



Deploying Smart City services in Messina with #SmartME

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MDSL Lab research team

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- Dr. **Giovanni Merlino**
- Prof. **Antonio Puliafito**





The #SmartME project

- **collaboration** of *MDSLab* team with **key** actors
 - *Arduino* Labs, municipality, university branches
- successful **crowdfunding** initiative
- a **platform** for experimental **testbeds**



Project timeline / roadmap

- I Nov. 2014: **brainstorming**, first idea of #SmartME
- II Dec. 2014 - Jan. 2015: aims and goals, first **draft architecture**, **identification** of hardware and software **technologies**
- III Feb. - April 2015: **crowdfunding** initiative
- IV April 2015 - Dec. 2015: equipment and **device design** and assembly
- V Sept. 2015 - June 2016: **software** platform **development**
- VI March 2016 - Dec. 2016: **initial** infrastructure **deployment** and operation
- VII June 2016 - Dec. 2017: **service development** and deployment



Crowdfunding campaign: tiers

Categories of contributions:

- 1st-tier supporter (no active role, **name inclusion** in the list)
- 2nd-tier supporter (as 1st + “thank you” **postcard**)
- 3rd-tier supporter (2nd + **t-shirt**)
- user (3rd + privileged/**preliminary access** to 1st year **data**)
- developer (3rd + 1-year **access to infrastructure**)
- adopting-a-sensor (3rd + user-provided **location** for **deployment**)
- brand sponsorship (3rd + 1-month **advertisement** on project **site**)





Crowdfunding campaign: results

Successfully terminated after **2** months:

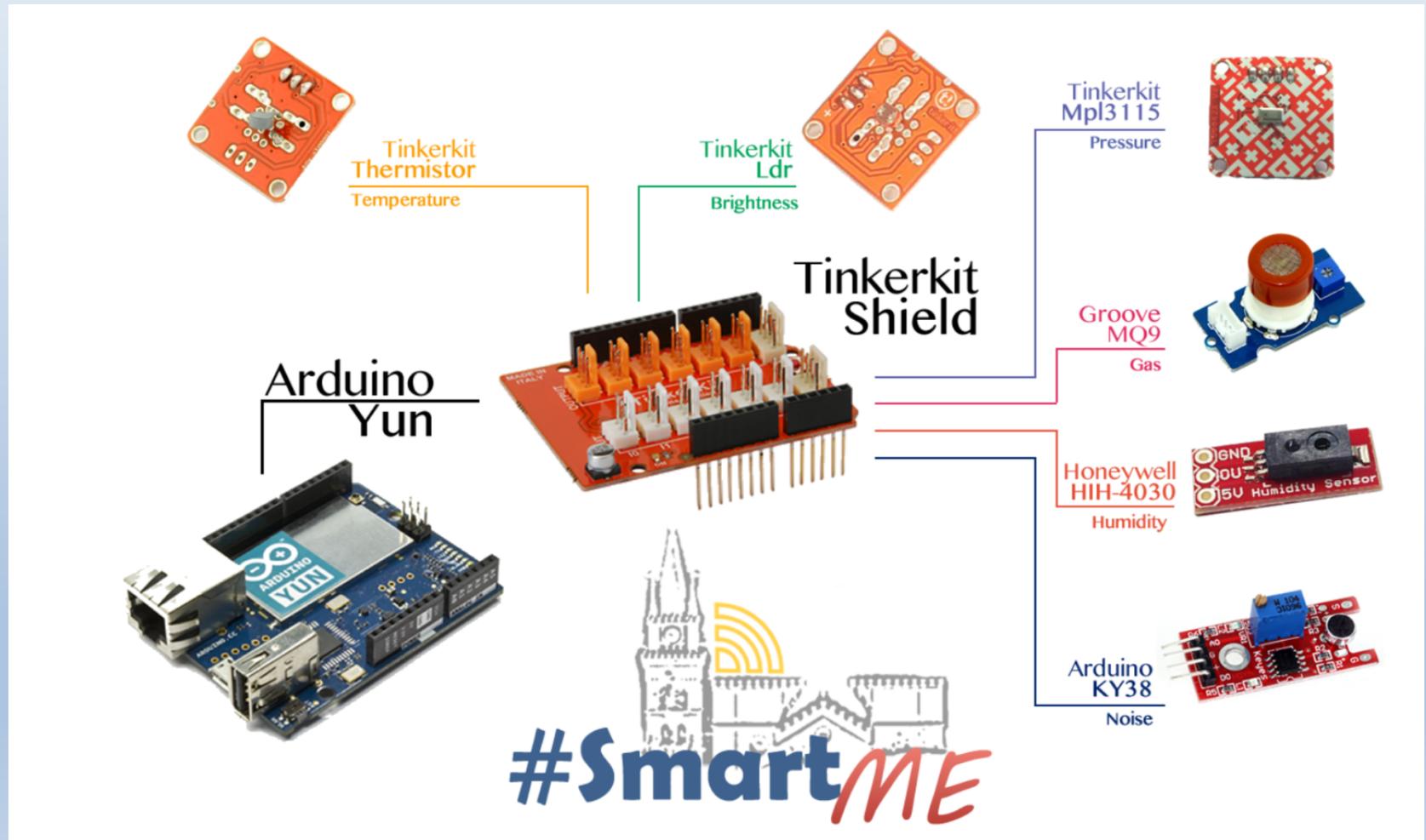
- collecting in total Euro **34132** Euros
 - more than **twice** the **target** of Euro 15000
- involving **84** backers
 - **16** 1st-tier supporters
 - **9** 2nd-tier supporters
 - **25** 3rd-tier ones
 - **14** users
 - **1** developer
 - **3** sensor adopters
 - **10** brand advertisers

Campaign link:

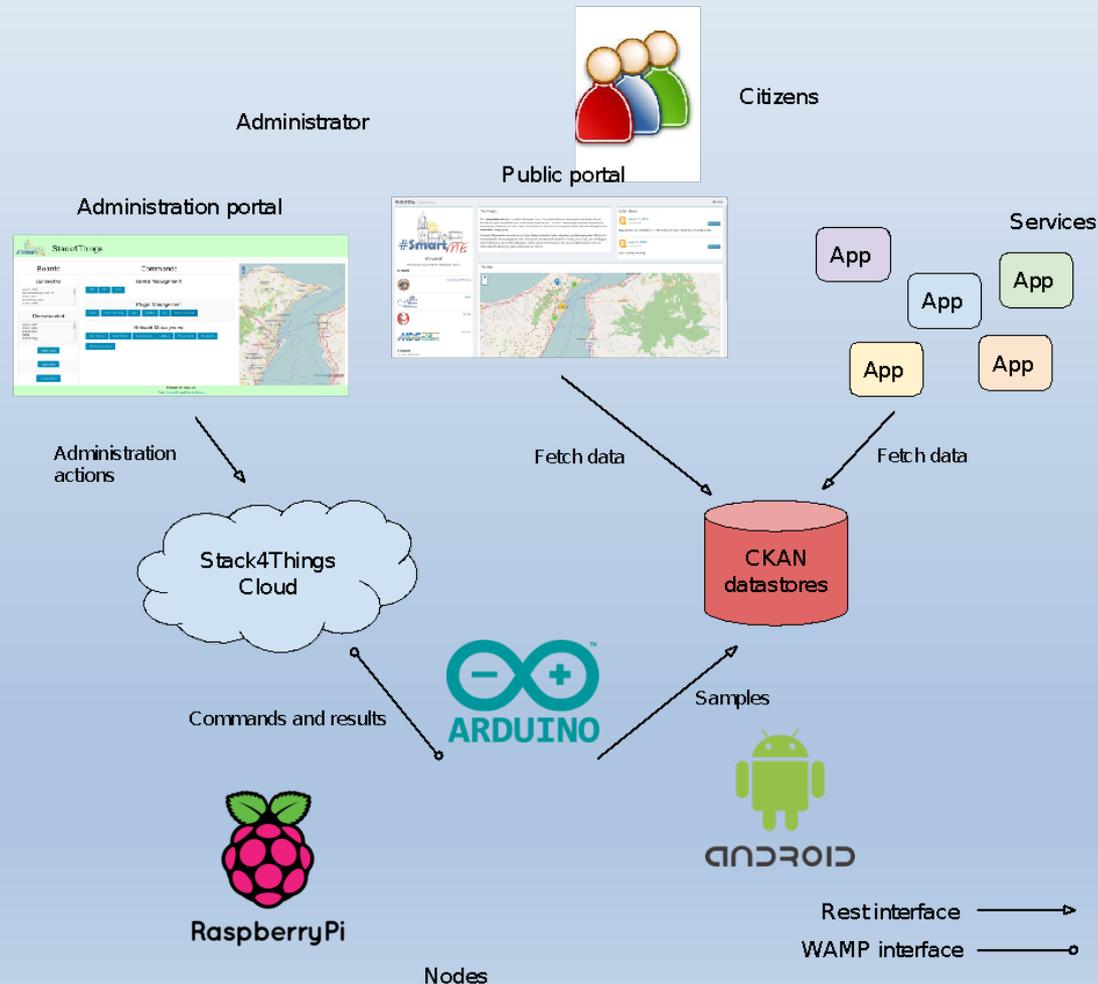
- <https://www.eppela.com/en/projects/5787-smartme-la-messina-del-futuro>



Example of a #SmartME node



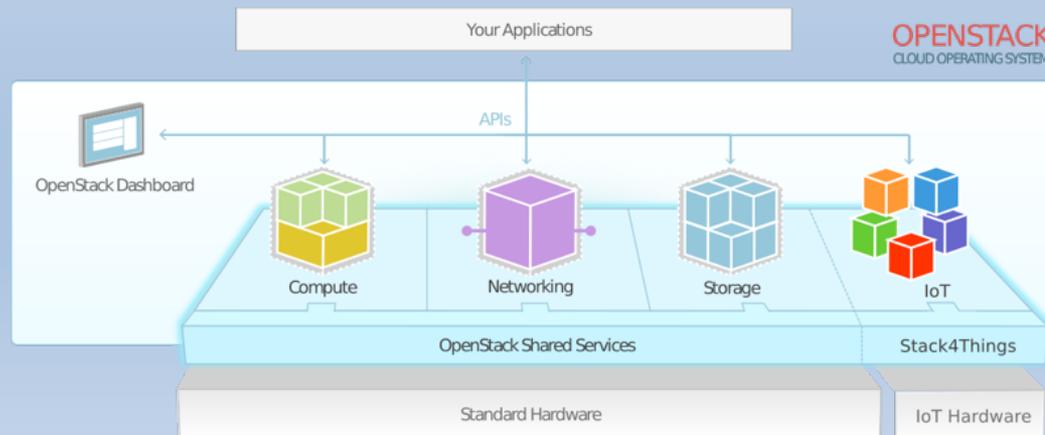
Architecture of the #SmartME framework





IoT-Cloud engine: Stack4Things

- an **OpenStack**-based Internet of Things framework developed by the Mobile and Distributed Systems Lab (MDSLab)
- an **open source** project helping administrators to manage IoT device fleets without caring about their physical location, their network configuration, their underlying hardware/software setup
- a **Cloud-oriented horizontal** solution providing IoT object virtualization, customization, and orchestration
- enables an **out-of-the-box** experience on several of the most **popular** embedded and mobile systems



