Ponencia presentada en:

http://jopes.uni.edu.pe/en/home/

25/Junio/2020

Internet de las Cosas
&
Energía en Edificaciones

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Abraham González Castro

Contenido

1. Internet de las Cosas
2. Energía en Edificaciones
3. ThingsBoard
4. Dispositivos
5. Retos
6. Conclusiones

Internet de las Cosas - IoT - Qué no es...

Internet de las Cosas - IoT - Qué no es...

1. Comunicación de máquina a máquina, i.e. ssh gbv@chilpayatl
2. No es un sistema embebido, i.e. Celular conectado a la nube
3. No es solo IA
4. No es un sistema de adquisición de datos conectado a la nube
5. No es una plataforma de cómputo en la nube

Internet de las Cosas - IoT - Qué **SI** es:

Internet de las cosas

El **internet de las cosas** (en inglés, *Internet of Things*, abreviado *IoT*;[1] IdC, por sus siglas en español [2]) es un concepto que se refiere a una interconexión digital de objetos cotidianos con internet.[3] [4] Es, en definitiva, la conexión de internet más con objetos que con personas.[2] También se suele conocer como *internet de todas las cosas* o *internet en*

INTERCONEXIÓN

INTERACCIÓN

Descripción gráfica del mundo interconectado

Internet de las Cosas

Conectividad

Sensores

Interacción

AI

Visualización

Automatización

Protección de datos

Energía en Edificaciones

- 4,700 kWh per capita en el mundo
- Canadá: 20,000 kWh per capita
- México: 2,500 kWh per capita (18% Total de energía de acuerdo al Balance Nacional de Energía SENER 2017)
- 44% de la energía eléctrica en edificaciones corresponde a uso de aire acondicionado cuando se requiere

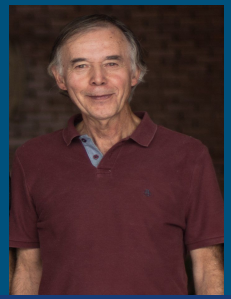
Energía en Edificaciones

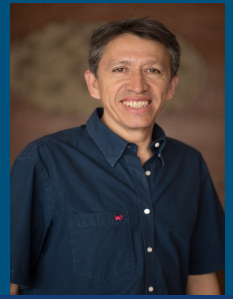
- México: 70% del territorio se puede alcanzar el confort higrotérmico sin uso de aire acondicionado
- Diseño bioclimático es clave
- Especialistas en diseño bioclimático y transferencia de calor:
  - EnergyPlus
  - Análisis de datos
  - Sistemas de bajo consumo de energía
  - IoT

ENERGY IN BUILDINGS

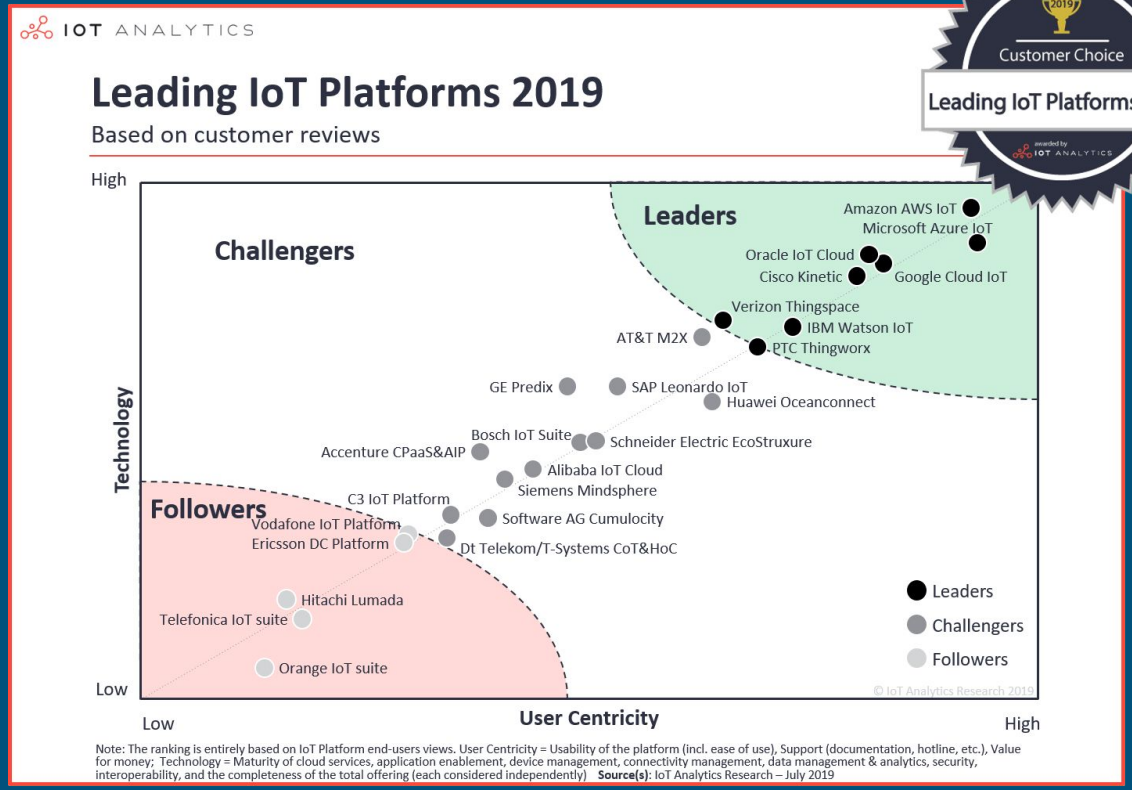
Hygrothermal comfort | Energy efficiency

gee.ier.unam.mx





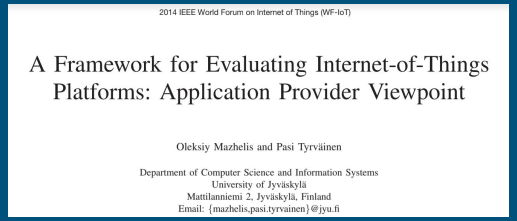
Cuál plataforma IoT



Cuál plataforma IoT


Future Generation Computer Systems

IoT big data analytics for smart homes with fog and cloud computing


2014 IEEE World Forum on Internet of Things (WF-IoT)

A Framework for Evaluating Internet-of-Things Platforms: Application Provider Viewpoint

