SMART-HOME FOR BEGINNERS

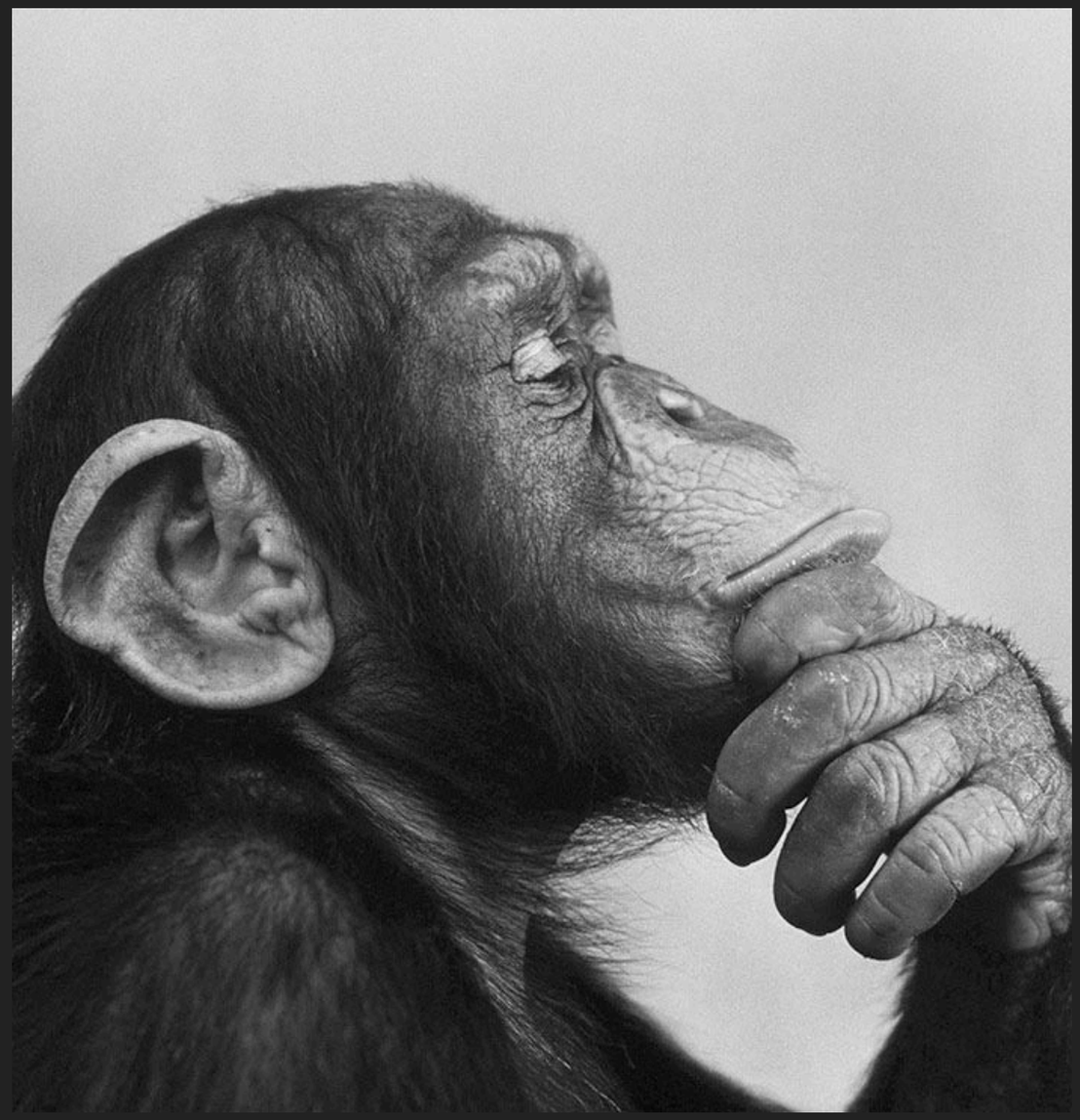
GLADOS

#THROWBACK

- Electrical Engineering student
- “Hello World” programming knowledge
- Forgetful
- lazy
- Curious
- First contact with electronics and embedded programming

PROBLEMS

- Constantly losing the apartment’s keys
- Forget to turn of Boiler
- Forget to turn of the lights
- Automatic music playback would be way too cool
- No programming knowledge or portfolio



