# SMART HOMES

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*03/12/2019 @ Tarragona Developers Meetup*

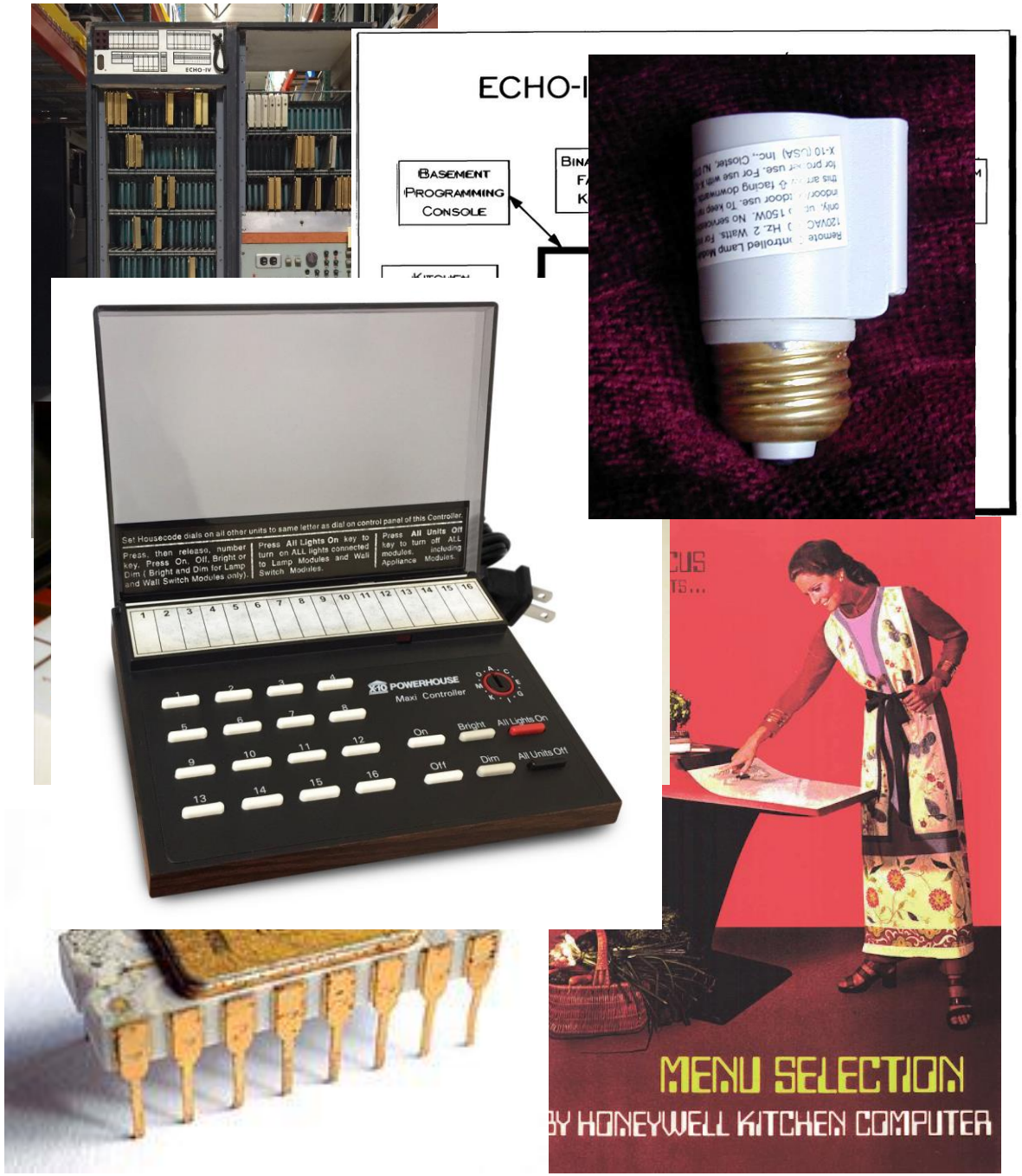
# What is a Smart Home?