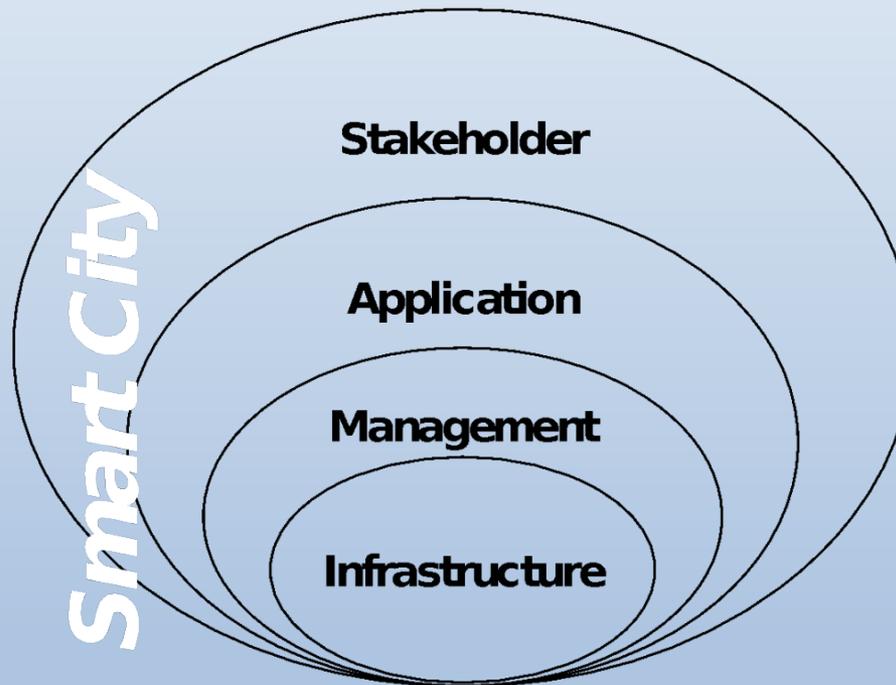


Stack4Things: features

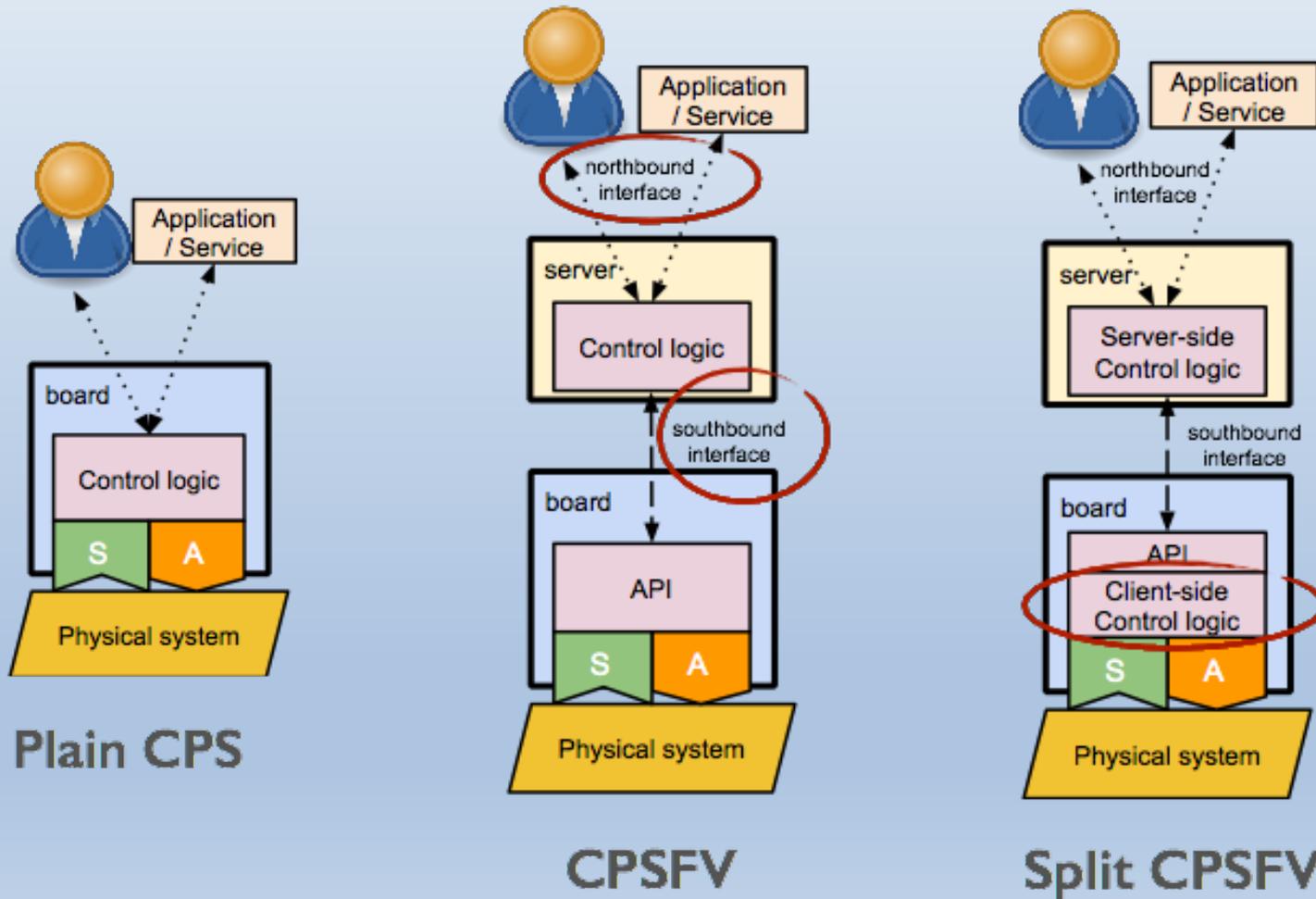
- **object virtualization** - interaction with IoT devices as entities in the Cloud through a uniform interface
- **overlay networks of things** - creation and management of Cloud-mediated virtual networks among remote objects
- **remote control and customization** - full customization of devices from low-level firmware/operating system configuration up to business logic
- **fleet management and delegation** - IoT objects can be organized in fleets and controlled hassle-free, coupled with a complex delegation model for a multi-tenant Cloud of objects
- **fog orchestration** - objects orchestrated by aggregating them in IoT ensembles, allowing to build and deploy new Fog-like applications



