación recibe apoyos del laboratorio de informática de la Universidad de Cambridge y de Broadcom.



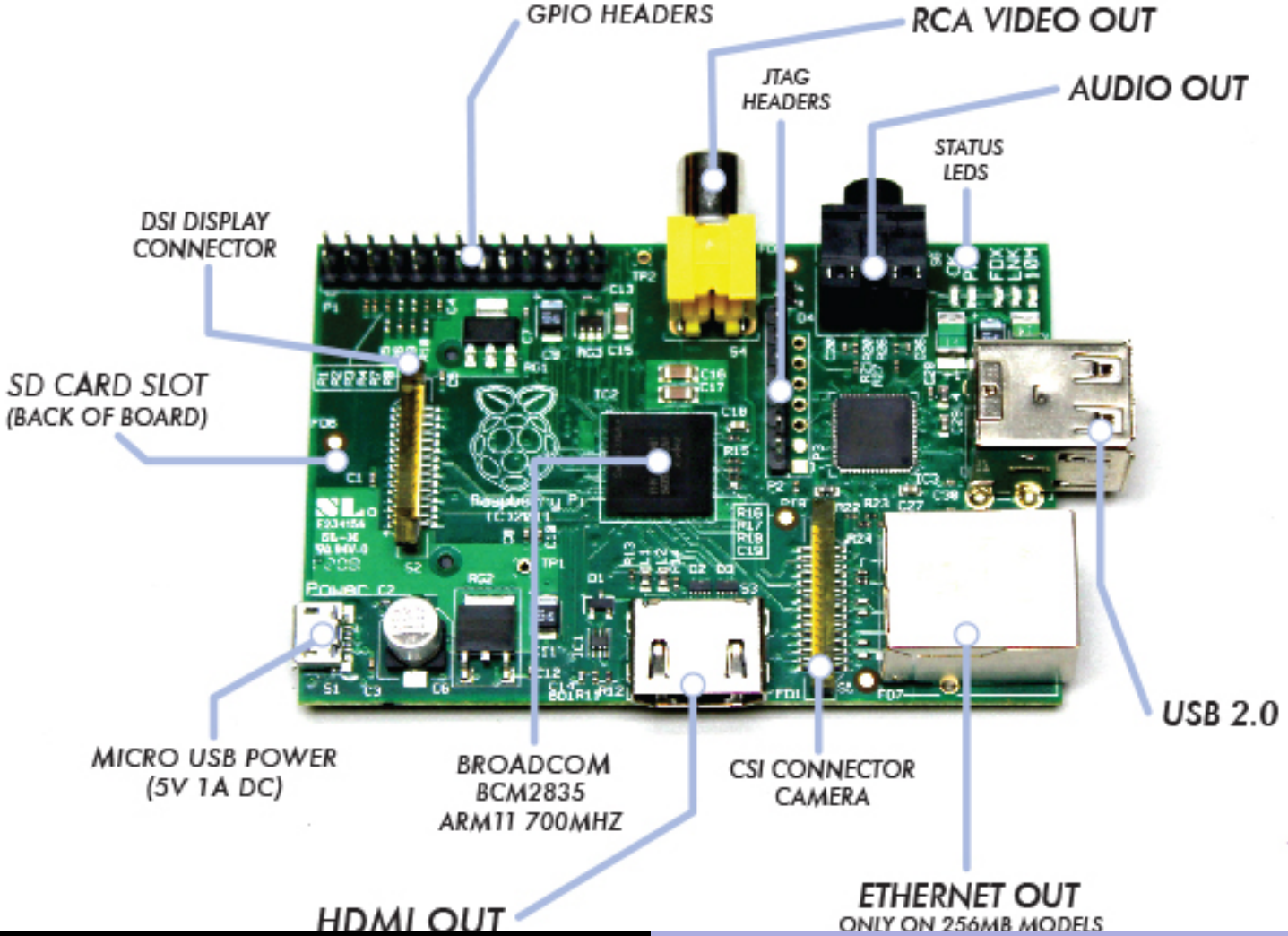
Specificaciones I

	Modelo A	Modelo B
Precio:	$25	$35
SoC:	BCM2835 (CPU + GPU + DSP + SDRAM + USB)	
CPU:	ARM1176JZF-Sx a 700 MHz (familia ARM11)	
GPU:	BCM VideoCore IV, , OpenGL ES 2.0, -2 y VC-1 (con licencia), 1080p30 H.264/MPEG-4 AVC	
Mem.:	256 MB (comp. GPU)	512 MB 15/10/2012
Ent. Víd:	Conector MIPI CSI (RPF webcam)	
Víd.:	RCA (PAL y NTSC), HDMI (rev1.3 y 1.4), DSI (LCD)	
Audio:	Jack 3.5 mm, HDMI	
Almac.:	Tarjeta SD / MultiMediaCard MMC / SDIO	
Red:	Ninguna	10/100 Ethernet (RJ-45) via hub USB

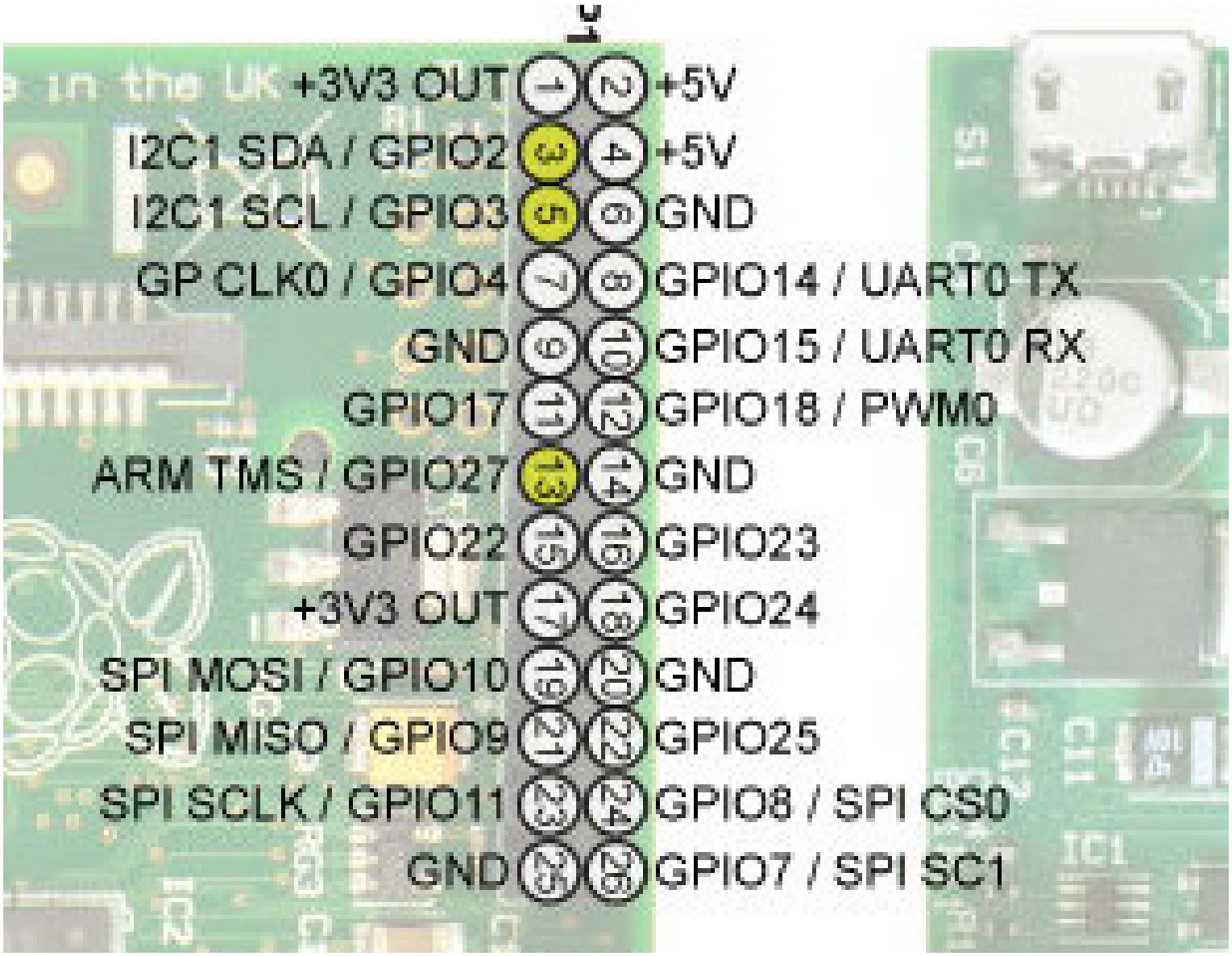
Specificaciones II

Perif.:	8 x General Purpose Input/Output GPIO, Serial Peripheral Interface SPI, Ii^{2}C, Universal Asynchronous Receiver-Transmitter UART	
RTClk:	Ninguno	
Cons.:	500 mA, (2.5 W)	700 mA, (3.5 W)
Alim.:	5 V vía Micro USB o GPIO header	
Dims:	85.60mm × 53.98mm (3.370 × 2.125 inch)	
SO:	GNU/Linux: Debian (Raspbian), Fedora (distribución Linux) (Pidora), Arch Linux (Arch Linux ARM) , Slackware Linux . RISC OS	

