

Llevemos la cafetera al internet

Is this new?

- The concept of a network of smart devices was discussed as early as **1982**, with a modified Coke machine at Carnegie Mellon University becoming the first internet-connected appliance, [9] able to report its inventory and whether newly loaded drinks were cold.

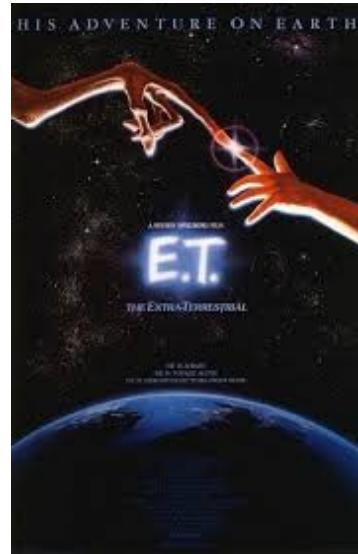


Source: Wikipedia

http://en.wikipedia.org/wiki/Internet_of_Things

1982?

Also in 1982



About me

- Javier Hernandez
- BS Computer Engineer, UPRM
- Developer
 - Data Collection
 - Mobile solutions



Contact:

Twitter @soynerdito

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Agenda

- Why?
- Methodology
 - Divide & Conquer
- Things to consider
 - Components
- Guidelines and recommendations
- Final goal:
 - Slave the dragon and rescue the princes

Clave de hacer un proyecto

- Establecer una meta
- Research
- Ejecutar
- Intentar nuevamente
- Seguir tratando

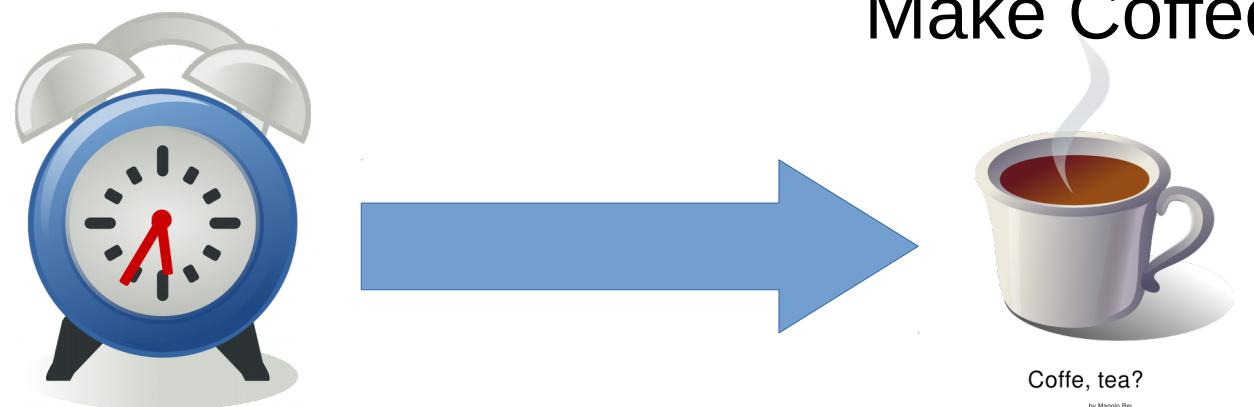


Llevemos la cafetera al internet

Pa'
que?!!!

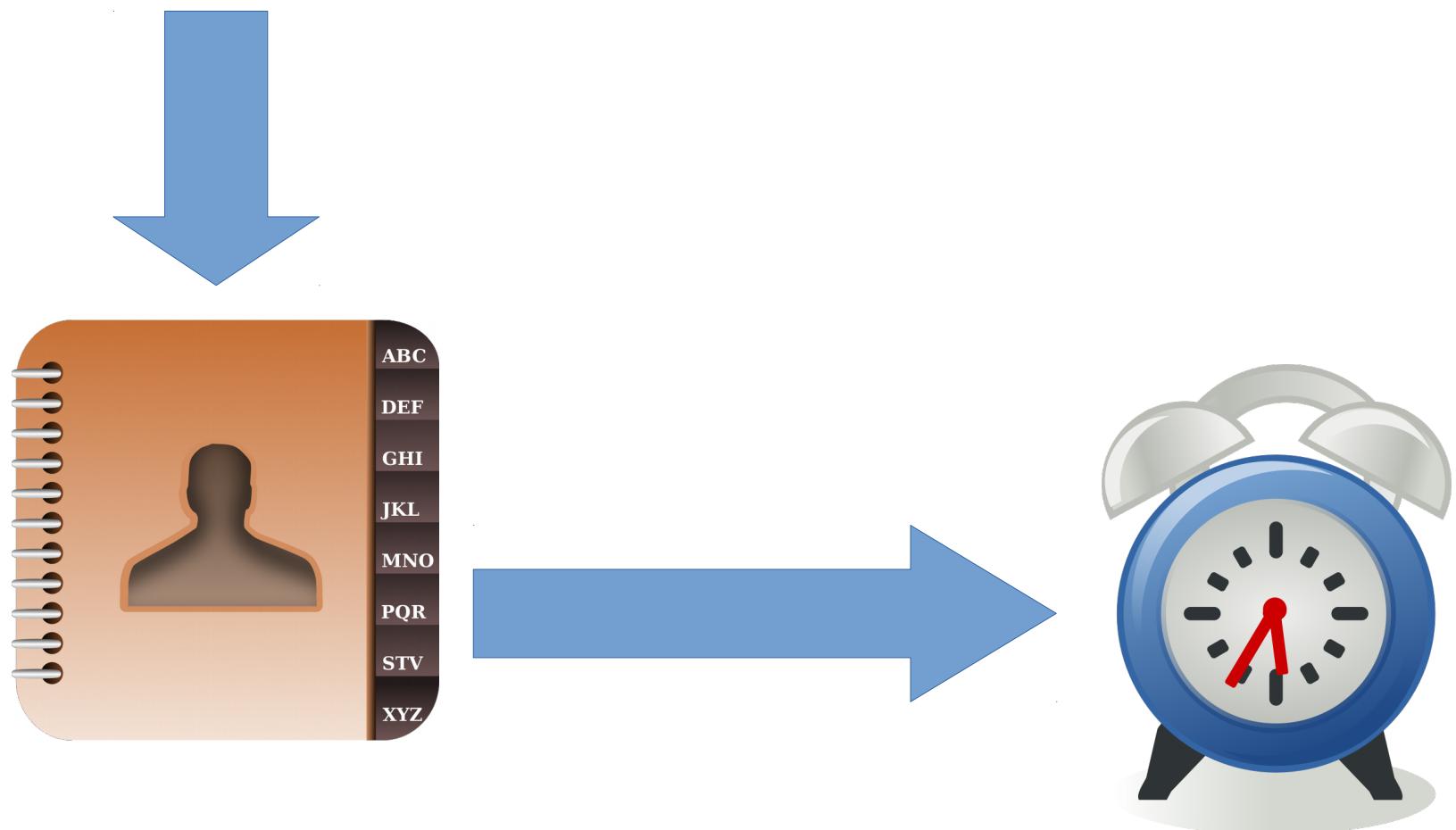
Monday

- Morning
 - Wake up on time
 - Automatically make coffee



Example

- Monday 8AM meeting @Office



Monday

- Morning
 - Wake up on time
 - Automatically make coffee



Make Coffee



Coffe, tea?

by Manolo Rei

Whaaa?



Mr. Coffee

Mr. Coffee Smart Wifi-Enabled WeMo 10-Cup Optimal Brew Coffeemaker, BVMC-PSTX91WE

★★★★★ 5 star 109 customer reviews | 44 answered questions

List Price: \$149.99

Price: **\$60.66 & FREE Shipping**

You Save: **\$89.33 (60%)**

In Stock.

Get it as soon as Thursday, Feb. 23 when you choose **Two-Day Shipping** at checkout.

Ships from and sold by [Action Gear](#).

- Schedule or adjust brew time and setup reminders so coffee is fresh and hot whenever you want it using the Free WeMo App from your smart device
- Free WeMo App available for Apple(iOS 7 and higher) and Android(4.0 and higher) devices to connect from anywhere with 3G / 4G / Wi-Fi
- Optimal Brew Technology - brews coffee faster in under 7 minutes and heats up water to the ideal brewing temperature to optimize flavor from the grounds.
- 10-Cup Thermal Carafe keeps your coffee hot and tasting fresh
- Brew button - for manual operation when brewing without the WeMo App and smart device

But.....



