



**STEMKIT**  
4SCHOOLS

# RASPBERRY PI FOR HOME ASSISTANT

LESSON PLAN 1



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# 1. RASPBERRY PI FOR HOME ASSISTANT

## 1.1 General information

### 1.1.1 Short description

#### Home Assistant

Home Assistant turns our STEMKIT Raspberry Pi into the ultimate home automation hub. With Home Assistant, we can focus on integrating the devices and writing automations.

The advantages of using Home Assistant:

- Free and open source
- Optimized for embedded devices like Raspberry Pi
- 100% local home automation
- Easy installation and updates (powered by the Home Assistant Operating System and Home Assistant Core)
- Management web interface integrated into Home Assistant
- Create and restore full backups of your whole configuration with ease
- Install many popular add-ons with a single click! For example, Google Assistant, encryption via Let's Encrypt and dynamic DNS via Duck DNS.
- Active community that is helpful and sharing add-ons including AppDaemon, Homebridge and InfluxDB.

### 1.1.2 Learning objectives

The main learning objectives of this lesson plan are:

- concept and content understanding of Electronic kits, to inspire students to invent with electronics and coding



- designing and performing an experiment or scientific investigation with collection of data, analysis and presentation of results, providing tools to solve the technology challenges of tomorrow
- familiarizing with circuits and programs to interact with GPIO pins of Raspberry Pi, to inspire and engage students with coding, design-thinking, and engineering
- understanding basic structures of programming, using Learning electronics

### 1.1.3 Links to curriculum

The domains, subdomains, subjects/topics that this lesson plan can be linked to are:

- Physics: motion, oscillation, waves, types of waves, characteristics of waves, propagation of waves, sound, speed of sound waves, spectrum of sound waves
- Science (Physics/Chemistry/Biology/Geology): scientific method, investigation, experimentation, analysis and interpretation of results
- Computer Science/Informatics: processing unit and peripherals, interfaces, programming language and main structures, coding
- Technology: electronics, open-source hardware and software, sensors, digital signal, circuits, single board computers

Maths/Statistics: spreadsheets and basic statistics

### 1.1.4 Materials required

The aim: you get Home Assistant running on a Raspberry Pi, turning your Raspberry Pi into the ultimate home automation hub. Following are steps to get started with Home Assistant. There are others alternative installation methods (see references). Once you finish your alternative installation, you can continue at the next step.

#### **SUGGESTED HARDWARE**

We will need a few things to get started with installing Home Assistant. Our **STEMKIT Raspberry Pi Model B+** seems well adapted, affordable starting point for your home automation journey.

- STEMKIT Raspberry Pi Model B+



- Micro SD Card. Ideally get one that is Application Class 2 as they handle small I/O much more consistently than cards not optimized to host applications. A 32 GB or bigger card is recommended.
- SD Card reader. This is already part of most laptops, but you can purchase a standalone USB adapter if you don't have one. The brand doesn't matter, just pick the cheapest.
- Ethernet cable. Home Assistant can work with Wi-Fi, but an Ethernet connection would be more reliable.

## SOFTWARE REQUIREMENTS

Download and extract the Home Assistant image for your device

Download balenaEtcher to write the image to an SD card

<https://www.balena.io/etcher/>

### 1.1.5 Duration

The duration of this lesson plan is estimated to be about two classroom hours.

## 1.2 Lesson plan

The lesson plan is divided in four phases, which are introduction, preparation, investigation and conclusion. As a follow-up there is also an optional exercise at the end.

### 1.2.1 Introduction



Home Assistant is 2 about 4 years old. Internet of Things as well as many new devices and services are now involved. For example: the introduction of voice assistants like Google Home and new standards like Apple HomeKit.

The aim is to see if we could offer a solution that makes updating a breeze for our users. A solution that can be flashed into the Raspberry Pi and would still be local first and respect the user's privacy.

Hass.io is an operating system based on ResinOS and Docker. Hass.io will take care of installing and updating Home Assistant, is managed from the Home Assistant UI, allows taking/restoring snapshots of your configuration and can easily be extended using Hass.io add-ons.

## 1.2.2 Preparation and execution

Here is preparation phase

### INSTALLATION

- 1) Put the SD card in your card reader.
- 2) Open balenaEtcher, select the Home Assistant image and flash it to the SD card.
- 3) Unmount the SD card and remove it from your card reader.
- 4) Follow this step if you want to configure Wi-Fi or a static IP address (this step requires a USB stick). Otherwise, move to step 5.
  - Format a USB stick to FAT32 with the volume name CONFIG.
  - Create a folder named network in the root of the newly-formatted USB stick.
  - Within that folder, create a file named my-network without a file extension.
  - Copy one of the examples to the my-network file and adjust accordingly.
  - Plug the USB stick into the Raspberry Pi.
- 5) Insert the SD card into your Raspberry Pi. If you are going to use an Ethernet cable, connect that too.
- 6) Connect your power supply to the Raspberry Pi.
- 7) The Raspberry Pi will now boot up, connect to the Internet and download the latest version of Home Assistant. This will take about 20 minutes.
- 8) Home Assistant will be available at <http://homeassistant.local:8123>. If you are running an older Windows version or have a stricter network configuration.
- 9) If you used a USB stick for configuring the network, you can now remove it.

## CONFIGURATION

The tough part is done.

With Home Assistant installed, it's time to configure it. Here you will create the owner account of Home Assistant. This account will be an administrator and will always be able to change everything. Enter a name, username, password and click on "create account".

## 1.3 References or Resources

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

<https://drzss.com/homeassistant-101/>