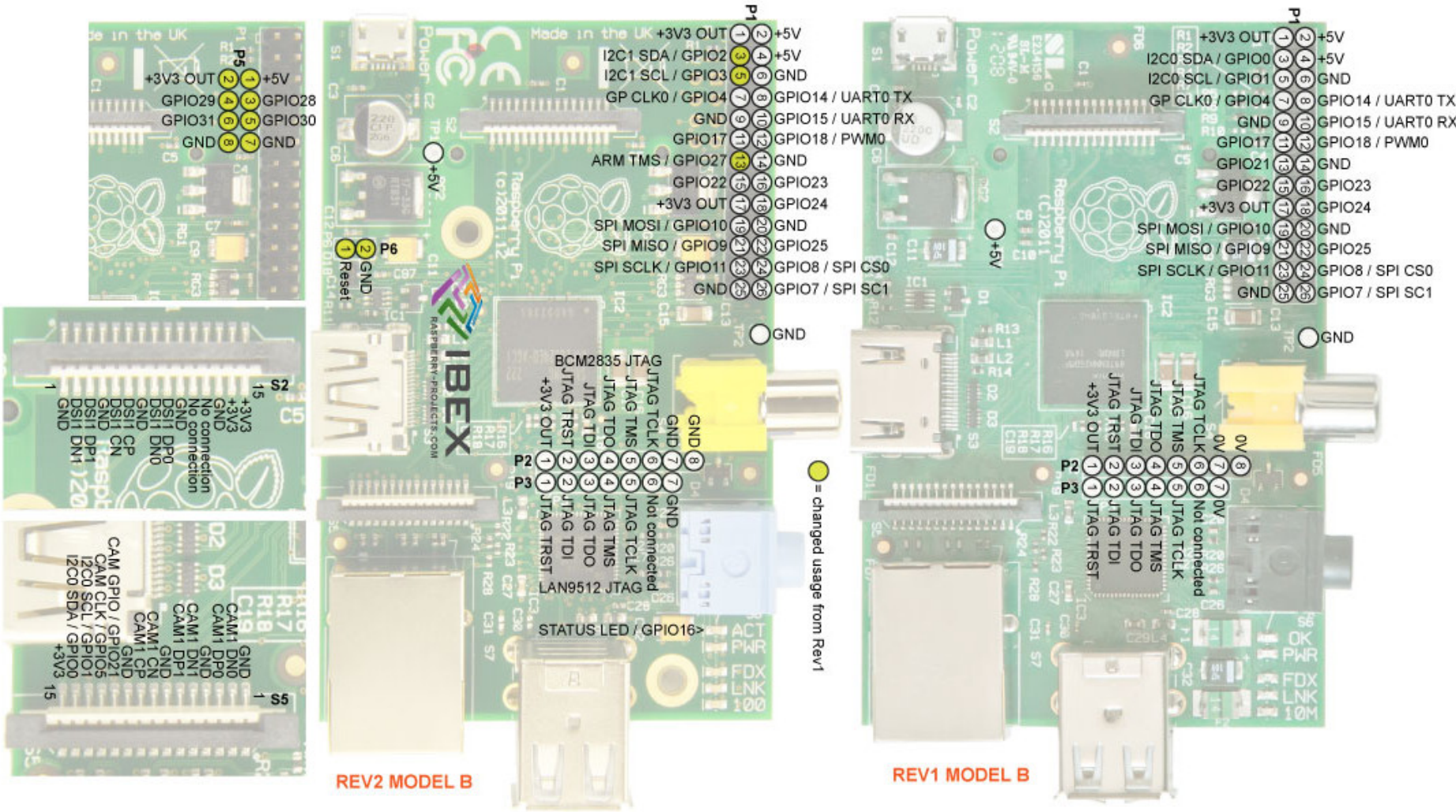
Raspberry Pi



Pinout Rev2 B



Pinout Rev2B vs. Rev1B



Notas I

Potencia

- Es necesario un alimentador USB de 700mA a 5V (1A recomendado).
- Cargadores de teléfonos móviles.
- Extremadamente sensible, si la alimentación baja de 5V el comportamiento de la RPi es errático.

SD Card

Tamaño mínimo 4Gb de clase 4. El acceso es muuuuuuy lento. factor crítico en el desempeño de todo el sistema.

Notas II

HDMI/Vídeo

- HDMI a HDMI (Incluyendo soporte para audio digital y HDMI-CEC !!).
- HDMI a DVI.
- Conector estándar RCA de vídeo compuesto.

HDMI connector

HDMI to DVI lead

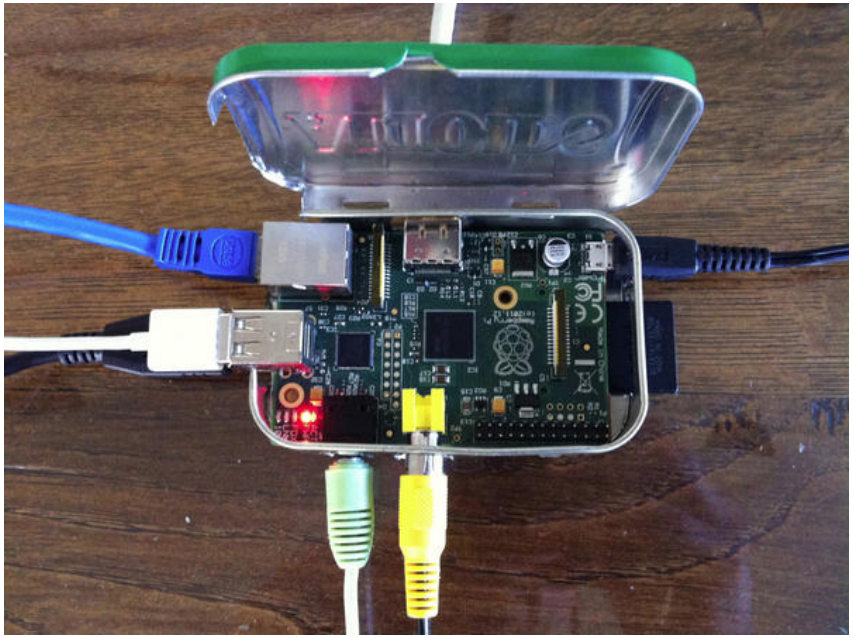
RCA composite video connector

Notas III

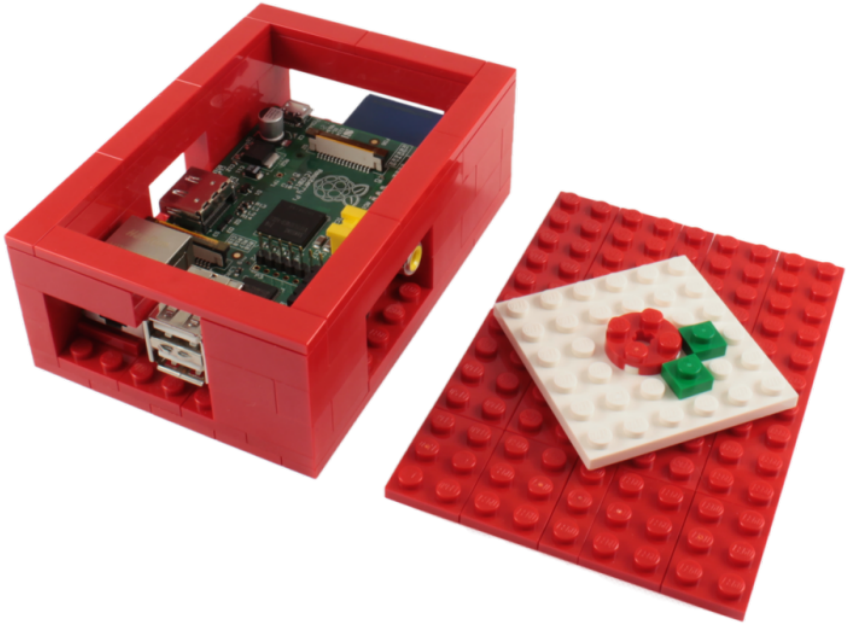
USB

- Cualquier teclado/ratón USB funciona siempre que no requiera mucha potencia al bus USB.
- Existen varias Cámaras USB listadas como compatibles (UVC, en general las que tienen soporte GNU/Linux ARM)
- USB hubs, depende de cada caso...