GLaDOS Mainframe

Enter

Leave

PC

LivingRoom

LivingRoom

Office

Boiler

Bath

Custom Time

5 min

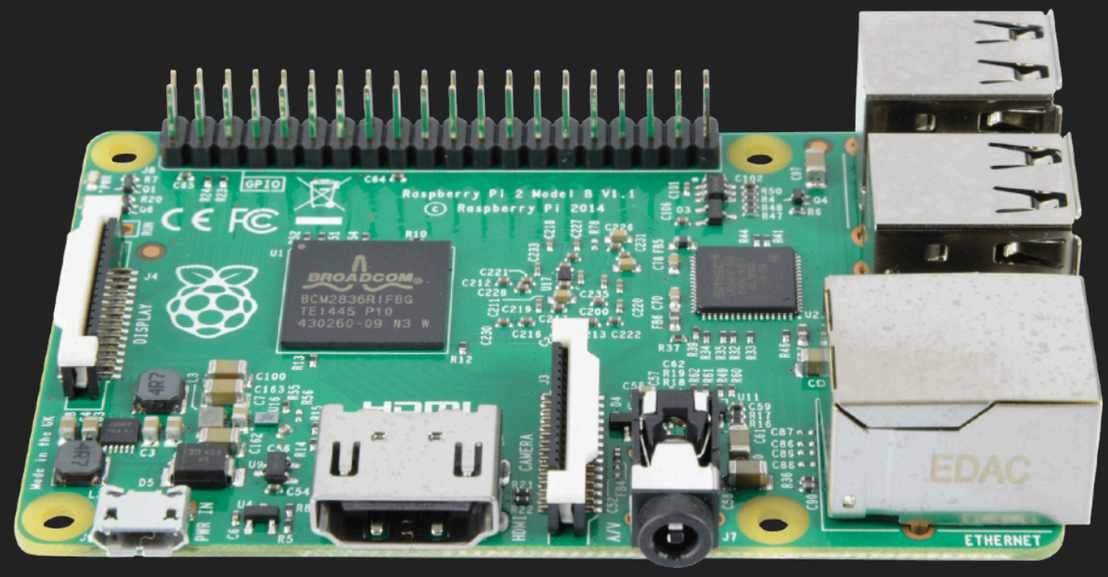
Minutes Seconds

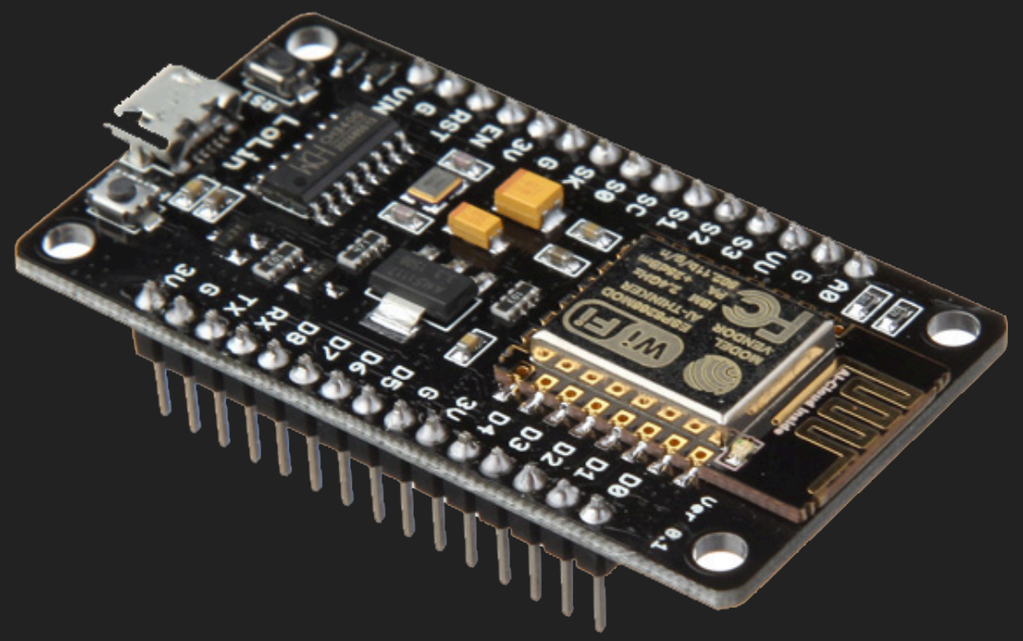
0 0 : 0 0

A COMPLETELY CUSTOM IOT SOLUTION

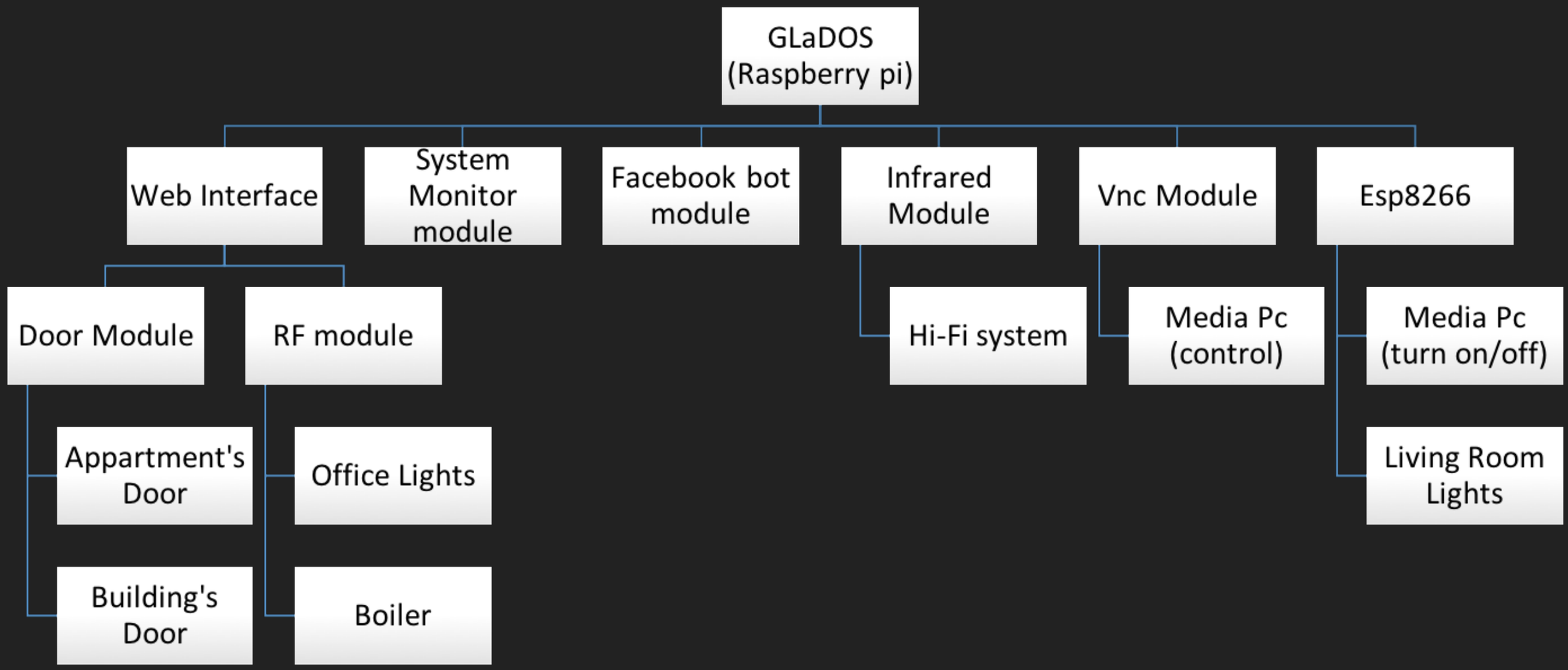
SOLUTION

- Based on Raspberry pi & Esp8266
- Simple web interface & facebook bot control
- Core platform uses python, thus infinite possibilities
- Modularity simplifies upgrading and iteration





OVERVIEW


GLaDOS
(Raspberry pi)
Web Interface
System Monitor module
Facebook bot module
Infrared Module
Vnc Module
Esp8266
Door Module
RF module
Hi-Fi system
Media Pc (control)
Media Pc (turn on/off)
Appartment's Door
Office Lights
Living Room Lights
Building's Door
Boiler