- "A dwelling incorporating a **communications network** that connects the key electrical **appliances and services**, and allows them to be **remotely controlled, monitored or accessed**."
  - *"Remotely in this context can mean both **within** the dwelling and from **outside** the dwelling."*

https://www.housinglin.org.uk/_assets/Resources/Housing/Housing_advice/Smart_Home_-_A_definition_September_2003.pdf

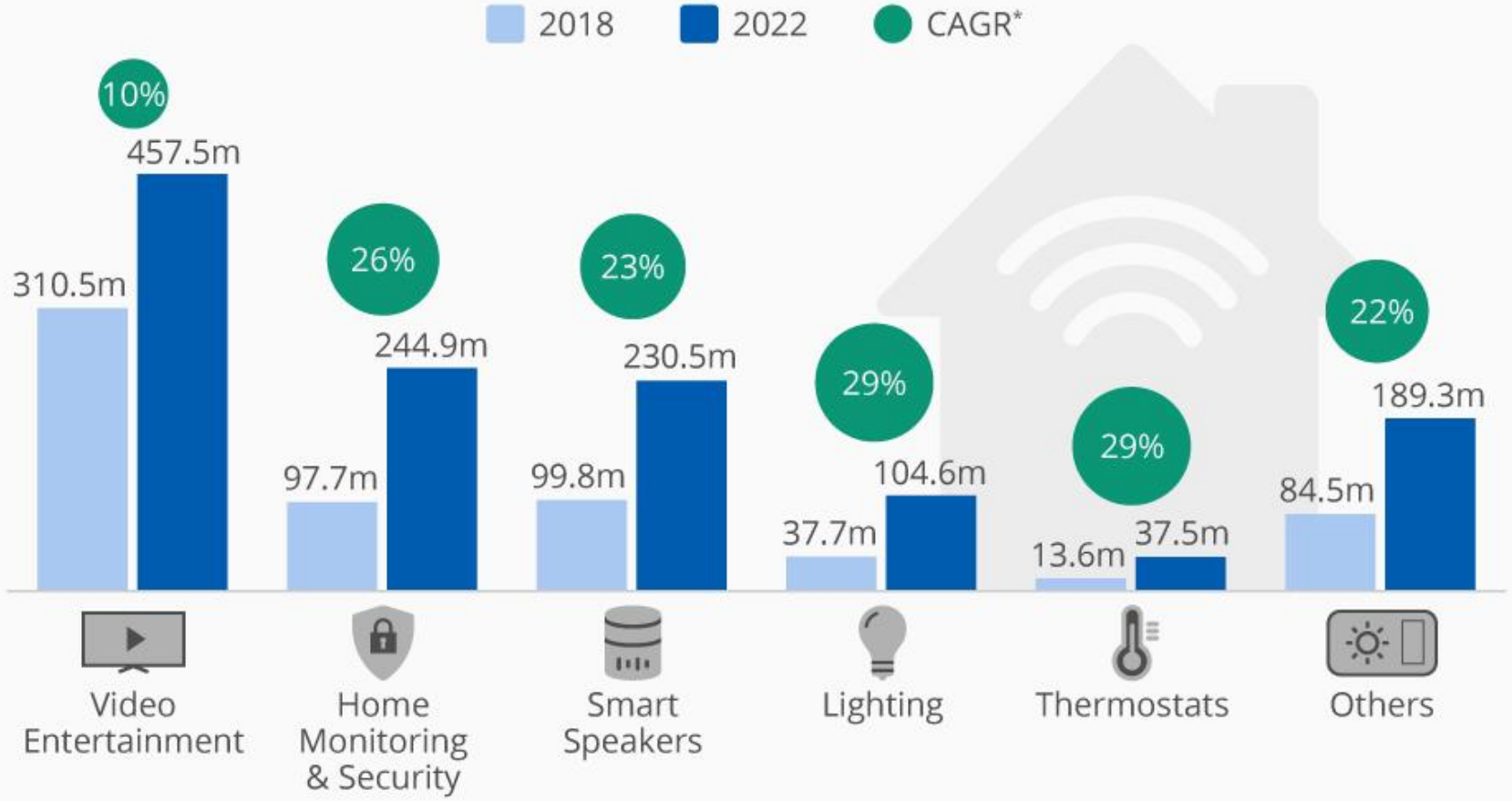
# A bit of history

- 1901–1920: the invention of home appliances
- 1966: Echo IV, the first smart automation system
- 1969: Honeywell Kitchen Computer
- 1971: Intel 4004, the first microprocessor
- 1975: X10, the first general purpose home automation network technology
- 1991: gerontechnology
- early 2000s: smart homes began to increase popularity