Cajas I

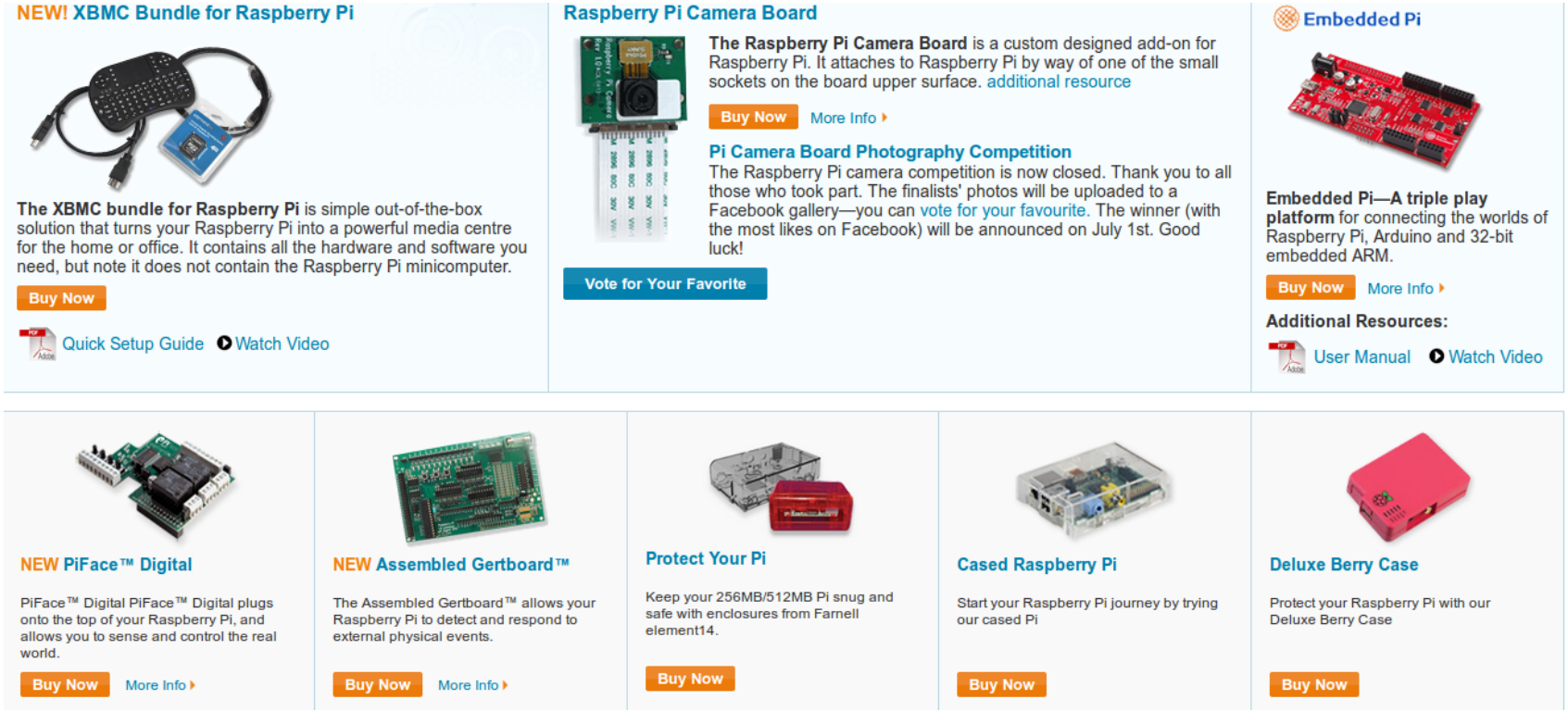


Cajas II



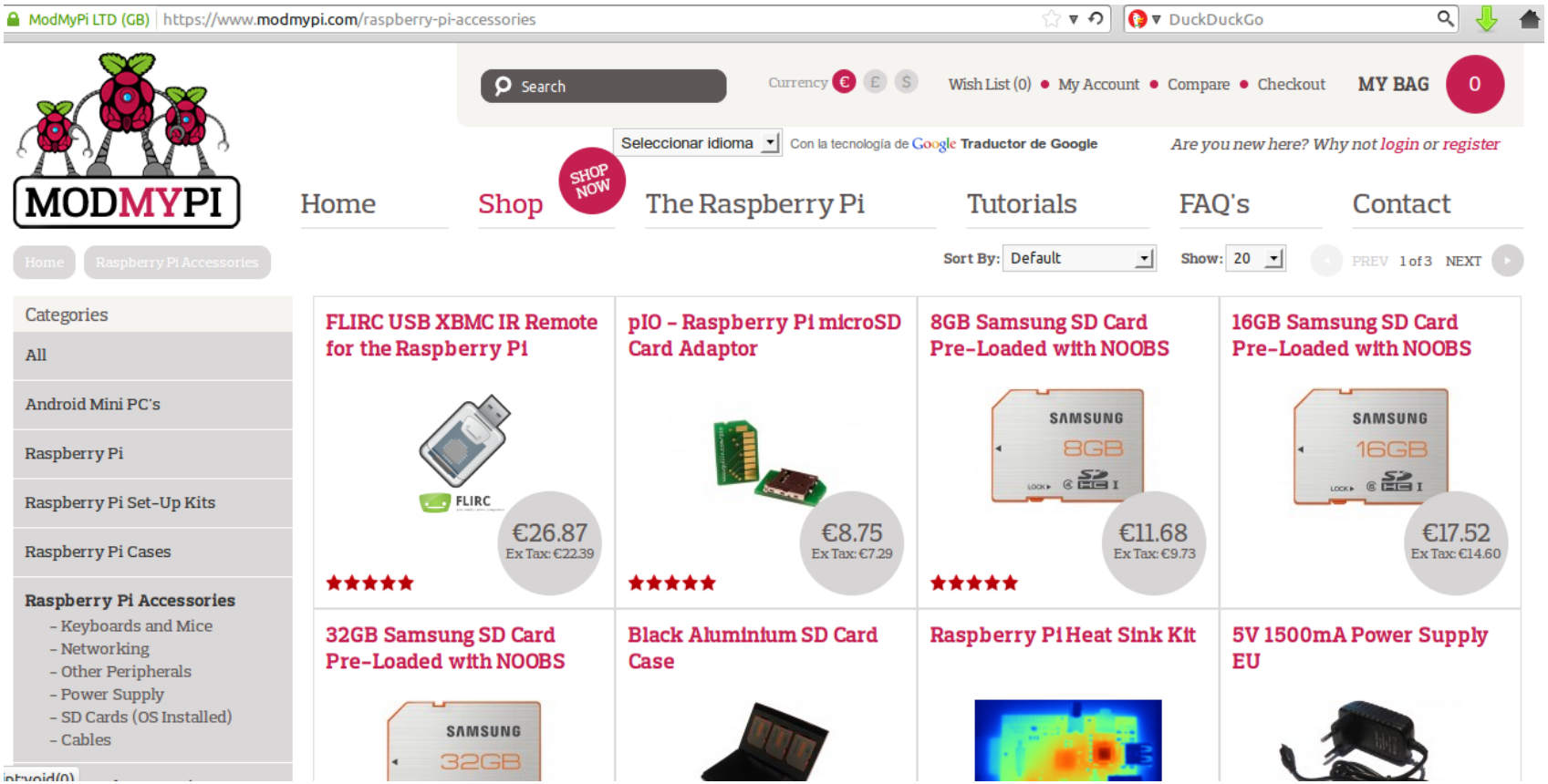
Cajas III

Element 14



http://www.element14.com/community/groups/raspberry-pi-accessories

ModMyPi



https://www.modmypi.com/raspberry-pi-accessories

Compatibilidad

elinux.org/RaspberryPiBoardVerifiedPeripherals

Log in / create account

Page | Discussion | Read | View source | View history | Search | Go | Search

Navigation

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Please note that User Registration has been temporarily disabled due to a recent increase in automated registrations. If anyone needs an account, please request one here: RequestAccount. Thanks for your patience!--Wmat (talk) 04:16, 27 November 2012 (UTC)
Please email User:Wmat if you experience any issues with the Request Account form.

RPi VerifiedPeripherals

(Redirected from RaspberryPiBoardVerifiedPeripherals)

Back to the Hub.

Hardware & Peripherals:

Hardware and *Hardware History*.

Low-level Peripherals and *Expansion Boards*.

Screens, *Cases* and ***Other Peripherals***.

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7.1 Working USB Mouse Devices
7.2 Problem USB Mouse Devices
8 USB Real Time Clocks
9 USB Wi-Fi Adapters

http://elinux.org/RaspberryPiBoardVerifiedPeripherals

Compatibilidad

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Brand	Name	Model Number	Hardware ID	USB Version	Number of Ports	Power Rating*	Powers Raspberry Pi	Additional Information
Atlantis	HUB USB2.0 7P	P014-GH902-B		USB 2.0	7-Port	5 V - 2 A	Verified	Powers the pi. Seems very good, tested with: a keyboard, a mouse, a numpad and an Xbox joypad
Belkin	4-Port Ultra-Slim Desktop Hub	F4U040	05e3:0608	USB 2.0	4-Port	5 V - 2.6 A	Verified	Powers the pi quite well, 4.85V across TP1&2 during idle and load. The PSU for the hub is a 2.5A 5v made in china. Seems solid. Does backfeed the mini USB port
Belkin	8-Port ExpressBus for iMac	F5U010		USB 2.0	8-Port 7x"A" 1x"B"		Verified	PSU 6v 4A Powering a 256 "A" RPi with the hub. With the USB output of the RPi connected to the one "B" port
Belkin	Hi-Speed USB 2.0 4-Port Hub	F5U224		USB 2.0	4-Port	5 V - 500 mA per Port	Not Verified	
Belkin	TetraHub™ USB 2.0 4-Port Hub	F5U231		USB 2.0	4-Port	5 V - 500 mA per Port	Verified	
Belkin	Hi-Speed USB 2.0 4-Port Hub	F5U234		USB 2.0	4-Port	5 V - 500 mA per Port	Verified	No backfeed, can power the RPi. Comes with a 2.4 A power supply. The user manual [4] says *"Per Port Current Self-Powered Mode: 500mA (max)"*. However, I've attached a HD that requires 850 mA and it worked fine.
Belkin	Hi-Speed USB 2.0 7-Port Hub	F5U237		USB 2.0	7-Port	5 V - 3.8 A	Verified	
Belkin	MyEssentials 7-Port High-Speed USB 2.0 Hub	F5U259-ME		USB 2.0	7-Port		Verified	
Belkin	Hi-Speed USB 2.0 4-Port Lighted	F5U403		USB 2.0	4-Port		Not Verified	

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Compatibilidad

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- **3COM**
  - 3CRUSB10075: ZyDAS zd1211rw chipset (!)
- **7DayShop**
  - W-3S01BLK, W-3S01BLKTWIN: Unbranded product available from 7DayShop, in a single or twin pack. [37], [38]. Tested on Debian Wheezy, with the dongle attached directly to the Raspberry Pi along with the wireless keyboard receiver. Shows up as a Ralink RT5370 device, and no drivers or additional software downloads required. Created wpa.conf, edited 'interfaces' file and restarted the networking. The manufacturer portion of the MAC address (7cdd90) is assigned to "Shenzhen Ogemray Technology Co., Ltd."
  - It works without additional software connected directly to a Rev 2 Raspberry Pi, but it stops working after a period of time (3 to 4 hours) with a fully updated Wheezy and all the 'USB workarounds' [39] in place.
- **Alfa**
  - AWUS036NEH: Tested on Debian Squeeze (with Ralink firmware package)
  - AWUS036NH: Tested on Arch Linux ARM using the rt2800usb module.
  - AWUS036NH: Tested on Debian Wheezy (with Ralink firmware package). Tested on Raspbian too (drivers from aircrack-ng).
  - AWUS036H (500 mW version): Tested on Raspbian (drivers from aircrack-ng).
  - AWUS036H (1 W version): Tested on Raspbian (drivers from aircrack-ng). Needs USB powered HUB or Rev2 of the board / polyfuse bypass.
  - AWUS036NHA: Tested on Raspbian (drivers from aircrack-ng). Works fine if connected after boot, otherwise Raspberry Pi won't boot up.
- **AirLink101**
  - AWLL5088: Tested on Debian Wheezy. This adapter is based on the OEM Edimax EW-7811Un. For automatic installation, See MrEngmanns script listed below under the Edimax device.
  - AWLL5099: Tested on Raspian Wheezy. Step-by-step installation and configuration instructions with screenshots can be found here. This adapter is based on the Realtek RTL8188CUS chipset. The rtl8192cu kernel driver is loaded automatically in the latest Raspian distribution. Wifi access point configuration - see tutorial and configuration script
  - AWLL6075: Tested on Raspian Wheezy 16-Dec-2012 build and distro upgrade as of 09-Jan-2013. lsusb reports: 0bda:8172 Realtek Semiconductor Corp. RTL8191SU 802.11n WLAN Adapter. Driver installed is r8712u. Powers OK from Model B Pi (Rev 000f) USB port (1200mA supply tested). Dongle does get hot under use when directly connected to USB port (slightly reduced when USB extender cable used).

