



Veleučilište u Bjelovaru

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DIY Smart Home

tech43

plan predavanja

- Demo trenutnog stanja *Smart Homea*.
- Home Assistant: Što je Home Assistant, uloga i svrha?
- Moduli:
 - DEV,
 - WEATHER STATION.
- Protokol za komunikaciju - MQTT.
- Mrežna infrastruktura:
 - LAN, WAN, IP kamere, wireless link...
- Dodatni (poslužiteljski) servisi i automatizacija:
 - OwnTracks, Google Distance Matrix API, Syncthing, rclone, Backblaze B2, PiHole, PowerDog i PushBullet.
- Što dalje?

Home Assistant

The screenshot shows the Home Assistant web interface in a browser. The browser's address bar displays the URL `https://ha.husak.me/lovelace/default_view`. The interface has a blue header bar with a hamburger menu icon on the left and a notification bell icon on the right. Below the header, a navigation bar contains tabs for **HOME**, **LIVING ROOM**, **DEV ROOM**, **CAMERAS**, **WEATHER**, and **APPLIANCES**. The **HOME** tab is currently selected.

The main content area features a row of six circular sensor cards:

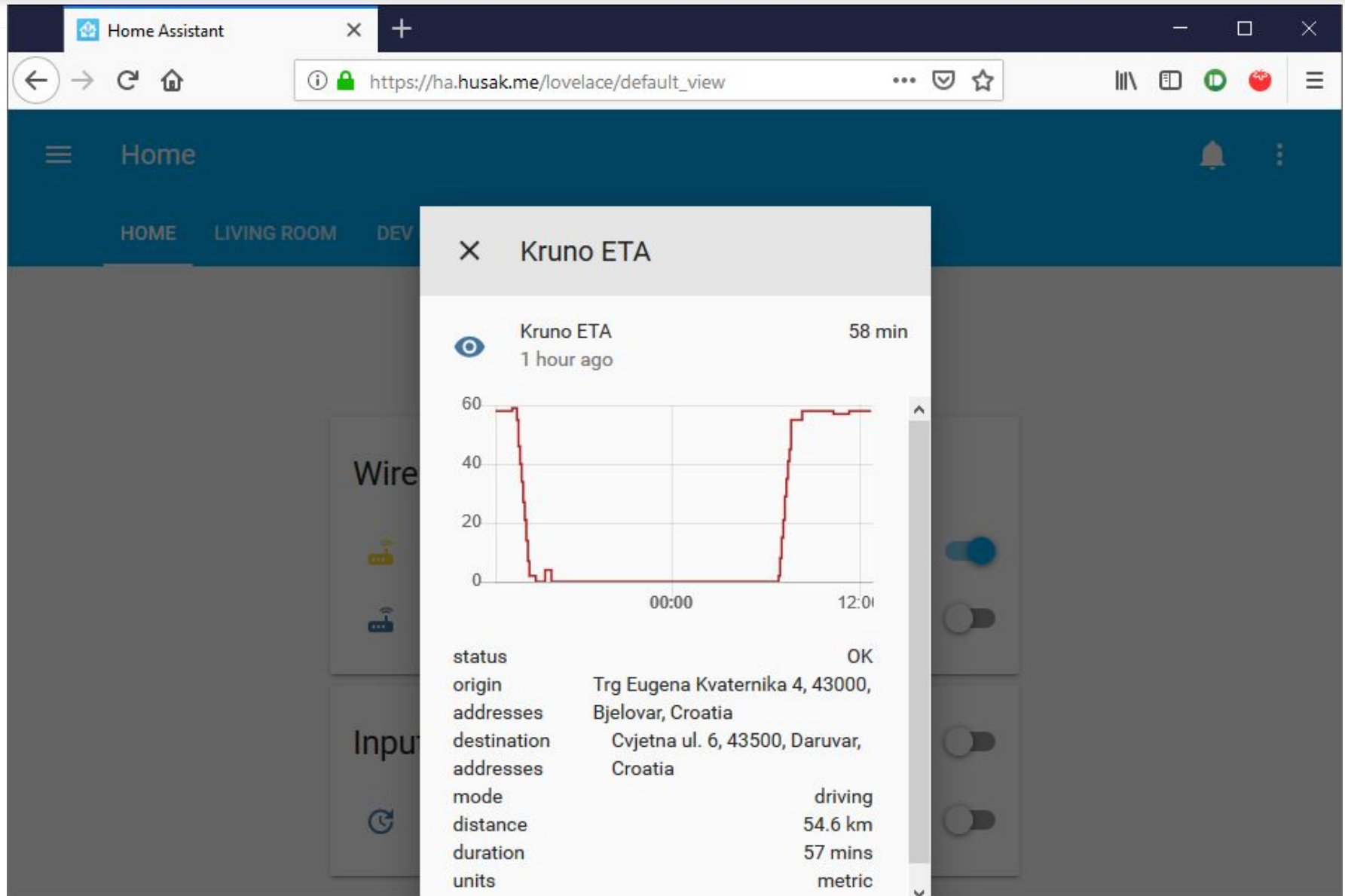
- VUB** (Krno): 58 min
- Kruno ETA**: 57 %
- Outside temperatur...**: 16.5 °C
- Outside humidity**: 23.7 %
- Outside pressure**: 1008.1 mBar

Below the sensors, there are two white panels with toggle switches:

- Wireless**
 - Agent Smith**: ☒
 - Agent Smith 2**: ☐
- Input boolean**
 - Update ETA**: ☐



Home Assistant





Home Assistant - automatizacija

Razni načini automatizacije:

- Home Assistant omogućava izvršavanja raznih akcija na temelju stanja bilo kojeg sensora/uređaja/servisa i raznih uvjeta.
- Mogućnost izvršavanja akcija na temelju trenutne lokacije (*geofencing*).



Home Assistant - prikaz podataka



Home Assistant - prikaz podataka



Kruno - 12%
43 m / 1 min
Daruvar

17:30
27. 03. 2019.

9.7 °C

9.9 °C

Pretežno oblačno

Sutra: Pretežno oblačno do navečer.