Melitta

Melitta ME1MSB Smart Mill & Brew 10-Cup Programmable Coffeemaker

★★★★★ 5 customer reviews

Available from these sellers.

- 10-cup programmable coffeemaker grinds and brews automatically for ease of use
- LCD display with animated coffee and region-specific weather information via MSN Direct
- Info via FM signal; no setup, subscription, or Internet connection required
- 7 grind selections; adjustable strength; brew-pause; warming plate with auto shutoff
- Measures 8 by 11 by 14 inches; 1-year limited warranty

Used (1) from \$199.99 & FREE shipping. Details



Find Products for your Kitchen

Selection for all your Kitchen needs; from pendant lights to appliances, cookware and more. [Shop Now](#)

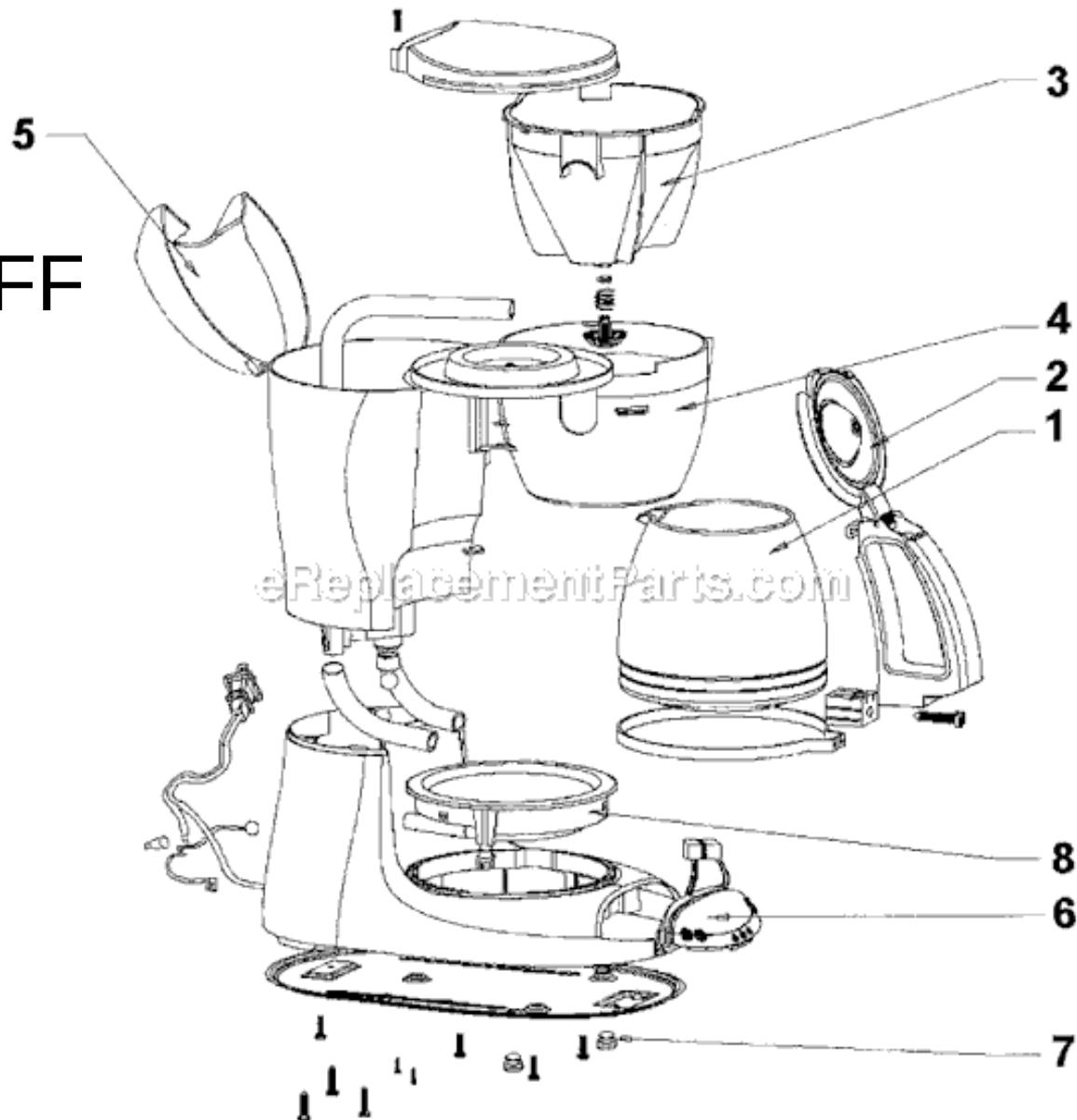
Divide & Conquer

- Goal
 - On/Off ?
 - Information?
 - All?
- Research
- Safety
- Mechanical
- Electrical
- Drink coffee



What do we know?

- Watter
- Switch ON/OFF
- Coffee
- Fuses...?



Safety

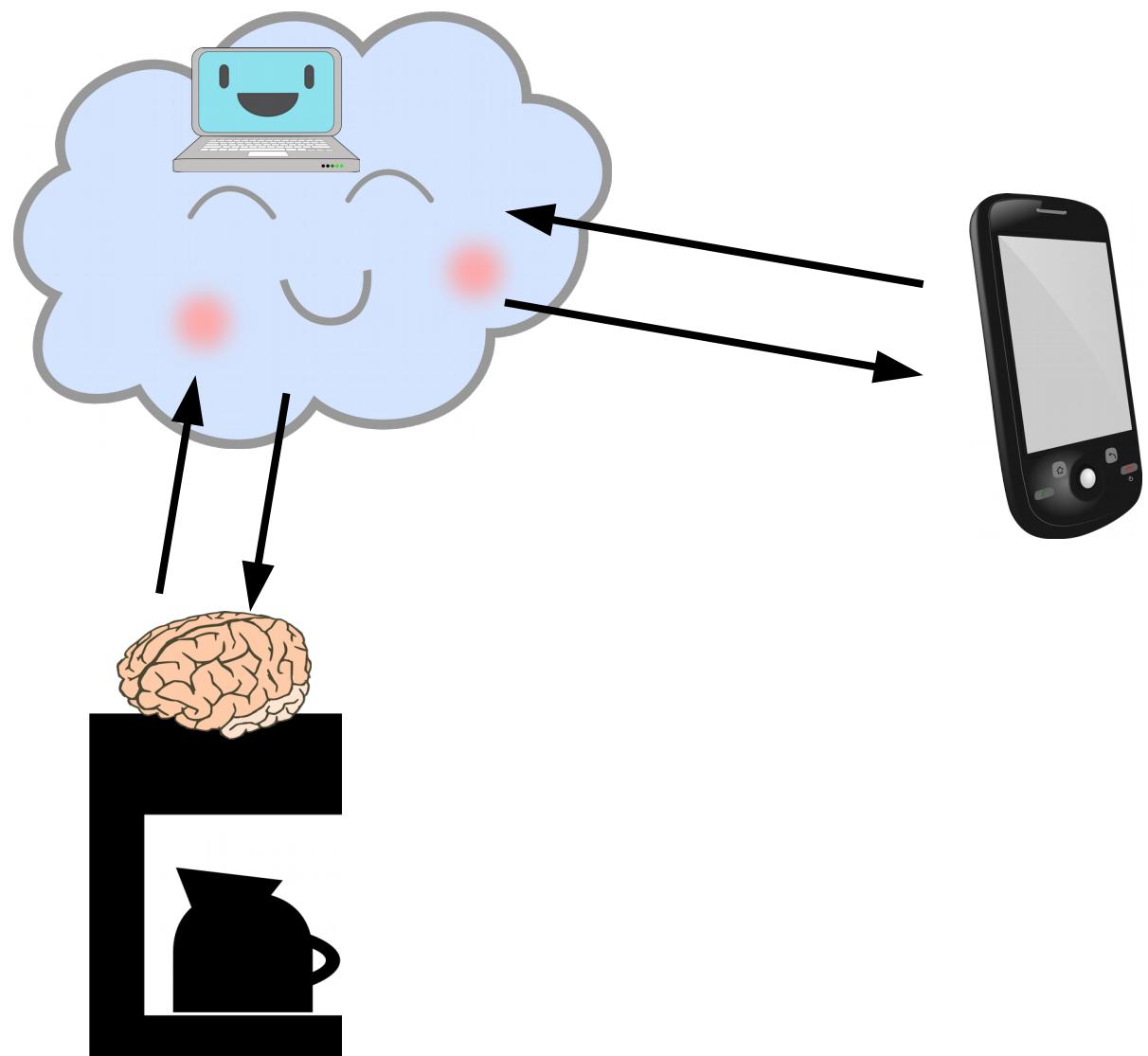
- Risk?



