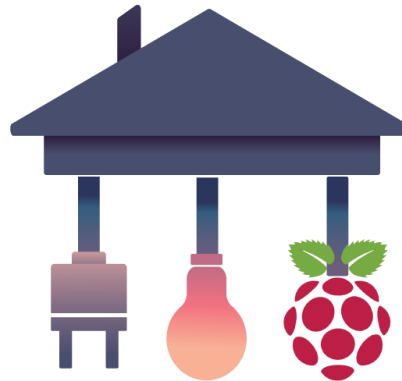


Universitatea “Alexandru Ioan Cuza” Iași  
Facultatea de Informatică



# Implementarea unui sistem software de tip Smart Home



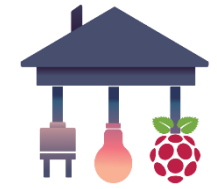
Autor:  
**Nicușor TURCU**

Coordonator științific:  
**Lector doctor Cristian FRĂSINARU**

Sesiunea: Iulie 2018

# Cuprins

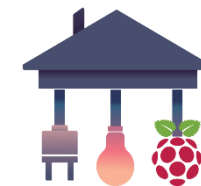
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1. Motivație
2. Ce este Smart Home?
3. Arhitectura sistemului
4. Aplicația web
5. Server REST Java
6. Dispozitive inteligente
7. Dispozitive utilizate
8. Direcții de dezvoltare
9. Concluzii

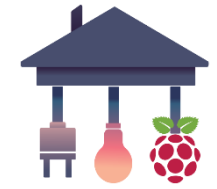
# Motivație

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# Ce este Smart Home?

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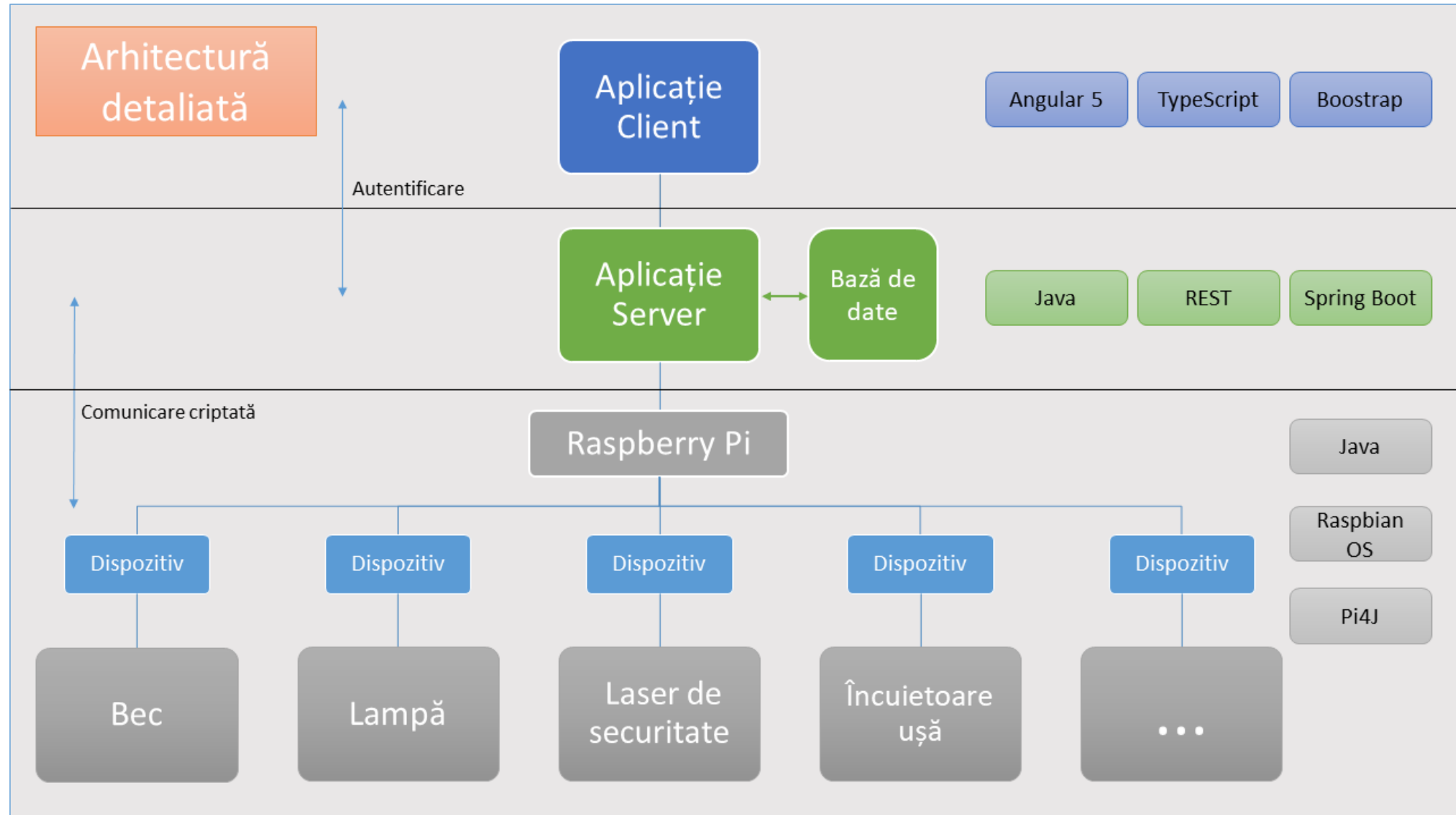
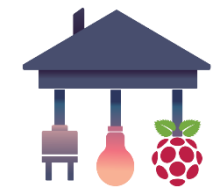
Reședință controlată de la distanță.

