# Pi-Ager install on Raspberry Pi 3/Pi 4/Pi zero (2)w under Pi OS 12 Lite bookworm

* For all Pi:

Download and install Raspberry Pi Imager v1.8.4 or later.

Start Raspberry Pi Imager, then select:

Raspberry Pi Device:

NO FILTERING

Operating System:

Raspberry Pi OS Lite (32-bit) ( A port of Debian Bookworm with no desktop environment)

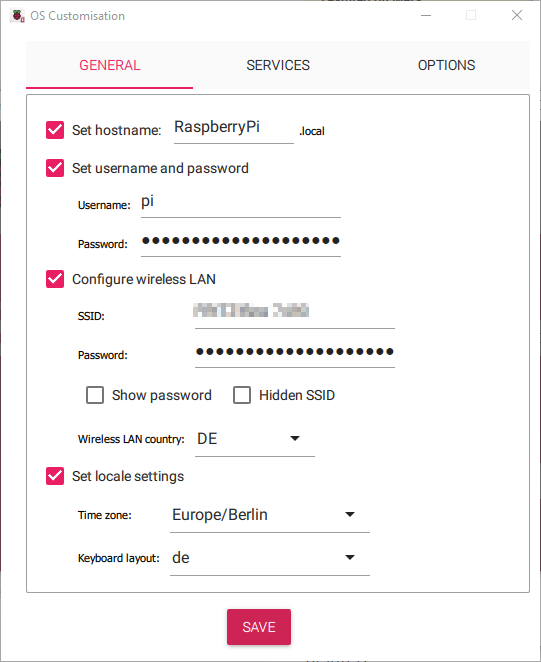
Storage:

Use an USB Reader and choose your SD-Card, min. 8 GB

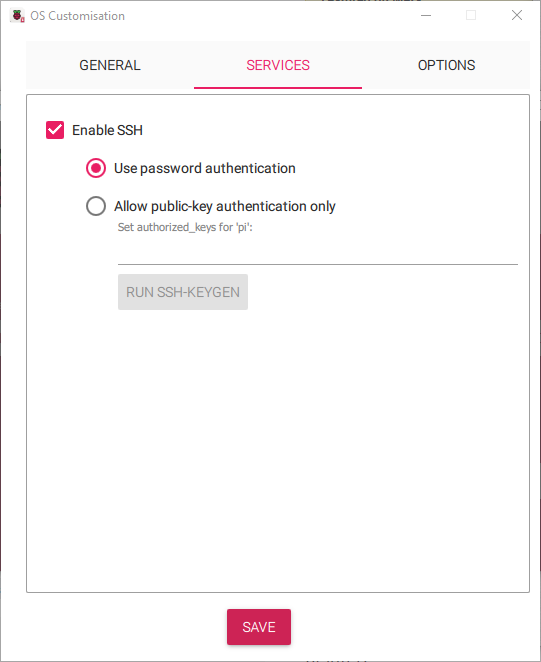
Then click ‘NEXT’

In popup Window ‘Use OS customisation’ select ‘EDIT SETTINGS’.

In the ‘GENERAL’ Tab edit your settings:



In the ‘SERVICES’ Tab enable SSH:



Then ‘SAVE’ and apply OS customisation settings with ‘YES’.

The customized OS is now written to your SD-Card.

Put your SD-Card in your Raspberry Pi and power on your Pi device.

Login via SSH (e.g. use PuTTY) or connect a HDMI monitor and USB keyboard to

your Raspberry device and continue with the setup as described below.

* To allow root login:

In /etc/ssh/sshd\_config : remove # from PermitRootLogin and replace prohibit-password to yes. Then restart ssh server: sudo service ssh restart

Set your root password with: sudo passwd root

* Run raspi-config and disable login shell on serial port and enable serial port
* Edit config.txt in /boot/firmware to support I2C and SPI devices:

CAUTION: If you want to edit config.txt ,cmdline.txt and setup.txt under Windows in a Terminal Window, e.g. using Terminal Apps like PuTTY, the Linux folder /boot/firmware on the SD-Card is mapped to a windows partition FAT32 USB Drive named bootfs and contains the above mentioned files.