Airlink 101 Wireless N 150 Ultra Mini-USB Adapter

- **Asus**
  - USB-N10 USB ID 0b05:1786, r8712u staging driver, included on Fedora Remix & Arch, must download for Debian and install firmware - Realtek from non-free Squeeze repository (B) (not needed with latest Raspbian "Wheezy" 2012-07-15: this Asus works N10 out of the box) Does not support nl80211 APIS, so hostapd won't work.
  - USB-N13 USB ID 0b05:17ab, works with Adafruit Occidentalis v0.1 image as it includes kernel with 8192u driver built-in (B)
  - WL-167G v1 USB ID 0b05:1706, Ralink RT2571 working out-of-the-box on Debian image from 2012-04-19. Requires powered hub, otherwise it is detected by OS, but it will not function.
  - WL-167G v3 USB ID 0b05:1791, working out-of-the-box on Linux raspberrypi 3.2.27+ #160 PREEMPT Mon Sep 17. Does not require powered hub.
- **AusPi Technologies**
  - AusPi Wireless Adapter [Realtek RTL8188S]. Works without a powered HUB. Tested on OpenELEC (works OOB), RaspBMC (works OOB) and 2012-08-08 Raspbian Wheezy (works OOB). Free shipping worldwide from Buy Raspberry Pi Australia.

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Compatibilidad

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- ADS InstantFM Music - FM radio tuner works fine under Debian.

USB TV Tuners and DVB devices

- August
  - DVB-T205, based on rtl2832u chipset, working with this driver. Tested with Saorview (Irish DTT service), both HD & SD.
- DVBSky
  - Mystique SaTiX-S2 Sky USB: Scanning/watching SD and HD works via vdr and streamdev plugin, watching on the Raspberry Pi directly is laggy as hell. DVB-USB and I2C support must be enabled in the kernel. Needs drivers/firmware from here.
- Sundtek
  - Sundtek MediaTV Digital Home
  - Sundtek MediaTV Pro
  - Sundtek SkyTV Ultimate
  - DVB-C, DVB-T, DVB-S/S2: digital TV works, streaming to Windows / Linux is no problem. Easy installation English
- Hauppauge
  - Hauppauge NOVA-T Stick (Revision 70xxx) DiBcom DiB0700 chipset, requires powered hub.
  - Hauppauge NOVA-TD Stick (Revision 52xxx) DiBcom DiB0700 chipset, requires powered hub.
  - Hauppauge WinTV-HVR-1950 (tested analog tuner with omxplayer)
  - Hauppauge WinTV-HVR-950Q (tested Digital OTA with TVHeadend in Raspbian)
- K-World
  - K-World UB499-2T Dual DVB-T USB Tuner. IT9137 chipset. With no other USB devices connected Raspberry Pi can just about power this stick. IR and supplied remote work with XBMC.
- Technisat
  - Technisat_SkyStar_USB_HD. Instructions: http://www.linuxtv.org/wiki/index.php/Technisat_SkyStar_USB_HD Used the Raspberry Pi to receive and redirect it via network to another host. Didn't try to play back the stream on the Raspberry Pi itself. Tested with Astra 19.2E radio and SD-TV channels
- Terratec
  - Terratec H7. Tested DVB-C with dvbv5 tools, part of v4l-utils, under Fedora 18 Remix and latest (April, 14 2013) DVB Kernel stack/drivers.
- Generic
  - DVB-T USB Dongle (Silver casing), based on AF9015 chipset.
  - DVB-T USB Dongle, based on RTL2832 FC12 (HD/SD), IR was detected, but it is not tested.
  - HDTV USB DVB-T dongle, based on IT9135. This tuner comes in two revisions. Revision is printed on PCB.
    - rev. 1.0; should work with 3.2+ kernel, need confirmation.
    - rev. 2.0; works with kernel 3.6.11, without a powered hub. This tuner also requires a firmware (dvb-usb-it9135-02.fw) which can be downloaded from this page. It's in Hungarian, so google translate or equivalent is recommended. The remote also works.

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Compatibilidad

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USB Webcams

This list is not entirely reliable, working does not necessarily mean working without errors. Please contribute with your own experiences!

Brand	Name	Model Number	Hardware ID	Verified OS	Verified OS version	Verified Resolution	Additional Information
Canyon		CNR-FWC113	0c45:6340	raspbian/wheezy	2013-04-11	640x480	works fine out of the box. Lacks autofocus (manual focus ring works fine). Has auto exposure, but seems to be optimized for indoor use. When using outdoors, image is completely overexposed.
Canyon		CNR-WCAM820		raspbian/wheezy		1280x1024	2 Mpixel camera with manual focus; works with fswebcam and v4l4j on Raspbian Wheezy armhf; problems with 1600x1200 resolution in some apps (timeouts - probably too slow USB); 1280x1024 and lower resolutions works OK
CBR		CW 835M Black		raspbian/wheezy	2013-02-12		works fine without powered hub
Creative	Live!	VF0470		ArchLinux			works out of the box on ArchLinux
Creative	Live! Cam Socialize HD	VF0610	041e:4080	raspbian/wheezy	2012-11-26	960x544	Works at 1280x720 taking stills in fswebcam with some errors using MJPEG, unusable with YUYV. 960x544 works in both MJPEG and YUYV. Has some stabilitiy issues if powered from RasPi (Drops USB +eth0 every 8 or so hours). Helps to append nodrop=1 and timeout=5000 to uvcvideo module.
Creative	Live! Cam Sync HD		041e:4095	raspbian/wheezy	2013-04-11	1280x720	Works out of the box. Autoexposure works well both indoors and outdoors. By default the image is bit too software enhanced (they call it "sharpness"), but this "sharpness" level can be set to a lower level via fswebcam tool.
Creative	Live! Cam Vista IM	VF0640		raspbian/wheezy			works on Raspbian at 320x240 resolution, 15fps
Creative	Live! Cam Socialize	VF0640		raspbian/wheezy			works on Raspbian at 320x240 resolution, 15fps
Creative	Webcam Notebook	PD1170					Detects, untested.
Creative	Webcam Pro	PD1030					ov519 driver crashes almost immediately. ("gspca: ISOC data error: [0] len=0, status=-4004")
Hercules	Webcam Deluxe		05a9:4519	raspbian/wheezy + Arch	2013-02-09		ov519 driver "Corrupt JPEG data: premature end of data segment" gives corrupt image in motion and fswebcam
HP	WebcamHD-2200	HD-2200					
HP	Webcam HD-2300	HD-2300					
HP	Webcam HP-3100	HP-3100					UVCVideo /dev/video0 Needs chmod to 666 to operate. Will work without hub if only device in USB ports. Works with both Arch and Wheezy out of the box

http://elinux.org/RaspberryPiBoardVerifiedPeripherals

Preparando una SD para la RPi I

Intrucciones paso a paso.

Tarjeta SD

Insertar una tarjeta SD de como mínimo 4Gb.

Formatear la tarjeta SD

Windows
https://www.sdcard.org/downloads/formatter_4/eula_windows
La opción de FORMAT SIZE ADJUSTMENT debe estar en ON.

OS X
https://www.sdcard.org/downloads/formatter_4/eula_mac/,
Seleccionar la opción "Overwrite Format".

Linux Usar *gparted*, formatear como FAT.

Preparando una SD para la RPi

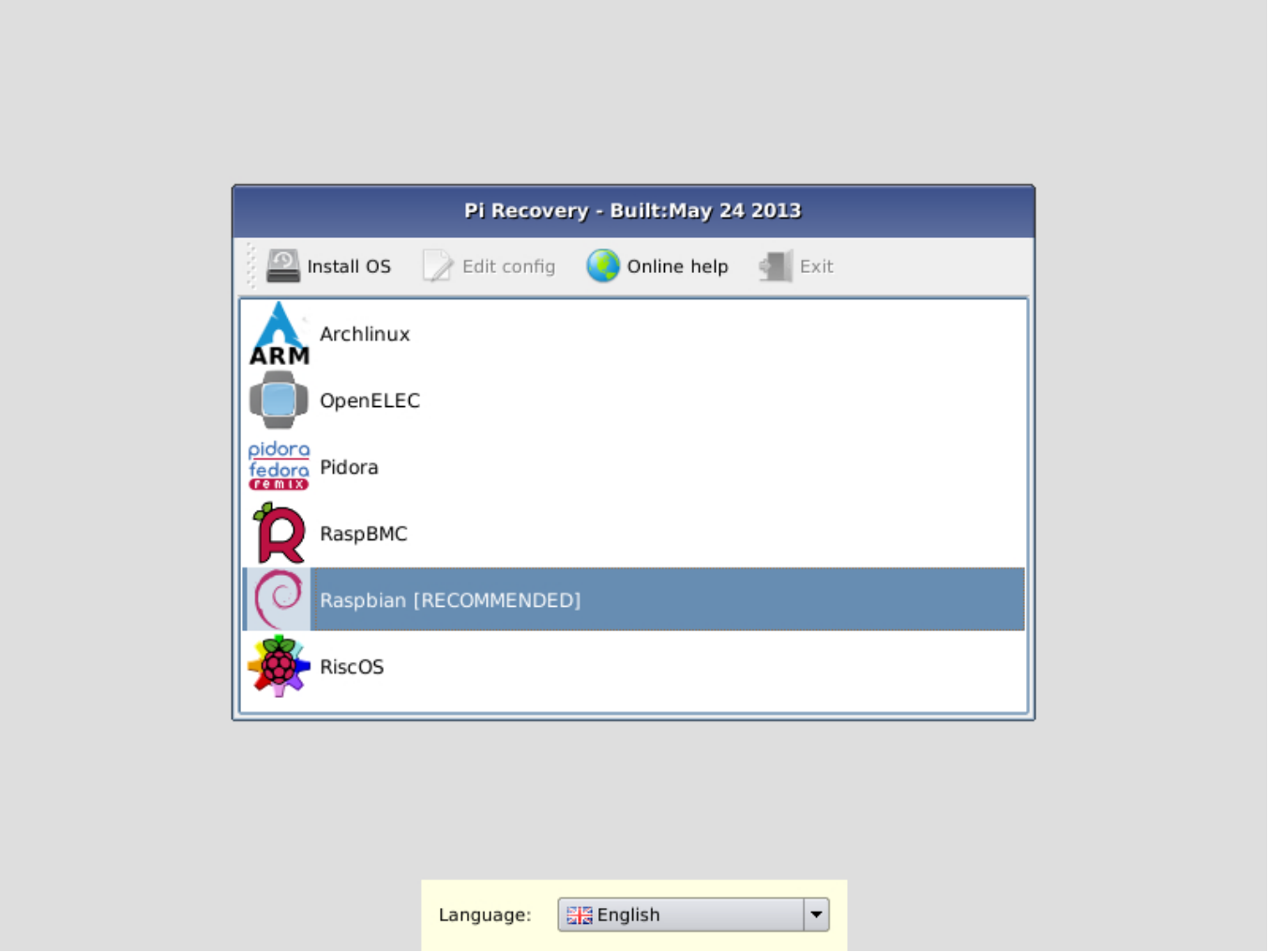
New Out Of the Box Software

1. Descargar NOOBS (ZIP de 1Gb) downloads.raspberrypi.org/noobs
2. Descomprimir el ZIP.
3. Copiar el contenido del ZIP en la tarjeta SD.
4. Listo!

