SunFounder Pironman

www.sunfounder.com

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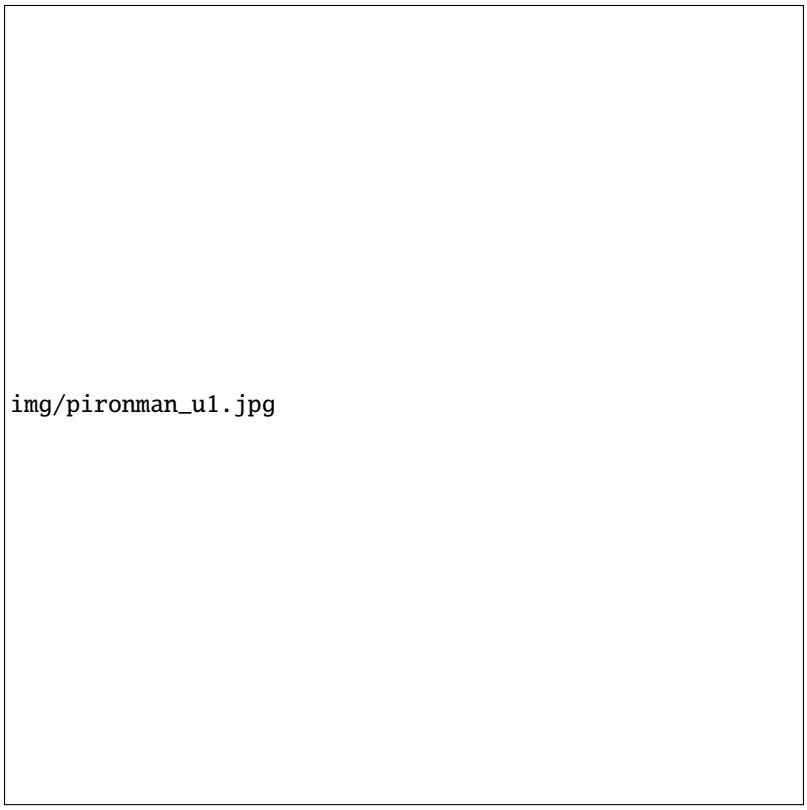
CONTENTS

Thanks for choosing our Pironman U1.



Meet the Pironman U1, the essential UPS case for Raspberry Pi, designed for seamless performance and sophisticated style. It features Advanced Hardware Power Path Switching for stable power, Triple Current Sensors for efficient power management, and Intelligent Charging to enhance battery life. Enjoy real-time battery monitoring via I2C Communication, extensive storage options with NVMe SSD Compatibility, and easy multimedia control with an IR Receiver. The case also boasts a retro-style Metal Power Button, an Extended 40-pin GPIO with labeled pins for easy access, and a robust, aesthetically pleasing build. With an efficient cooling fan and direct access to the microSD card slot, the Pironman U1 is the perfect blend of functionality and elegance for your Raspberry Pi.

If you have any questions, please send an email to service@sunfounder.com and we will respond as soon as possible.

CHAPTER

ONE

1. WHAT ELSE SHOULD WE PREPARE?

Essential Components

- Raspberry Pi 5/4 Model B

  The Pironman U1 is fully compatible with the Raspberry Pi 5/4 Model B.

- 5V/5A USB Type C Power Adapter

  It is recommended to use the official 27W power supply of Raspberry Pi or other Pi5 dedicated USB PD protocol 5V/5A power sources.

- Micro SD Card

  It is recommended to use an SD card with a minimum of 16GB of storage for Raspberry Pi OS. For Raspberry Pi OS Lite, a minimum of 4GB is advised.

Optional Components

- M.2 NVMe SSD

  The Pironman U1 features an NVMe PIP with an M.2 SSD connector, accommodating four NVMe M.2 SSD sizes: 2230, 2242, 2260, and 2280. It supports both PCIE2.0 and PCIE 3.0 NVMe M.2 SSDs.

- Screen

  To access the Raspberry Pi's desktop environment, a screen such as a TV or a computer monitor is required.

- Micro HDMI Cable

  A Micro HDMI cable is required when you want to connect the Raspberry Pi to a screen.

- Mouse & Keyboard

  Any USB port on the Raspberry Pi can be used to connect a wired keyboard and mouse, or a USB Bluetooth receiver for wireless peripherals.

CHAPTER

TWO

2. ASSEMBLY INSTRUCTIONS

Before assembling the Pironman, please first verify that all parts and components have been included. If there are any missing or damaged components, please contact SunFounder immediately at service@sunfounder.com to resolve the issue as soon as possible.

Tips

- It is recommended to follow the paper installation instructions step by step.
- Before installation, sort and stack the components to find them more quickly.
- Repeatedly check the connections of FFC and FPC cables to avoid poor contact.

CHAPTER

THREE

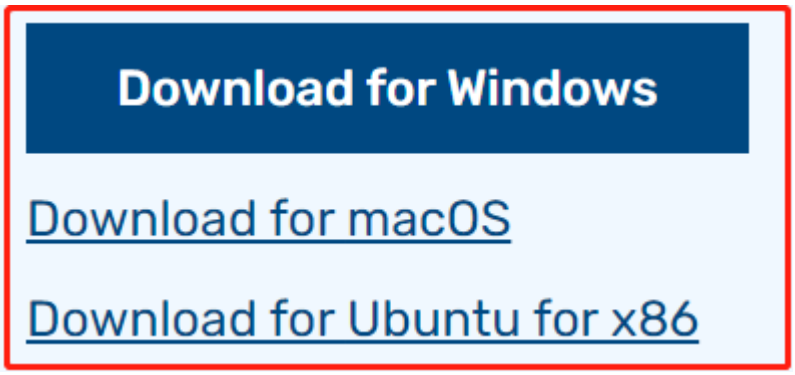
3. INSTALLING THE OS

Required Components

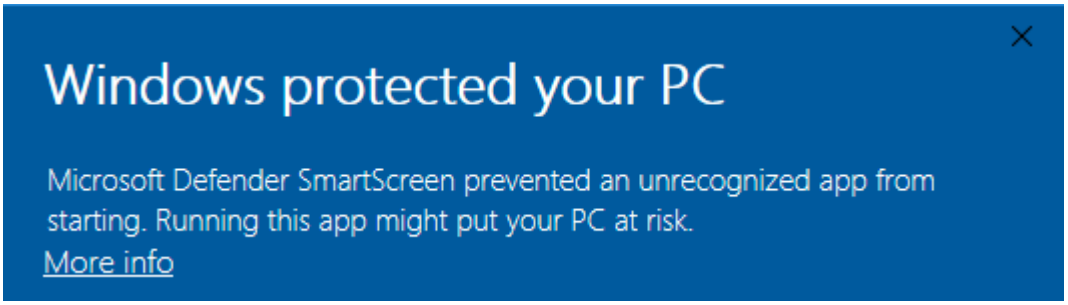
- Raspberry Pi 5B
- A Personal Computer
- A Micro SD card

Installation Steps

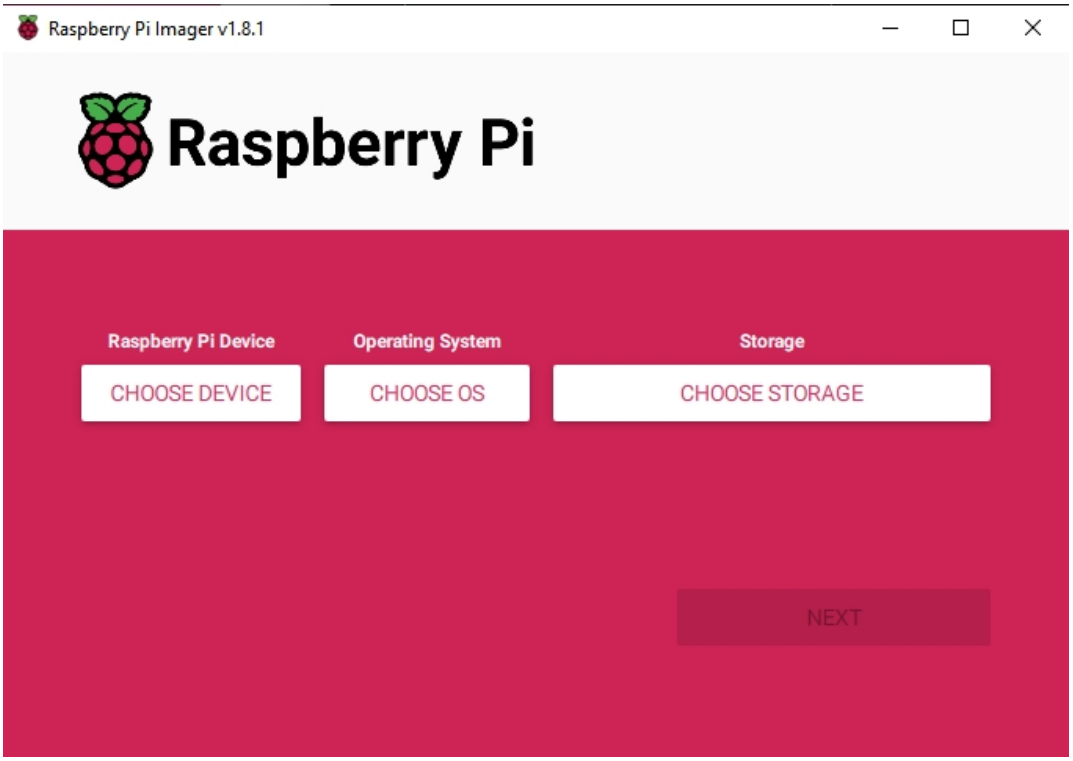
1. Visit the Raspberry Pi software download page at Raspberry Pi Imager. Choose the Imager version compatible with your operating system. Download and open the file to initiate installation.



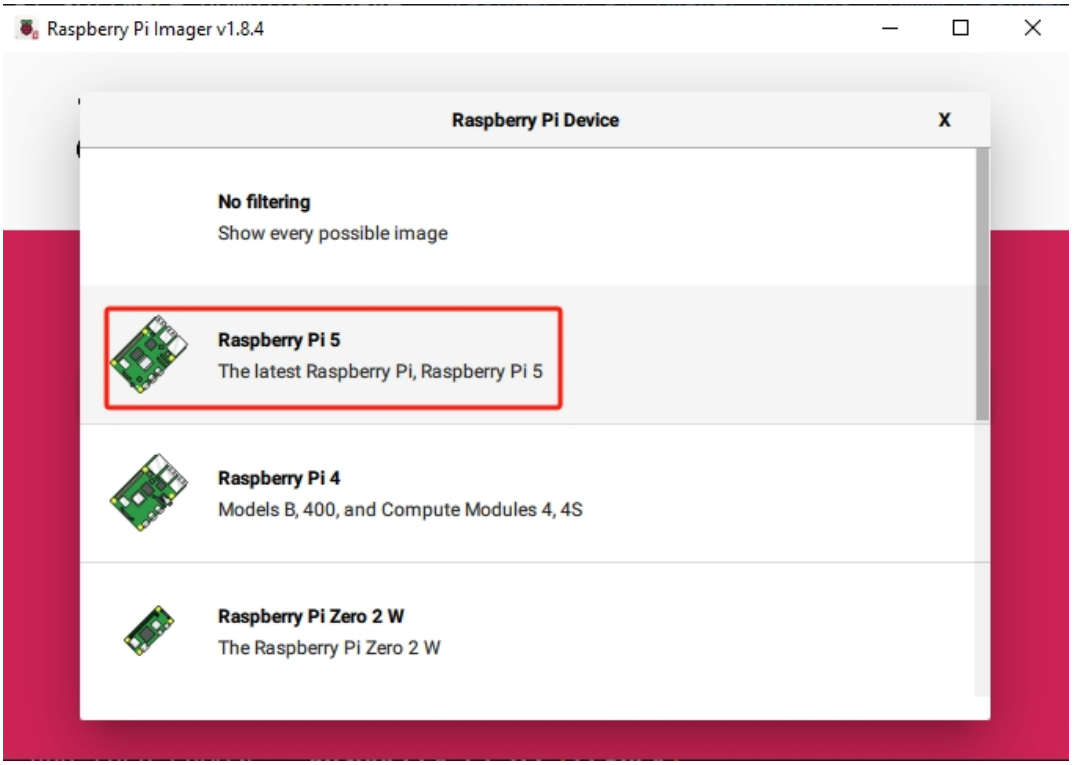
2. A security prompt may appear during installation, depending on your operating system. For example, Windows might display a warning message. In such cases, select **More info** and then **Run anyway**. Follow the on-screen guidance to complete the installation of the Raspberry Pi Imager.



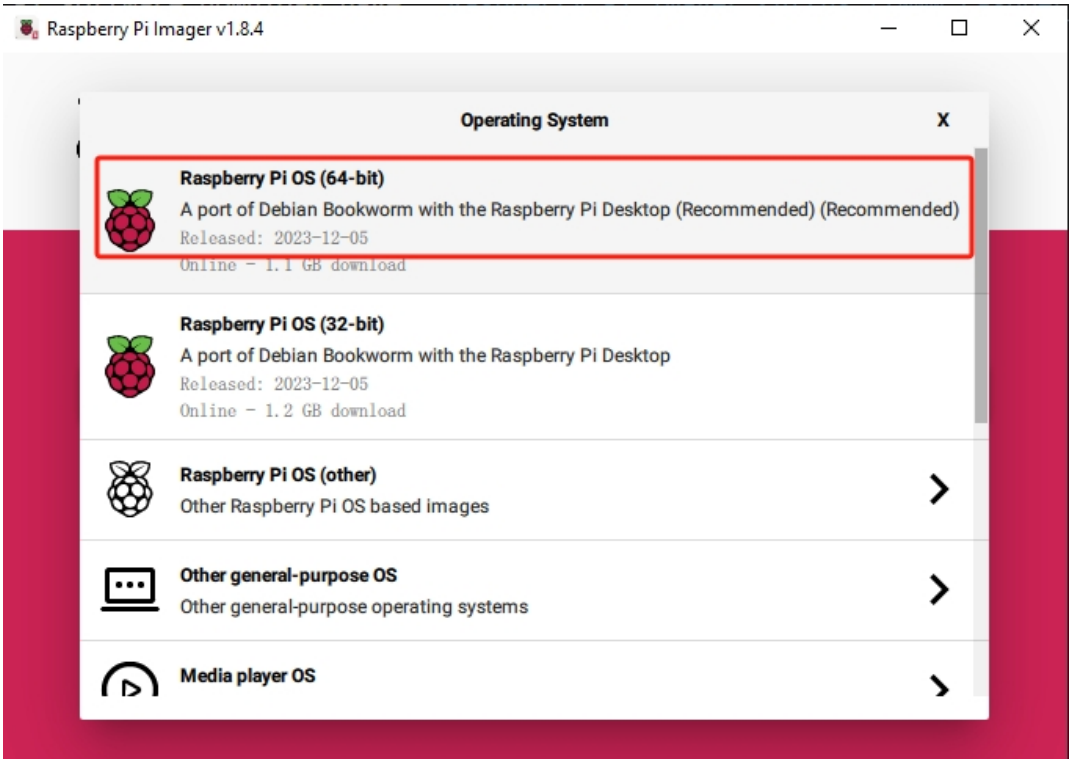
3. Insert your SD card into your computer or laptop's SD card slot.
4. Launch the Raspberry Pi Imager application by clicking its icon or typing `rpi-imager` in your terminal.



5. Within the Imager, click **CHOOSE DEVICE** and select the **Raspberry Pi 5** model from the dropdown list.

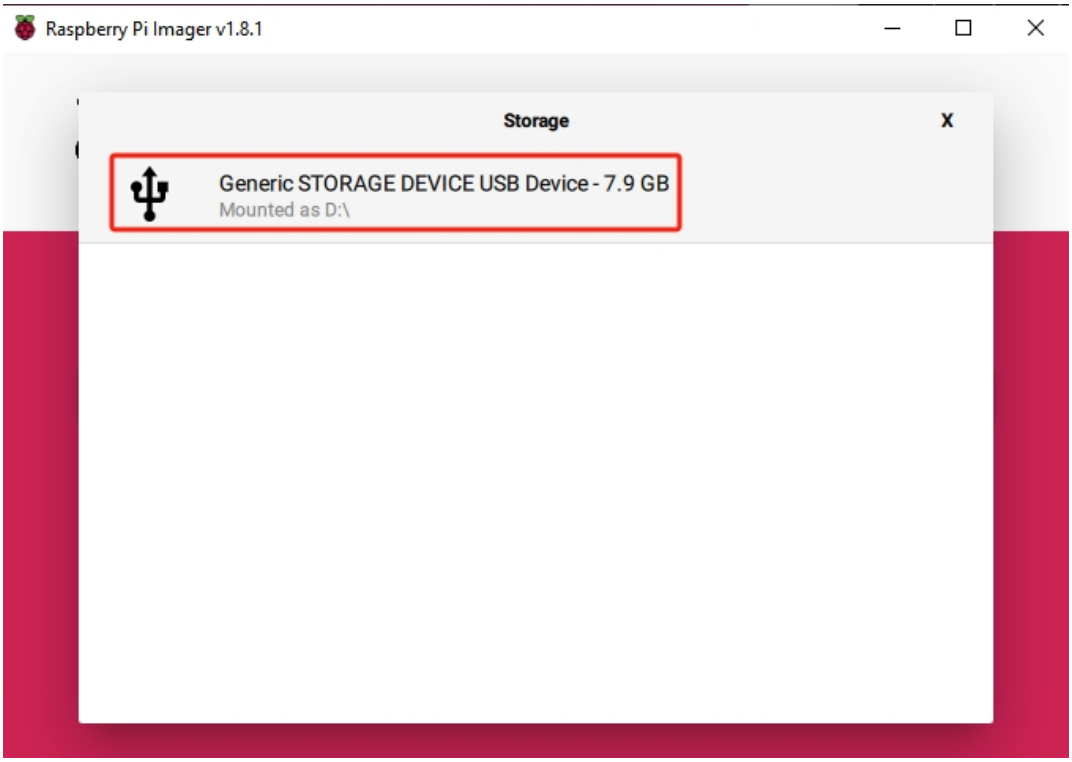


6. Select **CHOOSE OS** and opt for the recommended operating system version.

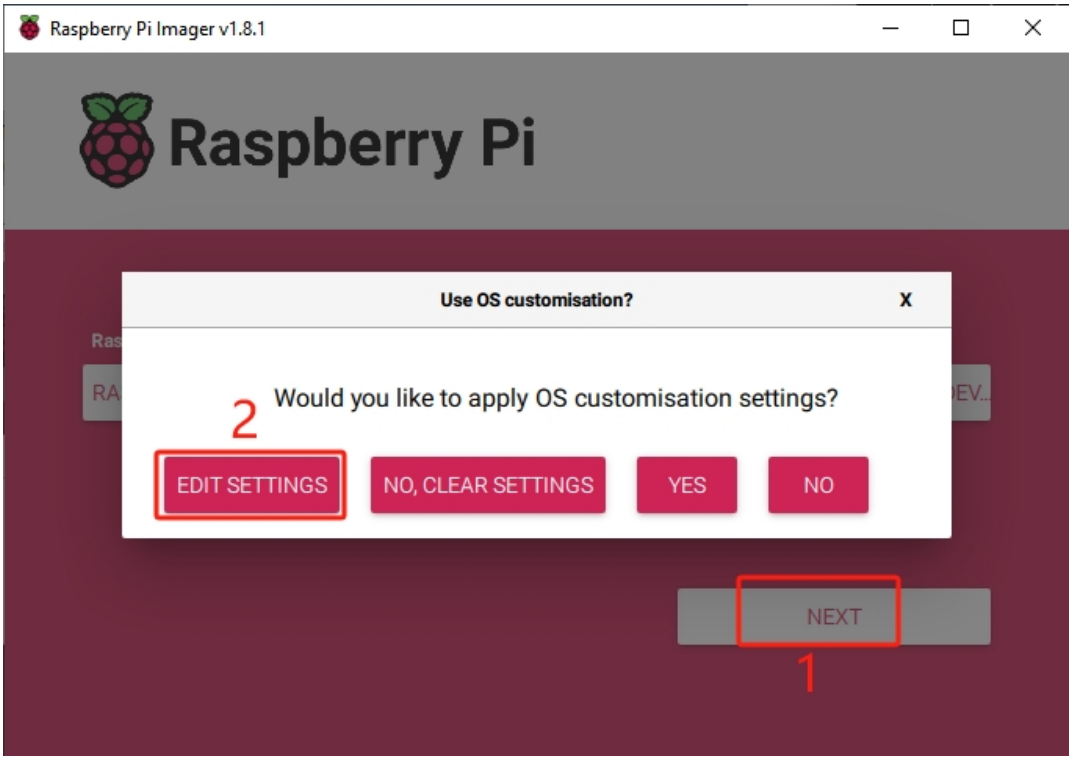


7. Click **Choose Storage** and select the appropriate storage device for the installation.

Note: Ensure you select the correct storage device. To avoid confusion, disconnect any additional storage devices if multiple ones are connected.

