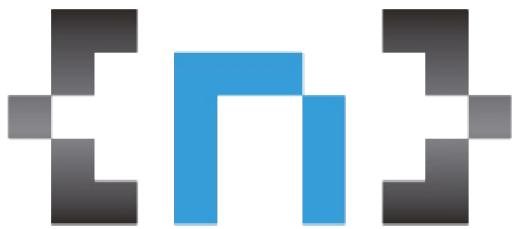


INTERNET  
OF  
THINGS

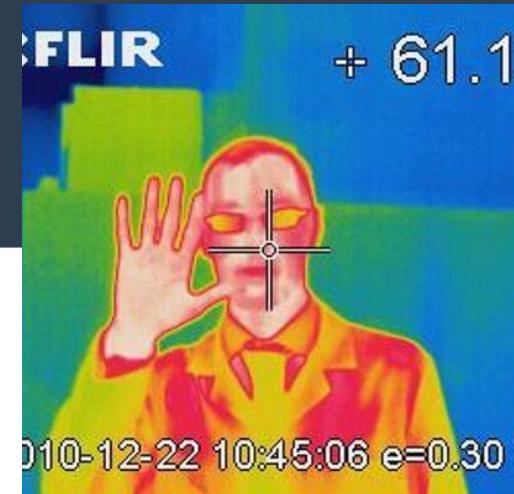


IoT Yourself

Hack your home!



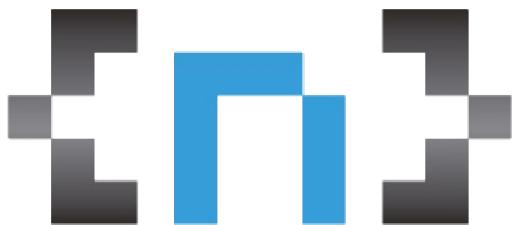
whoami



- **Fran Quinto**

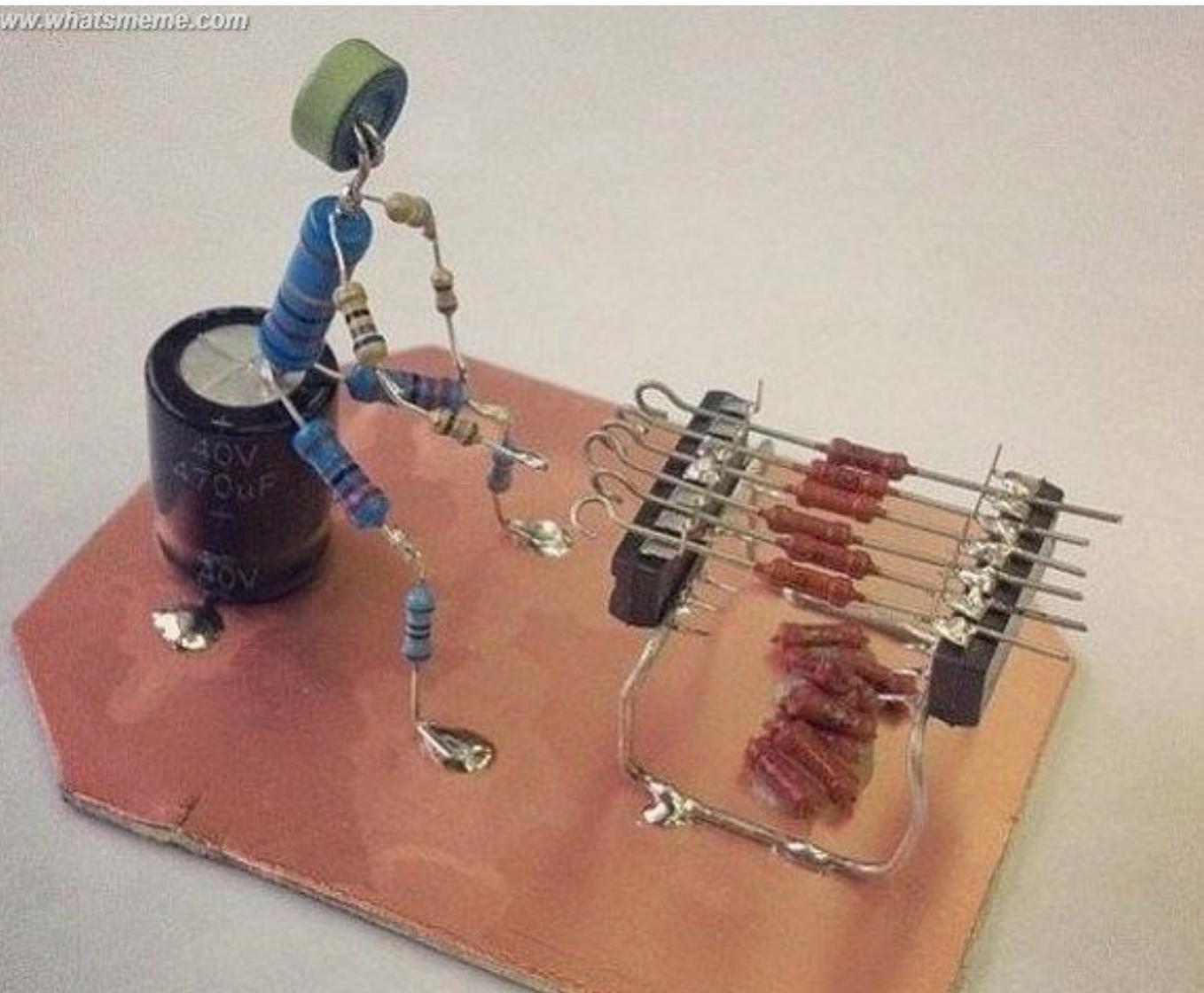
- B. Eng. Technical Industrial Electronics
- Electronic Engineering
- Master Eng. Electronic Engineering (EHEA)
- PhP Student: Automatic Control, Robotics and Computer Vision (ARV)

**Interest areas:** hardware design & embedded soft.  
security analyst, reverse engineering, PLC developer, scada audit, FPGAs, RTOs, GNU/Linux, IoT, RaspberryPi, drones, Arduino, AI



# Electronics?

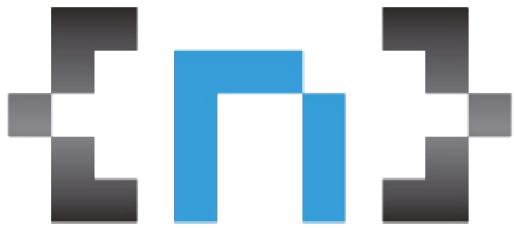
[www.whatsmeme.com](http://www.whatsmeme.com)



**ELECTRONIC BBQ**

# Electronics?





# ÍNDICE

- Encuestas + KITS
- IoT
- Hardware
- Práctica 1
- Práctica 2
- Práctica 3
- Práctica 4