Home Assistant

- **Home Assistant** (www.home-assistant.io) je platforma za kućnu automatizaciju pokretana Pythonom 3 - optimizirana za pokretanje na Raspberry Pi računalima.
- Omogućava praćenje i kontroliranje svih uređaja te pruža **automatizaciju** na temelju stanja tih uređaja.
- Omogućava pregled stanja i upravljanje svih uređaja kroz jednostavno (i konfigurabilno) web sučelje (web frontend).
- “Jednostavna” konfiguracija u kojem možemo definirati sve uređaje, izgled web sučelja, automatizaciju i sl.
- Pruža API server koji omogućava pristup trenutnim stanjima senzora i uređaja, te njihovo kontroliranje / upravljanje



Home Assistant

- **Prednosti:**

- besplatan i otvorenog koda,
- pod konstantnim razvojem (svaka dva tjedna nova verzija),
- optimiziran za pokretanje na računalima ograničenih resursa,
- podrška za (jako) veliki broj uređaja različitih namjena i različitih načina kontroliranja,
- vrlo jednostavno dodavanje novih uređaja - platforma automatski preuzima sav potreban kod koji to omogućava,
- cjelokupna konfiguracija se nalazi unutar jedne (ili više) YAML datoteke - jednostavan *backup* i *restore*,
- responzivan web dizajn,
- jednostavno definiranje automatizacija i notifikacija.

Components - Home Assistant

https://www.home-assistant.io/components/#notifications

All (1331)

Featured

Added in:

Alarm (29)

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Cover (36)

DIY (50)

Doorbell (4)


Downloading (11)


Energy (24)


Environment (12)


Fan (13)


Search components...



APNS
notifications



AWS Lambda
notifications



AWS SNS
notifications



AWS SQS
notifications



Cisco Spark
notifications



Clickatell SMS
notifications



ClickSend SMS
notifications



ClickSend text-to-speech
notifications



Command line Notify
notifications



Discord
notifications



Dovado
notifications


Ecobee
notifications


Facebook Messenger


File


Flock


Free Mobile

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Veleučilište u Bjelovaru

```
h00s@ghost: ~  
homeassistant:  
  name: Home  
  latitude: 45.5938  
  longitude: 17.2333  
  elevation: 140  
  unit_system: metric  
  time_zone: Europe/Zagreb  
  
customize:  
  sensor.devroom_temperature_dht:  
    friendly_name: Temperature (DHT)  
  sensor.devroom_temperature_bmp:  
    friendly_name: Temperature (BMP)  
  sensor.devroom_humidity:  
    friendly_name: Humidity  
  sensor.devroom_pressure:  
    friendly_name: Pressure  
  light.led_ambient_light:  
    friendly_name: Ambient light  
    assumed_state: false  
  sensor.pws_temp_c:  
    friendly_name: Temperature  
  sensor.pws_relative_humidity:  
    friendly_name: Humidity  
  sensor.pws_pressure_mb:  
    friendly_name: Pressure  
  binary_sensor.devroom_motion:  
    friendly_name: Motion  
  device_tracker.h00s_kruno:  
    friendly_name: Kruno  
  switch.agent_smith:  
    assumed_state: false  
    icon: mdi:router-wireless  
  switch.agent_smith_2:  
    assumed_state: false  
    icon: mdi:router-wireless  
  binary_sensor.kruno:  
    icon: mdi:desktop-mac  
  binary_sensor.katja:  
    icon: mdi:desktop-mac  
  binary_sensor.imac:  
    icon: mdi:desktop-mac  
  binary_sensor.tv:  
    icon: mdi:desktop-mac  
NORMAL > .homeassistant/configuration.yaml
```

< yaml utf-8[unix] < 0% : 1: 1 < ! trailing[8]

ghost 0.58, 0.45, 0.36 1: bash 2: bash# 3: bash# 4: bash# 5: bash# 6: bash# 7: bash#- 8: bash* 23 days 28.03.2019. Thu14:27

```
light:
- platform: mqtt
  command_topic: "home/devroom/switch1/set"
  name: "LED ambient light"

switch:
- platform: command_line
  switches:
    agent_smith_2:
      command_on: "/usr/local/bin/agentsmith2_enable.sh"
      command_off: "/usr/local/bin/agentsmith2_disable.sh"
      friendly_name: "Agent Smith 2"
    agent_smith:
      command_on: "/usr/local/bin/agentsmith_enable.sh"
      command_off: "/usr/local/bin/agentsmith_disable.sh"
      friendly_name: "Agent Smith"
```

```
binary_sensor:
- platform: mqtt
  state_topic: "home/devroom/motion"
  name: "Devroom motion"
  device_class: motion
- platform: mqtt
  state_topic: "home/weather/light"
  name: "Daylight"
- platform: ping
  host: 172.25.26.6
  name: "Router"
  count: 1
```

```
media_player:
- platform: philips_js
  host: 172.25.26.133
  name: tv
  api_version: 5
```

automation:

- alias: **Motion turn on lamp**

trigger:

- platform: state
 - entity_id: binary_sensor.devroom_motion
 - to: 'on'

condition:

- condition: state
 - entity_id: binary_sensor.daylight
 - state: 'off'
- condition: state
 - entity_id: input_boolean.game_mode
 - state: 'off'

action:

service: light.turn_on
entity_id: light.led_ambient_light

- alias: **Motion turn off lamp**

trigger:

- platform: state
 - entity_id: binary_sensor.devroom_motion
 - to: 'off'

action:

service: light.turn_off
entity_id: light.led_ambient_light

- alias: **Turn on wireless**
trigger:
 - platform: time
at: '06:00:00'action:
service: switch.turn_on
entity_id: switch.agent_smith
- alias: **Turn off wireless**
trigger:
 - platform: time
at: '23:55:00'action:
service: switch.turn_off
entity_id: switch.agent_smith

- alias: **Kruno arrived at VUB**
trigger:
 - platform: zone
 - entity_id: device_tracker.h00s_kruno
 - zone: zone.vub
 - event: enteraction:
service: notify.husakbot
data:
 - message: 'Kruno je stigao na VUB.'
- alias: **Kruno left VUB**
trigger:
 - platform: zone
 - entity_id: device_tracker.h00s_kruno
 - zone: zone.vub
 - event: leaveaction:
service: notify.husakbot
data:
 - message: 'Kruno je otišao s VUB-a.'