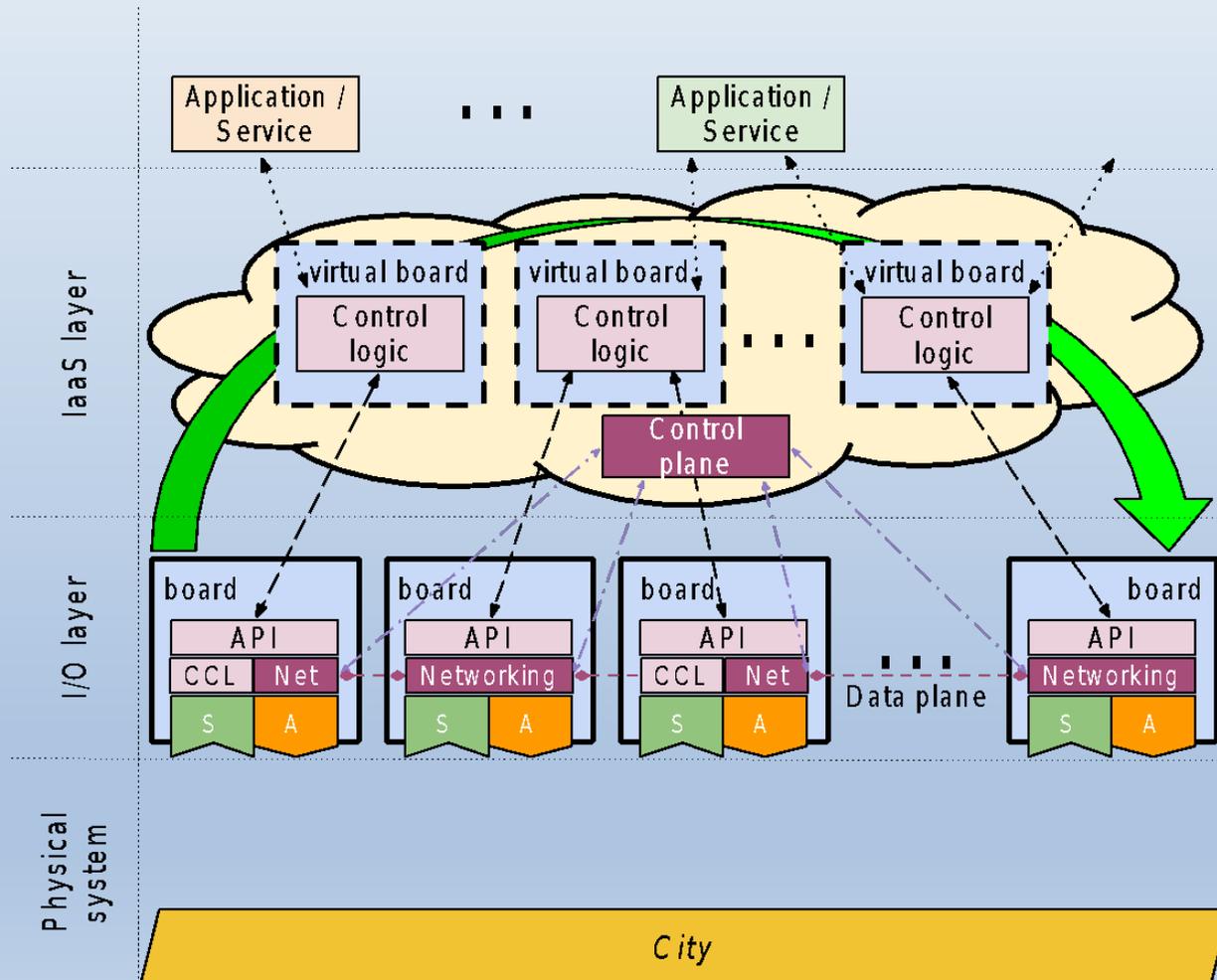
Smart City: layers model



Stack4Things: Cyber-Physical Systems

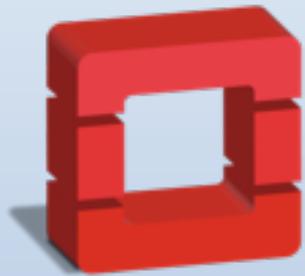


Stack4Things: Software-Defined Cities





Stack4Things: underlying technologies



openstack.
CLOUD SOFTWARE





Screenshot of the #SmartME portal

#SmartME Technologies Timeline Community

#SmartME it all starts here
Home



#SmartME

Innovatively making the city of Messina "smart".

Credits

-  University of Messina
-  CIAM
-  DHLabs
-  MDSLAB

Location
Messina - Sicily, Italy

Skills

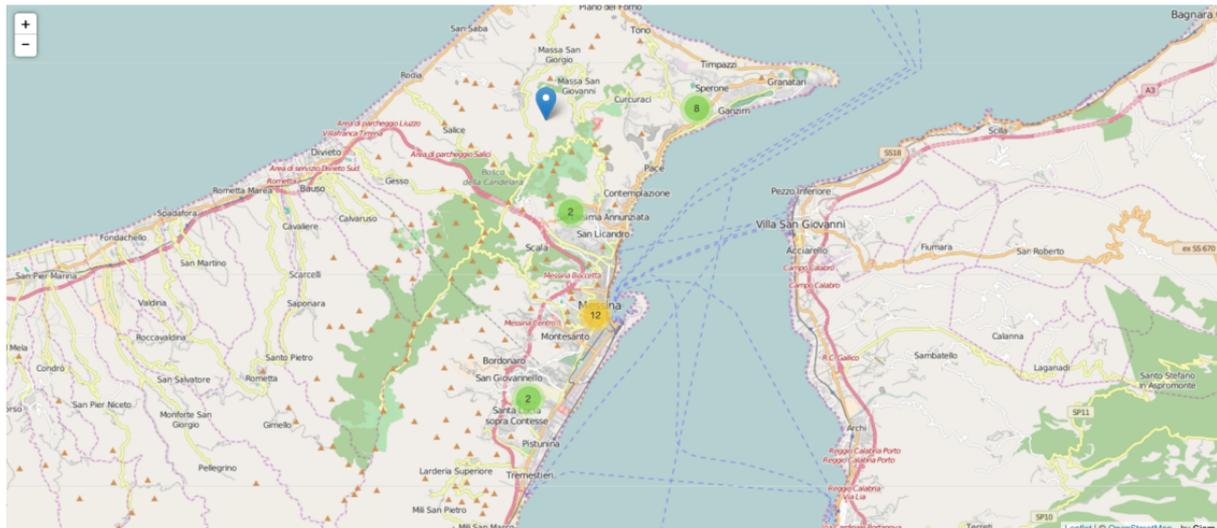
- [Open Data](#)
- [Smart City](#)
- [Arduino](#)
- [Sensors](#)
- [Internet of Things \(IoT\)](#)

