

Ensuring Wellness with Energy Efficiency

Aldo D'Aquino

Samuele Sabella

Domenico Tortorella



The problem

- ▶ Comfort
 - ▷ optimal room conditions
 - ▷ targetable on user needs
- ▶ Efficiency
 - ▷ monitoring room occupancy
 - ▷ hold on when there's no one to comfort... (!)

Our objectives



Plug and play



Scalable

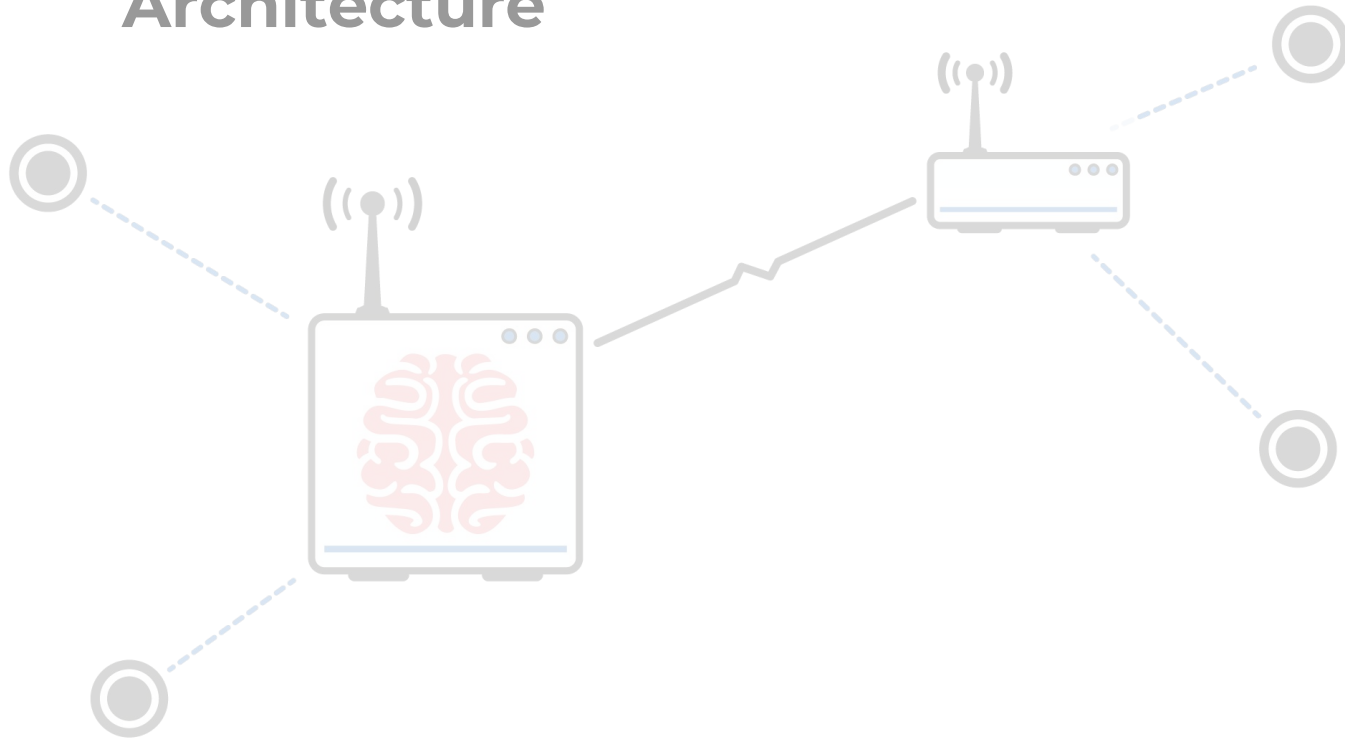


Reliable

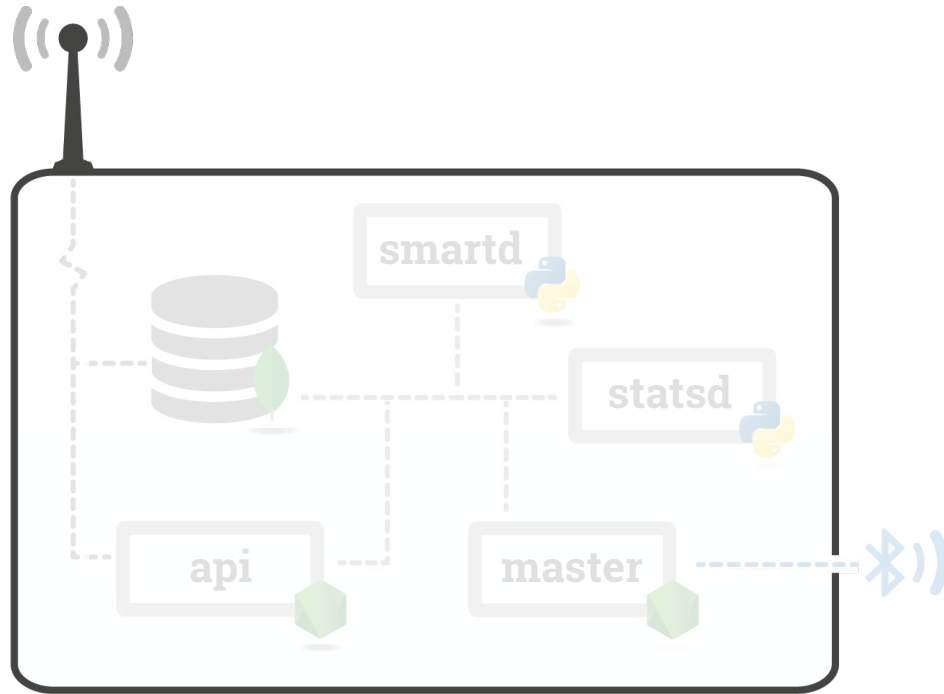
Areas

- ▶ Consumer
 - ▷ home, sweet home
- ▶ Business
 - ▷ office, sweet office
 - ▷ commercial centres
 - ▷ hotels
 - ▷ hospitals
 - ▷ ...

Architecture



Software components





Compatible devices

- ▶ Bluetooth LE, GATT profile
- ▶ Supported services
 - ▷ Automation IO (0x1815)

Temperature (°C)	0x2A1F	Blink (actuator)	0x2B01
Illuminance (lx)	0x2A77	Illumination switch	0x2B77
...

- ▷ more to come...

Concepts

- ▶ Devices are grouped in rooms
- ▶ Each room has its own policy
- ▶ Policies define the desired conditions when the room is occupied or free



Rest APIs

- ▶ Room management
 - ▷ Create and delete rooms
 - ▷ Bind devices to rooms
 - ▷ Monitor rooms and home
- ▶ Policy configuration
 - ▷ Set policy values
- ▶ Statistics
 - ▷ Get daily statistics, hour by hour
- ▶ Low-level device access
 - ▷ Read and write device attributes

Setup

- ▶ Plug the brain
 - ▶ Turn on devices
 - ▶ Create rooms layout
 - ▶ Enjoy!
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- ▶ The system will check for updates daily and install them automatically

Demo time!