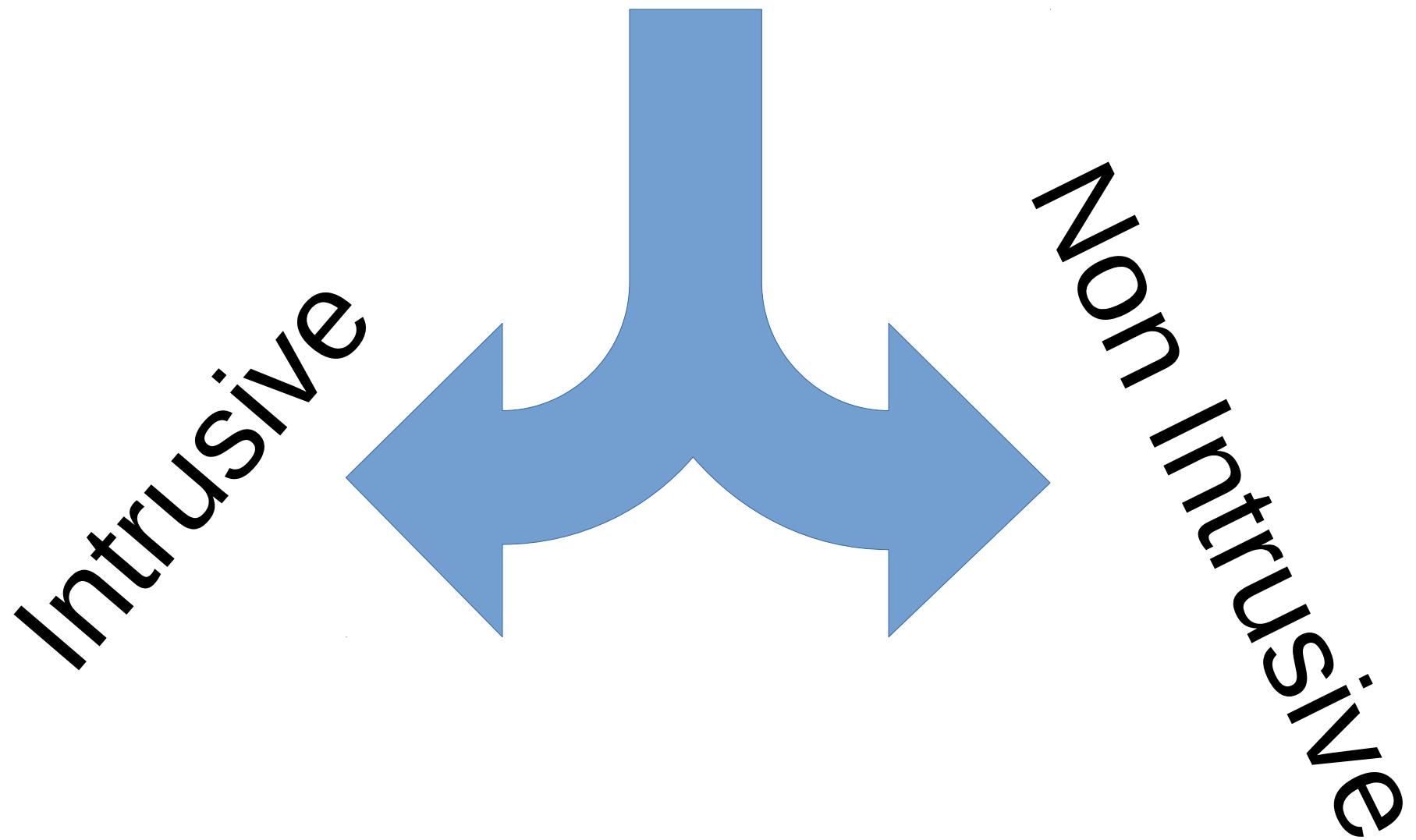
This is fine



Internet Coffee



Where to start



Intrusive

- Control raw material
 - Raw Coffee
 - Water
 - Filter
- Sensors:
 - Water level
 - Cup presence
 - Ambient conditions
 - Turn on/off
 - alerts

Non Intrusive

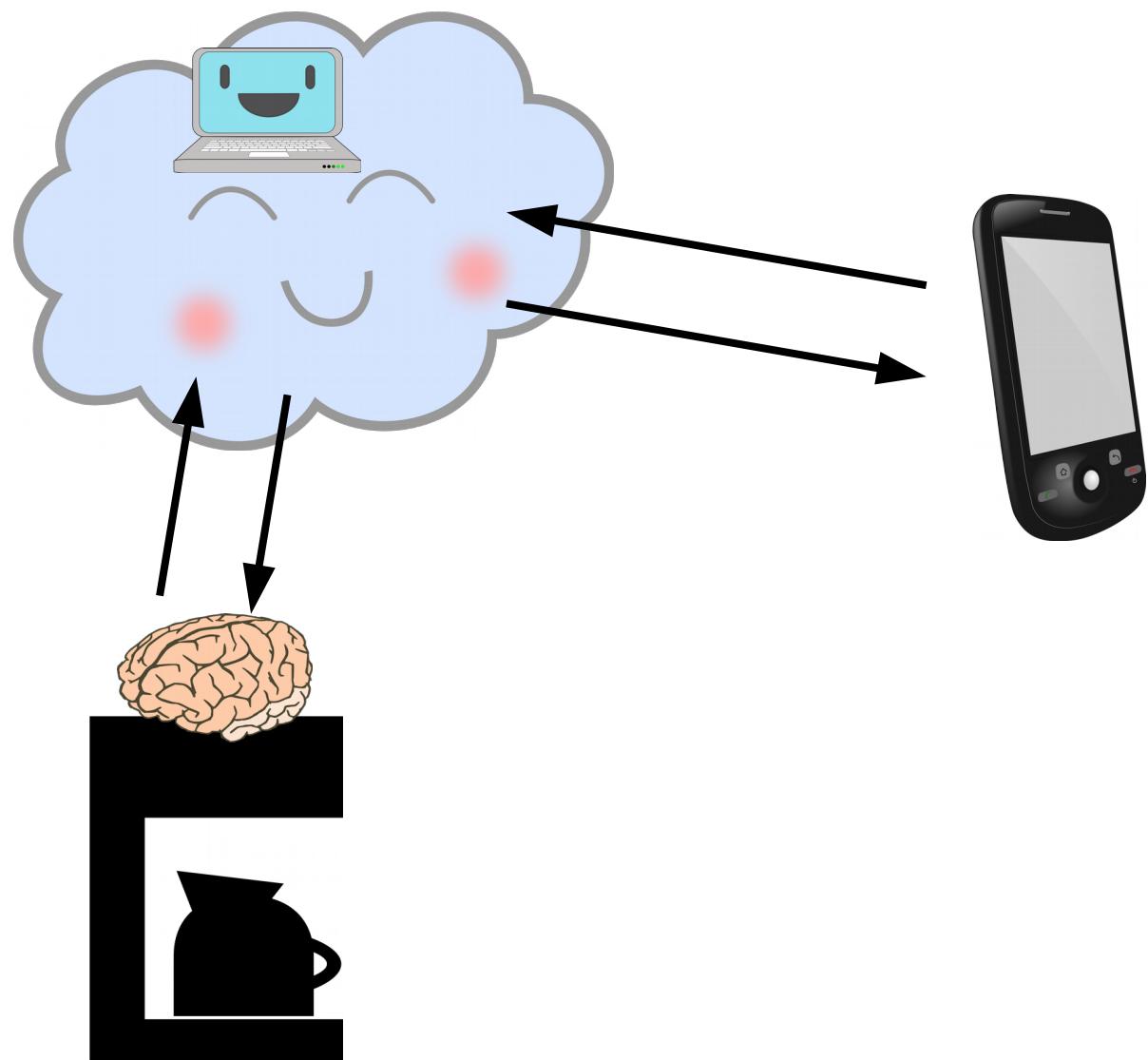
- Turn ON (could be on schedule)
 - Is there coffee?
 - Is there watter?
 - Is the cup set?

A Simple timer?



Esto no que era Internet of things?

Internet Coffee



What is the Internet of things?

