

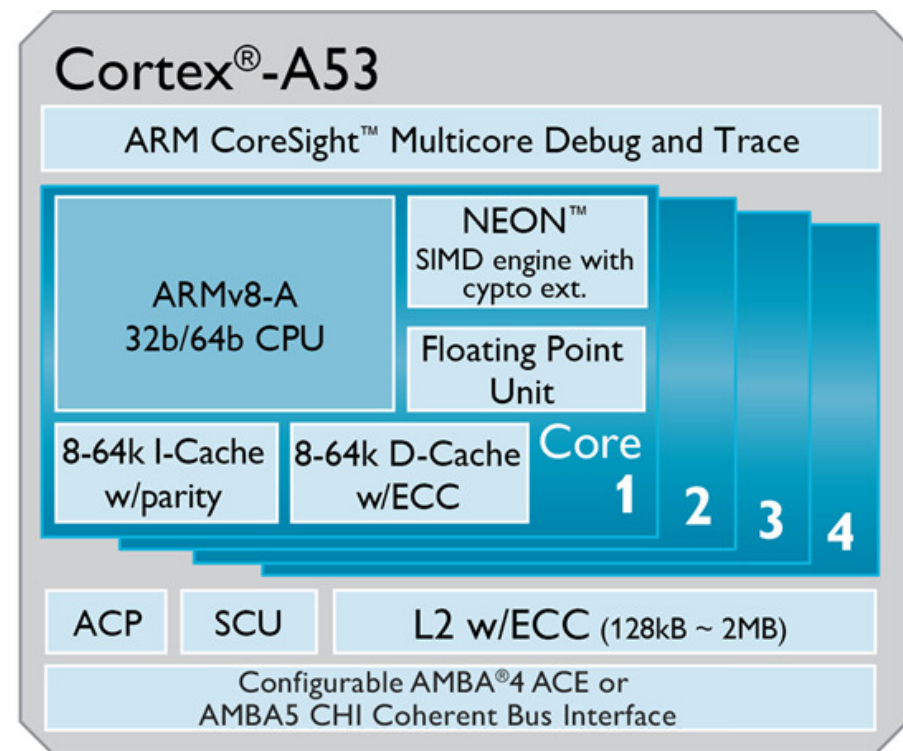
Raspberry Pi 3 modelo B

Sergio Takeo Kofuji

O Raspberry Pi 3 modelo B

Características	Raspberry Pi 2 Modelo B	Raspberry Pi 3 Modelo B
CPU	BMC2836	BMC2837
Velocidad (Sin overclock)	900MHz	1200MHz
Núcleos	4	
Micro-Arquitectura	ARM Cortex-A7	ARM Cortex-A53
GPU	VideoCore IV	
Velocidad GPU	300MHz	400MHz
Memoria	1GB (Compartida con GPU)	
Puertos USB 2.0	4	
Entrada de Video	Conector CSI	
Salida de Video	HDMI/Video Compuesto	
Salida de Audio	Digital/Jack 3.5mm	
Almacenamiento	Tarjeta microSDHC	
Red	Ethernet 10/100	Ethernet 10/100;WiFi;BLE

BroadCom BMC2837



Multimedia Processors

Chip ↕	Arch. ↕	Clock speed ↕	Cores ↕	First seen (FCC) ↕	Notes ↕
BCM2763	ARM 1176JZF-S	600 MHz	1		Full HD 1080p HP H.264 Video Encode/Decode DualCore VideoCoreIV Multimedia Processor
BCM2835	ARM 1176JZF-S	700 MHz	1	2011-06-29	Full HD 1080p HP H.264 Video Encode/Decode DualCore VideoCoreIV Multimedia Co-Processor
BCM2836	ARMv7 Cortex A7	900 MHz	4	2016-04-05	Full HD 1080p HP H.264 Video Encode/Decode DualCore VideoCoreIV Multimedia Co-Processor
BCM2837	ARMv8 Cortex A53	1.2 GHz	4	2016-02-26	Full HD 1080p HP H.264 Video Encode/Decode DualCore VideoCoreIV Multimedia Co-Processor
BCM7208	ARM 1176JZF-S	400 MHz	1	2012-02-22	Full HD 1080p HP H.264 Video Encode/Decode DualCore VideoCoreIV Multimedia Co-Processor
BCM7218	ARM 1176JZF-S	600 MHz	1	2013-09-17	Full HD 1080p HP H.264 Video Encode/Decode DualCore VideoCoreIV Multimedia Co-Processor
BCM7413	MIPS32 16e-class	400 MHz	2	2012-12-10	HD/SD H.264/AVC Main and High Profile 64-bit DDR2 800 MHz DRAM controller
BCM7615	MIPS 24Kc	500 MHz	1	2011-05-23	RCA_DSB772WE_Streaming_Media_Player ↗ Broadcom SOC's on linux-mips.org ↗
BCM11130	ARM Cortex A9	900 MHz	2	2013-02-08	Full HD 1080p HP H.264 Video Encode/Decode DualCore VideoCoreIV Multimedia Processor
BCM11140	ARM Cortex A9	1 GHz	2		Full HD 1080p HP H.264 Video Encode/Decode DualCore VideoCoreIV Multimedia Processor