# Smart Home Technology Poised for Blockbuster Growth

Forecast of wordwide smart home device shipments, by category (in million units)



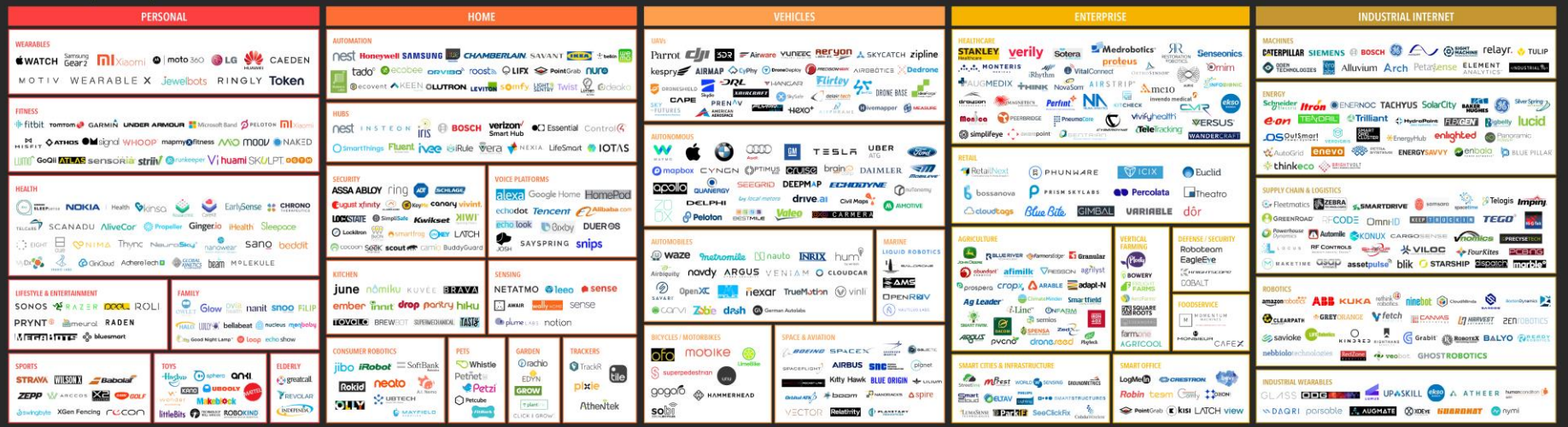

* Compound annual growth rate, i.e. the average annual growth rate for each category between 2018 and 2022

@StatistaCharts

Source: IDC

statista

# Internet of Things Landscape 2018






*Final version, revised and updated as of February 7, 2018*

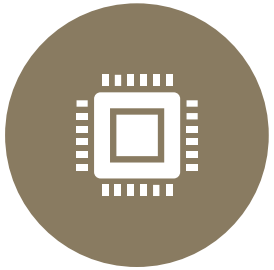
FIRSTMARK
EARLY STAGE VENTURE CAPITAL

# Challenges

- Heavily fragmented platforms
- Very few open and accepted industry standards
- Hard to develop cross-platform solutions
- Security
- Privacy