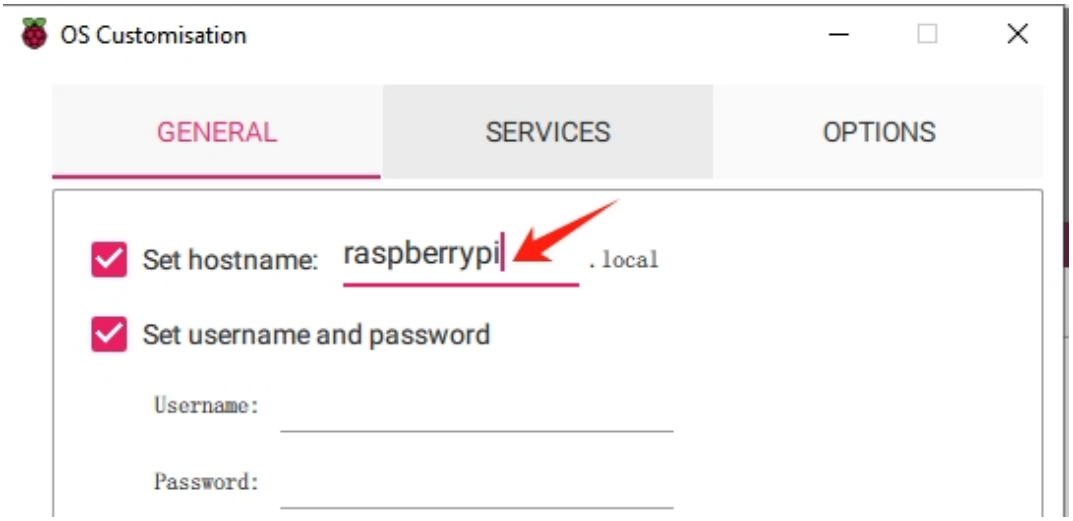


8. Click **NEXT** and then **EDIT SETTINGS** to tailor your OS settings. If you have a monitor for your Raspberry Pi, you can skip the next steps and click 'Yes' to begin the installation. Adjust other settings later on the monitor.



9. Define a **hostname** for your Raspberry Pi.

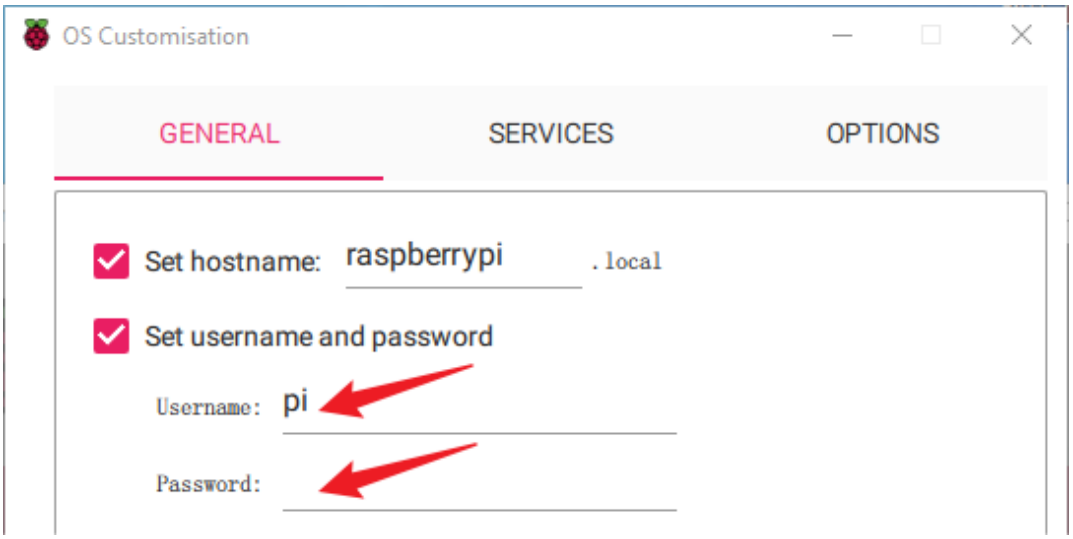
Note: The hostname is your Raspberry Pi's network identifier. You can access your Pi using `<hostname>.local` or `<hostname>.lan`.



10. Create a **Username** and **Password** for the Raspberry Pi's administrator account.

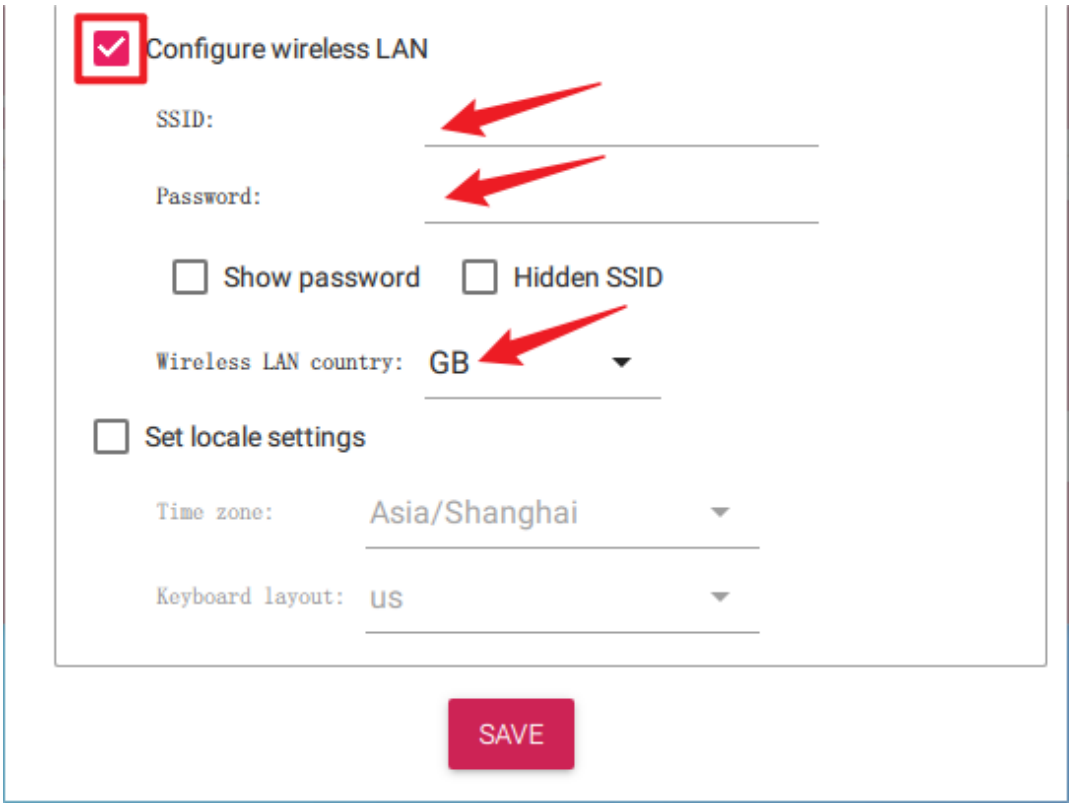
Note: Establishing a unique username and password is vital for securing your Raspberry Pi, which

lacks a default password.

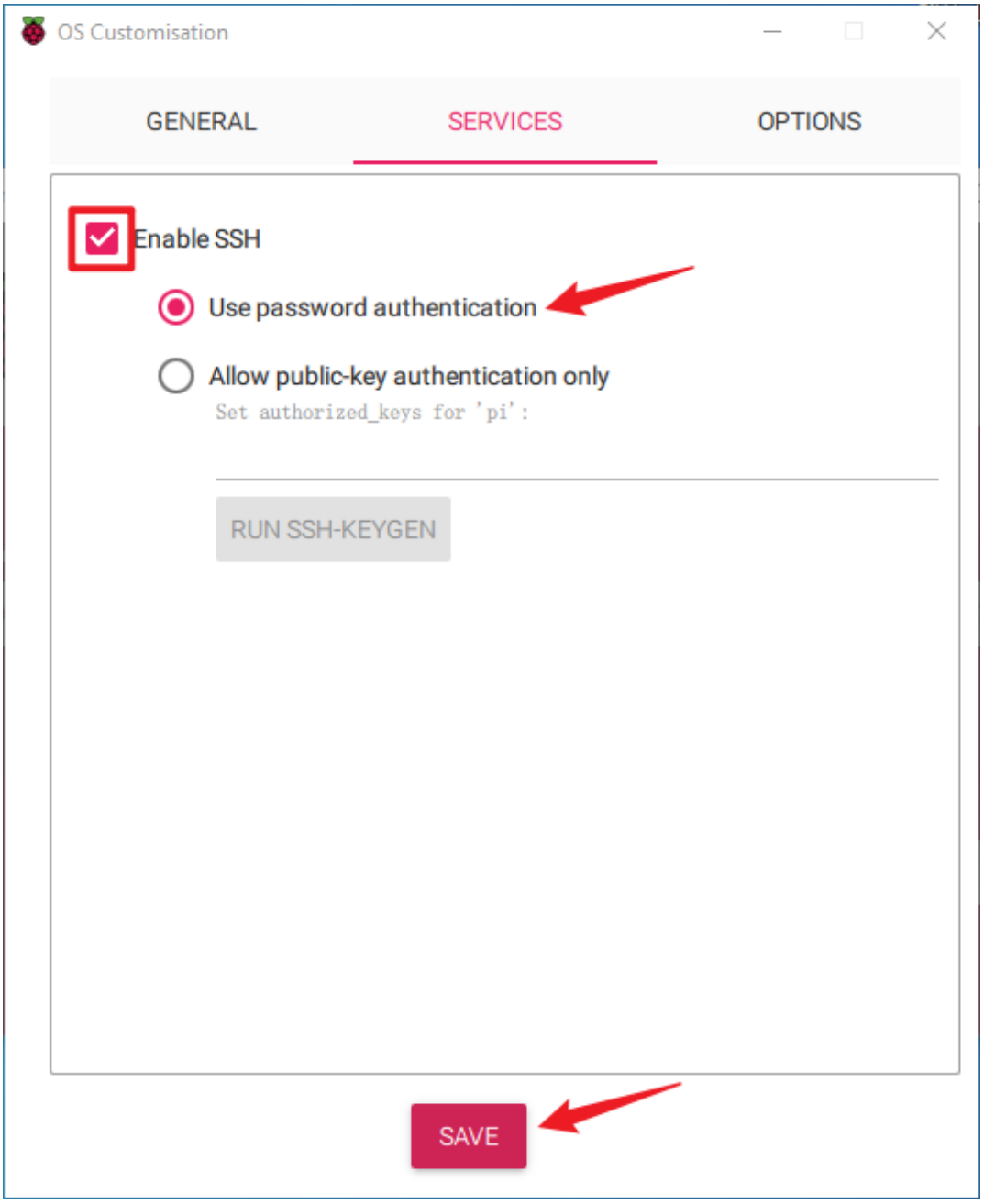


11. Configure the wireless LAN by providing your network's **SSID** and **Password**.

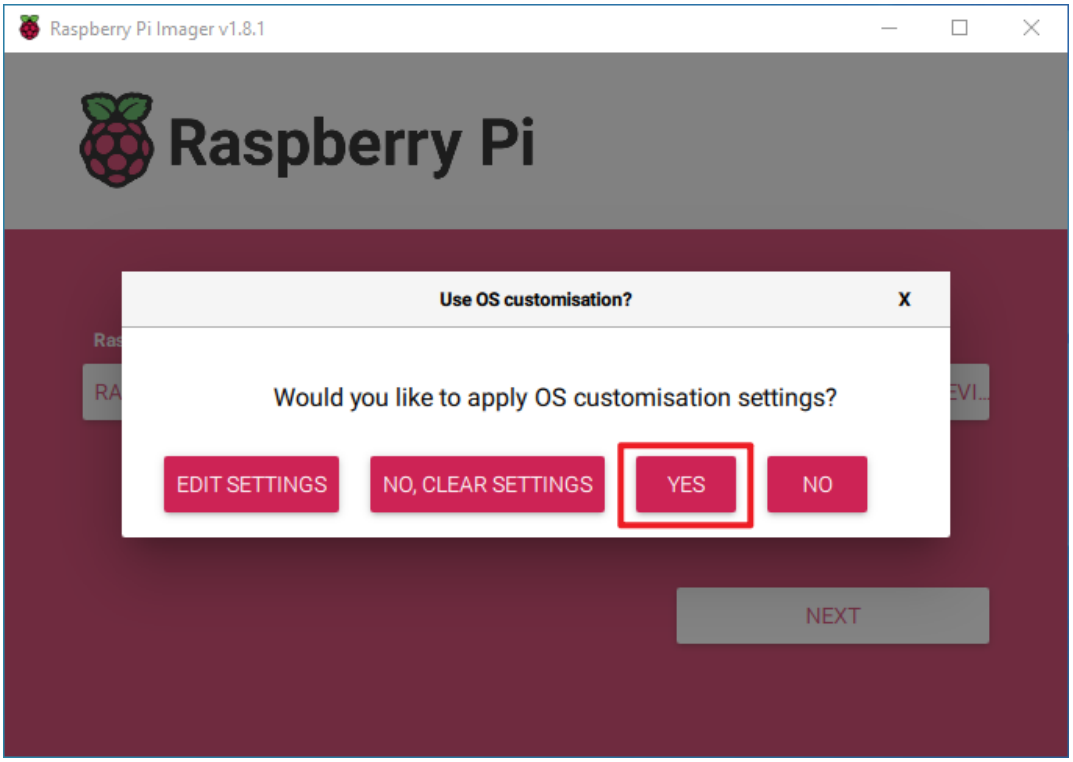
Note: Set the `Wireless LAN country` to the two-letter ISO/IEC alpha2 code corresponding to your location.



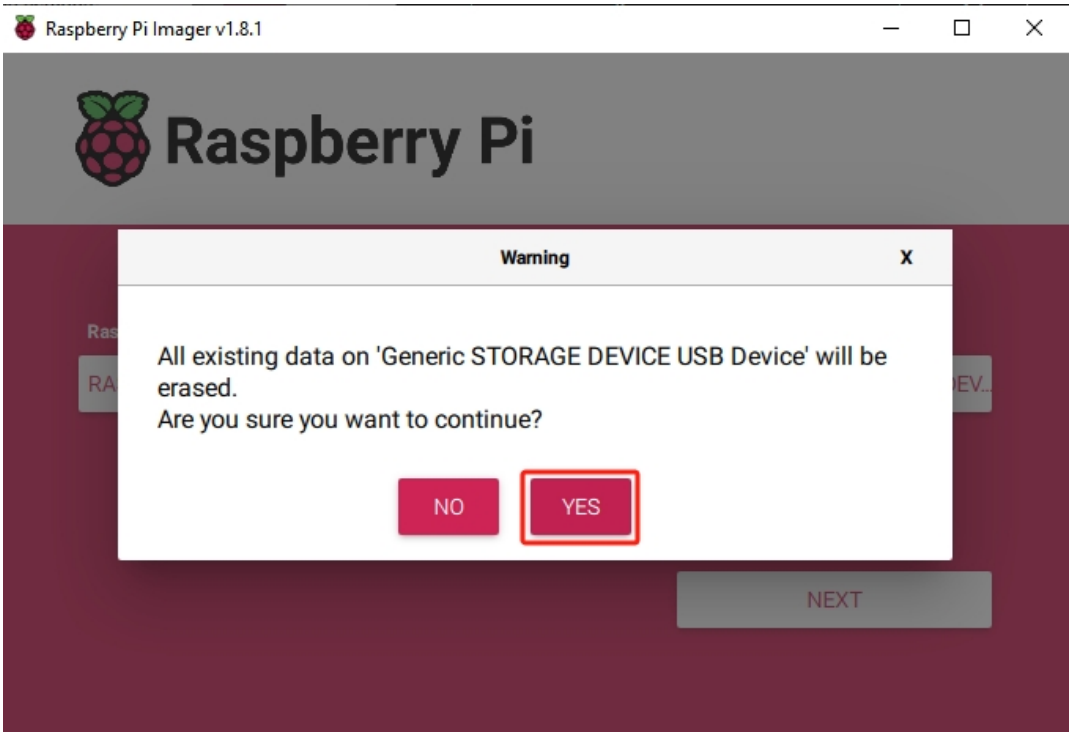
12. Click **SERVICES** and activate **SSH** for secure, password-based remote access. Remember to save your settings.



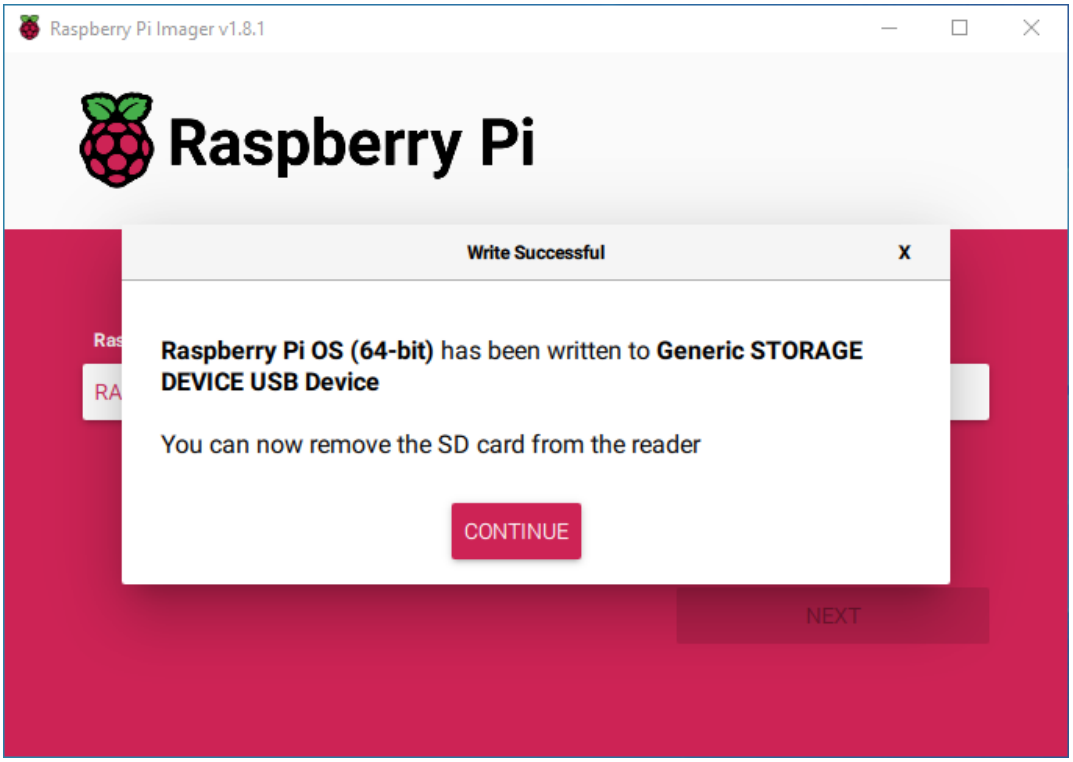
13. Confirm your selected settings by clicking **Yes**.



14. If the SD card contains existing data, ensure you back it up to prevent data loss. Proceed by clicking **Yes** if no backup is needed.