Oferă:

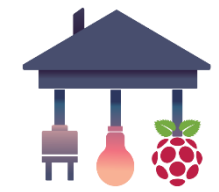
- Confort,
- Securitate,
- Ușurință în utilizare,
- Economii de timp, bani și energie.

Software-ul de calculator joacă rolul unui agent inteligent.

# Arhitectura sistemului



# Aplicația web



Angular 5

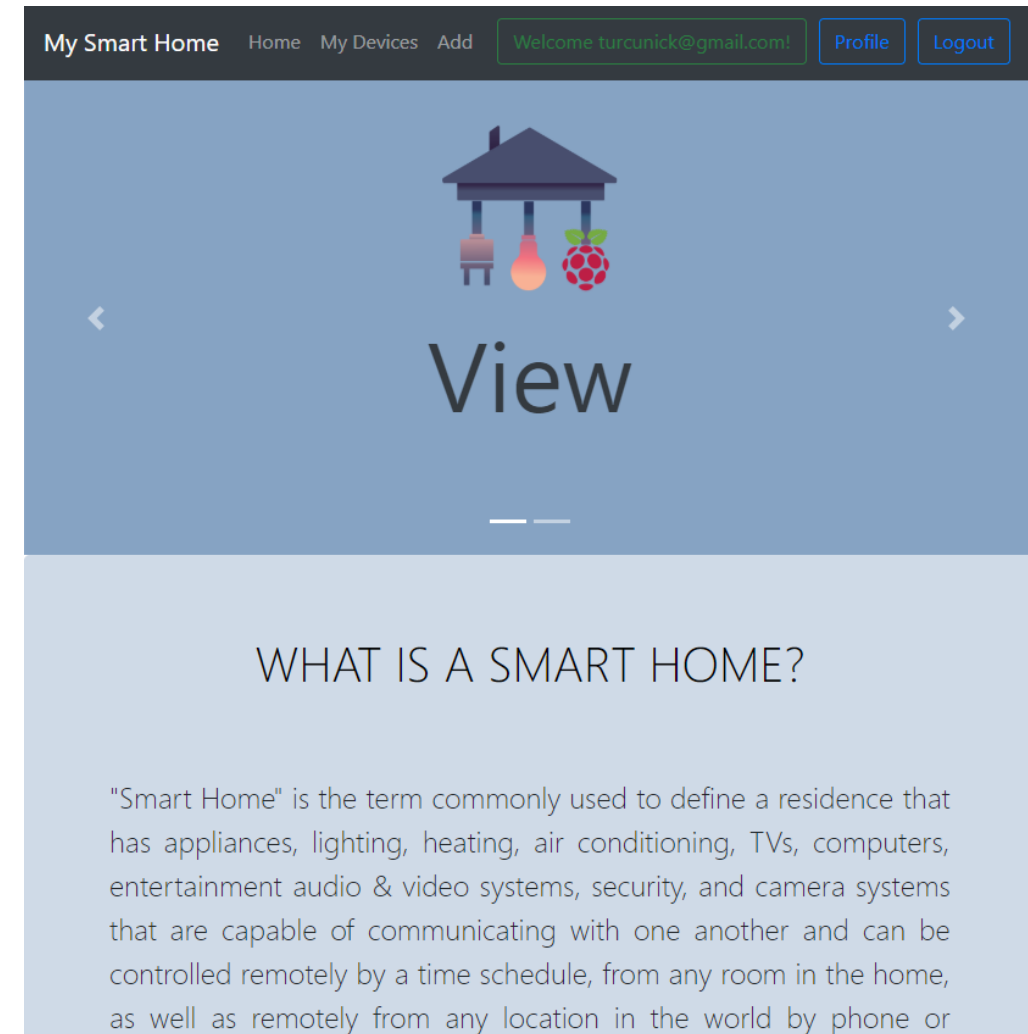
Bootstrap 4

HTML

CSS

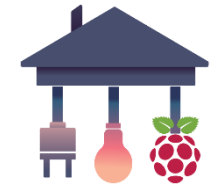
Typescript

- Design:
  - Intuitiv
  - Modern
  - Simplist
  - Responsive
- Comunicare HTTP cu serverul Java.



# Server REST Java

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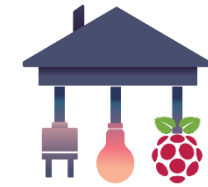
API REST

SSL/TLS

Java

- Manager de dispozitive.
- Protocol de comunicație personalizat.
- Securitate în comunicarea cu dispozitivele.

# Aspecte de securitate



| No. | Source              | Destination     | Protocol | Info  |
|-----|---------------------|-----------------|----------|---|
| 1.  | 493 169.254.48.113  | 169.254.207.167 | TCP      | 51776 → 8000 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1            |
|     | 494 169.254.207.167 | 169.254.48.113  | TCP      | 8000 → 51776 [SYN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1460 SACK_PERM=1 WS=128 |
|     | 495 169.254.48.113  | 169.254.207.167 | TCP      | 51776 → 8000 [ACK] Seq=1 Ack=1 Win=65536 Len=0                                  |
|     | 496 169.254.48.113  | 169.254.207.167 | TLSv1.2  | Client Hello  |
|     | 497 169.254.207.167 | 169.254.48.113  | TCP      | 8000 → 51776 [ACK] Seq=1 Ack=199 Win=30336 Len=0                                |
|     | 501 169.254.207.167 | 169.254.48.113  | TLSv1.2  | Server Hello, Certificate, Server Key Exchange, Server Hello Done               |
|     | 502 169.254.48.113  | 169.254.207.167 | TLSv1.2  | Client Key Exchange   |
