DESL

Developing Energy Efficient and Smart Lighting

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Open-Source Platforms Enhance Learning Activities in Smart Lighting

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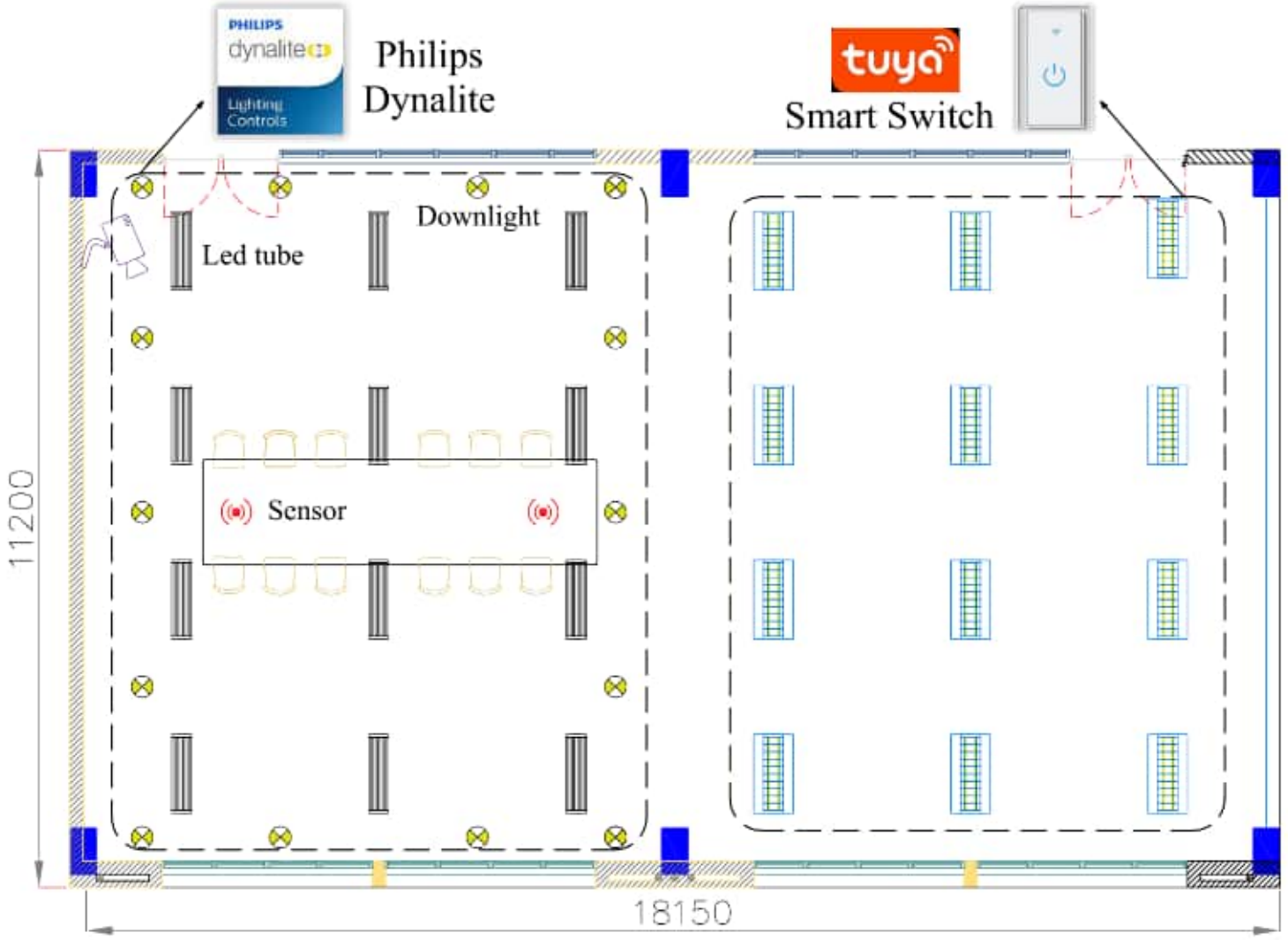
Content