15. The OS installation process will commence on the SD card. A confirmation dialog will appear upon completion.


Raspberry Pi Imager v1.8.1
Raspberry Pi
Write Successful
X
Raspberry Pi OS (64-bit) has been written to Generic STORAGE DEVICE USB Device
You can now remove the SD card from the reader
CONTINUE
NEXT

CHAPTER

FOUR

4. SETTING UP YOUR RASPBERRY PI

4.1 Setting Up with a Screen

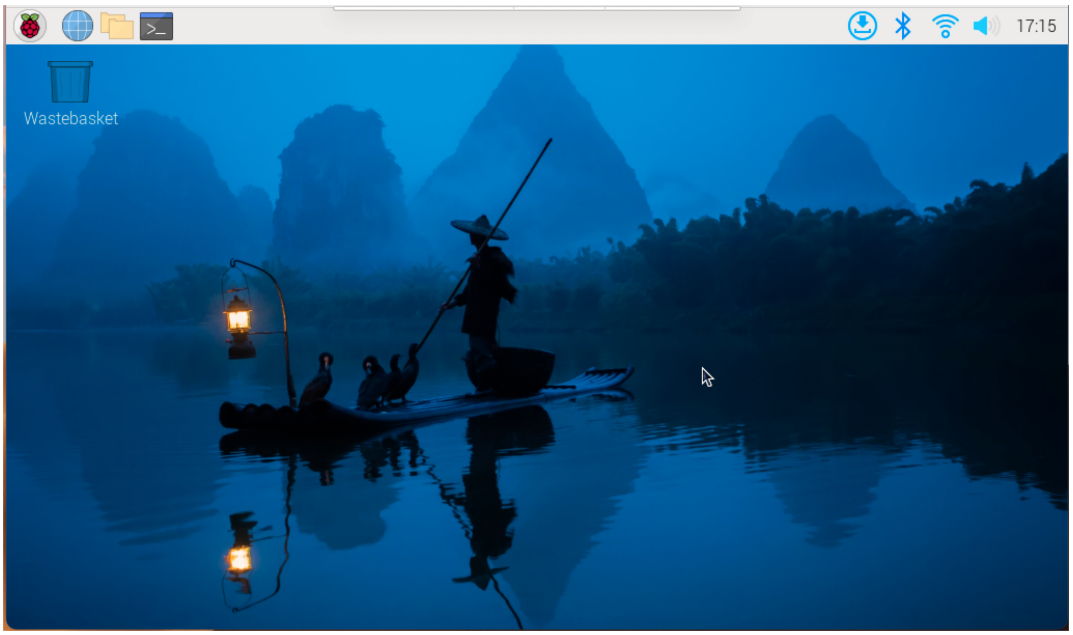
Having a screen simplifies the process of working with your Raspberry Pi.

Required Components

- Raspberry Pi 5/4 Model B
- Power Adapter
- Micro SD card
- Screen Power Adapter
- HDMI cable
- Screen
- Mouse
- Keyboard

Steps:

1. Insert the Micro SD card with Raspberry Pi OS installed into the Pironman U1.
2. Connect the Mouse and Keyboard to the Pironman U1.
3. Use the HDMI cable to connect the screen to the Pironman U1's HDMI port. Ensure the screen is plugged into a power source and turned on.
4. Power the Pironman U1 using the power adapter. The Raspberry Pi OS desktop should appear on the screen after a few seconds.



4.2 Setting Up Without a Screen

If you don't have a monitor, remote login is a viable option.

Required Components

- Raspberry Pi 5/4 Model B
- Power Adapter
- Micro SD card

Using SSH, you can access the Raspberry Pi's Bash shell, which is the default Linux shell. Bash offers a command-line interface for performing various tasks.

For those preferring a graphical user interface (GUI), the remote desktop feature is a convenient alternative for managing files and operations.

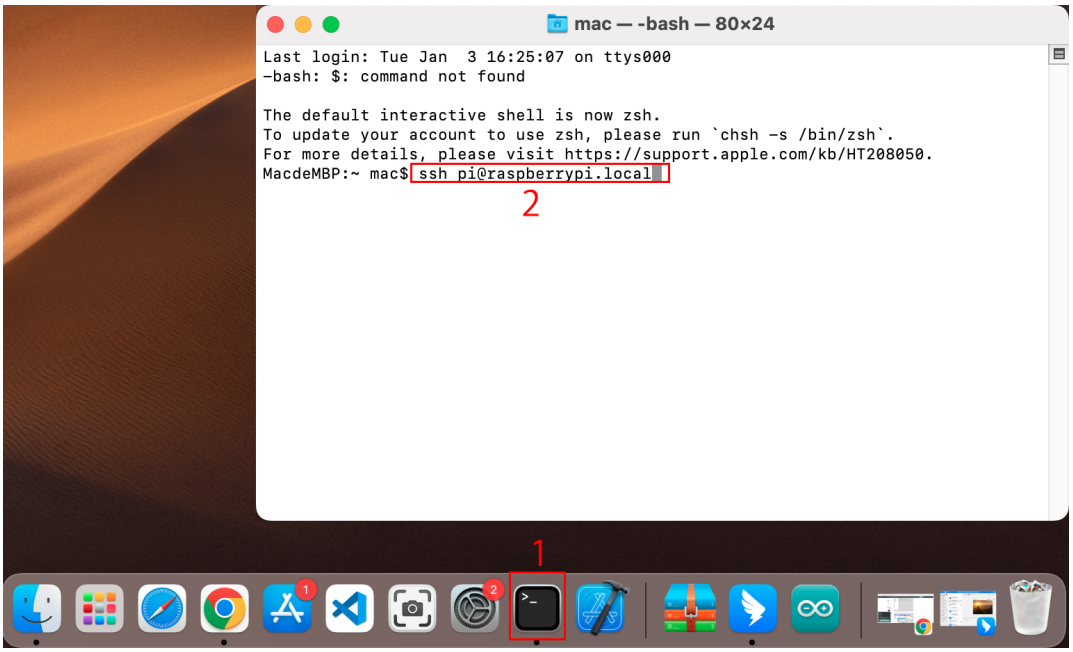
For detailed setup tutorials based on your operating system, refer to the following sections:

4.2.1 For Mac OS X Users

For Mac OS X users, SSH (Secure Shell) offers a secure and convenient method to remotely access and control a Raspberry Pi. This is particularly handy for working with the Raspberry Pi remotely or when it's not connected to a monitor. Using the Terminal application on a Mac, you can establish this secure connection. The process involves an SSH command incorporating the Raspberry Pi's username and hostname. During the initial connection, a security prompt will ask for confirmation of the Raspberry Pi's authenticity.

1. To connect to the Raspberry Pi, type the following SSH command:

```
ssh pi@raspberrypi.local
```



2. A security message will appear during your first login. Respond with **yes** to proceed.

```
The authenticity of host 'raspberrypi.local␣
↪(2400:2410:2101:5800:635b:f0b6:2662:8cba)' can't be established.
ED25519 key fingerprint is SHA256:oo7x3ZSgAo032wD1tE8eW0fFM/
↪kmewIvRwkBys6XRwg.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
```

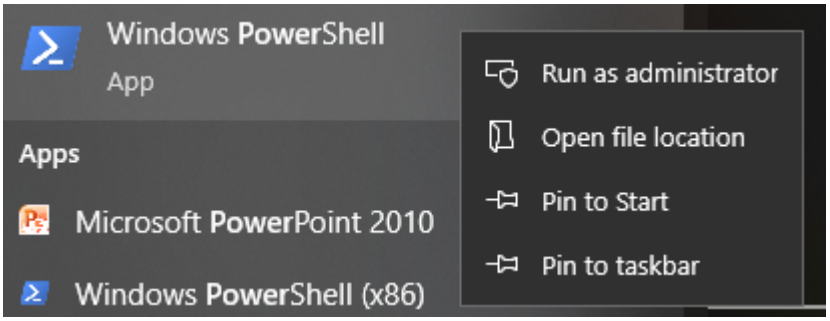
3. Input the password for the Raspberry Pi. Be aware that the password won't display on the screen as you type, which is a standard security feature.

```
pi@raspberrypi.local's password:
Linux raspberrypi 5.15.61-v8+ #1579 SMP PREEMPT Fri Aug 26 11:16:44 BST␣
↪2022 aarch64

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: Thu Sep 22 12:18:22 2022
pi@raspberrypi:~ $
```

4.2.2 For Windows Users

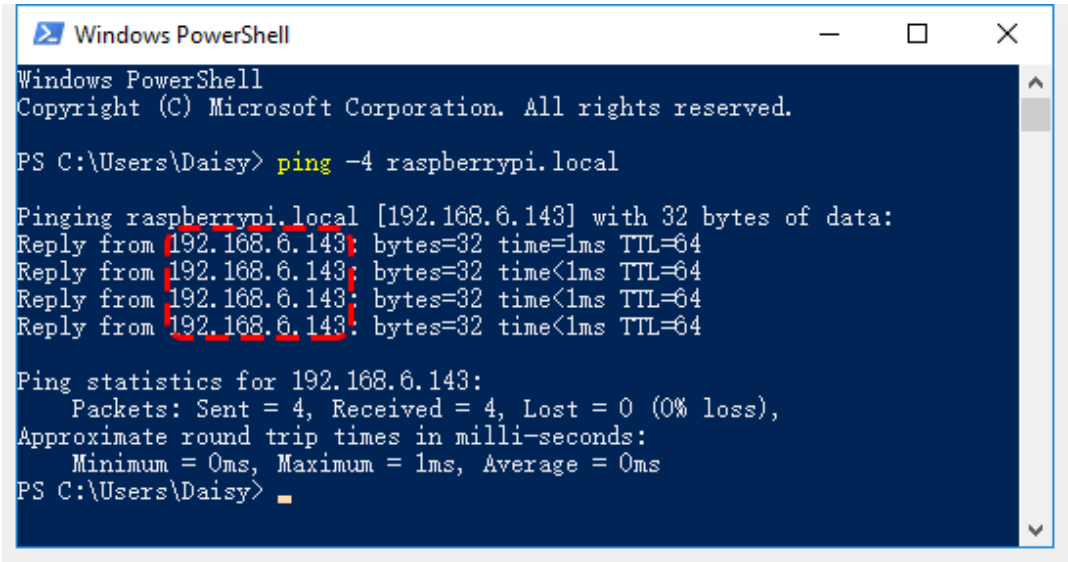
For Windows 10 or higher users, remote login to a Raspberry Pi can be achieved through the following steps:

1. Search for `powershell` in your Windows search box. Right-click on `Windows PowerShell` and select `Run as administrator`.



2. Determine your Raspberry Pi's IP address by typing `ping -4 <hostname>.local` in PowerShell.

```
ping -4 raspberrypi.local
```



The Raspberry Pi's IP address will be displayed once it's connected to the network.

- If the terminal displays `Ping request could not find host pi.local. Please check the name and try again.`, verify the hostname you've entered is correct.
- If the IP address still isn't retrievable, check your network or WiFi settings on the Raspberry Pi.

3. Once the IP address is confirmed, log in to your Raspberry Pi using `ssh <username>@<hostname>.local` or `ssh <username>@<IP address>`.

```
ssh pi@raspberrypi.local
```

> **Warning:** If an error appears stating `The term 'ssh' is not recognized as the name of a cmdlet...`, your system may not have SSH tools pre-installed. In this case, you need to manually install OpenSSH following *Install OpenSSH via Powershell*, or use a third-party tool as described in *PuTTY*.

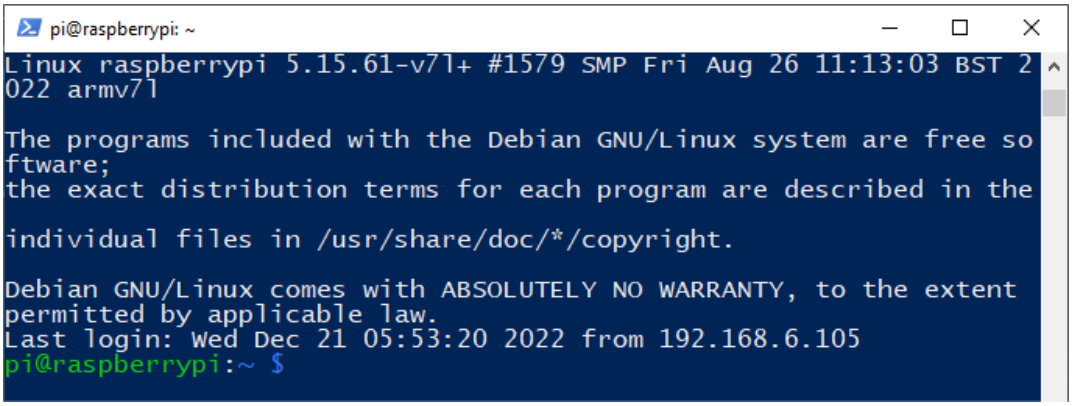
4. A security message will appear on your first login. Enter `yes` to proceed.

```
The authenticity of host 'raspberrypi.local␣
↪(2400:2410:2101:5800:635b:f0b6:2662:8cba)' can't be established.
ED25519 key fingerprint is SHA256:oo7x3ZSgAo032wD1tE8eW0fFM/
↪kmewIvRwkBys6XRwg.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
```

5. Enter the password you previously set. Note that the password characters won't be displayed on the screen, which is a standard security feature.

> **Note:** The absence of visible characters when typing the password is normal. Ensure you input the correct password.

6. Once connected, your Raspberry Pi is ready for remote operations.



4.2.3 For Linux/Unix Users

1. Locate and open the **Terminal** on your Linux/Unix system.
2. Ensure your Raspberry Pi is connected to the same network. Verify this by typing *ping <hostname>.local*. For example:

```
ping raspberrypi.local
```

   You should see the Raspberry Pi's IP address if it's connected to the network.

   - If the terminal shows a message like `Ping request could not find host pi.local. Please check the name and try again.`, double-check the hostname you've entered.
   - If you're unable to retrieve the IP address, inspect your network or WiFi settings on the Raspberry Pi.

3. Initiate an SSH connection by typing `ssh <username>@<hostname>.local` or `ssh <username>@<IP address>`. For instance:

```
ssh pi@raspberrypi.local
```

4. On your first login, you'll encounter a security message. Type `yes` to proceed.

```
The authenticity of host 'raspberrypi.local␣
↪(2400:2410:2101:5800:635b:f0b6:2662:8cba)' can't be established.
ED25519 key fingerprint is SHA256:oo7x3ZSgAo032wD1tE8eW0fFM/
↪kmewIvRwkBys6XRwg.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
```

5. Enter the password you previously set. Note that for security reasons, the password won't be visible as you type.

> **Note:** It's normal for the password characters not to display in the terminal. Just ensure to enter the correct password.

6. Once you've successfully logged in, your Raspberry Pi is now connected, and you're ready to proceed to the next step.

4.2.4 Access the Raspberry Pi desktop through VNC Viewer

For those preferring a graphical user interface (GUI) over command-line access, the Raspberry Pi supports remote desktop functionality. This guide will walk you through setting up and using VNC (Virtual Network Computing) for remote access.

We recommend using VNC® Viewer for this purpose.

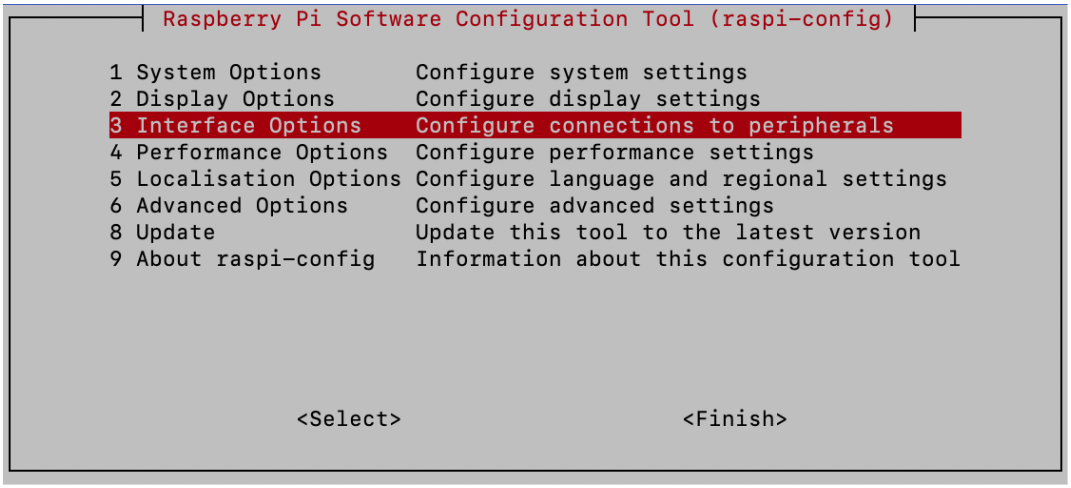
Enabling VNC Service on Raspberry Pi

VNC service comes pre-installed in the Raspberry Pi OS but is disabled by default. Follow these steps to enable it:

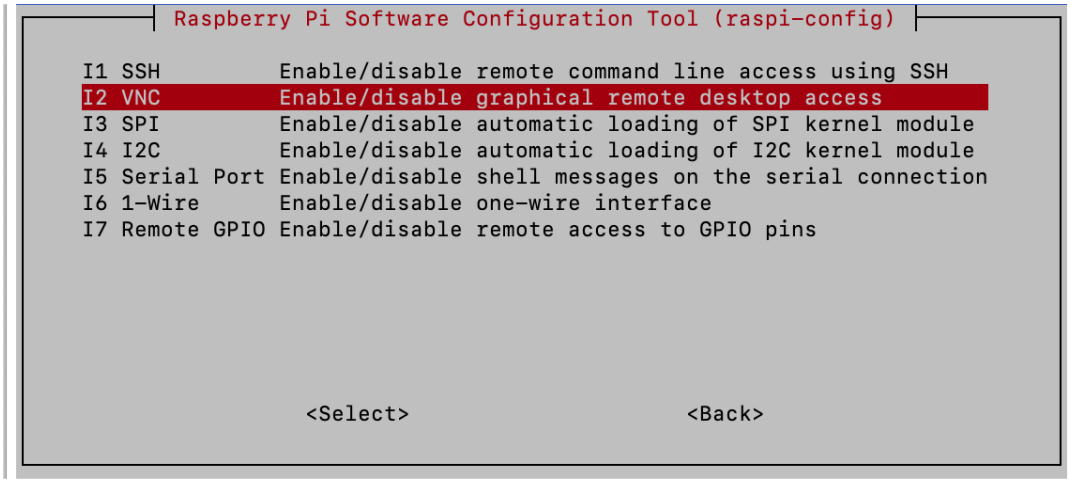
1. Enter the following command in the Raspberry Pi terminal:

```
sudo raspi-config
```

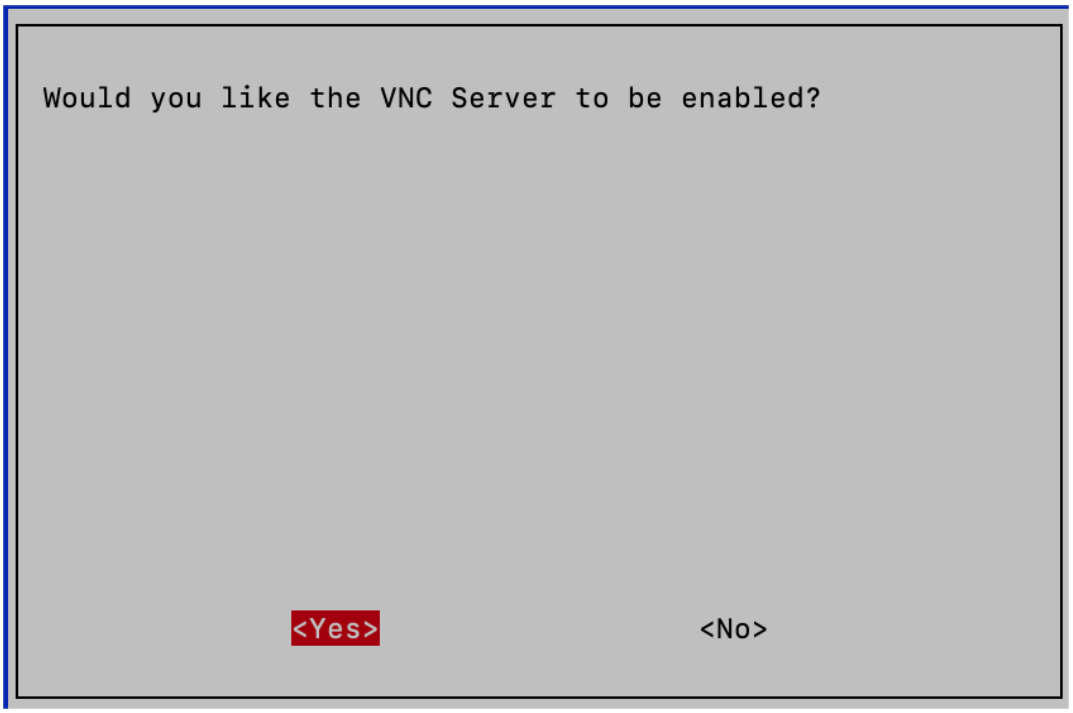
2. Navigate to **Interfacing Options** using the down arrow key, then press **Enter**.