# Classification

Devices, or things



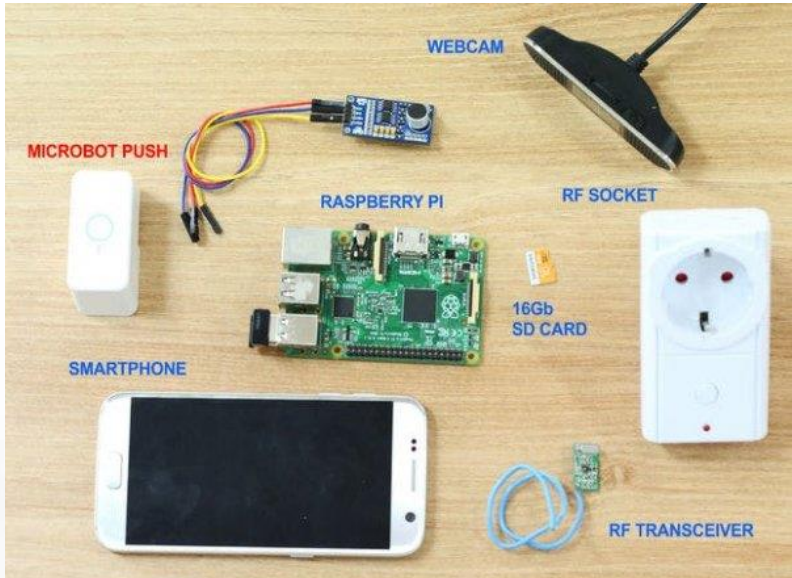
Central hub, or gateway

UI

Protocols

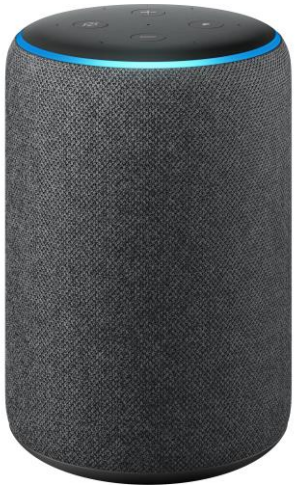
# Devices, or Things

- Products
  - *Lights*
  - *Blinds*
  - *Cameras*
  - *Presence detectors*
  - *Door locks*
  - *Thermostats*
  - *HVAC systems*
  - *Water detectors*
  - *Speakers*
  - *etc…*
- DYI
  - *Arduino*
  - *Raspberry PI*
  - ESP8266
  - RF Socket
  - etc…
- IoT classes:
  - Assumed State
  - Cloud Polling
  - Cloud Push
  - Local Polling
  - Local Push



# Central hub

- Proprietary software, e.g.:
  - *Samsung SmartThings*
  - *Google Home or Nest Hub*
  - *Amazon Echo*
- Open source software, e.g.:
  - *Home Assistant*
  - *OpenHAB*
  - *Domoticz*