TEXT

THE CORE FRAMEWORK

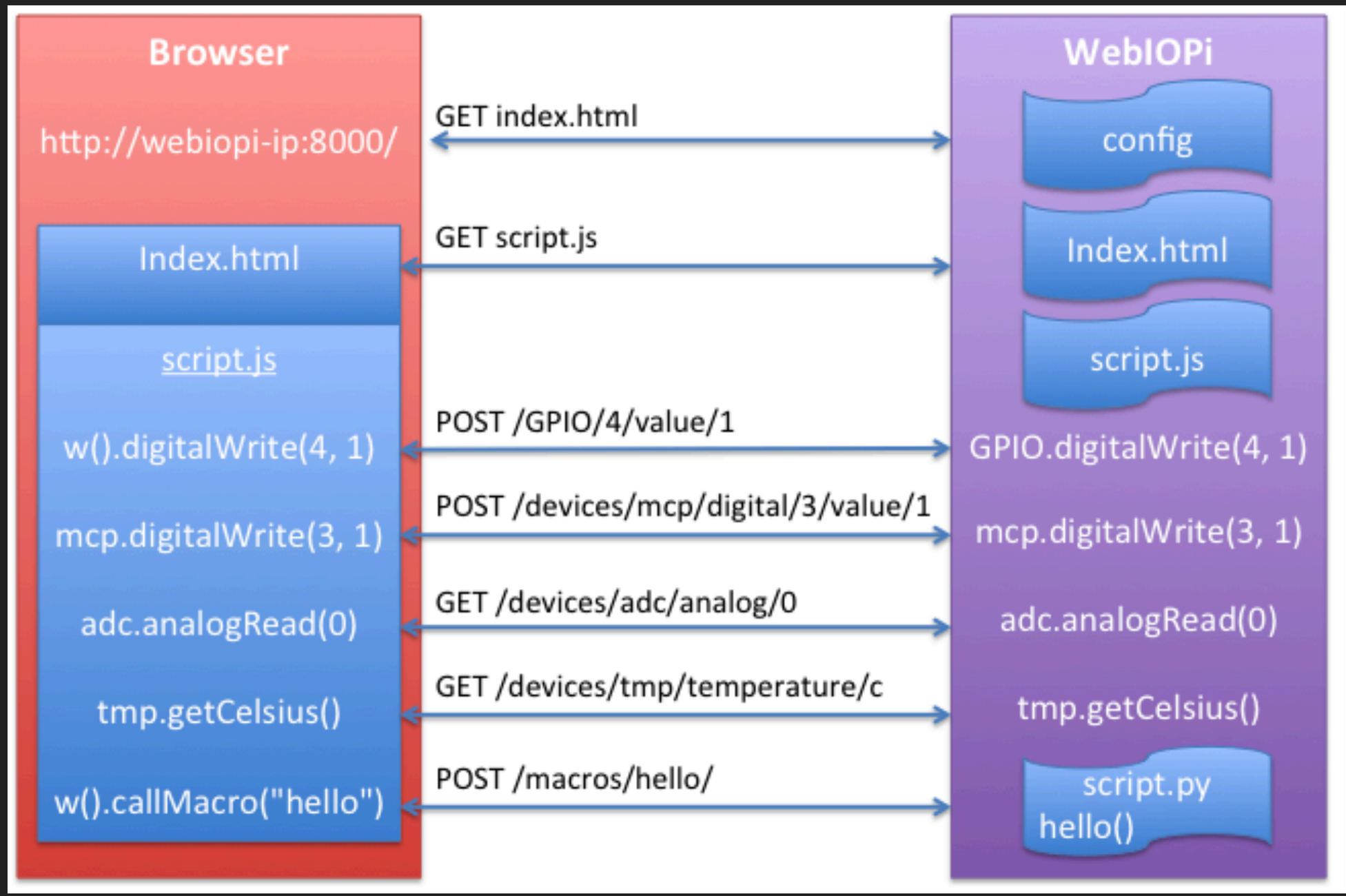
- One of the first IoT platforms, named Webiopi
- Written in python
- HTTP python server provides HTML interface
- Same python server provides REST API
- Javascript makes synchronous calls to python server

trouch.com | tech geek | webiopi - Raspberry Pi's GPI | WebIOPi | Control your Pi's G