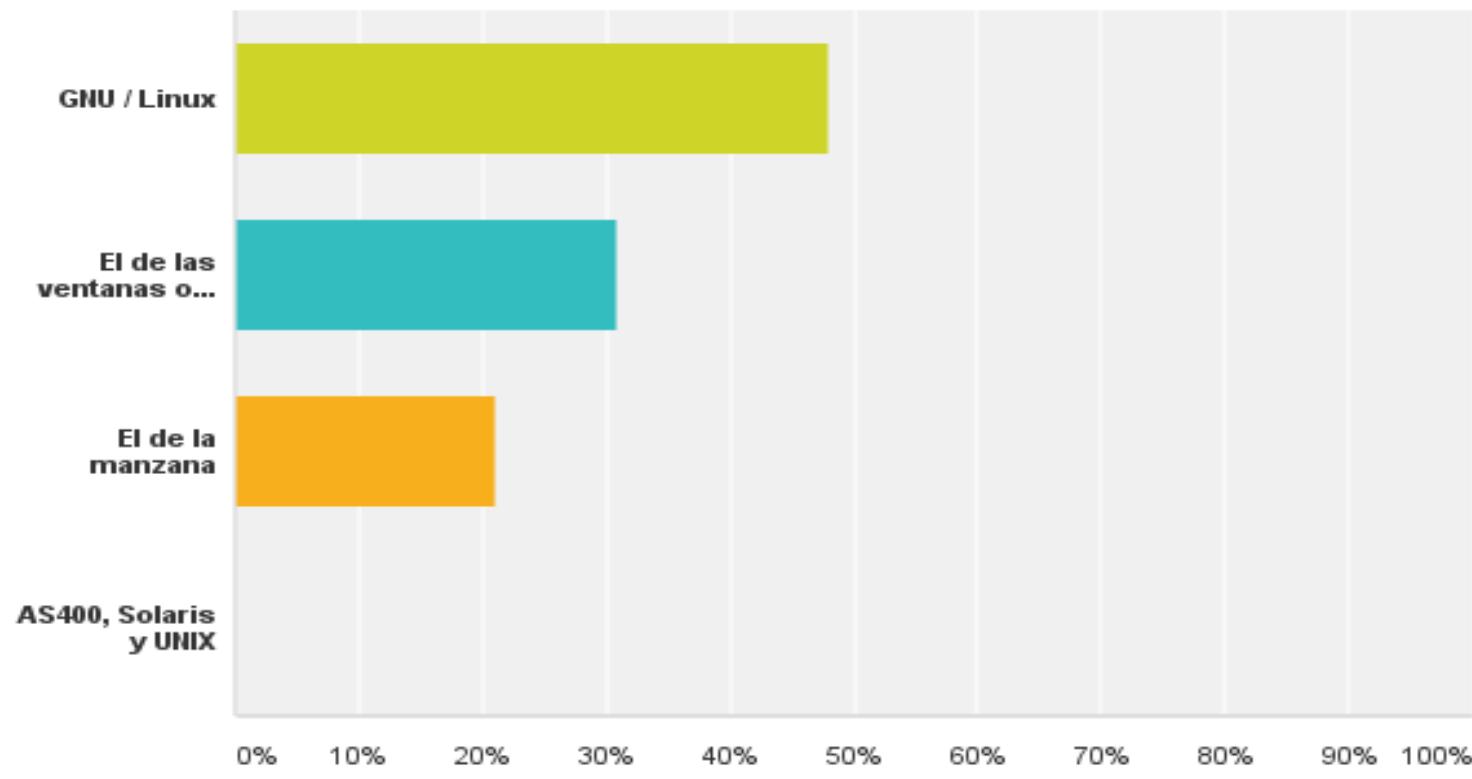


# ENCUESTAS

# Encuestas

## ¿Qué sistema operativo sueles usar?

Respondido: 100 Omitido: 0



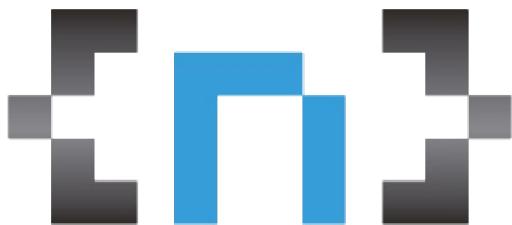
Opciones de respuesta

Respuestas

GNU / Linux

48,00%

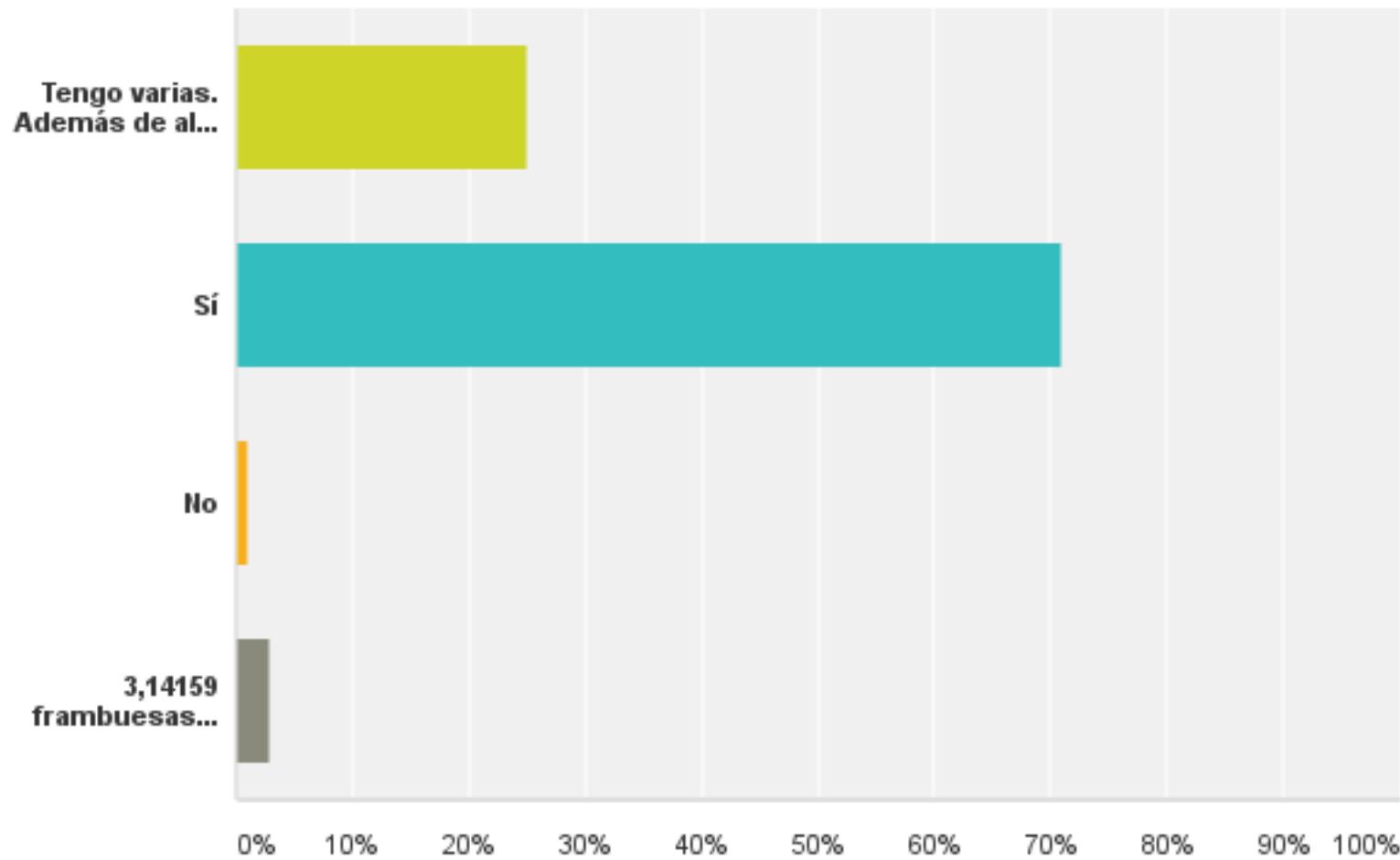
48



# Encuestas

## ¿Sabes qué es una Raspberry Pi?

Respondido: 100 Omitido: 0

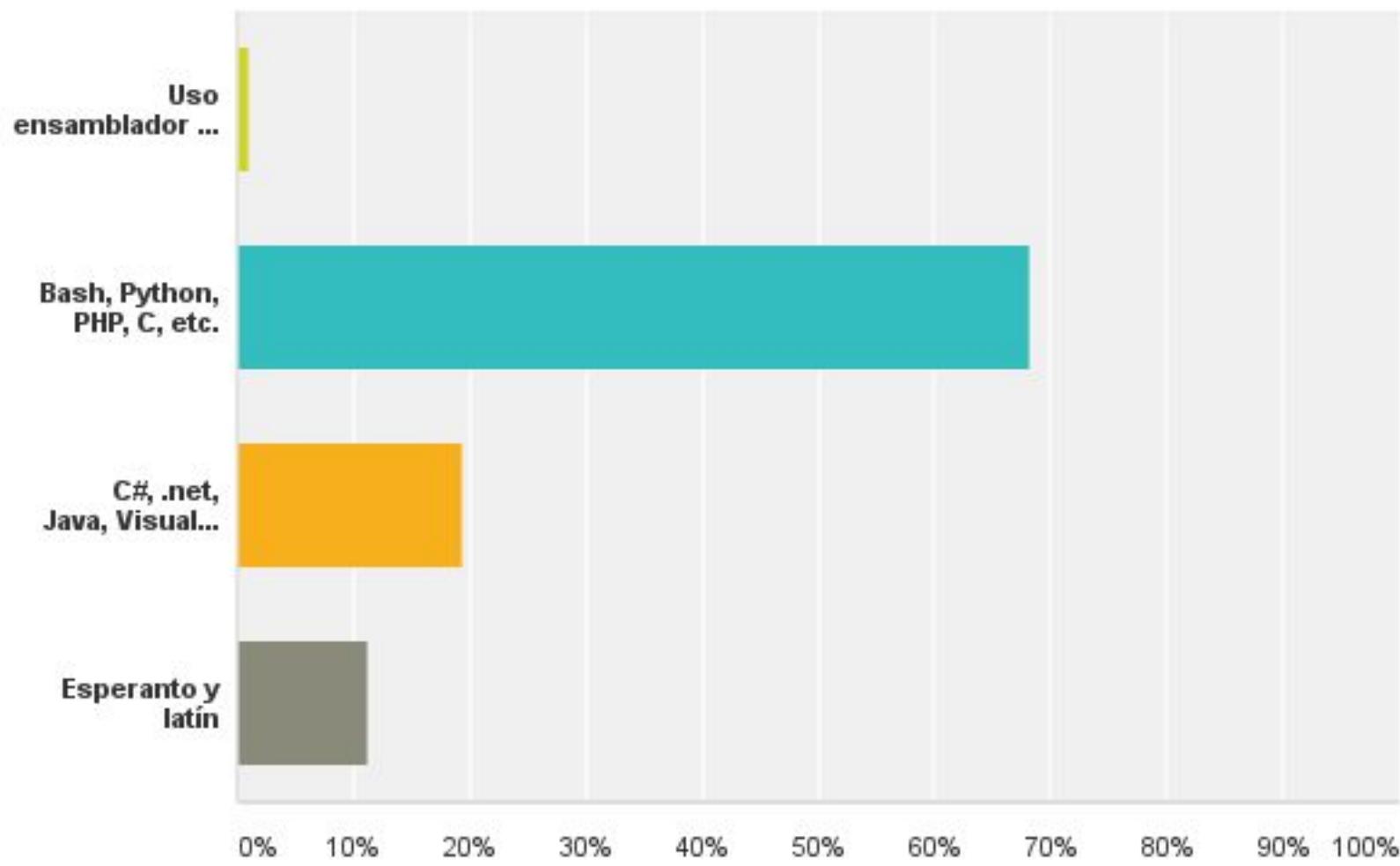




# Encuestas

## ¿Qué lenguajes conoces?

Respondido: 98 Omitido: 2

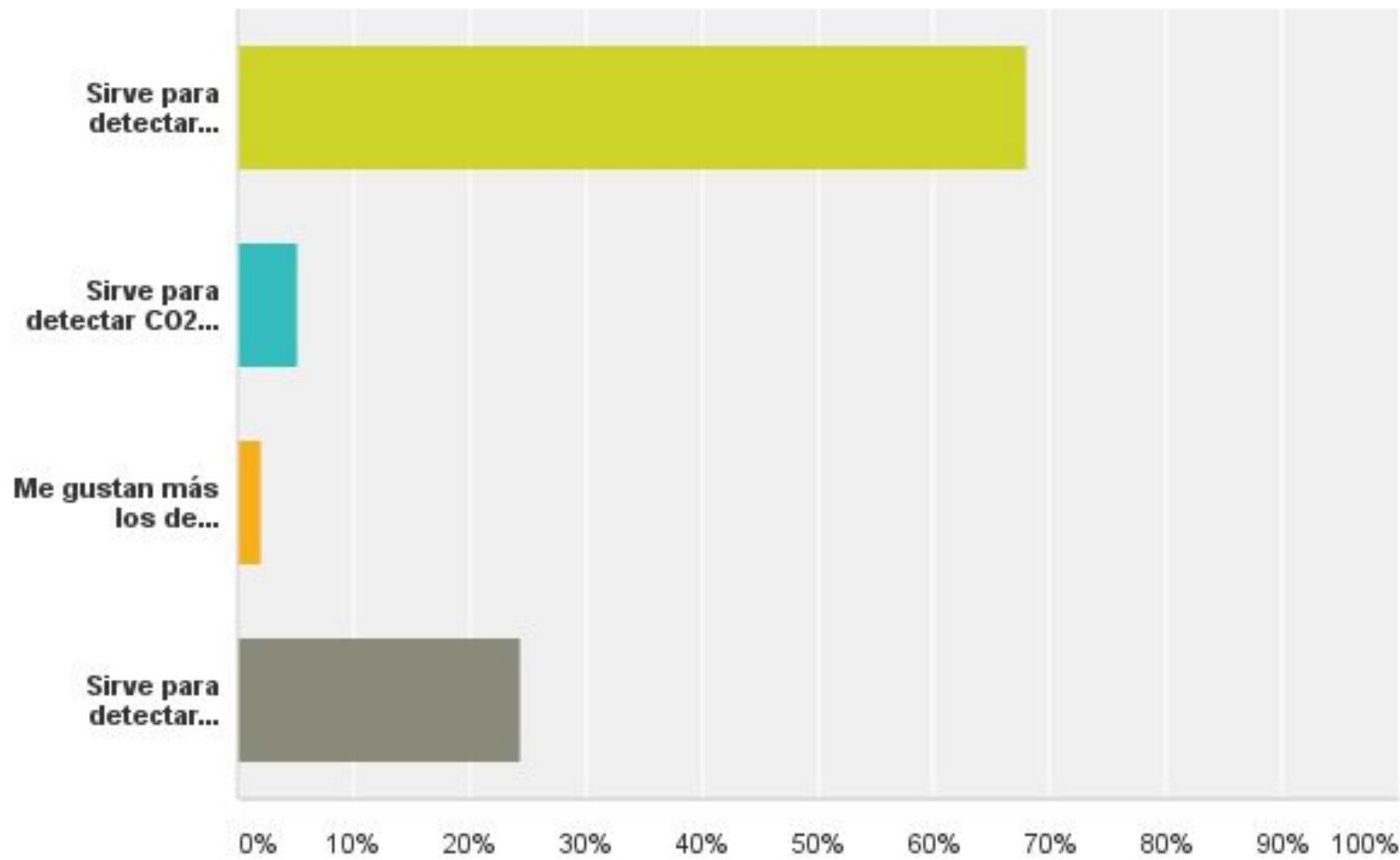


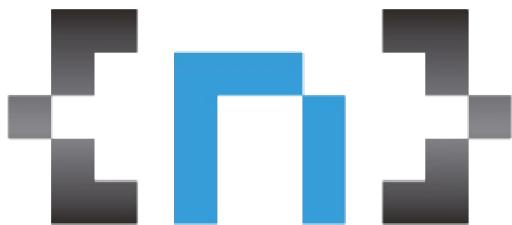


# Encuestas

## ¿Para qué sirve un sensor PIR?

Respondido: 94 Omitido: 6

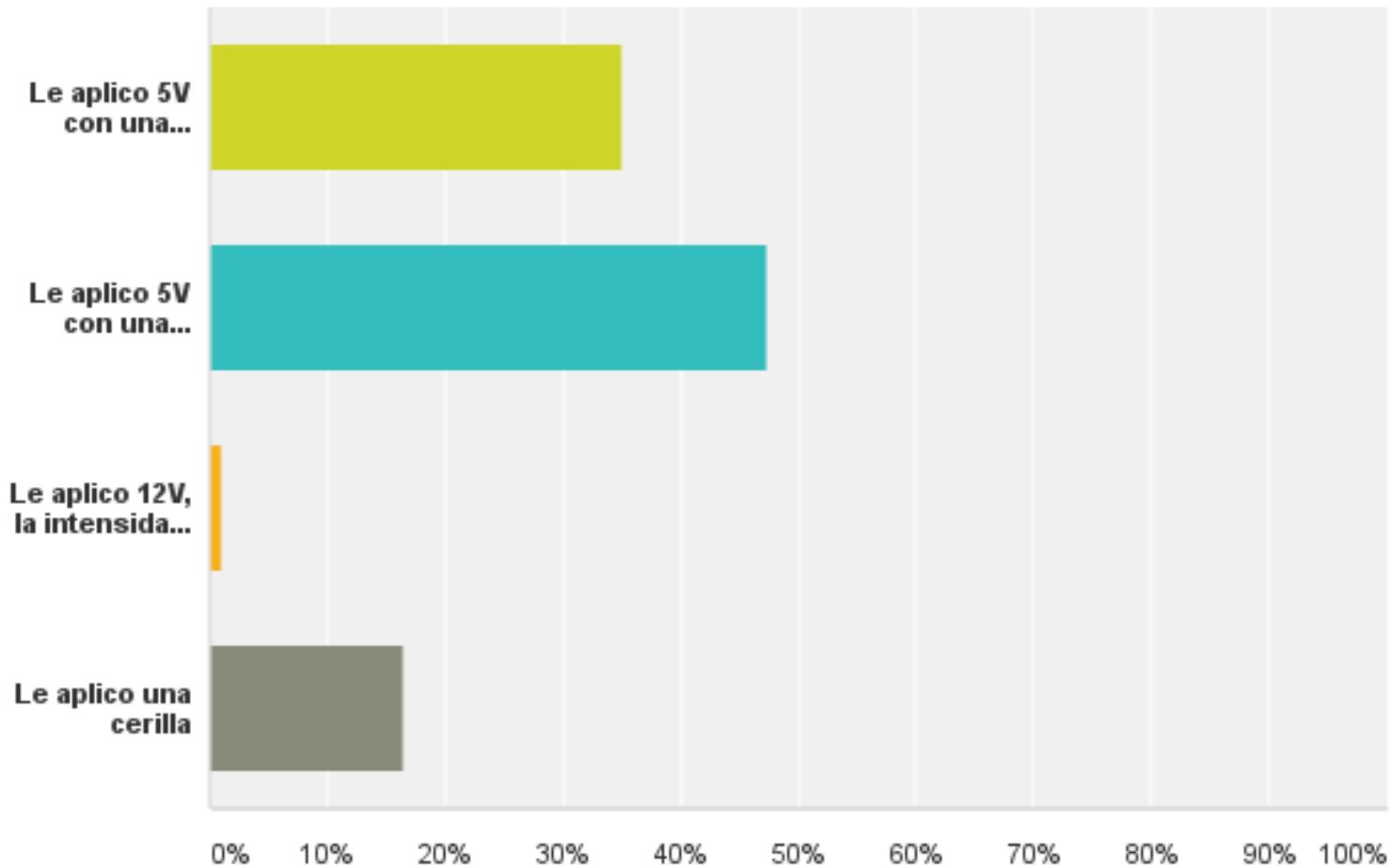


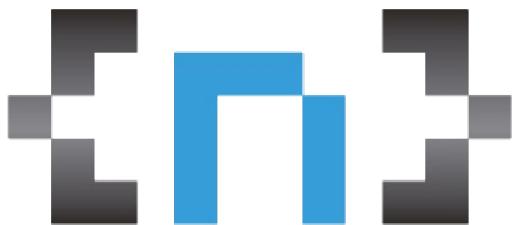


# Encuestas

## ¿Qué le haces a una Raspberry Pi para que se encienda?

Respondido: 97 Omitido: 3

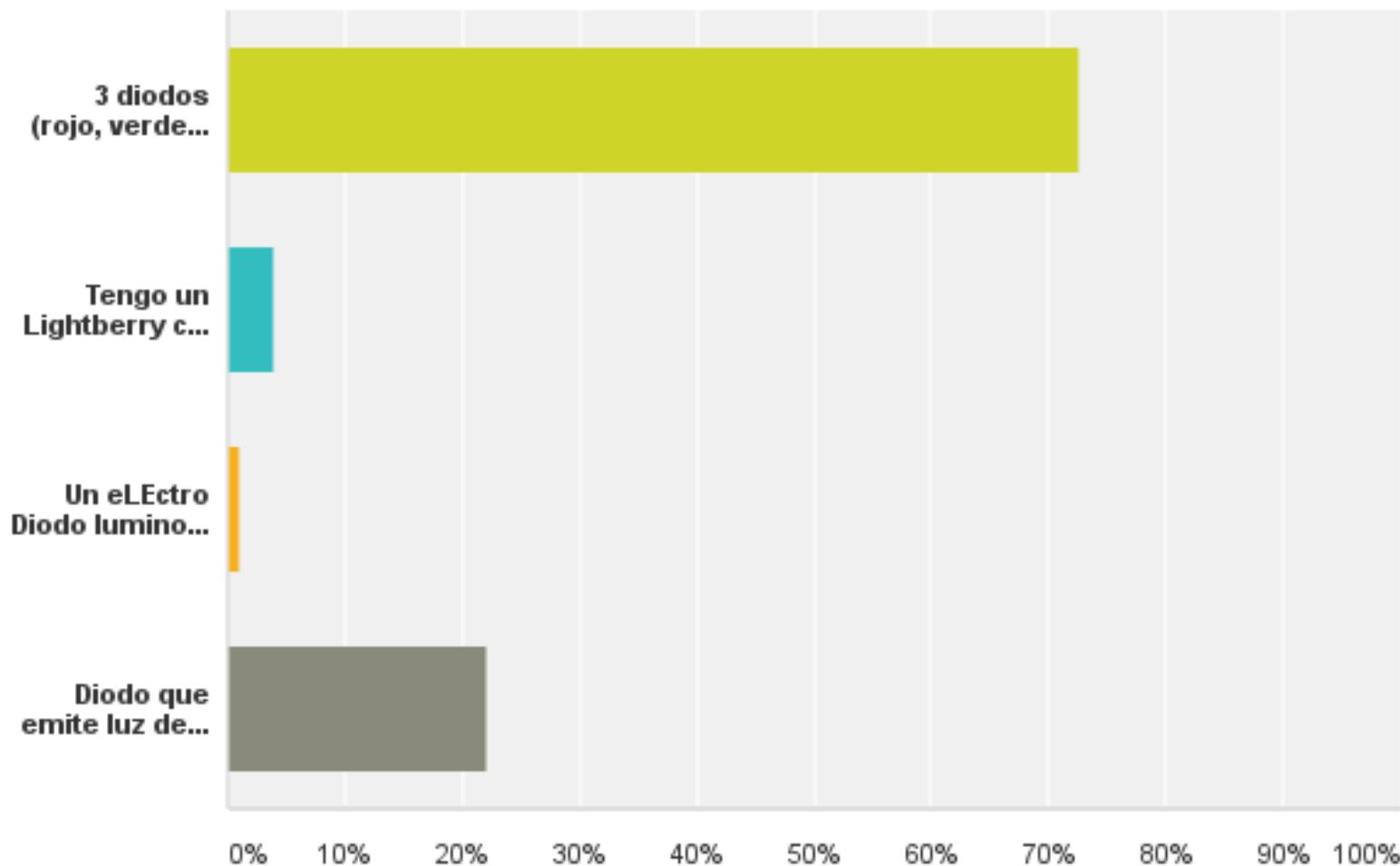


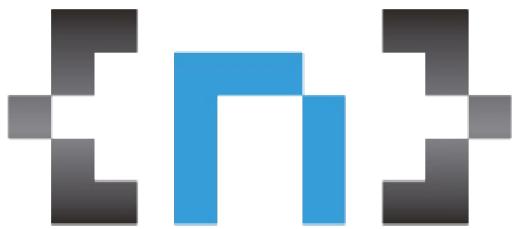


# Encuestas

## ¿Sabes qué es un LED RGB?

Respondido: 99    Omitido: 1

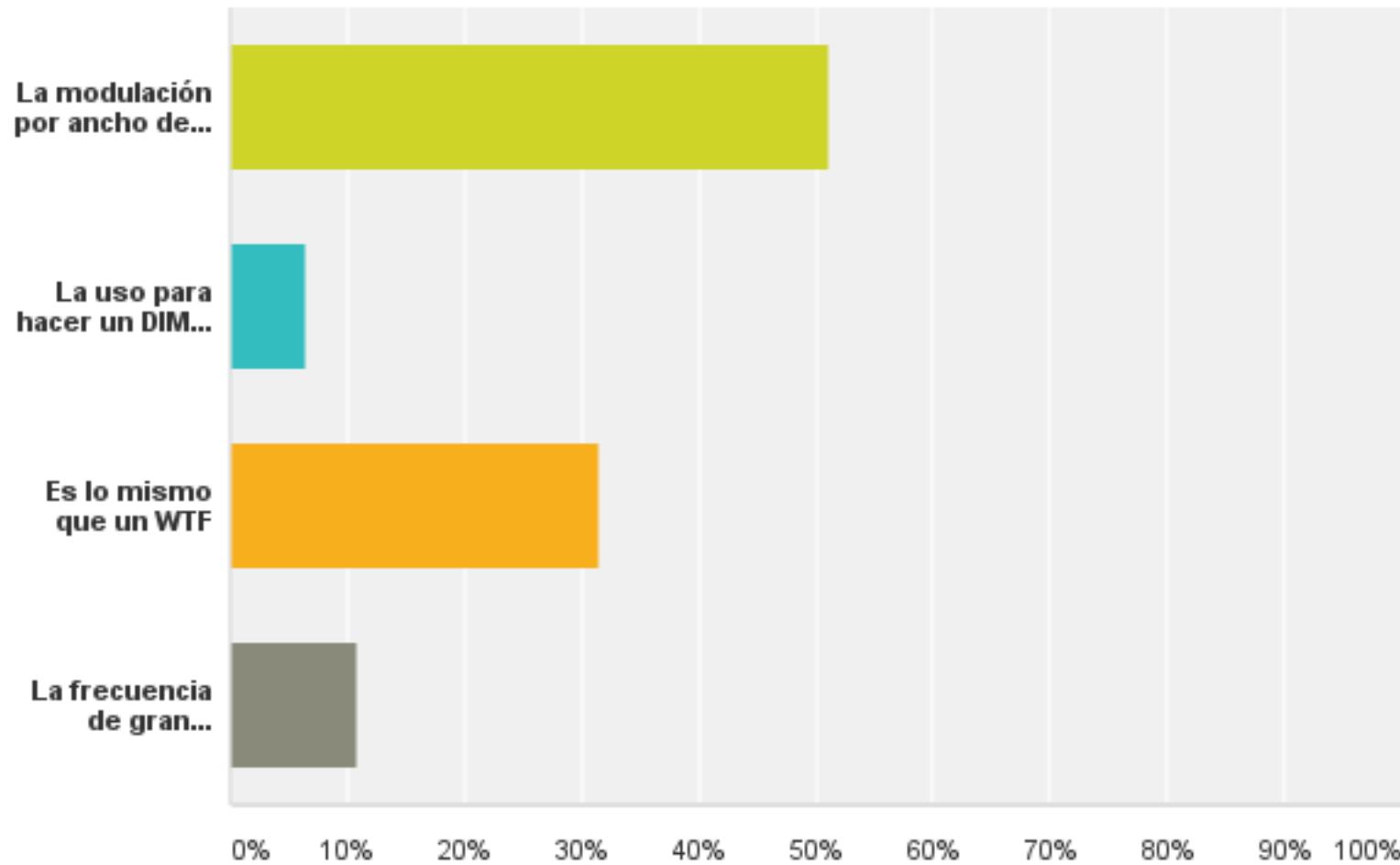




# Encuestas

## ¿Sabes qué es en electrónica una PWM?

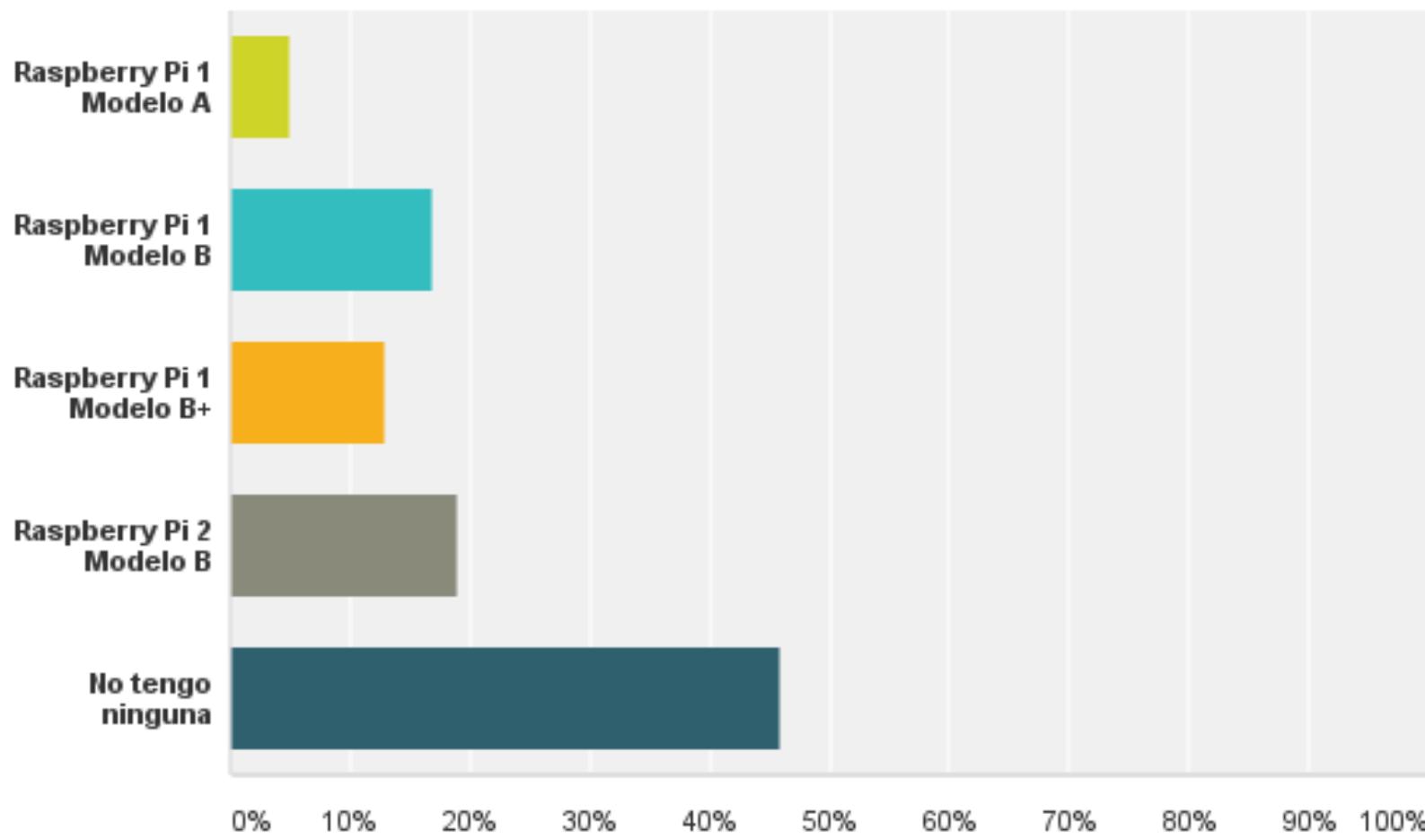
Respondido: 92 Omitido: 8

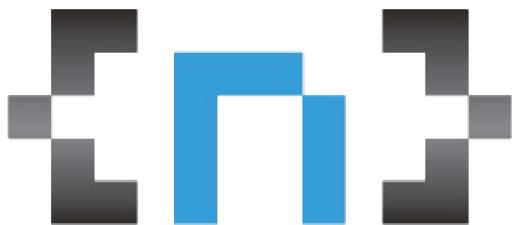


# Encuestas

## ¿Qué modelo de Raspberry Pi tienes?

Respondido: 100   Omitido: 0

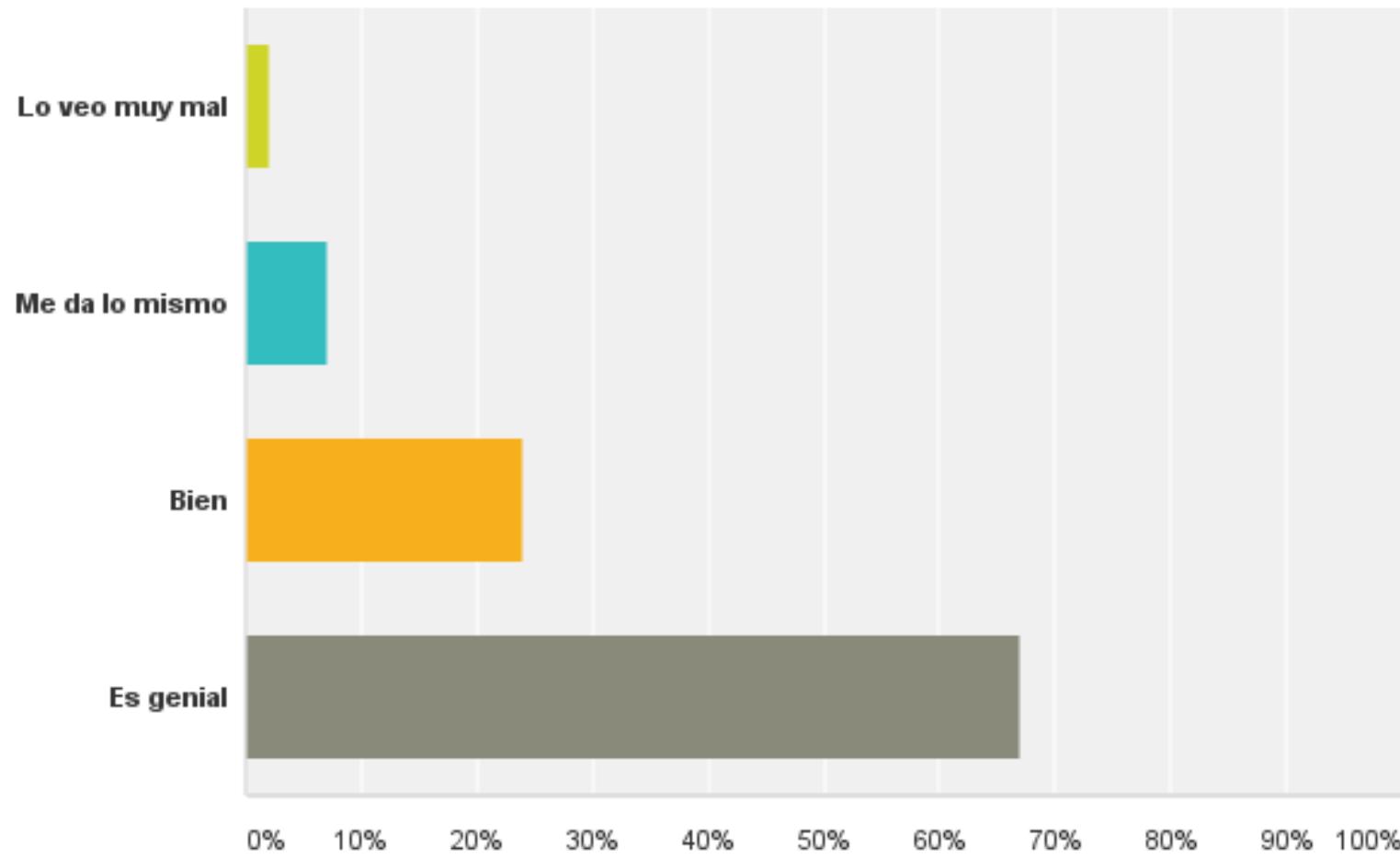




# Encuestas

¿Qué te parece la idea de que la organización prepare un kit para este taller?