3. Select **VNC** from the options.

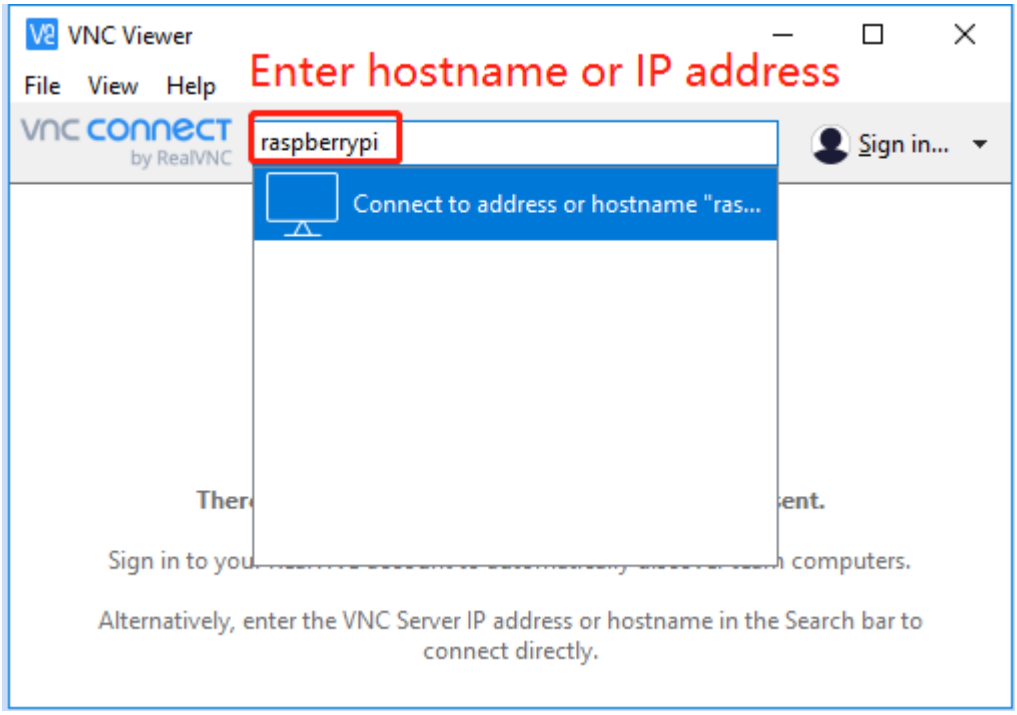


4. Use the arrow keys to choose **<Yes>** -> **<OK>** -> **<Finish>** and finalize the VNC service activation.

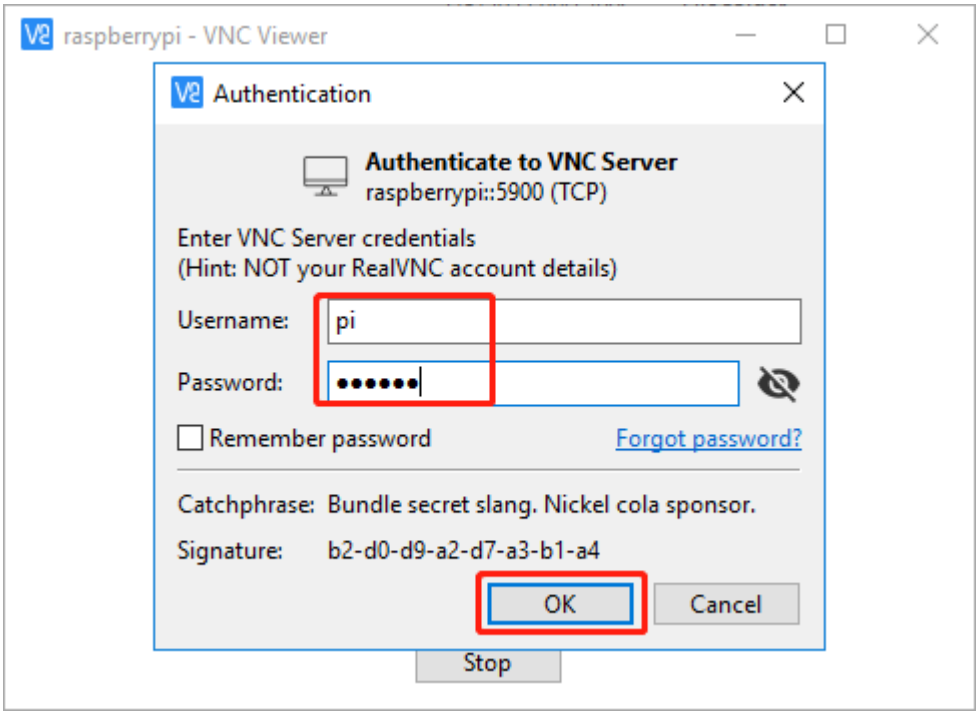


Logging in via VNC Viewer

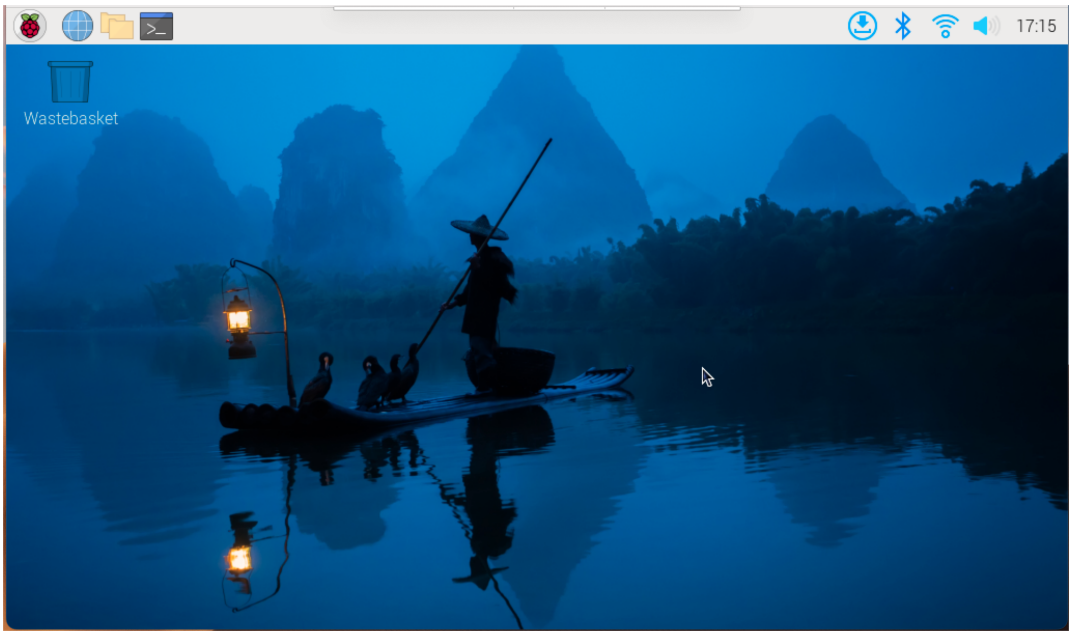
1. Download and install VNC Viewer on your personal computer.
2. Once installed, launch VNC Viewer. Enter the hostname or IP address of your Raspberry Pi and press Enter.



3. When prompted, enter your Raspberry Pi's username and password, then click **OK**.



4. You'll now have access to your Raspberry Pi's desktop interface.


17:15
Wastebasket

CHAPTER

FIVE

5. QUICK USER GUIDE

To effectively utilize the Pironman U1, we'll be employing the SunFounder Power Control Core (SPC).

This is a tool for power management and control of hardware devices. Its primary functions are to monitor battery voltage, current, capacity, and percentage, and to manage fan speed and modes. The SPC connects with devices via I2C communication, ensuring stable data transfer. Additionally, it supports real-time clock settings and features configuration and logging capabilities. This tool is ideal for professionals and hobbyists who require precise monitoring and control of hardware power.

5.1 1. Download and Install SPC

Note: For lite systems, initially install tools like `git`, `python3`, `pip3`, `setuptools`, etc.

```
sudo apt-get update
sudo apt-get install git -y
sudo apt-get install python3 python3-pip python3-setuptools -y
```

- Download and install `spc`. If you encounter any errors during the installation, it's recommended to rerun `sudo python3 install.py`.

```
cd ~
git clone https://github.com/sunfounder/spc.git
cd ~/spc
sudo python3 install.py
```

- After installation, a reboot is necessary to activate certain settings.

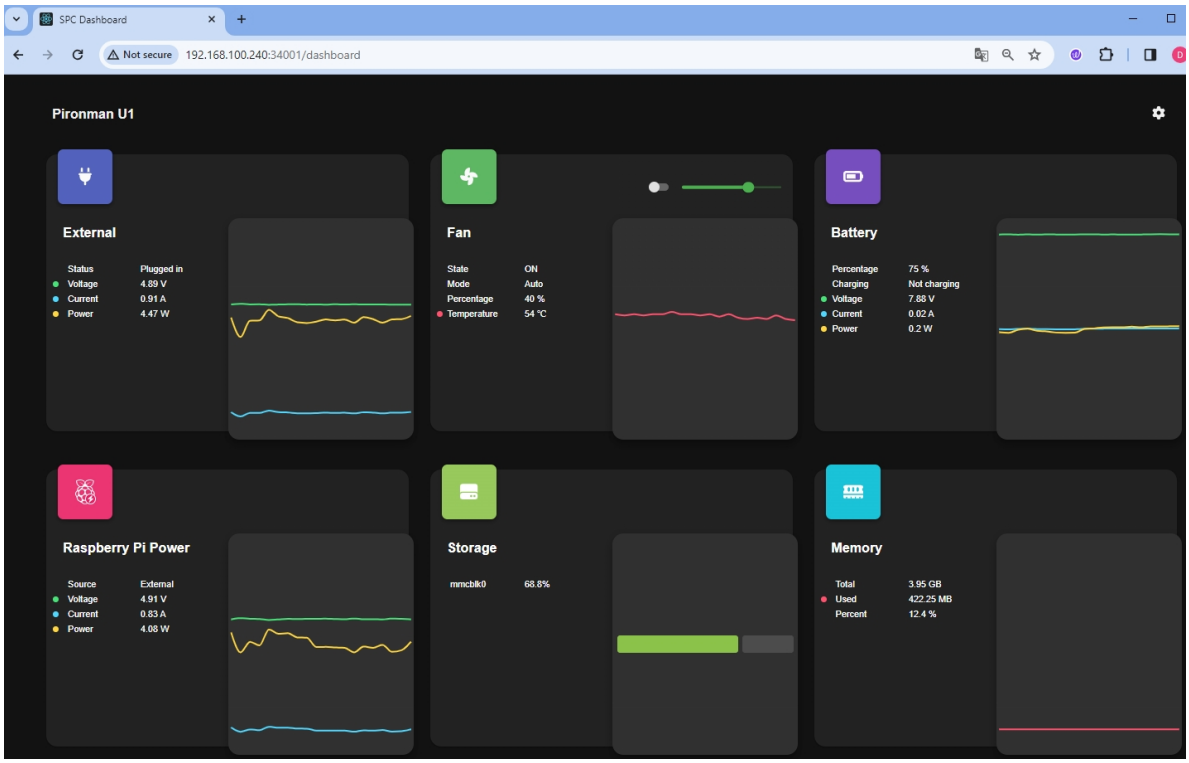
```
sudo reboot
```

- Instructions for Powering On and Off:
  - **Power On**: Press the button until the light turns green, indicating the system is powering on. You can then release the button.
  - **Shutdown**: Press and hold the button for 2 seconds until the light turns purple, then release. When the power button's light begins to flash purple, the Raspberry Pi will receive a shutdown signal and proceed to shut down. The power button's light will turn off once the shutdown process is complete.
  - **Power Cut**: If you haven't configured software on the Raspberry Pi, or for other reasons, you can opt for a power cut shutdown. Press and hold the button for 5 seconds and turns red, indicating a direct power cut. Be cautious with this method as it may damage data.

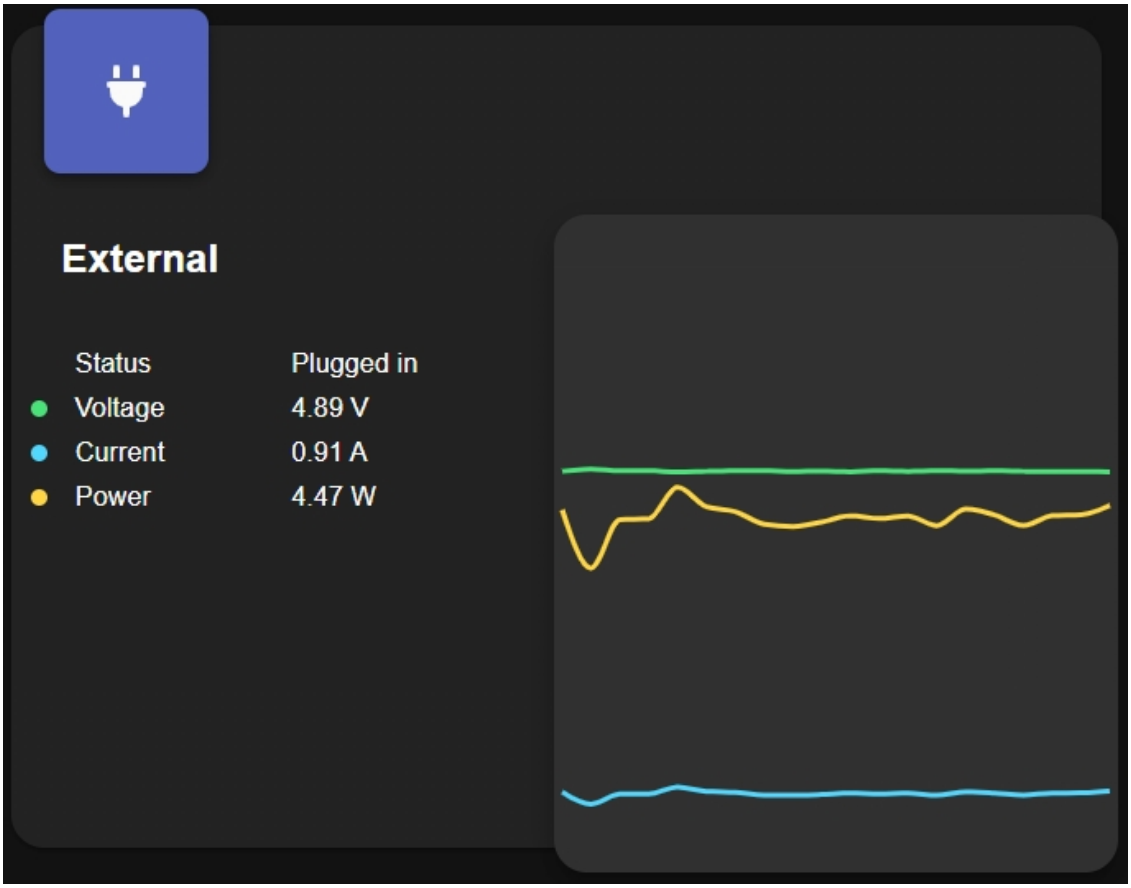
5.2 2. View Data from SPC Dashboard

Now, you can visit the SPC Dashboard to view various data.

- Enter `<your pi ip>:34001` in your browser to open the SPC Dashboard designed by us.



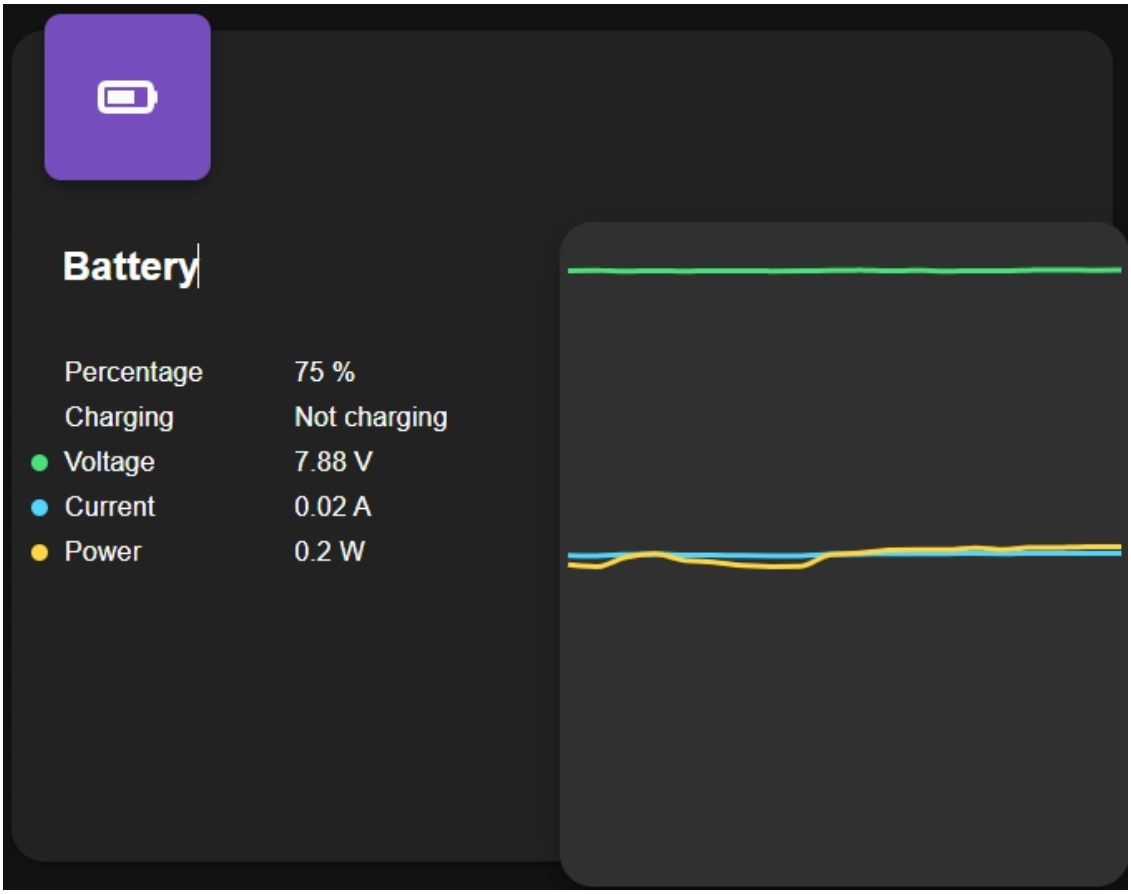
- The Dashboard will include the following:
  - **External**: Displays the status of the external USB power (Plugged in or Unplugged), its voltage, current, and power.