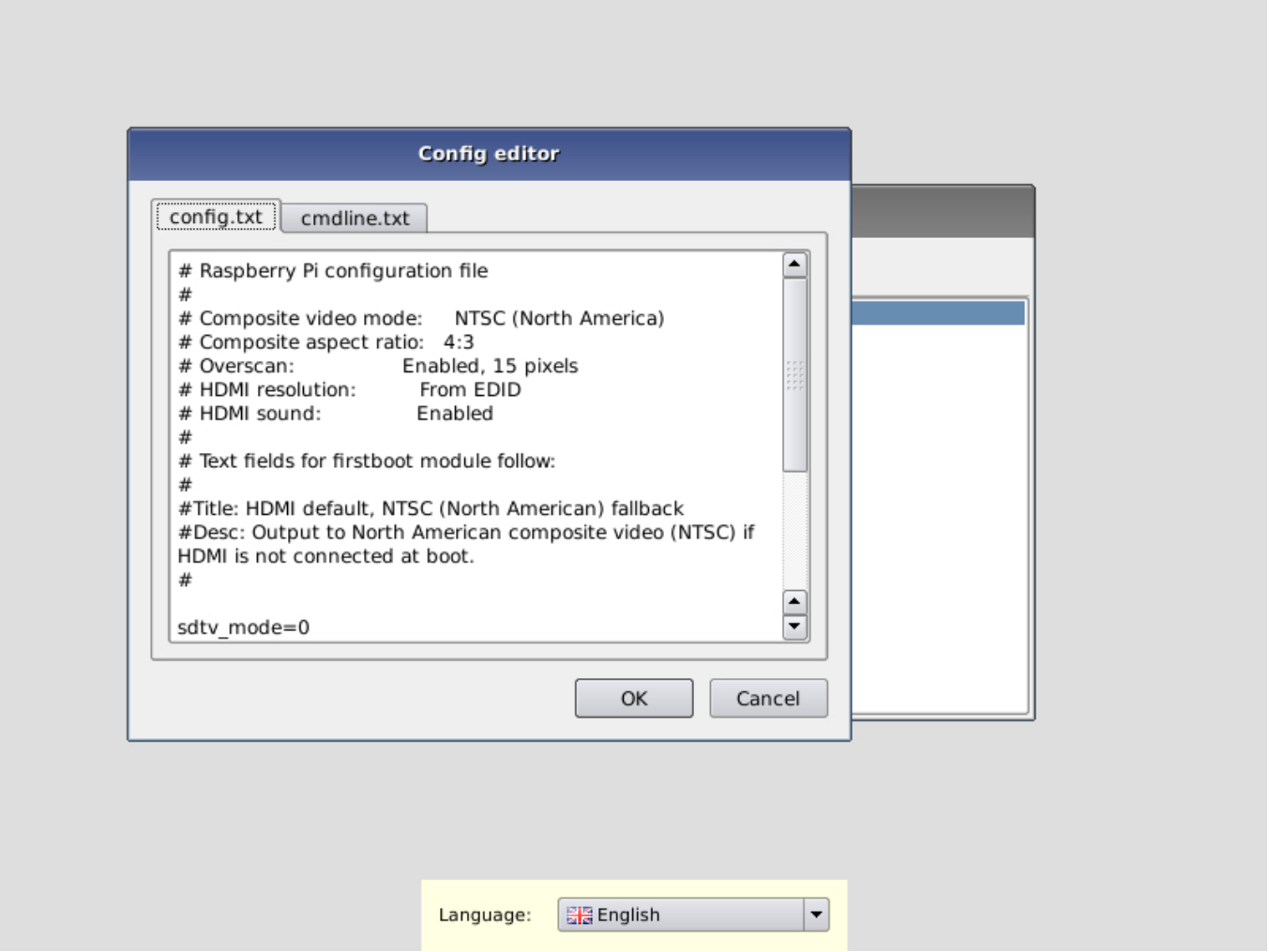
NOOBS

- NOOBS crea una Recovery Partition accesible mediante el uso de SHIFT al arrancar.
- Nos permite conmutar SOs o reparar una instalación corrupta.
- Contiene un editor de ficheros.
- Contiene un navegador (Arora)

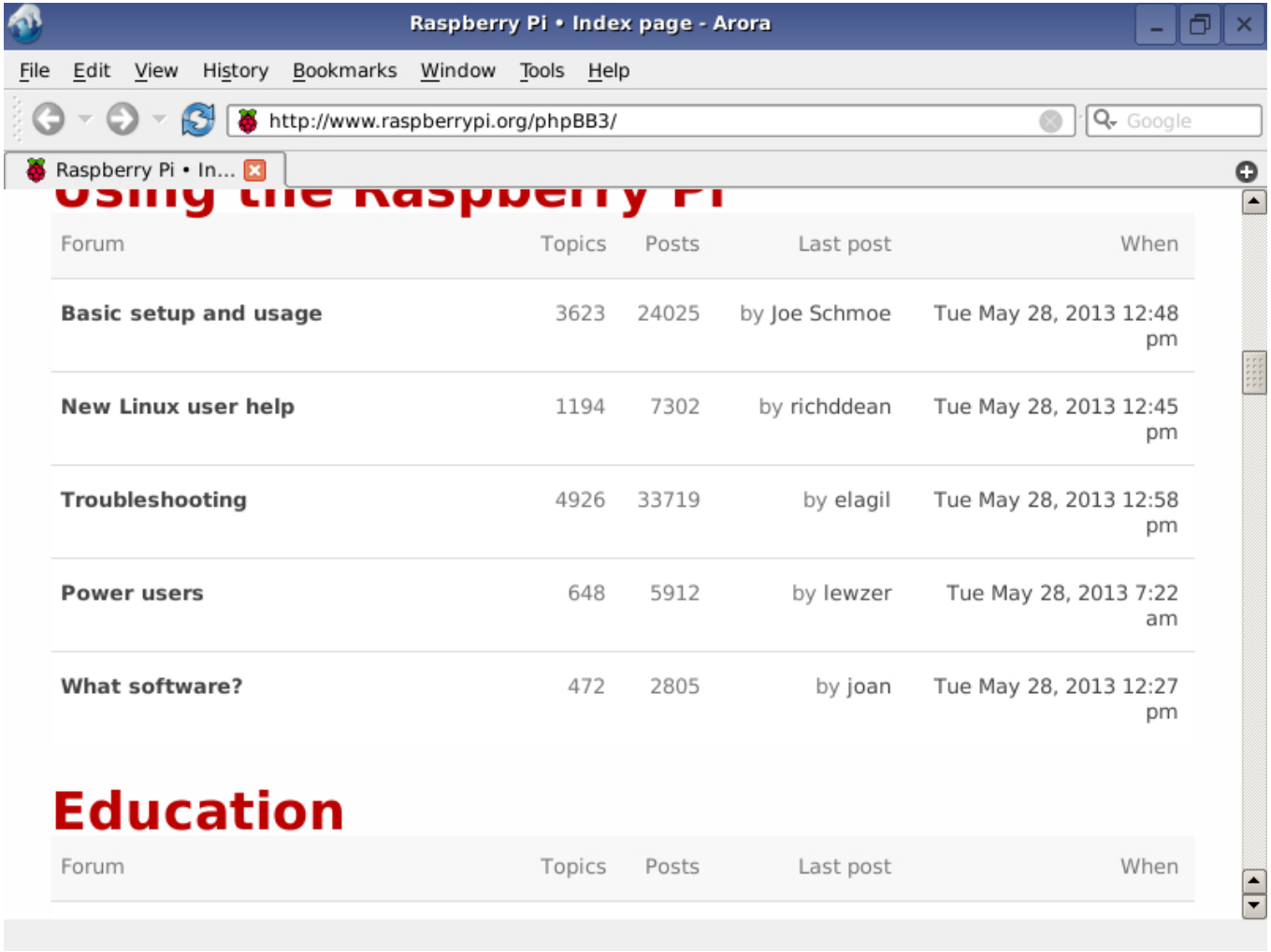
NOOBS


Pi Recovery - Built:May 24 2013
Install OS
Edit config
Online help
Exit
Archlinux
OpenELEC
Pidora
RaspBMC
Raspbian [RECOMMENDED]
RiscOS
Language:
English