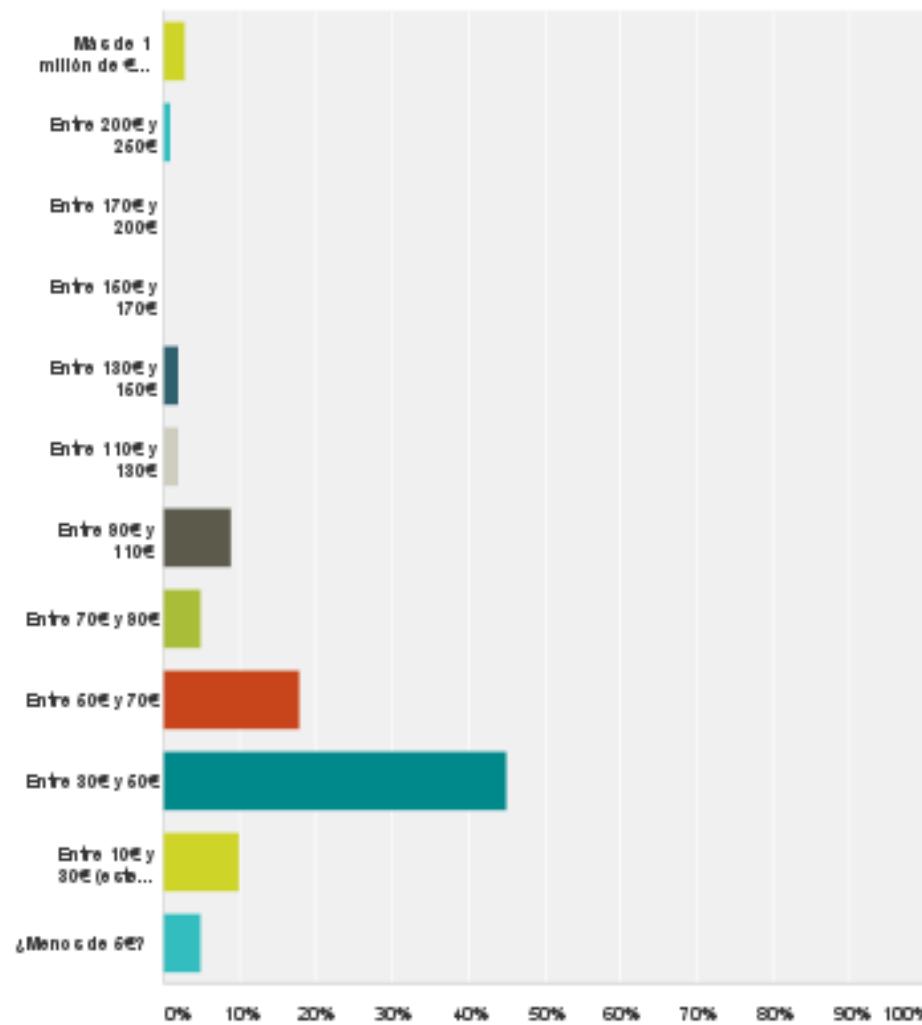
Respondido: 100 Omitido: 0



# Encuestas

¿Qué precio del kit consideras que se ajusta a tú economía? Valora cuanto dinero piensas gastarte en juguetes electrónicos

Respondido: 100 Omitido: 0



Eno

IoT

# Top 10 Strategic Technology Trends for 2015

## Merging the Real World and the Virtual World

Computing Everywhere



The Internet of Things



3D Printing



## Intelligence Everywhere

Advanced, Pervasive  
and Invisible Analytics



Context-Rich Systems



Smart Machines



## The New IT Reality Emerges

Cloud/Client Computing



Software-Defined  
Applications and  
Infrastructure



Web-Scale IT



Risk-Based Security  
and Self-Protection





**BRACE YOURSELVES**



memegenerator.net





# IoT

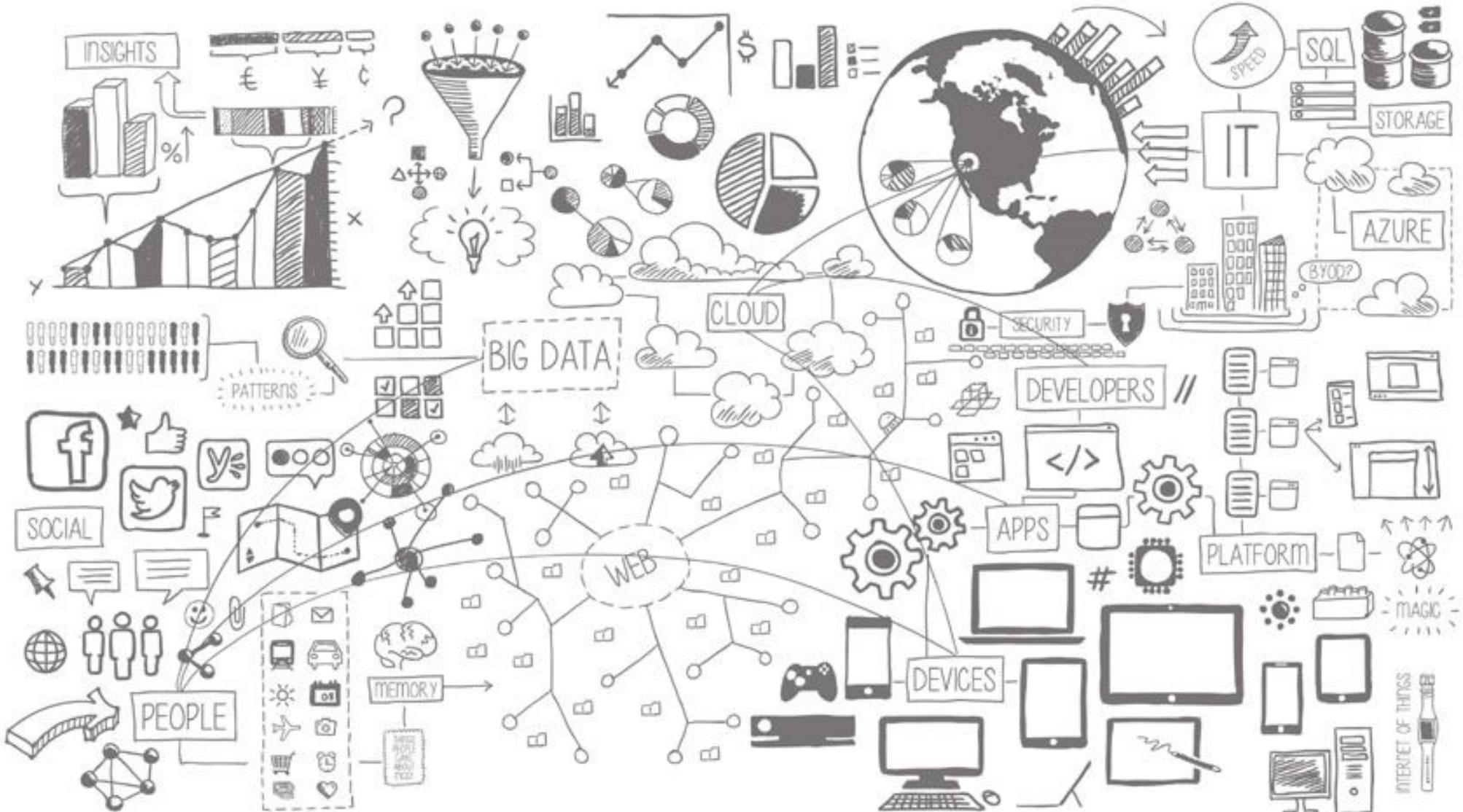




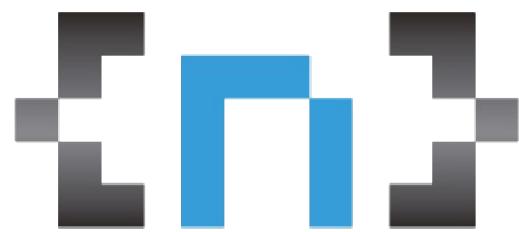
# IoT



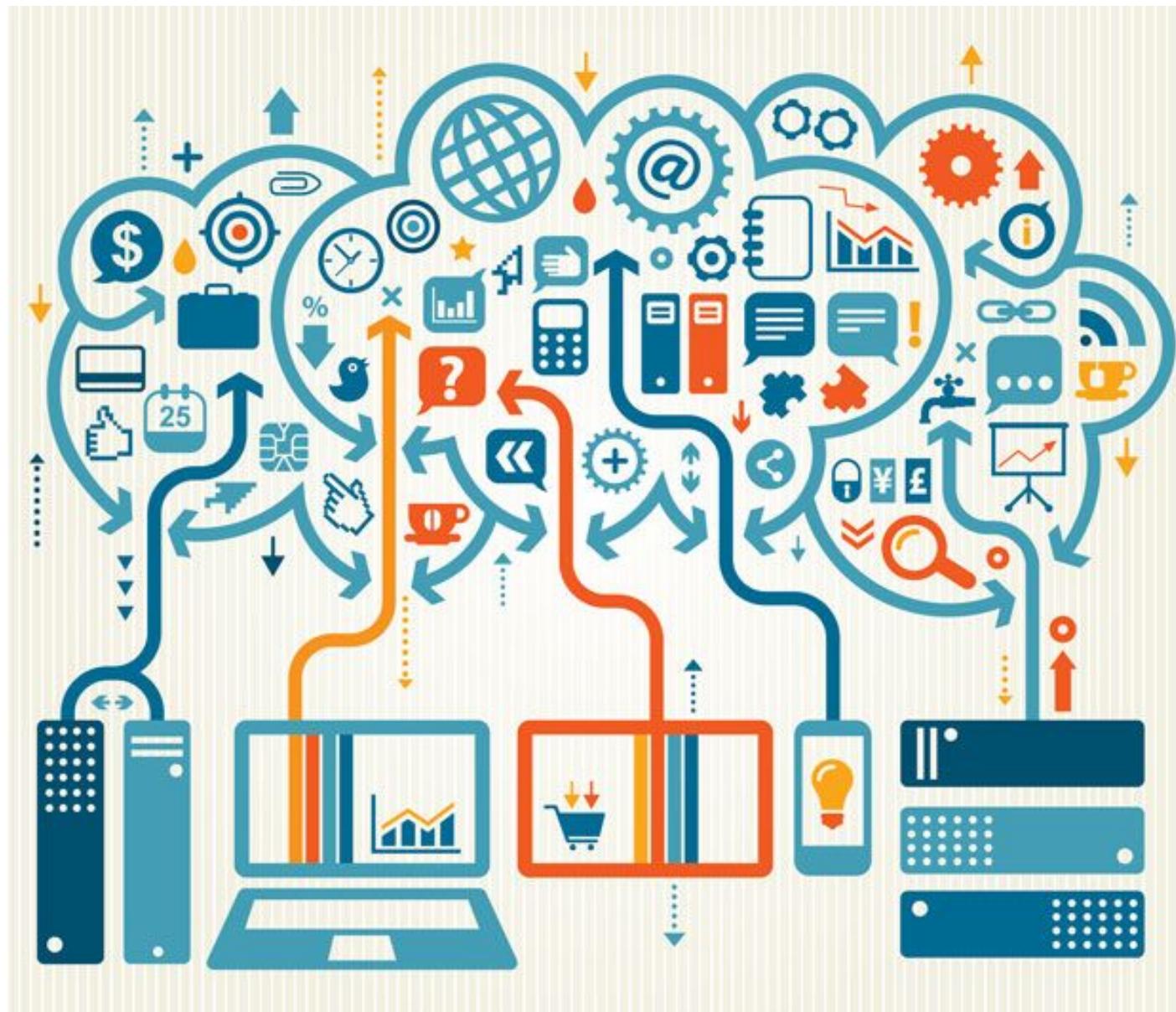
# IoT

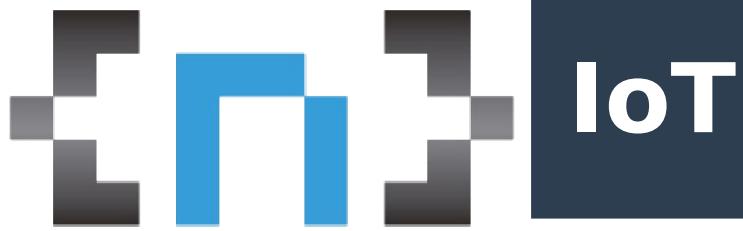






IoT





# En3 IoT



From the built environment, manufacturing, gaming, agriculture and defence



to aerospace, water management, consumer, ocean science, food and drink,



life sciences and pharma, offshore, healthcare, renewables and energy generation

## IoTWG Working Groups

### *Vertical Working Groups*



Education



Health



Manufacturing



Energy



Retail



Transportation



Smart City

### *Horizontal Working Groups*



Security,  
Privacy,  
Compliance



Standards &  
Interoperabilit  
y



Architecture,  
Management,  
Analytics



Innovations,  
Start-Ups



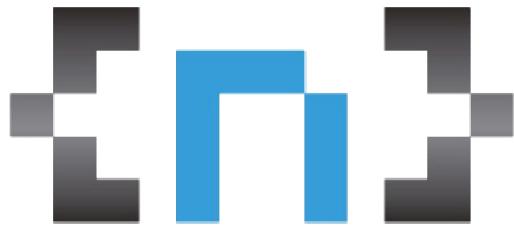
Sensors &  
Embedded OS



GTM:  
New Business  
Models



Marketing



# IoT

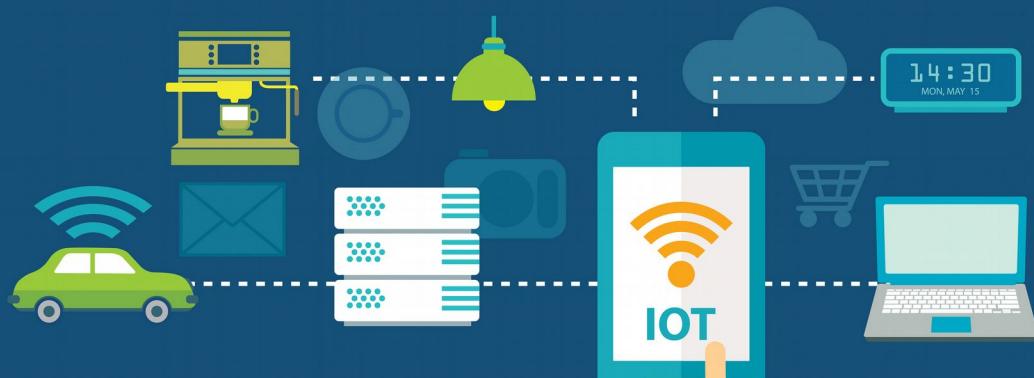
## SMARTWATCH

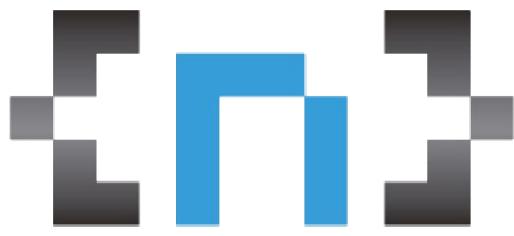
New Technology For ease of life



## INTERNET OF THINGS

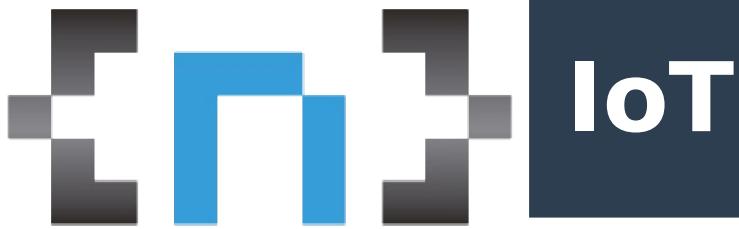
New Technology For ease of life





IoT





**SAY "CYBER" OR  
"IOT"**

**ONE MORE TIME**

[memegenerator.net](http://memegenerator.net)



# En3 IoT





IoT



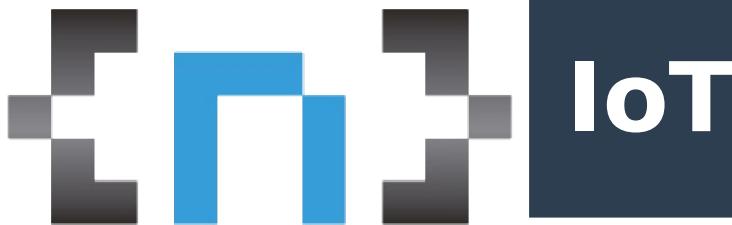
IoT

## Energy Controls 'Hive'



## Home Automation 'Iris'





Sobreviviendo en el mundo IoT

## ¿INTERNET DE LAS COSAS O UNA CONEXIÓN AL PELIGRO?

Conoce los riesgos del Internet de las cosas y aprende a usar correctamente los nuevos dispositivos conectados a Internet.



noviembre 06 22:29  
2015

by Alcides Leon  
0 comentarios

Imprimir esta entrada  
Compartir con amigos

### EXPERTOS DE KASPERSKY LAB EXPONEN LOS RIESGOS DE DISPOSITIVOS DOMÉSTICOS INTELIGENTES

Al hacer una selección al azar de los productos IoT (Internet de las cosas) más recientes, los investigadores de Kaspersky Lab descubrieron serias amenazas para los hogares conectados. Entre los productos analizados se encuentran: una cafetera que expone la contraseña para Wi-Fi del dueño de la casa; un monitor de video para bebé que lo puede controlar una persona ajena con malas intenciones; y un sistema de seguridad doméstico controlado por un teléfono inteligente que se puede engañar con un imán.

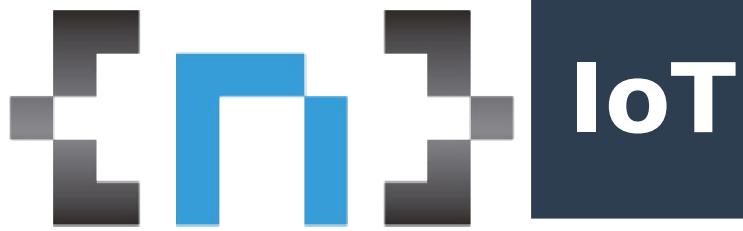
En 2014, el experto en seguridad de Kaspersky Lab David Jacoby observó lo que había en la sala de su casa y decidió investigar qué tan susceptibles podrían ser los dispositivos que tenía a un ataque cibernético. Descubrió que casi todos eran vulnerables. Después de esto, en 2015, un equipo de expertos antimalware de Kaspersky Lab repitió el experimento con una pequeña diferencia: la investigación de David se concentró principalmente en servidores conectados a la red, routers y televisiones inteligentes; esta última investigación se enfocó en los distintos dispositivos conectados actualmente disponibles en el mercado para el hogar inteligente.

## INTERNET OF THINGS OR INTERNET OF THREATS?

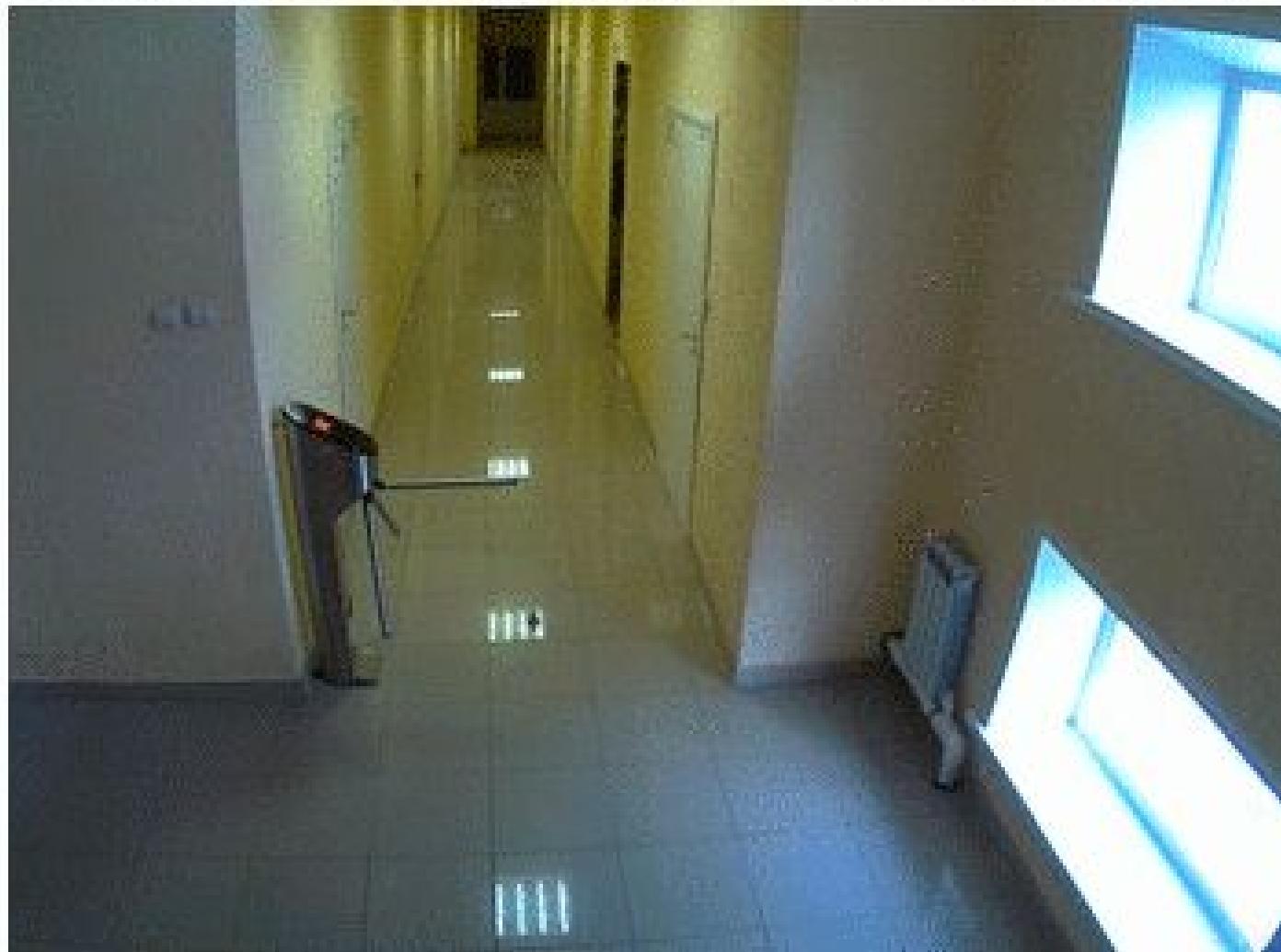
What risks does the IoT brings to your life and how do you use new connected devices wisely

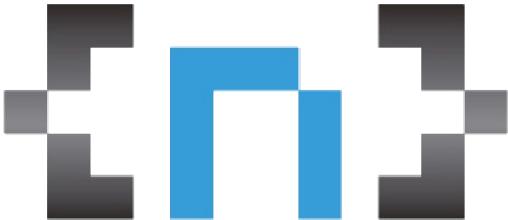


<http://www.kaspersky.com/about/news/press/2015/Surviving-in-the-IoT-world-Kaspersky-Lab-Experts-Discover-the-Risks-of-Smart-Home-Devices>