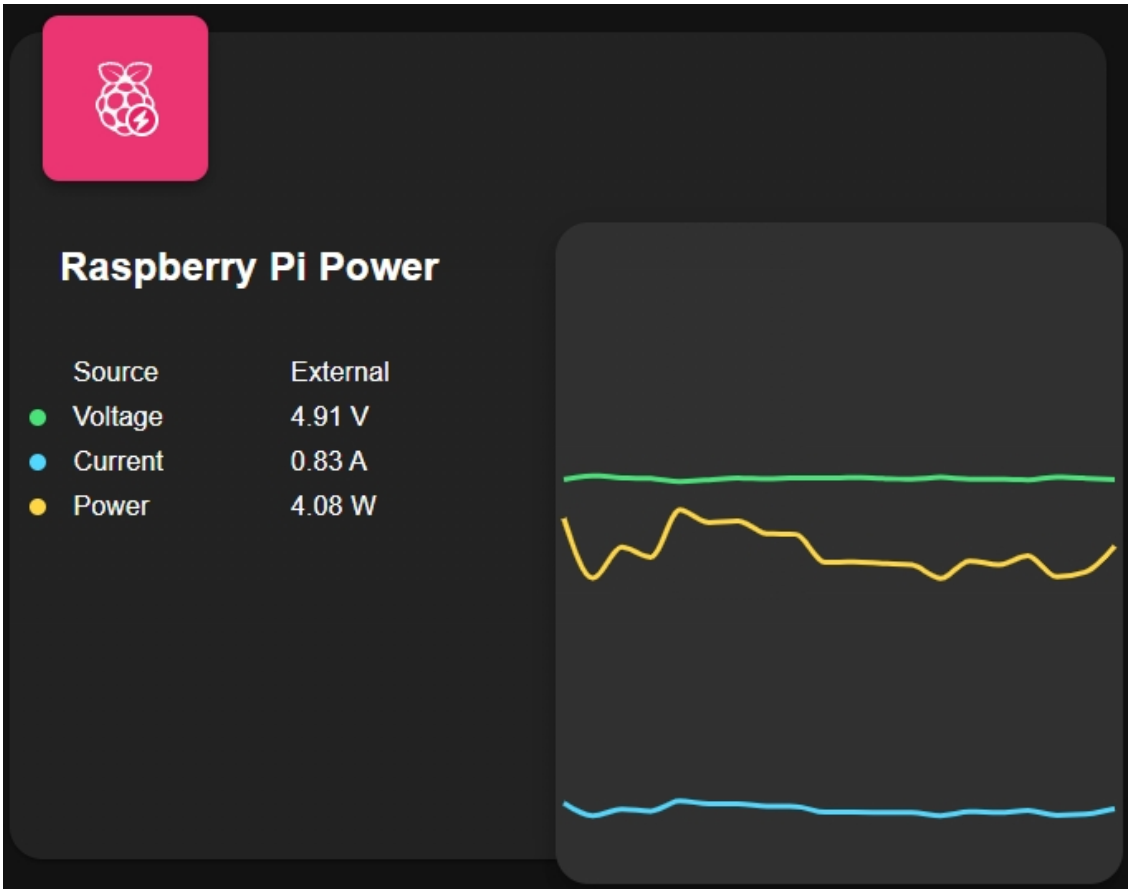
- **Fan**: Shows the fan status, mode, speed, and the current temperature of the Raspberry Pi.
  - You can manually turn the fan on or off and select different rotation modes for it.

– **Battery**: Displays the battery's percentage, charging status, voltage, current, and power.

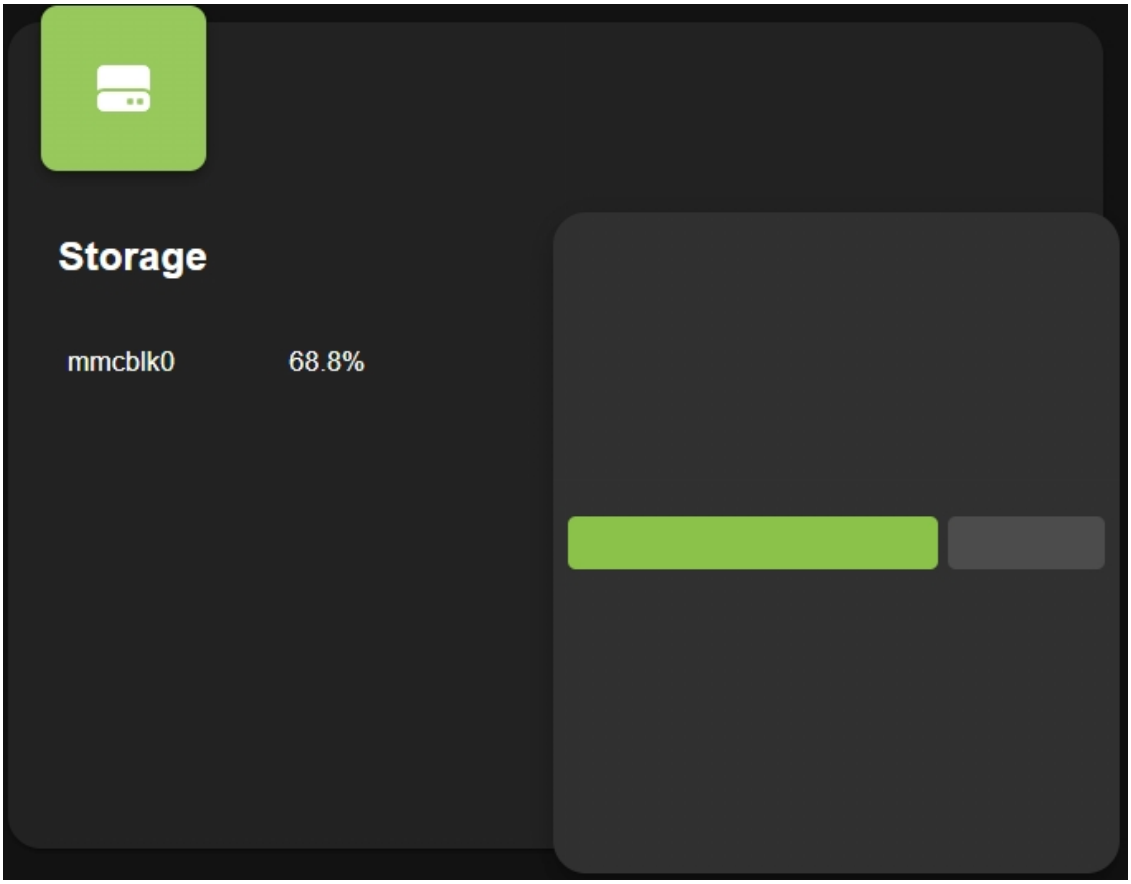
  * When an external USB power source is plugged in, the battery is in charging mode, showing its voltage, charging current, and power.
  * When the external USB is not plugged in, the current and power are negative, indicating the battery's output current and power.



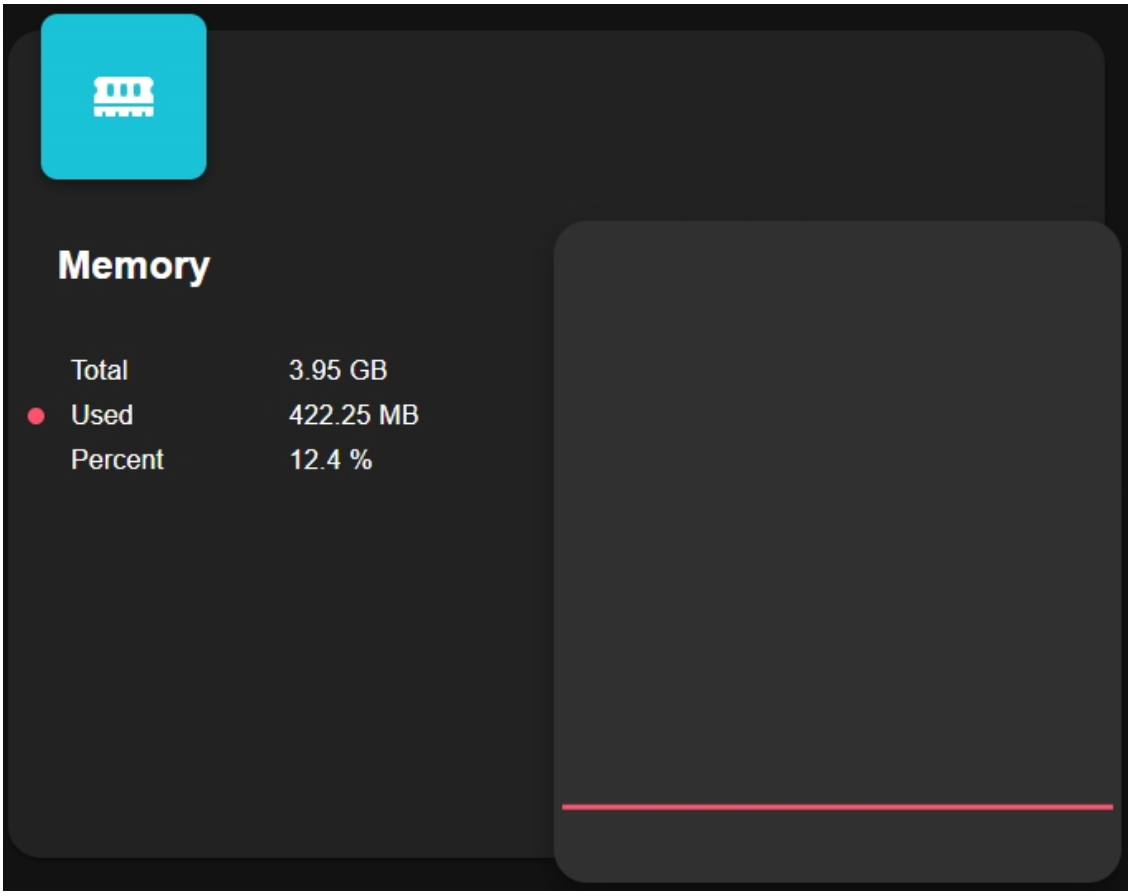
– **Raspberry Pi Power**: Displays the power supply to the Raspberry Pi (External or battery), its voltage, current, and power.



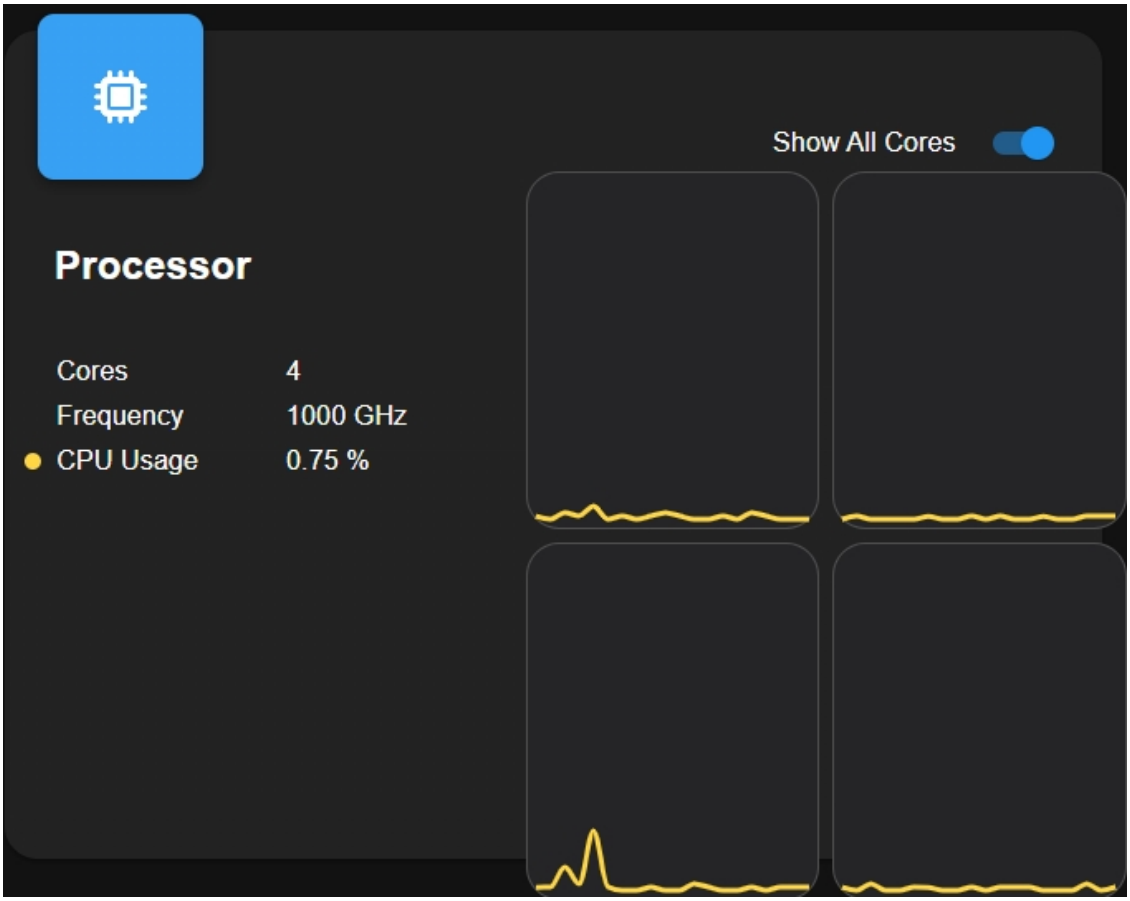
– **Storage**: Displays the storage capacity of a Raspberry Pi, showing various disk partitions with their used and available space.



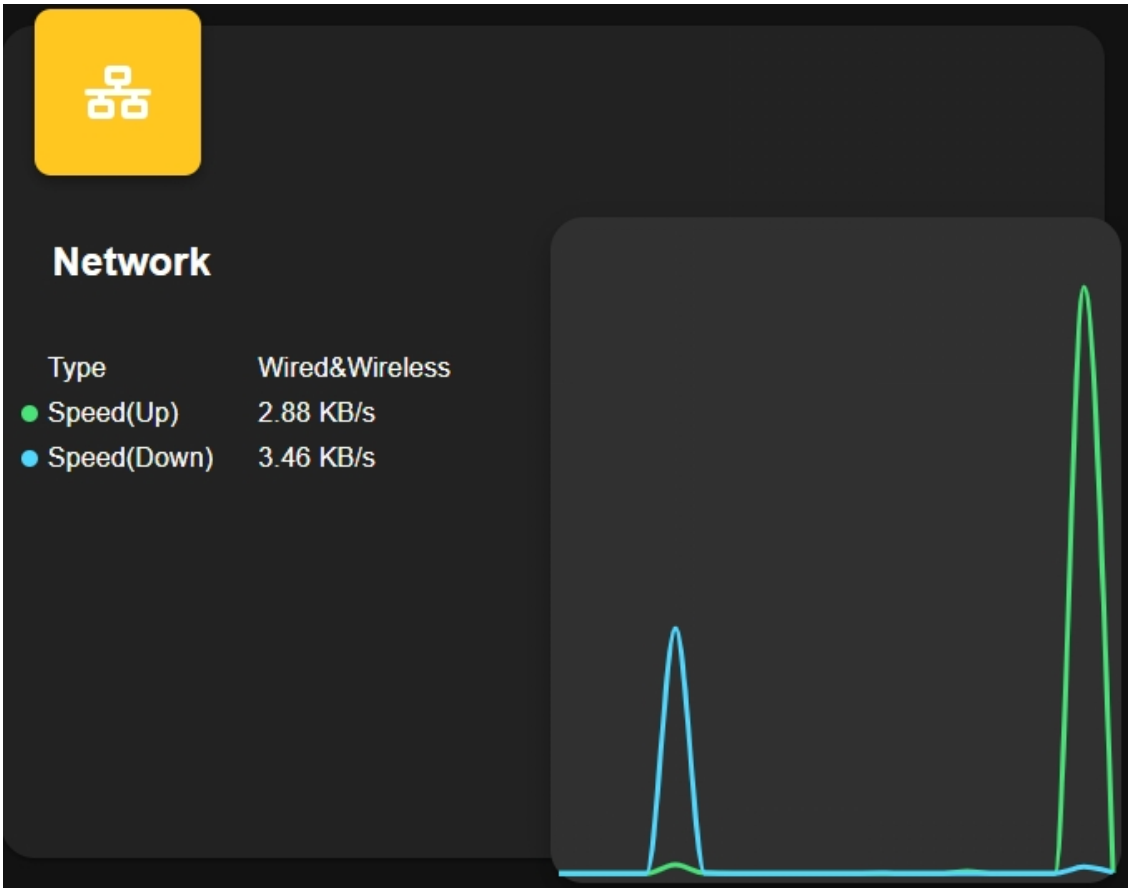
- **Memory**: Shows the Raspberry Pi's RAM usage and percentage.



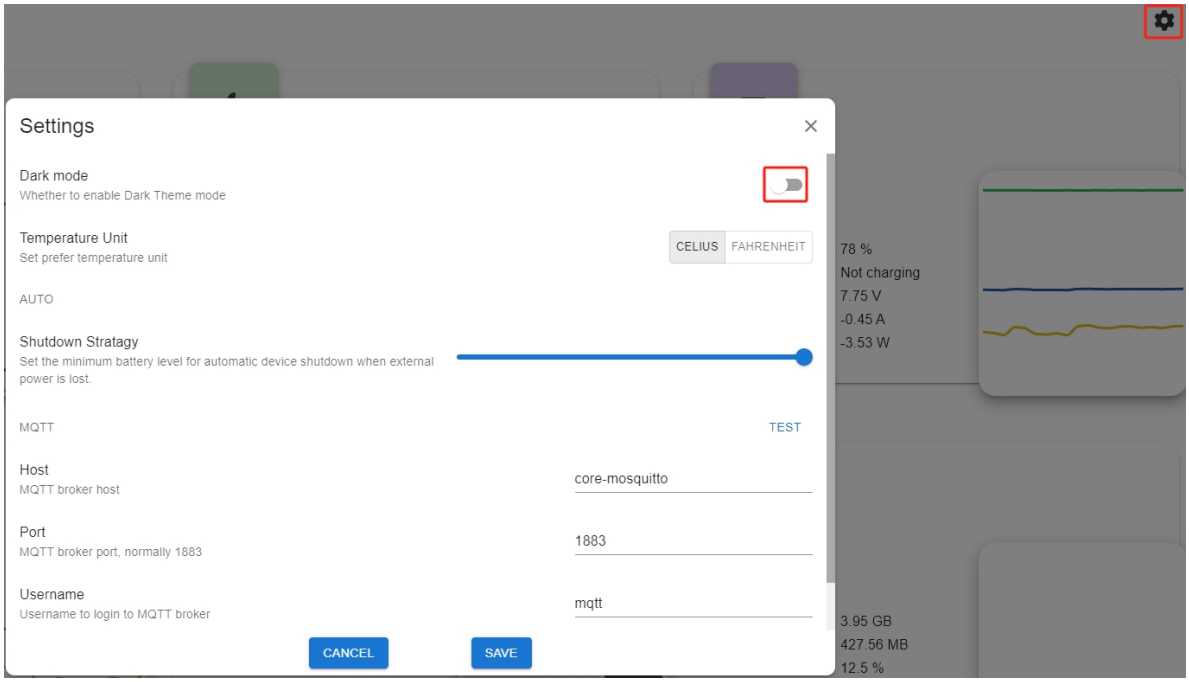
– **Processor**: Illustrates the Raspberry Pi's CPU performance, including the status of its four cores, operating frequencies, and CPU usage percentage.



– **Network**: Displays the current network connection type, upload, and download speeds.



- You can also switch this page to a white mode.



5.3 3. Modify Configuration from Terminal

You can also view data related to the battery, fan, etc., from the Terminal.

1. The spc program runs in a python3 virtual environment. Use the following command to enter the virtual environment:

```
source /opt/spc/venv/bin/activate
```

2. Once entered, use the following command to view the available instructions.

```
spc -h
```

```
usage: spc [-h] [-m] [-a] [-f [speed percentage]] [-F [{auto,quiet,normal,
↪performance}]] [-b] [-e] [-o] [-p] [-c] [-j]
       [-st [battery percentage]]

options:
  -h, --help            show this help message and exit
  -m, --monitor         open a monitor
  -a, --all             print all the data of spc
  -f [speed percentage], --fan [speed percentage]
                        get/set the speed of fan
  -F [{auto,quiet,normal,performance}], --fan-mode [{auto,quiet,normal,
↪performance}]
                        get/set the mode of fan
  -b, --battery         battery voltage, current, percentage
  -e, --external_input  external input
  -o, --raspberry_pi_power
                        raspberry pi voltage, current
  -p, --powered         power source
  -c, --charge          is charging
  -j, --json            output json format
  -st [battery percentage], --shutdown-strategy [battery percentage]
                        get/set battery percentage for Shutdown Strategy
```

   - For most commands, simply use `spc -x` to print the relevant data. For example, you can use the following command to get the battery voltage, current, and percentage.

```
spc -b
```

   - For `-f`, `-F`, `-st`, you can use them without parameters to get the current data. For example, use the command below to get the current fan speed.

```
spc -f
```

   - You can also use them with parameters to set values.

```
spc -f 40
```

3. View log files.

   - First, enter the log directory.

```
cd /opt/spc/log
```

- To see what log files are available, use the `ls` command.

```
config.log  ha_api.log  spc.log  system_status.log
```

- To view the contents of a log file, such as `spc.log`, use the `cat` command.

```
cat spc.log
```

4. To view the logs generated by systemctl, press `Q` to exit the current page.

```
sudo systemctl status spc.service
```

- `spc.service` includes software shutdown, fan control, dashboard, and MQTT functionality. If the program isn't running properly, you can try restarting `spc.service`.

```
sudo systemctl restart spc.service
```

CHAPTER

SIX

6. ABOUT HARDWARE

This chapter is a detailed description of all the components in Pironman U1, as well as the associated software configuration.

