

Lab 4: Smart Home

Part 1: Introduction to the Home Assistant platform

1.1. Introduction

Smart home is a concept that everyone has heard about. Nevertheless, people sometimes understand it in different ways. There are also various possibilities to organise and maintain a smart home. They have many similarities but also differences. In order to understand the basics and to be able to use Smart Home in the future if necessary, it is advantageous to get to know it in practice.

1.2. Objectives

In this laboratory exercise, you will learn the basics of organising Smart Home structure using the Home Assistant platform as an example. In real-life cases, other software solutions may also be applied; nevertheless, a number of basic principles might remain the same. This exercise aims to provide a basic understanding of how Smart Home devices and services can be interconnected and start working “as a team”, providing the maximal benefit compared to standalone solutions.

In this exercise, you will explore only some very basic use cases. This limitation ensures that the activity remains accessible to everyone, without requiring additional hardware or services that involve complex account setups or paid subscriptions. However, it is important to note that the true potential of Smart Home systems (including its assistive power) can only be unlocked through the integration of various hardware devices and services. Therefore, we encourage you to experiment with additional smart devices in the future to fully experience the benefits of such systems. This lab will provide you with the essential knowledge to make that possible and guide you toward more advanced implementations.

1.3. Home Assistant basics

First, you must learn basic information about the platform and its potential. To understand the Home Assistant platform and get your first experience, you can start by reading the theoretical information. You can find it on the “Getting Started” page on the Home Assistant web page:

<https://www.home-assistant.io/getting-started/>



Home Assistant

Please read the entire documentation to become familiar with it. You can also find in internet video tutorials, which can be helpful if some points are unclear or you would like to get more information than the official webpage provides. In general, the community of Home Assistant users is quite extensive and helpful, and hence you will be able to find answers to most questions that may arise.

1.3.1 Home Assistant installation

After getting familiar with the platform basics, you may proceed with the installation.

There are several installation methods available for Home Assistant. Furthermore, the installation options depend on the device/operating system you would like to use for the installation. You can find more detailed information at:

<https://www.home-assistant.io/installation/>

You may choose the most suitable installation approach based on the hardware and operating system available. Please refer to the additional document provided on Moodle, which includes examples that may assist you if needed. However, please note that these materials are not part of the lab itself and may not always be fully up to date. They are intended solely to offer general guidelines in case you encounter significant issues during the installation process. The most up to date information can be found on the Home Assistant Installation web-page mentioned above.

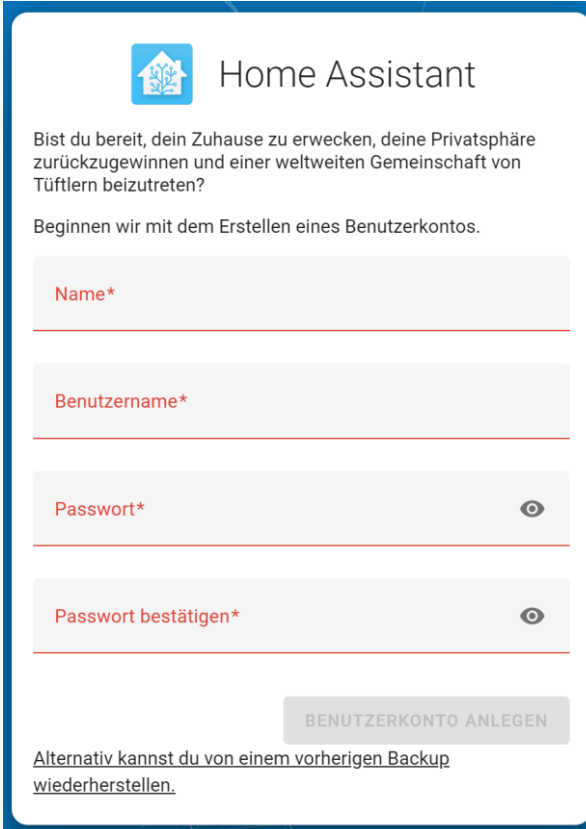
1.3.2 Onboarding Home Assistant

Now it is time to initially configure Home Assistant, which can be done via the address (homeassistant.local:8123) or (localhost:8123)

The detailed information can be found under:

<https://www.home-assistant.io/getting-started/onboarding/>

First, a user account is to be created. For this purpose, the name, user name and password are to be defined:



The screenshot shows the Home Assistant onboarding interface. At the top, there is a Home Assistant logo and the title "Home Assistant". Below this, a German text block asks if the user is ready to wake up their home, regain their privacy, and join a global community of tinkerers. It then prompts the user to start by creating a user account. The form consists of four input fields: "Name*", "Benutzername*", "Passwort*", and "Passwort bestätigen*", each with a red asterisk indicating it is required. The password fields have an eye icon to toggle visibility. At the bottom right, there is a button labeled "BENUTZERKONTO ANLEGEN". Below the button, there is a link that says "Alternativ kannst du von einem vorherigen Backup wiederherstellen."