# COMO FUNCIONA MI ANTIVIRUS





We're Hiring Yes, I want to Join

Home Hacking Tech News Cyber Attacks Vulnerabilities Malware Encryption Spy



## Serious, Yet Patched Flaw Exposes 6.1 Million IoT, Mobile Devices to Remote Code Execution

Friday, December 04, 2015 Swati Khandelwal



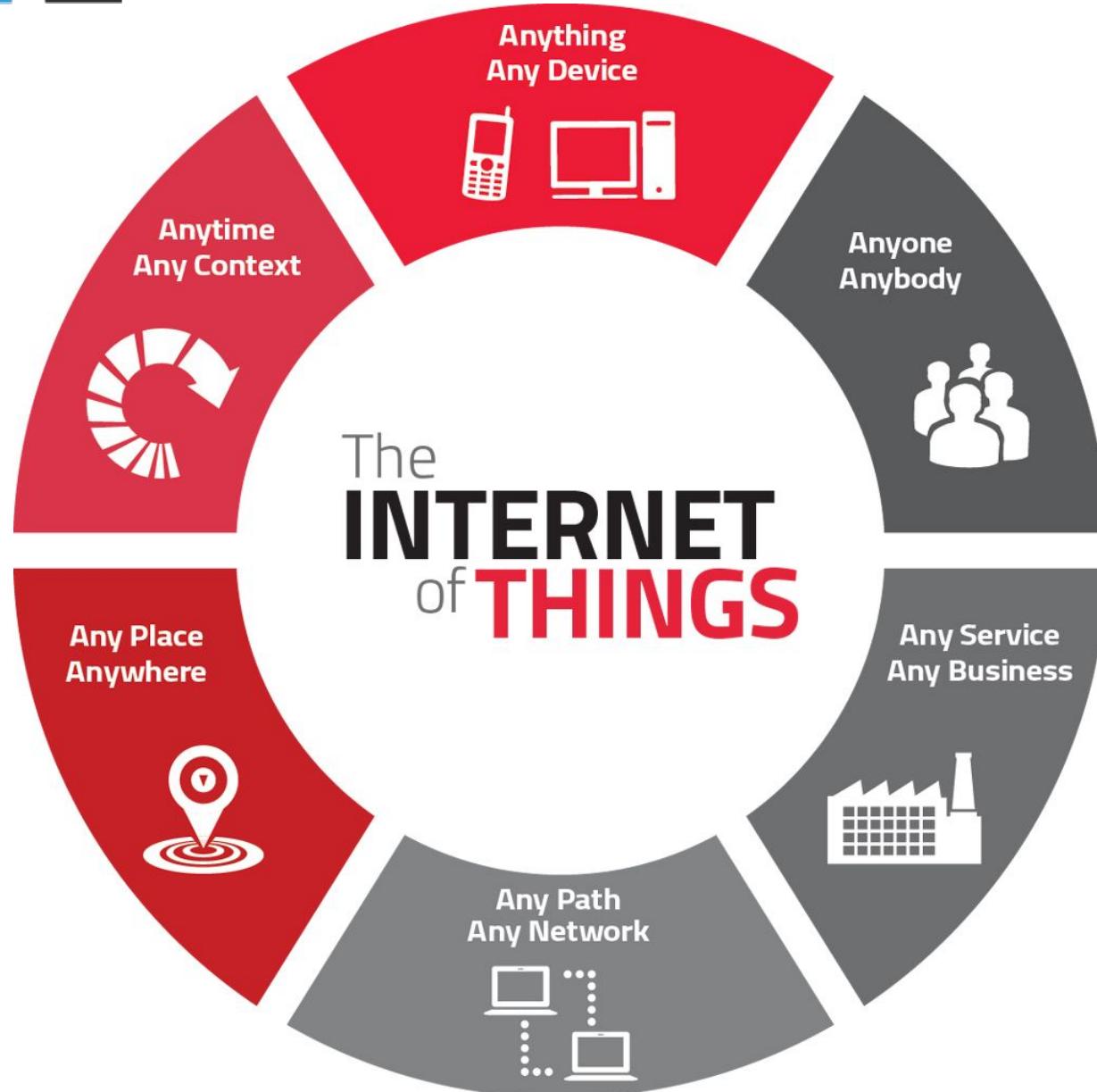
As much as you protect your electronics from being hacked, hackers are clever enough at finding new ways to get into your devices. But, you would hope that once a flaw discovered it would at least be fixed in few days or weeks, but that's not always the case.

A three-year-old security vulnerability within a software component used by more than 6.1 Million smart devices still remains unpatched by many vendors, thereby placing Smart TVs, Routers, Smartphones, and other Internet of Things (IoT) products at risk of exploit.

Security researchers at Trend Micro have brought the flaw to light that has been known since 2012 but has not been patched yet.

### Remote Code Execution Vulnerabilities

Researchers discovered a collection of **Remote Code Execution** (RCE) vulnerabilities in the **Portable SDK for UPnP, or libupnp** component – a software library used by mobile devices, routers, smart TVs, and other IoT devices to stream media files over a network.





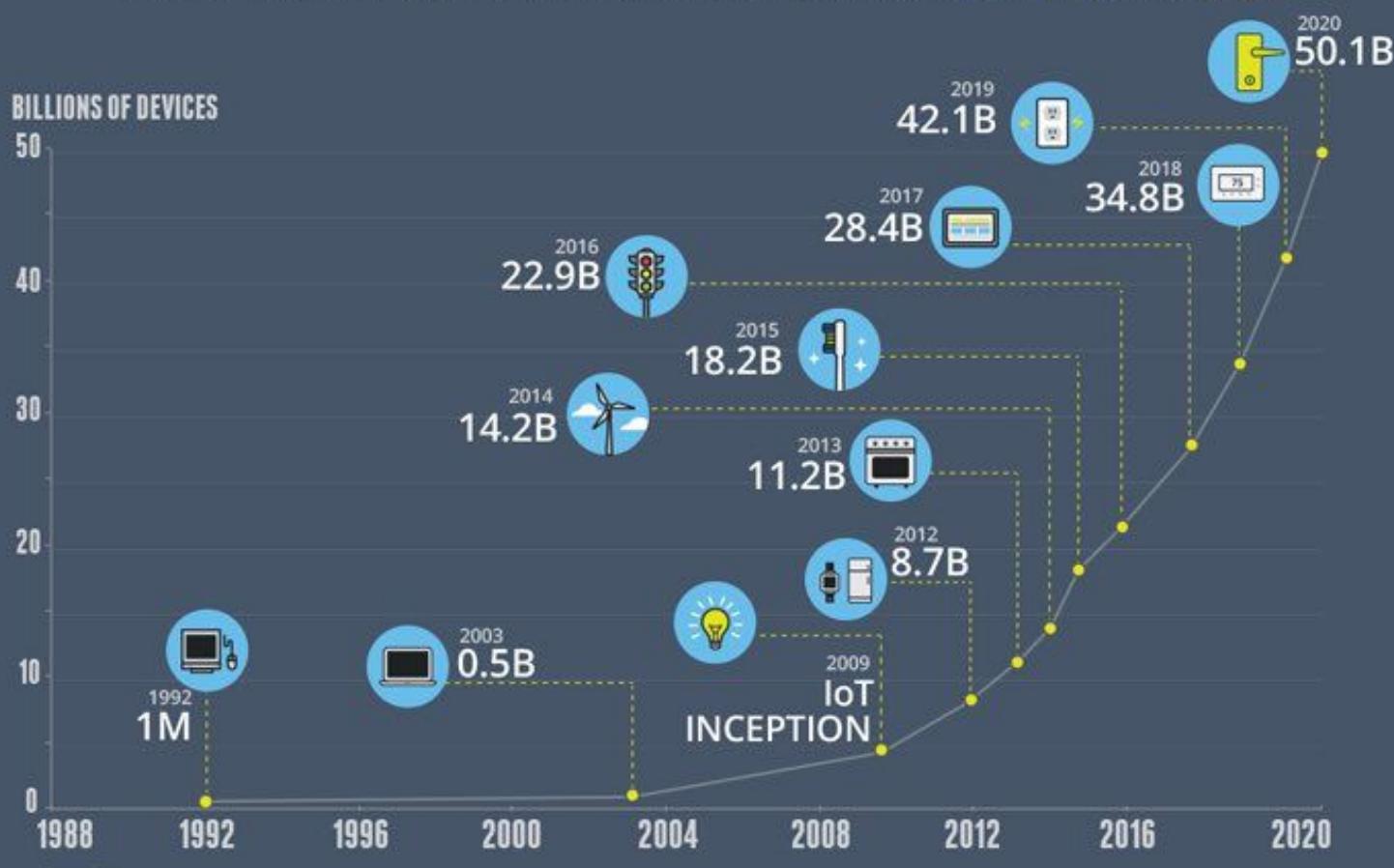
IoT

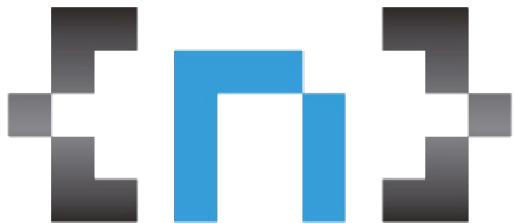
## IoT Predictions 2020



## GROWTH IN THE INTERNET OF THINGS

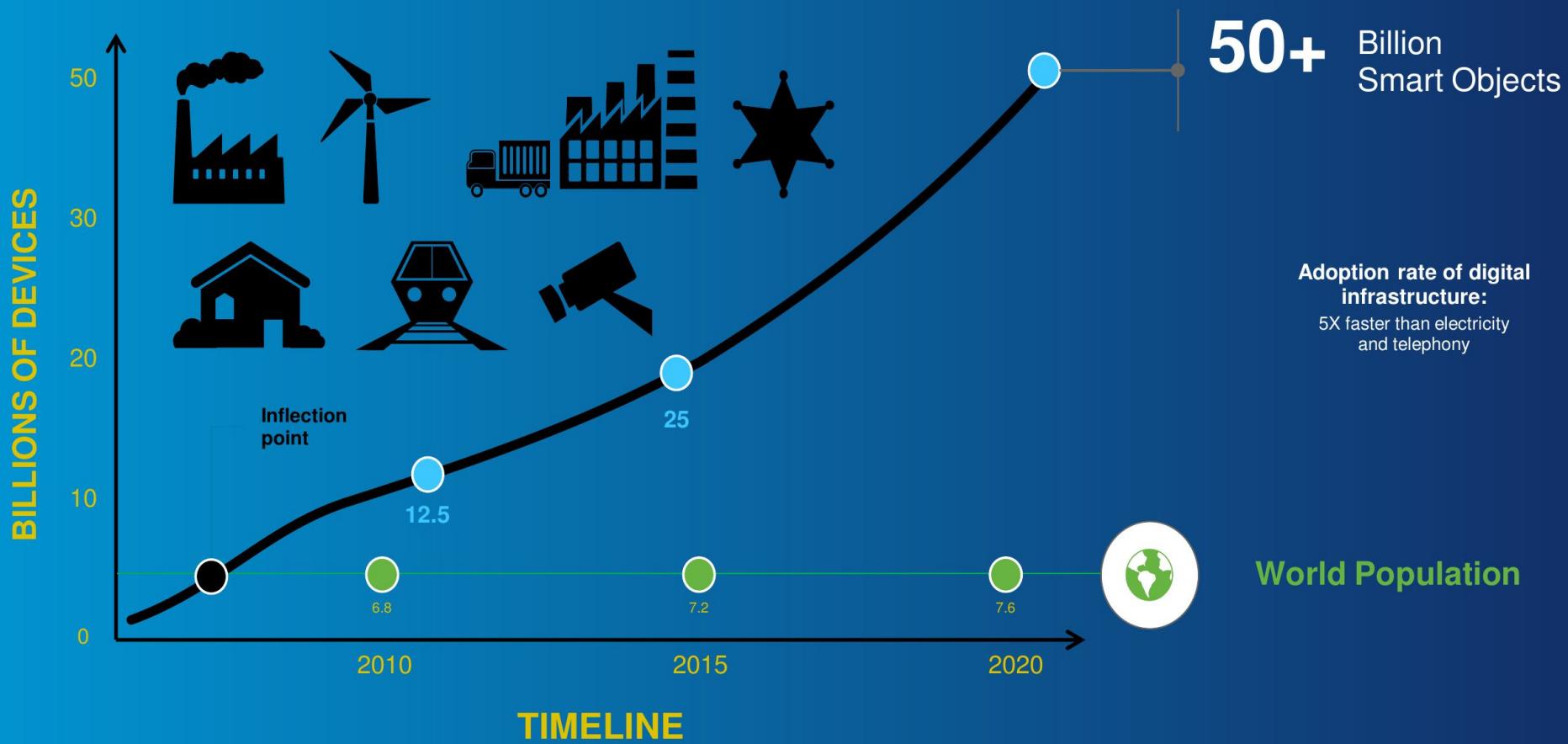
THE NUMBER OF CONNECTED DEVICES WILL EXCEED **50 BILLION** BY 2020





# IoT

## IoT is Here Now. And it's Growing !



# Ejemplos de estándar IoT

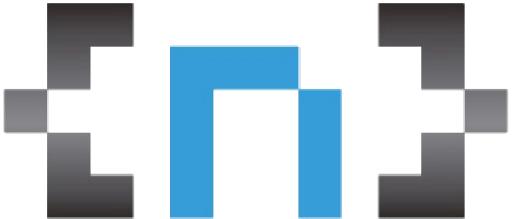


CoAP



HTTP





# IoT everywhere

Internet of Things Landscape v3.0

## Applications (Verticals)

A collage of logos for various Internet of Things (IoT) companies, organized into five main categories: Personal Devices, Lifestyle, Connected Home, Industries, and Industrial Internet. Each category contains a grid of logos from different companies within that sector.

## Platforms & Enablement (Horizontals)

The image is a horizontal collage of logos from numerous IoT (Internet of Things) companies. It is organized into six distinct sections by color-coded boxes: 1. Connectivity/Dev Platforms (blue box): Includes logos for spark kynex, ioBridge, pinoccio, RacoWireless, Yaler.net, greenwave, Arravant, electric imp, Ayla Networks, EUROTECH, resin.io, Symplio, TESSEL, and bluecity. 2. Software/Data Platforms (orange box): Includes logos for EXOSITE, icontrol, thingsquare, 2lemetry, ThingWorx, SeeControl, Lhings, NewAer, BERG, Axeda, IFTTT, greenwave, RACO, ARRAVANT, WOLO, ZATAZ, Cyberlighting, IOTaX, altux, Yo, data networks, PRISMTECH, CANDI, bugswarm, evercam.io, covisint, osisoft, Webberware, Tellient, Buddy, InfluxDB, PubNub, NEURA, carrots, xively, and ETHERIOS. 3. Open Source Platforms (green box): Includes logos for webinos, openHAB, AllMy, Kaa, ThingSpeak, GRID2HOME, MaruLearn, SpaceCurve, DN2K, AGT, Keen IO, ConnectTHO, thingful, motomic, splunk, TempoIQ, GroveStreams, SensorCloud, glassbeam, THALIMICLABS, INTUNIGE, api.ai, osisoft, and MotionLoft. 4. Personal Interfaces (red box): Includes logos for NeuroSky, Laggar, IN, Interaxon, gestigon, iSpeech, THALIMICLABS, EMOTIV, Maluuba, Reemo, and placemeter. 5. Security (purple box): Includes logos for Inside E-Secure, SafeNet, utimaco, escript, gemalto, BASTILLE NETWORKS, MOCANA, ASA 350T, and Oculus. 6. Corporates (yellow box): Includes logos for amazon, hp, LG, intel, htc, PHILIPS, IBM, SAMSUNG, apple, Google, WIND RIVER, MOTOROLA, belkin, DELL, BOSCH, NATIONAL INSTRUMENTS, ARM, LogMeIn, Microsoft, Honeywell, TEXAS INSTRUMENTS, SONY, Atmel, SIEMENS, Qualcomm, CISCO, TOSHIBA, BROADCOM, and SHARP.

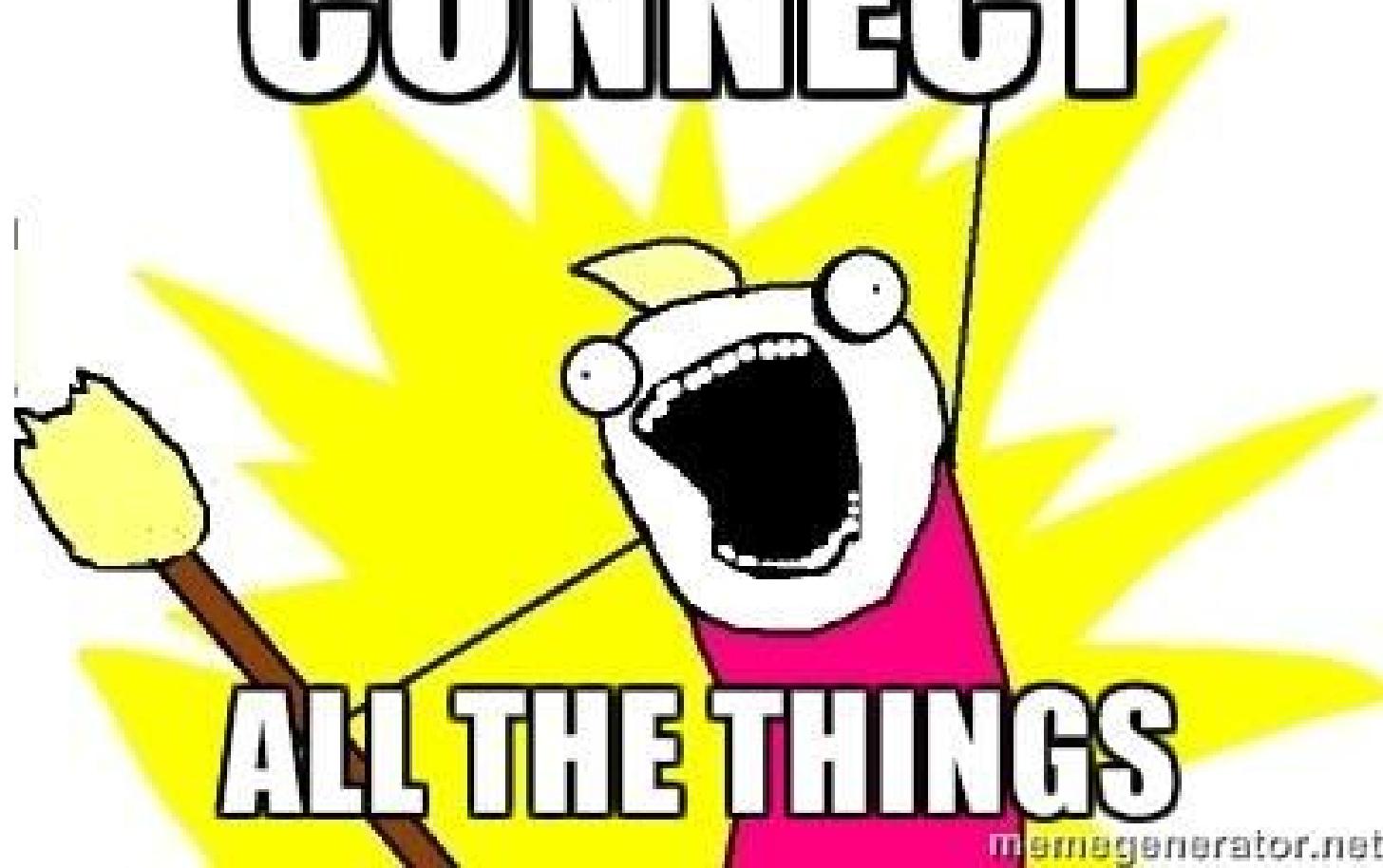
## Building Blocks

© Matt Turck (@mattturck), David Rogg (@davidrogg) & FirstMark Capital (@firstmarkcap)

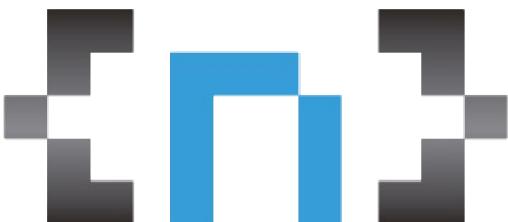


Y esto?