6.1 Features

Functions

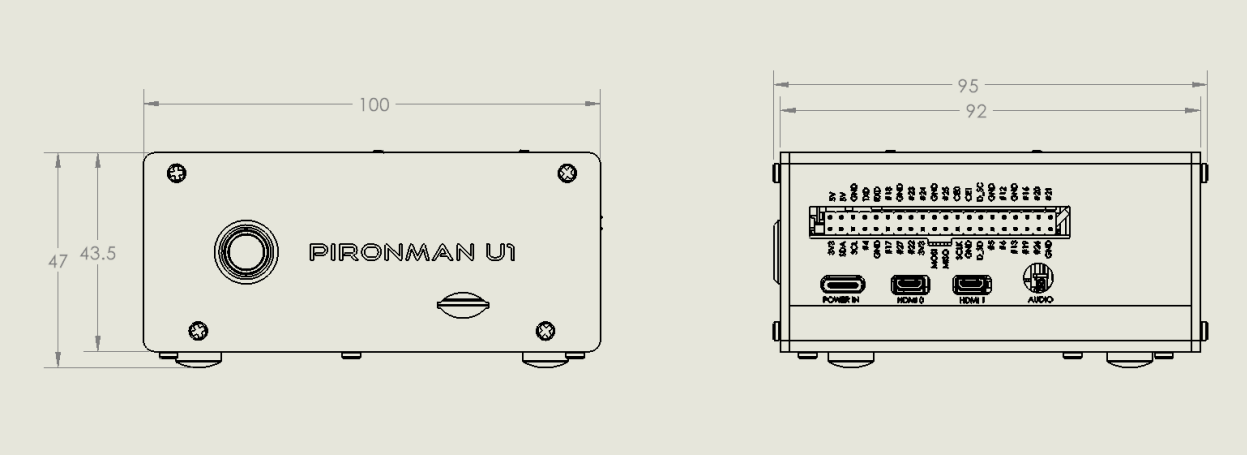
- Raspberry Pi 5/4 Model B UPS Case
- Hardware power path switching to ensure power supply to the Raspberry Pi
- Equipped with 3 current sensors to measure: USB input current, Raspberry Pi current, and battery charge/discharge current.
- Intelligent adjustment of charging current
- I2C communication to read battery voltage, current, and other information
- PCIe 3.0 x1 M.2 M key 2230, 2242, 2260, 2280 for NVMe SSD
- IR Receiver for multimedia centers like Kodi or Volumio
- Comes with a fan controlled by Raspberry Pi via I2C to MCU
- Retro metal power button with indicator light for safe shutdown
- Extend the 40-pin GPIO outward with pin name label, for easy access
- Direct Access to Raspberry Pi's microSD Card Slot
- Aluminum main body with a black Acrylic side panel

Parameters

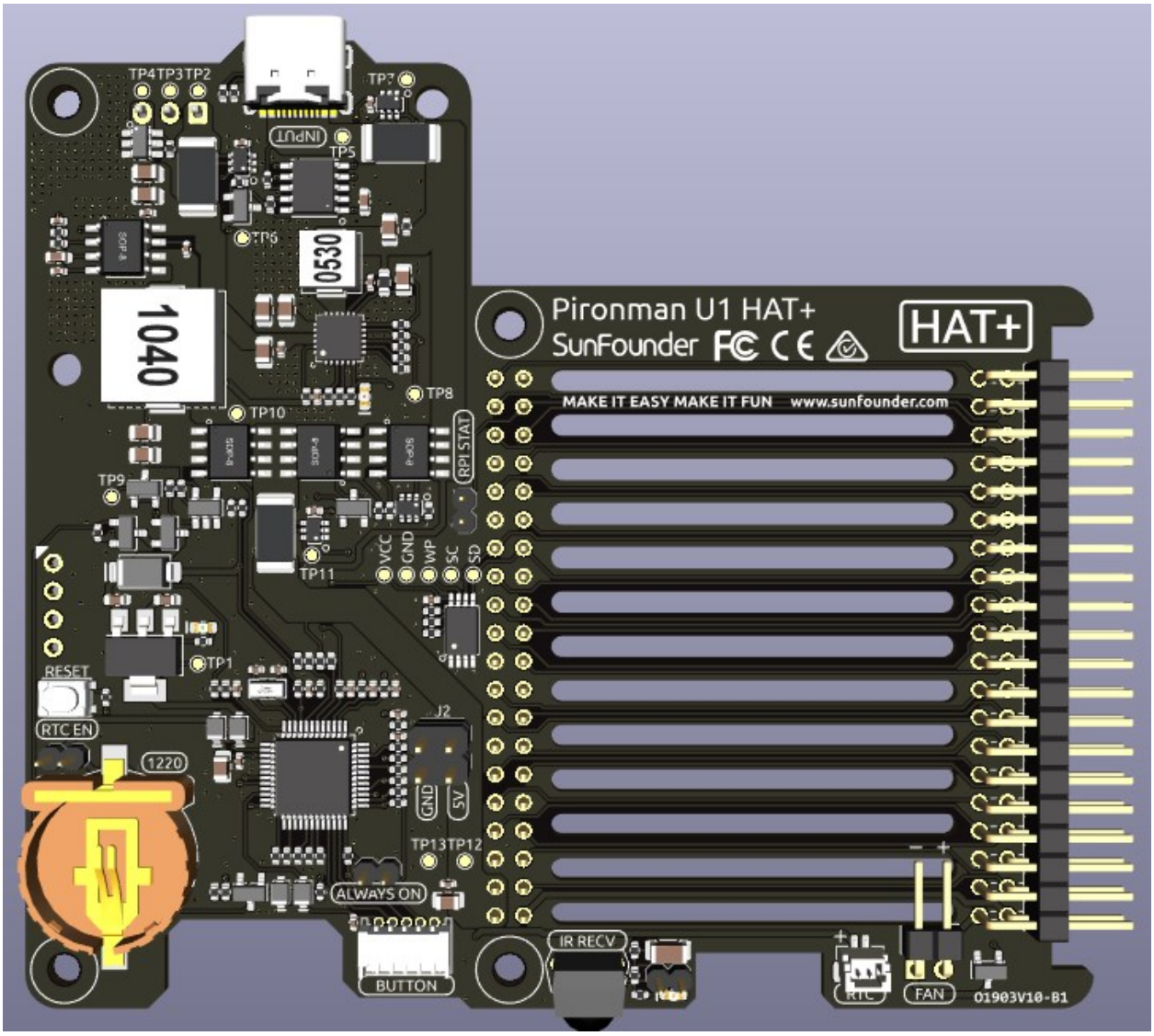
- Dimension: 100x95x47mm
- **Material**
  - Main body: aluminum alloy
  - Two side panel: acrylic
- Support Platform: Raspberry Pi 5B/4B
- Power Input: USB Type C input, 5V/5A, supports PD protocol. It is recommended to use the official 27W power supply of Raspberry Pi or other Pi5 dedicated USB PD protocol 5V/5A power sources.
- Power supply to Raspberry Pi: 5V/5.5A
- Charging Power: 7.4V/1A

- **Interfaces**
  - Raspberry Pi standard 40-Pin GPIO
  - micro SD
  - USB Type C power input
  - 2 x USB 2.0
  - 2 x USB 3.0
  - Gigabit LAN port
  - 2 x 4Kp60 HDMI Type A
- 1 x Fan: 40x40x10mm
- 38KHz IR Receiver
- PCIe 3.0 x1 M.2 M key 2230, 2242, 2260, 2280 for NVMe SSD
- A CR1220 non-rechargeable battery for RTC
- RGB LED Metal Power Button

Dimensional Drawing



6.2 Main Board



6.2.1 Power Supply

Power Input

USB Type C input, 5V/5A, PD protocol. It's recommended to use the official 27W power supply of Raspberry Pi or other Pi5 dedicated USB PD protocol 5V/5A power sources.

Battery

Equipped with a custom battery pack made by SunFounder, consisting of two 18650 batteries with a capacity of 2000mAh. The connector is XH2.54, 3P, which can be directly charged after being inserted into the board.

The battery includes a built-in protection circuit, with an over-discharge protection voltage of 2.6V and an over-charge protection voltage of 4.2V.

Power Path

The Pironman U1 features an integrated power path function, which can automatically switch power paths to reduce battery wear and ensure uninterrupted power supply to the Raspberry Pi.

- When an external USB power source is connected, it directly supplies power to the Raspberry Pi and can also charge the battery if needed.
- If external power is lost, the system automatically switches to battery power, ensuring uninterrupted operation.
- If external power voltage drops below 4.72V, the system automatically switches to battery power to prevent low voltage issues in the Raspberry Pi.

Advantage: Normally powered by an external USB power source, extending the lithium battery's lifespan. In critical moments, it timely switches to battery power to ensure the safety of the Raspberry Pi.

Charging Current

Capable of intelligently adjusting the charging current. When the input current from the external USB power source is sufficient, the charging current for the battery is increased, up to a maximum of 7.4V/1A. When the Raspberry Pi requires more current, or the input current is insufficient, the charging current is automatically reduced.

Overcharge Protection

Charging ends when the total battery voltage reaches 8.4V. Charging resumes when the battery voltage drops below 8V.

Charge Balancing

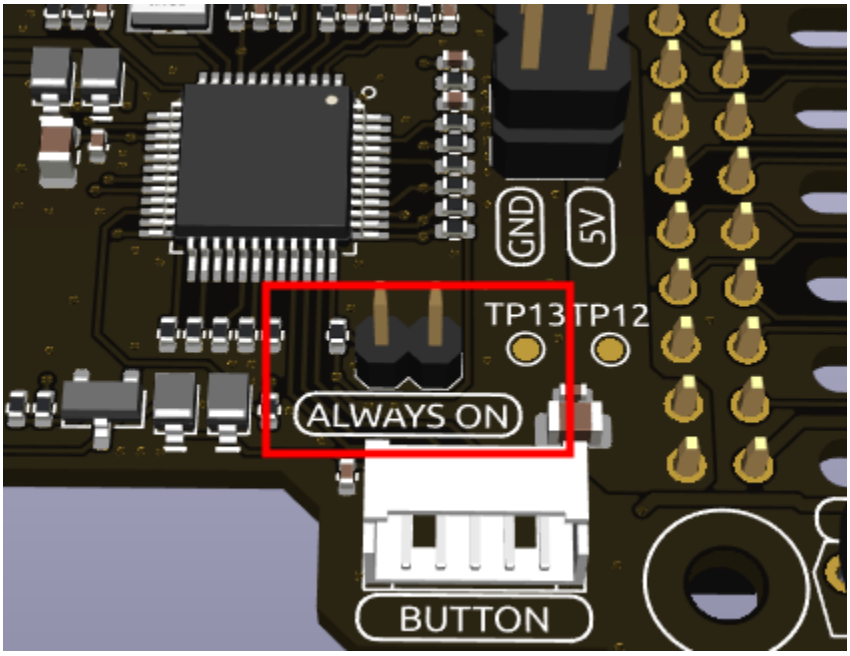
During charging, the voltage of each of the two batteries is continuously monitored. If the voltage of any one battery reaches the balance initiation voltage of 4.1V, the corresponding balance MOS is activated to reduce the charging current of that battery.

Balance is turned off under the following conditions:

- The voltage of both batteries exceeds the balance initiation voltage of 4.1V.
- Exiting normal charging state (input overvoltage, battery full, etc.).

6.2.2 Power-On Startup

The module supports power-on startup, initiating as soon as the external power source is plugged in. To disable automatic power-on, remove the **ALWAYS ON** jumper cap. This requires manually pressing the power button to start the Raspberry Pi, even when an external power source is connected or after a power outage.



6.2.3 Raspberry Pi Status Monitoring

To turn off the Pironman U1, you need to press and hold the power button for 2 seconds until the button light turns purple, then release.

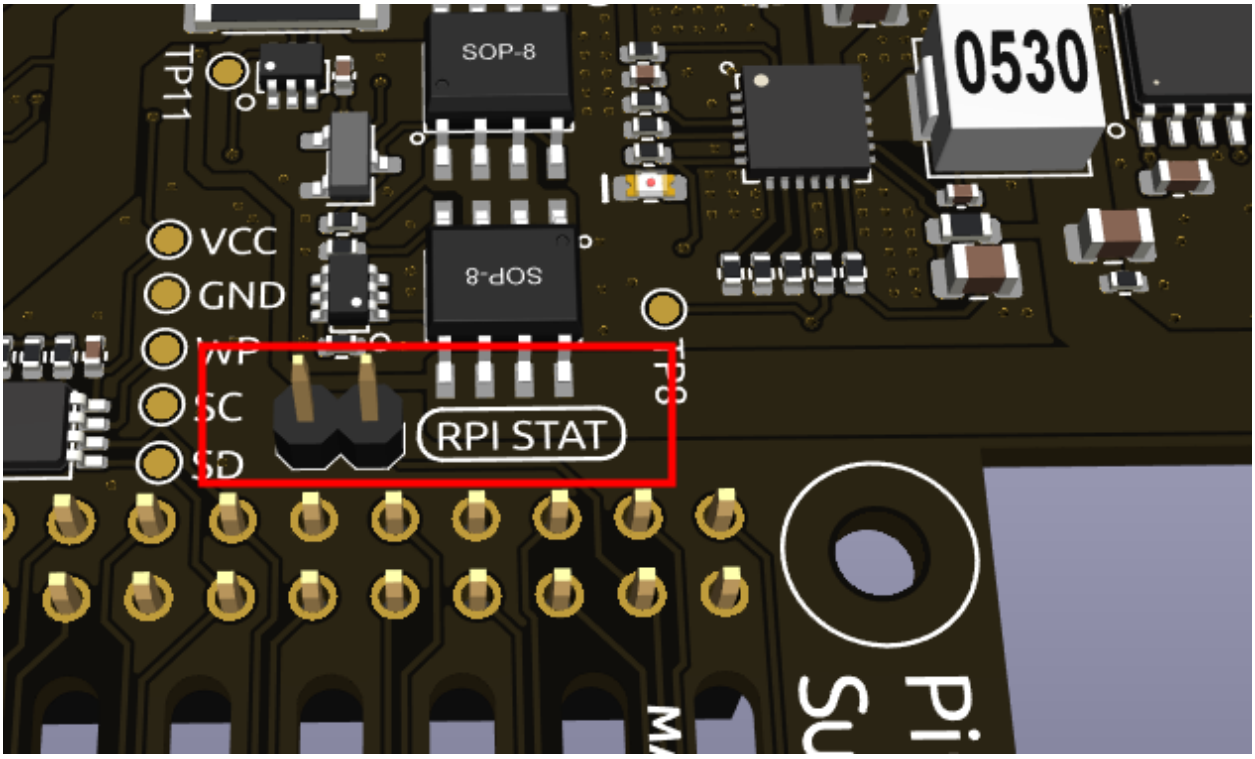
At this point, Pironman U1 will send a shutdown signal to the Raspberry Pi via I2C. If you have followed the *1. Download and Install SPC*, the Raspberry Pi will then proceed with a safe shutdown.

After shutdown, the configured Raspberry Pi shutdown signal pin, GPIO26, will go low. Once the main board detects this low signal, it cuts off the power to the Raspberry Pi.

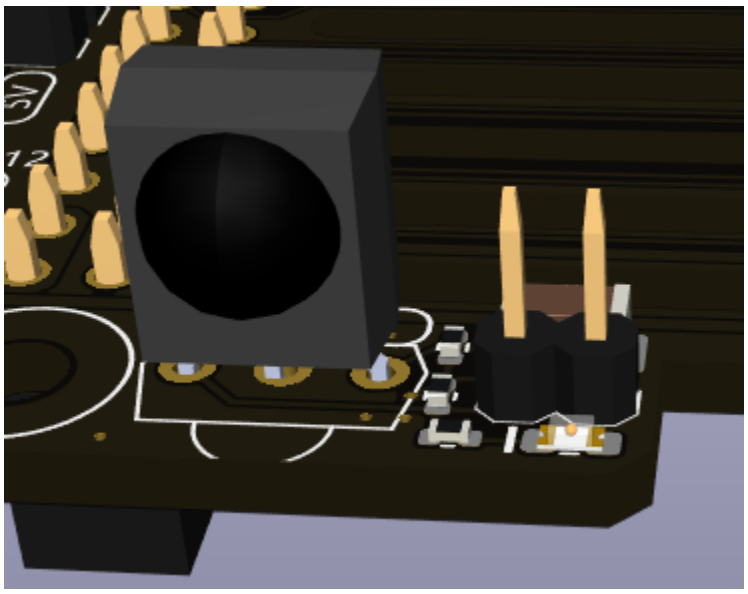
In the `spc` program, the shutdown signal pin is set by adding the following line to the Raspberry Pi's `/boot/config.txt` file.

```
dtoverlay=gpio-poweroff,gpio_pin=26,active_low=0
```

The **RPI STAT** jumper cap connects the microcontroller's shutdown signal with the Raspberry Pi's GPIO26. You can also remove this jumper cap to free up GPIO26. However, doing so means you won't be able to perform a safe shutdown of the Raspberry Pi.



6.2.4 Infrared Receiver



- **Model**: IRM-56384, operating at 38KHz.
- Two pins for enabling the infrared function. By default, a jumper cap is inserted for immediate functionality. Remove the cap to free GPIO13 if the IR receiver is not in use.
- An infrared reception indicator that blinks upon signal detection.

To utilize the IR receiver, verify its connection and install the necessary module:

- Test the connection:

```
sudo ls /dev |grep lirc
```

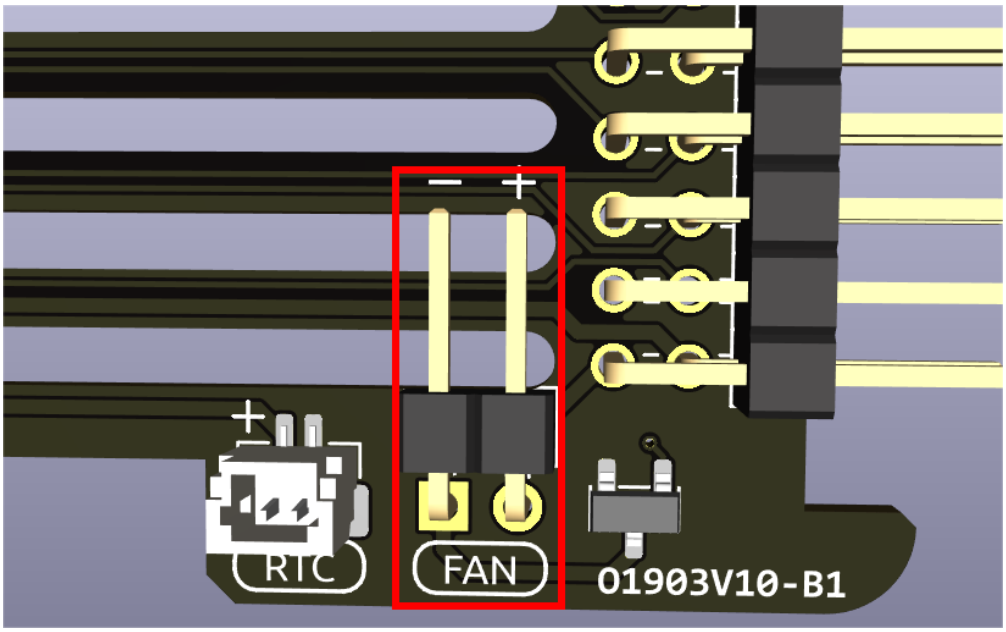
- Install the `lirc` module:

```
sudo apt-get install lirc -y
```

- Now, test the IR Receiver by running the following command. After running the command, press a button on the remote control, and the code of that button will be printed.

```
mode2 -d /dev/lirc0
```

6.2.5 Fans Pin



Fan Pin, for connecting a 4010 fan.