The Project

The **#SmartME project** is a crowd-funded project born from a wish of a team of researchers in the Mobile and Distributed Systems Lab (MDSLab) at the University of Messina. Its aim is to encourage a conversation with the municipality of Messina in order to spur the creation of a novel virtual ecosystem based upon the paradigm of the **Internet of Things (IoT)**.

To morph Messina into a smart city, an Open Data platform has been set up through the employment of low-cost microcontroller boards equipped with sensors and actuators and installed on buses, lamp posts, and buildings of local institutions, all over the urban area. Thanks to such infrastructure, it is now possible to collect data and information for designing advanced services for citizens.

The Map



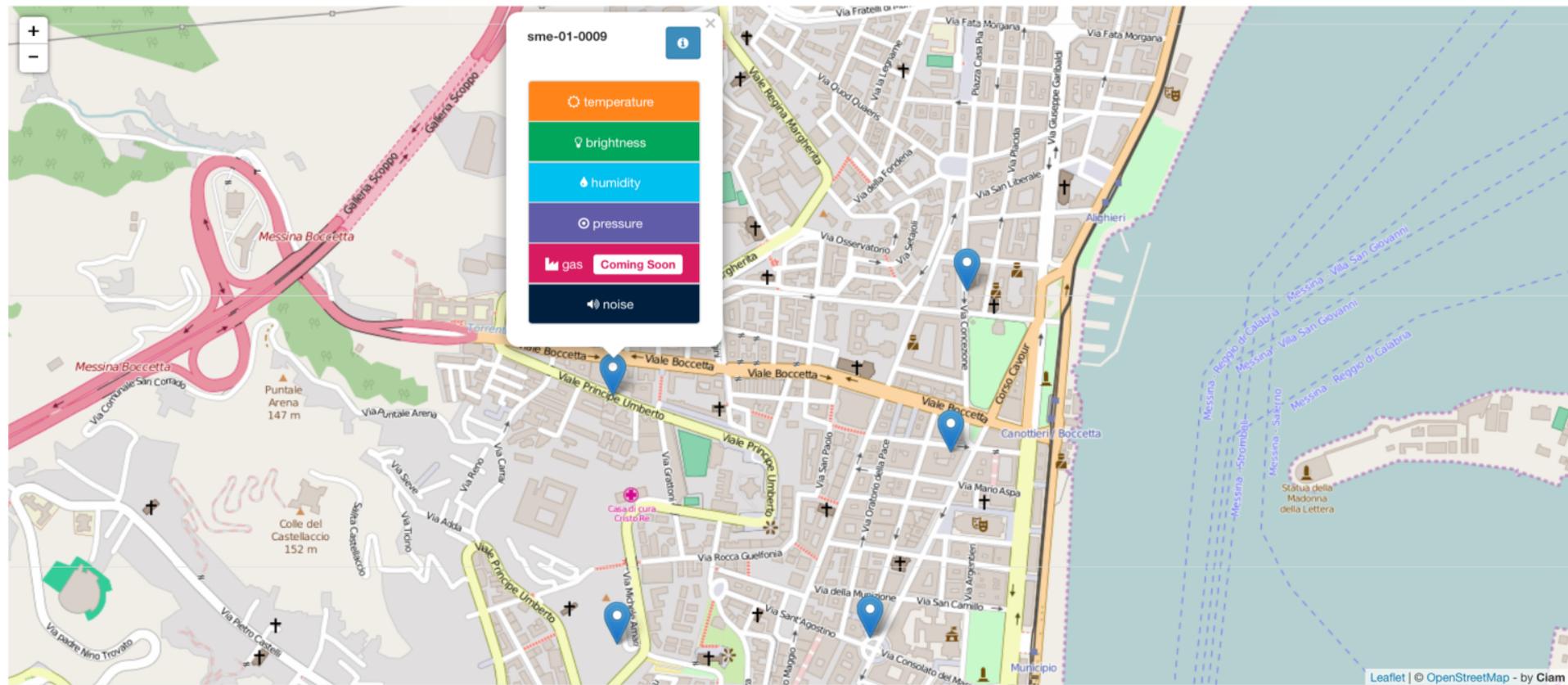
Latest News

- 
March 17, 2016
 Deployment Read more
- Deployment and installation of the first seven sensor boards in the city center.
- 
April 28, 2015
 Deployment Read more
- First working meeting.



Map detail

The Map





Realtime data





Board details and datasets

Board Name: Sme-01-0012 [Arduino Yun]

[OpenData](#) on SmartMe-Data

	Temperature TinkerKit Thermistor C	OpenData
	Brightness TinkerKit LDR lux	OpenData
	Humidity Honeywell HIH-4030 percent	OpenData
	Barometer TinkerKit mpl3115 hPa	OpenData
	Gas Grove MQ9 ppm	Coming Soon
	Sound_detect Keyes HY-038 amplitude	OpenData



Management dashboard



Stack4Things

Boards

Connected

- sme-01-0019
dip-sienze-co.psi.ped.cul
- sme-01-0012
facolta-ingegneria
- sme-01-0022

Disconnected

- sme-01-0011
- sme-01-0024
- sme-00-0027
fablab
- sme-00-0020

Register Board

Update Board

Unregister Board

Commands

Board Management

LED SSH OKAN

Plugin Management

Create Remove from Cloud Inject Start/Stop Call Remove from Board

Network Management

Show Networks Create Network Destroy Network Add Board Remove Board Show Boards

Start Network on Board





Board registration

Add new board to the Cloud ✕

Registration

Board Code

Label

Latitude (example: 38.12345678)