In the next step, the basic configuration, including the installation name, location, currency, time zone and system of units, has to be performed.

After that, you will be able to adjust the policies for sharing anonymised information from your installation.

If you have any devices in your network that can be discovered by Home Assistant, they will be shown on the next screen. However, any devices can be added later as well.

After finishing the Onboarding, the web interface of Home Assistant will be displayed – here you will be able to see all added devices and services. Next, we will try to check the adding of devices/services and automating of Home Assistant.

1.4. Report

Please provide a screenshot of the Home Assistant platform main screen/dashboard and a brief description of the installation method chosen and any challenges/issues encountered during the installation process.

Part 2: Adding devices/services and automating Home Assistant

2.1. Introduction

A detailed description of the platform configuration, adding devices/services and automating can be found using the following links:

<https://www.home-assistant.io/docs/configuration/>

<https://www.home-assistant.io/getting-started/concepts-terminology/>

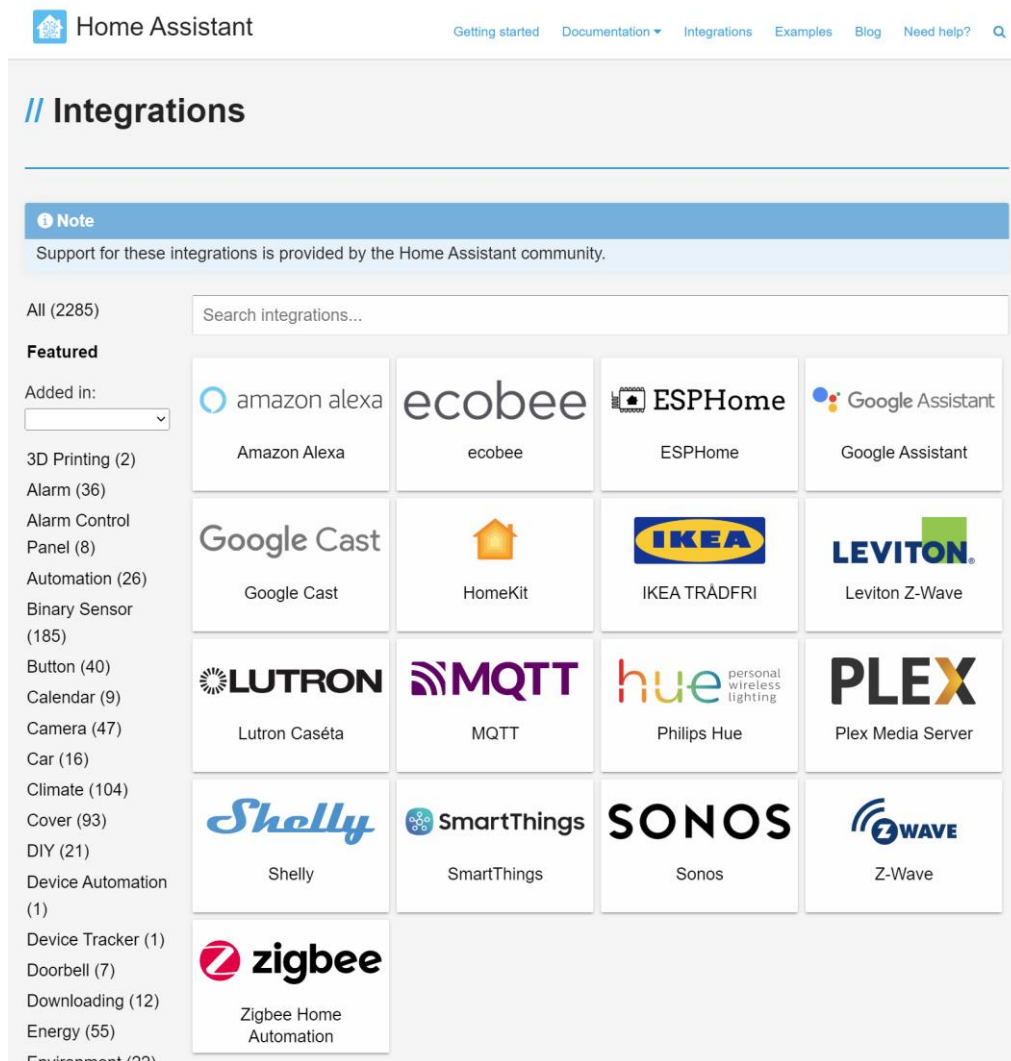
<https://www.home-assistant.io/getting-started/onboarding/>

<https://www.home-assistant.io/getting-started/automation/>

Please read the links listed above to get a general overview of options.