raspberrypi/webiopi/

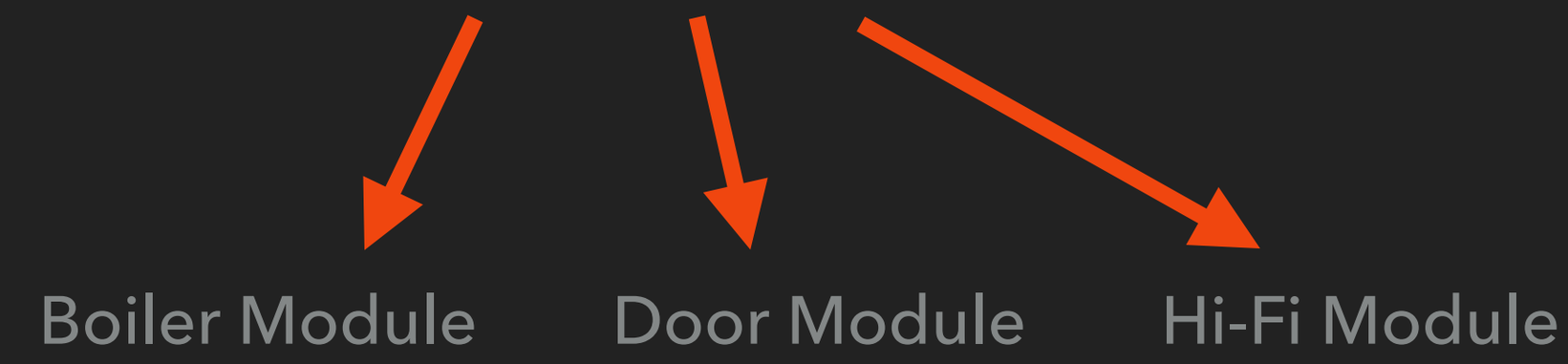
	3.3V	1	2	5V	
IN	GPIO 0	3	4	--	
IN	GPIO 1	5	6	GROUND	
IN	GPIO 4	7	8	UART TX	
	--	9	10	UART RX	
OUT	GPIO 17	11	12	GPIO 18	IN
IN	GPIO 21	13	14	--	
IN	GPIO 22	15	16	GPIO 23	IN
	--	17	18	GPIO 24	IN
OUT	GPIO 10	19	20	--	
OUT	GPIO 9	21	22	GPIO 25	OUT
OUT	GPIO 11	23	24	GPIO 8	OUT
	--	25	26	GPIO 7	OUT

TEXT


Browser
http://webiopi-ip:8000/
Index.html
script.js
w().digitalWrite(4, 1)
mcp.digitalWrite(3, 1)
adc.analogRead(0)
tmp.getCelsius()
w().callMacro("hello")
GET index.html
GET script.js
POST /GPIO/4/value/1
POST /devices/mcp/digital/3/value/1
GET /devices/adc/analog/0
GET /devices/tmp/temperature/c
POST /macros/hello/
WebIOPi
config
Index.html
script.js
GPIO.digitalWrite(4, 1)
mcp.digitalWrite(3, 1)
adc.analogRead(0)
tmp.getCelsius()
script.py
hello()

CONFIGURATION

- Create the interface, use of specialised JS library
- Configure framework’s options.
- Create the central Python script.



LIBRARIES USED

- Python:
  - Pi-switch, Vncdotool, Pywit
  - Selenium, Pywin32, flask
  - Fbchat
- Other:
  - Lirc, aREST

NOTABLE MODULES

DOOR MODULE

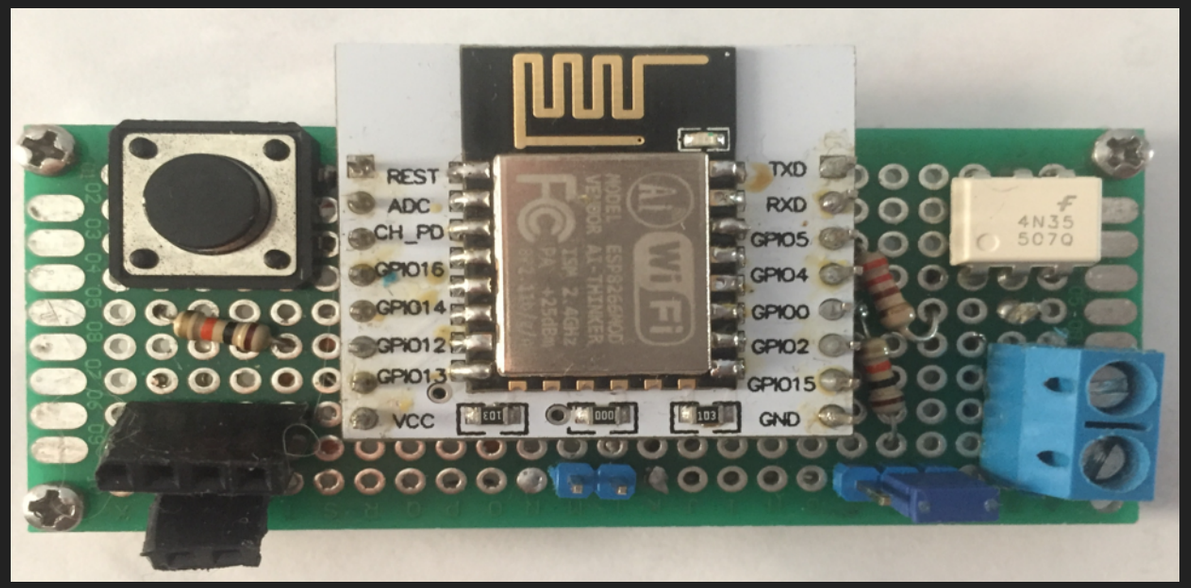
- Use of special door lock with handle from the inside
- Use of 3d printed cogs & servo
- Servo can be controlled from any MCU
- Reed switch is used to detect door status (open - close)