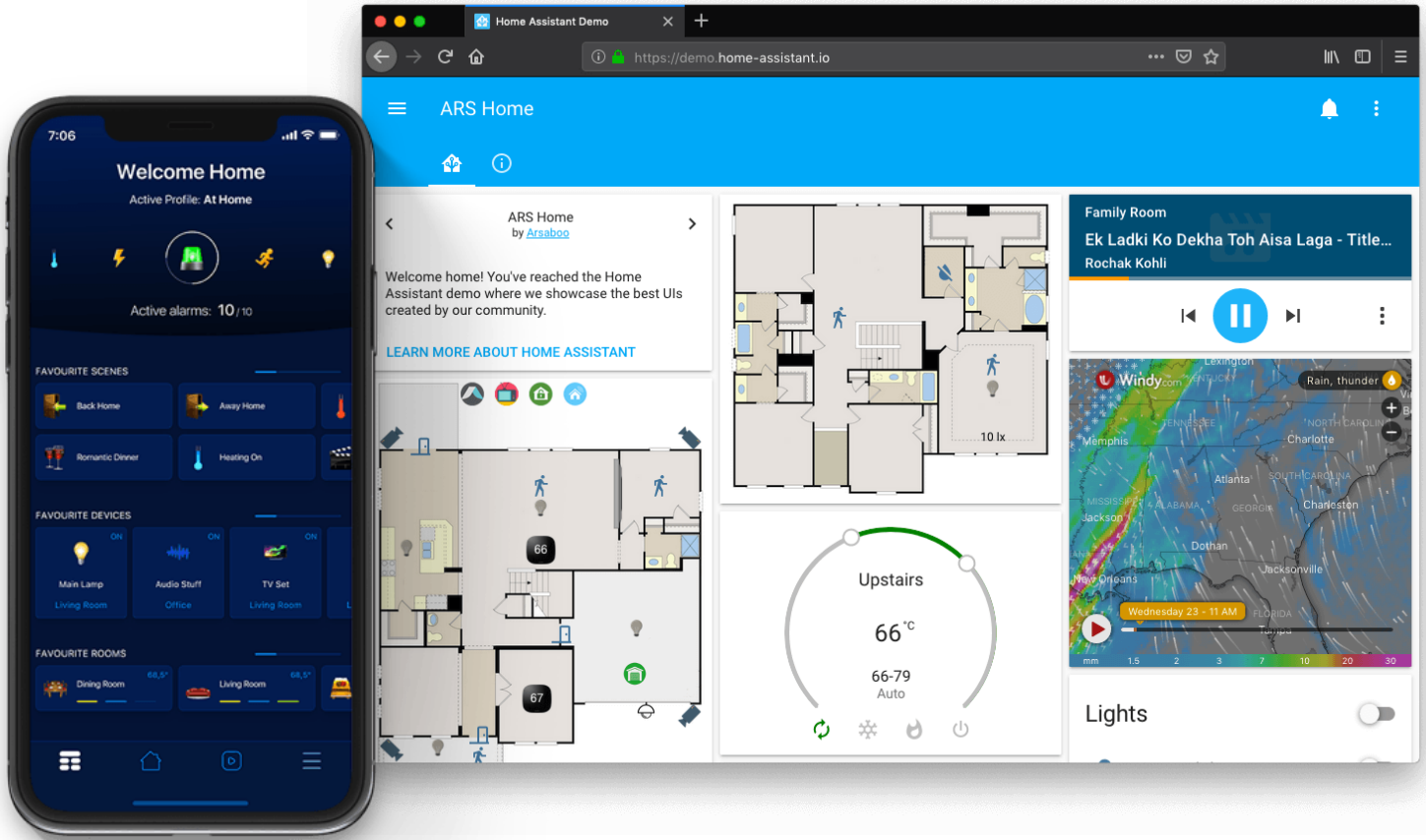



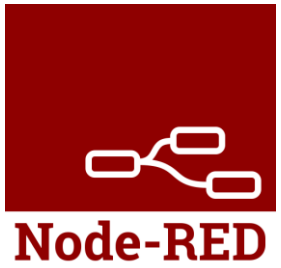
Domoticz
control at your fingertips.

openHAB
empowering the smart home

# UI

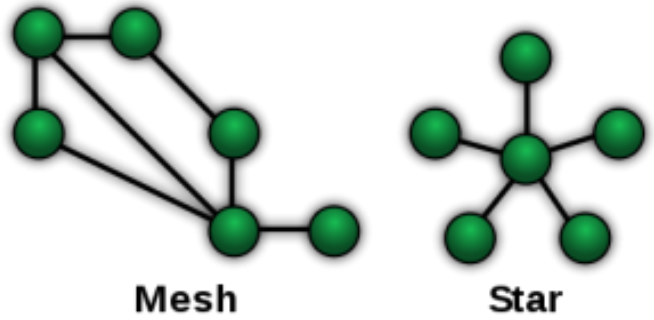
- Web apps
- Mobile apps
- Voice assistants, e.g.:
  - *Google Home*
  - *Amazon Alexa*
- Automation systems, e.g.:
  - *IFTTT*
  - *Node-RED*




Google Assistant

# Protocols




| | Wi Fi | Z-WAVE | zigbee |
|---|---|---|---|
| **Topology** | Star | Mesh | Mesh |
| **Standard** | IEEE 802.11 | Z-Wave Alliance proprietary | IEEE 802.15.4 |
| **Frequency** | 2.4 - 5 GHz | 865 - 926 MHz | 2.4 GHz |
| **Transfer rate** | > 1 GB/s | 20-40 KB/s | 20-250 KB/s |
| **Range** | 10-30 m | 35-100 m | 10-30 m |
| **Power consumption** | High | Very low | Very low |
| **Encryption** | AES 128 | AES 128 | AES 128 |
| **Devices limit** | Unlimited (theoretical) | 232 | 65.000 (theoretical) |
| **Device cost** | € | €€€ | €€ |

# MY HOME SETUP

# Requirements

- No vendor lock-in
- Single app
- Single hub
- Prefer Local over Cloud
  - *data locality*
- Prefer push over pull
- Prefer open source over proprietary
- Prefer non-Wifi devices

