



# **Part 54**

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# **OpenHAB**

## openHABian - Hassle-free openHAB Setup

The Raspberry Pi and other small single-board computers are quite famous platforms for openHAB. However, setting up a fully working Linux system with all recommended packages and openHAB recommendations is a boring task taking quite some time and Linux newcomers shouldn't worry about these technical details.

openHABian aims to provide a self-configuring Linux system setup specific to the needs of every openHAB user. To that end, the project provides two things:

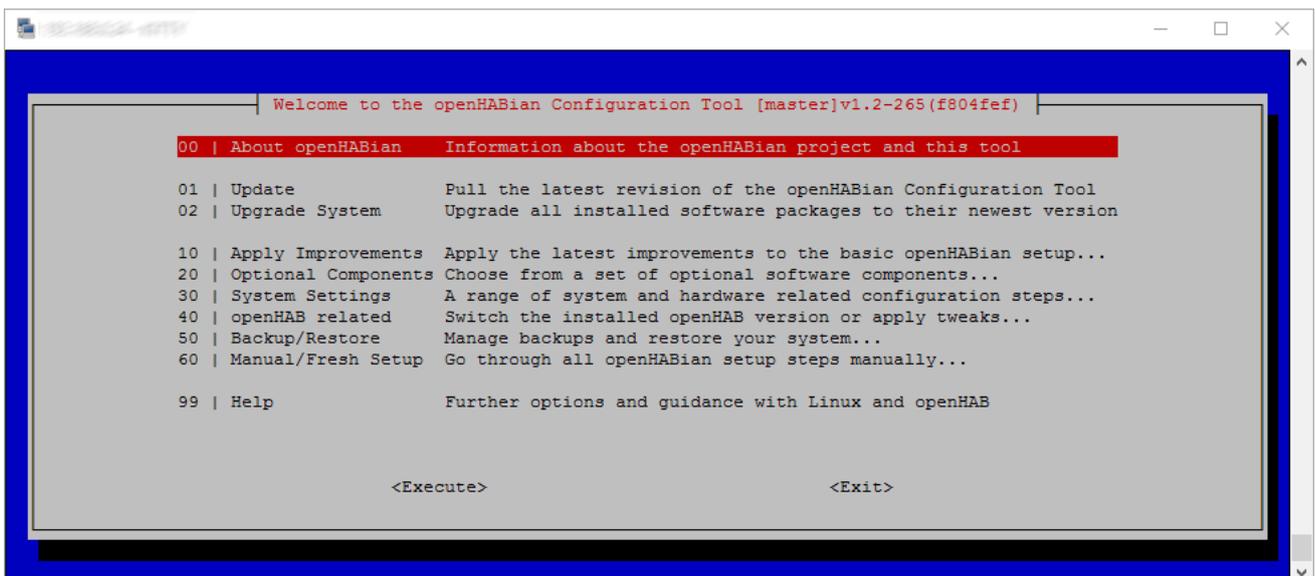
- Complete SD-card images pre-configured with openHAB and many other openHAB- and Hardware-specific preparations for the Raspberry Pi
- The openHABian Configuration Tool to set up and configure openHAB and many related things on any Debian/Ubuntu based system

### Features

The following features are provided by the openHABian images out of the box:

- Hassle-free setup without a display or keyboard, connected via Ethernet or Wi-Fi
- openHAB 2 in the latest stable version
- Zulu Embedded OpenJDK Java 8
- openHABian Configuration Tool including updater functionality
- openHAB Log Viewer (based on frontail)
- Samba file sharing with pre-configured to use shares
- Useful Linux packages pre-installed, including vim, mc, screen, htop, ...
- Login information screen, powered by FireMotD
- Customized Bash shell experience
- Customized vim settings, including openHAB syntax highlighting
- Customized nano settings, including openHAB syntax highlighting
- Raspberry Pi specific: Extend to the whole SD card, 16MB GPU memory split

Additionally the openHABian Configuration Tool `openhabian-config` is included and provides the following optional settings and components:

A screenshot of a terminal window displaying the openHABian Configuration Tool menu. The window title is "Welcome to the openHABian Configuration Tool [master]v1.2-265(f804fef)". The menu is displayed in a light gray box with a blue border. The menu items are as follows:

```
00 | About openHABian    Information about the openHABian project and this tool
01 | Update              Pull the latest revision of the openHABian Configuration Tool
02 | Upgrade System      Upgrade all installed software packages to their newest version
10 | Apply Improvements  Apply the latest improvements to the basic openHABian setup...
20 | Optional Components Choose from a set of optional software components...
30 | System Settings     A range of system and hardware related configuration steps...
40 | openHAB related     Switch the installed openHAB version or apply tweaks...
50 | Backup/Restore      Manage backups and restore your system...
60 | Manual/Fresh Setup  Go through all openHABian setup steps manually...
99 | Help                Further options and guidance with Linux and openHAB
```

At the bottom of the menu, there are two options: "<Execute>" and "<Exit>".

- Switch over to the latest *Milestone* or *Snapshot* release of openHAB 2 *unstable/SNAPSHOT* build
- Install and Setup a reverse proxy with password authentication and/or HTTPS access (incl. Let's Encrypt certificate) for self-controlled remote access
- Set up a Wi-Fi connection
- Bind the openHAB remote console to all interfaces
- Setup Backup for your system
- Easily install and preconfigure Optional Components of your choice
- ... and many more
- Raspberry Pi specific:
  - Prepare the serial port for the use with extension boards like Razberry, SCC, Enocean Pi, ...
  - Move the system partition to an external USB stick or drive

## Raspberry Pi (Prepackaged SD-Card Image)

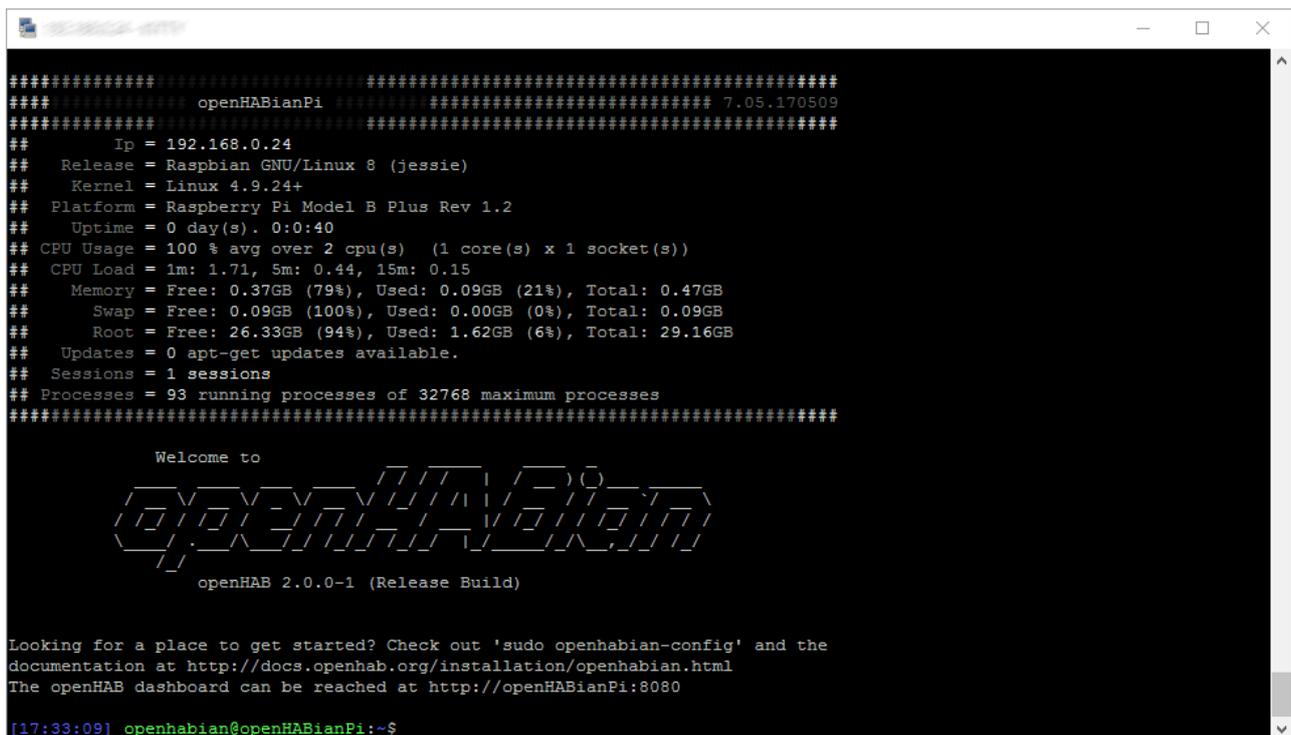
The provided image is based on the Raspbian Lite standard system. On first boot the system will set up openHAB and the mentioned settings and tools. All packages will be downloaded in their newest version and configured to work without further modifications. The whole process will take a few minutes, then openHAB and all other needed tools to get started will be ready to use without further configuration steps. openHABian is designed as a headless system, you will not need a display or a keyboard.