1) Project’s objectives
2) Introduction to the lighting system of EIU Lighting Lab and Smart lighting solution using **Philips Dynalite**
3) **Home Assistant** and smart lighting solutions using Home Assistant
4) Demonstration of lighting control in EIU Lighting Lab

Objectives

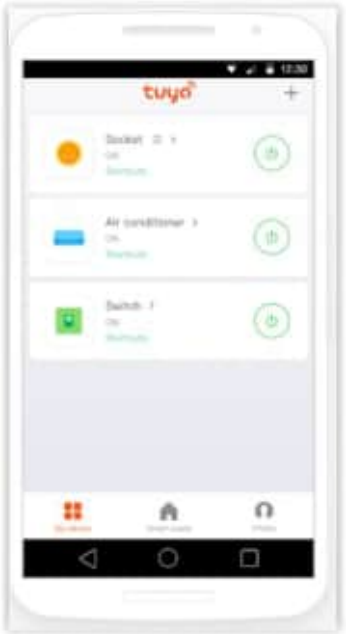
- Introducing “Home Assistant”, a free software for Smart lighting teaching and learning.
- Sharing open-source platform with the community to enhance learning activities in lighting control systems.

Layout of Lighting Lab



Energy Saving, Comfort, Flexibility

Philips App



Tuya App

Smart lighting with Philips Dynalite

- **Smart lighting** is a lighting system that utilizes technology, typically through wired or wireless connectivity protocols. These systems often incorporate features such as automation, energy savings, remote control, and customization.
- **Philips Dynalite** is part of the Philips lighting (Signify) systems group. It is a lighting control system that offers energy savings, flexibility, and the ability to create smart lighting environments.