Home Assistant

- **Mane:**

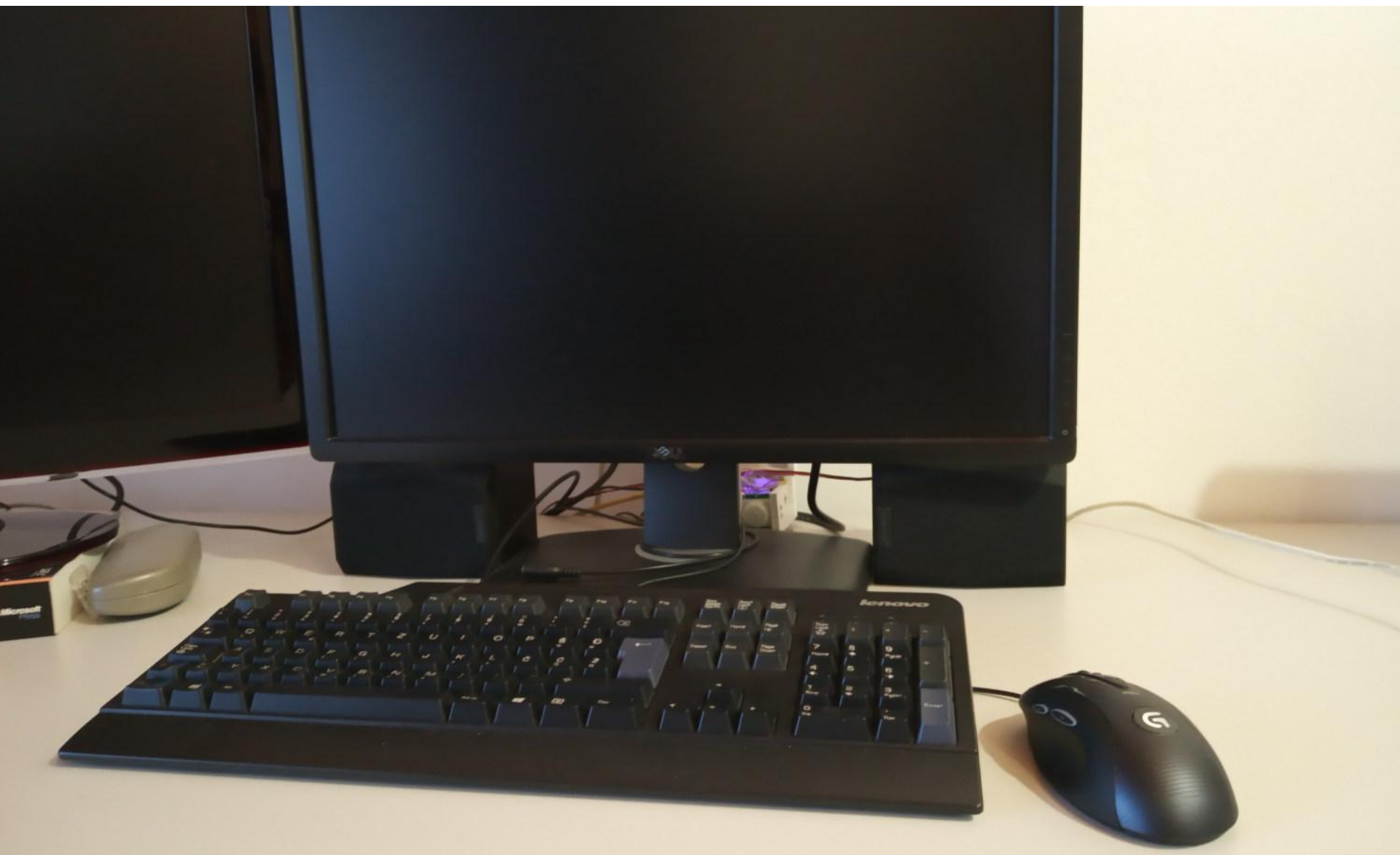
- pod konstantnim razvojem (svaka dva tjedna nova verzija),
- vrlo jednostavno dodavanje novih uređaja - platforma automatski preuzima sav potreban kod koji to omogućava,
- cjelokupna konfiguracija se nalazi unutar jedne (ili više) YAML datoteke - jednostavan *backup* i *restore*,
- baza podataka:
 - SQLite na sporoj SD kartici,
 - veličina baze vrlo brzo raste što dodatno usporava rad (trenutna veličina baze 4GB!)