Raspberry Pi 3 Model B

Dimensions
85.6mm x 56mm x 21mm

element14

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

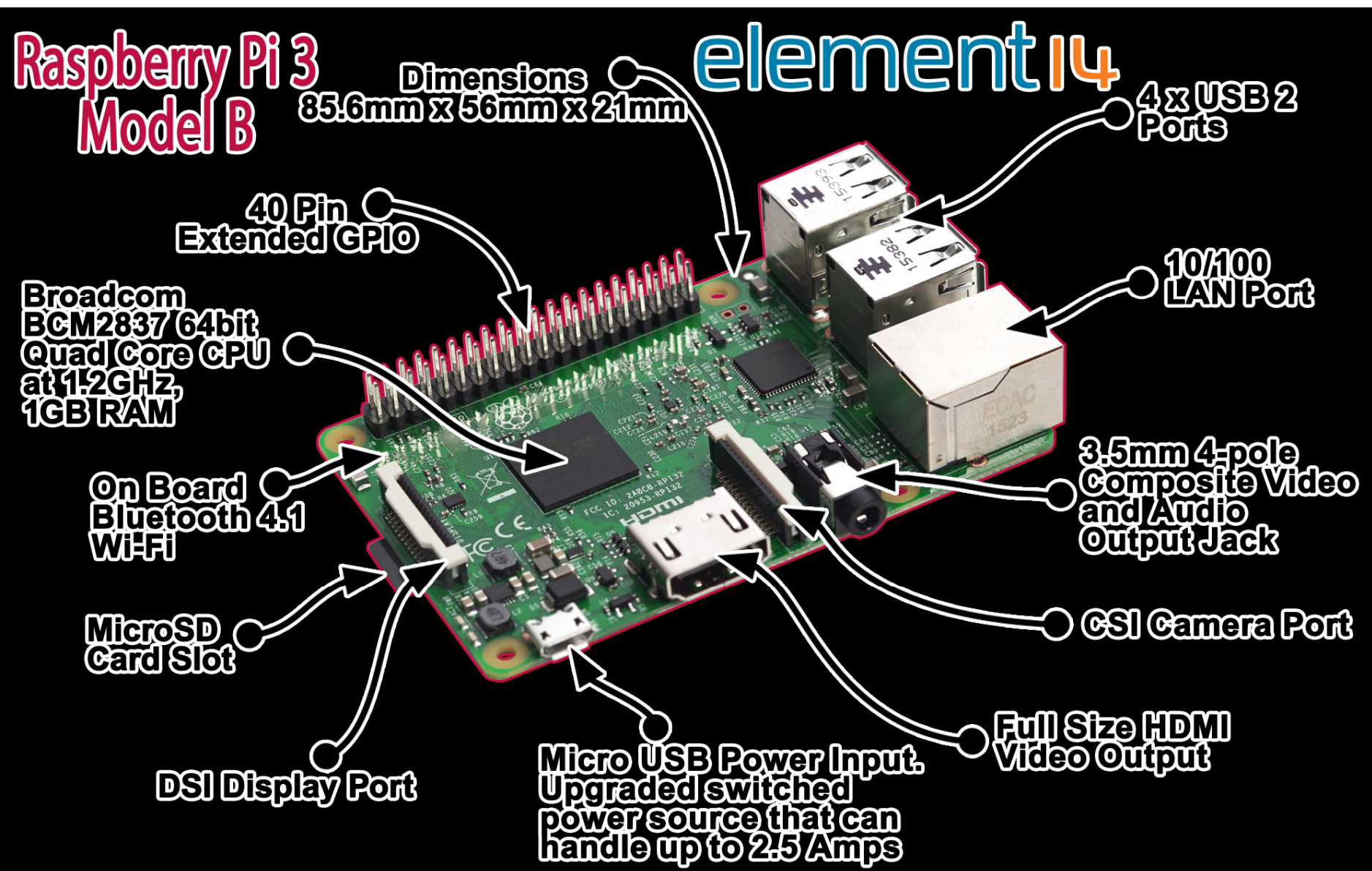
MicroSD
Card Slot

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 GPIO Header

Pin#	NAME		NAME	Pin#
01	3.3v DC Power		DC Power 5v	02
03	GPIO02 (SDA1 , I ² C)		DC Power 5v	04
05	GPIO03 (SCL1 , I ² C)		Ground	06
07	GPIO04 (GPIO_GCLK)		(TXD0) GPIO14	08
09	Ground		(RXD0) GPIO15	10
11	GPIO17 (GPIO_GEN0)		(GPIO_GEN1) GPIO18	12
13	GPIO27 (GPIO_GEN2)		Ground	14
15	GPIO22 (GPIO_GEN3)		(GPIO_GEN4) GPIO23	16
17	3.3v DC Power		(GPIO_GEN5) GPIO24	18
19	GPIO10 (SPI_MOSI)		Ground	20
21	GPIO09 (SPI_MISO)		(GPIO_GEN6) GPIO25	22
23	GPIO11 (SPI_CLK)		(SPI_CE0_N) GPIO08	24
25	Ground		(SPI_CE1_N) GPIO07	26
27	ID_SD (I ² C ID EEPROM)		(I ² C ID EEPROM) ID_SC	28
29	GPIO05		Ground	30
31	GPIO06		GPIO12	32
33	GPIO13		Ground	34
35	GPIO19		GPIO16	36
37	GPIO26		GPIO20	38
39	Ground		GPIO21	40

Especificações Técnicas

- Broadcom BCM2837 64bit Quad Core Processor powered Single Board Computer running at 1.2GHz 1GB RAM
- BCM43143 WiFi on board
- Bluetooth Low Energy (BLE) on board
- 40pin extended GPIO
- 4 x USB 2 ports
- 4 pole Stereo output and Composite video port
- Full size HDMI CSI camera port for connecting the Raspberry Pi camera
- DSI display port for connecting the Raspberry Pi touch screen display
- Micro SD port for loading your operating system and storing data