- You can set the fan's operation mode via command: `auto`, `quiet`, `normal`, `performance`.

```
spc -F auto
```

- Alternatively, you can directly set the fan speed, ranging from 0% to 100%.

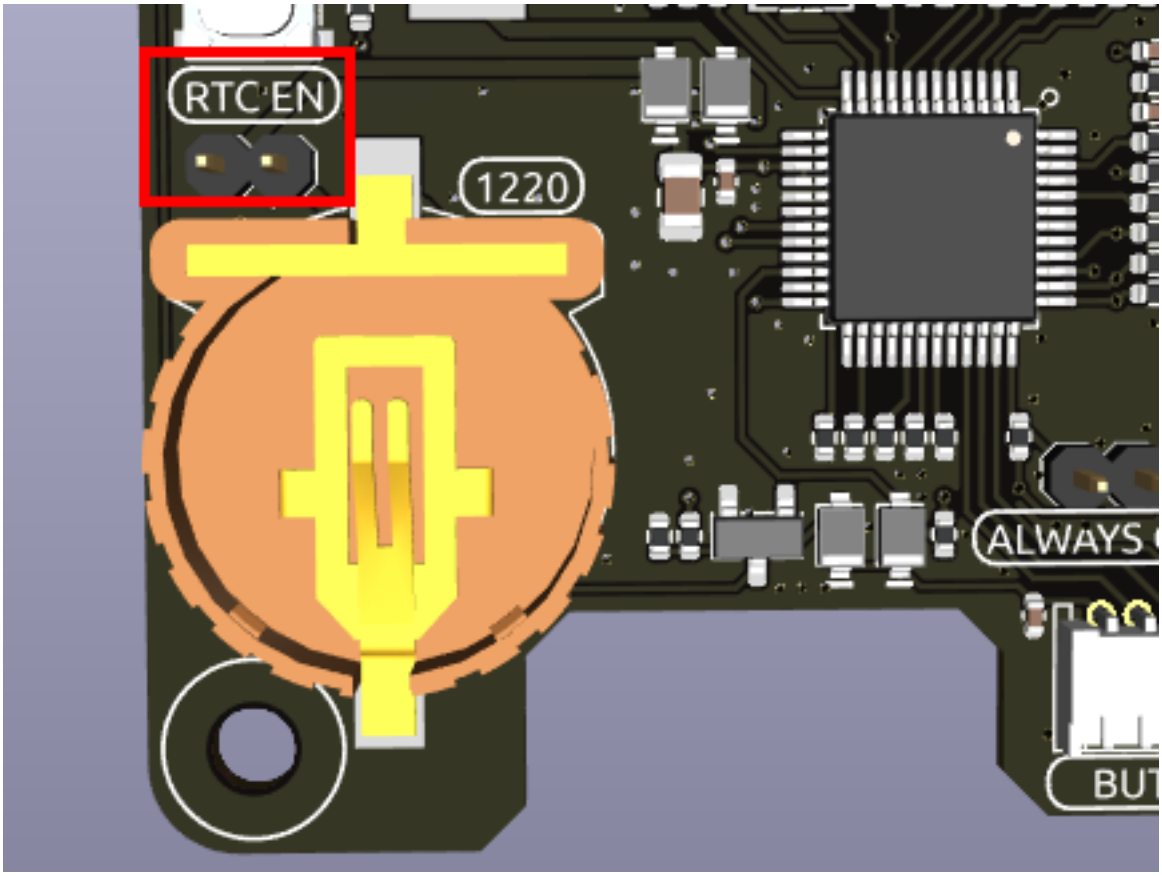
```
spc -f 40
```

- You can use them without parameters to get the current data. For example, use the command below to get the current fan speed.

```
spc -f
```

6.2.6 RTC Function

The onboard microcontroller supports the RTC (Real-Time Clock) function. Install a button cell battery in the onboard 1220 battery holder, and connect the **jumper cap (RTCEN)** on the battery holder (by default, it is connected) to use the microcontroller's RTC function.



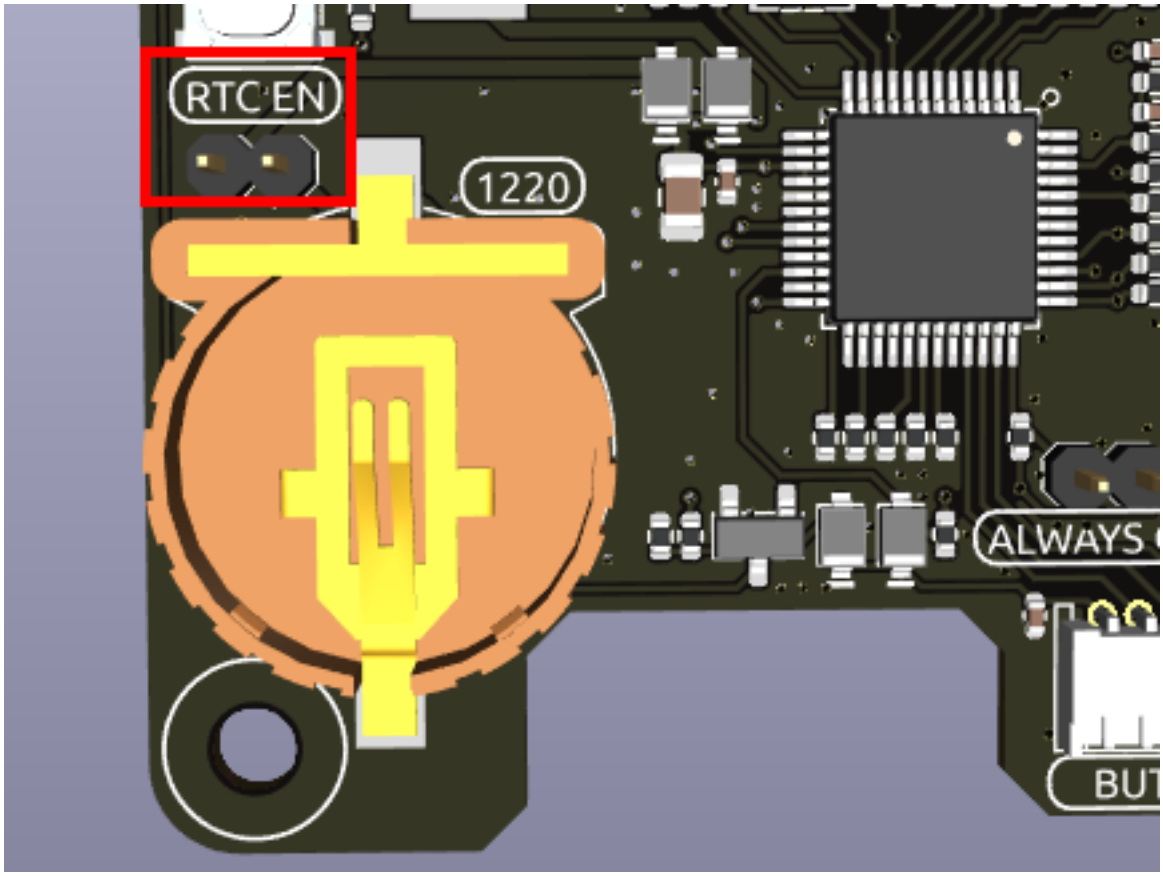
For Raspberry Pi 4

When the Pironman U1 is powered off or shut down, the microcontroller is powered by the button cell battery, recording the time, with a standby current of about 2uA. The board does not support charging the RTC battery, so there is no need to use a rechargeable battery. The **CR1220 non-rechargeable** battery provided in the kit is recommended.

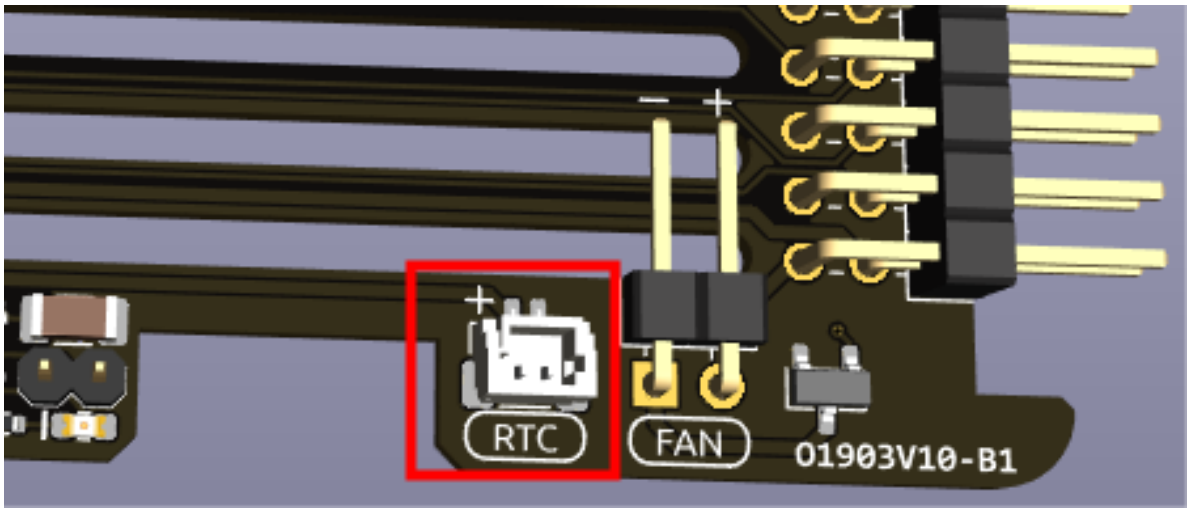
If you have followed the *1. Download and Install SPC* instructions, the Raspberry Pi will automatically synchronize with the RTC time upon booting.

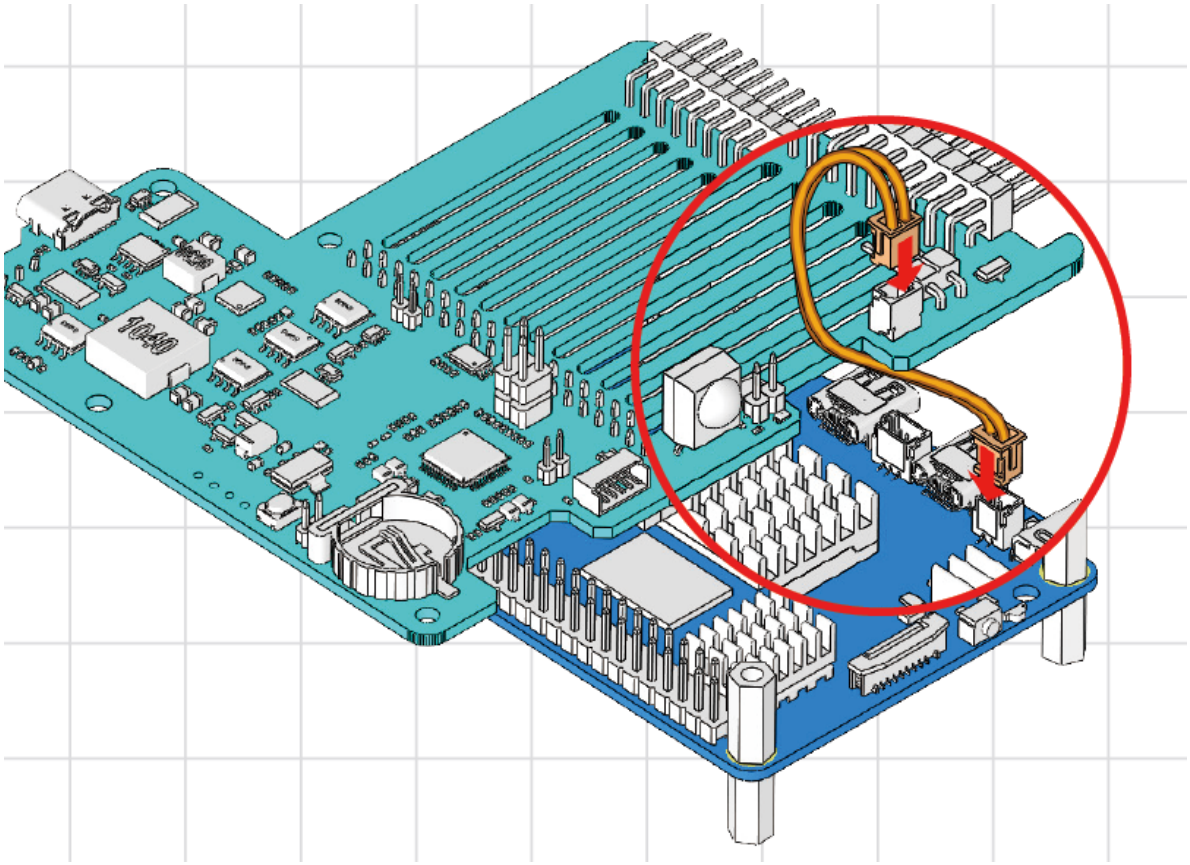
For Raspberry Pi 5

- Since the Raspberry Pi 5 itself supports RTC functionality, you can choose to remove the **RTCEN** jumper cap to disconnect the battery from the microcontroller.



- And use a SH1.0 2Pin reverse cable to connect the **RTC** socket to the Raspberry Pi's **BAT** power socket. This way, the onboard RTC battery is completely disconnected from the board and only serves as a battery holder.





Enable Trickle Charging

- The Raspberry Pi 5 supports charging the RTC battery. By default, the trickle charging feature for the battery is disabled. The `sysfs` files indicate the current trickle charging voltage and limits:

> **Warning:**
>
> – A **rechargeable ML1220** battery can be used here.
>
> – If you are using the **CR1220 non-rechargeable** battery provided in the kit, make sure not to enable the Trickle Charging feature.

```
pi@raspberrypi:~ $ cat /sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_
↪voltage
0
pi@raspberrypi:~ $ cat /sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_
↪voltage_max
4400000
pi@raspberrypi:~ $ cat /sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_
↪voltage_min
1300000
```

- To enable trickle charging, add `rtc_bbat_vchg` to `/boot/firmware/config.txt`.
  - Open the `/boot/firmware/config.txt`.

```
sudo nano /boot/firmware/config.txt
```

- Add `rtc_bbat_vchg` to `/boot/firmware/config.txt`.

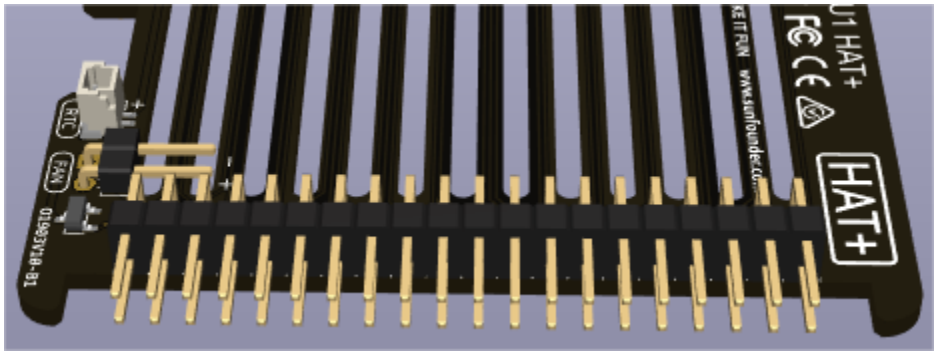
```
dtparam=rtc_bbat_vchg=3000000
```

- After rebooting, the system will display:

```
pi@raspberrypi:~ $ cat /sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_
↪voltage
3000000
pi@raspberrypi:~ $ cat /sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_
↪voltage_max
4400000
pi@raspberrypi:~ $ cat /sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_
↪voltage_min
1300000
```

This confirms the battery is now under trickle charging. To disable this feature, simply remove the `dtparam` line from `config.txt`.

6.2.7 Pin Headers

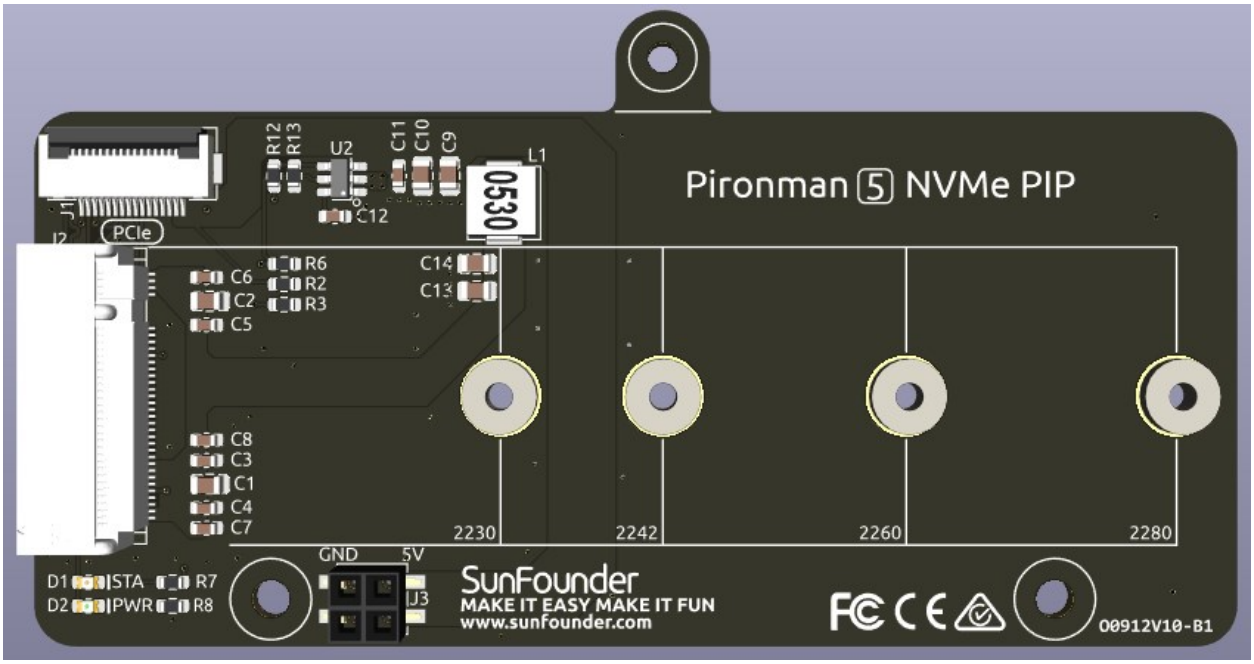


The Pironman U1 extends the GPIO of the Raspberry Pi, but note that the Pironman U1 utilizes some of these pins. You can choose to disable certain features according to your needs to free up these pins.

Pironman U1	Raspberry Pi
IR Receiver(Optional)	GPIO16(Optional)
I2C SDA	SDA
I2C SCL	SCL
Soft Shutdown Status Monitoring	GPIO26(Optional)

6.3 Pi5 NVMe PIP

The Pi5 NVMe PIP (PCIe Peripheral Board), as defined by the Raspberry Pi Foundation, is a PCIe adapter board designed specifically for NVMe solid-state drives. It supports four different sizes of NVMe SSDs: 2230, 2242, 2260, and 2280, all fitting into an M.2 M key slot.



- The board connects through a 16P 0.5mm reverse FFC (Flexible Flat Cable) or a custom impedance-matched FPC (Flexible Printed Circuit) cable.
- **STA**: A Status LED indicator.
- **PWR**: A Power LED indicator.
- The onboard 3.3V power supply can support up to 3A output. However, since the Raspberry Pi PCIe interface is limited to providing 1A output (equivalent to 5W), additional power for 3.3V/3A usage can be supplied through the J3 connector from a 5V source.

6.3.1 Configure PCIe

Enabling PCIe

By default the PCIe connector is not enabled.

- To enable it you should open the `/boot/firmware/config.txt` file.

```
sudo nano /boot/firmware/config.txt
```

- Then add the following line to the file.

```
# Enable the PCIe External connector.
dtparam=pciex1
```

- A more memorable alias for `pciex1` exists, so you can alternatively add `dtparam=nvme` to the `/boot/firmware/config.txt` file.

```
dtparam=nvme
```

Note: Enumeration of PCIe devices behind a switch is not currently supported.

PCIe Gen 3.0

- The connection is certified for Gen 2.0 speeds (5 GT/sec), but you can force it to Gen 3.0 (10 GT/sec) if you add the following lines to your `/boot/firmware/config.txt`.

```
# Force Gen 3.0 speeds
dtparam=pciex1_gen=3
```

Warning: The Raspberry Pi 5 is not certified for Gen 3.0 speeds, and connections to PCIe devices at these speeds may be unstable.