Oleksiy Mazhelis and Pasi Tyrväinen

Department of Computer Science and Information Systems
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Mattilanniemi 2, Jyväskylä, Finland
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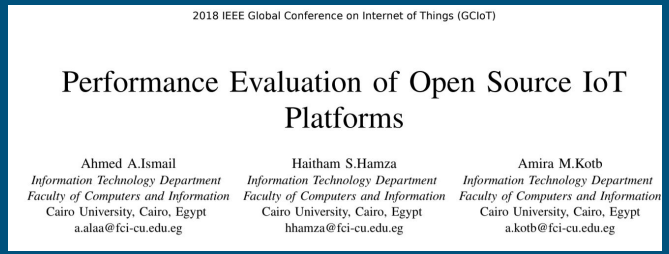
Future Generation Computer Systems

IoT big data analytics for smart homes with fog and cloud computing


2018 IEEE Global Conference on Internet of Things (GCIoT)

Performance Evaluation of Open Source IoT Platforms

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Automation in Construction

journal homepage: www.elsevier.com/locate/autcon

Adopting Internet of Things for the development of smart buildings: A review of enabling technologies and applications

Mengda Jia[a,*], Ali Komeily[a], Yueren Wang[b], Ravi S. Srinivasan[a]

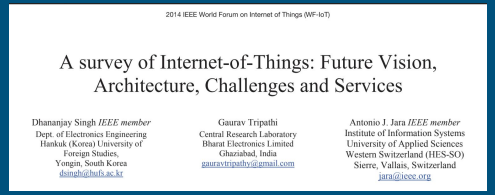
[a] *M.E. Rinker, Sr. School of Construction Management, University of Florida, Gainesville, FL 32611, USA*
[b] *Microsoft Corporation, Redmond, WA 98052, USA*


Engineering Science and Technology, an International Journal

Review

Network optimizations in the Internet of Things: A review

N.N. Srinidhi[*], S.M. Dilip Kumar, K.R. Venugopal


2014 IEEE World Forum on Internet of Things (WF-IoT)

A survey of Internet-of-Things: Future Vision, Architecture, Challenges and Services

Dhananjay Singh *IEEE member*
Dept. of Electronics Engineering
Hankuk (Korea) University of Foreign Studies,
Yongin, South Korea
dsingh@hufs.ac.kr

Gaurav Tripathi
Central Research Laboratory
Bharat Electronics Limited
Ghaziabad, India
gauravtripathy@gmail.com

Antonio J. Jara *IEEE member*
Institute of Information Systems
University of Applied Sciences
Western Switzerland (HES-SO)
Sierre, Vallais, Switzerland
jara@ieee.org


2018 Twelfth International Conference on Sensing Technology (ICST)

Smart Building Based on Internet of Things Technology

Nicolas Havard
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nicolas.havard@polytech-lille.net

Sean McGrath[1], Colin Flanagan[2], Ciaran MacNamee[3]
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Contents lists available at ScienceDirect

Computer Communications

journal homepage: www.elsevier.com/locate/comcom

A gap analysis of Internet-of-Things platforms

Julien Mineraud[a,*], Oleksiy Mazhelis[b], Xiang Su[c], Sasu Tarkoma[a]

[a] *Department of Computer Science, University of Helsinki, Finland*
[b] *Department of Computer Science and Information Systems, University of Jyväskylä, Finland*
[c] *Center for Ubiquitous Computing, University of Oulu, Finland*

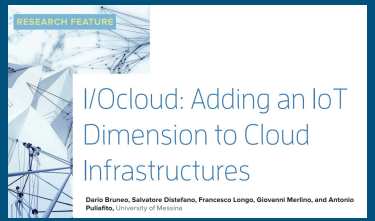

Engineering Science and Technology, an International Journal

Review

Network optimizations in the Internet of Things: A review

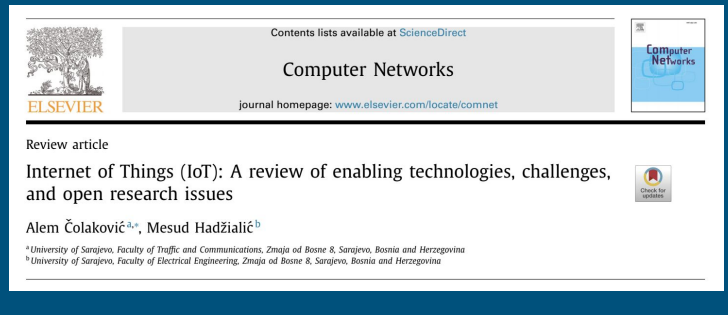
N.N. Srinidhi[*], S.M. Dilip Kumar, K.R. Venugopal


Review of Internet of Things (IoT) in Electric Power and Energy Systems


RESEARCH FEATURE

I/Ocloud: Adding an IoT Dimension to Cloud Infrastructures

Dario Bruneo, Salvatore Distefano, Francesco Longo, Giovanni Merlino, and Antonio Puliafito, University of Messina


Contents lists available at ScienceDirect

Computer Networks

journal homepage: www.elsevier.com/locate/comnet

Review article

Internet of Things (IoT): A review of enabling technologies, challenges, and open research issues

Alem Čolaković[a,*], Mesud Hadžialić[b]

[a] *University of Sarajevo, Faculty of Traffic and Communications, Zmaja od Bosne 8, Sarajevo, Bosnia and Herzegovina*
[b] *University of Sarajevo, Faculty of Electrical Engineering, Zmaja od Bosne 8, Sarajevo, Bosnia and Herzegovina*

Cuál plataforma IoT

- Documentación
- Actualizada
- Vigente
- Dispositivos heterogéneos
- Arquitectura
- OpenSource