# Additional overlays and parameters are documented /boot/overlays/README

# Use Pi-Ager Pins 11/13 GPIO 17/27 for I2C

dtoverlay=i2c-gpio,bus=3,i2c\_gpio\_sda=17,i2c\_gpio\_scl=27

# Use Pi-Ager Pin 16 for MCP3204

dtoverlay=spi1-1cs,cs0\_pin=16

at the end of config.txt add the following lines to support bluetooth and Nextion TFT displays

via serial port /dev/serial0 :

[all]

enable\_uart=1

dtoverlay=miniuart-bt

# force\_turbo=1

* Add in /boot/firmware/cmdline.txt at the end of line this to enable USB camera with fswebcam :

dwc\_otg.fiq\_fsm\_mask=0x3

• Reboot system

* Edit /etc/modules to load i2c-dev at boot, add this line :

i2c-dev

* Add file :

sudo touch /etc/modprobe.d/raspi-blacklist.conf

* Install git: sudo apt install git
* Get a copy from Pi-Ager repository to your local system:

git clone –depth=1 –b master <https://github.com/Tronje-the-Falconer/Pi-Ager>

All project file are now in the folder ./Pi-Ager/

Change working directory to Pi-Ager

cd Pi-Ager

* Copy setup.txt from local repository to /boot/ and edit it as needed:

sudo cp ./boot/setup.txt /boot/firmware/

Create a symbolic link in /boot to /boot/firmware/setup.txt

cd /boot

sudo ln –s /boot/firmware/setup.txt setup.txt

* Copy /etc/modprobe.d/Pi-Ager\_i2c\_off.conf.on from local repository to /etc/modprobe.d/

sudo cp ./etc/modprobe.d/Pi-Ager\_i2c\_off.conf.on /etc/modprobe.d/

* Reboot system
* Update system:

sudo apt-get update

sudo apt-get upgrade

• Install php 8:

sudo apt install php-fpm php-cli

sudo apt install php

sudo apt install php-common php-sqlite3

* Install additional modules for php:

sudo apt install php-mbstring php-zip php-curl

* Install lighttpd:

sudo apt-get install lighttpd

sudo systemctl status lighttpd

sudo nano /etc/lighttpd/lighttpd.conf

and change/add Parameter

server.document-root = "/var/www/html"

to

server.document-root = "/var/www"

add “mod\_auth” to server.modules list

add “mod\_authn\_file” to server.modules list

Save and close nano

To enable PHP8 in Lighttpd, we must modify /etc/php/8.2/fpm/php.ini and uncomment the line cgi.fix\_pathinfo=1. In my php.ini file, I found it on line 807. To uncomment, just remove the semicolon in the beginning.

sudo usermod -G www-data -a pi

sudo chown -R www-data:www-data /var/www

sudo chmod -R 755 /var/www

* Reboot system

For testing the web server, generate html-page:

sudo nano /var/www/test.html

with content:

<html>

<head><title>Test-Seite</title></head>

<body>

<h1>Das ist eine Test-Seite.</h1>

</body>

</html>

Change owner: sudo chown www-data:www-data /var/www/test.html

Enter your IP Address into the browser followed by /test.html

In addition we need .htcredentials to contain user and password.

For that we use the Online-Tool https://websistent.com/tools/htdigest-generator-tool/

Username: pi-ager

REALM: Pi-Ager

Password: raspberry

Caution! All entries are case sensitive!

Open this file now

sudo nano /var/.htcredentials

and fill in the string output from the generator tool.

Save file with “STRG+o”, “RETURN” and close with “STRG+x”

Now we have to setup the password authentification in lighttpd:

sudo nano /etc/lighttpd/conf-available/05-auth.conf

The following lines are added under server.modules += („mod\_auth“) :

auth.backend = "htdigest"

auth.backend.htdigest.userfile = "/var/.htcredentials"

auth.require = ( "/settings.php" =>

(

"method" => "digest",

"realm" => "Pi-Ager",

"require" => "user=pi-ager"

),

"/admin.php" =>

(

"method" => "digest",

"realm" => "Pi-Ager",

"require" => "valid-user"

),

"/webcam.php" =>

(

"method" => "digest",

"realm" => "Pi-Ager",

"require" => "valid-user"

),

"/notification.php" =>

(

"method" => "digest",

"realm" => "Pi-Ager",

"require" => "valid-user"

)

)