BOILER MODULE

- Power Relay interrupts the connection of the boiler with it’s switch
- Power Relay is controlled from a RF switch
- RF switch is controlled from a RF transmitter connected to Raspberry.

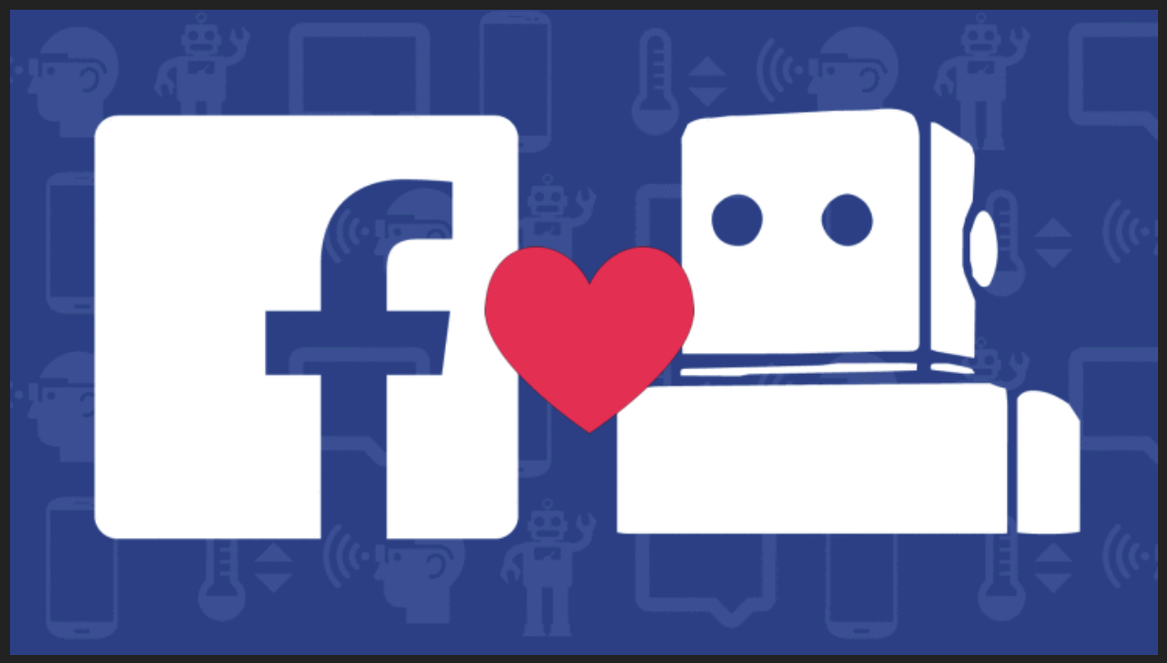
ESP8266

- IoT MCU manufactured by Espresif, cost = 1-2 $
- Use of community built Arduino firmware
- Coupled with 4 relays, and a power supply, we have a smart-strip
- Mimic button switch by using an opto-coupler