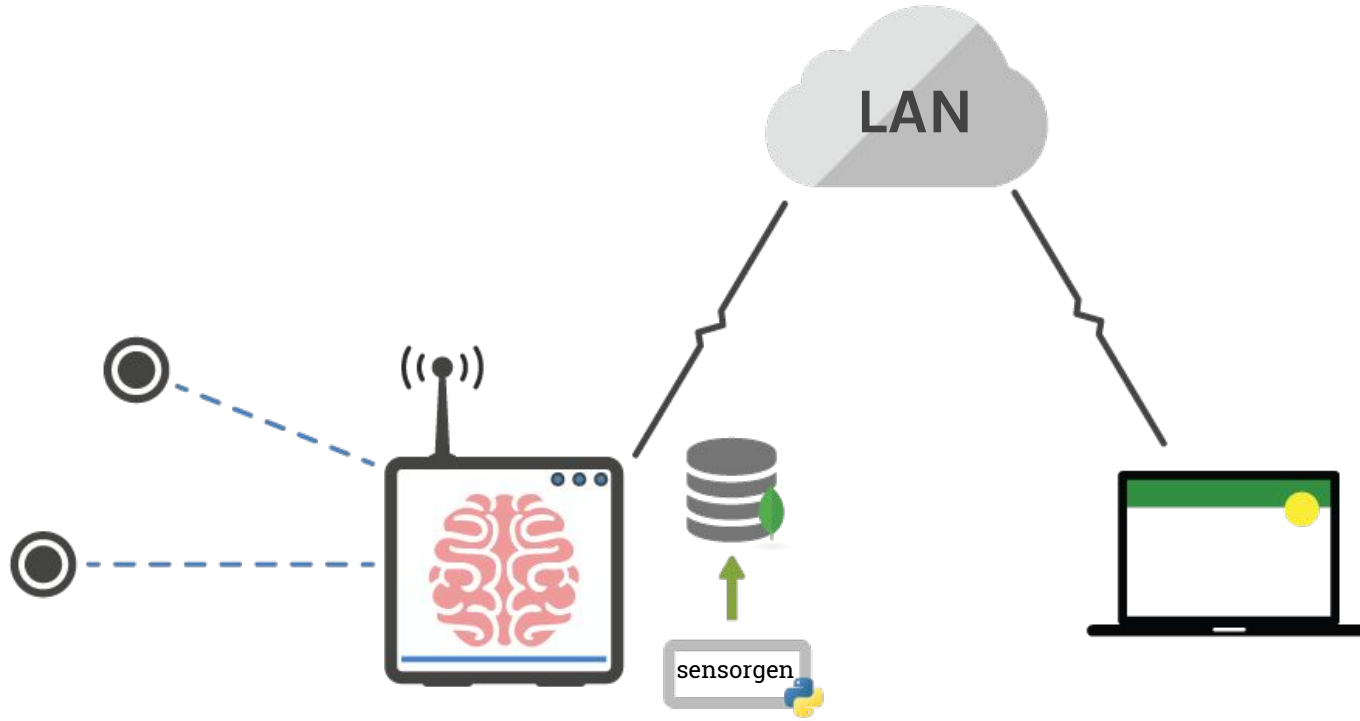
Setup demo

- ▶ Demo devices
 - ▷ Raspberry PI v3 with the brain
 - ▷ ESP32 with lots of sensors
- ▶ We will
 - ▷ Setup the brain
 - ▷ Turn on the ESP32 with sensors
 - ▷ Configure a new room

Usage demo

- ▶ We'll show a complete setup
- ▶ Simulated behavior of many devices in many rooms
- ▶ Usage of the UI to monitor room status, show statistics and manage policy

Demo architecture





**Perspectives
& conclusions**

Home assistant integration

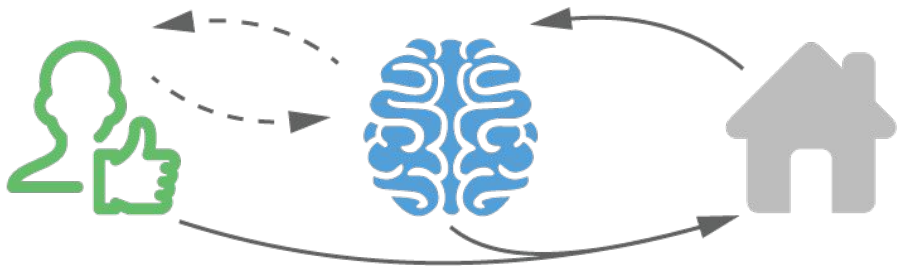
- ▶ Actions offered by the Rest API
- ▶ Manage room status, setup and policy via conversations





Reinforcement learning

- ▶ Learn room policy, but...
- ▶ Using only statistics of room status and user actions requires too much data
- ▶ Exploit continuous user interaction via home assistant to receive feedback



Services for business

- ▶ Advanced management
 - ▷ User-based authentication
 - ▷ Advanced analytics
 - ▷ Real time alerts
- ▶ Configuration options for net admins
- ▶ Customizations
 - ▷ Corporate server for the brain
 - ▷ Cloud services
 - ▷ ...



**Any
questions?**