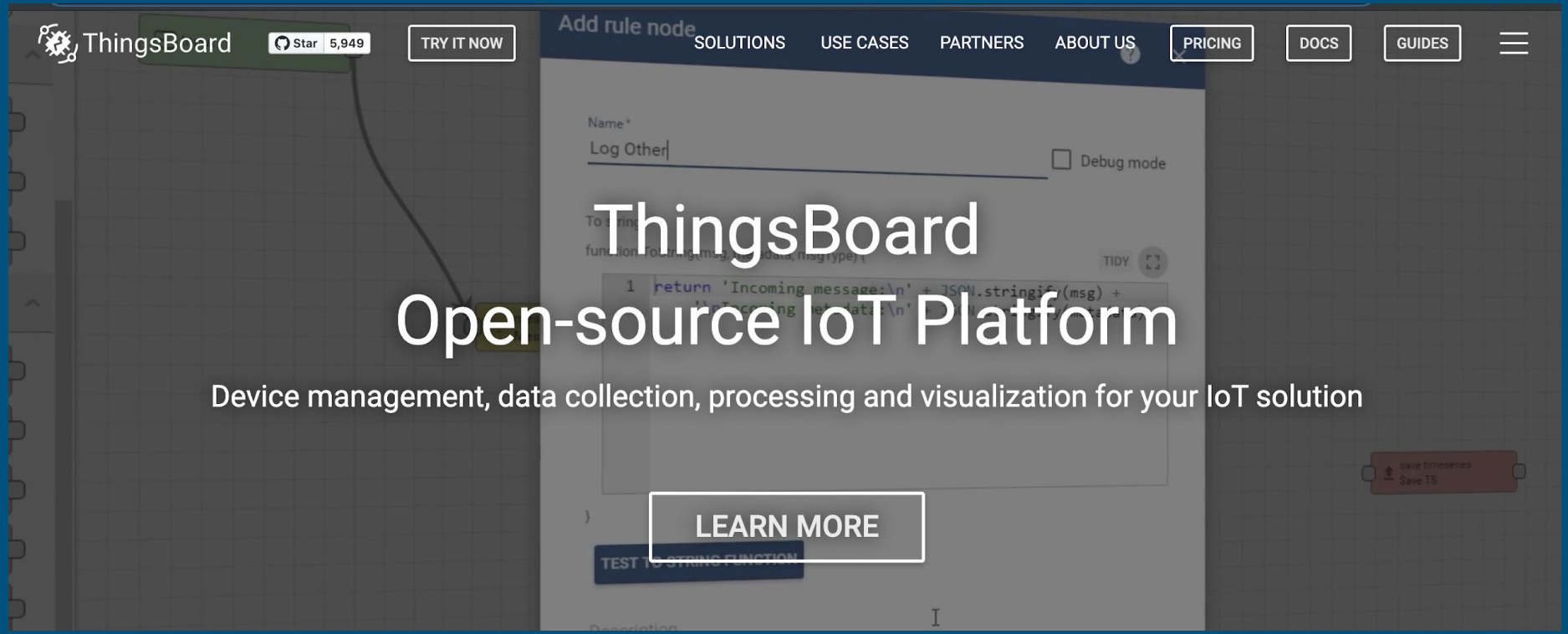
- Escalabilidad
- Dispositivos heterogéneos
- REST
- Lenguaje
- Costo
- Seguridad

Cuál plataforma IoT

	Plataformas gratuitas		
1	FIWARE	https://www.fiware.org/about-us/	No
2	OpenMTC	https://www.openmtc.org/	Si
3	SiteWhere	https://sitewhere.io/	Si
4	Arduino IoT Cloud	https://auth.arduino.cc/login/	No
5	CloudFoundry	https://www.cloudfoundry.org/	No
6	Thingsboard	https://thingsboard.io/	Si
7	Nimbits		
8	Open IoT	https://openiot.in/	No
9	RealTime.io	http://realtime.io/	Si
10	TempoiQ*	https://www.tempoiq.com/	No
11	IFTTT	https://ifttt.com/collections/iot	
12	Cayenne	https://mydevices.com/	Si
13	Carriots	https://www.altairsmartworks.com/index.	No
14	Eclipse	https://iot.eclipse.org/	Si