# Hub

- Spare Raspberry PI 2
- Home Assistant (Hass.io)
- Aeotec Z-Wave Z-Stick Gen5

https://www.home-assistant.io/hassio/
https://www.amazon.es/Aeotec-Adaptador-USB-GEN5-bater%C3%ADa/dp/B00YETCNOE/

# Lights

- Zemismart WiFi Downlights (Tuya cloud)
- TECKIN WiFi E27 bulbs (Tuya cloud)

- Flashed to Tasmota firmware
  - *MQTT protocol (local push)*



https://www.aliexpress.com/item/32872319062.html
https://www.amazon.es/gp/product/B07GTHMPK5
https://github.com/ct-Open-Source/tuya-convert
https://github.com/arendst/Tasmota

# Blinds

- Fibaro Z-Wave Roller Shutter 3

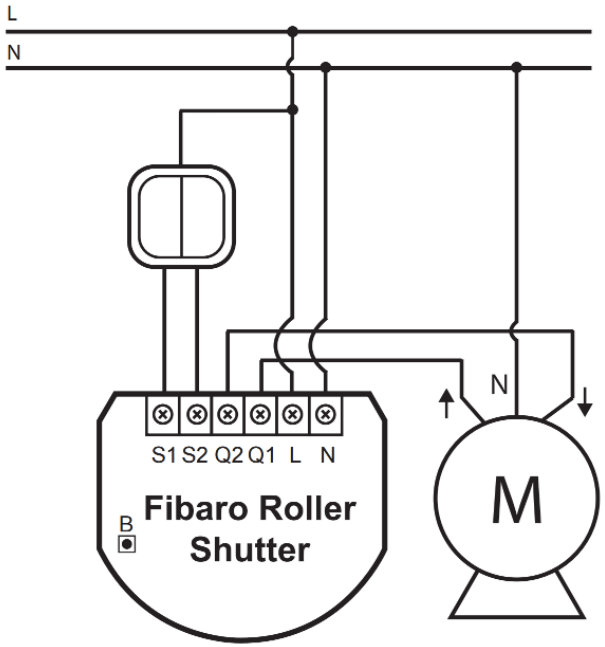




Fig. 1 Roller Shutter wiring diagram

https://www.amazon.es/Fibaro-Roller-Shutter-Controlador-tecnolog%C3%ADa/dp/B07L5S38RN/

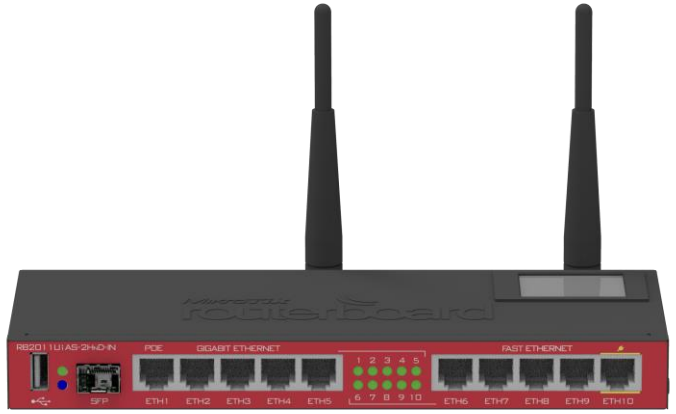
# Heating

- Qubino Z-Wave Flush 1D Relay


https://www.amazon.es/Qubino-ZMNHND1-Potencia-Alimentado-Oculto/dp/B01545A2DK

# Others

- Chromecast
  - *TV*
- Google Home
  - *Music*
  - *Voice commands*
- Set-top box
  - *TV*
- OpenWeather
  - *Sunrise and sunset*
  - *Outside weather (temp., hum., wind)*
  - *Forecast*
- Mikrotik router
  - *DHCP devices*



MikroTik


OpenWeather

# DEMO

# Future work

- Upgrade to Raspberry PI 4
- InfluxDB and Grafana for advanced monitoring and dashboards
- More sensors! (temperature, doors, windows, presence, …)
- Automations

# THANK YOU!

Questions?