According to Google

About 123,000,000 results (0.38 seconds)

Inter·net of things

noun

noun: Internet of things

a proposed development of the Internet in which everyday objects have network connectivity, allowing them to send and receive data.

"if one thing can prevent the Internet of things from transforming the way we live and work, it will be a breakdown in security"

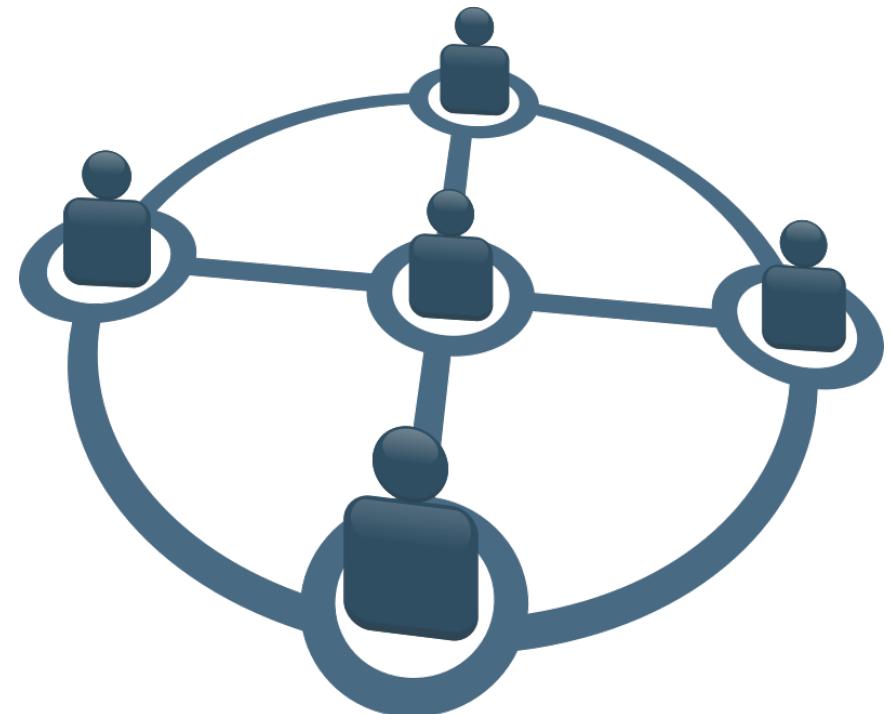
“Everyday object”

- What is an object?
 - Mobile: phones, tablets, laptops, “phablets”
 - Transportation: Car, Bus, Bikes
 - Home appliances: Fridge, TV
 - Traffic lights
 - Doors
 - Clothes
 - Furniture
 - Anything and everything

Every object has network connectivity

- **Some** examples may be:

- Wireless
 - Bluetooth
 - Wifi
 - RF
 - IRDA
- Wired
 - Ethernet
 - RS232/RS485
 - USB



Es este IOT?



In my book

- Is any device communicating with something else?
- If not, for me it is not!

My two cents

- Everything and nothing
- Loosely used term



Data

Data?
Measurement of anything
Temp, pressure, Internet usage, heart rate ...

Communication

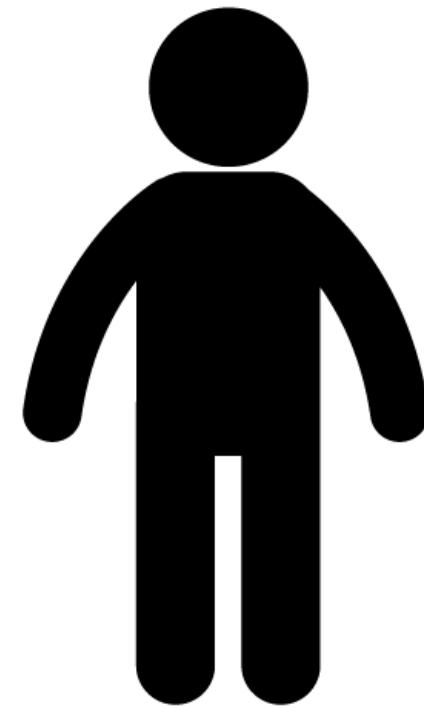
Communication type

- Thing to thing



Communication type

- Thing to human



Communication methods

- Wire
 - Serial
 - RS232, RS485
 - Printers, scanners
 - Wiegand interface
 - Access control
 - Parallel
 - Proprietary protocol
 - Ethernet
 - TCP (http)
- Wireless
 - 2.4Gz, 5Ghz, 900Mhz ...
 - RF

Eclipse <http://iot.eclipse.org/>

Open Source for IoT

IoT needs open source to be successful.
Eclipse IoT simplifies IoT development.



Standards

Implementation of IoT standards like
MQTT, CoAP, LWM2M and OneM2M



Services & Frameworks

Building blocks to accelerate IoT
development



Getting Started

Step-by-step guide to getting
started on IoT development



All projects

Check out all our IoT open source
projects

Technology

Eclipse IoT provides open
source implementations of the
standards, services and
frameworks that enable an
Open Internet of Things.

Standards

- OMA LightweightM2M
 - LightweightM2M is principally a device management protocol, but it should be designed to be able to extend to meet the requirements of applications. LightweightM2M is not restricted to device management, it should be able to transfer service / application data.
 - OMA LightweightM2M (LWM2M) is an industry standard for device management of M2M/IoT devices. It heavily relies on CoAP and therefore is optimized for communications over sensor or cellular networks.
 - OMA LWM2M provides an extensible object model that allows to enable application data exchanges in addition to the core device management features (firmware upgrade, connectivity monitoring, ...)