### Setup:

- Download the latest "openHABianPi" SD card image file  
Note: the file is xz compressed. Decompress it first with eg: 7-Zip or unzip
- Write the image to an SD card of at least 16GB with Rufus or Etcher
- Insert the SD card into the Raspberry Pi, connect Ethernet cable and power up.
- Wait approximately 15-45 minutes for openHABian to do its magic.  
The device will be available under its IP address or via the local DNS name `openhab`  
You can check the progress in your web-browser by opening the site <http://openhab>

openHABian has installed and configured your openHAB system and you can start to use it right away. If you want to get in touch with the system or want to install one of the previously mentioned optional features, you can come back here later.

You can also connect to your Raspberry Pi SSH console using the username `openhastian` and password `openhastian`. You will see the following welcome screen:

A screenshot of a terminal window showing the openHABianPi welcome screen. The terminal output includes system information such as IP address (192.168.0.24), release (Raspbian GNU/Linux 8 (jessie)), kernel (Linux 4.9.24+), platform (Raspberry Pi Model B Plus Rev 1.2), uptime (0 day(s) 0:0:40), CPU usage (100% avg over 2 cpu(s)), CPU load (1m: 1.71, 5m: 0.44, 15m: 0.15), memory (Free: 0.37GB (79%), Used: 0.09GB (21%), Total: 0.47GB), swap (Free: 0.09GB (100%), Used: 0.00GB (0%), Total: 0.09GB), root (Free: 26.33GB (94%), Used: 1.62GB (6%), Total: 29.16GB), updates (0 apt-get updates available), sessions (1 sessions), and processes (93 running processes of 32768 maximum processes). Below this information, it says "Welcome to" followed by a large, stylized ASCII art logo for "openHAB". Underneath the logo, it says "openHAB 2.0.0-1 (Release Build)". At the bottom, it provides instructions: "Looking for a place to get started? Check out 'sudo openhabian-config' and the documentation at http://docs.openhab.org/installation/openhabian.html. The openHAB dashboard can be reached at http://openHABianPi:8080". The terminal prompt is "[17:33:09] openhabian@openHABianPi:~\$".

```
#####
###          openHABianPi          ##### 7.05.170509
#####
##      Ip = 192.168.0.24
##      Release = Raspbian GNU/Linux 8 (jessie)
##      Kernel = Linux 4.9.24+
##      Platform = Raspberry Pi Model B Plus Rev 1.2
##      Uptime = 0 day(s). 0:0:40
## CPU Usage = 100 % avg over 2 cpu(s)  (1 core(s) x 1 socket(s))
## CPU Load = 1m: 1.71, 5m: 0.44, 15m: 0.15
##      Memory = Free: 0.37GB (79%), Used: 0.09GB (21%), Total: 0.47GB
##      Swap = Free: 0.09GB (100%), Used: 0.00GB (0%), Total: 0.09GB
##      Root = Free: 26.33GB (94%), Used: 1.62GB (6%), Total: 29.16GB
##      Updates = 0 apt-get updates available.
##      Sessions = 1 sessions
##      Processes = 93 running processes of 32768 maximum processes
#####

Welcome to

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openHAB 2.0.0-1 (Release Build)

Looking for a place to get started? Check out 'sudo openhabian-config' and the
documentation at http://docs.openhab.org/installation/openhabian.html
The openHAB dashboard can be reached at http://openHABianPi:8080

[17:33:09] openhabian@openHABianPi:~$
```