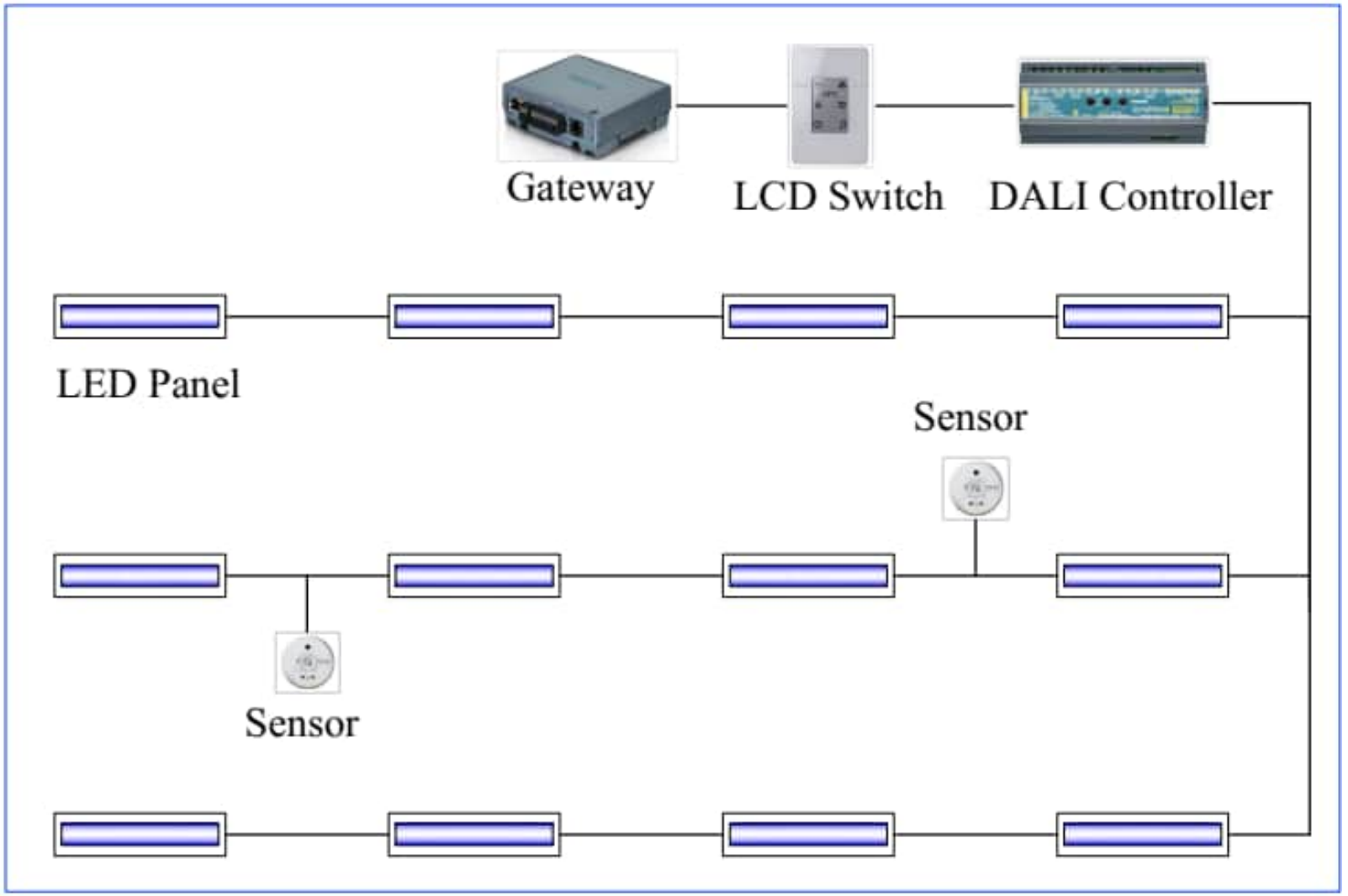
Lighting diagram with Philips Dynalite

Components:

1. DALI Controller

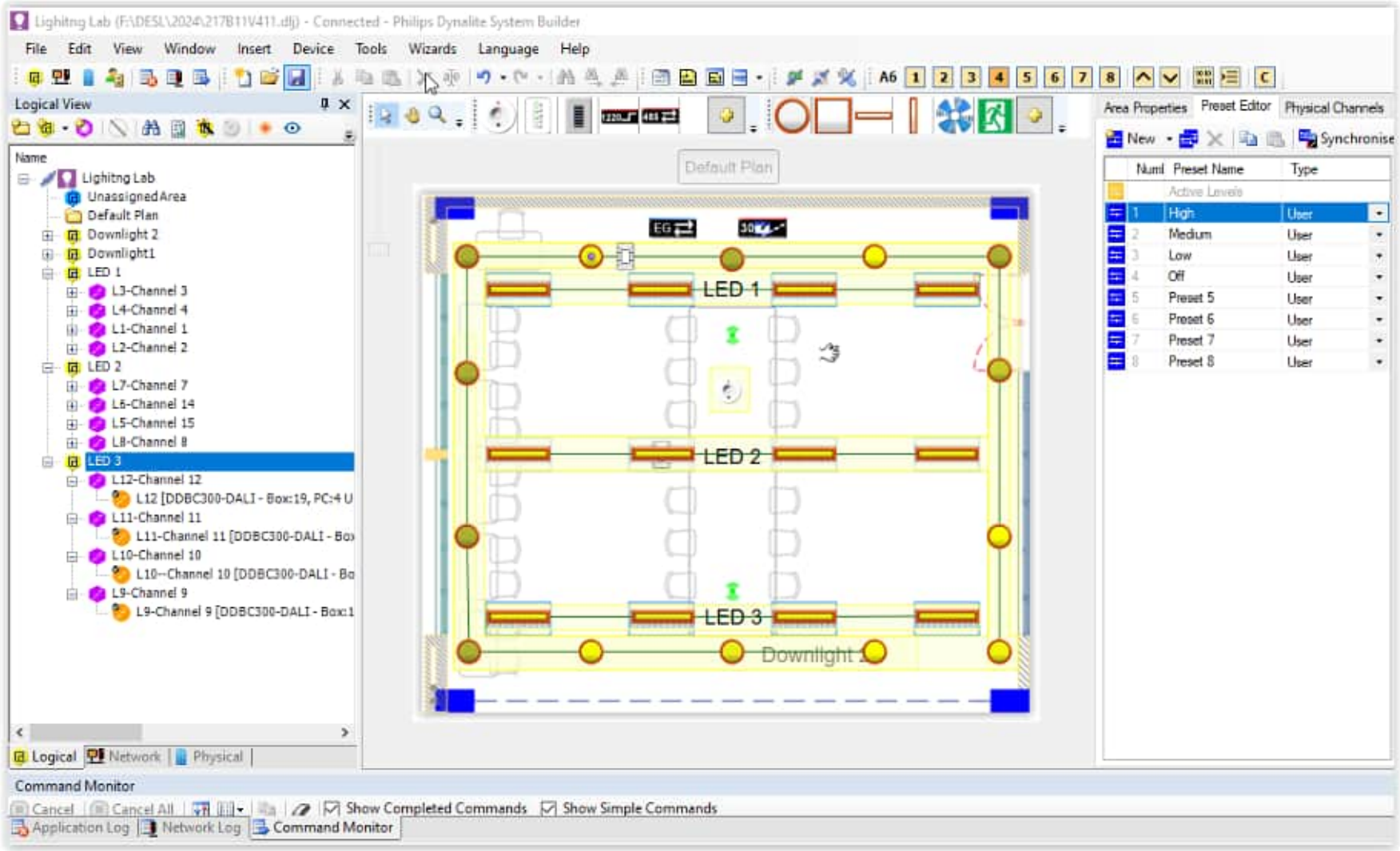
(Digital Addressable Lighting Interface)