Longitude (example: 15.12345678)

Altitude (example: 150.12345678)

Net enabled

Sensors On Board

- temperature
- brightness
- humidity
- sound_detect
 - gas
 - barometer

[Register](#)





Plugins

Create Plugin ✕

Plugin Management

Plugin Name

Plugin Json

Javascript Code
 nessuno selezionato

Output



Networking

Create New Network ✕

New Network

Network Name

IP Address

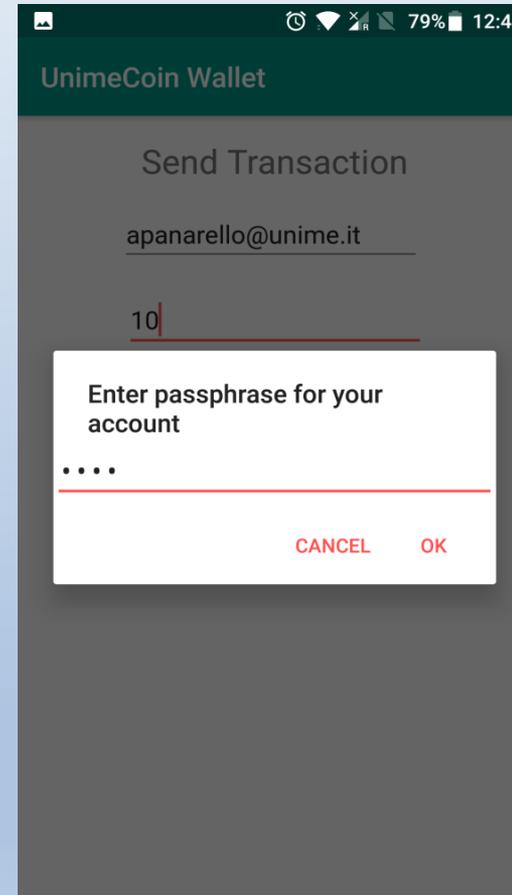
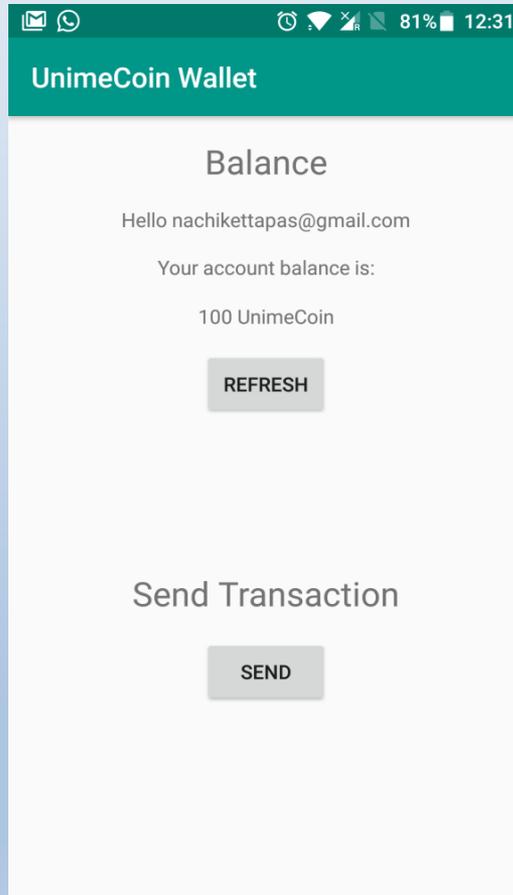
Send

Output





Incentive mechanisms: UniMeCoin



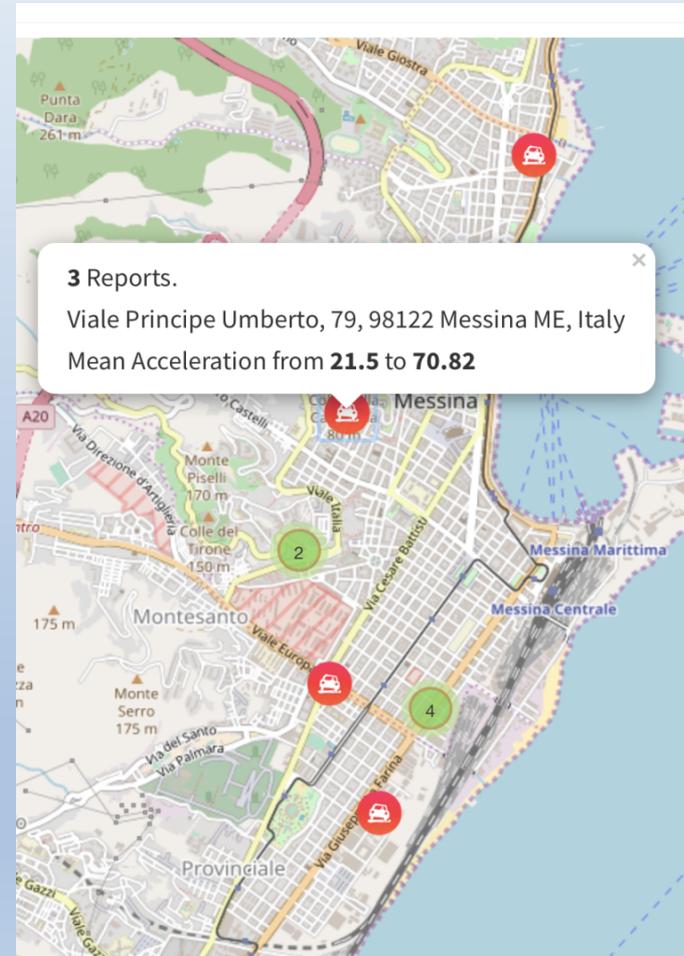
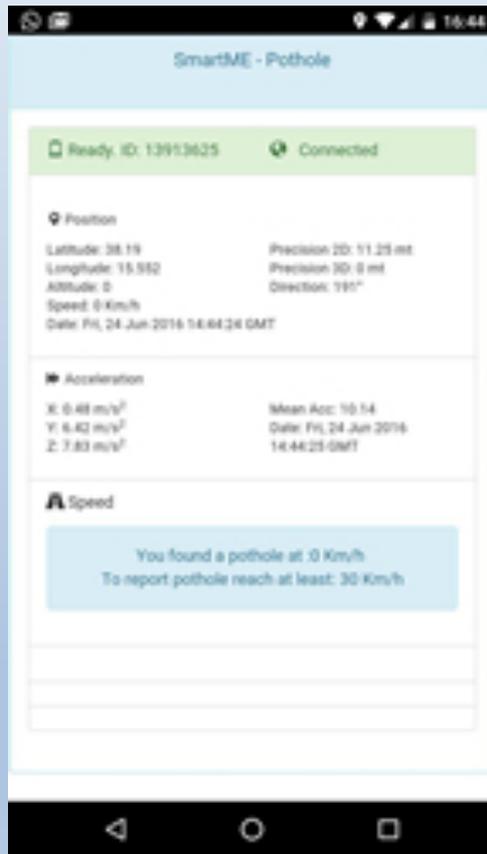