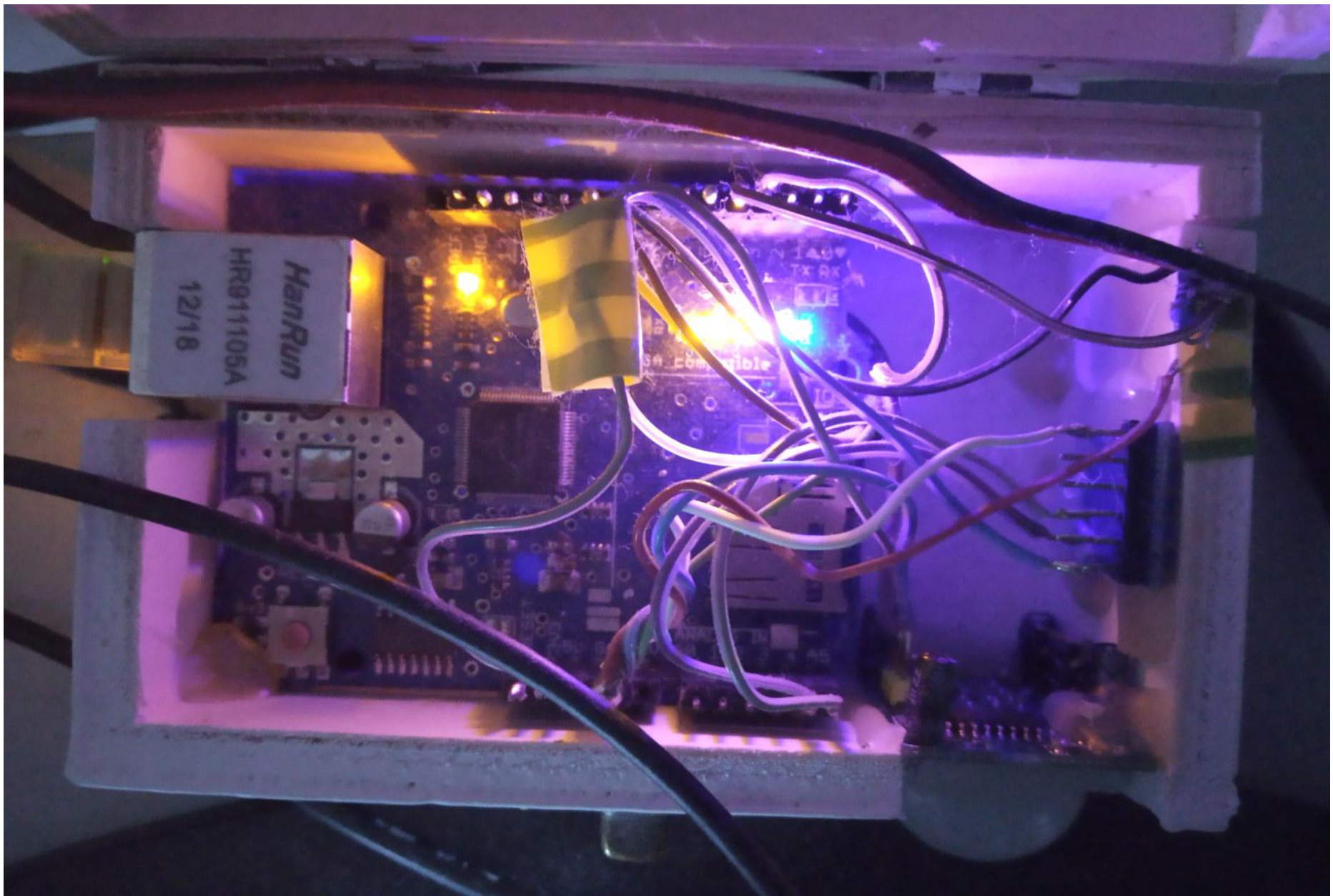
Home Assistant / moduli

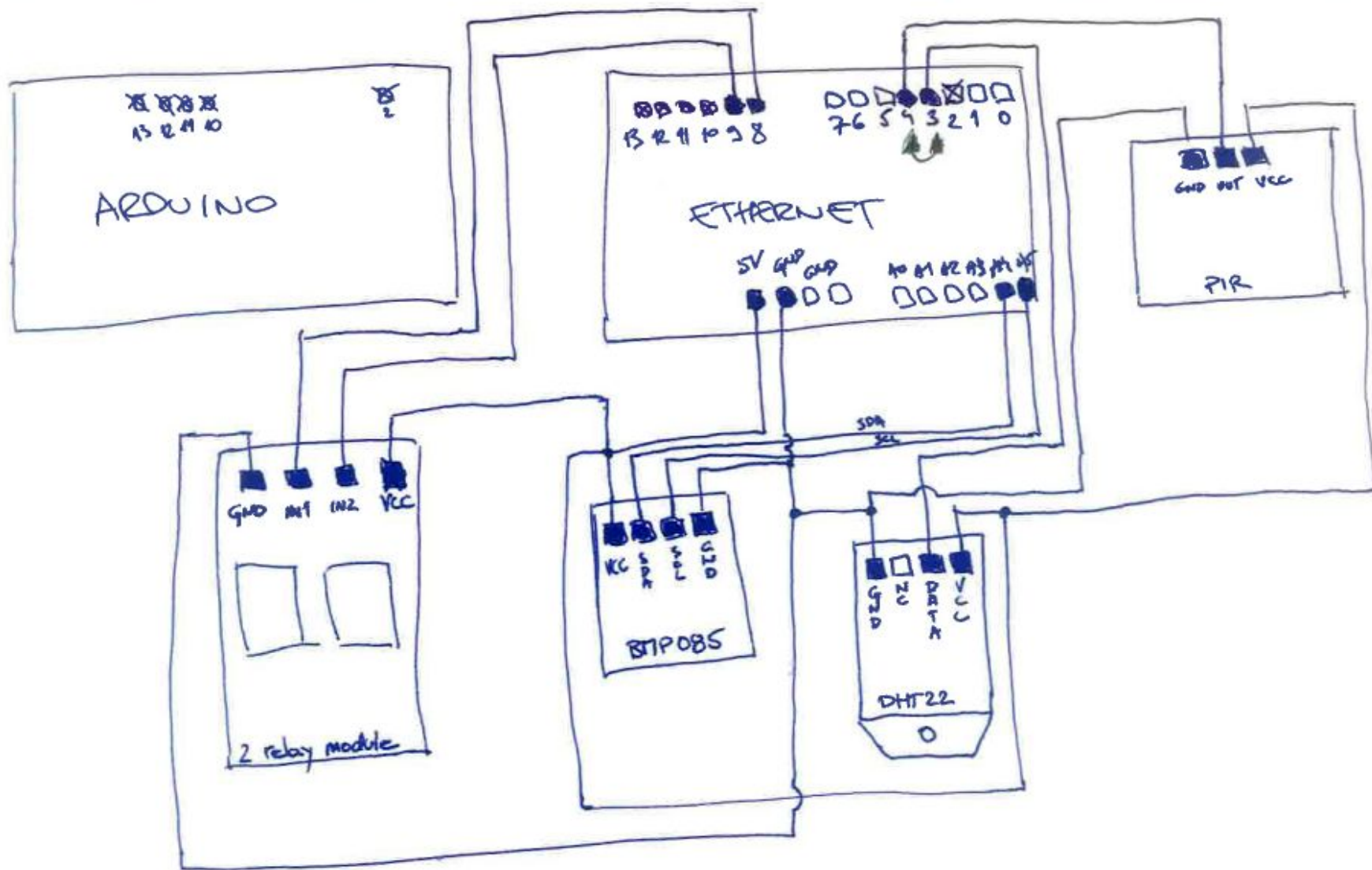
- **Ideja:**

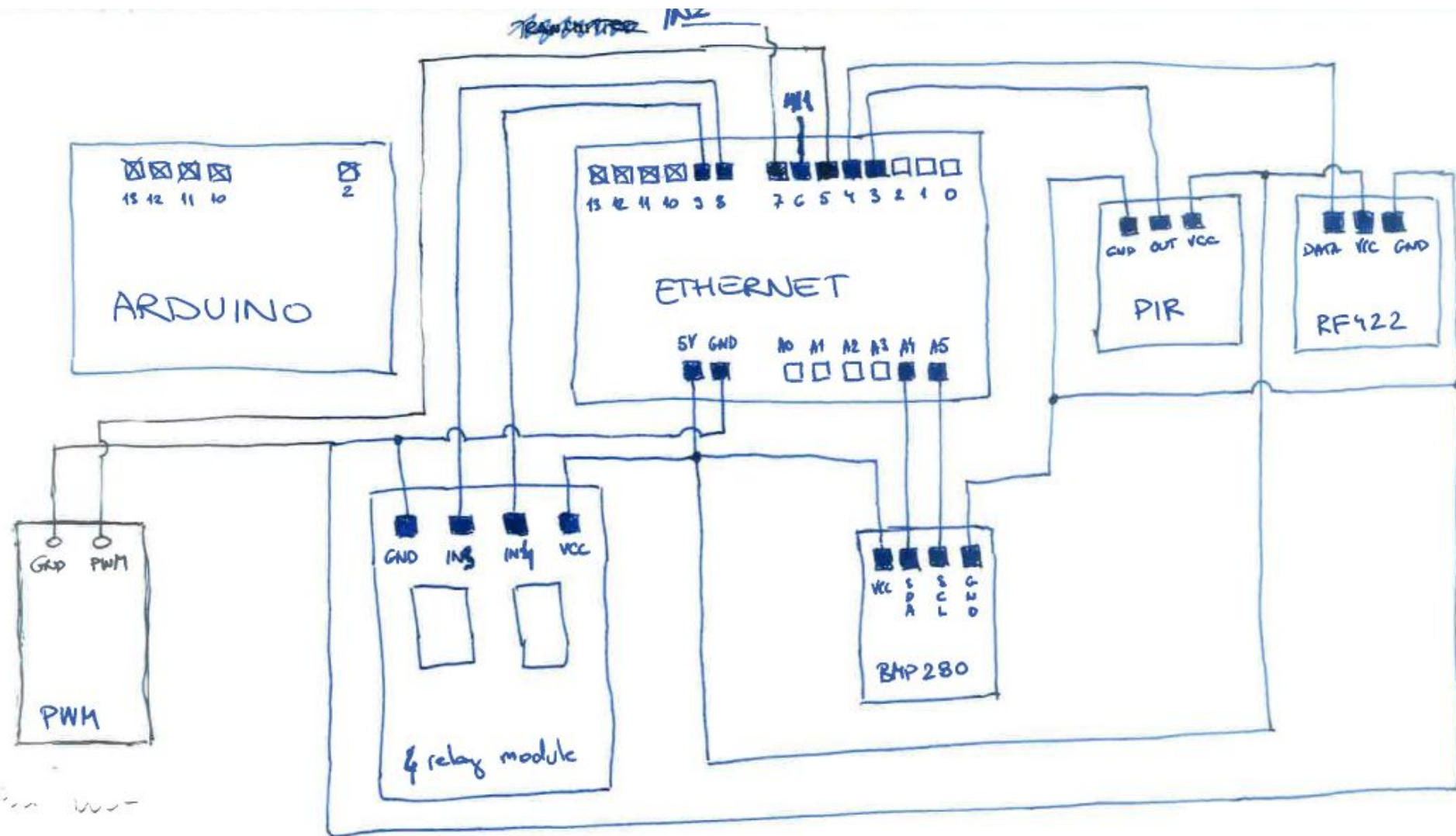
- Izrada malih, jednostavnih i jeftinih uređaja koji se mogu jednostavno postaviti na bilo koju lokaciju unutar kuće / garaže, odnosno gdje je potrebno.
- Bazirano na Arduino platformi - jednostavno za programiranje, dostupan veliki broj biblioteka.
- Veliki broj dostupnih i jednostavnih senzora koje je jednostavno priključiti na Arduino i programirati.