Please also check the list of available integrations to get more ideas about which devices and services can be integrated into the Home Assistant platform:

<https://www.home-assistant.io/integrations/>



2.2. Adding a first Service/Device

Let us add a first Service that will display the current weather. It will also help us to check if your Home Assistant installation has an internet connection.

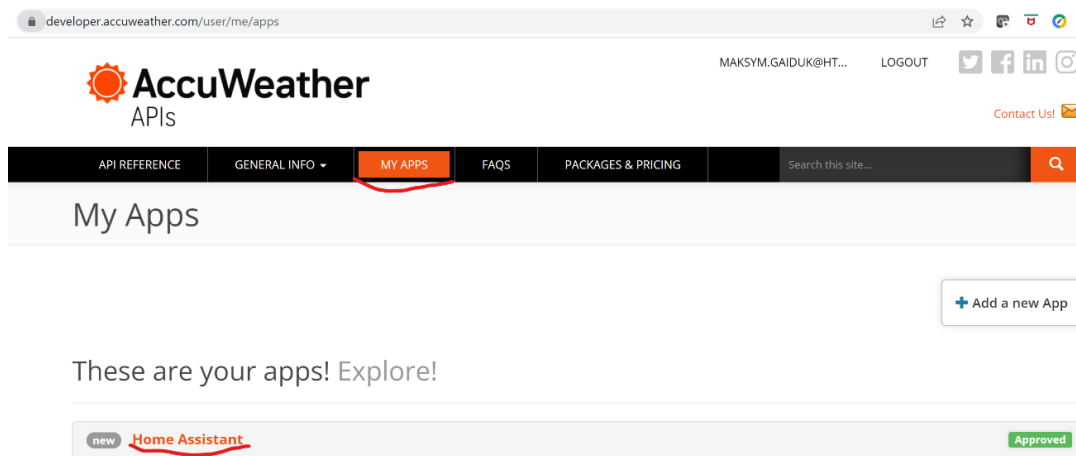
First, you will have to create a new account at AccuWeather:

<https://developer.accuweather.com/>

Next, you need to create an application at AccuWeather. For this (after logging in!), go to the “My Apps” tab and select “Add a new App”. The settings for the app can be found at:

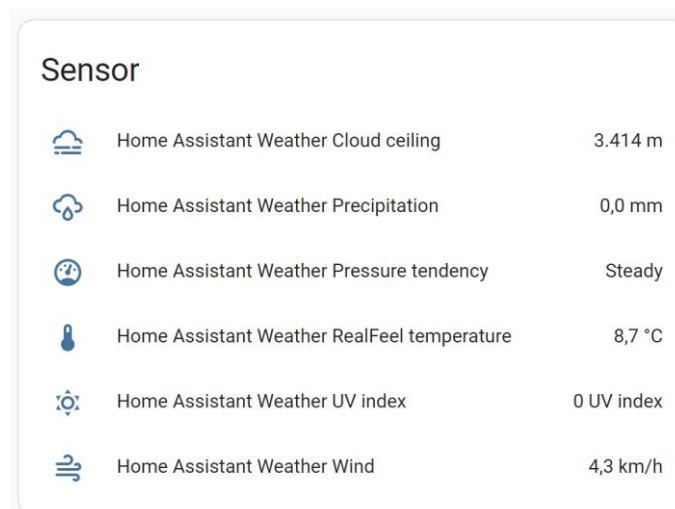
<https://www.home-assistant.io/integrations/accuweather>

Now, go to the list of applications and click on the created one:



You will see the API key that will be needed later.

Now, open your Home Assistant server (homeassistant.local:8123) and go to Settings->Devices & Services->Add new integration. Find the AccuWeather integration and add it. Copy the obtained in the previous step API key into the corresponding field and click “Submit”. Click “Finish” to complete the process. Now move to the main dashboard by clicking on “Overview” in Home Assistant. You should see there something like this:



If it is the case, congratulations – you have added your first Service in Home Assistant, and the internet connection of the platform works properly!

2.3. Creating the first automation

Your first practical task is to create an automation, sending you a Telegram notification every day at sunset and sunrise. You may try to perform this task independently or follow the instructions below.

The first step, if you are going to use Telegram integration, is to create a Telegram Bot. A good explanation of this process can be found here:

<https://www.youtube.com/watch?v=XoryoE9V88E>

And here:

<https://blog.devgenius.io/how-to-set-up-your-telegram-bot-using-botfather-fd1896d68c02>

After creating a Telegram bot, you will also need to get a Chat ID:

Start a Telegram chat with @GetIDs Bot writing /start as a message. The bot will answer you with some information. Write down the value of the id; this is the chat id required later.