| 2.  | 503 169.254.207.167 | 169.254.48.113  | TCP      | 8000 → 51776 [ACK] Seq=1204 Ack=338 Win=31360 Len=0                             |
|     | 504 169.254.48.113  | 169.254.207.167 | TLSv1.2  | Change Cipher Spec  |
|     | 505 169.254.207.167 | 169.254.48.113  | TCP      | 8000 → 51776 [ACK] Seq=1204 Ack=344 Win=31360 Len=0                             |
|     | 506 169.254.48.113  | 169.254.207.167 | TLSv1.2  | Encrypted Handshake Message   |
|     | 507 169.254.207.167 | 169.254.48.113  | TCP      | 8000 → 51776 [ACK] Seq=1204 Ack=429 Win=31360 Len=0                             |
|     | 508 169.254.207.167 | 169.254.48.113  | TLSv1.2  | Change Cipher Spec  |
|     | 509 169.254.48.113  | 169.254.207.167 | TCP      | 51776 → 8000 [ACK] Seq=429 Ack=1210 Win=64256 Len=0                             |
|     | 510 169.254.207.167 | 169.254.48.113  | TLSv1.2  | Encrypted Handshake Message   |
|     | 511 169.254.48.113  | 169.254.207.167 | TLSv1.2  | Application Data  |
|     | 512 169.254.207.167 | 169.254.48.113  | TCP      | 8000 → 51776 [ACK] Seq=1295 Ack=498 Win=31360 Len=0                             |
|     | 513 169.254.207.167 | 169.254.48.113  | TLSv1.2  | Application Data  |
| 3.  | 517 169.254.48.113  | 169.254.207.167 | TLSv1.2  | Application Data  |
|     | 518 169.254.207.167 | 169.254.48.113  | TLSv1.2  | Application Data  |
|     | 519 169.254.48.113  | 169.254.207.167 | TLSv1.2  | Application Data  |
|     | 520 169.254.207.167 | 169.254.48.113  | TLSv1.2  | Application Data  |
|     | 521 169.254.48.113  | 169.254.207.167 | TLSv1.2  | Application Data  |
|     | 522 169.254.207.167 | 169.254.48.113  | TLSv1.2  | Application Data  |
|     | 528 169.254.48.113  | 169.254.207.167 | TCP      | 51776 → 8000 [ACK] Seq=721 Ack=1651 Win=65280 Len=0                             |