- Svaki takav modul se priključuje na izvor napajanja i najbliži mrežni switch (ethernet).
- Moduli putem mrežne infrastrukture komuniciraju s glavnim serverom -> Home Assistant.









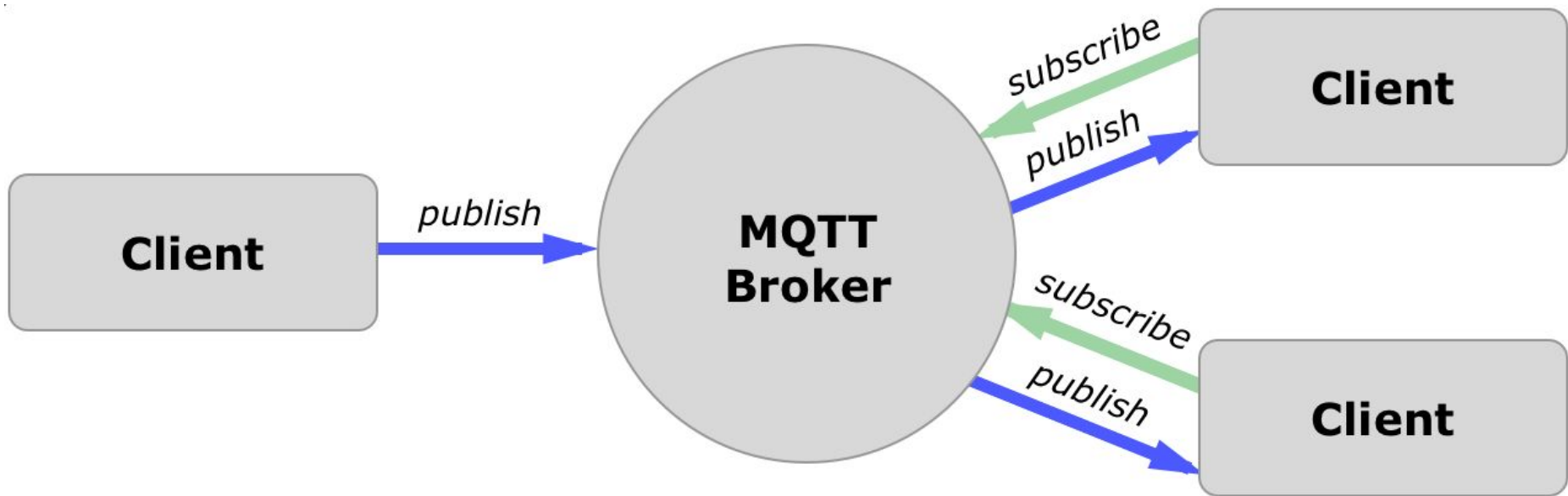




Protokol za komunikaciju

- **MQTT**

- Message Queuing Telemetry Transport.
- Protokol baziran na TCP/IP-u za razmjenu poruka na principu objave i pretplate (*publish-subscribe protocol*).