Now you will have to perform some changes in the configuration of the Home Assistant. Here you can find the information on it:

<https://www.home-assistant.io/docs/configuration/>

In case if you are using the Docker-based installation, Add-Ons may be unavailable. If so, you should edit the configuration.yaml file using another way. Just go to the file and change it with any editor of your choice. Then go to the HomeAssistant server to “Developer Tools”, and in “Check and restart” go to “Check configuration” and then “Restart”

Add the Telegram bot configuration as well as a new notification channel at the end of the configuration.yaml file:

```
# Telegram bot
telegram_bot:
  - platform: polling
    api_key: telegram_bot_api_key
    allowed_chat_ids: telegram_bot_chat_ids

# Notification Channels
notify:
  - platform: telegram
    name: telegram
    chat_id: telegram_bot_my_chat_id
```

Restart the Home Assistant to apply the performed changes in the configuration:

Developer Tools->YAML->Check Configuration, Restart

Create a new automation, sending a notification via Telegram at sunset and sunrise.

For this:

- Go to Settings->Automations and Scenes->Create Automation
- Select the “Start with an empty automation”
- Add Trigger-> Sun-> Sunrise

- Add Trigger->Sun->Sunset
- Add Action->Call Service->Notifications:Send a notification with telegram
- Enter some text that will be sent via Telegram in the “Message” field
- Save the created automation and provide it with a name

Now you will get a notification from Home Assistant on your Telegram at sunrise and sunset when Home Assistant is running and online.

2.4. Creating a periodic automation

Your next task is to create an automation, where your platform will send a message using, e.g. Telegram every 5 minutes. To find out, what could be used for the implementation of this task, check the list of possible triggers for automation:

<https://www.home-assistant.io/docs/automation/trigger/#event-trigger>

Select a suitable one and perform the implementation. Finally, a notification should be sent to your Telegram every 5 minutes.

There are also a lot of other possibilities for automation in Home Assistant. Check the documentation or just google for “Home Assistant automation” if interested. The number of devices that can be integrated into the platform and automations that can be created with them is enormous.

2.5. Report

Please provide the screenshots of the following screens:

- Dashboard with the current weather information provided by AccuWeather integration.
- Screenshot of the Automation creation/adjustment page showing all Triggers/Actions for the created automation sending notifications at Sunset/Sunrise.
- Automation creation/adjustment page with all settings (Triggers/Actions) for the created automation sending a notification every 5 minutes.
- Telegram chat screenshot with notifications received every 5 minutes.

Please write a brief description of any challenges/issues encountered during the automation creation process.

Part 3: Smart Home Planning

3.1. Exercise description

Smart-Home has been a hot topic for already a lot of years. Almost every person is talking about it, however, not so many people really understand how it could be implemented, what is included in this term and which problems can occur during the implementation.

Your task is to prepare a simple project of a smart-home implementation in a detached house. The house has a basement floor, ground floor, first floor and garage.

For the planning, you should consider, among other things following points:

- Which types of devices could be implemented in the building? Try to use as many different devices as possible, but all of them should provide additional value for the user.
- How are you going to connect them to each other?
- How are you going to ensure the cooperative work of the devices?
- Which protocols/interfaces may be used?
- How are you going to provide the power supply?
- Which devices will have which aims (e.g. increasing comfort/providing security/safety, etc.)?

To visualise your idea, prepare simple floor plans (for all floors + garage) and sketch the devices' placement and connections. The plan should include a legend with all types of devices and used connections (e.g. different wires). The plan can be added to Home Assistant in a few different ways (you can find them on the internet), e.g. here one of the methods is described (I would recommend you to create a new dashboard and add this new card with the created plan there):

<https://www.home-assistant.io/dashboards/picture-elements/>

Your report should also include a short description of your system, its structure, and why you think it is reasonable to use these devices. **Don't forget all the abovementioned points to be considered during the planning, and include your thoughts about them in the report.**

If you already have an idea about which exact devices (and not only types) can be used (e.g. "Philips Hue light bulbs" for intelligent lighting), please mention them. Do not forget about the interoperability of different parts of your system.

Try to get a complete conception of a Smart-Home implementation and describe all, in your opinion, essential points. The idea is that based on your prepared document, it should be possible to start the implementation immediately!

Just a tiny hint to make your work more enjoyable – imagine you are planning your own home! What would you like to get, and how would you organise it with all details?

3.2. Report

Please add to your report a section (2-4 pages) with the detailed description of the **all** mentioned above points and additionally a visualization of the floor plan.

3.3. Presentation

In addition to the report, you will need to present your Smart Home proposal during the 5-minute presentation. **Please practise to be able to present all the main points in 5 minutes!**