## Other Linux Systems or manual installation

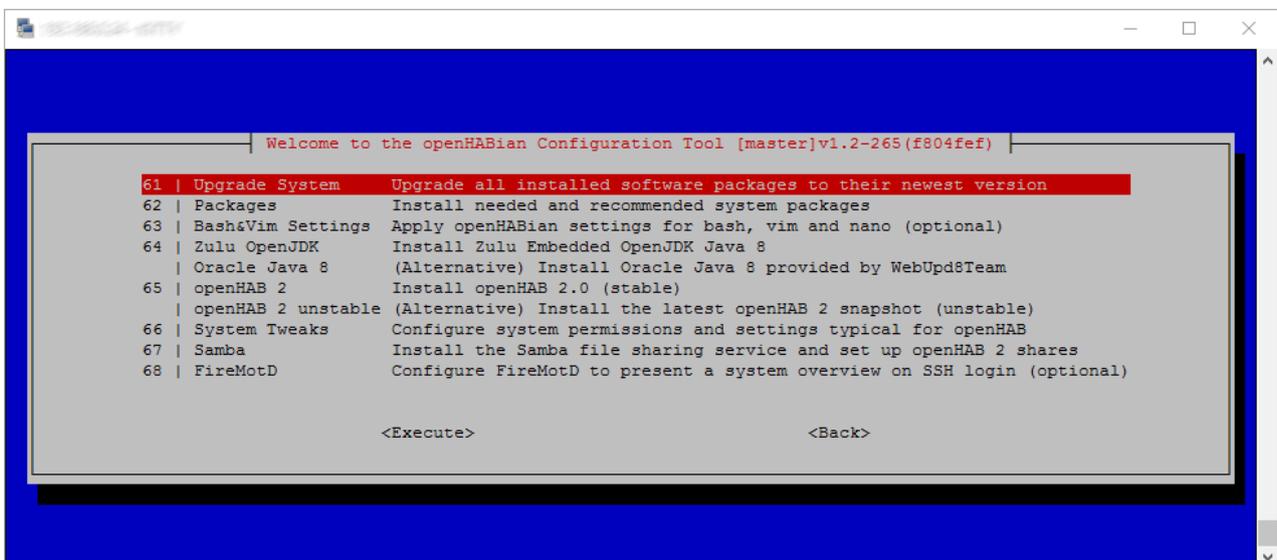
openHABian also supports general Debian/Ubuntu based systems on different platforms. Starting with a fresh installation of your operating system, install git, then clone the openHABian project and finally execute the openHABian configuration tool:

```
# install git
sudo apt-get update
sudo apt-get install git

# download and link
sudo git clone https://github.com/openhab/openhabian.git /opt/openhabian
sudo ln -s /opt/openhabian/openhabian-setup.sh /usr/local/bin/openhabian-
config

# execute
sudo openhabian-config
```

You'll see the openHABian configuration menu and can now select all desired actions. The "Manual/Fresh Setup" submenu entry is the right place for you. Execute all entries one after the other to get the full openHABian experience:



## Wi-Fi based Setup Notes

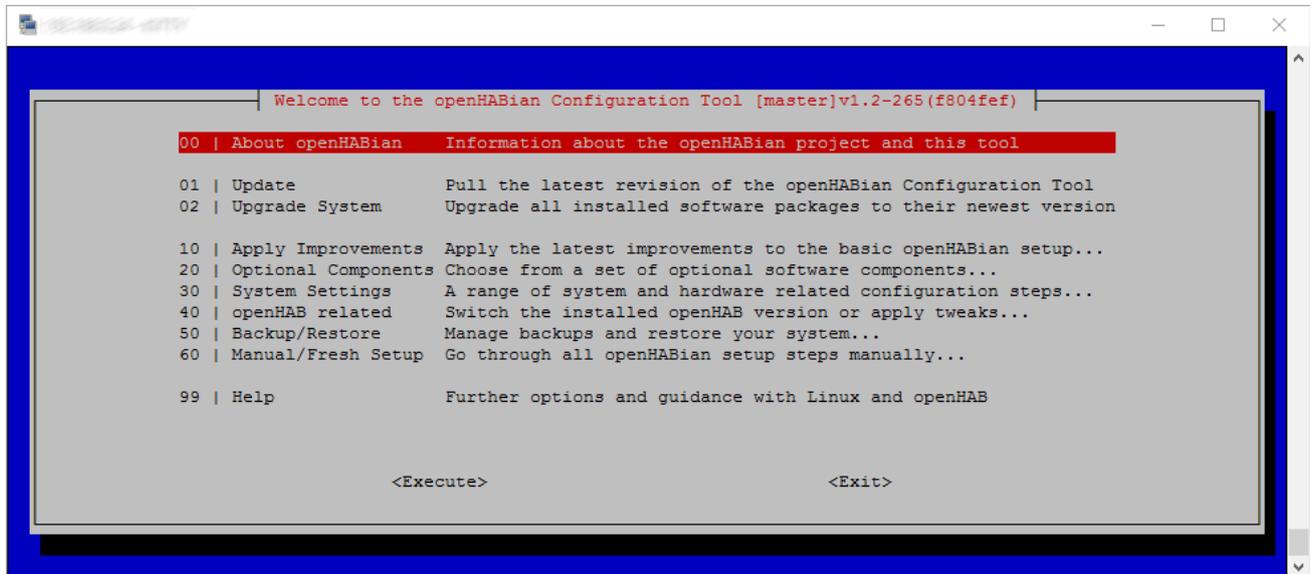
If you own a RPi3, RPi3+, RPi4, a RPi0W, you can set up and use openHABian purely via Wi-Fi. For the setup on Wi-Fi, you'll need to make your SSID and password known to the system before the first boot. Additionally to the setup instructions given above, the following steps are needed:

- Flash the system image to your micro SD card as described, do not remove the SD card yet
- Access the first SD card partition from the file explorer of your choice (e.g. Windows file explorer)
- Open the file `openhabian.conf` in a text editor
- Uncomment and fill in `wifi_ssid="My Wi-Fi SSID"` and `wifi_psk="password123"`
- Save, Unmount, Insert, Boot
- Continue with the instructions for the Raspberry Pi

## openHABian Configuration Tool

Once connected to the command line console of your system, please execute the openHABian configuration tool by typing the following command. (Hint: sudo executes a command with elevated rights and will hence ask for your password: openhabian).

```
sudo openhabian-config
```



The configuration tool is the heart of openHABian. It is not only a menu with a set of options, it's also used in a special unattended mode inside the ready to use images.

A quick note on menu navigation. Use the cursor keys to navigate, <Enter> to execute, <Space> to select and <Tab> to jump to the actions on the bottom of the screen. Press <Esc> twice to exit the configuration tool.

## First Steps with openHAB

When completed, connect to the openHAB 2 dashboard: <http://openhab:8080>

Connect to the Samba network shares with username `openhabian` and password `openhabian`

Connect to the openHAB Log Viewer (frontail): <http://openhab:9001>

After your first setup of openHABian is successful and you are able to access the openHAB dashboard, you should dig into the possibilities. Install Bindings, discover your devices, and configure your smart home. You might want to start defining Items, Sitemap and HABPanel dashboard for your home. To kickstart that process you may check out the openHAB Home Builder.