Más de 40 opciones

https://thingsboard.io/

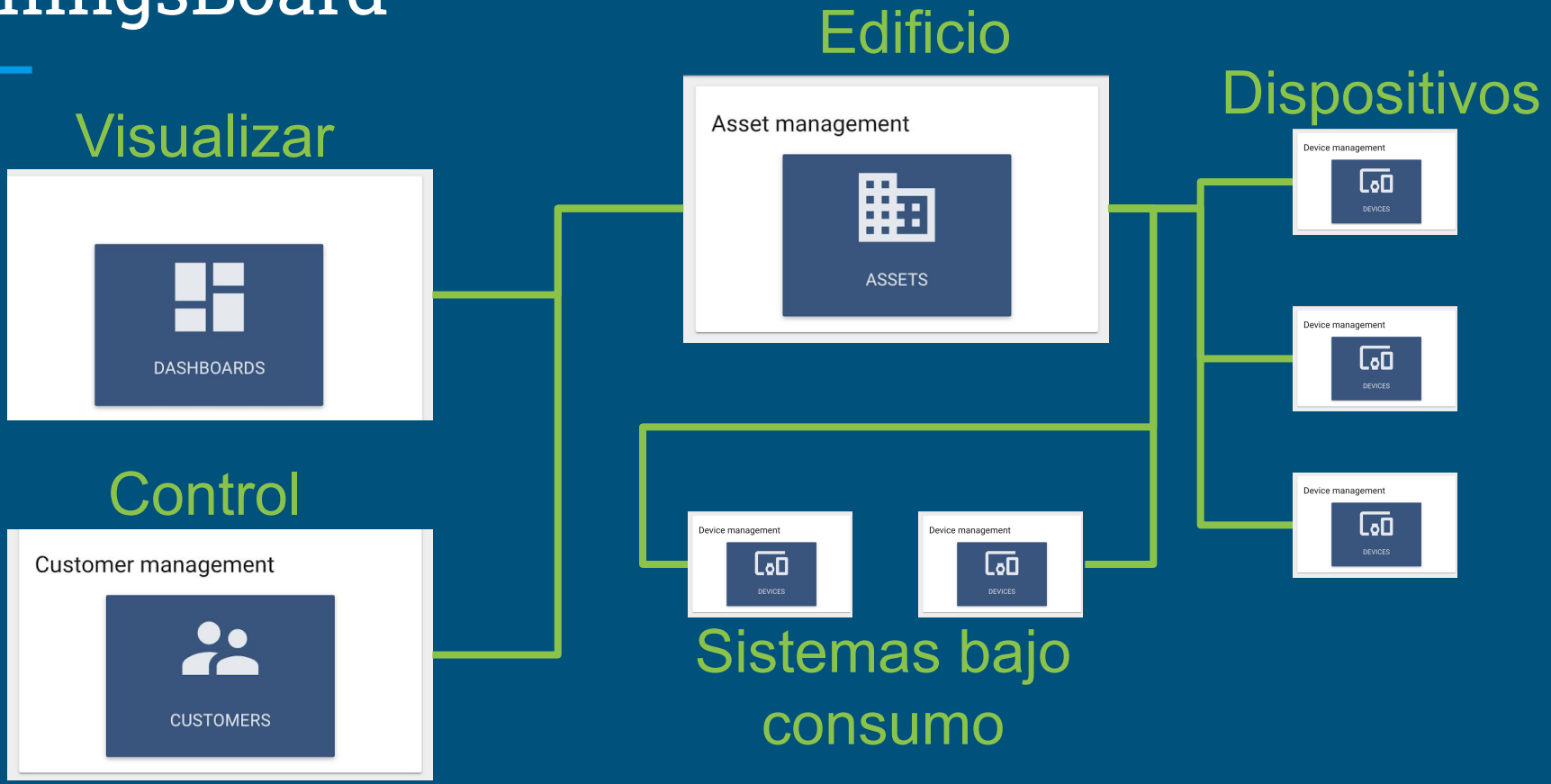


ThingsBoard https://thingsboard.io/

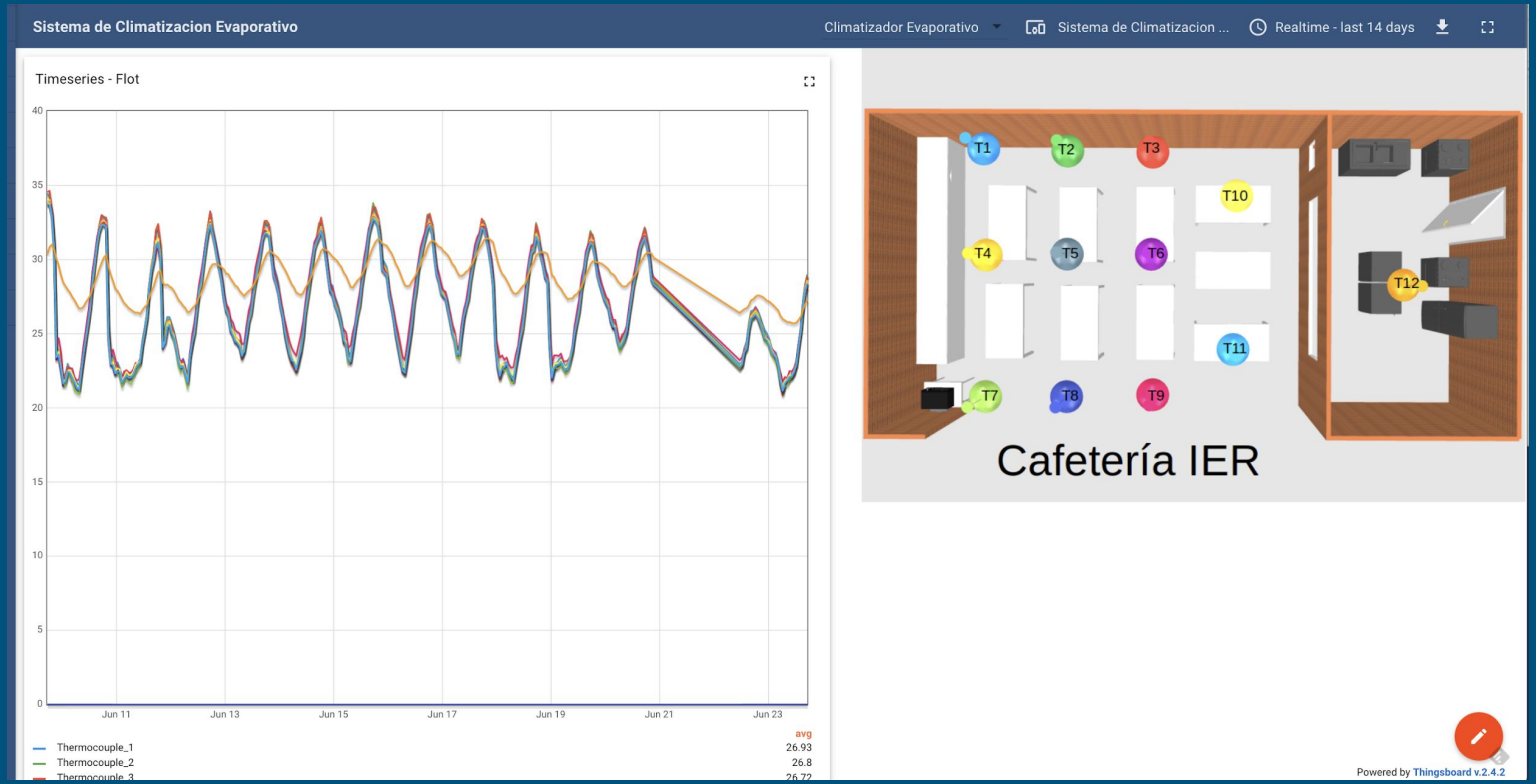
- OpenSource
- Documentado
- En desarrollo
- Multiplataforma
- Multiples dispositivos
- MQTT broker
- Se puede instalar en una Raspberry Pi 3