# CONNECT



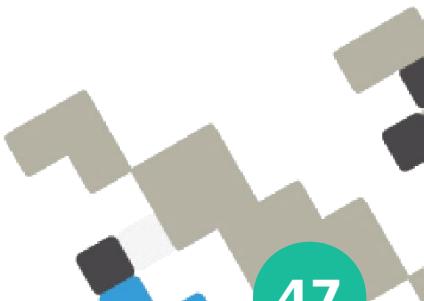
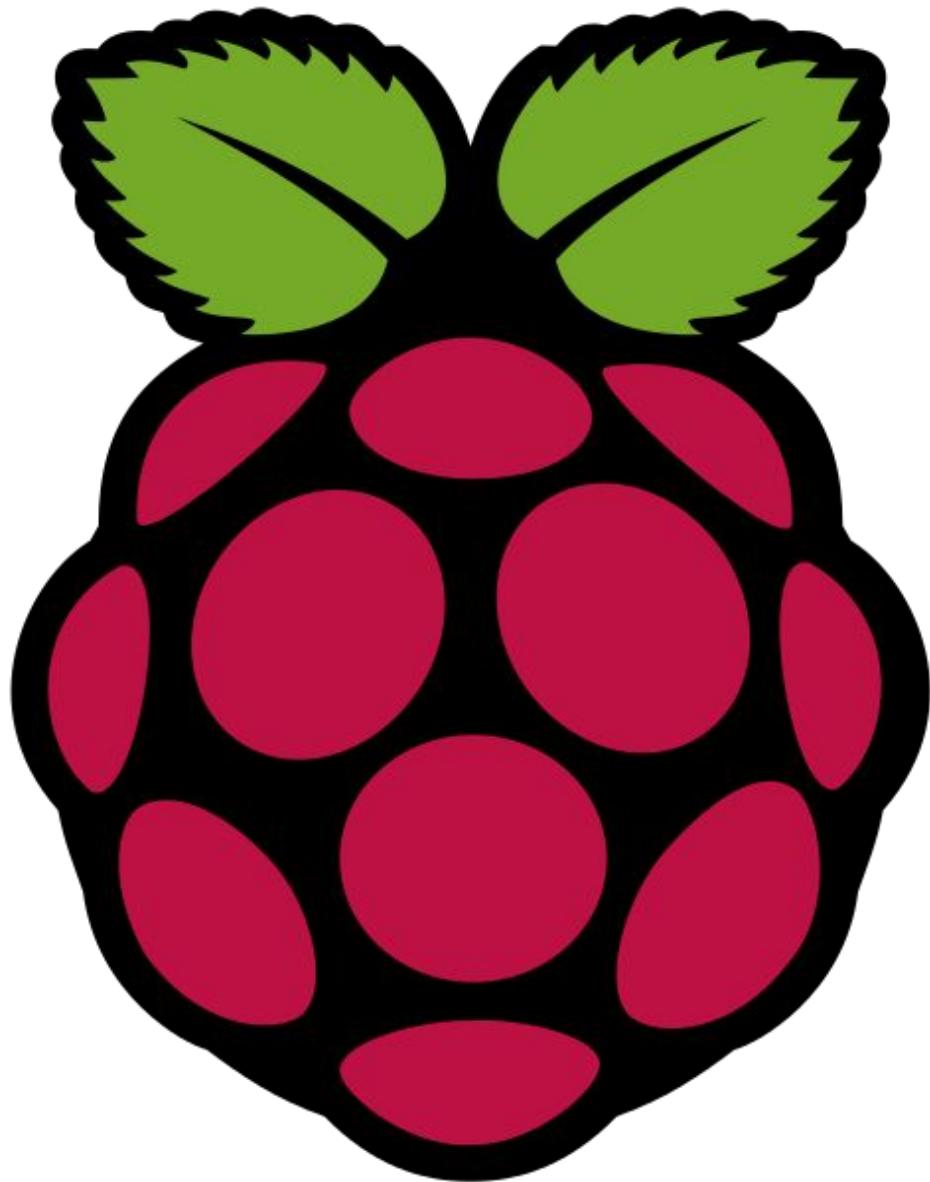
memegenerator.net

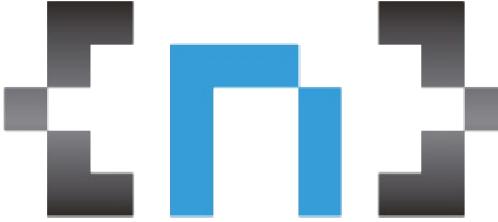


# Hardware

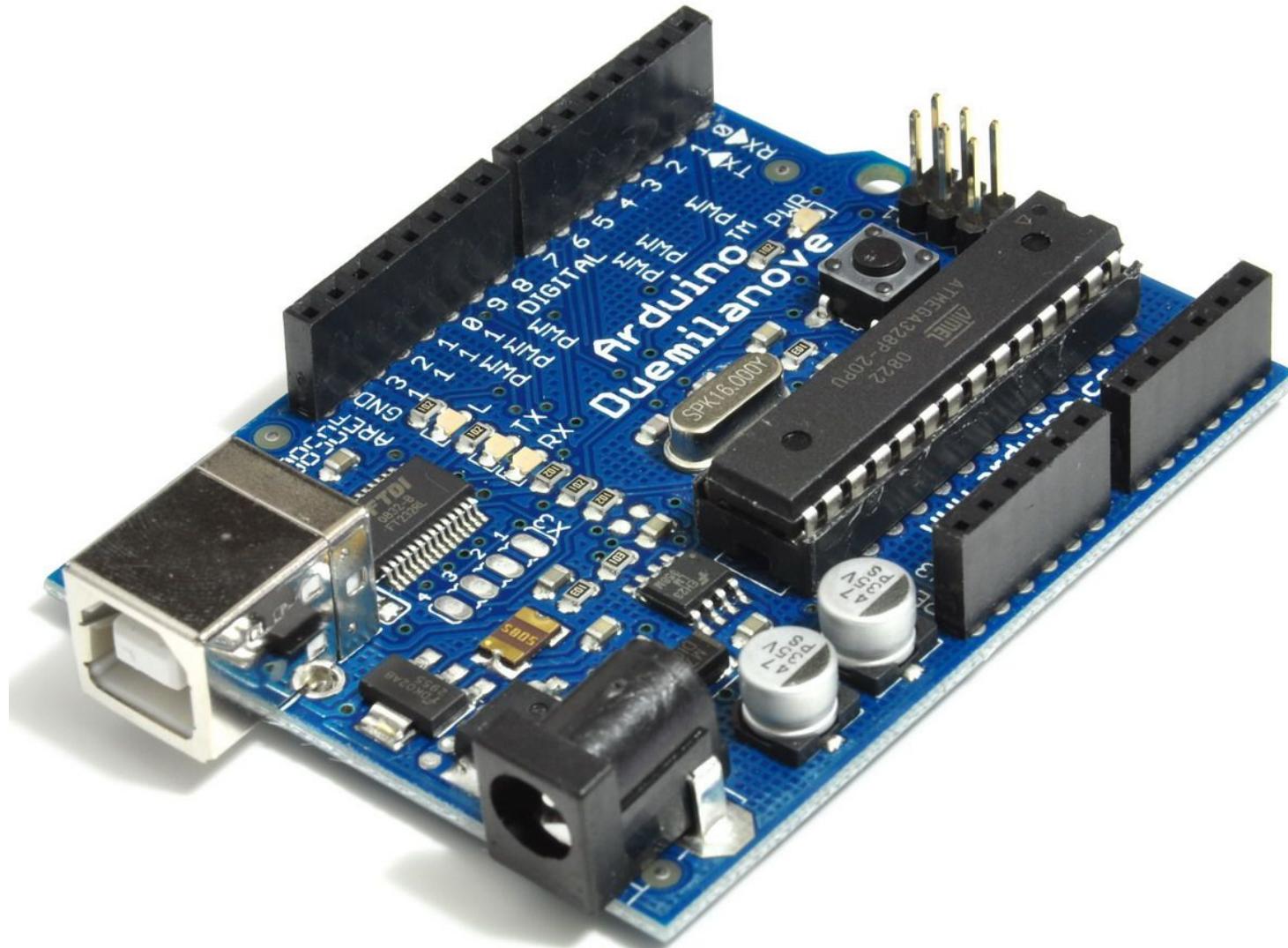


Y esto?



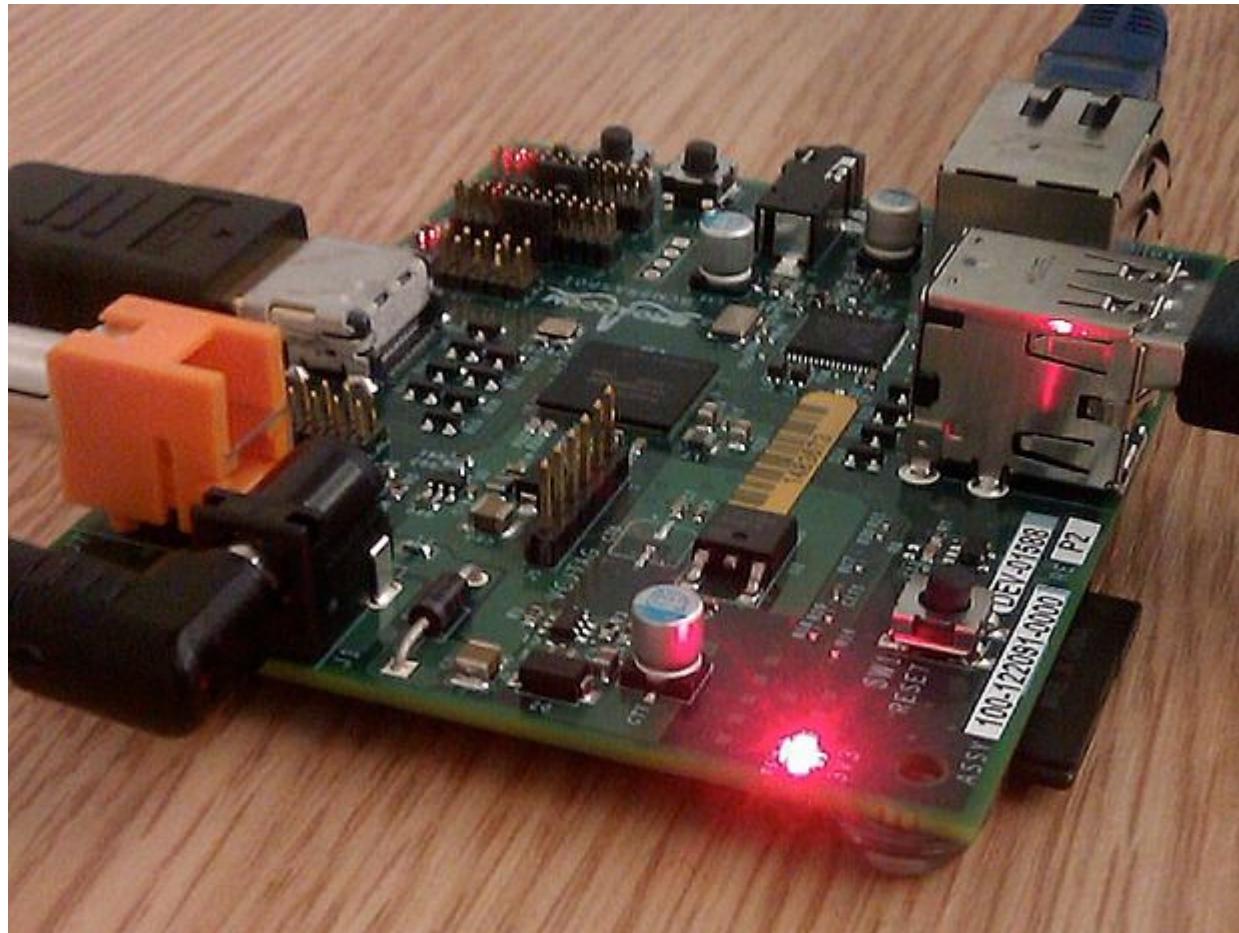


# Raspberry Pi?





# Raspberry Pi





# Raspberry Pi





# Raspberry Pi



# Raspberry Pi

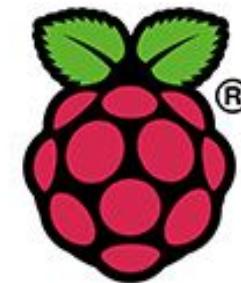
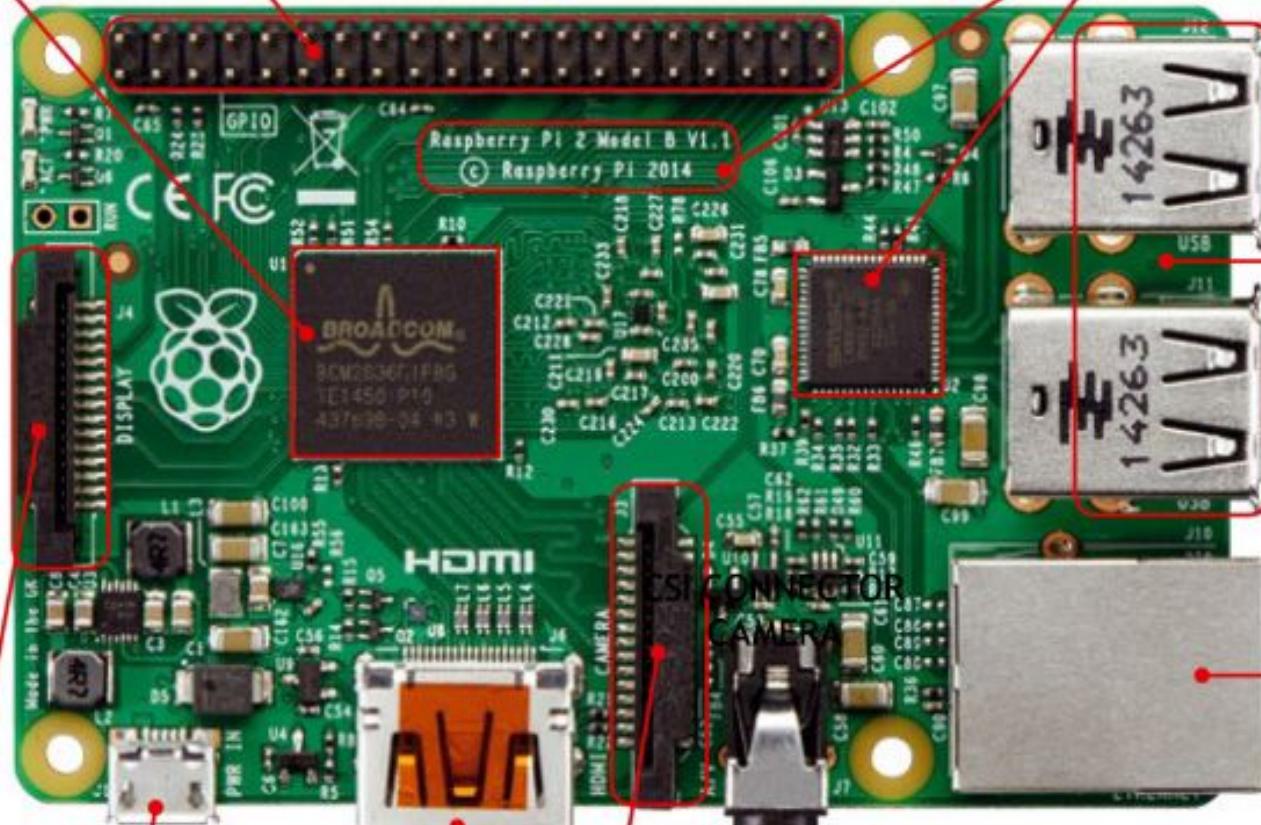
SOC BCM2836 4 X CORTEX A7

GPIO 40 PIN

RASPBERRY PI 2 MODEL B

MODELO DE RASPBERRY PI

HUB USB

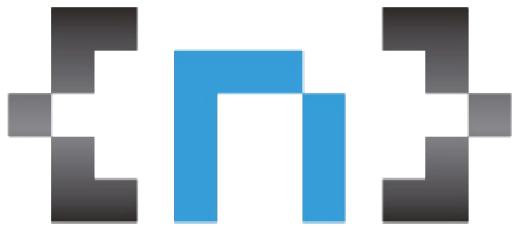


ETHERNET  
10/100MB  
RJ45



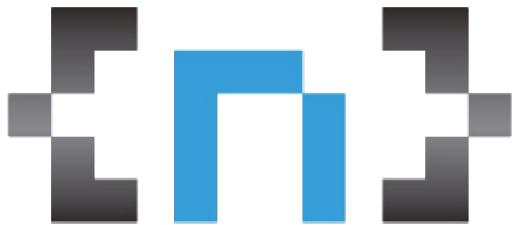
DSI DISPLAY CONNECTOR

CSI CONNECTOR CAMERA



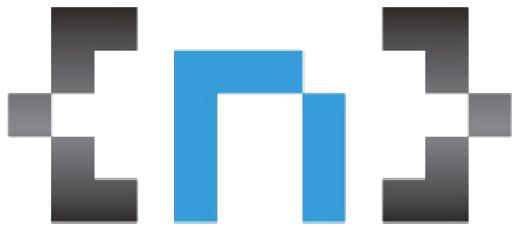
# Raspberry Pi

- Model A and Model B versions available
- 700 MHz ARM11 processor
- 256MB RAM, shared with GPU
- Model B has 2 USB ports, Model A has 1
- Ethernet port, no wireless
- HDMI output, can play 1080p video
- 5V Micro USB power source
- 8 General Purpose Input Output (GPIO) chips on board
- SD card slot, requires SD card to be bought separately



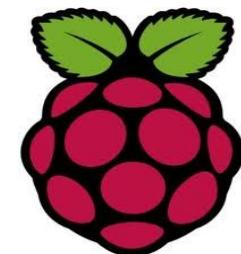
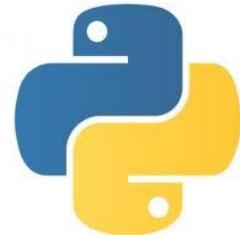
# Raspberry Pi

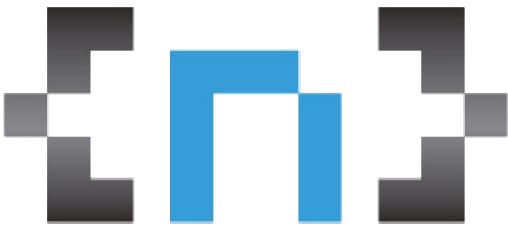
- Requires bootable Linux image on SD card
- Current recommended distribution is Debian Squeeze
- Arch Linux ARM distribution
- Original supported distribution was Raspberry Pi Fedora 14 Remix
- Fedora 17 Raspberry Pi remix currently being worked upon
- Qton Pi is Embedded Linux platform and SDK for developing Qt5 applications on Raspberry Pi



## Why Python and Raspberry Pi?

- Python is main supported language on Raspberry Pi
- Python available by default on Linux
- Python is clear and human-readable
- Python already popular for teaching programming
- Python can be run from command-line, so does not require IDE
- Rpi.GPIO package available on pypi for Raspberry Pi
- Active helpful Python community available

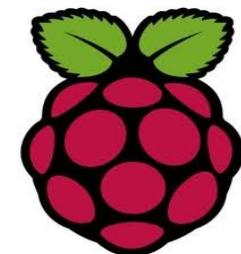
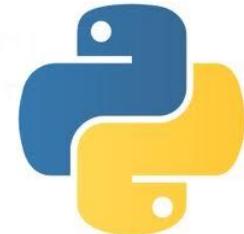


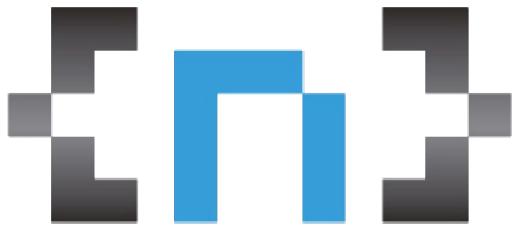


# Raspberry Pi

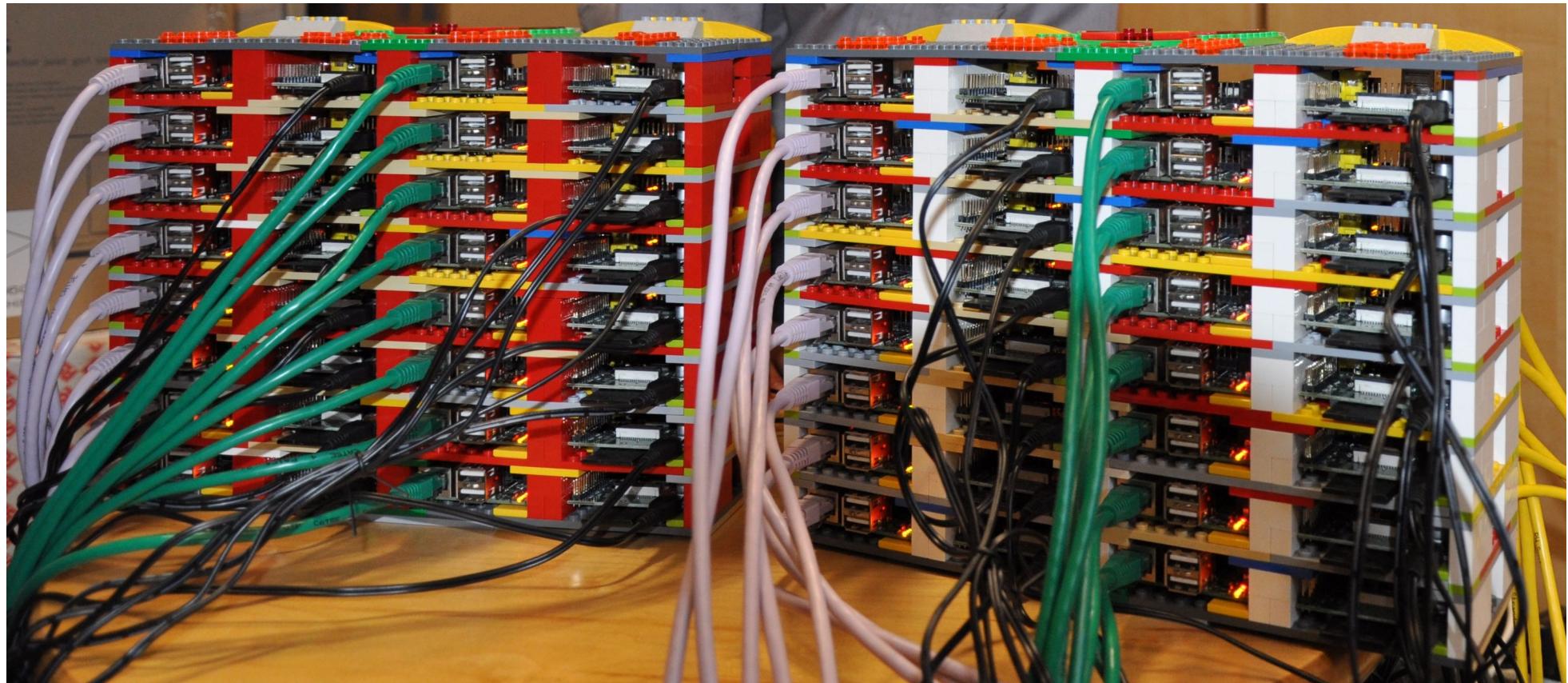
## Python environments

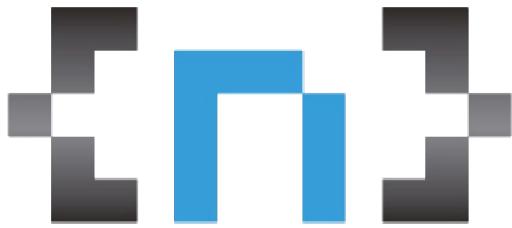
- Debian Squeeze has Python 2.6
- Fedora Remix has Python 2.7
- Python 3 supported and available through apt-get or yum
- Debian Squeeze uses SPE (Stani's Python Editor) and Geany
- IDLE available through yum
- Eclipse PyDev not supported through Fedora
- Eclipse PyDev available for Debian Squeeze but slow
- Vim always available!