These are just some first hints. Be sure to read up on the Configuration section of the documentation page to learn more.

### Further Configuration Steps

openHABian is supposed to provide a ready-to-use openHAB base system. There are however a few things we can not decide for you.

- Time Zone: The time zone of your openHABian system will be determined based on your internet connection. In some cases you might have to adjust that setting.
- Language: The locale setting of the openHABian base system is set to "en\_US.UTF-8". While this setting will not do any harm, you might prefer e.g. console errors in German or Spanish. Change the locale settings accordingly. Be aware, that error solving might be easier when using the English error messages as search phrases.
- Passwords: Relying on default passwords is a security concern you should care about! The openHABian system is preconfigured with a few passwords you should change to ensure the security of your system. This is especially important if your system is accessible from outside your private subnet.

All of these settings can easily be changed via the openHABian Configuration Tool.

Here are the passwords in question with their respective default "username:password" values. All password can be changed from openHABian menu.

- User password needed for SSH or sudo (e.g. "openhabian:openhabian")
- Samba share password (e.g. "openhabian:openhabian")
- openHAB remote console (e.g. "openhab:habopen")
- Amanda backup password (no default, applied when installing)
- Nginx reverse proxy login (no default, applied when installing)
- InfluxDB (No password set by default)
- Grafana visualization ("admin:admin")

### System Backup & Maintenance

Once you have gotten grip on how to use openHAB for your needs it is a good moment to think about backup. Maybe you accidentally delete something or get hit by SD card wearout problem which is quite common on many single board computers such as Raspberry Pis.

There are four measures and methods in openHABian to cover this matter today, but they all need some research and readup to be successfully used.

1. Use openHAB integrated backup tool.
2. Move the root filesystem to an external USB-memory. Warning: USB stick are as-susceptible to flash wearout as SD cards. [Menu option: 37]
3. (BETA) Reduce wear on SD card by moving write intensive actions temporary to RAM during operation (logs,persistent-data). Warning: power failure will result in lost data. [Menu option: 6A]
4. (Advanced) Use Amanda Network Backup for full system backup [Menu option: 51]

## Optional Components

openHABian comes with a number of additional routines to quickly install and set up home automation related software. You'll find all of these in the openHABian Configuration Tool

- frontail - openHAB Log Viewer accessible from <http://openhab:9001>
- Mi Flora MQTT demon
- InfluxDB and Grafana - persistence and graphing available from <http://openhab:3000>
- Eclipse Mosquitto - Open Source MQTT v3.1/v3.1.1 Broker
- Node-RED - "Flow-based programming for the Internet of Things", with preinstalled openHAB2 and BigTimer add-ons. Accessible from <http://openhab:1880>
- Homegear - Homematic control unit emulation
- KNXd - KNX daemon running at 224.0.23.12:3671/UDP
- OWServer - 1wire control system
- FIND - the Framework for Internal Navigation and Discovery
- Tellstick core

## FAQ and Troubleshooting

For openHABian related questions and further details, please have a look at the main discussion thread in the Community Forum:

- <https://community.openhab.org/t/13379>

If you want to get involved, you found a bug, or just want to see what's planned for the future, come visit our Issue Tracker:

- <https://github.com/openhab/openhabian/issues>

## Did my Installation succeed? What to do in case of a problem?

A note on patience: Remember to stay calm. The openHABian setup will take 15 up to 45 minutes to complete all steps. This time highly depends on your device's performance, your internet connection and sometimes even on the load of external servers.

RPi note: The progress indication via the green Raspberry Pi LED is currently not possible and hence not part of the openHABian v1.3 image. We will re-add the functionality as soon as the underlying issue is resolved.