Carpooling@UniME



#SmartME Taxi

#SmartME Pothole





#SmartME Pothole: operator portal

Home Dettagli segnalazioni buca Riparazione buca

Intervallo intensità d'urto

Inizio: Fine:

Map Satellite

Id : 5a0584de64516b4a134ec918
Sito verificato dalle Google API
Indirizzo : Viale Principe Umberto, 8, 98122 Messina ME, Italy
Latitudine : 38.19390466149394
Longitudine : 15.546524985717744
Intensita' minima rilevata : 4.238405531165476
Intensita' massima rilevata : 4.238405531165476
Numero di segnalazioni : 1
Data di prima notifica : Fri Nov 10 2017 11:52:12 GMT+0100 (CET)
Data ultima notifica : Fri Nov 10 2017 11:52:12 GMT+0100 (CET)





#SmartME Parking

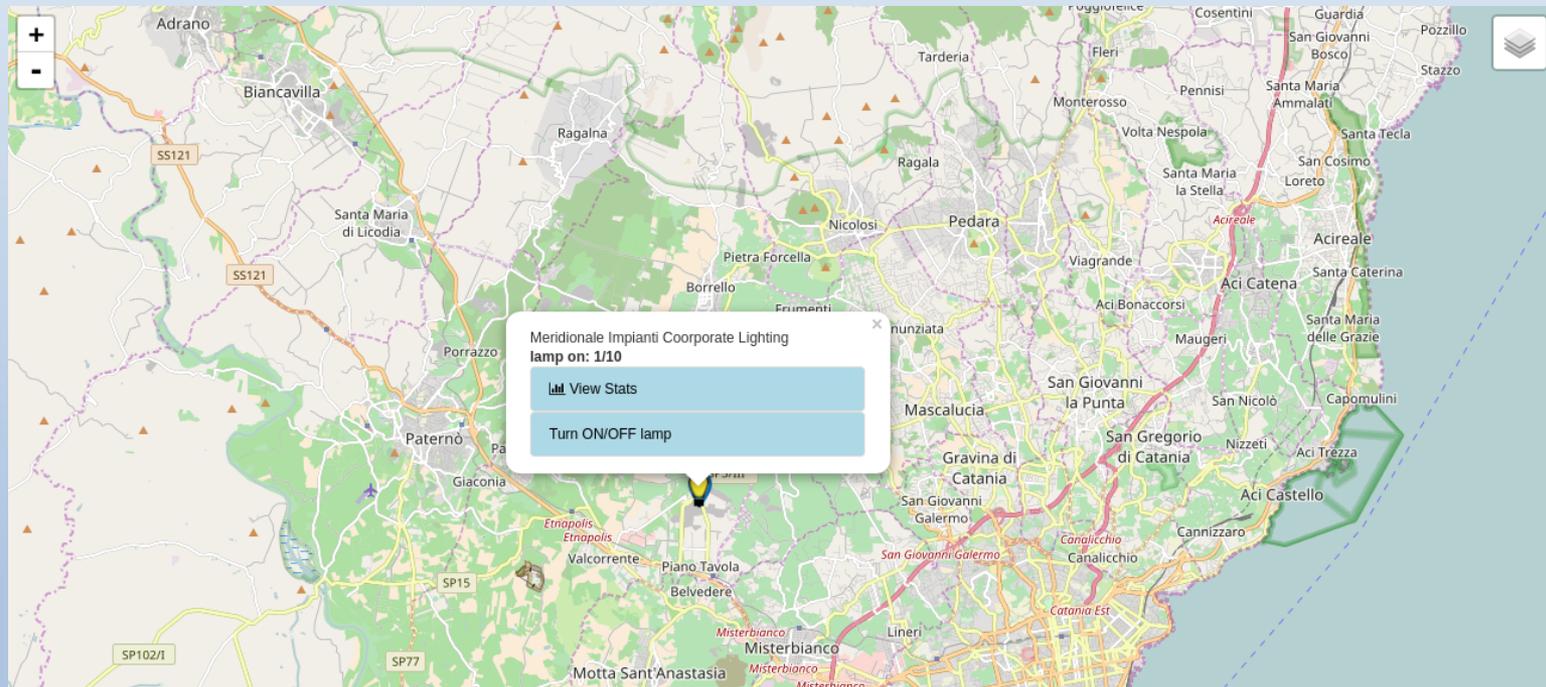




#SmartME Airport

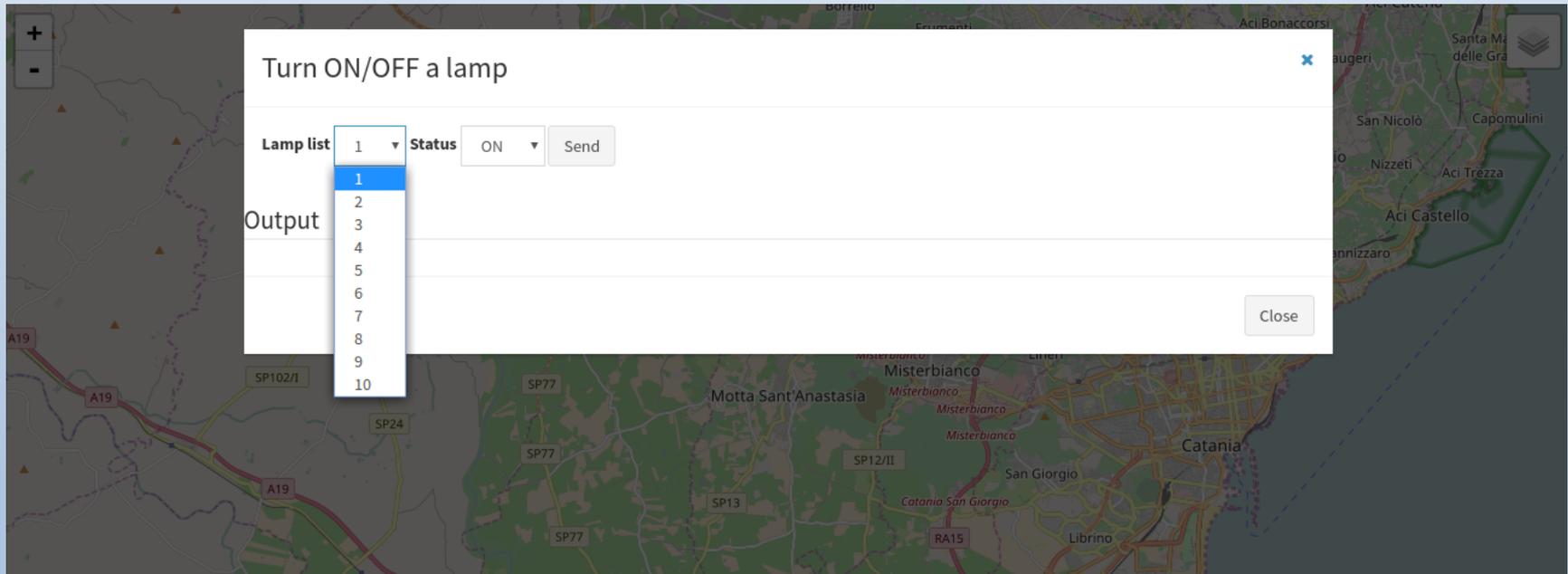


#SmartME Lighting: map detail



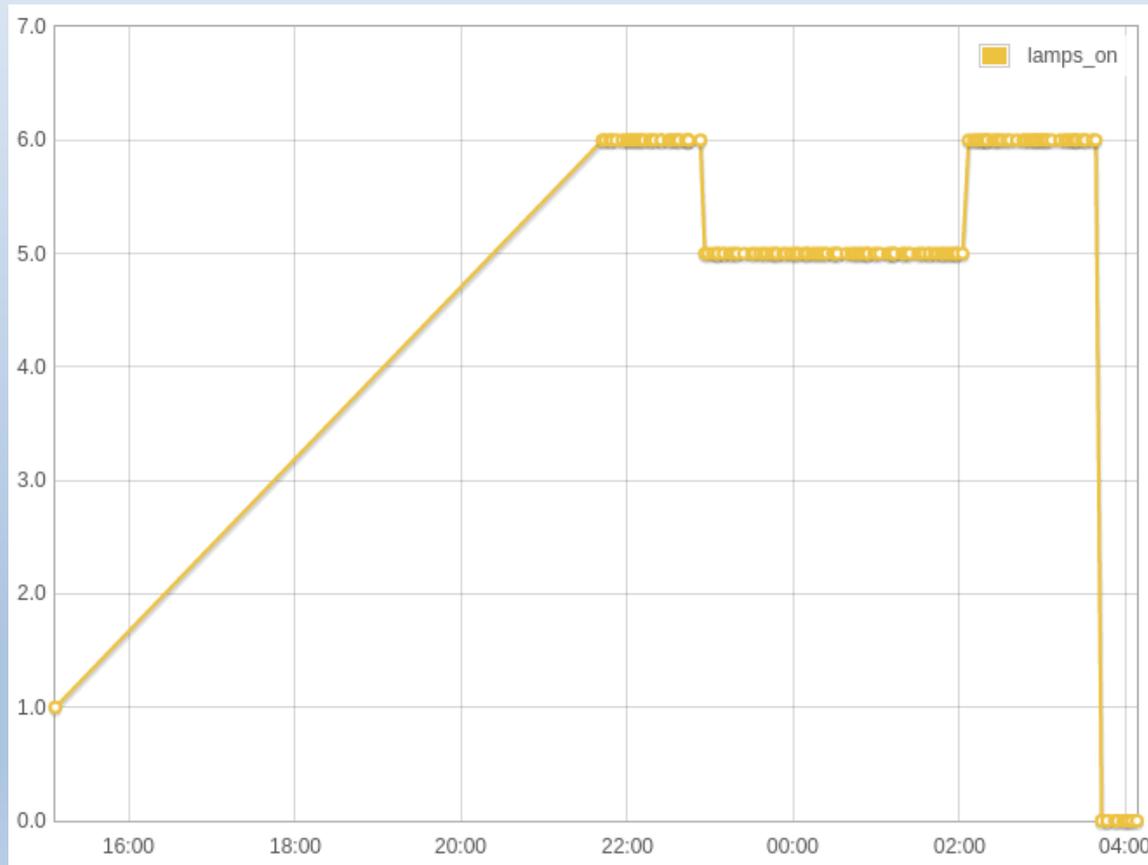


#SmartME Lighting: remote control





#SmartME Lighting: monitoring



#SmartME Trashcan



#SmartME Art





Thank you!

<http://smartme.unime.it>

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