ThingsBoard https://thingsboard.io/

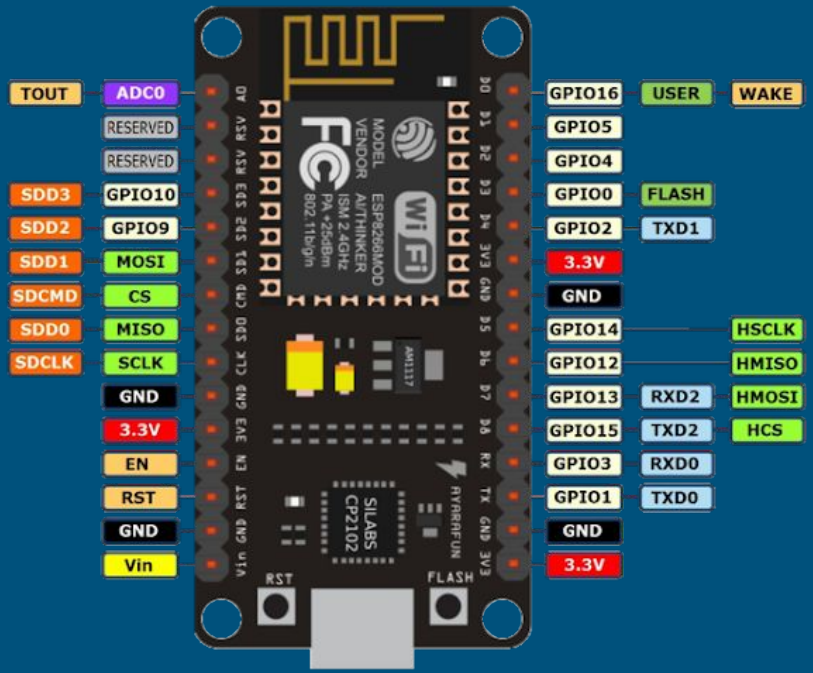
ThingsBoard



ThingsBoard



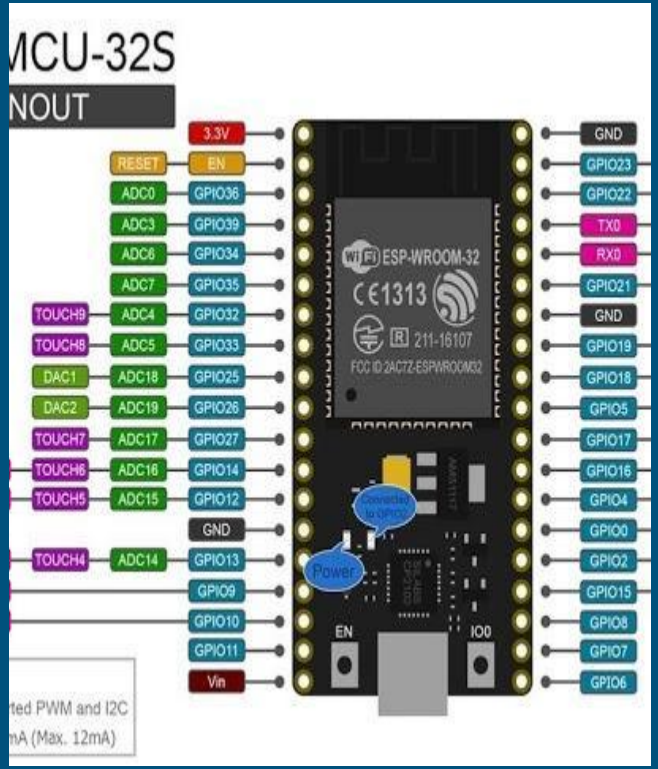
Dispositivos



Las especificaciones del ESP8266 son:

- CPU RISC de 32-bit: Tensilica Xtensa LX106 a un reloj de 80 MHz
- RAM de instrucción de 64 KB, RAM de datos de 96 KB
- Capacidad de memoria externa flash QSPI - 512 KB a 4 MB* (puede soportar hasta 16 MB)
- IEEE 802.11 b/g/n Wi-Fi
  - Tiene integrados: TR switch, balun, LNA, amplificador de potencia de RF y una red de adaptación de impedancias
  - Soporte de autenticación WEP y WPA/WPA2
- 16 pines GPIO (Entradas/Salidas de propósito general)
- SPI, I²C,
- Interfaz I²S con DMA (comparte pines con GPIO)
- Pines dedicados a UART, mas una UART unicamente para transmisión que puede habilitarse a través del pin GPIO2
- 1 conversor ADC de 10-bit

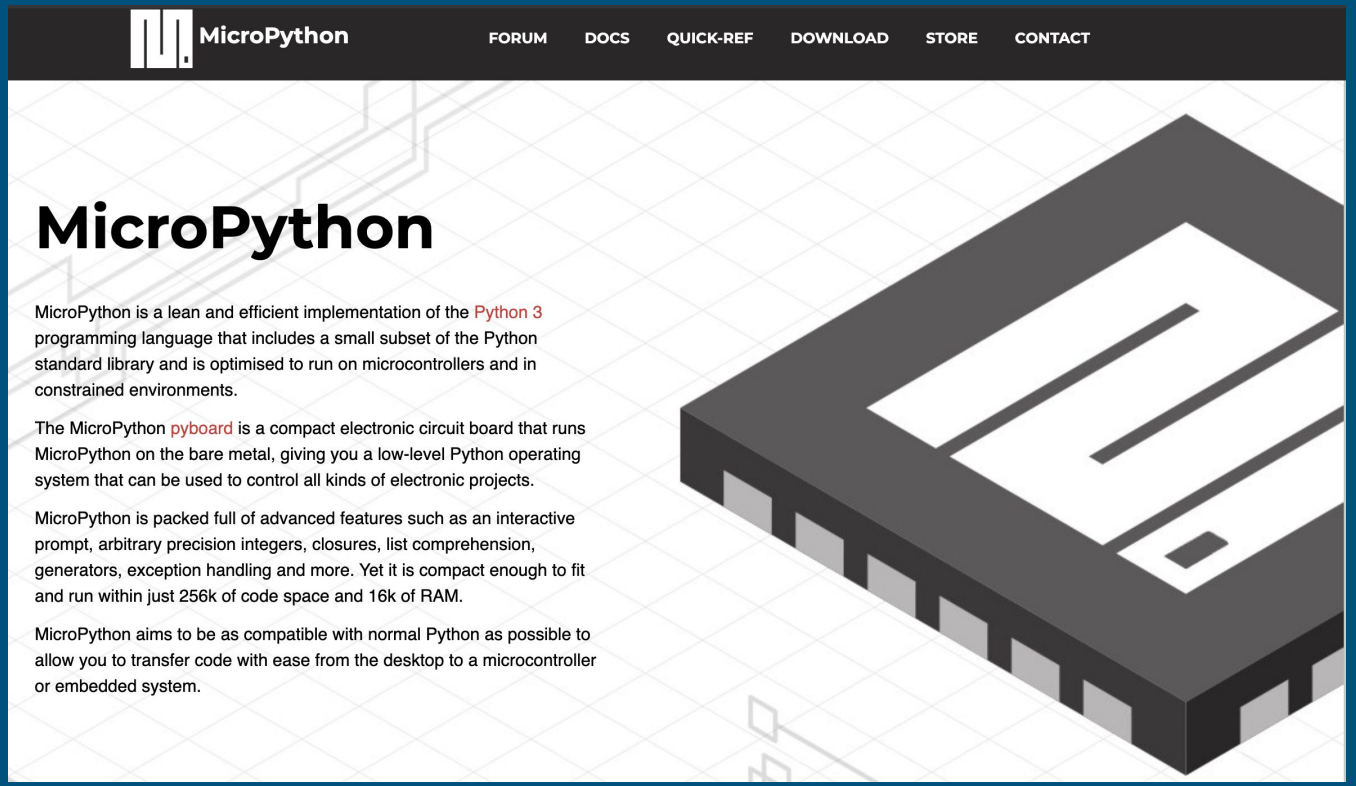
Dispositivos



Las especificaciones del ESP32 son:

- CPU: Xtensa dual-core (or single-core) 32-bit LX6 microprocessor, operating at 160 or 240 MHz and performing at up to 600 DMIPS
  - Ultra low power (ULP) co-processor
- Memory: 520 KiB SRAM
- Wireless connectivity:
  - Wi-Fi: 802.11 b/g/n
  - Bluetooth: v4.2 BR/EDR and BLE
- Peripheral interfaces:
  - 12-bit SAR ADC up to 18 channels
  - 2 × 8-bit DACs
  - 10 × touch sensors (capacitive sensing GPIOs)
  - Temperature sensor
  - 4 × SPI
  - 2 × I²S interfaces
  - 2 × I²C interfaces
  - 3 × UART
  - SD/SDIO/CE-ATA/MMC/eMMC host controller
  - SDIO/SPI slave controller
  - Ethernet MAC interface with dedicated DMA and IEEE 1588 Precision Time Protocol support
  - CAN bus 2.0
  - Infrared remote controller (TX/RX, up to 8 channels)
  - Motor PWM
  - LED PWM (up to 16 channels)
  - Hall effect sensor
  - Ultra low power analog pre-amplifier

Dispositivos



Dispositivos: El futuro es MicroPython

ARDUINO

STORE SOFTWARE EDUCATION PRO RESOURCES COMMUNITY HELP

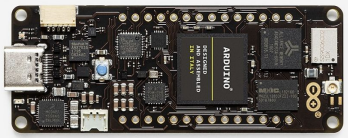
Learn about Arduino Response to the COVID-19 outbreak

STORE SOFTWARE EDUCATION PRO RESOURCES COMMUNITY HELP

PORTENTA H7

Code: ABX00042

Barcode: 7630049202252



$103.40

tax not included

Quantity: 1

ADD TO CART

PRE-ORDER

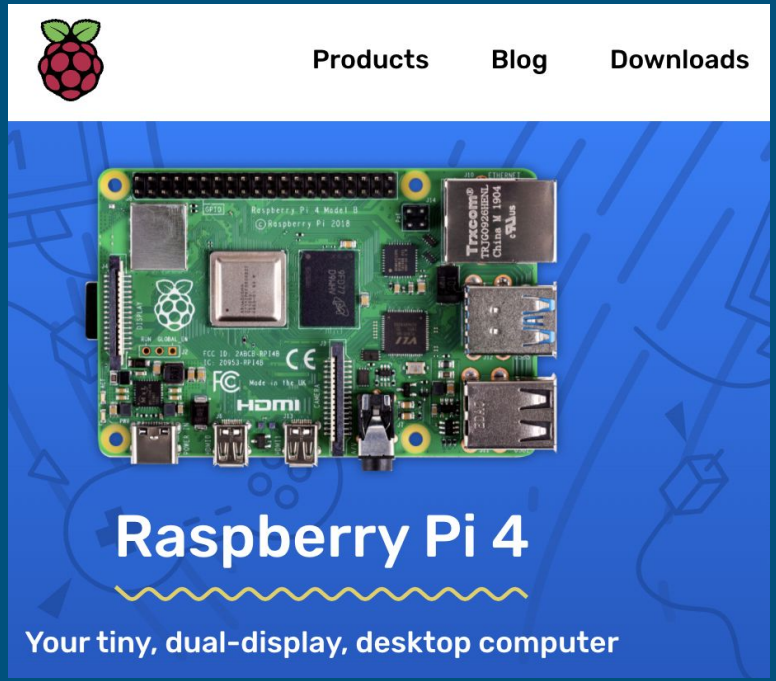
Add to Wishlist

Two Parallel Cores

H7's main processor is the dual core STM32H747 including a Cortex® M7 running at 480 MHz and a Cortex® M4 running at 240 MHz. The two cores communicate via a *Remote Procedure Call* mechanism that allows calling functions on the other processor seamlessly. Both processors share all the in-chip peripherals and can run:

- Arduino sketches on top of the Arm® Mbed™ OS
- Native Mbed™ applications
- MicroPython / JavaScript via an interpreter
- TensorFlow™ Lite

Dispositivos



- OpenHardware
- Linux
- Python
- C
- Arduino
- PoE
- Puede correr ThingsBoard!

Dispositivos

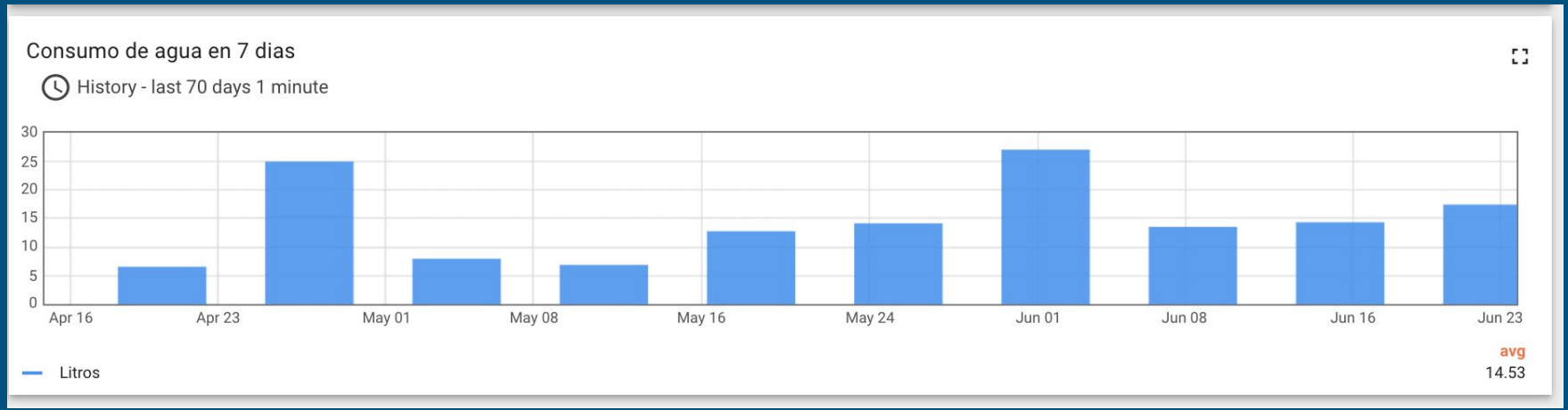
THIS: **T**emperatura **H**umedad **I**luminación y **S**onido