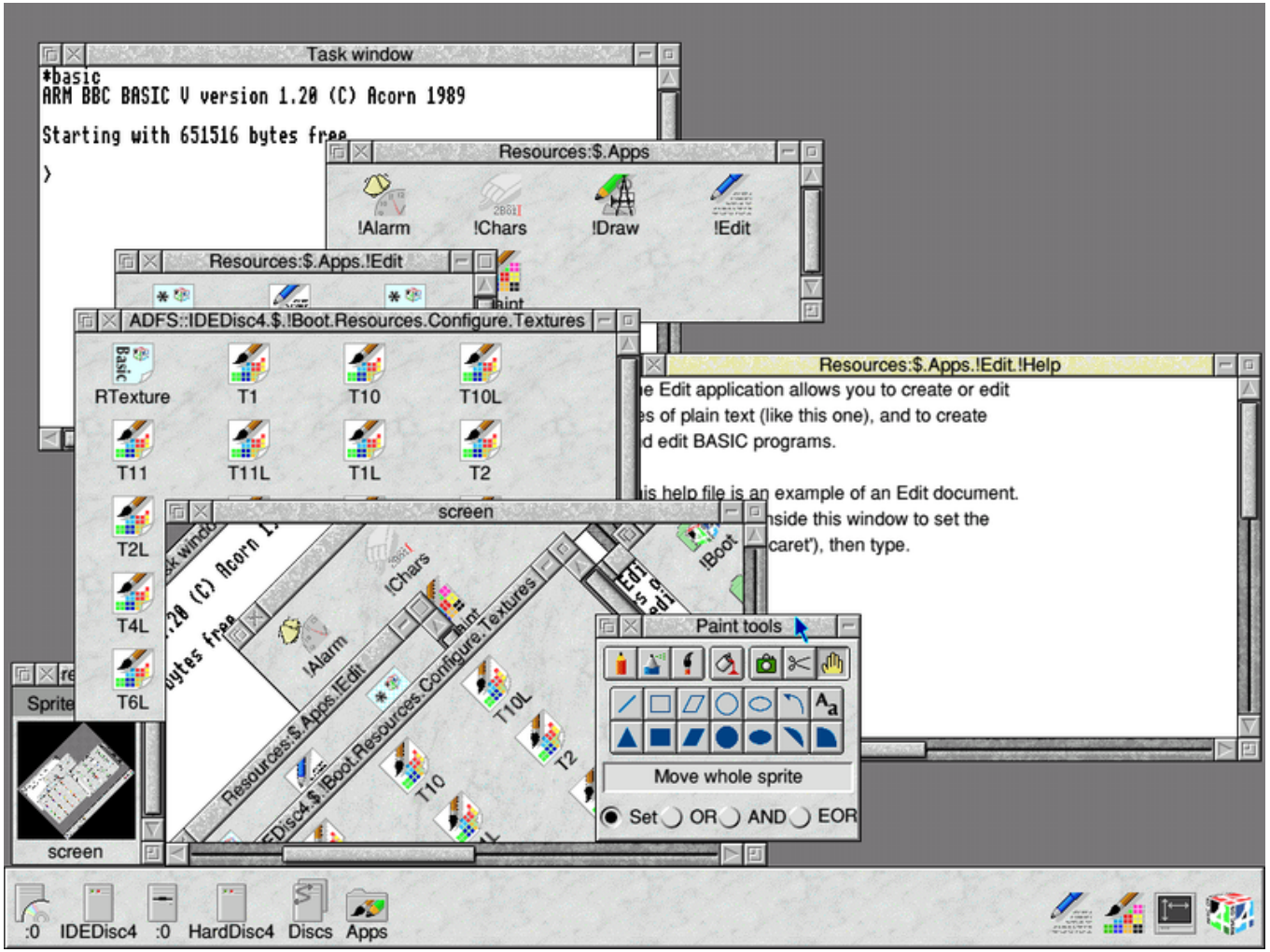
NOOBS


Config editor
config.txt
cmdline.txt
Raspberry Pi configuration file
#
Composite video mode: NTSC (North America)
Composite aspect ratio: 4:3
Overscan: Enabled, 15 pixels
HDMI resolution: From EDID
HDMI sound: Enabled
#
Text fields for firstboot module follow:
#
#Title: HDMI default, NTSC (North American) fallback
#Desc: Output to North American composite video (NTSC) if HDMI is not connected at boot.
#
sdtv_mode=0
OK
Cancel
Language:
English

NOOBS


Raspberry Pi • Index page - Arora
File Edit View History Bookmarks Window Tools Help
http://www.raspberrypi.org/phpBB3/
Google
Raspberry Pi • In...
Using the Raspberry Pi
Forum Topics Posts Last post When
Basic setup and usage 3623 24025 by Joe Schmoe Tue May 28, 2013 12:48 pm
New Linux user help 1194 7302 by richddean Tue May 28, 2013 12:45 pm
Troubleshooting 4926 33719 by elagil Tue May 28, 2013 12:58 pm
Power users 648 5912 by lewzer Tue May 28, 2013 7:22 am
What software? 472 2805 by joan Tue May 28, 2013 12:27 pm
Education
Forum Topics Posts Last post When

NOOBS


Task window
*basic
ARM BBC BASIC V version 1.20 (C) Acorn 1989
Starting with 651516 bytes free
Resources:$.Apps
!Alarm
!Chars
!Draw
!Edit
Resources:$.Apps.!Edit
ADFS::IDEDisc4.$.!Boot.Resources.Configure.Textures
RTexture
T1
T10
T10L
T11
T11L
T1L
T2
T2L
T4L
T6L
Resources:$.Apps.!Edit.!Help
screen
Paint tools
Move whole sprite
Set
OR
AND
EOR
:0
IDEDisc4
:0
HardDisc4
Discs
Apps

Desde una imagen

Descargar una imagen

http://www.raspberrypi.org/downloads

Linux

```
$ sudo dd if=imagen.iso of=/dev/sdc bs=1M
```

Windows

Usar Win32DiskImager:
http://sourceforge.net/projects/win32diskimager/

Aplicaciones

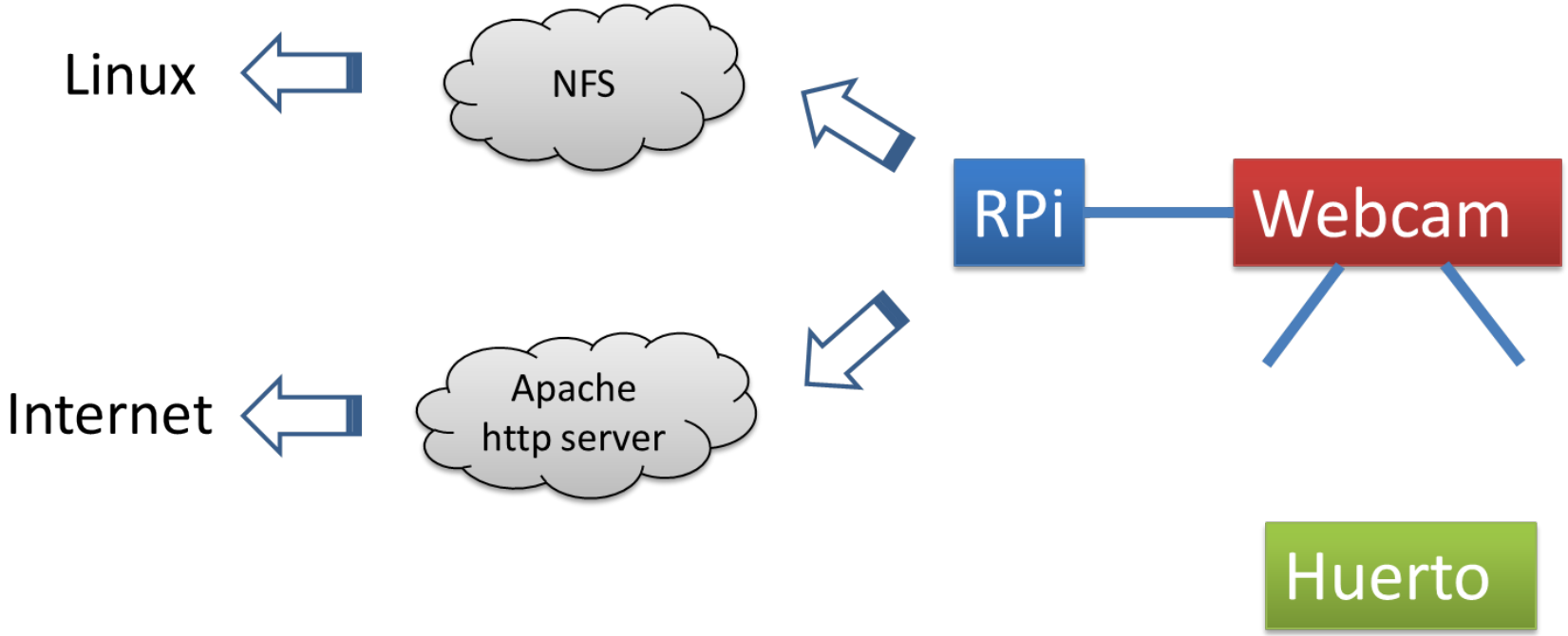
Ok, ya tengo una Raspberry Pi, y ahora?