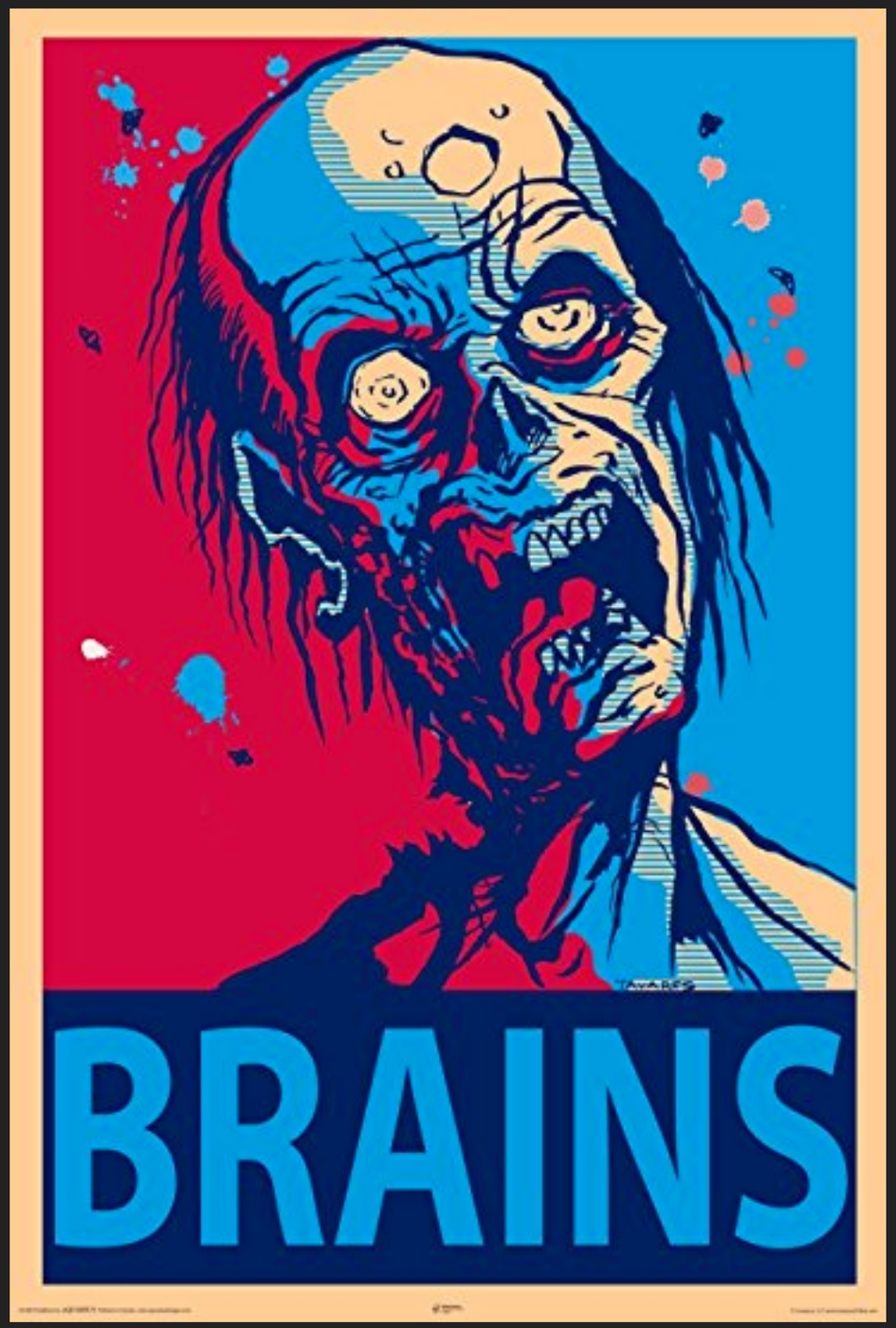
FACEBOOK BOT

- Use of a Facebook profile.
- fbchat would simply fetch all incoming messages and send the reply
- fbchat mimics the behaviour of web messenger
- Proof of concept, not actual bot



BOT'S BRAINZ

- Need of Natural Language Processor, use of WIT.ai
- Train bot to extract the correct meaning from a range of expressions
- Bot can understand variations, as also the place of a word in the phrase