## openHAB Dashboard

After the installation of openHABian was successful, you should be able to access the openHAB dashboard:

Raspberry Pi image setup: <http://openhab:8080>

In any case: <http://<your-device-hostname>:8080> or <http://<your-device-IP-address>:8080>

## SSH Login Screen

If the installation was successful you will see the normal login screen as shown in the first screenshot. If the installation was not successful you will see a warning and further instructions as shown in the second screenshot.

```
#####
##### openHABianPi ##### 7.05.170509
#####
##      Ip = 192.168.0.24
##   Release = Raspbian GNU/Linux 8 (jessie)
##   Kernel  = Linux 4.9.24+
## Platform = Raspberry Pi Model B Plus Rev 1.2
##   Uptime  = 0 day(s). 0:0:40
## CPU Usage = 100 % avg over 2 cpu(s) (1 core(s) x 1 socket(s))
## CPU Load  = 1m: 1.71, 5m: 0.44, 15m: 0.15
##   Memory  = Free: 0.37GB (79%), Used: 0.09GB (21%), Total: 0.47GB
##     Swap  = Free: 0.09GB (100%), Used: 0.00GB (0%), Total: 0.09GB
##     Root  = Free: 26.33GB (94%), Used: 1.62GB (6%), Total: 29.16GB
## Updates  = 0 apt-get updates available.
## Sessions = 1 sessions
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openHAB 2.0.0-1 (Release Build)

Looking for a place to get started? Check out 'sudo openhabian-config' and the
documentation at http://docs.openhab.org/installation/openhabian.html
The openHAB dashboard can be reached at http://openHABianPi:8080

[17:33:09] openhabian@openHABianPi:~$
```

```
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Sat Jan 21 15:06:08 2017 from 192.168.11.1

Attention! The openHABian setup process seems to have failed on your system.
Sorry, this shouldn't happen! Please restart the installation process. Chances
are high setup will succeed on the second try. Execute the following commands
to restart now:
  sudo mv /boot/config-reinstall.txt /boot/config.txt
  sudo reboot

In order to find the cause of the problem, have a look at the installation log:
  sudo tail -n 20 /var/log/raspbian-ua-netinst.log

Contact the openHAB community forum for help if the problem persists:
https://community.openhab.org/tags/openhabian

[15:07:17] pi@openHABianPi:~$
```

## **Where is the graphical user interface?**

You've just installed openHABian and are confused. No fancy login screen, no windows, no mouse support. What did I get into?

You are not the first one to get confused about the intended use case of openHABian or most other solutions based on a Raspberry Pi. Maybe it helps to not think of the RPi as a PC as we know it. It is not (necessarily) build to be used with a keyboard and display. You already own a powerful PC or Mac which you should benefit from. It would be a shame to have a powerful computer at your fingertips and then have to restrict yourself to a very limited graphical frontend on another device, wouldn't you agree?

The intended use case of a lot of these small SBCs is to sit in a corner and provide a service reliably 24/7. You'll find that most solutions for the RPi are characterized by this.

Moving on. What we actually want and what openHABian is aimed for is a dedicated headless system to reliably execute openHAB and to expose all interfaces needed to interact and configure it (PaperUI, BasicUI, HABPanel, openHAB LogViewer, Samba Network Shares, openHABian Configuration Tool, SSH). If you know how to work with these interfaces, you are set for a way better experience than the alternatives. The main challenge is to get used to the Linux command line, not even a GUI (like Pixel, see below) will relieve you from that in the long run. If you are not willing to teach yourself a few fundamental Linux skills you will not become happy with any Linux system and should resort to a e.g. Windows machine. However as you are willing to tinker with smart home technology, I'm sure you are ready to teach yourself new stuff and expand your experience.

If the above didn't convince you, execute the following commands to get the graphical user interface Pixel installed. You have been warned, if there came any warranty with openHABian to begin with, it would end here.

```
sudo apt -y install raspberrypi-ui-mods
sudo reboot
```

After the reboot, connect via SSH and type the following command to start a VNC server to connect to:

```
vncserver -randr 1280x800
```