Hort urbà

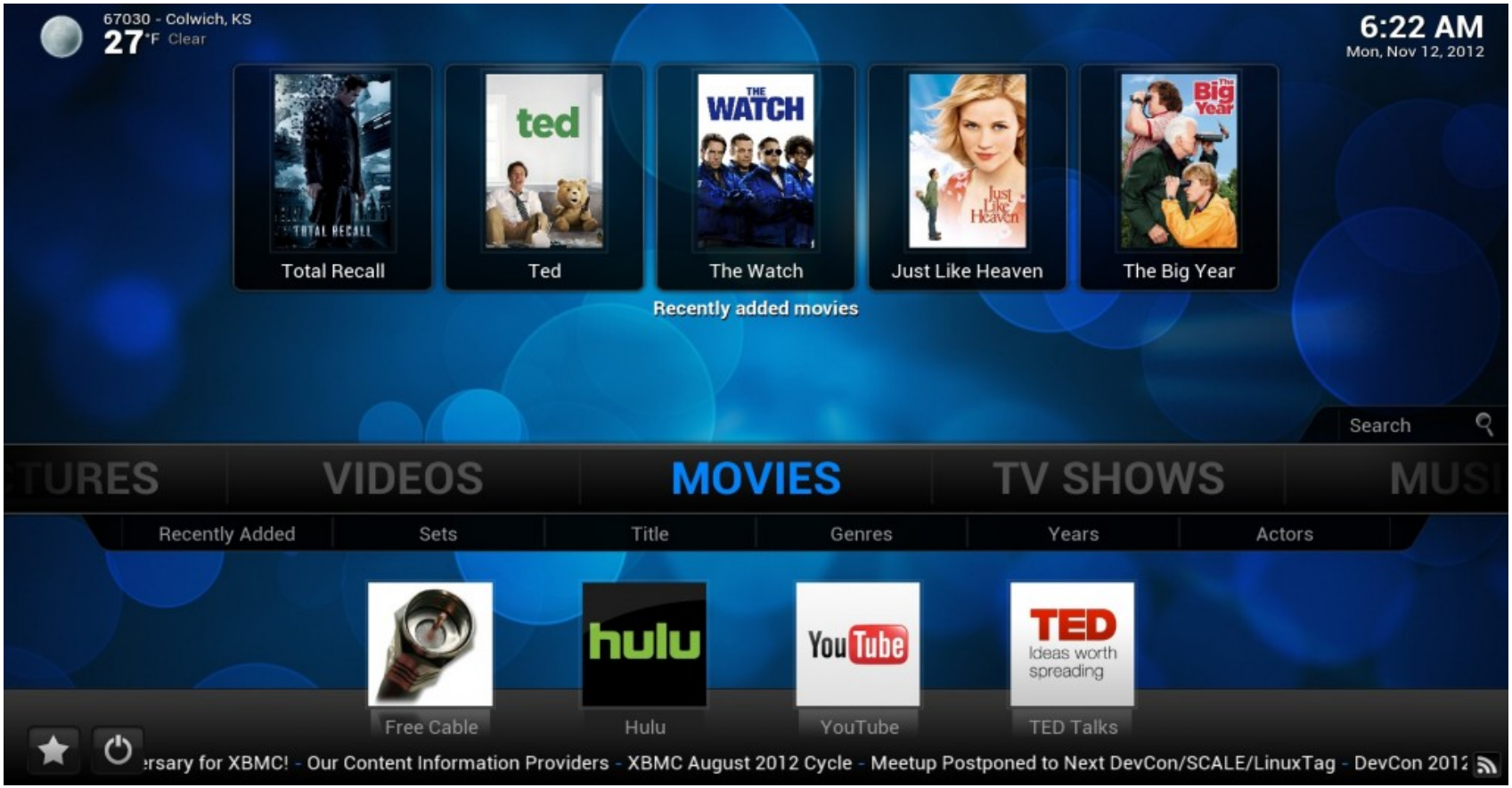
elmeuhort.org:2021

L'Hort Unrbà

Aplicaciones



xbmc



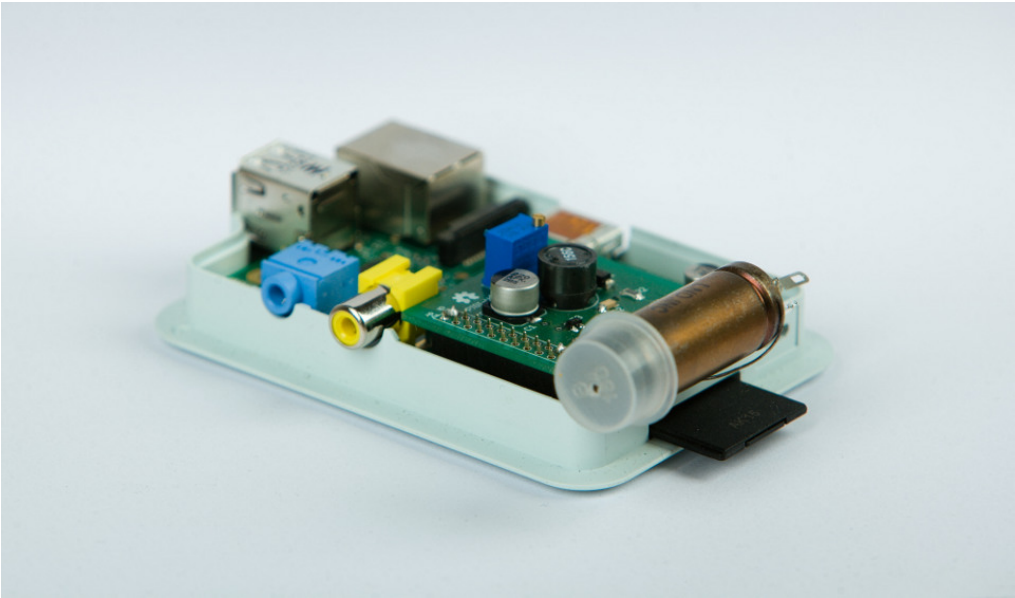
http://www.elinux.org/RPi_Projects

Geiger Counter

Pigi

https://apollo.open-resource.org/lab:pigi

- A Raspberry Pi
- PiGI Module
- Geiger-Müller Tube
- 13 eur.



Dropbox Clone

ownCloud

http://owncloud.org/

BarracudaDrive

http://barracudadrive.com/RaspberryPi.lsp

WiringPI

GPIO Interface Library for the Raspberry Pi

http://wiringpi.com

```
#include <wiringPi.h>
main ()
{
  wiringPiSetup () ;
  pinMode (0, OUTPUT) ;
  for (;;)
  {
    digitalWrite (0, HIGH) ; delay (500) ;
    digitalWrite (0,  LOW) ; delay (500) ;
  }
}
```

```
gcc -Wall -o blink blink.c -lwiringPi
```

Wiring PI

Wiring PI permite el acceso al GPIO en espacio de usuario.

```
import wiringpi
from time import sleep
io = wiringpi.GPIO(wiringpi.GPIO.WPI_MODE_SYS)
io.pinMode(18,io.OUTPUT)  # Setup pin 18 (GPIO1)
while True:
    io.digitalWrite(18,io.HIGH)  # Turn on light
    sleep(2)
    io.digitalWrite(18,io.LOW)  # Turn off
    sleep(2)
```

Python blink (RPi.GPIO)

```
import RPi.GPIO as GPIO
import time
# blinking function
def blink(pin):
        GPIO.output(pin,GPIO.HIGH)
        time.sleep(1)
        GPIO.output(pin,GPIO.LOW)
        time.sleep(1)
        return
# to use Raspberry Pi board pin numbers
GPIO.setmode(GPIO.BOARD)
# set up GPIO output channel
GPIO.setup(11, GPIO.OUT)
# blink GPIO17 50 times
for i in range(0,50):
        blink(11)
GPIO.cleanup()
```