- RaspBerry Pi 3
- Python
- Sensor de humedad relativa
- Sensor de temperatura
- Sensor de presión acústica
- Cámara

Dispositivos

H20: Consumo de agua

- ESP8266
- MicroPython
- Sensor de volumen YF-S201

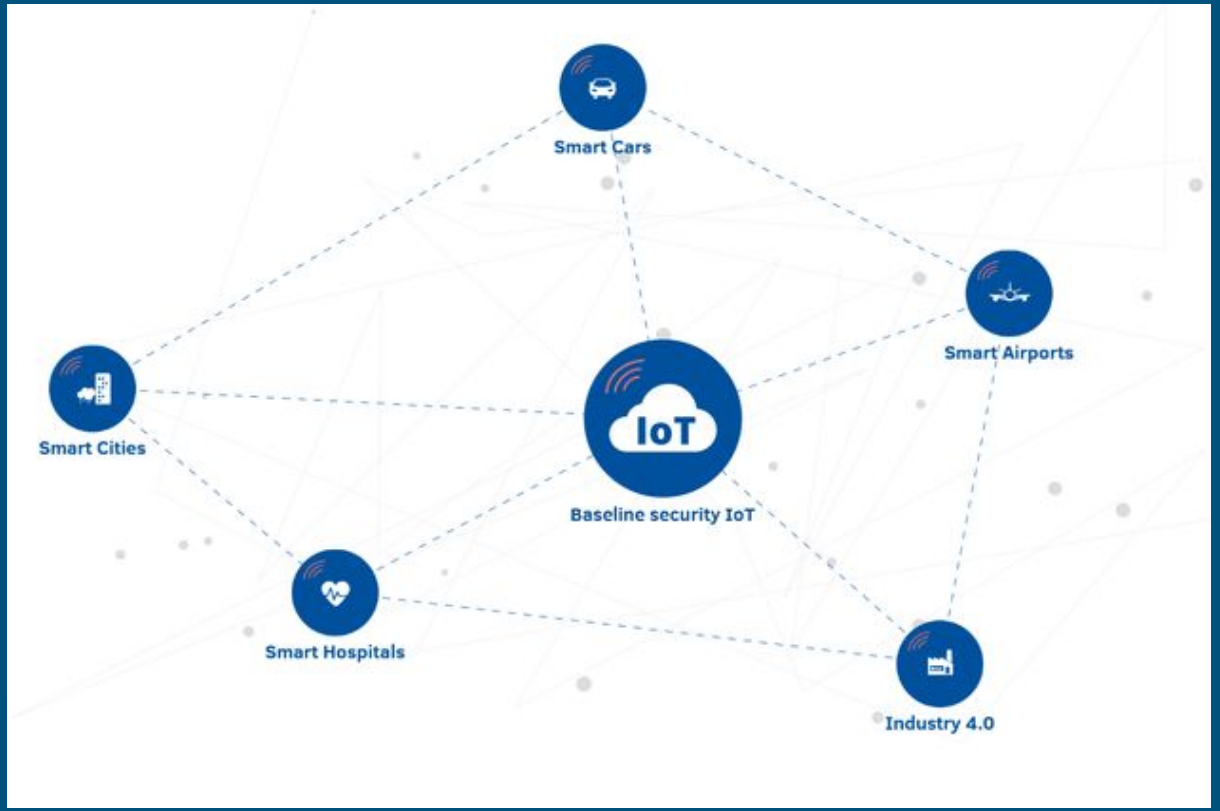


Dispositivos

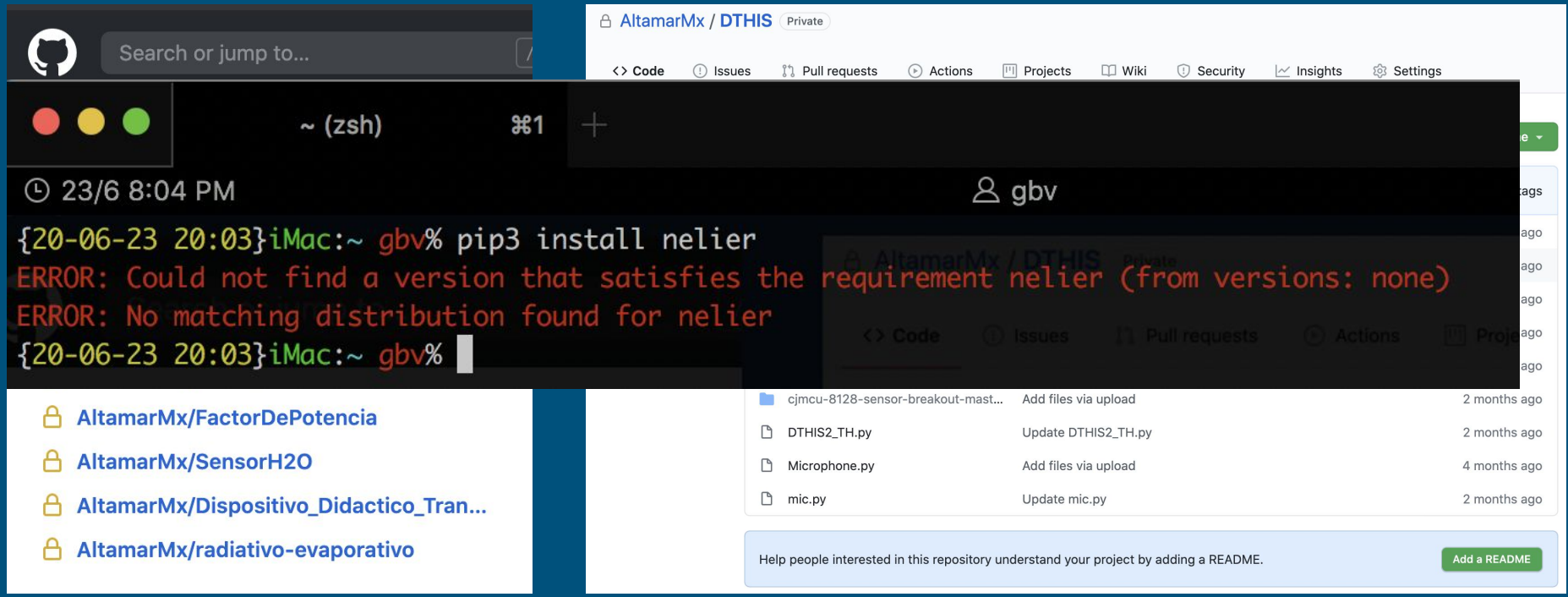
E: Consumo eléctrico

- Arduino UNO o Arduino Mega + ESP12
- Sensor voltaje ZMPT101B
- Sensor corriente SCT–013

Retos

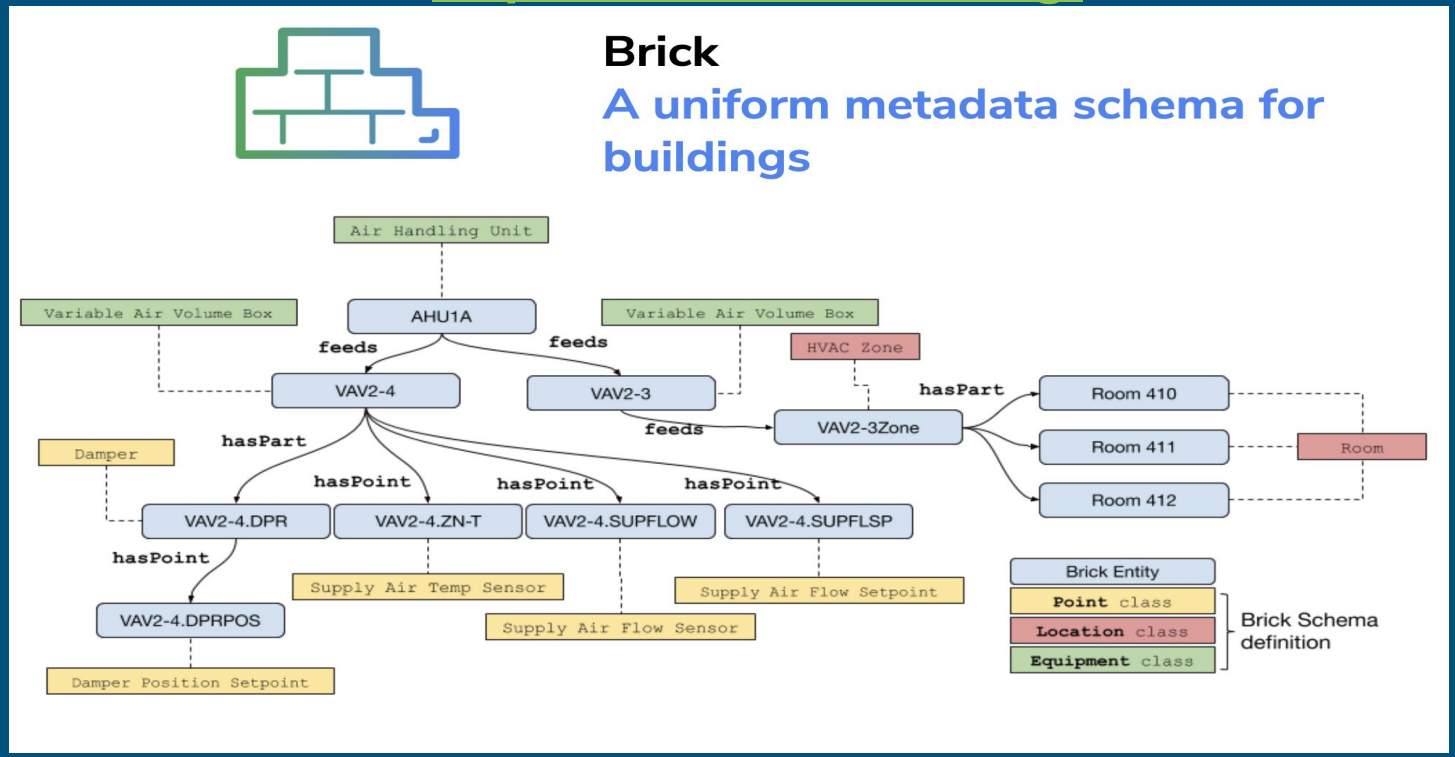

Smart Cars
Smart Airports
Smart Cities
IoT
Baseline security IoT
Smart Hospitals
Industry 4.0

Retos


Search or jump to...
~ (zsh) ⌘1
23/6 8:04 PM
gbv
{20-06-23 20:03}iMac:~ gbv% pip3 install nelier
ERROR: Could not find a version that satisfies the requirement nelier (from versions: none)
ERROR: No matching distribution found for nelier
{20-06-23 20:03}iMac:~ gbv%
AltamarMx/FactorDePotencia
AltamarMx/SensorH2O
AltamarMx/Dispositivo_Didactico_Tran...
AltamarMx/radiativo-evaporativo
AltamarMx / DTHIS
Private
Code
Issues
Pull requests
Actions
Projects
Wiki
Security
Insights
Settings
cjmcu-8128-sensor-breakout-mast...
Add files via upload
2 months ago
DTHIS2_TH.py
Update DTHIS2_TH.py
2 months ago
Microphone.py
Add files via upload
4 months ago
mic.py
Update mic.py
2 months ago
Help people interested in this repository understand your project by adding a README.
Add a README

Retos

https://brickschema.org/



Conclusiones

1. IoT con ThingsBoard
2. Adquisición de datos, automatización, AI
3. Detección de fugas
4. Mejora de hábitos
5. Visualización en tiempo real

Dr. Guillermo Barrios del Valle
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