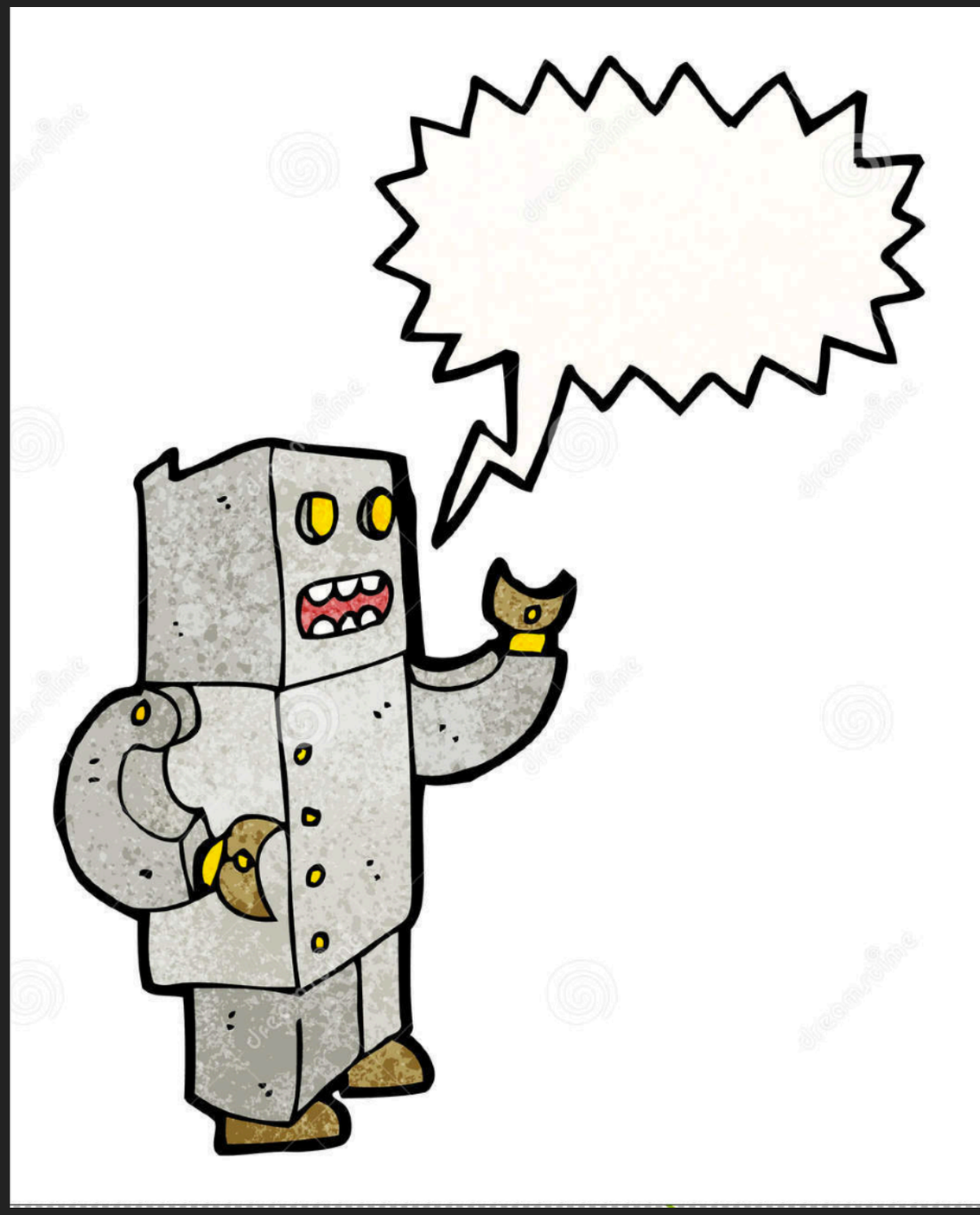
ανοιξε τον θερμοσιφωνα για 30 λεπτα

action	open
heater	boiler
intent	heater_control
sentiment	negative
time_custom	30
time_type	minutes

Add a new entity

DISCUSSIONS

- Bot can be trained to follow certain “stories”
- A story is a conversation, the bot replies according to the user’s reply.
- The rules can be directly integrated into the bot.
- The decision making in the client program stays minimum



heater

heater (context)

s_positive && ctime && timetype && open	no_ctime && open	uncertain	turn_off

Τον ανοίγω για **{ctime} {timetype}**. Ειδες πόσο καλά τα πάμε όταν είσαι ευγενικός;

Variable

Set quick replies

end (context)

Updates context keys with...

Bot sends Bot executes Jump

CONCLUSIONS

- The system is highly tailored to the apartment
- The reliability is somewhat poor
- Security is non-existent, adequate for the project's needs
- It was accomplished with no knowledge
- Thousands of projects and platforms to choose from
- Everything is F u c k i n g Open Sourced

DREAM BIG ,START SMALL,
BUT MOST OF ALL. . .
START

Simon Sinek