# Raspberry Pi



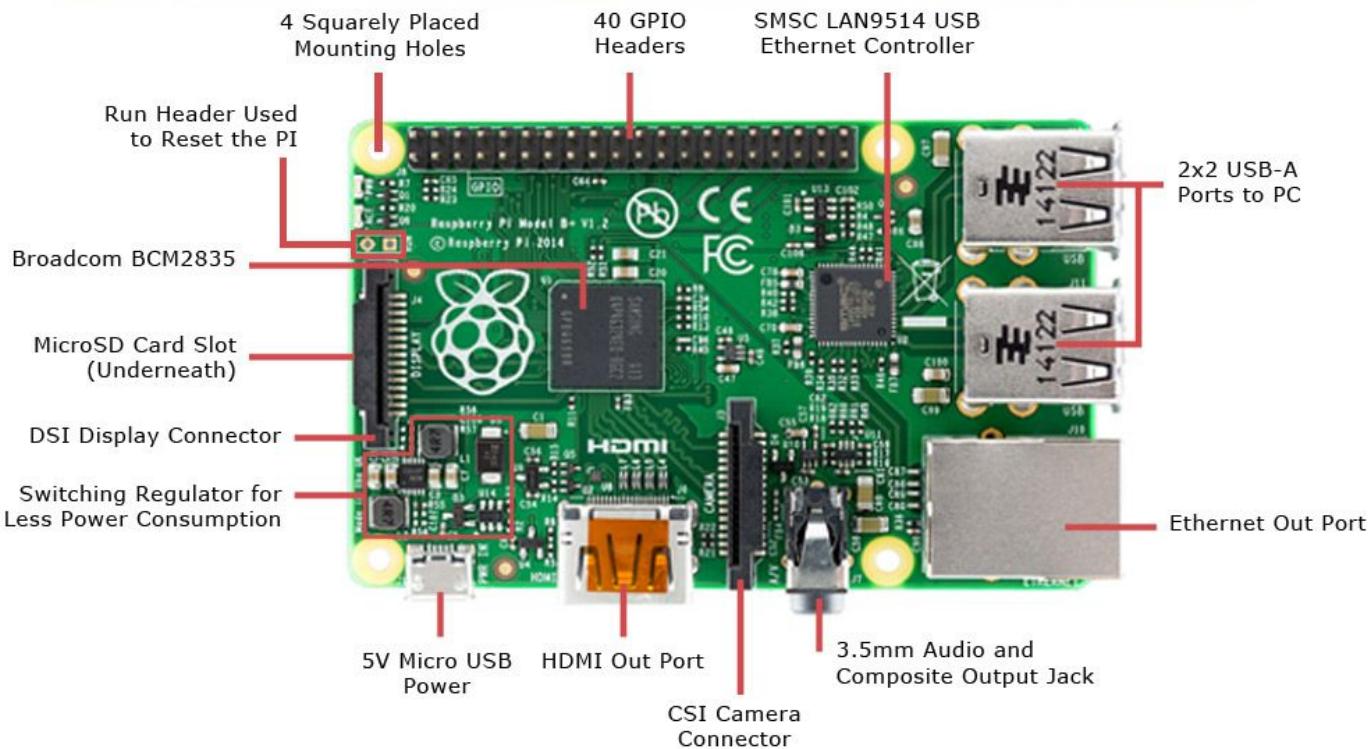
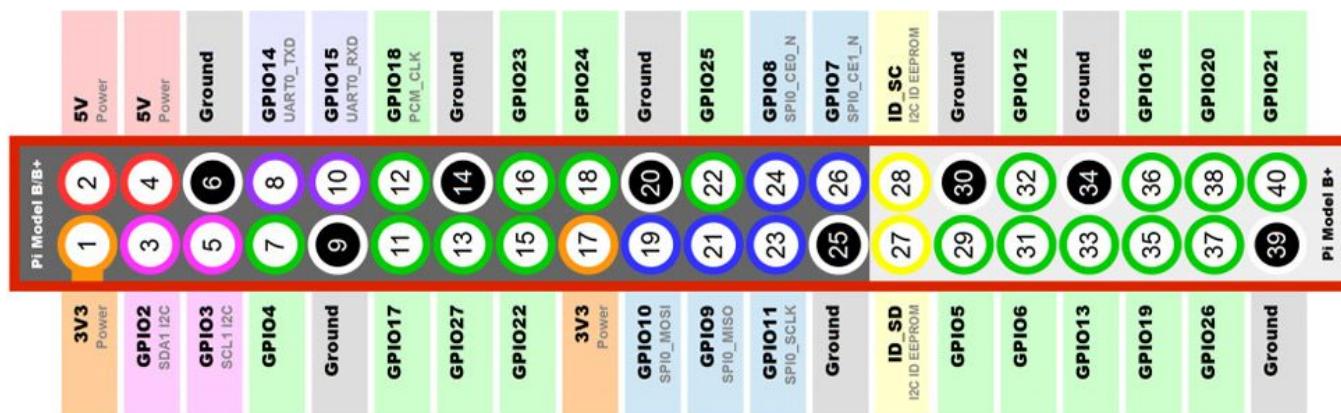


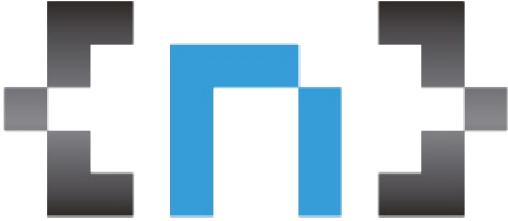
# Raspberry Pi



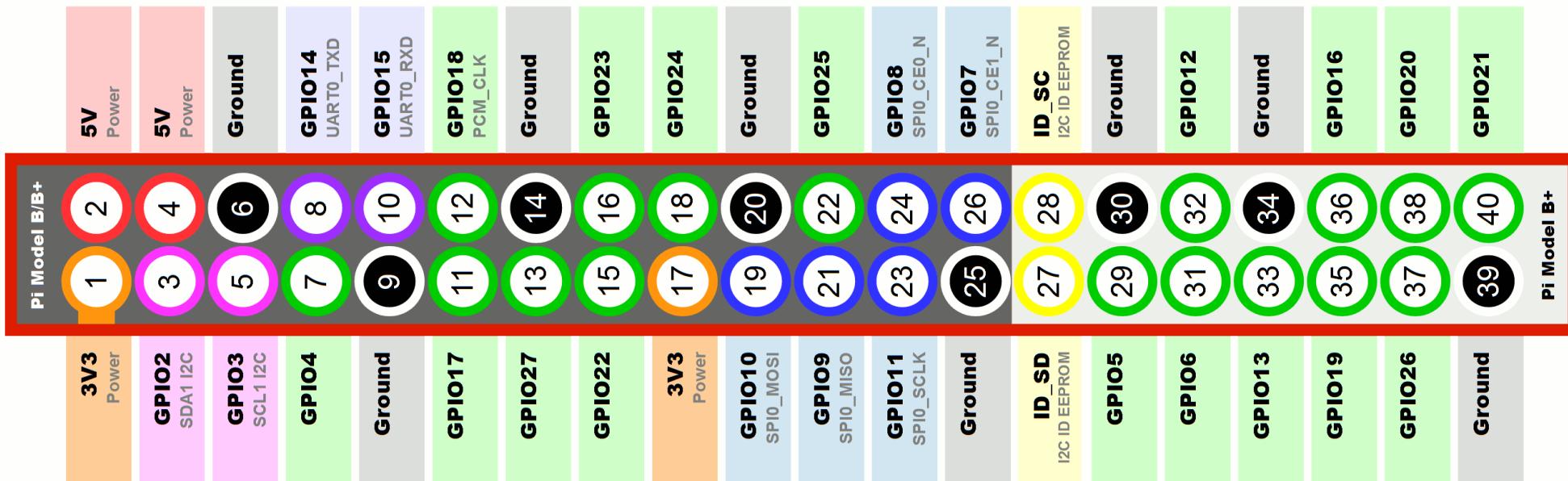
# GPIOs

GPIO Pinout Diagram

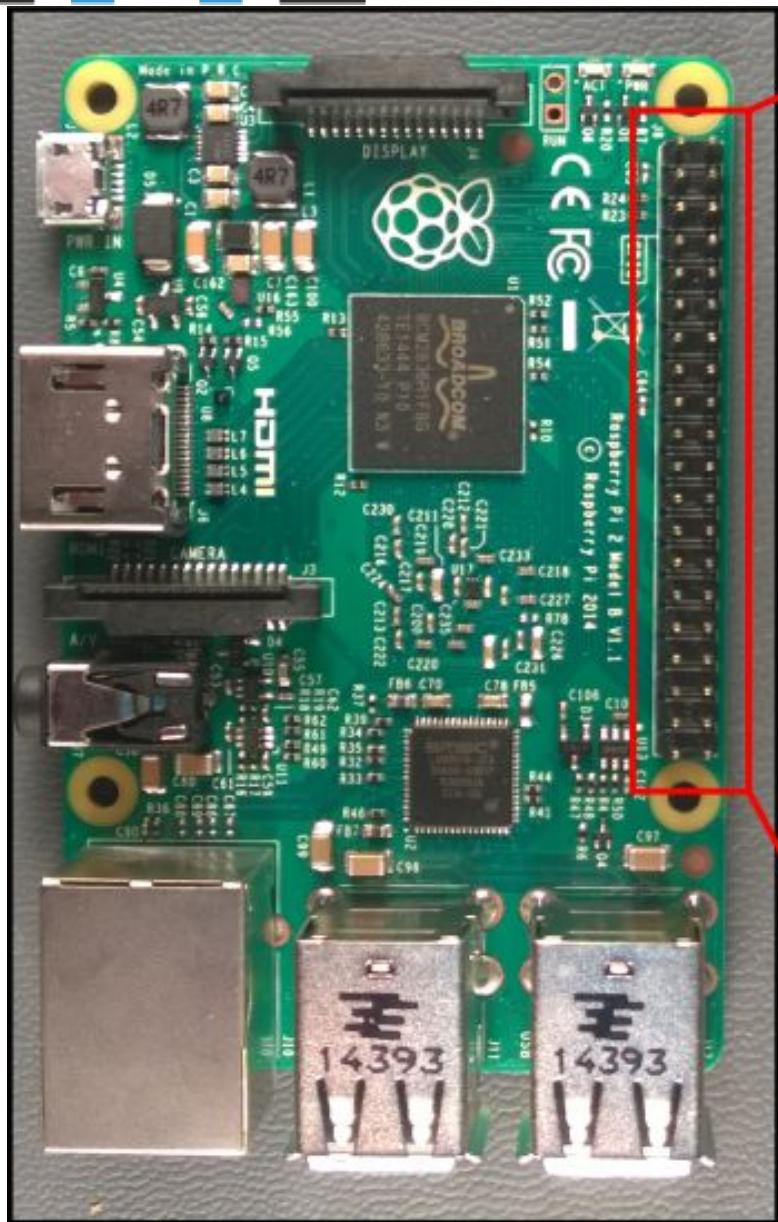




# GPIOs



# GPIOs

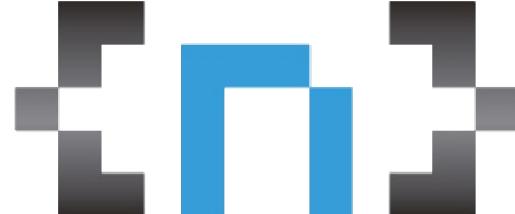


3.3V PWR	1		2	5V PWR
I2C1 SDA	3		4	5V PWR
I2C1 SCL	5		6	GND
GPIO 4	7		8	Reserved
GND	9		10	Reserved
GPIO 17	11		12	GPIO 18
GPIO 27	13		14	GND
GPIO 22	15		16	GPIO 23
3.3V PWR	17		18	GPIO 24
SPI0 MOSI	19		20	GND
SPI0 MISO	21		22	GPIO 25
SPI0 SCLK	23		24	SPI0 CS0
GND	25		26	SPI0 CS1
Reserved	27		28	Reserved
GPIO 5	29		30	GND
GPIO 6	31		32	GPIO 12
GPIO 13	33		34	GND
GPIO 19	35		36	GPIO 16
GPIO 26	37		38	GPIO 20
GND	39		40	GPIO 21

# GPIOs



# GPIOs



## GPIO Numbers

Raspberry Pi B  
Rev 1 P1 GPIO Header

Pin No.	1	2	<b>5V</b>
<b>GPIO0</b>	3	4	<b>5V</b>
<b>GPIO1</b>	5	6	<b>GND</b>
<b>GPIO4</b>	7	8	<b>GPIO14</b>
<b>GND</b>	9	10	<b>GPIO15</b>
<b>GPIO17</b>	11	12	<b>GPIO18</b>
<b>GPIO21</b>	13	14	<b>GND</b>
<b>GPIO22</b>	15	16	<b>GPIO23</b>
<b>3.3V</b>	17	18	<b>GPIO24</b>
<b>GPIO10</b>	19	20	<b>GND</b>
<b>GPIO9</b>	21	22	<b>GPIO25</b>
<b>GPIO11</b>	23	24	<b>GPIO8</b>
<b>GND</b>	25	26	<b>GPIO7</b>

Raspberry Pi A/B  
Rev 2 P1 GPIO Header

Pin No.	1	2	<b>5V</b>
<b>GPIO2</b>	3	4	<b>5V</b>
<b>GPIO3</b>	5	6	<b>GND</b>
<b>GPIO4</b>	7	8	<b>GPIO14</b>
<b>GND</b>	9	10	<b>GPIO15</b>
<b>GPIO17</b>	11	12	<b>GPIO18</b>
<b>GPIO27</b>	13	14	<b>GND</b>
<b>GPIO22</b>	15	16	<b>GPIO23</b>
<b>3.3V</b>	17	18	<b>GPIO24</b>
<b>GPIO10</b>	19	20	<b>GND</b>
<b>GPIO9</b>	21	22	<b>GPIO25</b>
<b>GPIO11</b>	23	24	<b>GPIO8</b>
<b>GND</b>	25	26	<b>GPIO7</b>

Raspberry Pi B+  
B+ J8 GPIO Header

Pin No.	1	2	<b>5V</b>
<b>GPIO2</b>	3	4	<b>5V</b>
<b>GPIO3</b>	5	6	<b>GND</b>
<b>GPIO4</b>	7	8	<b>GPIO14</b>
<b>GND</b>	9	10	<b>GPIO15</b>
<b>GPIO17</b>	11	12	<b>GPIO18</b>
<b>GPIO27</b>	13	14	<b>GND</b>
<b>GPIO22</b>	15	16	<b>GPIO23</b>
<b>3.3V</b>	17	18	<b>GPIO24</b>
<b>GPIO10</b>	19	20	<b>GND</b>
<b>GPIO9</b>	21	22	<b>GPIO25</b>
<b>GPIO11</b>	23	24	<b>GPIO8</b>
<b>GND</b>	25	26	<b>GPIO7</b>
DNC	27	28	DNC
<b>GPIO5</b>	29	30	<b>GND</b>
<b>GPIO6</b>	31	32	<b>GPIO12</b>
<b>GPIO13</b>	33	34	<b>GND</b>
<b>GPIO19</b>	35	36	<b>GPIO16</b>
<b>GPIO26</b>	37	38	<b>GPIO20</b>
<b>GND</b>	39	40	<b>GPIO21</b>

Key	
<b>Power +</b>	<b>UART</b>
<b>GND</b>	<b>SPI</b>
<b>I<sup>2</sup>C</b>	<b>GPIO</b>



How the customer explained it



How the Project Leader understood it



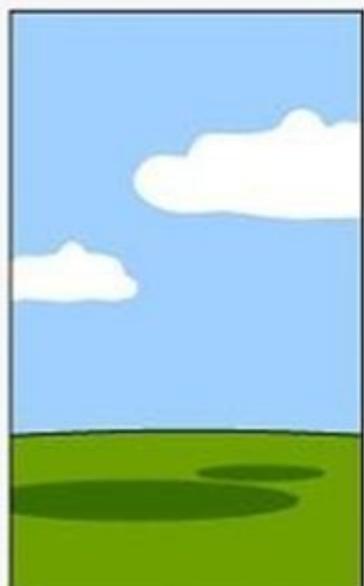
How the System Analyst designed it



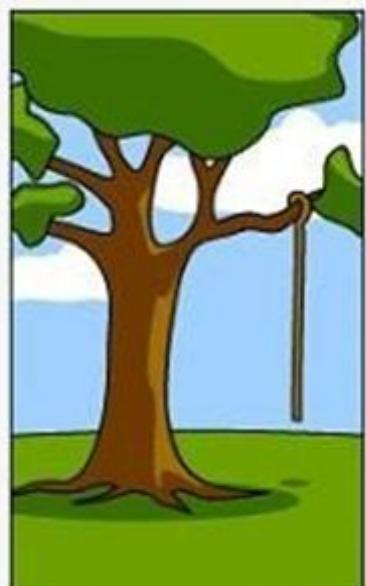
How the Programmer wrote it



How the Business Consultant described it



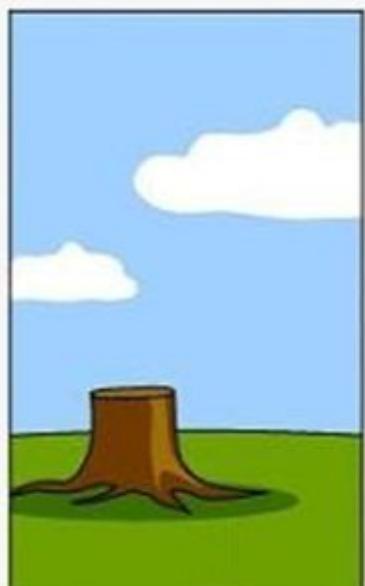
How the project was documented



What operations installed



How the customer was billed



How it was supported

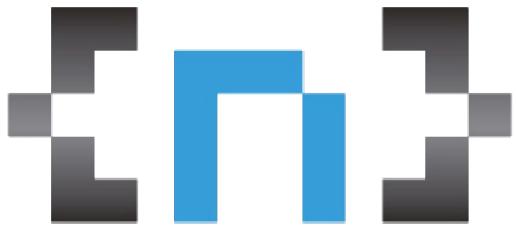


What the customer really needed



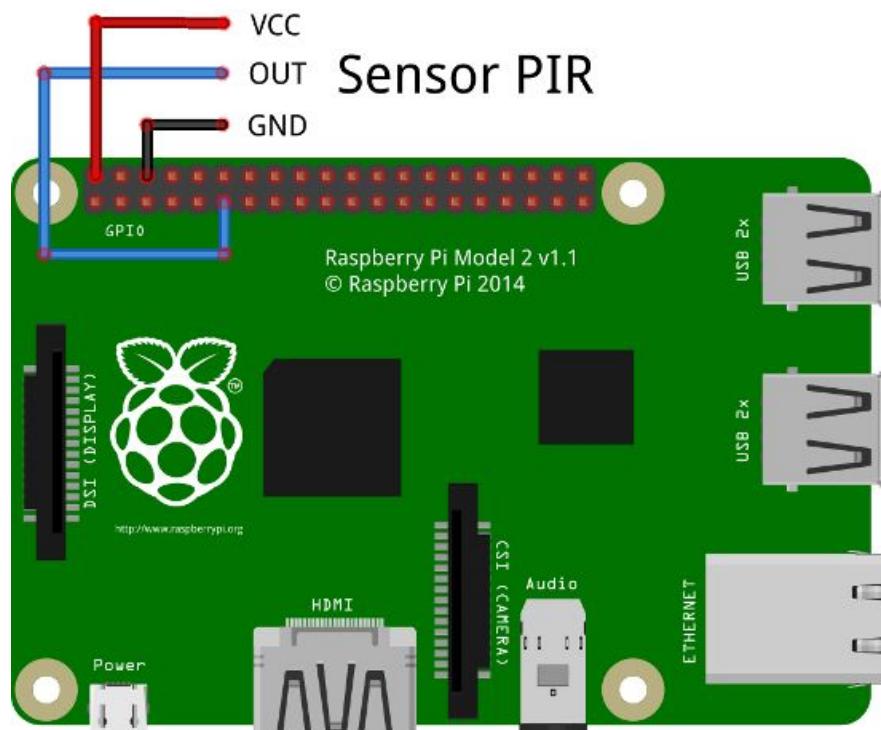
# Circuitos electrónicos





# Circuitos electrónicos

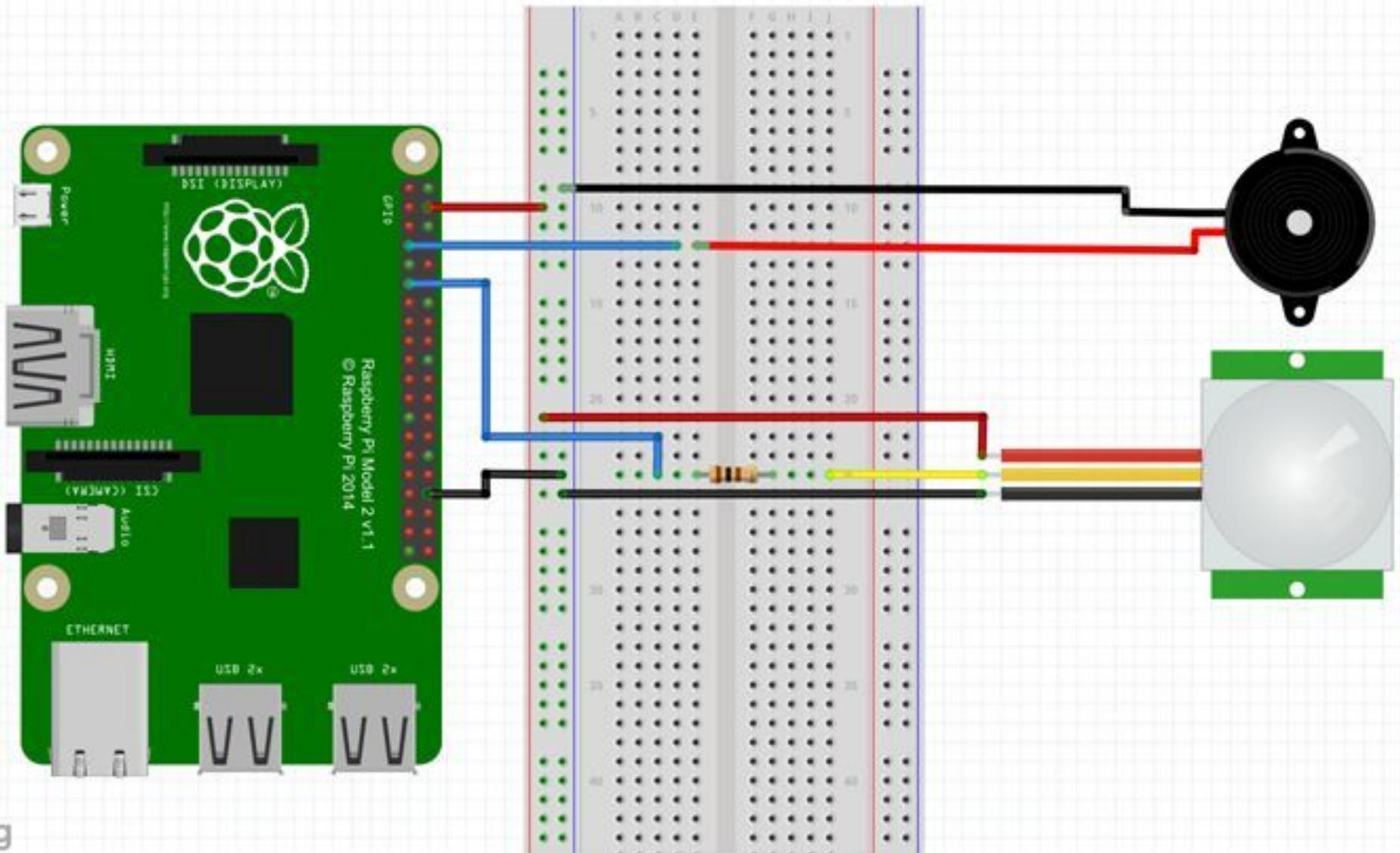
# fritzing



[blog.everpi.net](http://blog.everpi.net)