Then we activate this modul:

sudo lighty-enable-mod auth

In addition we have to edit :

sudo nano /etc/lighttpd/conf-available/15-fastcgi-php-fpm.conf

Add “broken-scriptfilename” and “x-sendfile” :

fastcgi.server += ( ".php" =>

((

"socket" => "/run/php/php-fpm.sock",

"broken-scriptfilename" => "enable",

"x-sendfile" => "enable"

))

)

save and close nano

Now enable these modules:

sudo lighty-enable-mod fastcgi-php-fpm

Now reload the the webserver:

sudo service lighttpd force-reload

Now continue to install additional modules:

* Install smbus

sudo apt-get install python3-smbus

* Install sqlite3:

sudo apt install sqlite3

* Install pip3

sudo apt install python3-pip

CAUTION : sudo pip3 install <module> no longer supported.

If you see an error message, try to install the module with

sudo apt install python3-<module name>. If this does not work, try install modules with

sudo pip3 install <module name> –break-system-packages

error: externally-managed-environment

× This environment is externally managed

╰─> To install Python packages system-wide, try apt install

python3-xyz, where xyz is the package you are trying to

install.

If you wish to install a non-Debian-packaged Python package,

create a virtual environment using python3 -m venv path/to/venv.

Then use path/to/venv/bin/python and path/to/venv/bin/pip. Make

sure you have python3-full installed.

If you wish to install a non-Debian packaged Python application,

it may be easiest to use pipx install xyz, which will manage a

virtual environment for you. Make sure you have pipx installed.

See /usr/share/doc/python3.11/README.venv for more information.

note: If you believe this is a mistake, please contact your Python installation or OS distribution provider. You can override this, at the risk of breaking your Python installation or OS, by passing --break-system-packages.

hint: See PEP 668 for the detailed specification.

* Install DHT sensor support

sudo pip3 install Adafruit-DHT

* Install SHT1x sensors

sudo pip3 install pi-sht1x

* Install libgd-dev (needed for new version of fswebcam)

sudo apt install libgd-dev

* Install openssl dev package

sudo apt install libssl-dev

* Install fswebcam:

sudo apt install fswebcam

* Install cryptography

sudo apt install python3-cryptography

* Install uuidgen

sudo apt install uuid-runtime

* Install wiringpi new version with Pi4 support :

cd /tmp

wget https://project-downloads.drogon.net/wiringpi-latest.deb

sudo dpkg -i wiringpi-latest.deb

* Copy gpio to /usr/local/bin

sudo cp /usr/bin/gpio /usr/local/bin

sudo chmod 4755 /usr/local/bin/gpio

* Install PiShrink ( not longer needed )

wget <https://raw.githubusercontent.com/Drewsif/PiShrink/master/pishrink.sh>

chmod +x pishrink.sh

sudo mv pishrink.sh /usr/local/bin

* Nextion serial client (HMI Dislplay support)

sudo pip3 install nextion

* Install lsof command:

sudo apt update

sudo apt install lsof

* Install Locale en-GB and de-DE UTF-8 using

sudo raspi-config

* Enable Serial Interface, disable login, needed for HMI Nextion Display

sudo raspi-config

* Install zip and unzip:

sudo apt install zip unzip

* Install schedule

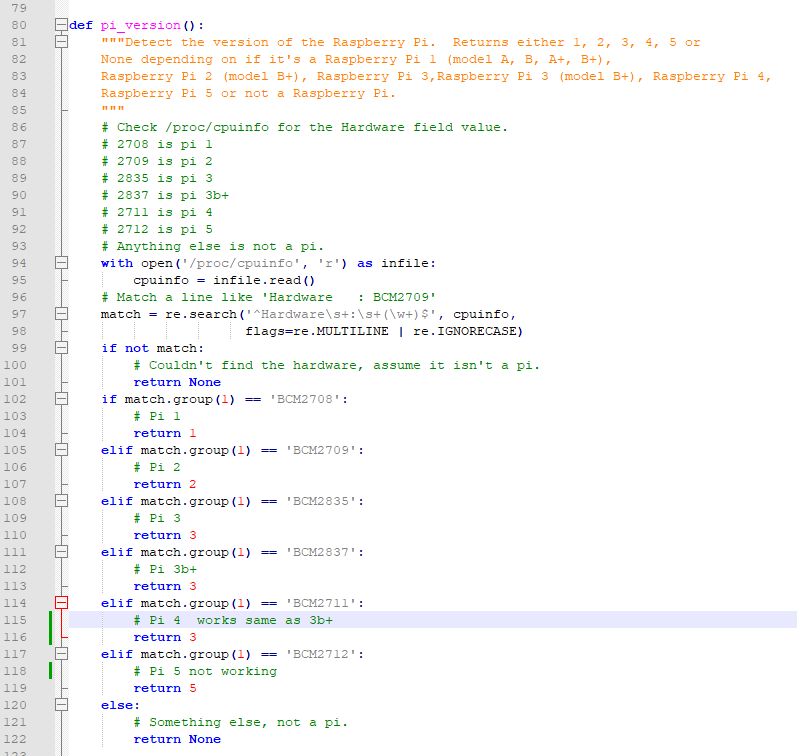
sudo pip3 install schedule

* Install MQTT client

sudo apt install python3-paho-mqtt

* Workaround for Adafruit\_DHT for Pi4:

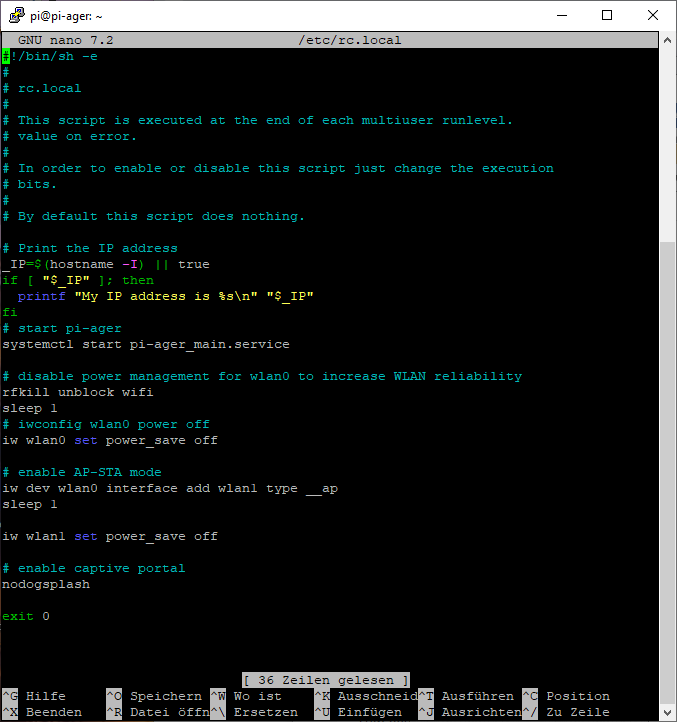
In "/usr/local/lib/python3.11/dist-packages/Adafruit\_DHT/platform\_detect.py", you can add/modify some lines, so it should workaround the issue, that GPIO Control does not work.



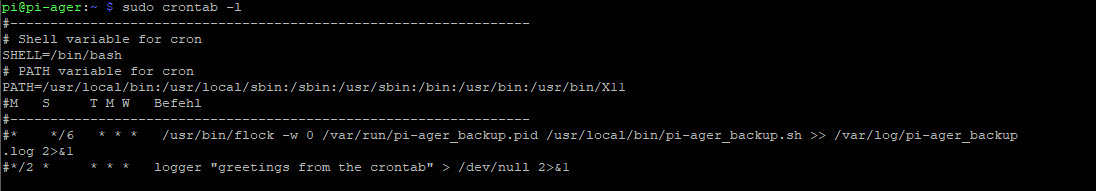
* Unblock wifi for Pi4, add rfkill unblock wifi and disable power management for wlan0:

cd /etc

sudo nano rc.local



* Only if wanted: Generate/edit crontab to prepare for automatic enable pi-ager\_backup.sh



* Use visudo to edit /etc/sudoers, so that the www-data User (User of Website) can execute /var/sudowebscript.sh :

sudo visudo

and then in sudoers following

...

#User privilege specification

root ALL=(ALL:ALL) ALL

...

adding:

www-data ALL=NOPASSWD:/var/sudowebscript.sh, /var/show\_wifi\_connections.sh, /var/updatessid.sh,/usr/bin/raspi-config,/usr/bin/nmcli

Save and exit.