Frame 518: 171 bytes on wire (1368 bits), 171 bytes captured (1368 bits) on interface 0

Ethernet II, Src: Raspberr\_0a:f0:6b (b8:27:eb:0a:f0:6b), Dst: TanakaS/\_0c:27:1d (00:05:0f:0c:27:1d)

Internet Protocol Version 4, Src: 169.254.207.167, Dst: 169.254.48.113

Transmission Control Protocol, Src Port: 8000, Dst Port: 51776, Seq: 1364, Ack: 567, Len: 117

Secure Sockets Layer

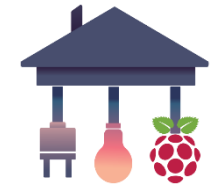
|      |   |                   |
|------|---|-------------------|
| 0000 | 00 05 0f 0c 27 1d b8 27 eb 0a f0 6b 08 00 45 00 | ....'...'...k..E. |
| 0010 | 00 9d 98 b7 40 00 40 06 4d 8e a9 fe cf a7 a9 fe | ....@.@. M.....   |
| 0020 | 30 71 1f 40 ca 40 af 77 0d f5 ba d1 d9 4a 50 18 | 0q:@.@.w ....JP.  |
| 0030 | 00 f5 1b 49 00 00 17 03 03 00 70 e0 3c 04 f7 04 | ...I.... ..p<...  |
| 0040 | ff a0 c9 80 5c 59 b8 25 b4 8f 74 67 b0 b2 21 8a | ....\Y.% ..tg..!  |

4.



# Dispozitive inteligente

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Raspberry Pi

Arduino

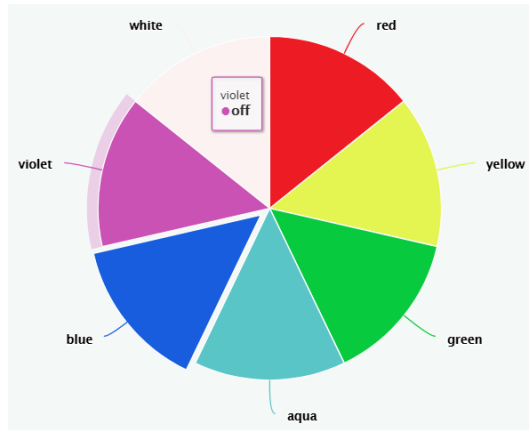
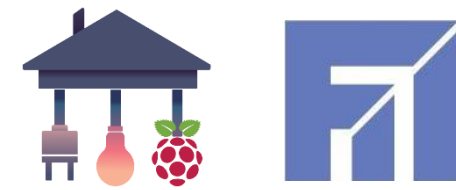
PI4J

SSL/TLS

Java

- Raspberry Pi.
- Dinamicitate în expunerea configurărilor dispozitivelor.