1. LED Panels
2. Gateway
3. Sensors
4. LCD Switch

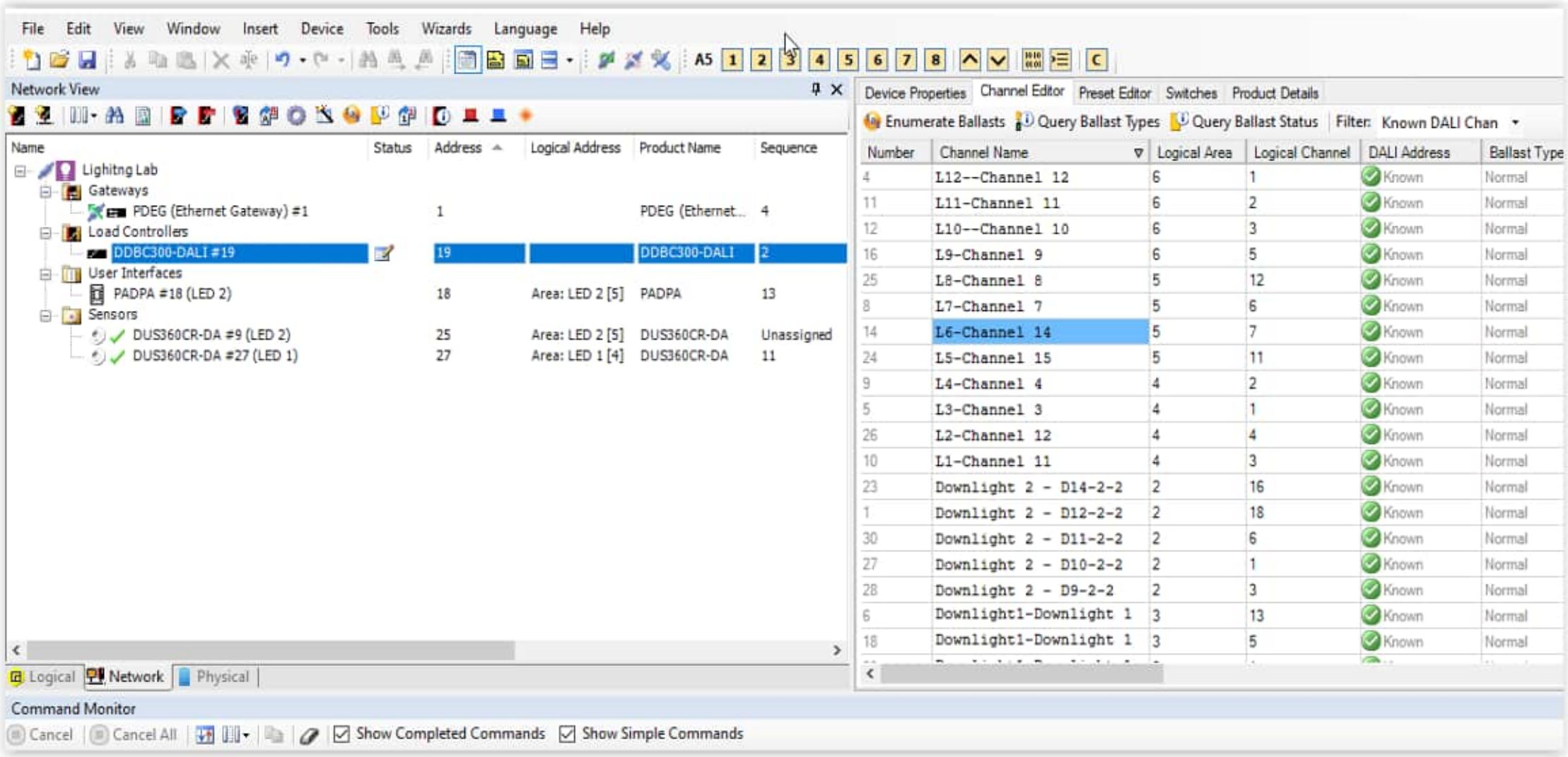


Main application windows of System Builder software

System Builder is a comprehensive platform from Philips Dynalite



Network view windows of System Builder software

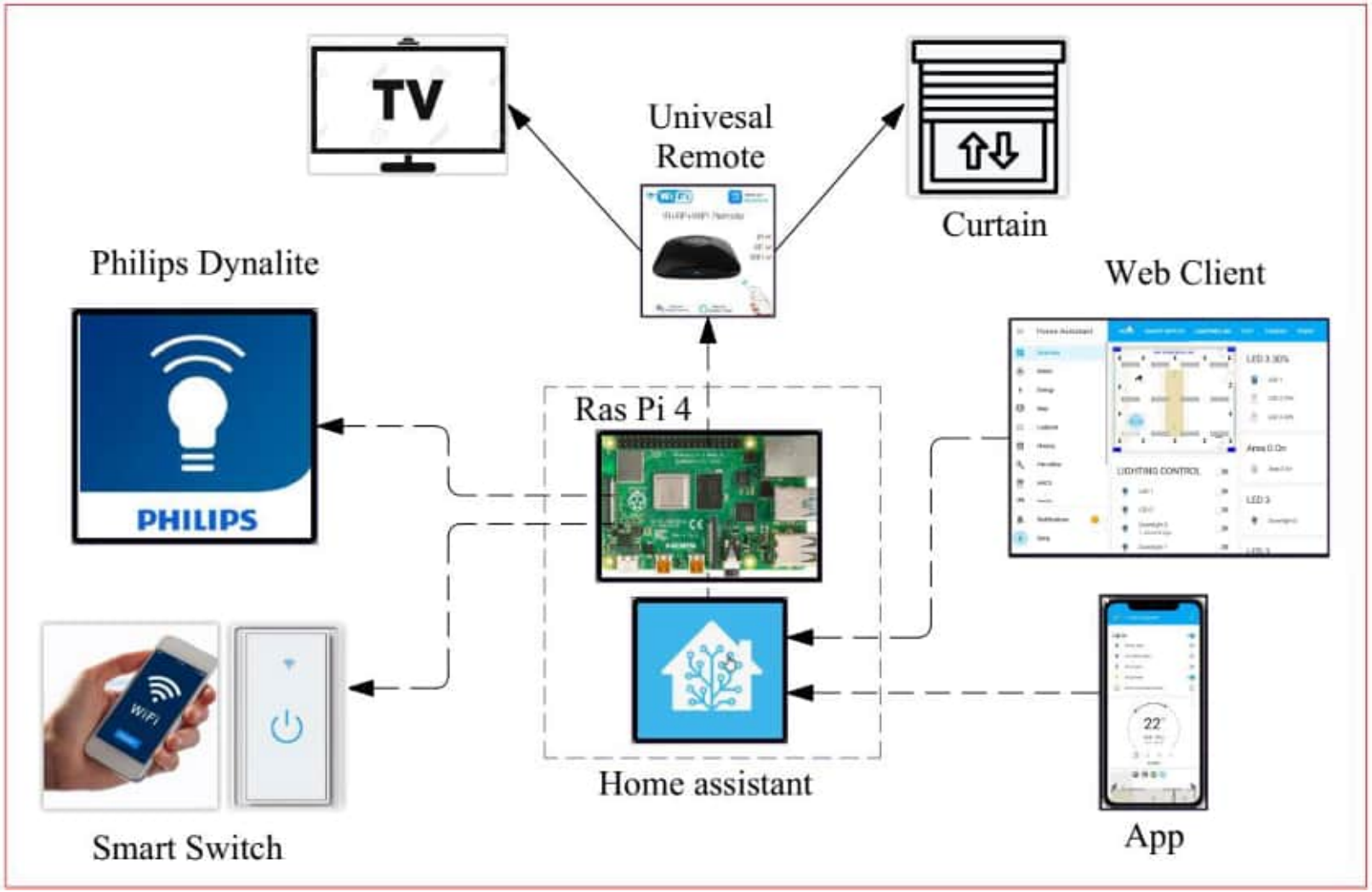


Introduction to Home Assistant

- Home Assistant (HA) is ***free*** and ***open-source*** software for home automation that supports a wide range of smart devices and platforms.
- **Community support**: A large community can provide opportunities for learning from others, receiving assistance with problems, and contributing to open-source projects.
- **Integration**: Many smart devices, such as smart switches, lights, and sensors, can be integrated with Home Assistant, and they can be controlled individually or in a group.
- ***Web-based user*** **interface** (UI) allows users to interact with their home automation system.

Smart lighting solution using Home Assistant

1. Home Assistant
2. Web client
3. Mobile app
4. Universal Remote
5. Philips Dynalite
6. Tuya smart switch



Smart lighting solution using Home Assistant

Central hub: Raspberry Pi 4 acts as the central hub for home automation, allowing users to connect and control a wide range of smart devices in smart home.

Web-based user interface offers a interface for device control, customization, and automation, including user management and integrations with other smart home platforms.

The mobile app provides users to remotely control and manage the lighting systems and devices through an UI.