Windows supports OMA-DM
DM Desktop Management

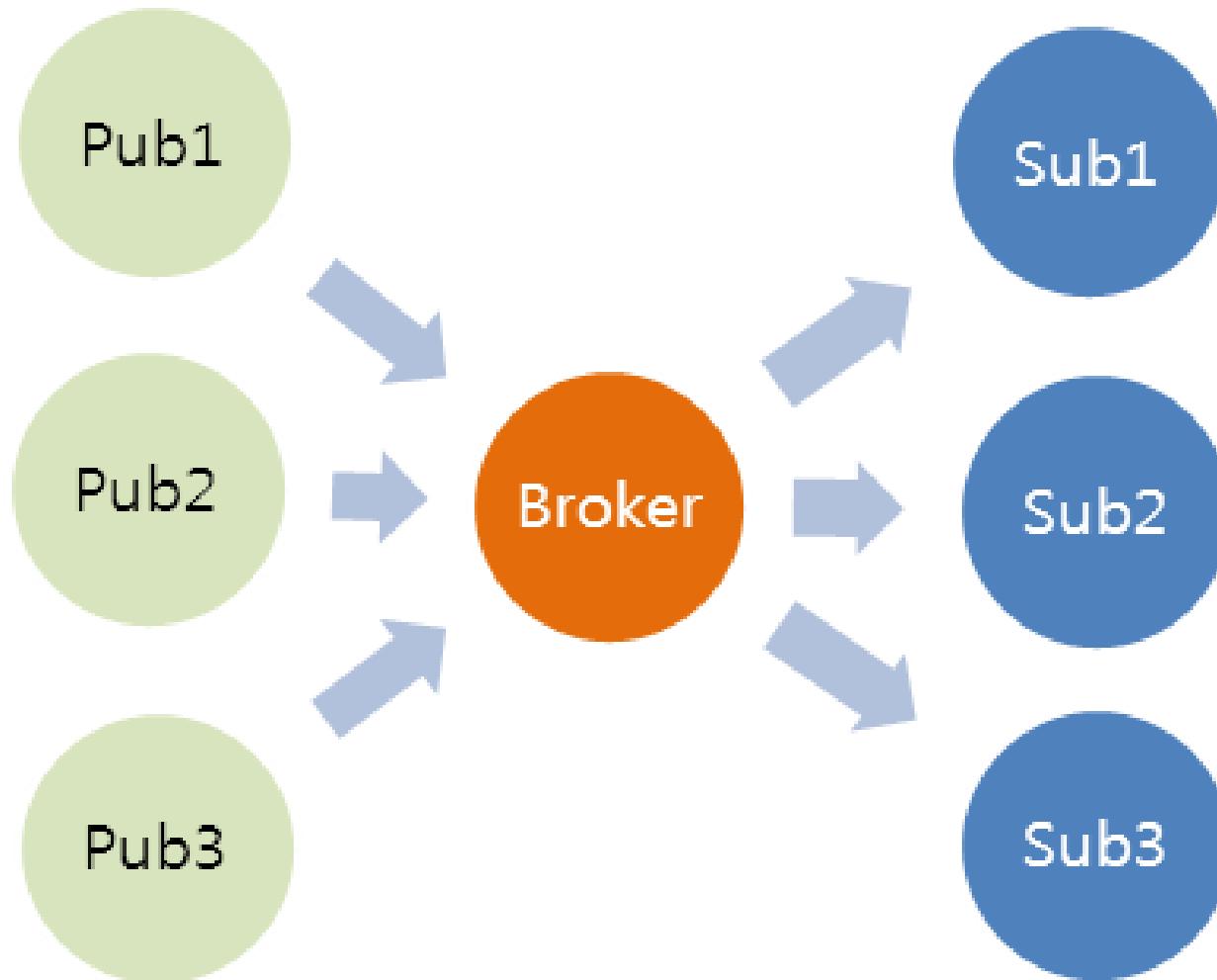
Standards

- CoAP
 - CoAP (Constrained Application Protocol) is a protocol specialized for use with constrained nodes and networks.
 - It implements the REST architectural style, it can be transparently mapped to HTTP. However, CoAP also provides features that go beyond HTTP such as native push notifications and group communication.

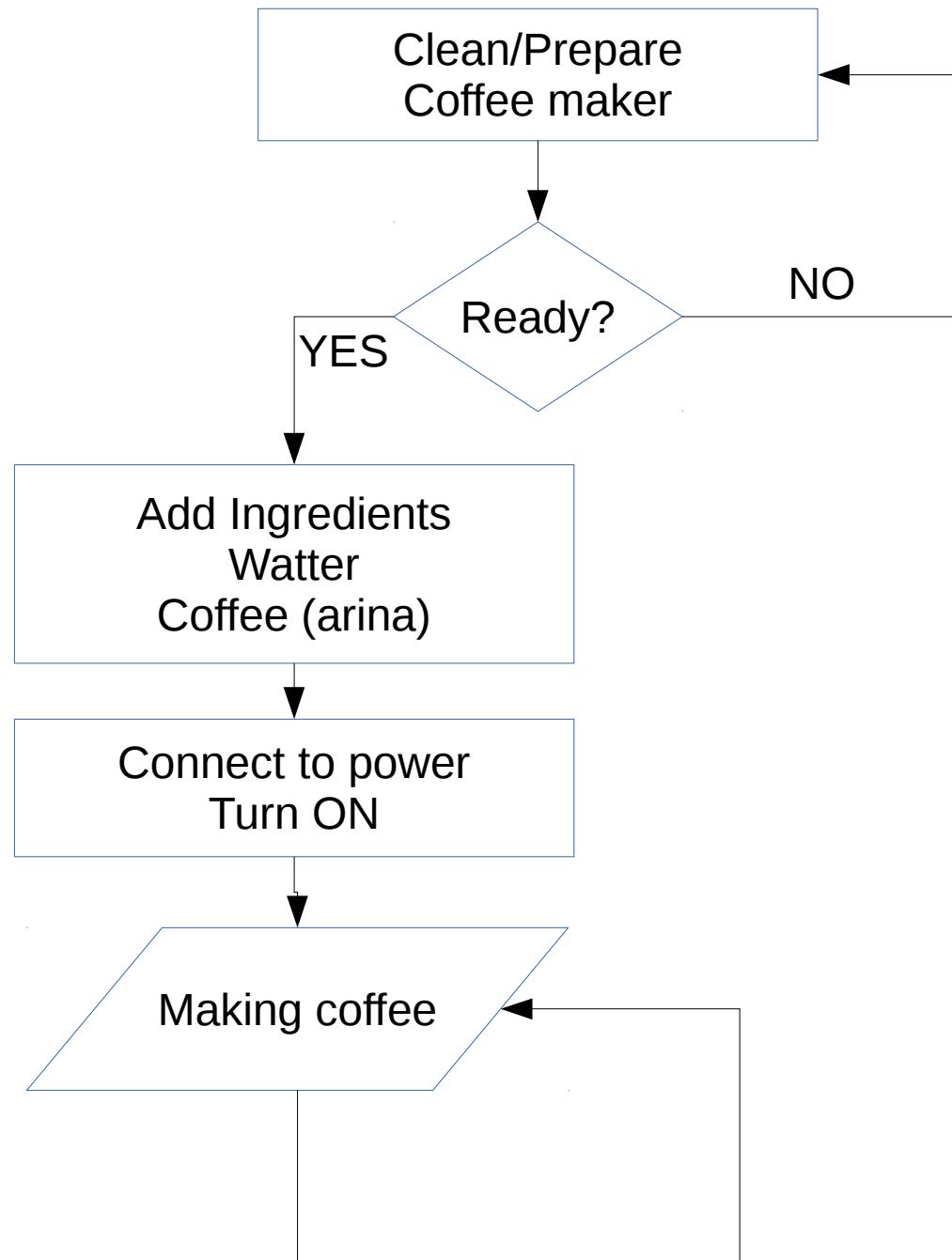
Standards

- Message Queuing Telemetry Transport (MQTT)
 - Protocol designed to connect the physical world devices and networks, with applications and middleware used in IT and Web development.
 - Lightweight
 - Publish/Subscribe
 - Wired/Wireless
 - Protocol used by Facebook chat!

MQTT



Back to the coffee project!





wiseGEEK



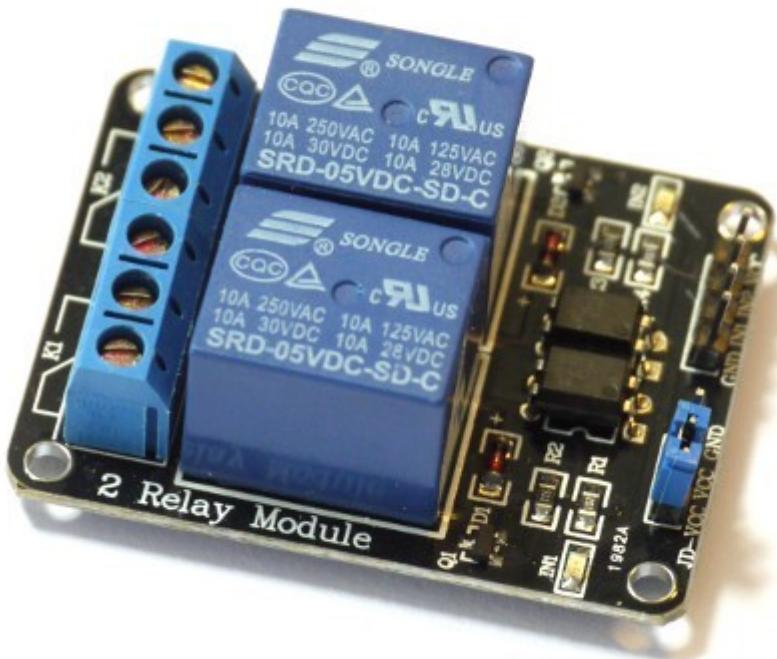
Valve

- Control water
 - ON/OFF
- Description
 - 12VDC (320 mA)
 - Liquid flow one direction
 - Response time (open): ≤ 0.15 sec
 - Response time (close): ≤ 0.3 sec
 - Actuating voltage: 12VDC (but we found it would work down to 6V)



<https://www.adafruit.com/products/997>

Relay

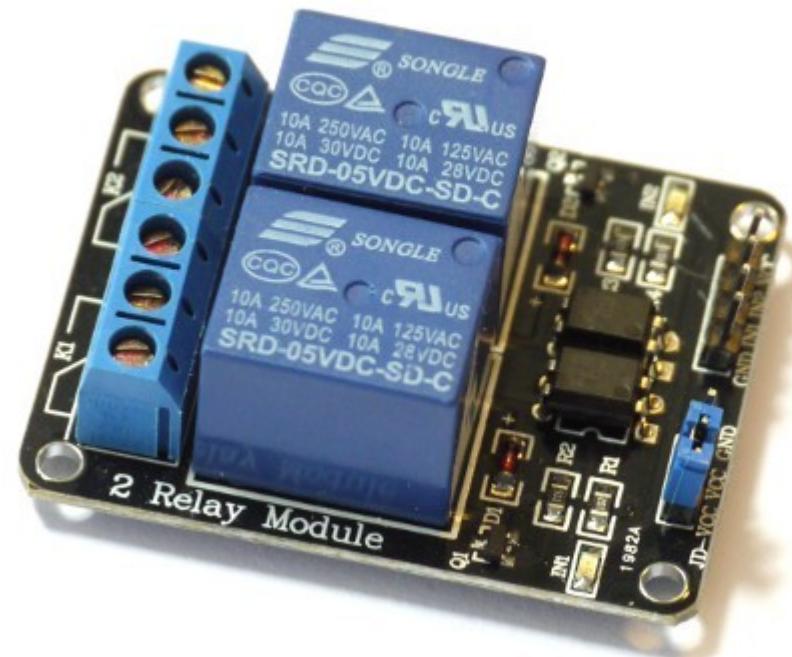


Mechanical

Solid state

Mechanical relay

- Cheap
- Physical parts
- Make noise
- May produce arc
- State ON or OFF
- Normally open or close