Protokol za komunikaciju

- **MQTT brokeri / serveri:**

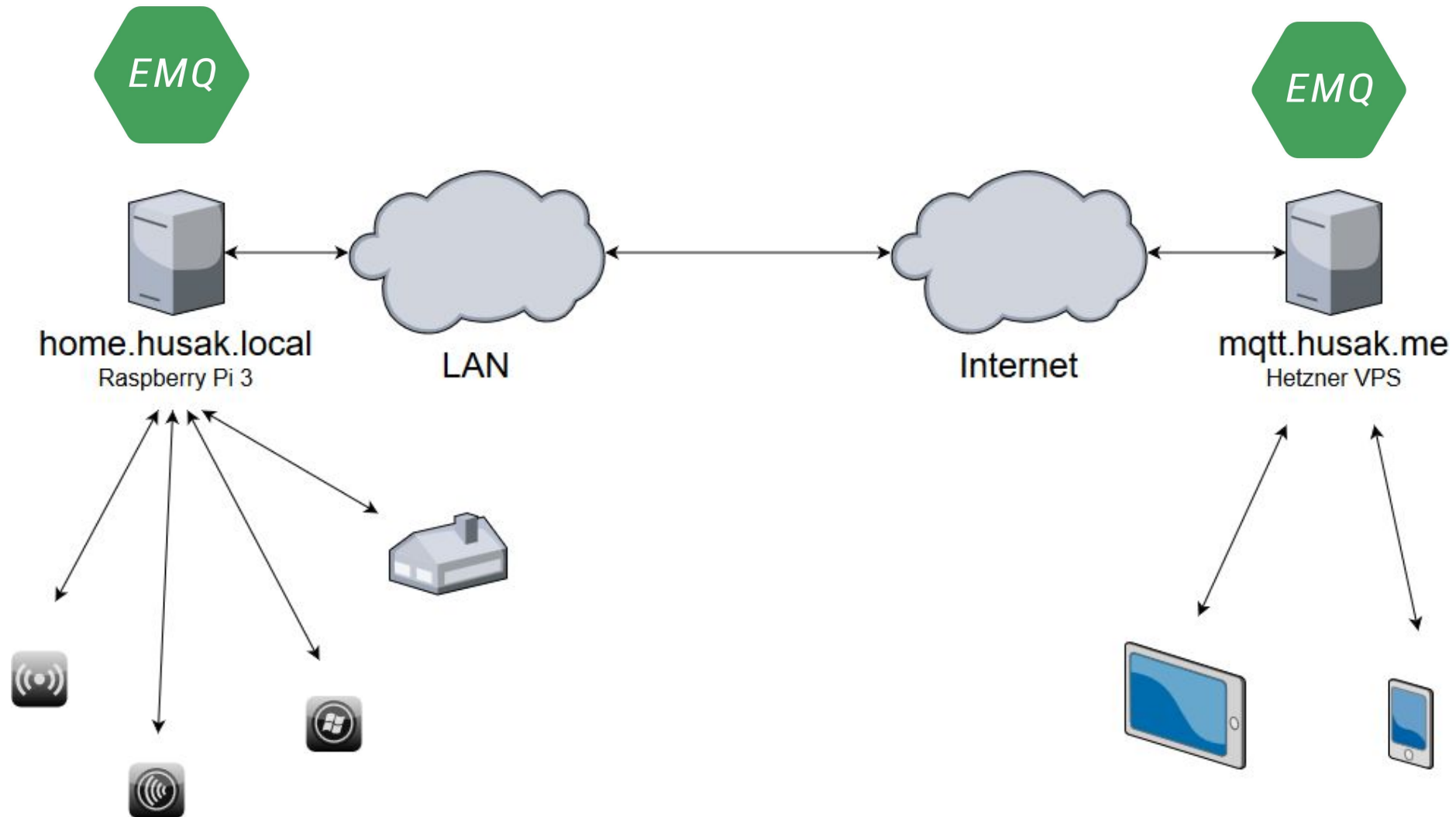
- Mosquitto,
- HiveMQ,
- RabbitMQ,
- Cassandra,
- **EMQX**