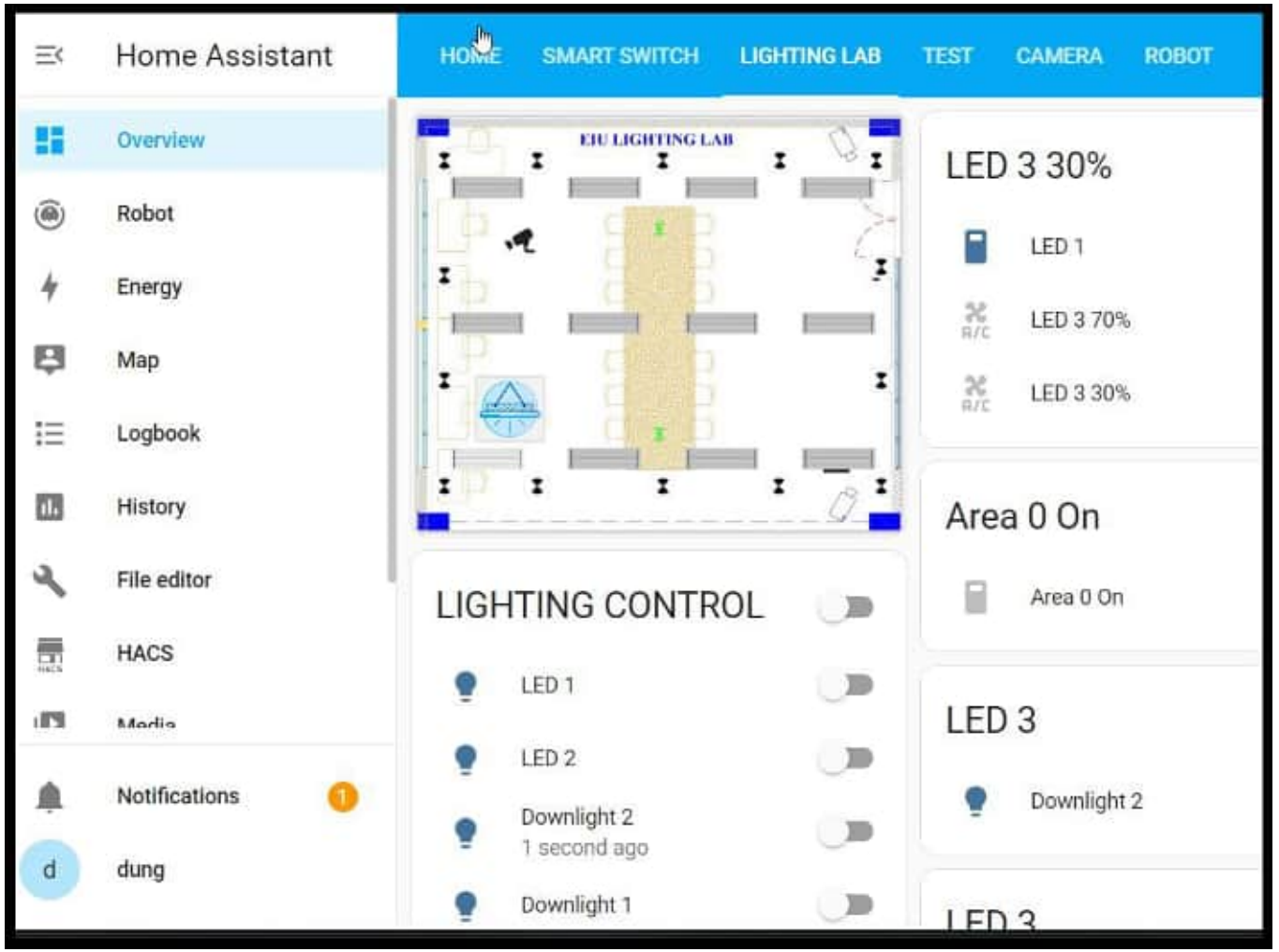
Universal Remote: Broadlink Rm4 is a universal remote. It serves as a single replacement for multiple individual remote controls within a home assistant.

Philips Dynalite is a lighting control system.

Tuya smart switches are used to remotely control the lights.

Home assistant Dashboard

- Home Assistant's architecture promotes flexibility and customization. Users can create custom integrations and components.



Applying Philips Dynalite and HA in the smart lighting experiment

- **Hands-On Learning**: Students gain practical experience with real-world smart lighting systems, enhancing their understanding of how such systems work.
- **Problem-Solving Skills**: Students develop problem-solving skills by configuring and troubleshooting the smart lighting setup.
- **Technical Competence**: Students become proficient in using industry-standard tools and technologies, preparing them for future careers
- **Programming Skills**: With open-source HA platforms provides an opportunity to develop programming skills.