* Install access point with network manager:

Copy from repository /usr/local/bin/setup\_pi-ager-ap.sh to destination.

Create virtual interface wlan1:

sudo iw dev wlan0 interface add wlan1 type \_\_ap

then run script :

cd /usr/local/bin

sudo ./setup\_pi-ager-ap.sh

* Install nodogsplash captive portal

sudo apt install iptables

sudo apt install libmicrohttpd-dev

cd ~

git clone <https://github.com/nodogsplash/nodogsplash.git>

cd ./nodogsplash

make

sudo make install

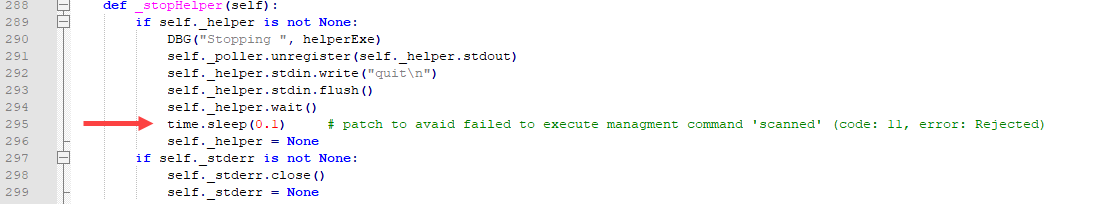
copy all from repository /etc/nodogsplash to /etc/nodogsplash

sudo chmod +x /usr/bin/nodogsplash

sudo chmod +x /usr/bin/ndsctl

* Install Bluetooth modules to support Bluetooth Temp./Hum Sensor from Xiaomi
* sudo apt install libglib2.0-dev
* sudo pip3 install bluepy requests
* sudo apt install bluetooth libbluetooth-dev
* # sudo pip3 install pybluez pycryptodomex
* Patch btle.py to stop intermittend errors:

File : /usr/local/lib/python3.11/dist-packages/bluepy/btle.py :



* Now copy all files and folders from your local git repository /var/www to /var/www/
* from local repository /opt/pi-ager/ to /opt/pi-ager/
* from local repository /var/sudowebscript.sh to /var/
* sudo chown –R www-data:www-data /var/www
* sudo usermod –G gpio –a www-data
* sudo chmod 666 /var/www/logs/logfile.txt
* sudo chmod 755 /var/www/logs/
* sudo chmod 664 /var/www/config/pi-ager.sqlite3
* sudo chown -R www-data:www-data /var/www/config/
* sudo chmod 777 /var/www/config/
* sudo chmod 555 /var/sudowebscript.sh /var/updatessid.sh /var/show\_wifi\_connections.sh
* from local repository /usr/local/bin/\*.sh copy all to /usr/local/bin/

(pi-ager\_backup.sh, pi-ager\_image.sh,setup\_pi-ager.sh)

Set +x mode to the scripts :

sudo chmod +x /usr/local/bin/\*.sh

* from local repository /lib/systemd/system copy the following files to

/lib/systemd/system/ :

pi-ager\_main.service

setup\_pi-ager.service

Then activate these services:

sudo systemctl daemon-reload

* from local repository /usr/bin copy the following file to /usr/bin/. This is a newer version of fswebcam with re-get frame on error.

fswebcam

Set +x mode to fswebcam:

sudo chmod +x /usr/bin/fswebcam

* from local repository /usr/share/man/man1/fswebcam.1.gz copy the following file to /usr/share/man/man1/