- **Cloud serveri:**

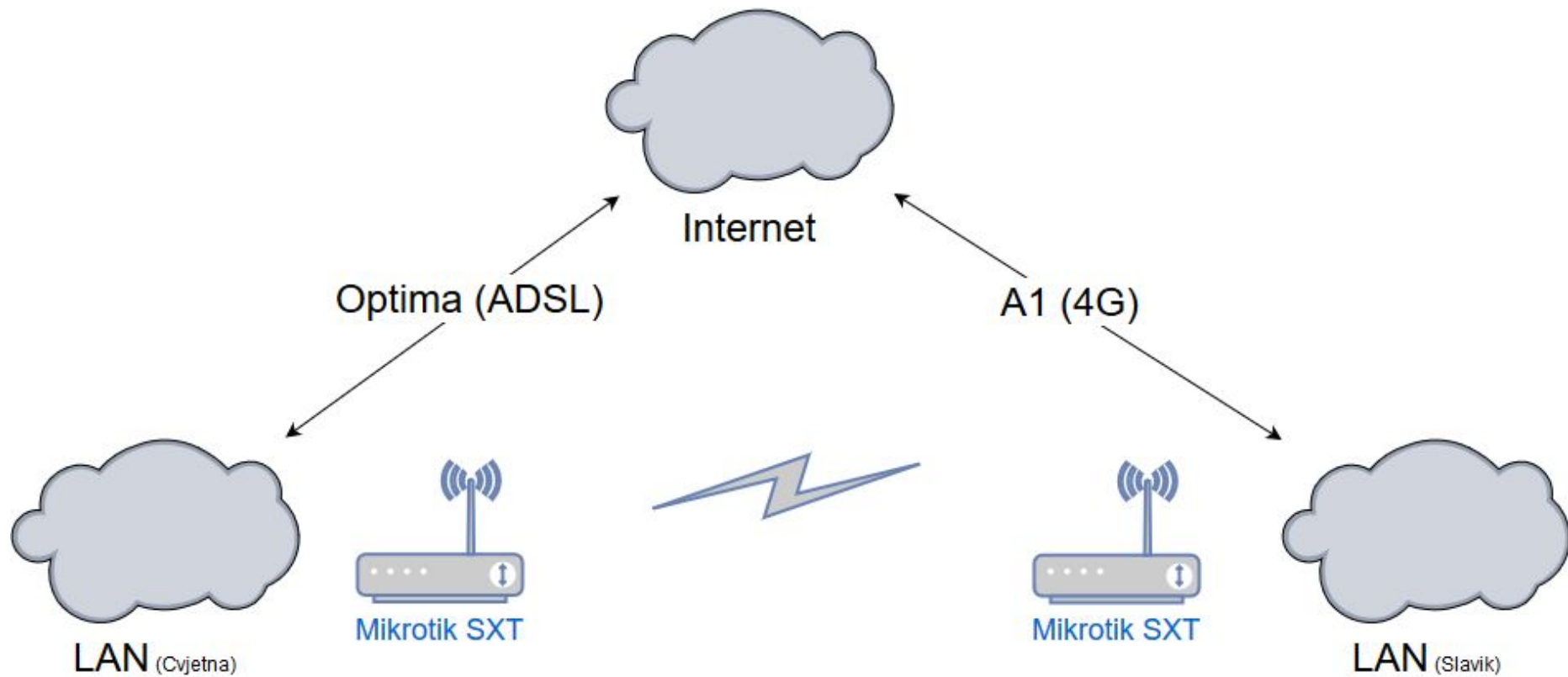
- CloudMQTT,
- HiveMQ,
- ...



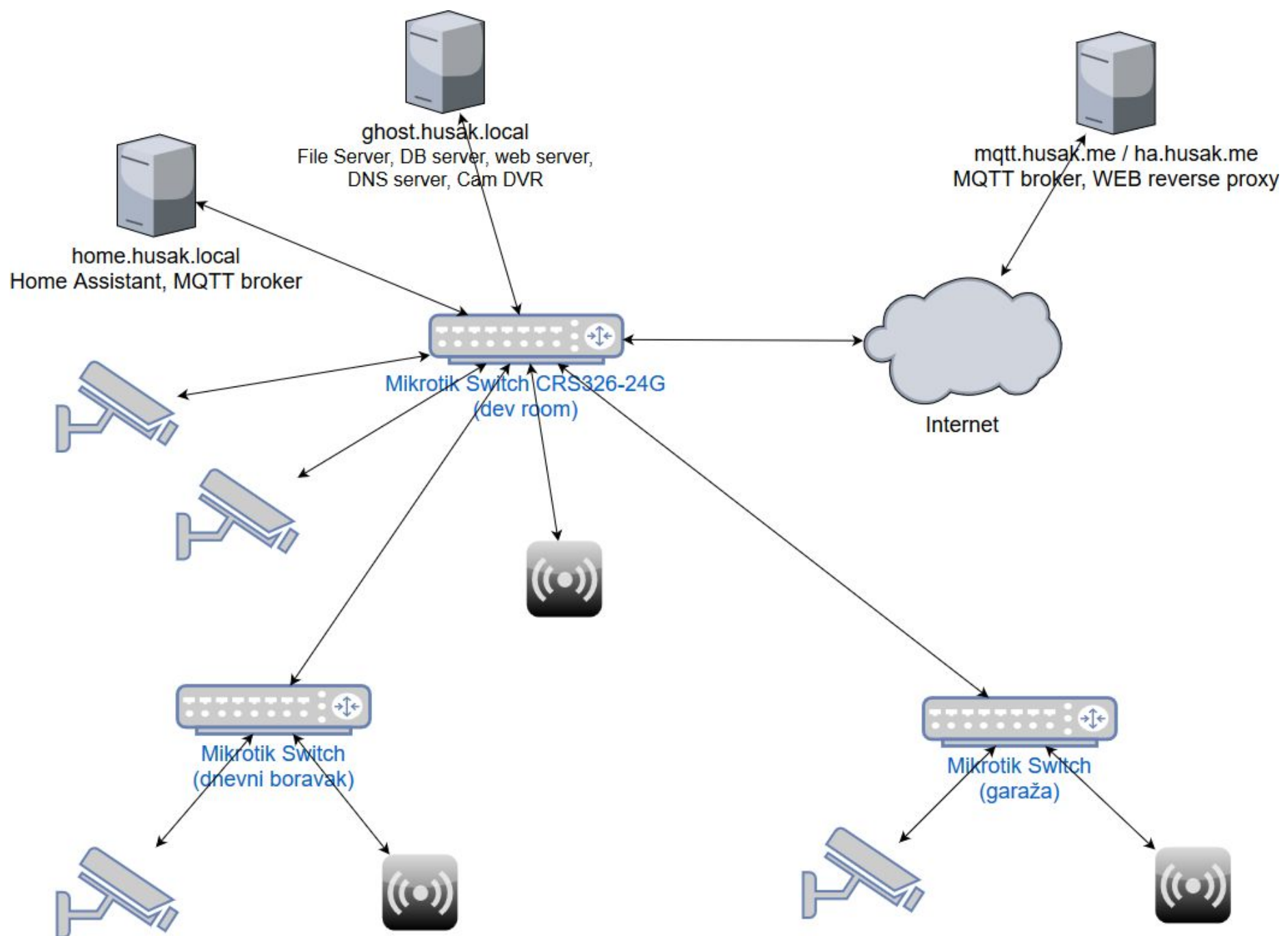
MQTT server



Mrežna infrastruktura









Mikrotik Switch

Mikrotik Router

Raspberry Pi 3
Raspbian

Home Assistant
MQTT broker

Intel Atom / 2GB / 3T
Debian 9

File server, DB server, web
server, DNS server, Cam DVR

IP kamere

- Jeftine i dostupne (AliExpress).
 - ~145kn
- Specifikacije:
 - 2Mpix / 720p
 - IR LED (automatsko uključivanje po noći)
 - TCP/IP, UDP, RTP, RTSP, RTCP, HTTP...
 - ONVIF motion detection