Examples of programming in Home Assistant

Code for Curtain control

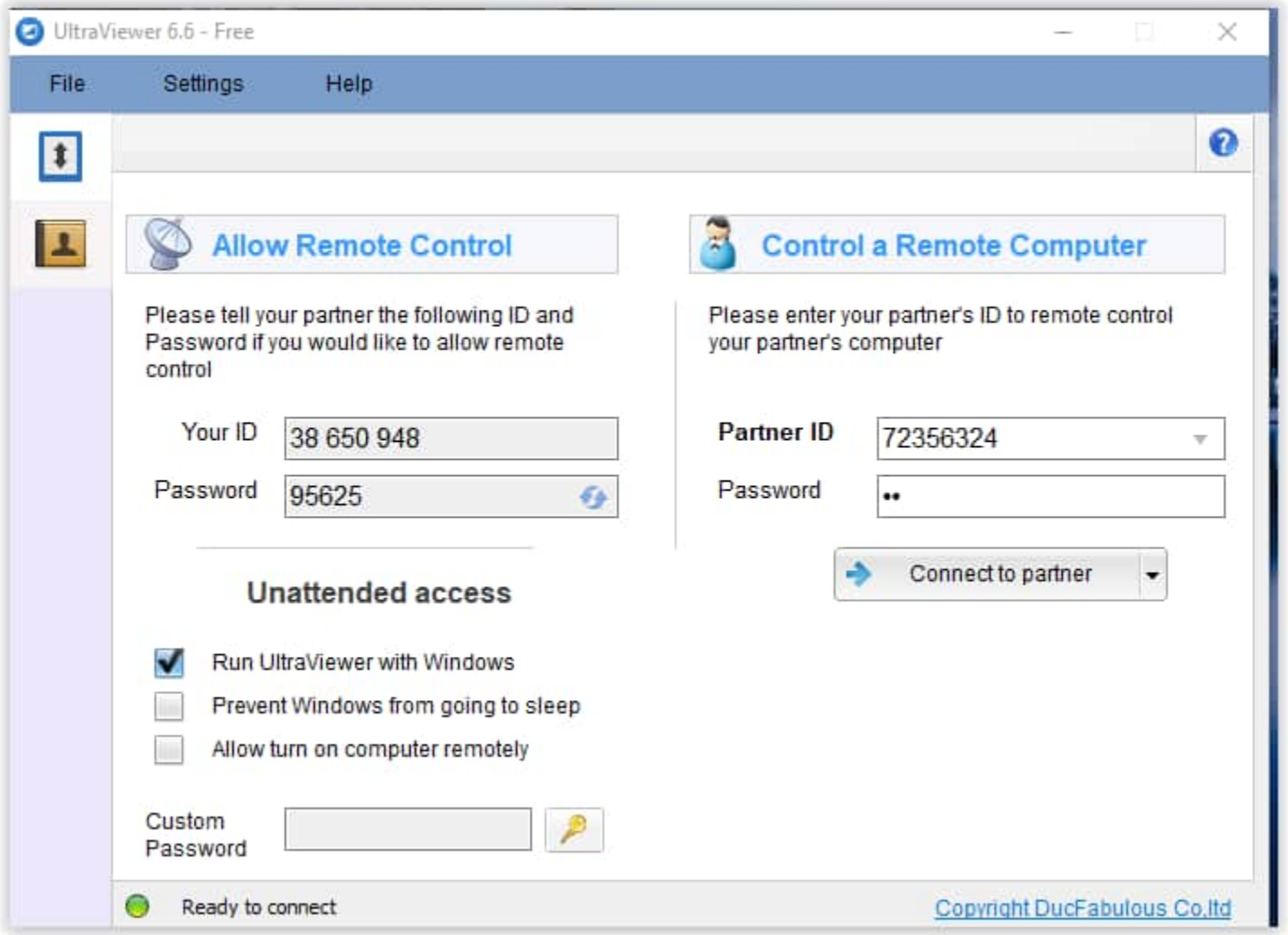
```yaml
curtain:
  alias: CURTAIN
  sequence:
  - service: remote.send_command
    data:
      device: CURTAIN
      command: OPEN_CURTAIN
    target:
      area_id: living_room
      device_id: 09ec248d3246d91556c407c06469be72
      entity_id: remote.curtain_remote
  mode: single
  icon: mdi:curtains

  curtain_close:
  alias: CURTAIN_CLOSE
  sequence:
  - service: remote.send_command
    data:
      delay_secs: 8.9
      device: CURTAIN
      command: CLOSE_CURTAIN
      hold_secs: 2.4
    target:
      area_id: living_room
      device_id: 09ec248d3246d91556c407c06469be72
      entity_id: remote.curtain_remote
  mode: single
  icon: mdi:curtains-closed
```

Code for Philips LED control

```yaml
dynalite:
  bridges:
    - host: 192.168.1.89
      port: 50000
      autodiscover: true
      polltimer: 1
      area:
        "4":
          name: LED 1
          template: room
          room_on: 1
          room_off: 4
        "5":
          name: LED 2
          template: room
          room_on: 1
          room_off: 4
        '6':
          name: LED 3
          template: room
          nodefault: true
          room_on: 1
          room_off: 4
```

Video Demonstration/ Remotely control lighting system

Link



Thank you!