- Upgraded switched Micro USB power source (now supports up to 2.4 Amps)
- Same form factor as the Pi 2 Model B, however the LEDs have changed position

Alimentação e cartão micro SD

- Fonte de tensão micro USB 5V@2,5 A
- Micro SD CARD: 8GB+ classe 10

Sistemas Operacionais Suportados

- A instalação do NOOBS no micro SD card permite avaliar vários sistemas operacionais.
 - <https://www.raspberrypi.org/downloads/>
- Alguns sistemas operacionais suportados pelo RBP
 - Raspbian
 - Ubuntu
 - Ubuntu Mate
 - Snappy Ubuntu Core
 - Windows 10 IoT Core
 - OSMC
 - Arch Linux ARM
 - SUSE 64 bits (SLES, openSUSE Leap, e openSUSE Tumbleweed)
 - SLE = Suse Linux Enterprise

Raspbian Jessie

- Vamos utilizar o SO Linux Raspbian Jessy. Não vamos usar o NOOBS
- Site do Raspberry PI:
 - <https://www.raspberrypi.org/downloads/>
- Site oficial do Raspbian:
 - <http://www.raspbian.org>

Gravação do cartão FLASH

- Micro SD Card de 8Gbytes, classe 10 ou superior
- No Windows 10:
 - Formatar o micro SD Card, por exemplo, com o utilitário do SD Association
 - https://www.sdcard.org/downloads/formatter_4/eula_windows/
- Descomprimir o arquivo zip com o utilitário 7ZIP (não será necessário se a ferramenta de gravação do cartão SD for o **Ether**)
- Gravar o cartão Flash
 - Ferramenta Etcher (<https://etcher.io/>)
 - Ferramenta Win32DiskImager (<https://sourceforge.net/projects/win32diskimager/>)
- Verifique no Windows as partições que foram gravadas no cartão SD