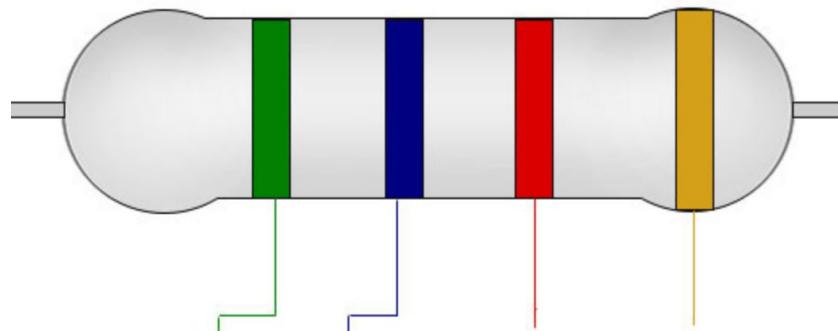
fritzing

# Circuitos electrónicos



fritzing

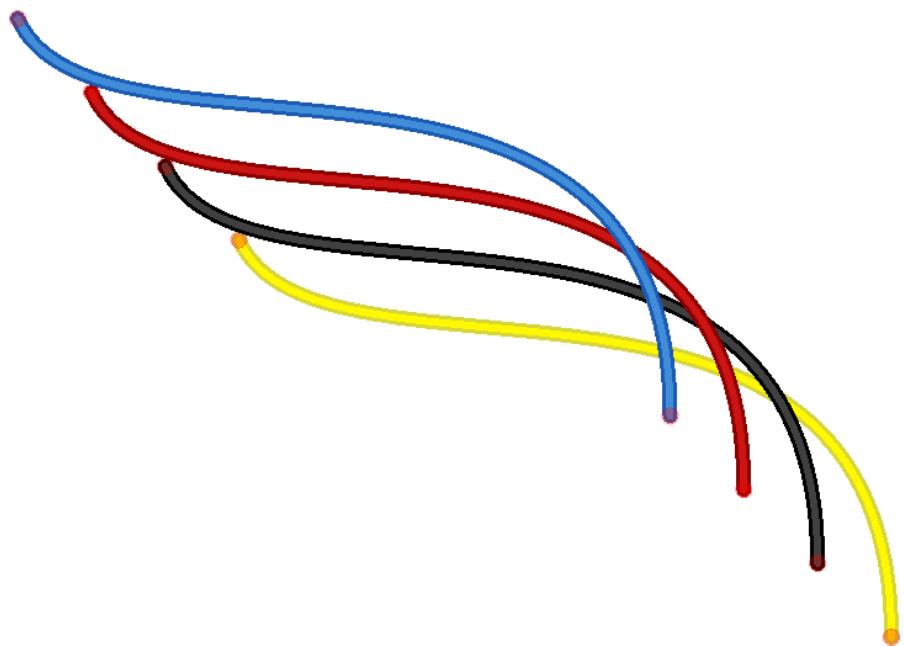
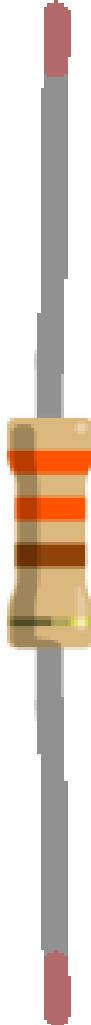
# Tabla colores resistencias



	First Digit	Second Digit	Multiplier	Tolerance
Black	Nil	0	1	Nil
Brown	1	1	10	±1%
Red	2	2	100	±2%
Orange	3	3	1000	±3%
Yellow	4	4	10000	±4%
Green	5	5	100000	±0.5%
Blue	6	6	1M	±0.25%
Violet	7	7	10M	±0.10%
Grey	8	8	100M	±0.05%
White	9	9	1G	Nil
Gold	Nil	Nil	÷10	±5%
Silver	Nil	Nil	÷100	±10%



# Circuitos electrónicos

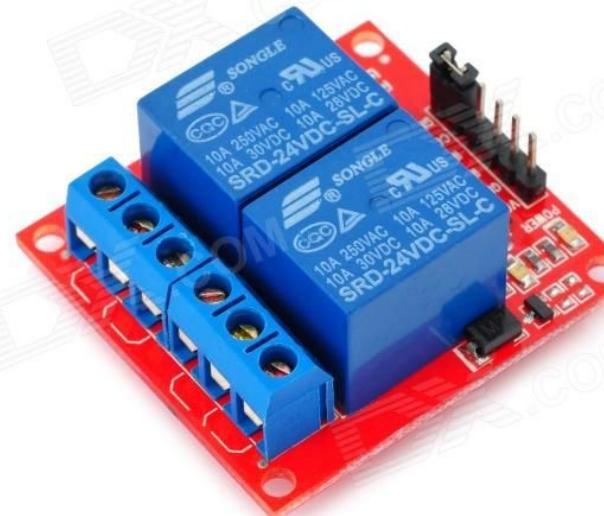




# Circuitos electrónicos

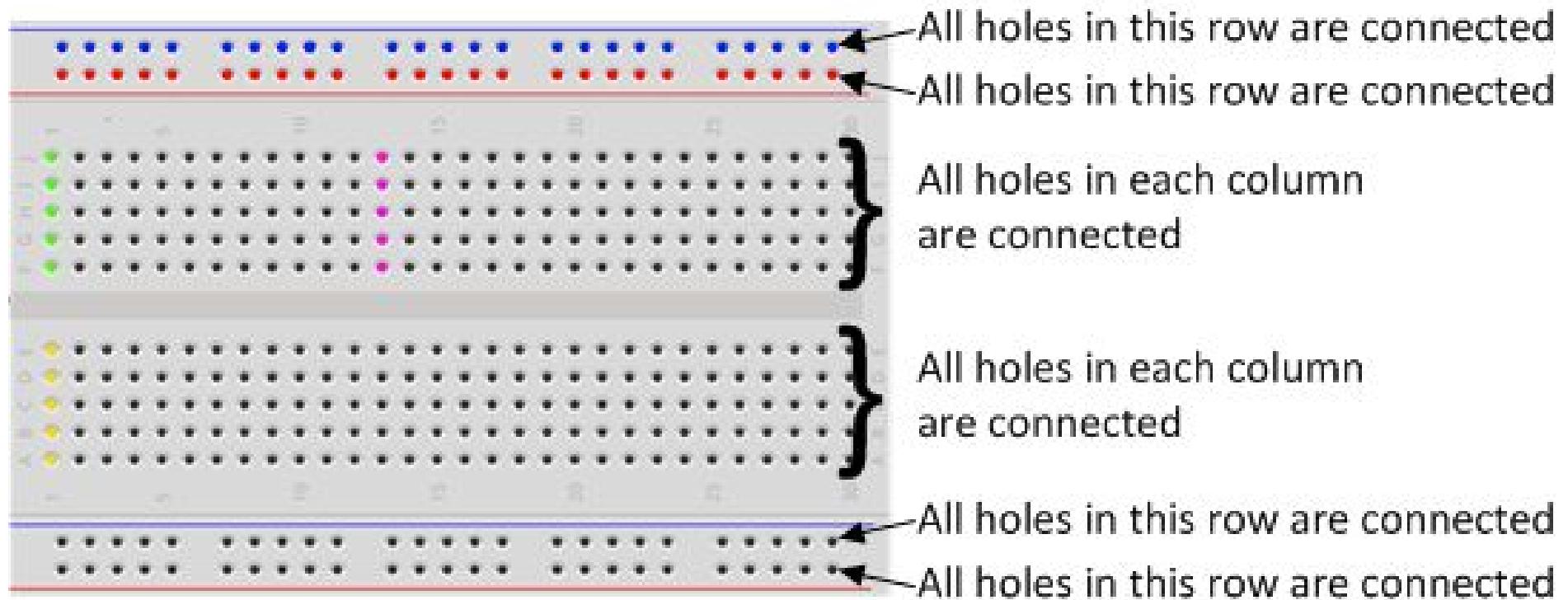


3.3V	1	2	5.0V
I2C1 SDA	3	4	5.0V
I2C1 SCL	5	6	GROUND
GPIO 4	7	8	UART0 TX
GROUND	9	10	UART0 RX
GPIO 17	11	12	GPIO 18
GPIO 27	13	14	GROUND
GPIO 22	15	16	GPIO 23
3.3V	17	18	GPIO 24
GPIO 10	19	20	GROUND
GPIO 9	21	22	GPIO 25
GPIO 11	23	24	GPIO 8
GROUND	25	26	GPIO 7



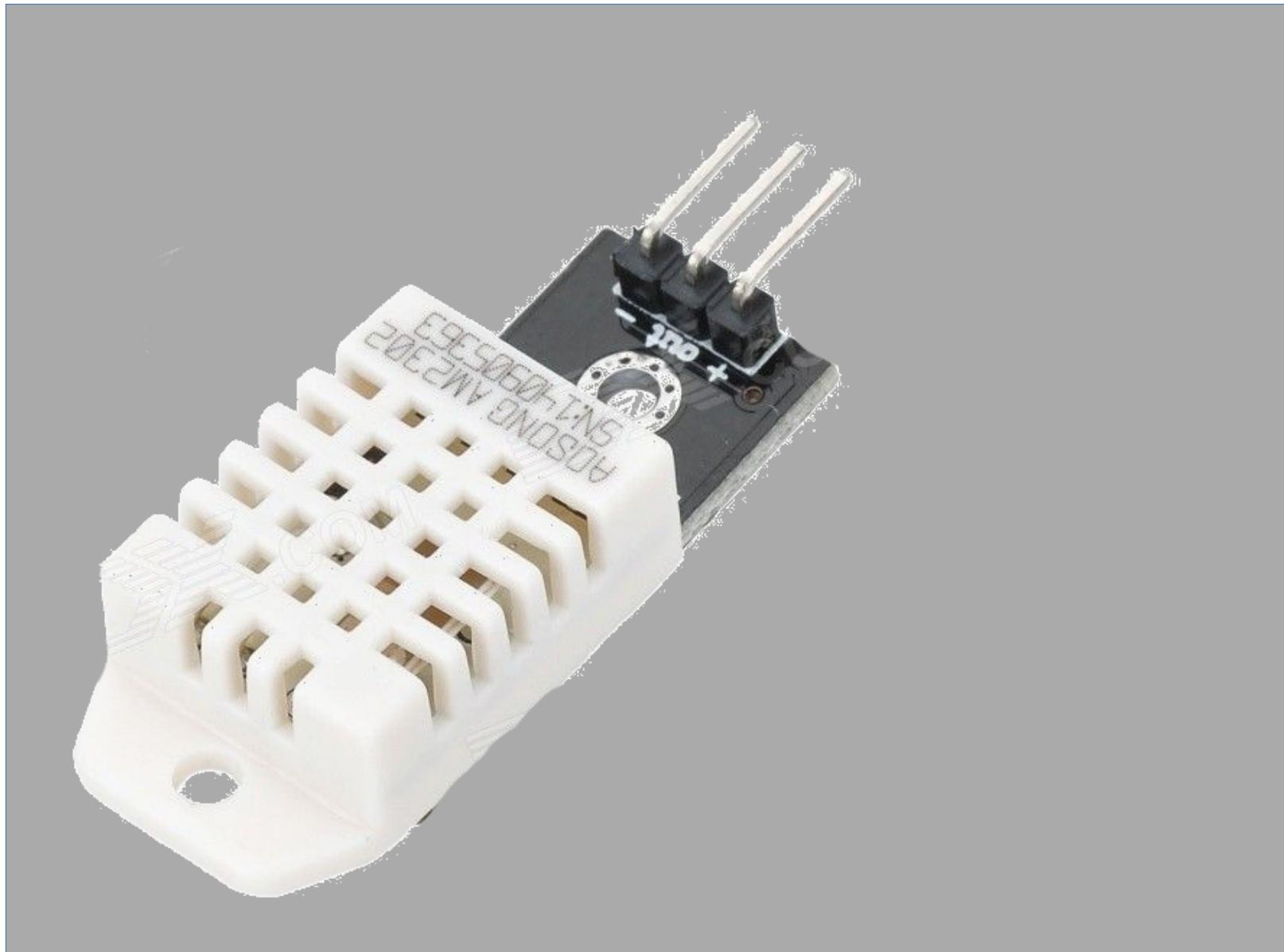
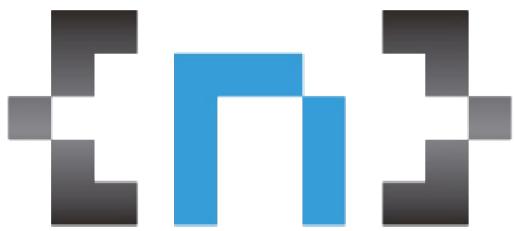


# Circuitos electrónicos



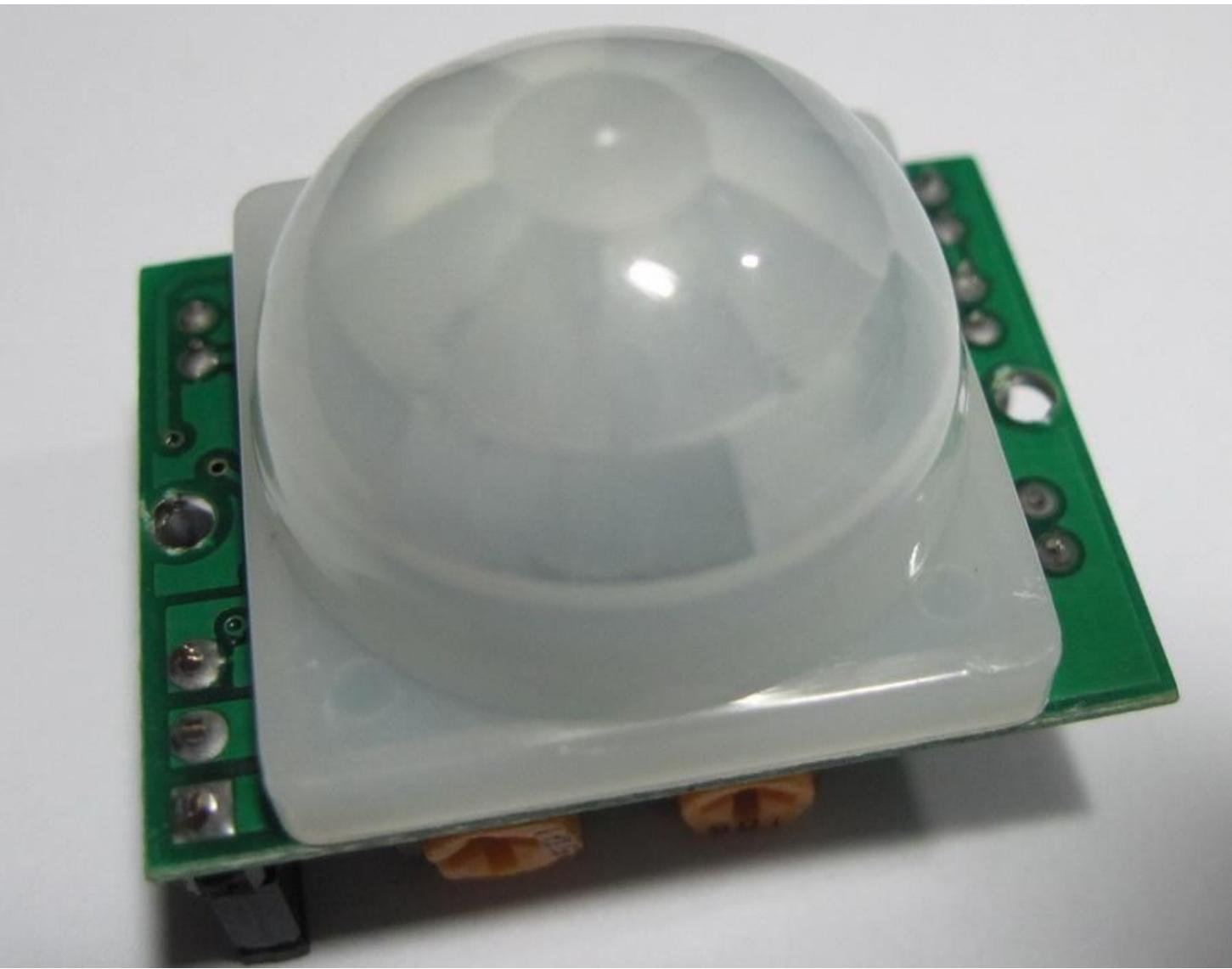


# P1



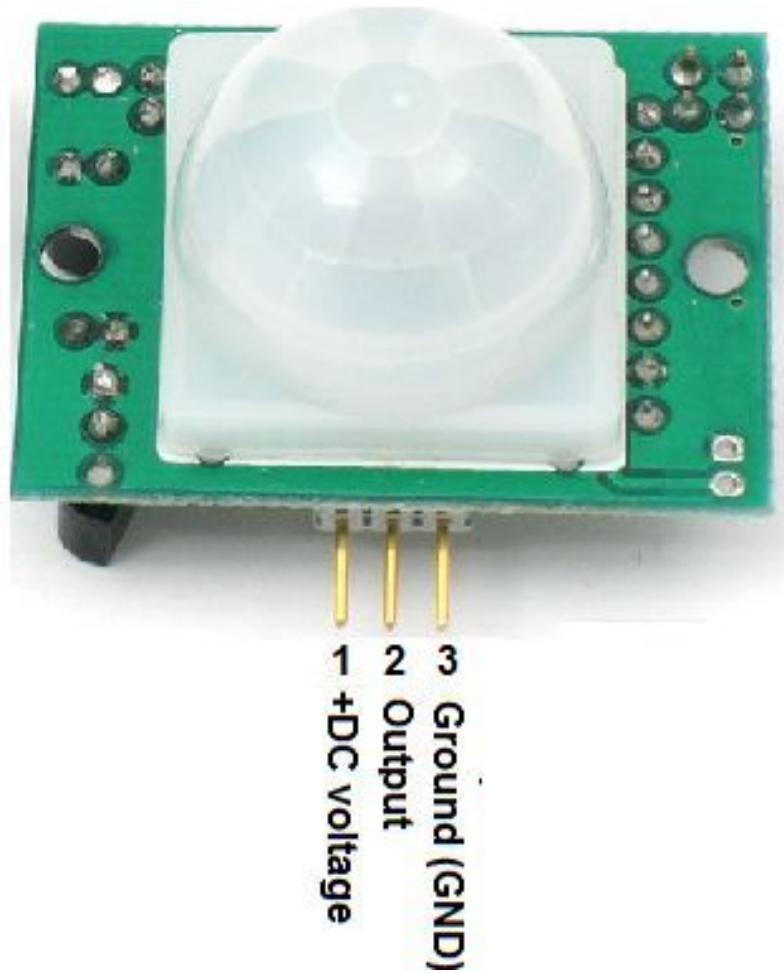


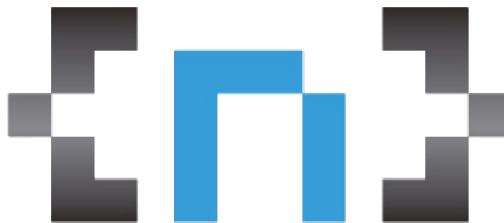
# P2



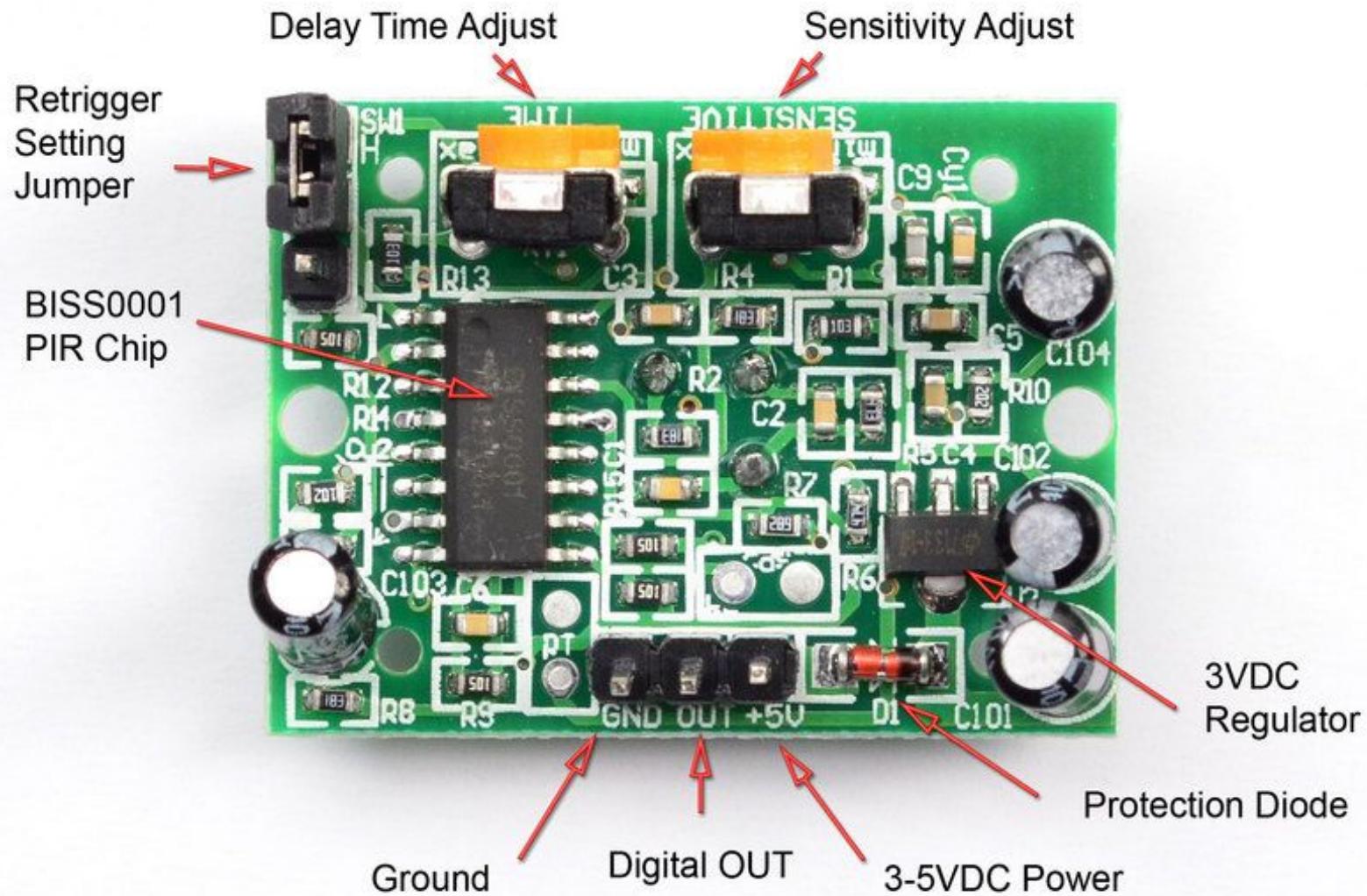


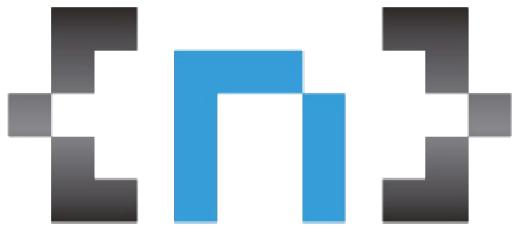
# PIR y webcam + MQTT





# PIR y webcam + MQTT





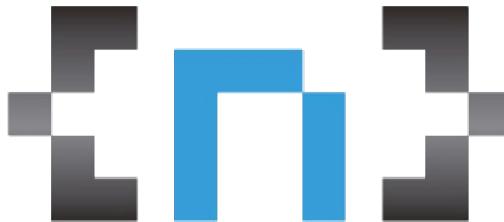
# PIR y webcam + MQTT

MQTT is a light-weight publish/subscribe messaging protocol, originally created by IBM and Arcom (later to become part of Eurotech) around 1998. The [MQTT 3.1.1 specification](#) has now been standardised by the OASIS consortium. The standard is available in a variety of [formats](#).