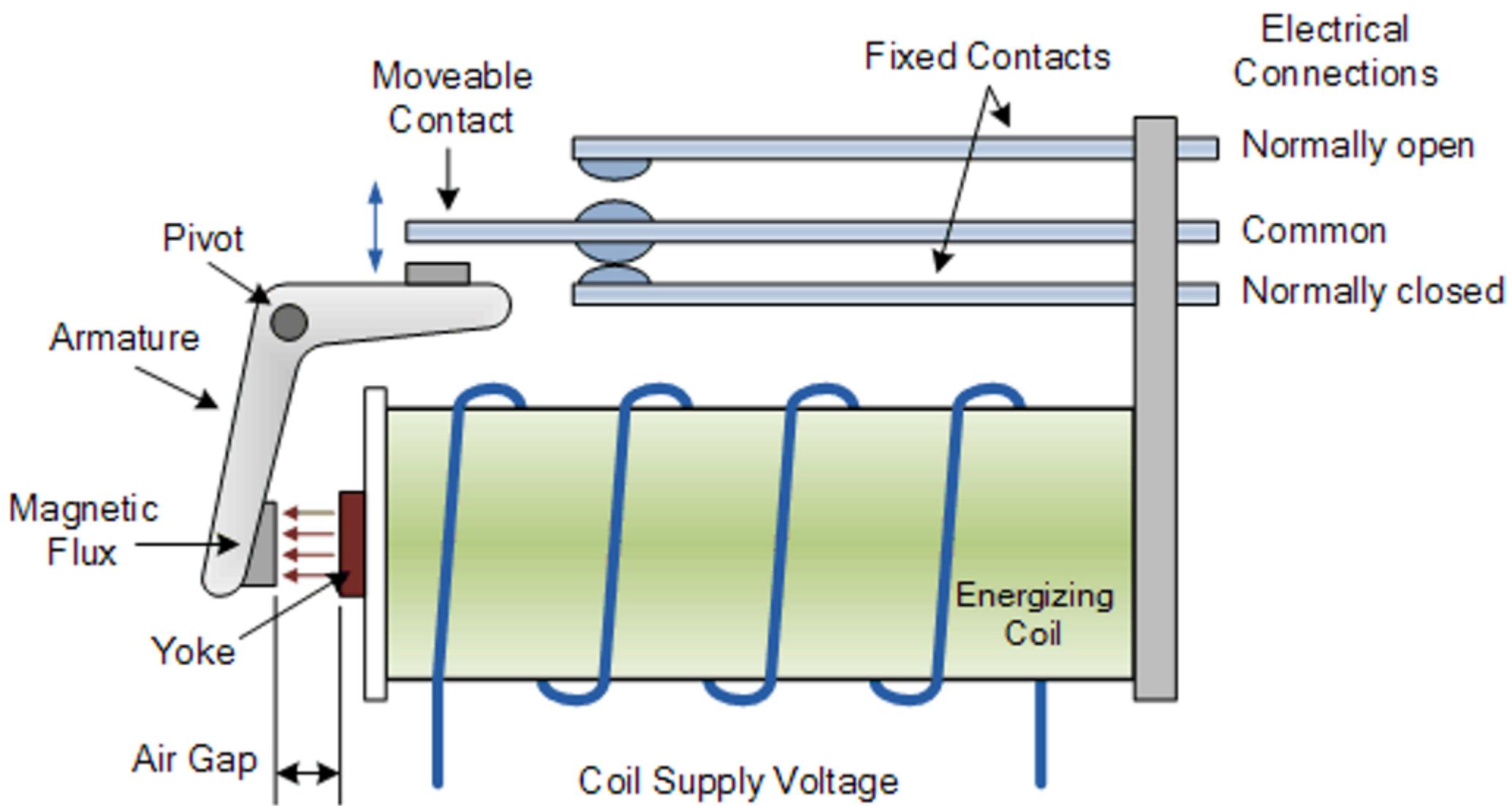


Solid state

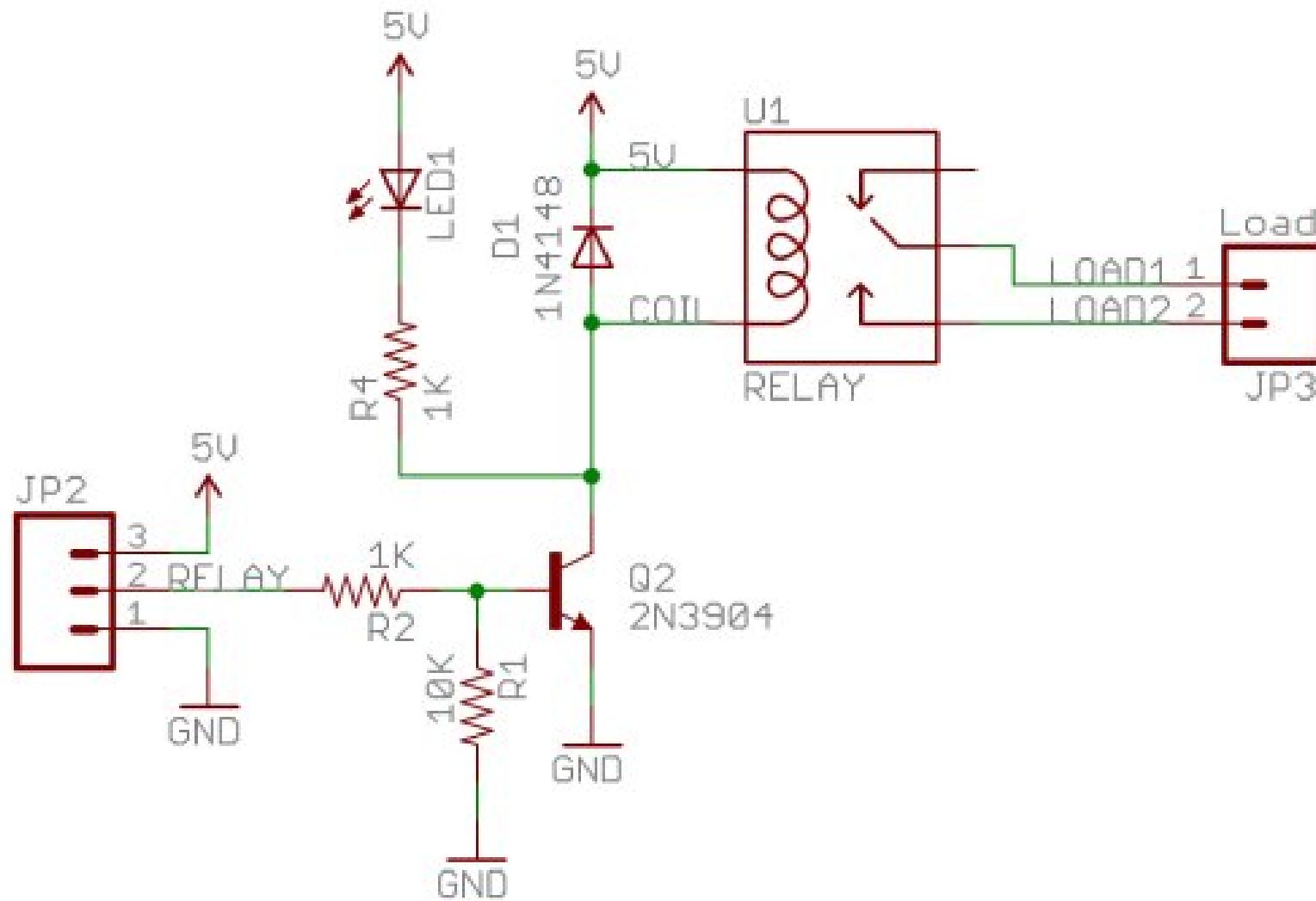
- \$\$
- No moving parts
- May not be full ON or OFF
- May produce heat
- Can be faster
- Option Opto Isolated