fswebcam.1.gz

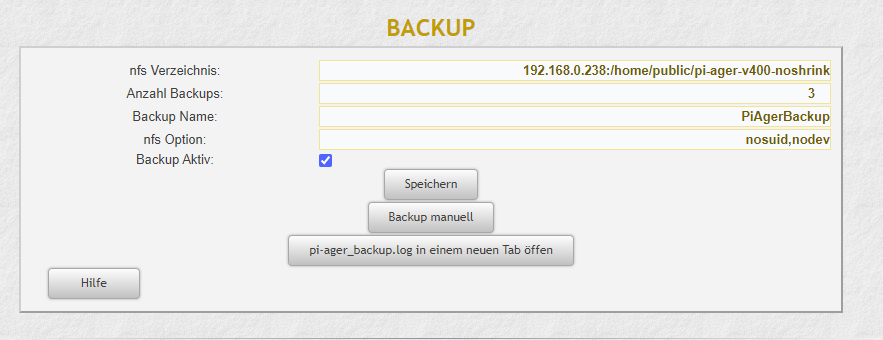
* Restart system

sudo reboot

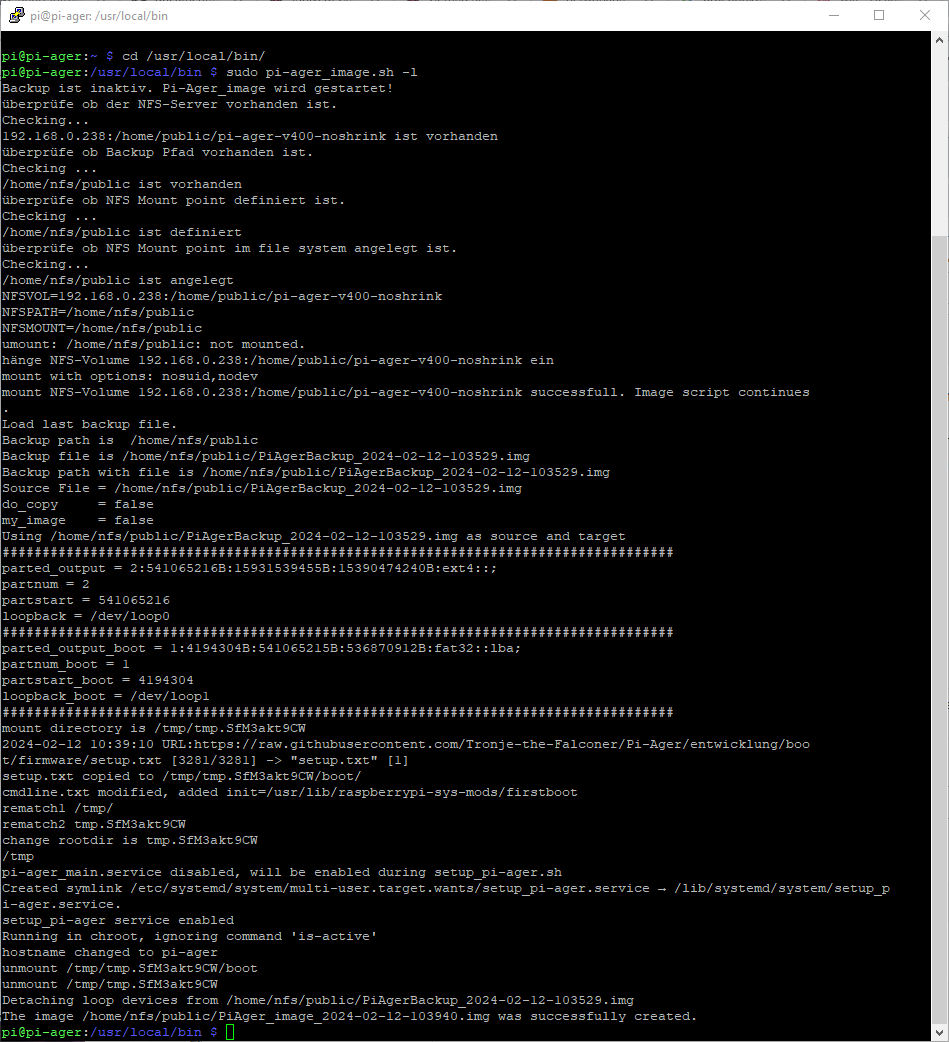
# How to generate and deploy Pi-Ager Images

There are some steps to do for generating and deploying a new image from a running Pi-Ager system:

1. Setup a NFS Server to store a new image. The best way is using a Raspi 4B or 5 equipped with an USB Memory stick with 128GB or more. Using RPi 5 it is now possible to add a NVME SSD so that there will be enough space for storing one or more images.
2. On the NFS Server System Install Pi Power Tools using the well-known Pi-Apps.
3. On the Pi-Ager setup and start an Image backup on the ADMIN page. For example :



1. Next start a terminal on the Pi-Agerand start the pi-ager\_image.sh script with option -l:



1. Zip and deploy your new image.