More information about the protocol can be found on the [MQTT.org](#) community site.



There is a publically accessible sandbox server for the Eclipse IoT projects available at [iot.eclipse.org](http://iot.eclipse.org), port [1883](#).



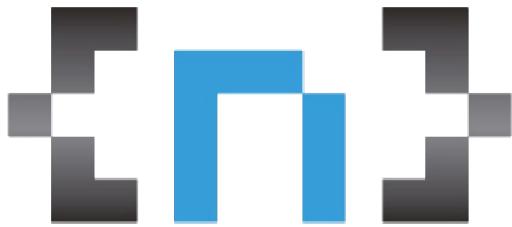
# PIR y webcam + MQTT



The Paho project provides open-source client implementations of MQTT and MQTT-SN messaging protocols aimed at new, existing, and emerging applications for Machine-to-Machine (M2M) and Internet of Things (IoT).

## Latest release: 1.1

	Downloads
C client for Windows/Unix/Mac	1.0.3
Java client and utilities	1.0.2
Android service	1.0.2
Python client	1.1
JavaScript client	1.0.1
C/C++ MQTT Embedded clients	1.0.0
.Net and WinRT client (M2Mqtt)	4.0.0.0



# PIR y webcam + MQTT



For Constrained Networks

M2M and IoT systems need to deal with frequent network disruption and intermittent, slow, or poor quality networks. Minimal data costs are crucial on networks with millions and billions of connected devices.



Devices and Embedded Platforms

Devices and edge-of-network servers often have very limited processing resources available. Paho understands small footprint clients and corresponding server support.

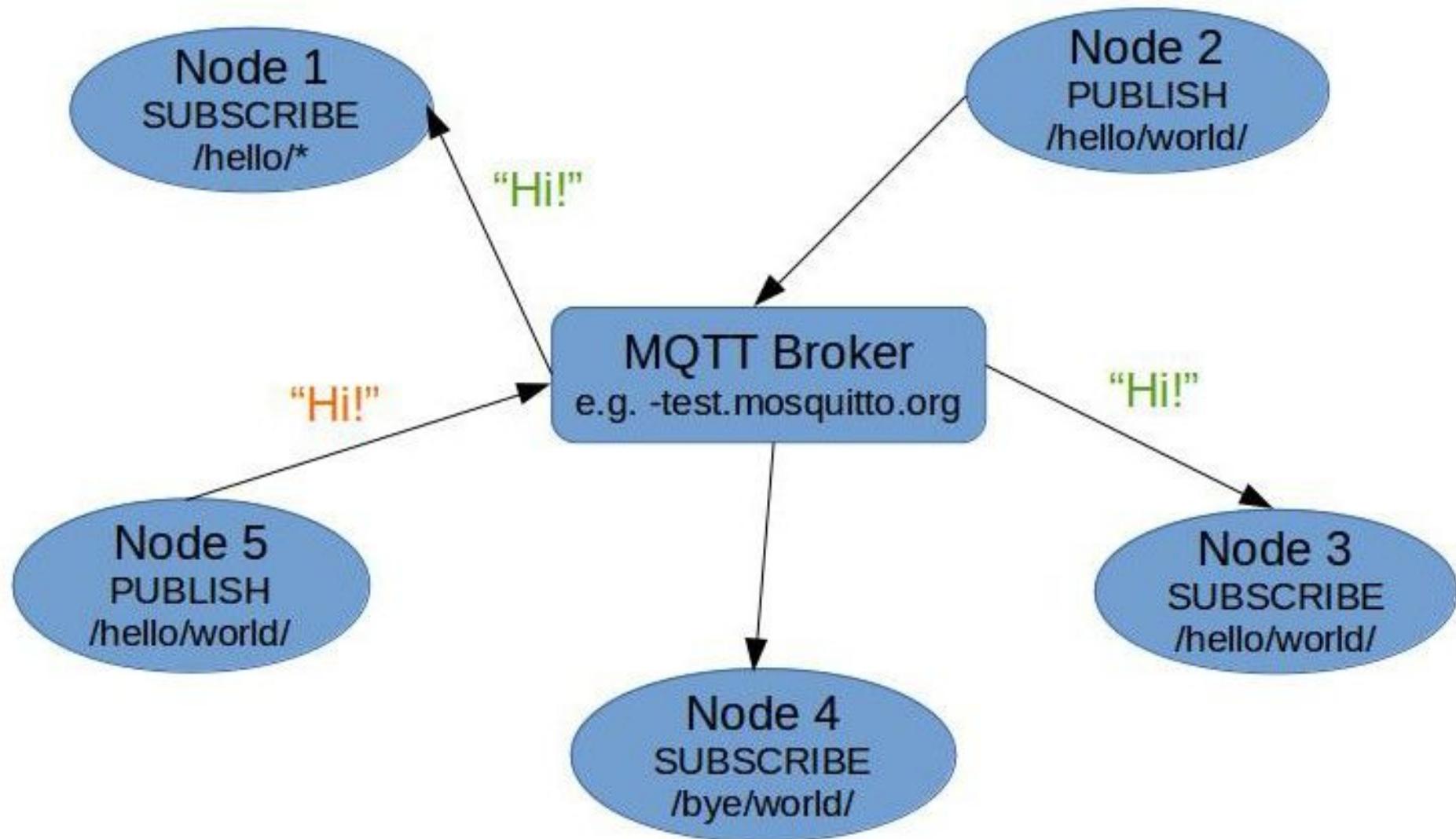


Reliable

Paho focuses on reliable implementations that will integrate with a wide range of middleware, programming and messaging models.



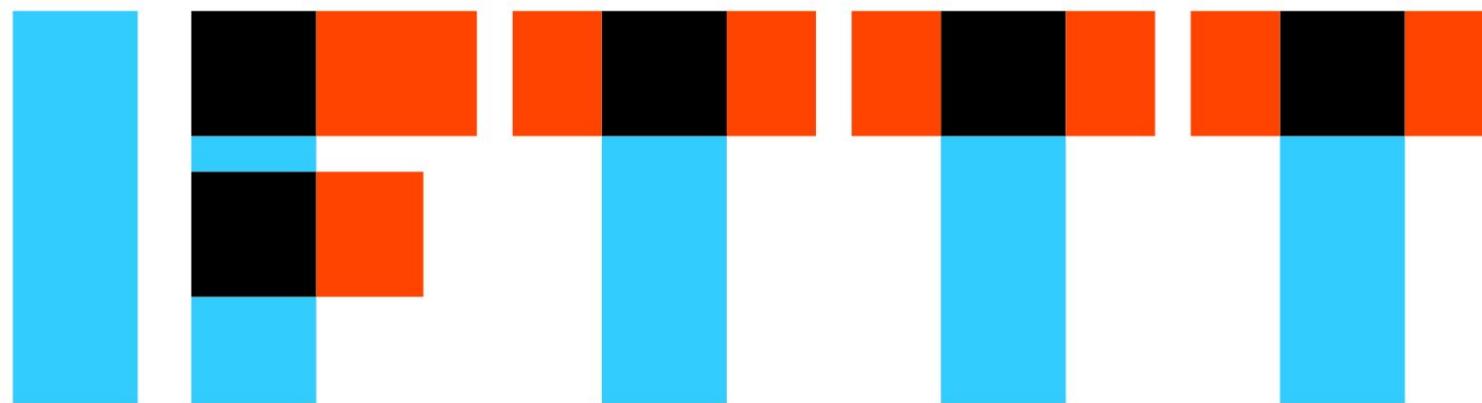
# PIR y webcam + MQTT



En3

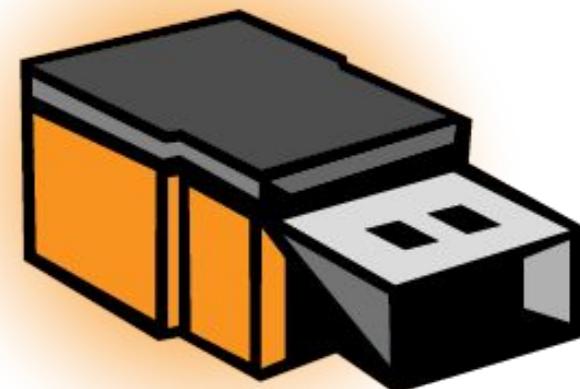
P3

En3





# IFTTT + Blink



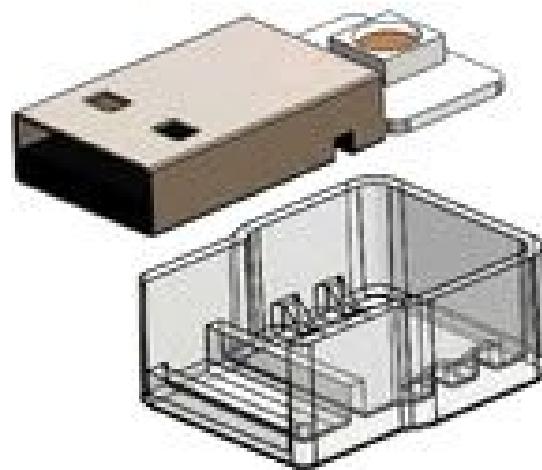


# IFTTT + Blink

Accent Snap Cover



Semi-translucent  
Polypropolene Body



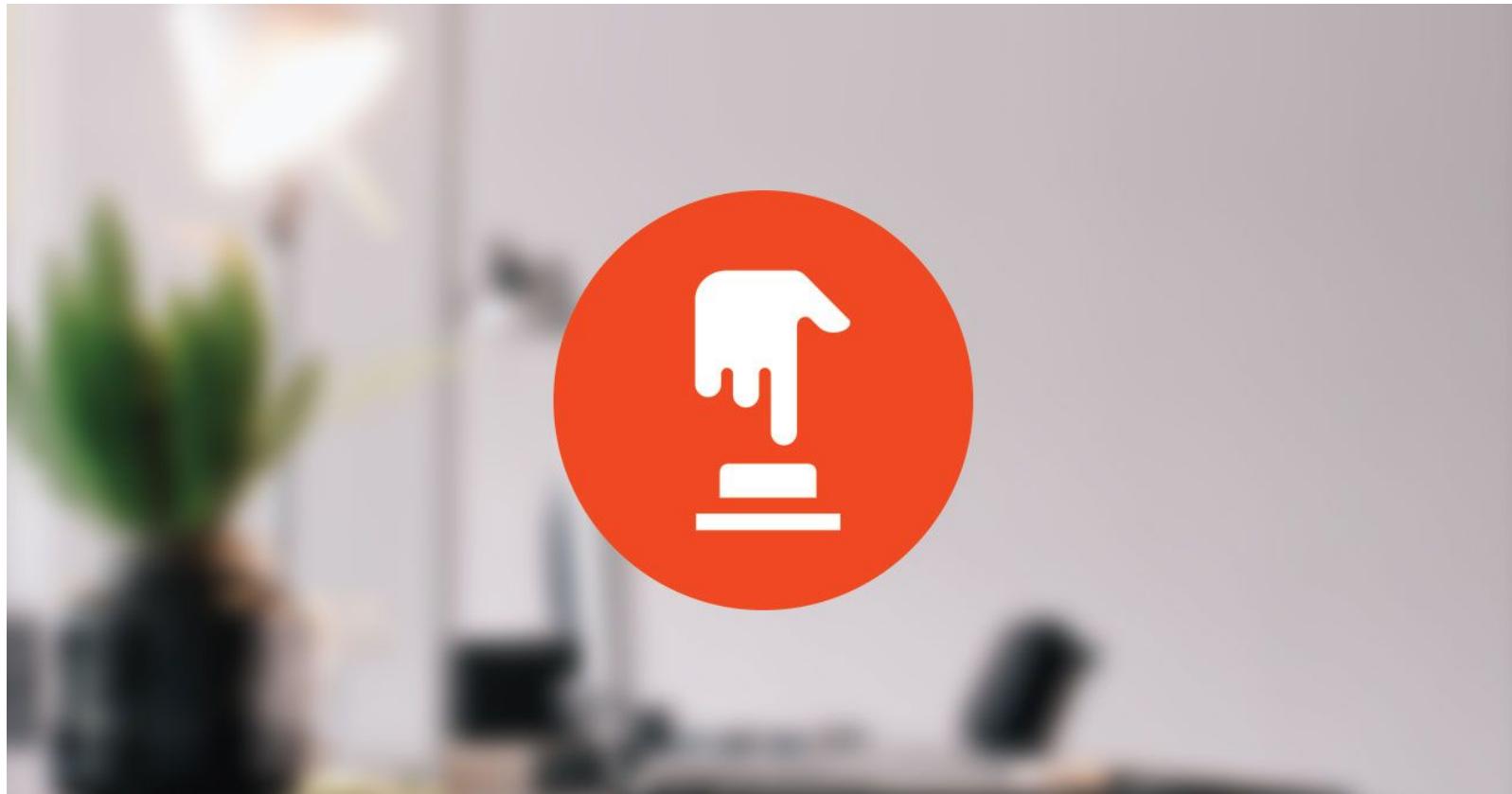


# IFTTT + Blink





## IFTTT + Blink

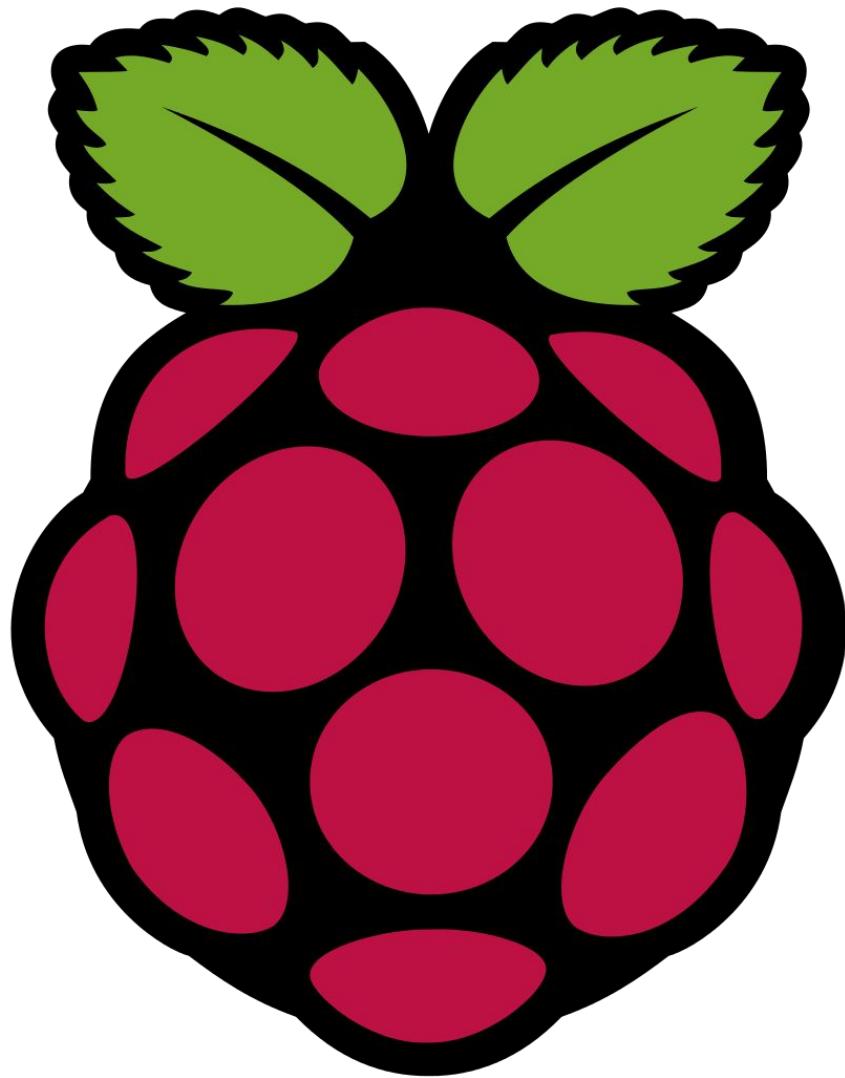




# P4



# Whatsapp: Yowsup



+

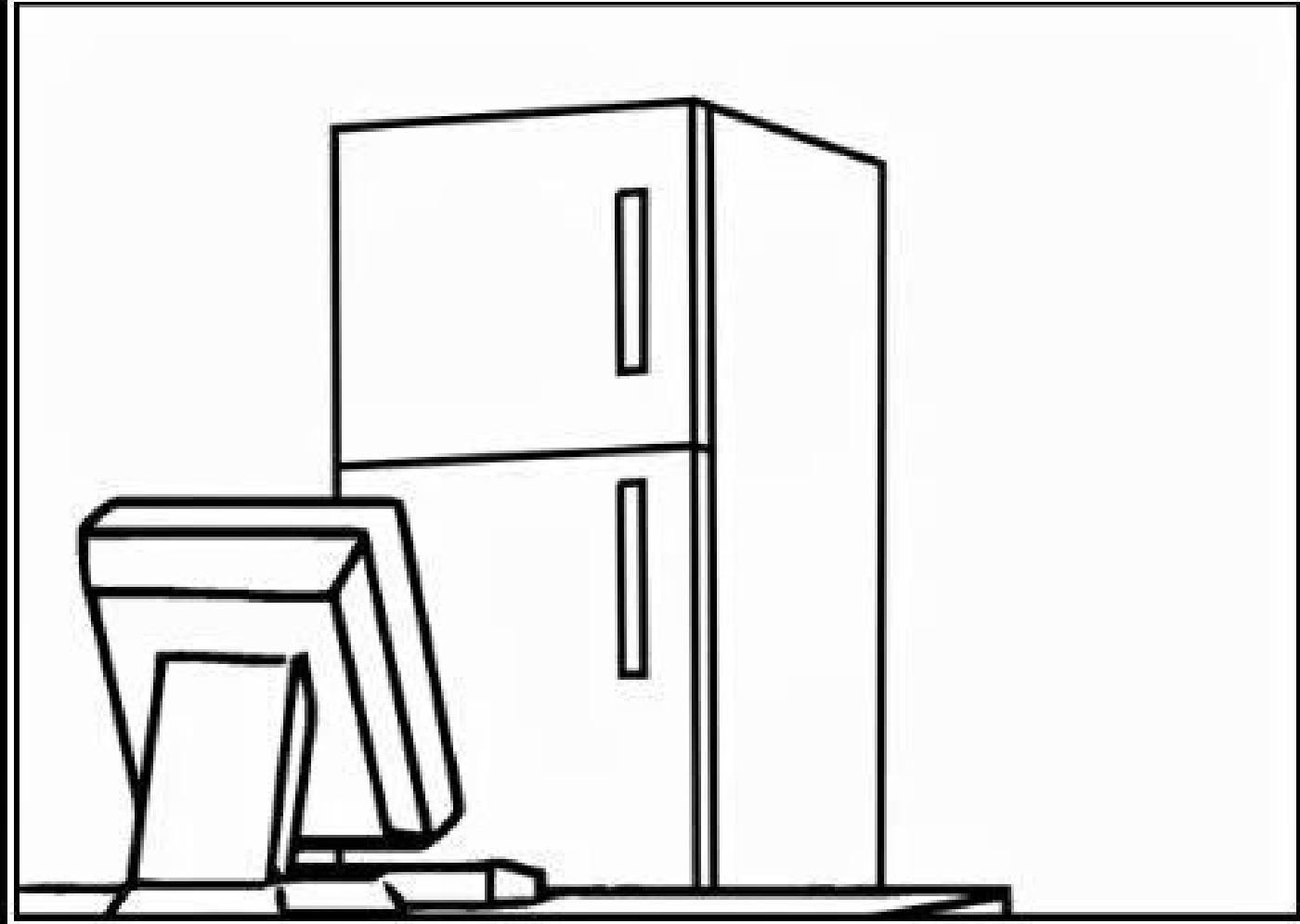




Whatsapp: Yowsup







# ON THE INTERNET OF THINGS

NOBODY KNOWS YOU'RE A FRIDGE



TacticalMaidYinette  
@yinettesys

Ficken bathrooms on the internet  
[shodan.io/host/62.72.198...](https://shodan.io/host/62.72.198.144)



62.72.198.144

Ports open: 53, 443, 1723, 5900  
[shodan.io](https://shodan.io/host/62.72.198.144)

11:56 PM · 26 Nov 15



# Face palm

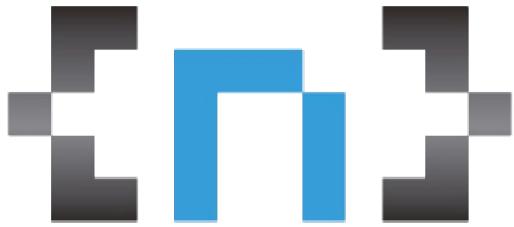


I'M A  
**No con Name**  
**"SPEECHER"**



**I SOLVE PROBLEMS**  
**YOU DON'T KNOW YOU HAVE**  
**IN WAYS YOU CAN'T UNDERSTAND**

# ¿Preguntas?



# Contact

@Fran\_Quinto



In association with @enelago