Relay inside



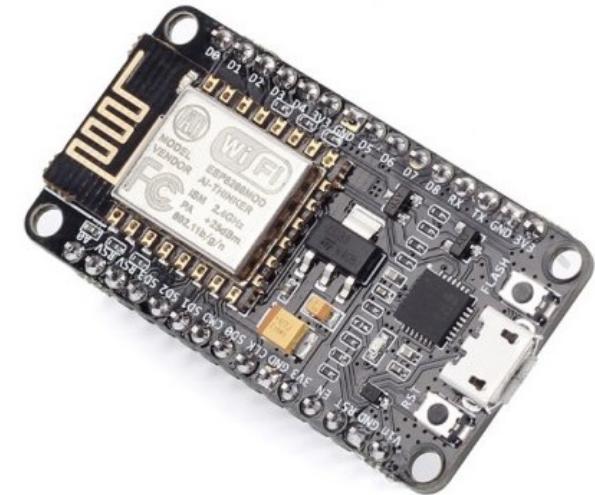
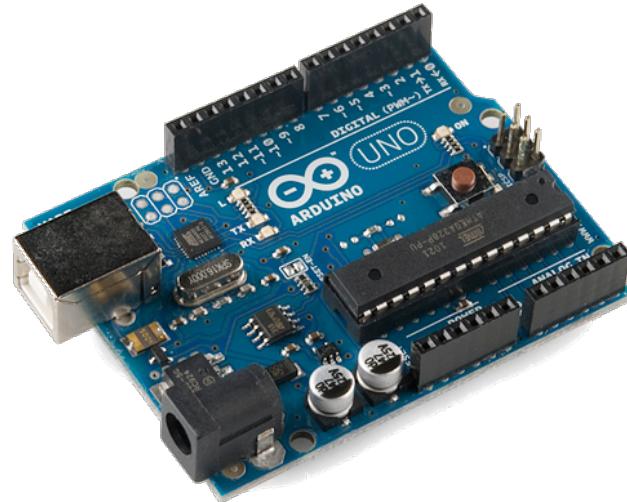
Relay on schematic





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The brains

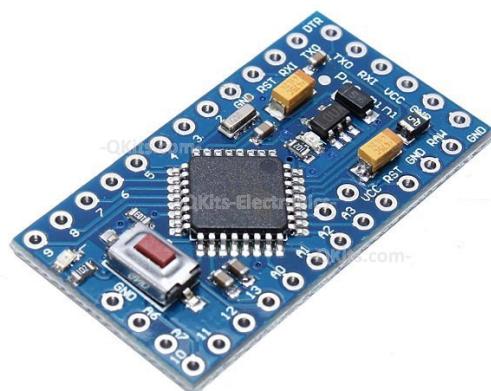
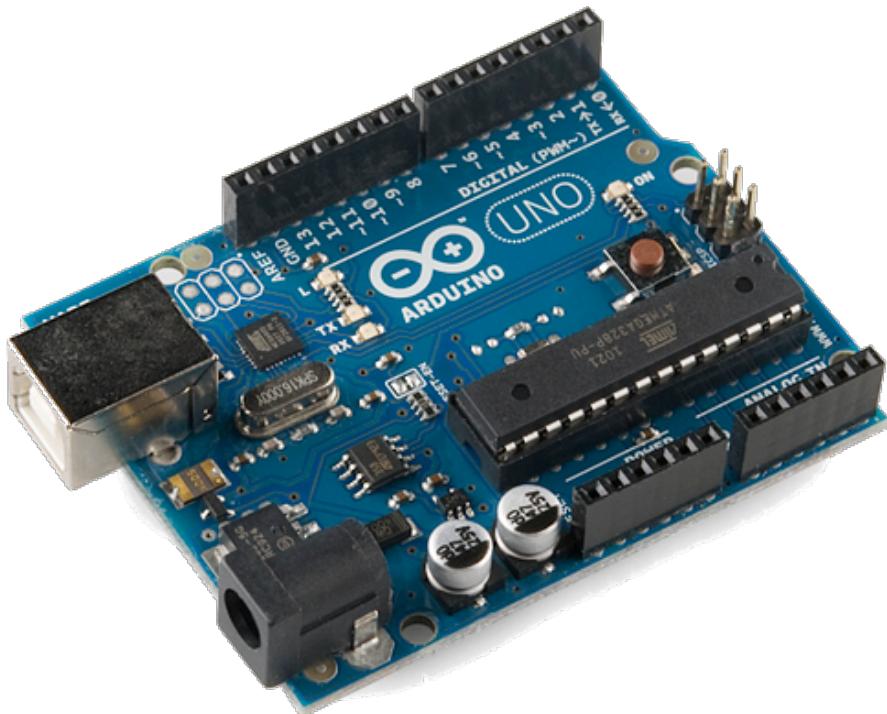


Raspberry pi

- Price \$35 +/-
- Mini Computer
 - Linux, Windows for IOT
 - Multi threading
 - Languages Python..... a ton
- Support
 - Tons of documentation
 - Tons of projects
- Communication
 - Wifi, ethernet, bluetooth
 - USB
 - Digital IO (3VDC)
 - HDMI
 - Audio out



Arduino



- Support
- Samples
- Different form factors
- Digital/Analog
- UART, I2C, SPI
- 5VDC logic

Arduino \$\$



[Hot uno R3 Mega 328P Atmega 16U2 Placa de Desarrollo para Arduino + cable Usb](#)

USD4.49

[¡Cómpralo ahora!](#)

De Hong Kong



76 vendidos



[Mini Usb Nano V3.0 Atmega328p ch340g 5v 16m Microcontrolador Board Arduino](#)

USD2.57

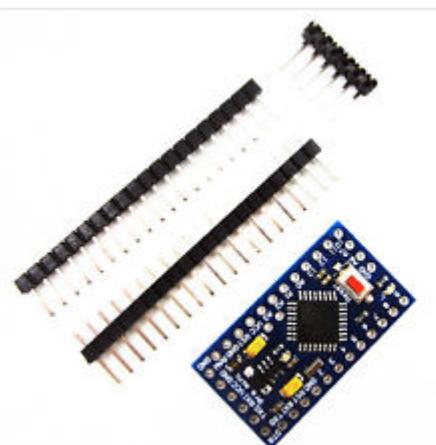
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USD1.71

[o Mejor oferta](#)

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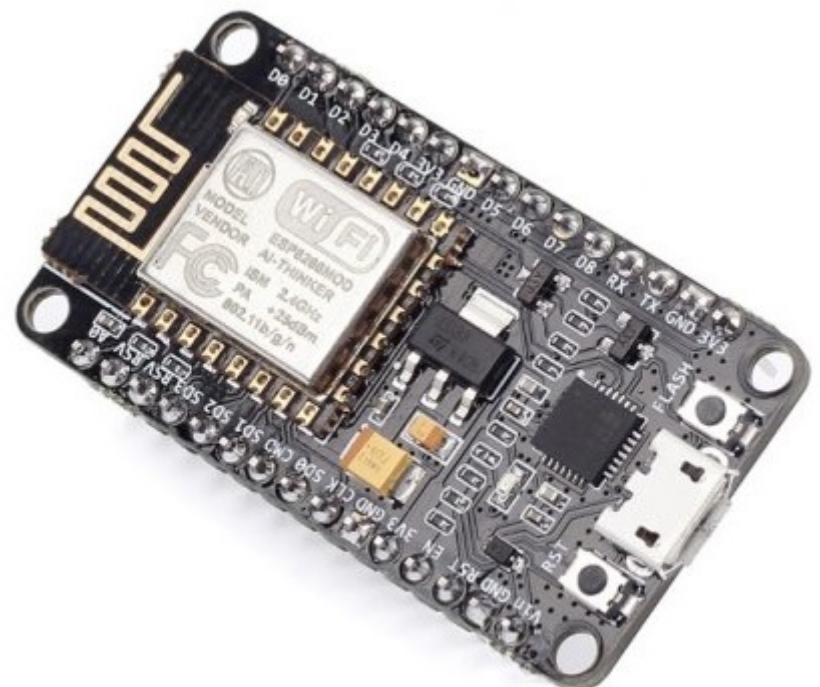