# Dispozitive utilizate



Lampă



Bec



Laser de securitate

## Dispozitiv

## Hardware



KY-016, Modul LED cu 3 culori

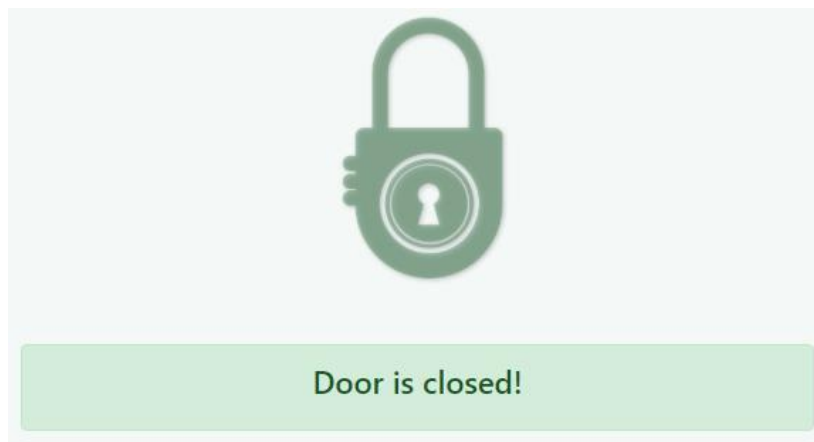
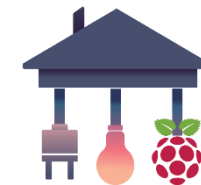