Procedimento de Boot e de Desligamento

- Boot:
 - Instale o micro cartão SD **ANTES de LIGAR a energia** (cabo micro USB)
 - Conecte o cabo de alimentação micro USB (5V@2,5 A)
- Desligamento:
 - Evite desligar o RBP desconectando o cabo micro USB, **SEM dar o shutdown do Linux!**

Senhas

- Default user: pi
- Default password: raspberry

Teclado

- O teclado default é o Inglês Britânico
- O teclado deve ser configurado para o ABNT2
- A configuração pode ser feita através de comandos ou através da interface gráfica:
 - Preferences->Mouse and Keyboard Settings

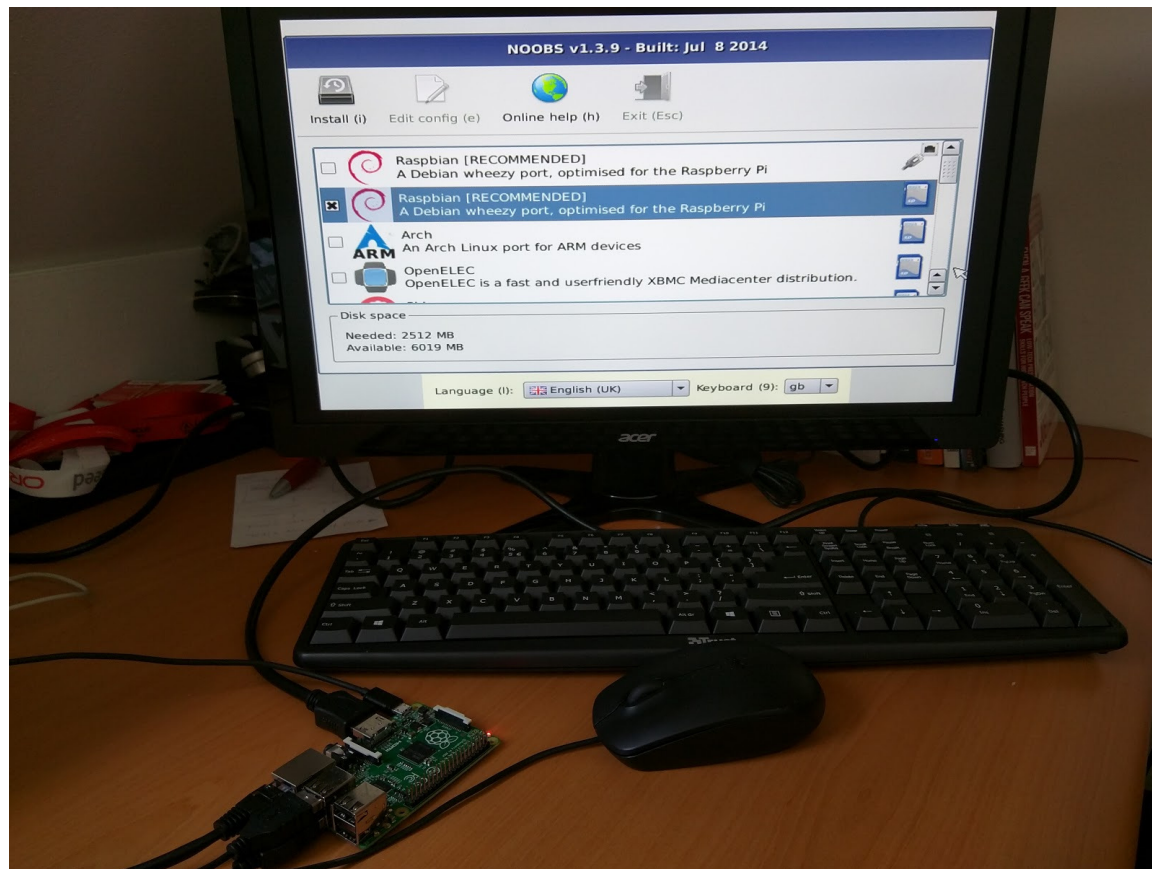
Root File System

- Examine o diretório raiz do sistema

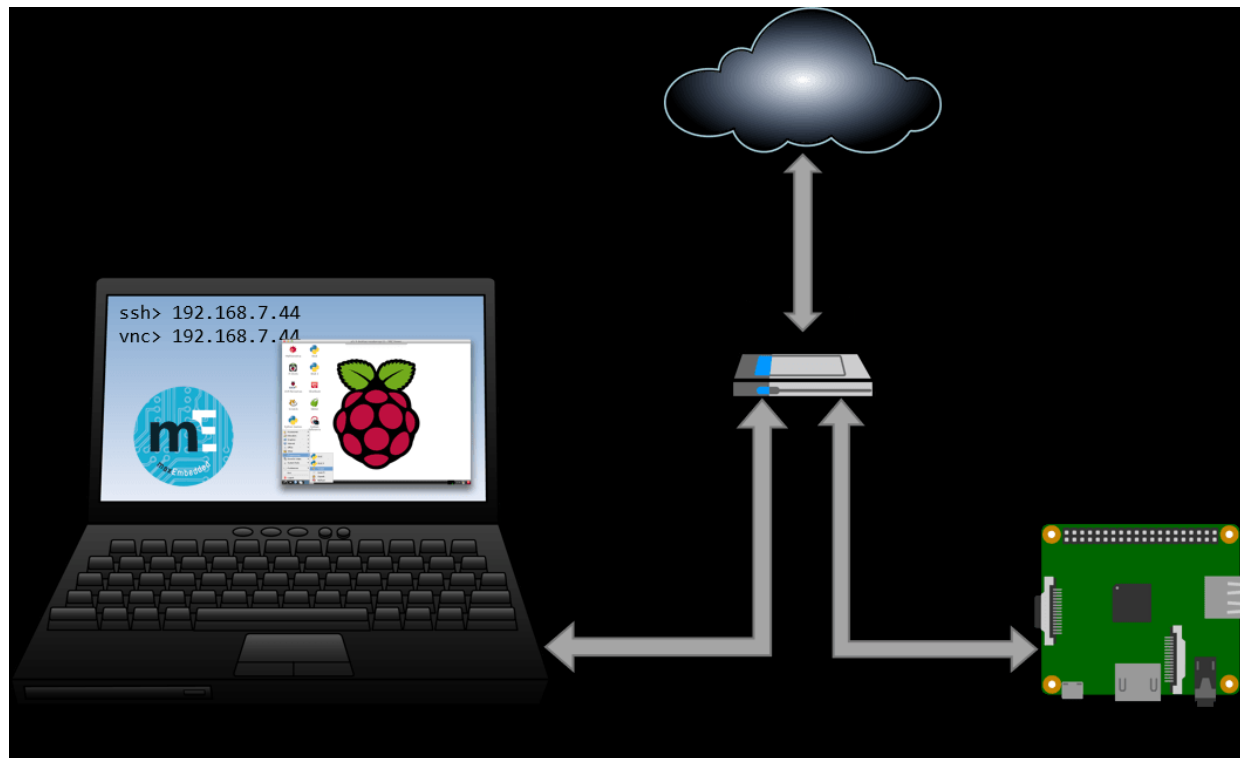
Dispositivos USB

- Execute o comando `lsusb -v`
- Examine a listagem e discrimine as seções correspondentes ao teclado e ao mouse