891 vendidos

[Ver más como éste](#)

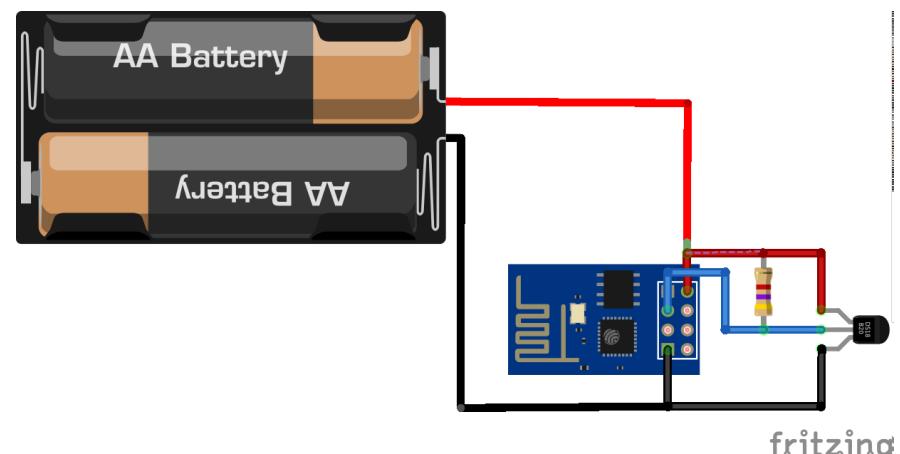
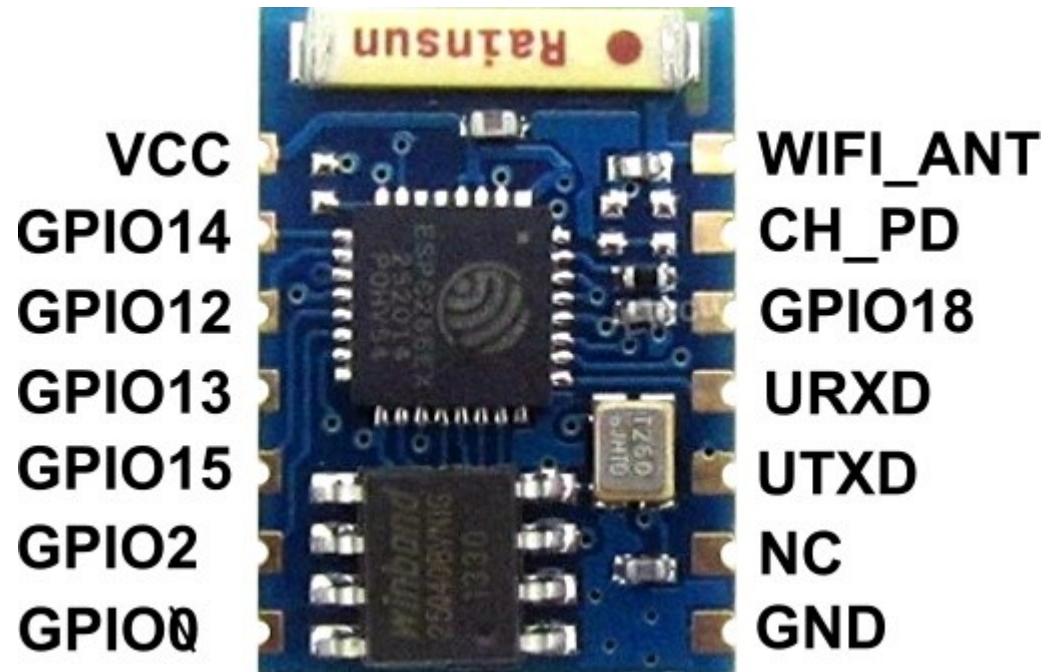
ESP8266

- Wifi 2.4Ghz B,G,N
- Cheap (\$5 +/-)
- Digital IO
- Languages
 - Python, Lua, C
- Uses Arduino platform

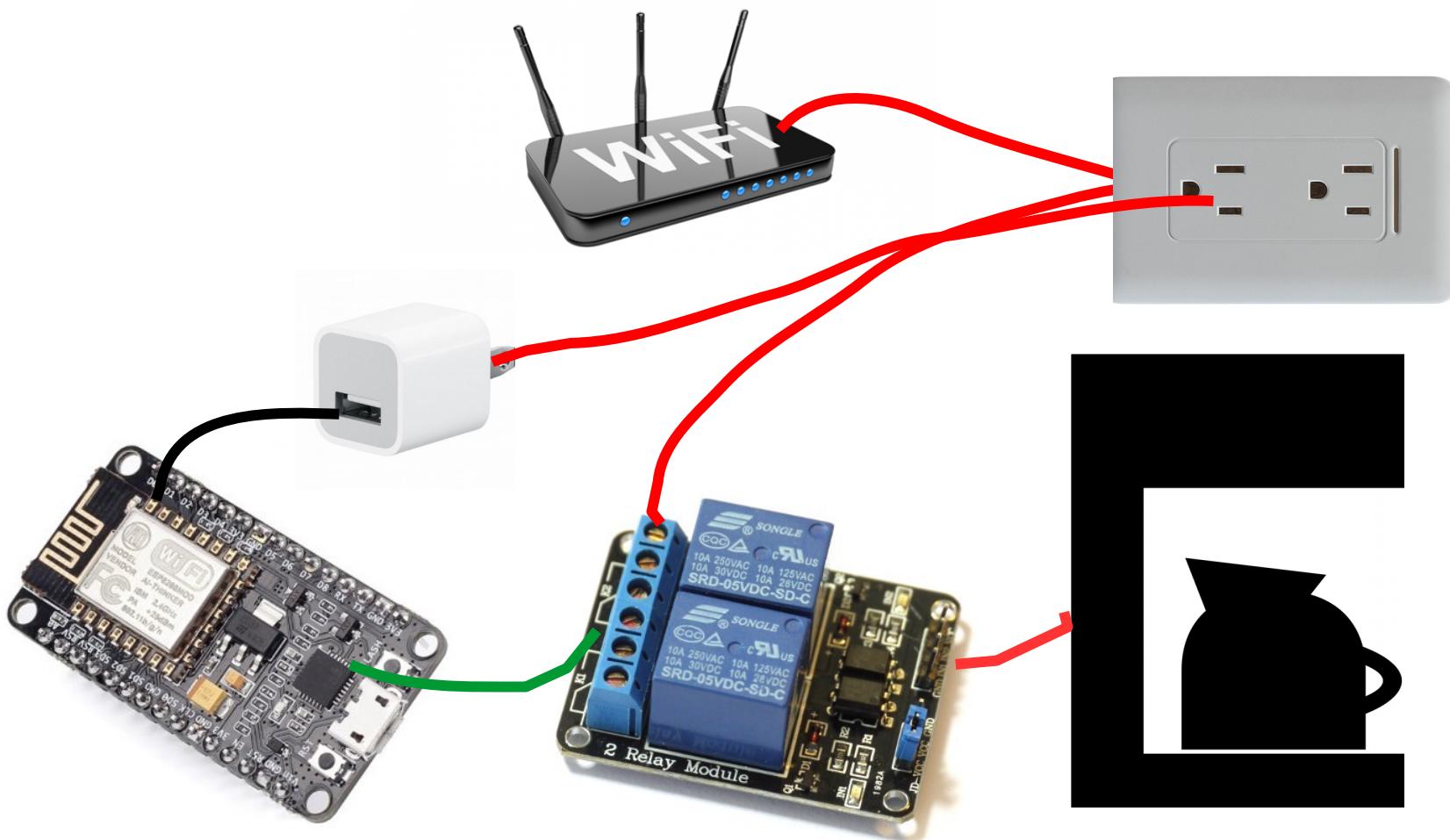


How to get started

- Wifi is cheap
- Multiple options
- ESP8266 < \$5



Wires



Internet Users by Country

- In 2014, nearly 75% (2.1 billion) of all internet users in the world (2.8 billion) live in the top 20 countries.
- The remaining 25% (0.7 billion) is distributed among the other 178 countries, each representing less than 1% of total users.

E-waste

- “according to United Nations University estimates reported by ITU, 67 million metric tons of electrical and electronic equipment were put on the market in 2013. In the same year, 53 million metric tons of e-waste (waste electrical and electronic equipment) were disposed of worldwide.”



Source:

<https://itunews.itu.int/En/4850-E-waste-and-the-Internet-of-Things.note.aspx>