KY-011, Modul LED cu 2 culori

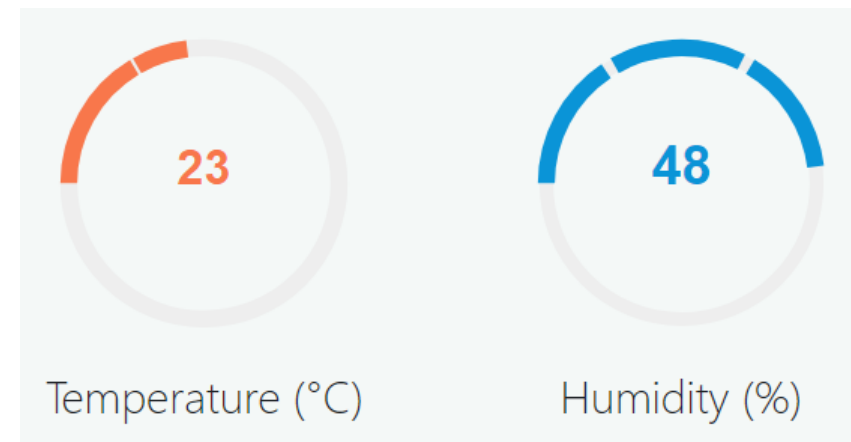


KY-008, Modulul senzor laser

# Dispozitive utilizate



Încuietoarea ușii



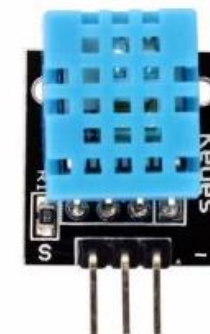
Monitor ambianță locuință

## Dispozitiv

## Hardware



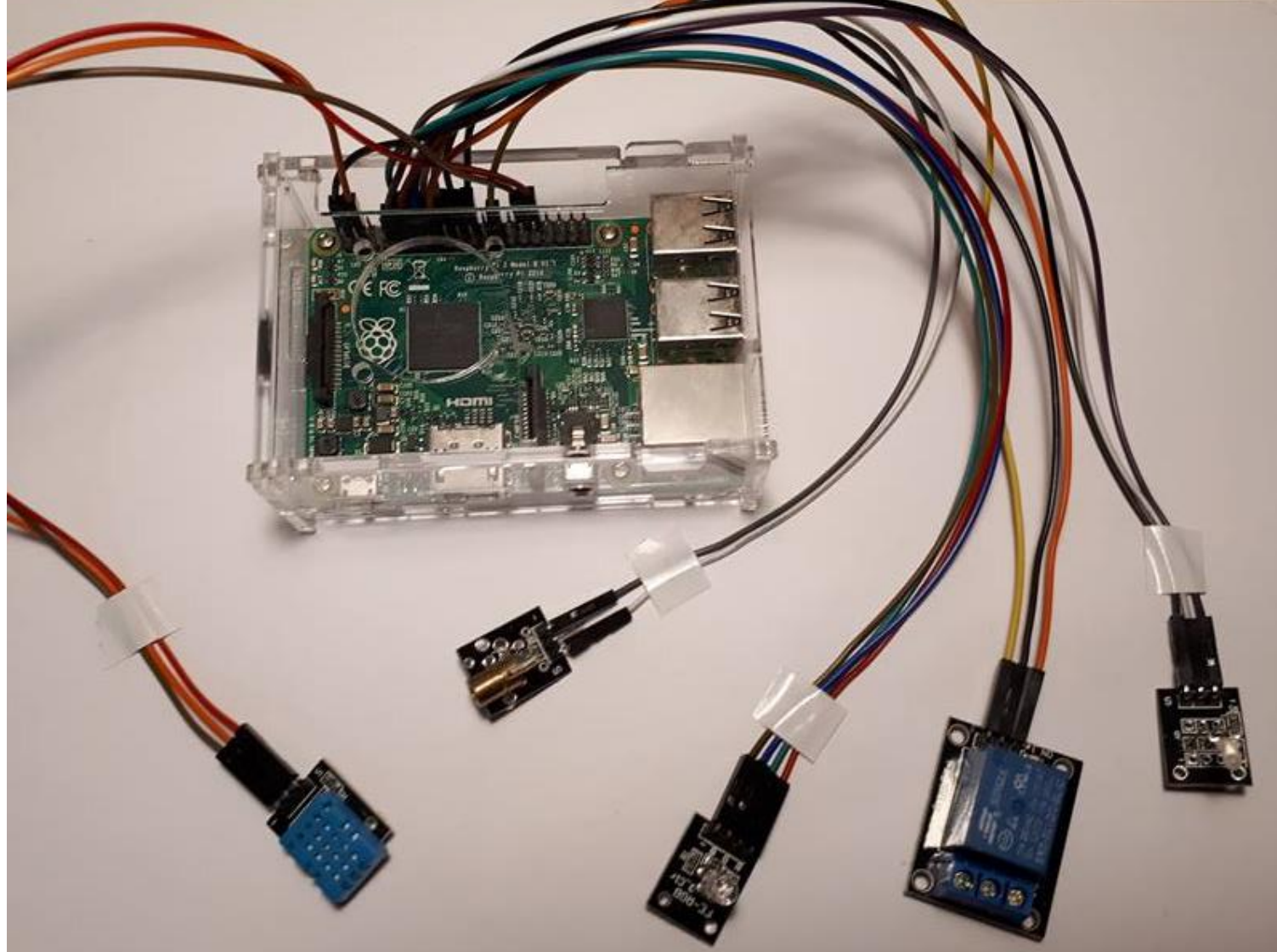
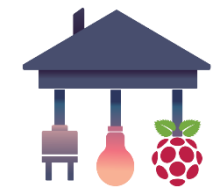
KY-019, Modul releu 5V



KY-015, Modulul cu senzor de temperatură și umiditate

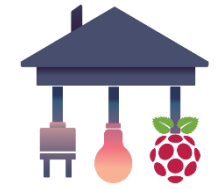
# Demo

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# Directii de dezvoltare

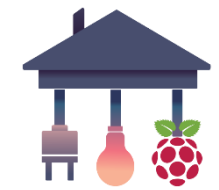
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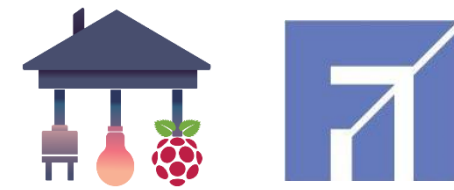
- Creșterea numărului de dispozitive.
- Creare a grupuri de utilizatori.
- Folosire HTTPS.

# Concluzii

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- Arhitectură bine construită.
- Consider că lucrarea și-a atins scopul.
- Demonstrarea avantajelor sistemului.
- Experiență cu o gamă largă de tehnologii.



Mulțumesc pentru atenție!