RBP com periféricos



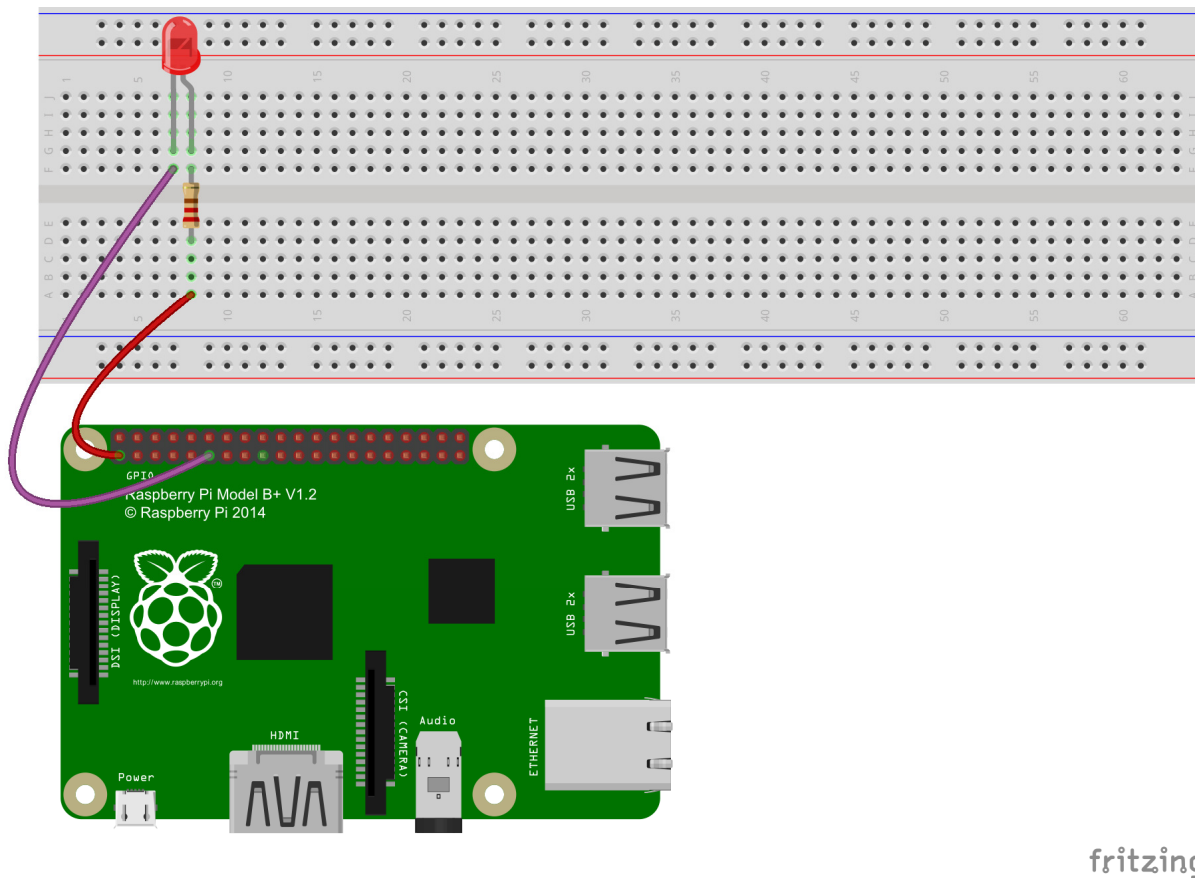
Headless Linux



Captura de vídeo

- Vamos utilizar um webcam instalado em alguma das portas USB
- Instale a ferramenta de vídeo V4L2
 - Requer acesso à internet
 - Conecte a webcam
 - Liste os dispositivos USB
 - `lsusb -v`
 - Instale o pacote `qv4l2`:
 - `sudo apt-get install qv4l2`
- Execute o aplicativo de vídeo pelo menu de “Sound & Video”

Exemplo Simples – Led Blinking



<https://www.sunfounder.com/learn/Super Kit V2 for RaspberryPi/lesson-1-blinking-led-super-kit-for-raspberrypi.html>

Procedimento em C

Step 1: Change directory

```
cd /home/pi/Sunfounder_SuperKit_C_code_for_RaspberryPi/01_LED/
```

Step 2: Compile

```
gcc led.c -o led -lwiringPi
```

Step 3: Run

```
sudo ./led
```

Procedimento em Python

Step 1: Change directory

```
cd /home/pi/Sunfounder_SuperKit_Python_code_for_RaspberryPi/
```

Step 2: Run

```
sudo python 01_led.py
```

Código C

- `/******`
- `* Filename : led.c`
- `* Description : Make an led blinking.`
- `* Author : Robot`
- `* E-mail : support@sunfounder.com`
- `* website : www.sunfounder.com`
- `* Date : 2014/08/27`
- `*****/`
- `#include <wiringPi.h>`
- `#include <stdio.h>`
- `#define LedPin 0`

```

int main(void)
{
    if(wiringPiSetup() == -1){ //when initialize wiring failed,print message to screen
        printf("setup wiringPi failed !");
        return 1;
    }
    printf("linker LedPin : GPIO %d(wiringPi pin)\n",LedPin); //when initialize wiring successfully,print message
to screen

    pinMode(LedPin, OUTPUT);

    while(1){
        digitalWrite(LedPin, LOW); //led on
        printf("led on...\n");
        delay(500);
        digitalWrite(LedPin, HIGH); //led off
        printf("...led off\n");
        delay(500);
    }

    return 0;
}

```


RPP + Raspbian Jessie + OpenCV

- <http://www.pyimagesearch.com/2016/04/18/install-guide-raspberry-pi-3-raspbian-jessie-opencv-3/>

Obrigado

kofuji@usp.br