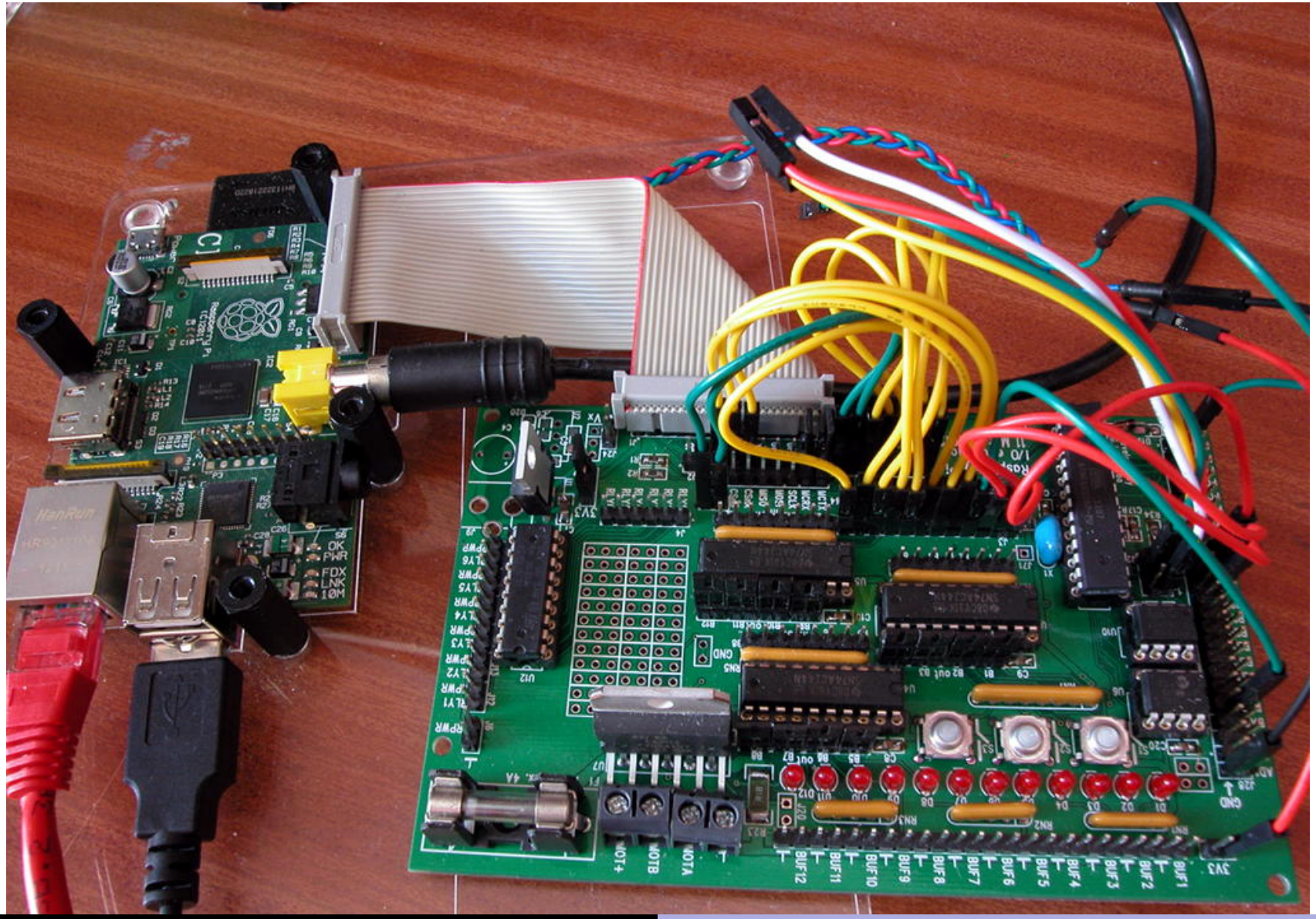
Gert Board

Espcificationes

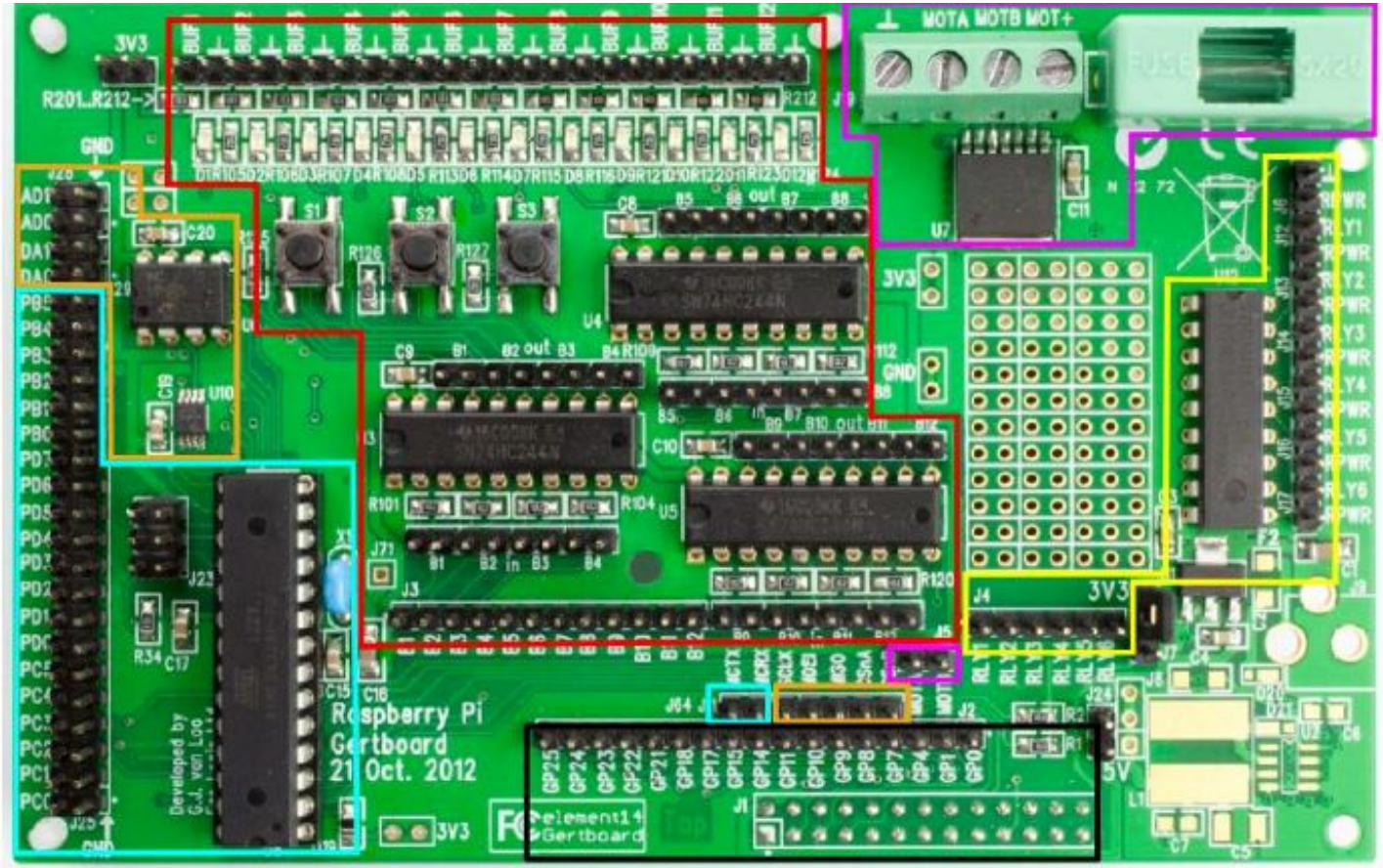
- Acceso a los pines del GPIO de la RPi,
- Acceso a los pines del ATmega.
- 12 digital buffers. Configurable para entada/salida via jumpers/
- 12 LEDs conectados a los puertos digitales.
- 3 botones
- 2 conversores canales D/A via SPI
- 2 conversores canales A/D via SPI
- Un controlador de motor (velocidad y dirección de un motor DC).
- 6 salidas en colector abierto (para relés, etc)...

Fué diseñada por Gert van Loo http://www.fenlogic.com/

Gert Board


OK
PWR
FDX
LNK
10M
MOT+
MOTB
MOTA
BUF12
BUF11
BUF10
BUF9
BUF8
BUF7
BUF6
BUF5
BUF4
BUF3
BUF2
BUF1
GND

Gert Board



http://manuelaantao.blogspot.com.es/2013/03/setting-up-gertboard-io-expansion-board.html

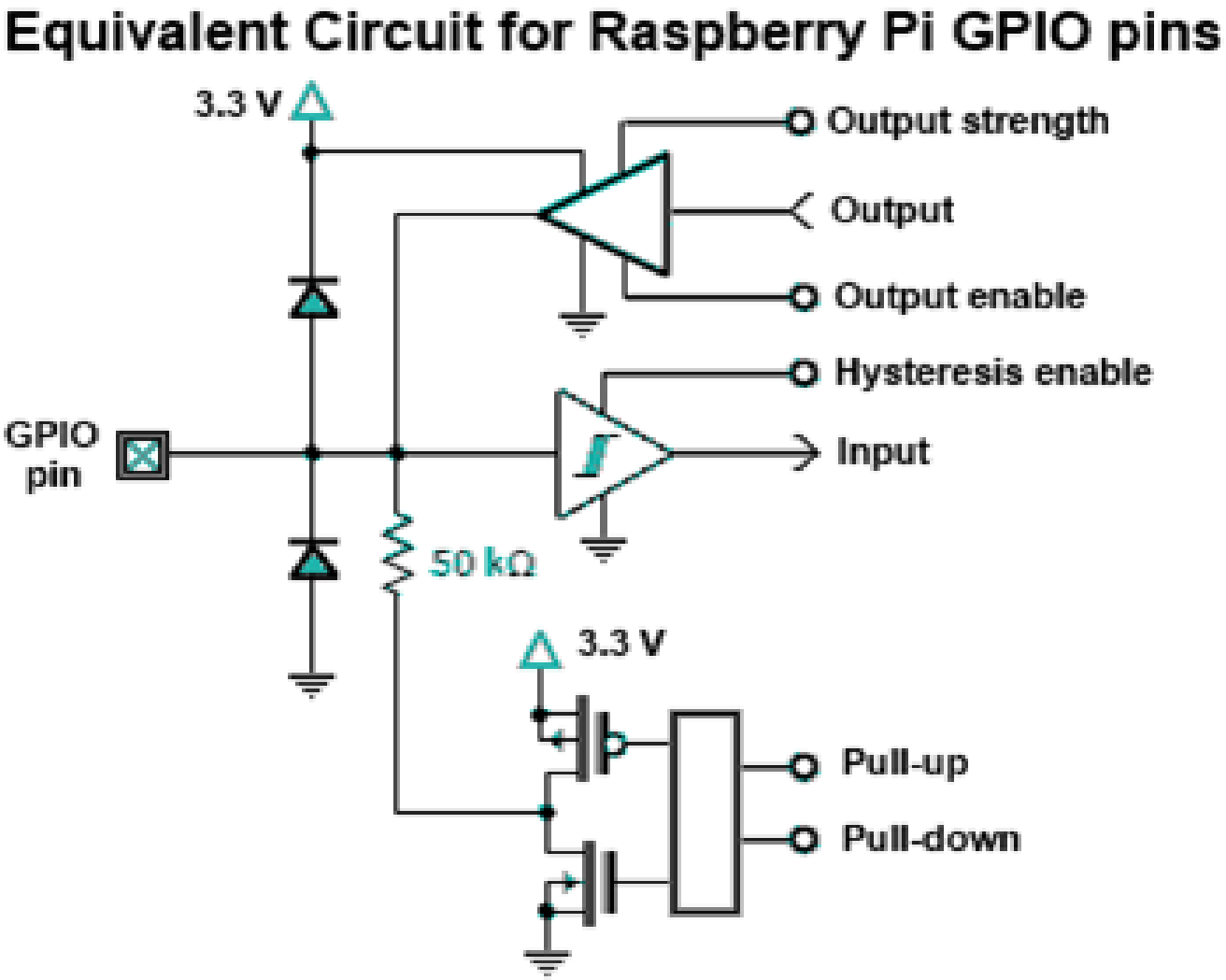
Demo I

PIN-OUT

8 free digital I/O

3.3V	1	2	5V
I2C0 SDA	3	4	DNC
I2C0 SCL	5	6	GROUND
GPIO4	7	8	UART TXD
DNC	9	10	UART RXD
GPIO 17	11	12	GPIO 18
GPIO 21	13	14	DNC
GPIO 22	15	16	GPIO 23
DNC	17	18	GPIO 24
SP10 MOSI	19	20	DNC
SP10 MISO	21	22	GPIO 25
SP10 SCLK	23	24	SP10 CE0 N
DNC	25	26	SP10 CE1 N

Demo II


Equivalent Circuit for Raspberry Pi GPIO pins
3.3 V
Output strength
Output
Output enable
Hysteresis enable
GPIO pin
Input
50 kΩ
3.3 V
Pull-up
Pull-down

Demo II

provaio.py

```
import RPi.GPIO as GPIO

GPIO.setmode(GPIO.BCM)
GPIO.setup(23,GPIO.IN,pull_up_down=GPIO.PUD_UP)

print("Esperant contacte...")

GPIO.wait_for_edge(23,GPIO.FALLING)

print("Sortint")

GPIO.cleanup()
```

Demo II

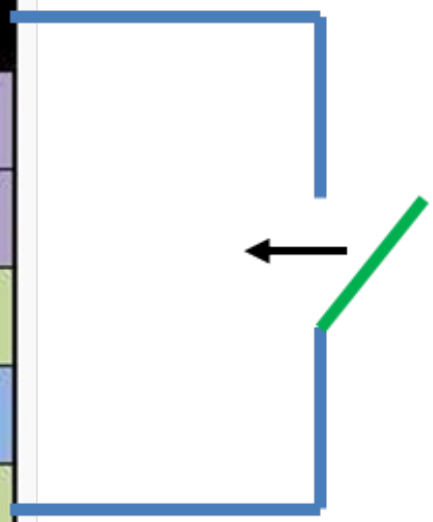
Some I/O Electrical Parameters		
V_{IL}	Input low voltage	Typical: < 0,54V
V_{IH}	Input high voltage	Typical: > 2,31V
V_{OL}	Output low voltage	Typical: < 0,40V
V_{OH}	Output high voltage	Typical: > 2,40V
I_{DRV}	Intensity drive (single pin) Sink/Source	2 - 16 mA (2mA step select) Typical: 8mA
I_{DRV}	Intensity drive (all pins)	Maximum: 50mA !!
R_{UD}	Pull Up/down resistor	Typical: 50 KOhm

Demo IV

```
$ sudo apt-get update
$ sudo apt-get install python-dev
$ sudo apt-get install python-rpi.gpio
```

Demo II

3.3V	1	2	5V
I2C0 SDA	3	4	DNC
I2C0 SCL	5	6	GROUND
GPIO4	7	8	UART TXD
DNC	9	10	UART RXD
GPIO 17	11	12	GPIO 18
GPIO 21	13	14	DNC
GPIO 22	15	16	GPIO 23
DNC	17	18	GPIO 24
SP10 MOSI	19	20	DNC
SP10 MISO	21	22	GPIO 25
SP10 SCLK	23	24	SP10 CE0 N



Para saber más

- https://projects.drogon.net/raspberry-pi/wiringpi/
- http://www.treehugger.com/slideshows/gadgets/20-awesome-projects-raspberry-pi-microcomputers/
- http://www.raspberrypi.org/phpBB3/
- http://manuelaantao.blogspot.com.es/2013/03/setting-up-gertboard-io-expansion-board.html
- https://launchpad.net/win32-image-writer

Questions