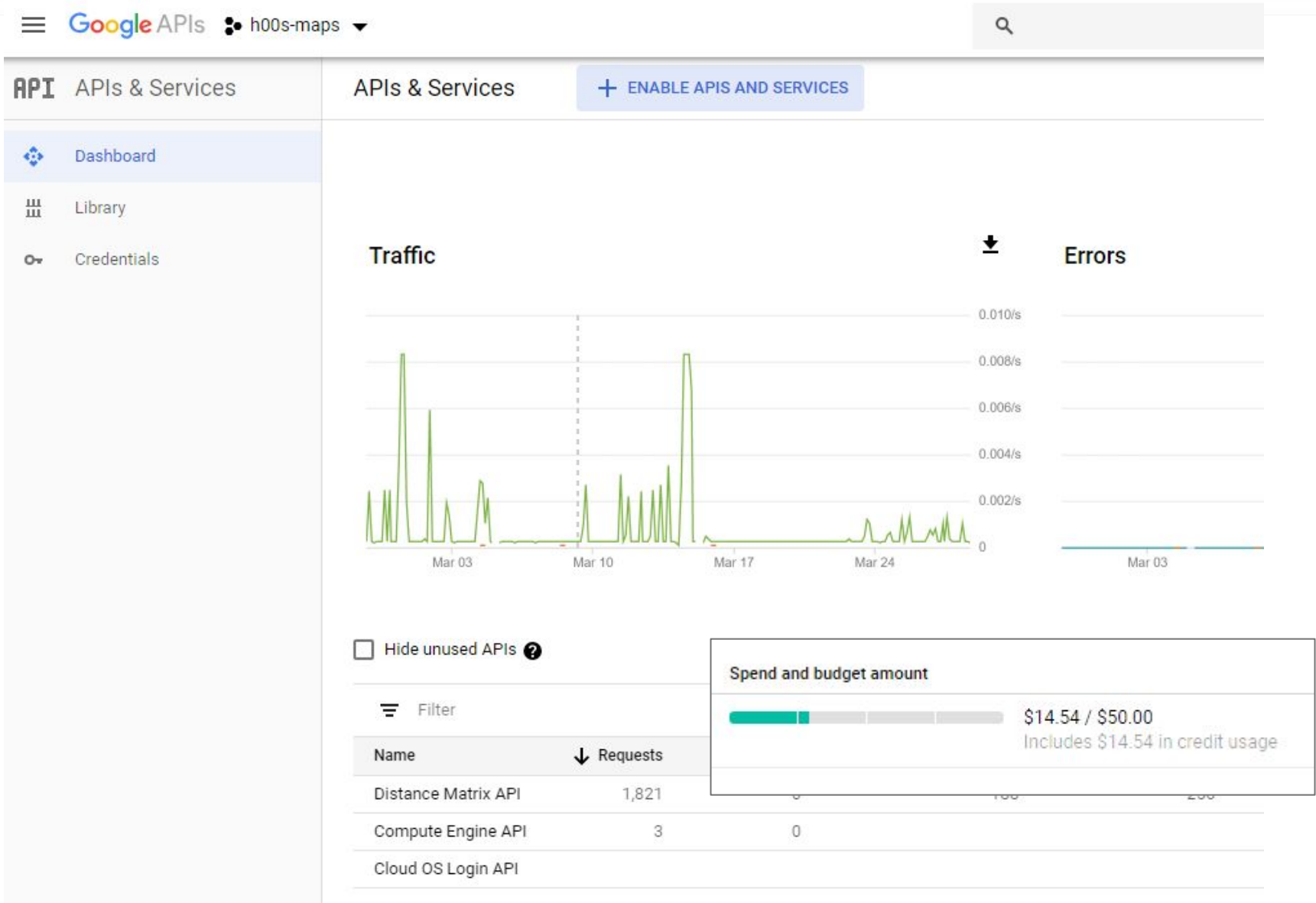


Dodatni servisi

- OwnTracks
 - MQTT klijent (Android aplikacija) koji u određenim vremenskim intervalima šalje brokeru informacije o lokaciji mobilnog uređaja.
 - Postavke omogućuju da lokaciju šalje u određenim vremenskim intervalima i/ili ukoliko se lokacija promijenila za određeni broj metara.



Google Distance Matrix API



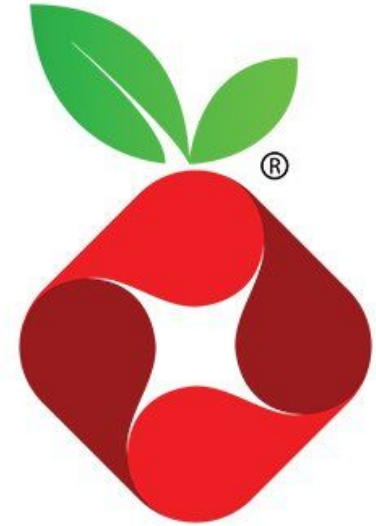
SyncThing

- Server i Android klijent
- Omogućava vrlo jednostavnu sinkronizaciju podataka između više uređaja.
- U mom slučaju koristim za sinkroniziranje mobitela s file serverom.
- Automatski backup.



PiHole

- pi-hole.net
- “A black hole for Internet advertisements”
- Filtriranje internet reklama kroz DNS poslužitelj.
- Nema reklama niti na jednom uređaju koji koristi navedeni DNS poslužitelj (računala, mobiteli, PS3, ...)



- Jednostavna aplikacija za otkrivanje nestanka električne energije.
- Pisana u Go programskom jeziku.
- Princip rada:
 - Periodički *pinga* mrežne uređaje koji nisu spojeni na uređaje besprekidnog napajanja (UPS).
 - Ukoliko ne može “doći” niti do jednog uređaja koji su definirani u konfiguraciji, šalje informaciju svim drugim PowerDogovima.
 - Računala koji pokreću PowerDog odlučuju za koliko minuta će se isključiti.
 - Ukoliko u međuvremenu “dode” električna energija, šalje se nova informacija.
 - Putem PushBuleta se šalje informacija o nestanku el. energije na mobilni uređaj / računalo.



Što dalje?

Hvala na pozornosti!

Za sva dodatna pitanja sam
vam uvijek dostupan na

khusak@vub.hr