- You should then reboot your Raspberry Pi for these settings to take effect.

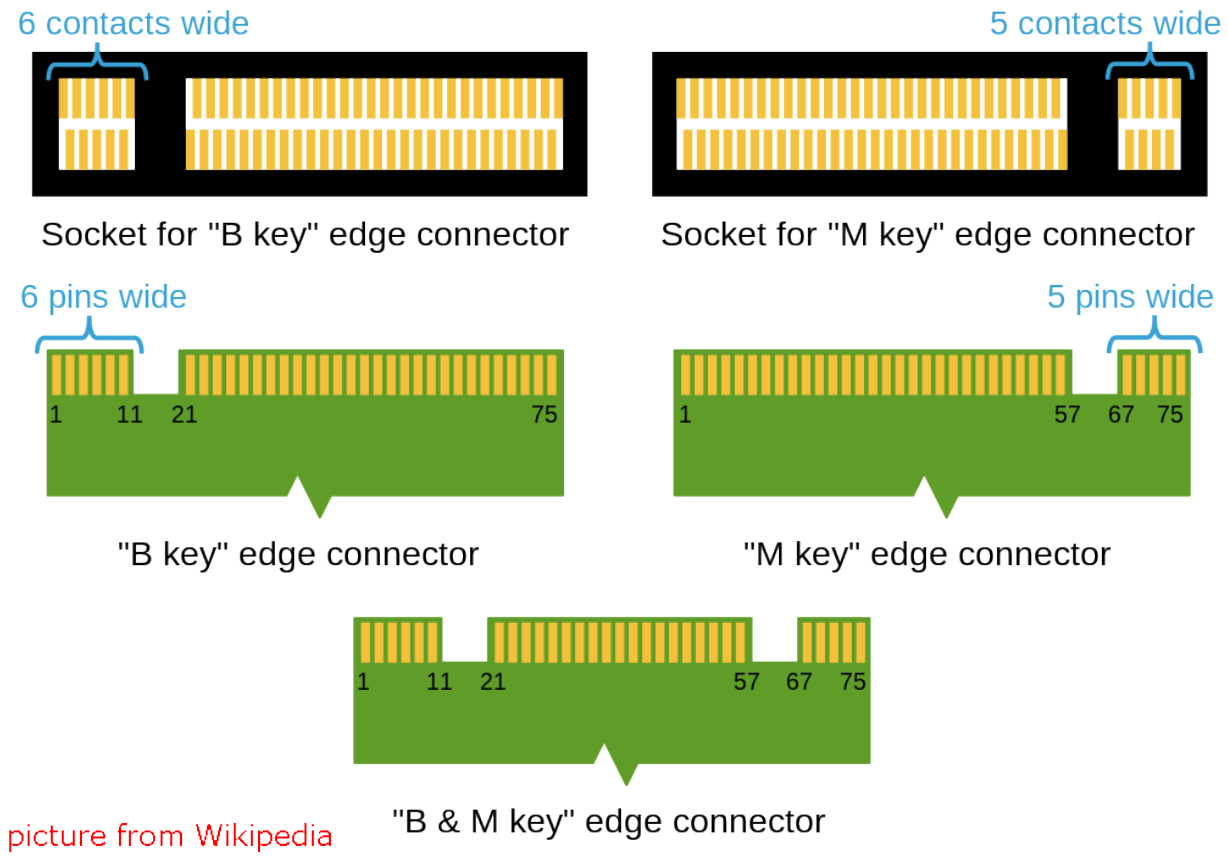
```
sudo reboot
```

6.3.2 About the Model

M.2 SSDs, known for their compact size, come in various types mainly differentiated by their keying (notch design on the connector) and the interface they use. Here are the primary types:

- **M.2 SATA SSDs**: These use the SATA interface, similar to 2.5-inch SATA SSDs but in the smaller M.2 form factor. They are limited by the SATA III maximum speeds of around 600 MB/s. These SSDs are compatible with M.2 slots keyed for B and M keys.
- **M.2 NVMe SSDs**: These SSDs use the NVMe protocol over PCIe lanes and are significantly faster than M.2 SATA SSDs. They are suitable for applications requiring high read/write speeds like gaming, video editing, and data-intensive tasks. These SSDs typically require M-keyed slots. These drives utilize the PCIe (Peripheral Component Interconnect Express) interface, with different versions like 3.0, 4.0, and 5.0. Each new version of PCIe effectively doubles the data transfer speed of its predecessor. However, the Raspberry Pi 5 uses a PCIe 3.0 interface, capable of delivering transfer speeds up to 3,500 MB/s.

M.2 SSDs come in three key types: B key, M key, and B+M key. However, later on, the B+M key was introduced, combining the functionalities of the B key and M key. As a result, it replaced the standalone B key. Please refer to the image below.

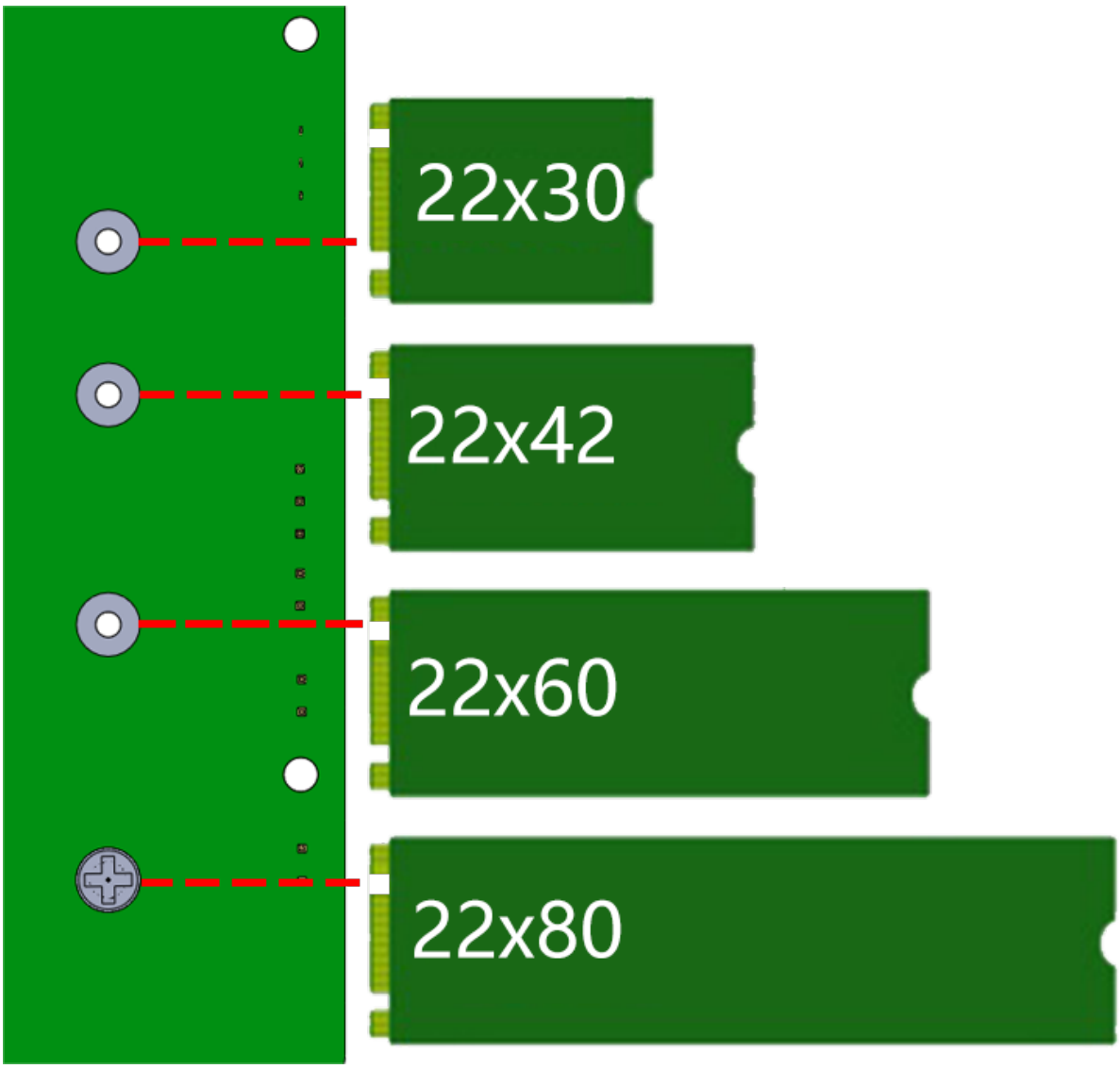


In general, M.2 SATA SSDs are B+M-keyed (can fit in sockets for B-keyed and M-keyed modules), while M.2 NVMe SSDs for PCIe 3.0 x4 lane are M-keyed.

6.3.3 About the Length

M.2 modules come in different sizes and can also be utilized for Wi-Fi, WWAN, Bluetooth, GPS, and NFC.

Pironman 5 supports four (PCIE2.0 / PCIE 3.0) NVME M.2 SSD sizes based on their names: 2230, 2242, 2260, and 2280. The “22” is the width in millimeters (mm), and the two following numbers are the length. The longer the drive, the more NAND flash chips can be mounted; therefore, the more capacity.



6.3.4 Booting from the SSD

After you install the SSD into the Pironman 5 and reboot, an NVMe disk connected through the PCIe should be visible. If you want to boot your Raspberry Pi from the SSD, you need to do some configurations and install an operating system on the SSD.

1. Configure boot from the SSD

- To enable boot support, you need to change the `BOOT_ORDER` in the bootloader configuration. Edit the EEPROM configuration by:

```
sudo rpi-eeprom-config --edit
```

- Then, change the `BOOT_ORDER` line to be as below.

```
BOOT_ORDER=0xf416
```

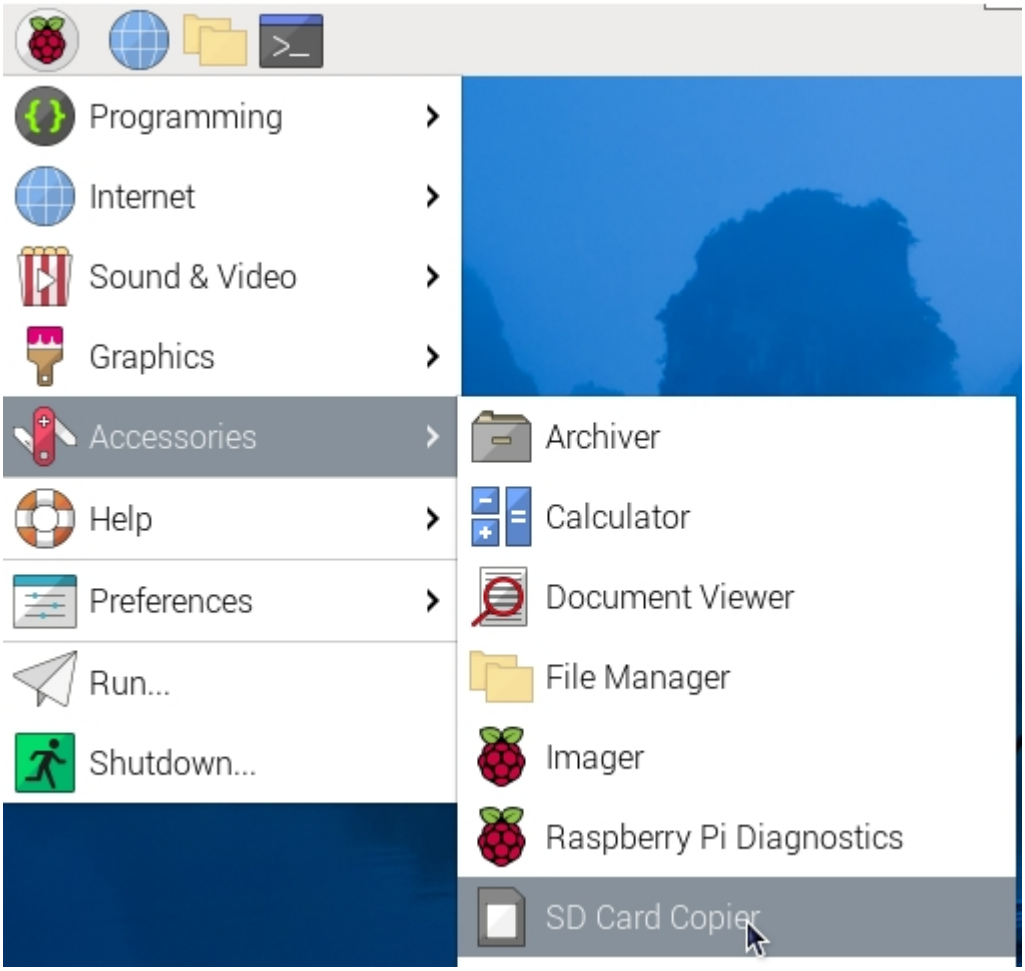
2. Install an Operating System on the SSD

There are two ways to install an operating system on the SSD:

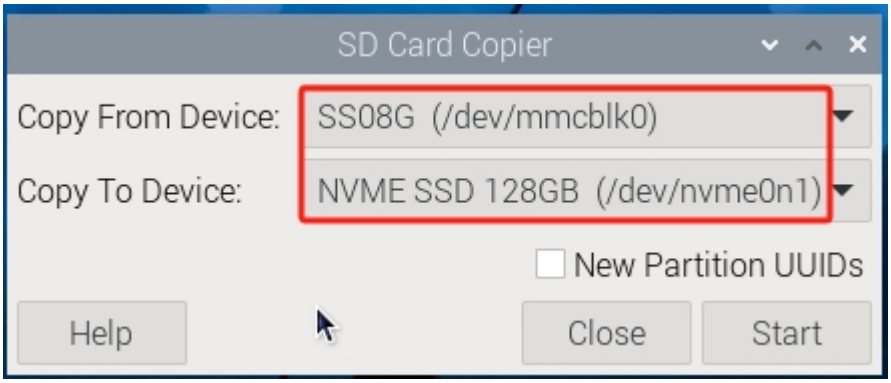
- **Copy the system from the Micro SD to the SSD**: This method is simpler, and your previous configurations can also be directly copied.
- **Install via Raspberry Pi Imager**: If your Raspberry Pi uses a desktop version of the operating system, you can use an imaging tool (like Raspberry Pi Imager) to burn the system to the SSD. This example uses Raspberry Pi OS bookworm, but other systems might require installing the imaging tool first. However, this method requires you to reinstall the prionman module, and other configurations need to be redone as well.

Copying the System from the Micro SD Card to the SSD

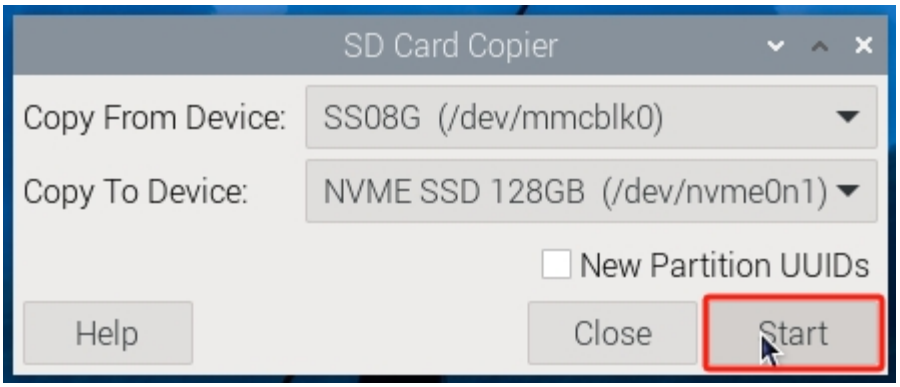
1. Connect a display or *Access the Raspberry Pi desktop through VNC Viewer*. Then click **Raspberry Pi logo** -> **Accessories** -> **SD Card Copier**.



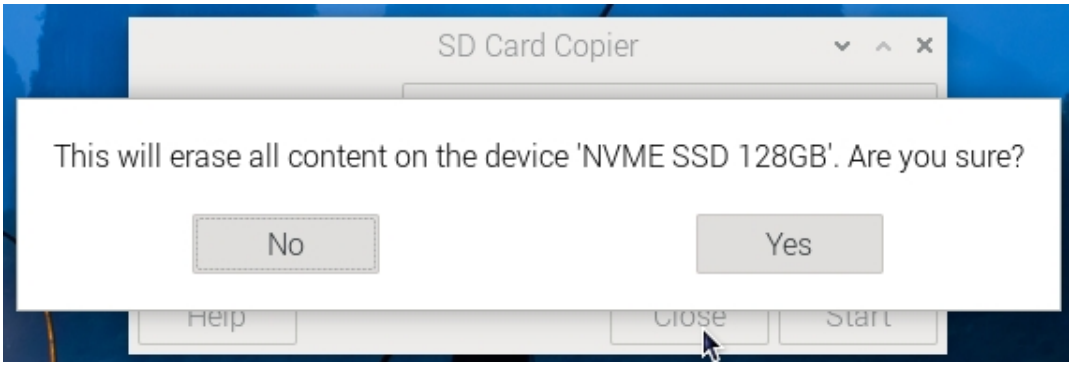
2. Make sure to select the correct **Copy From** and **Copy To** devices. Be careful not to mix them up.



3. After selection, click **Start**.



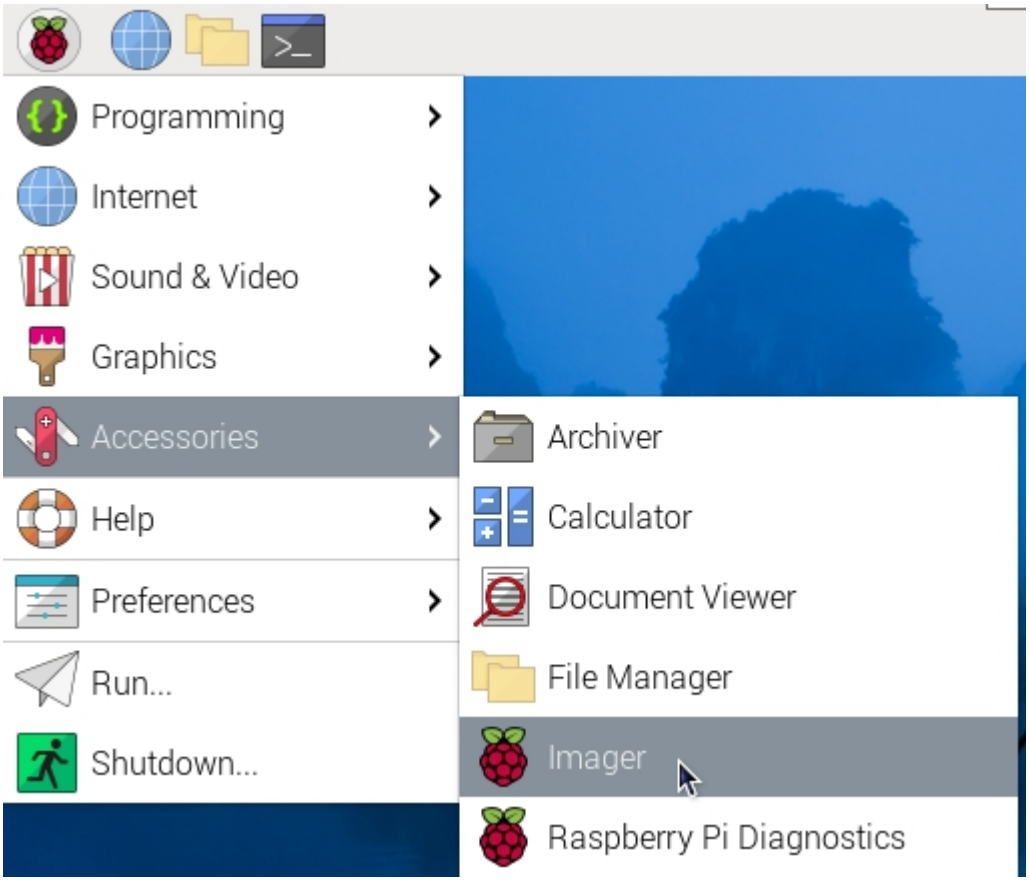
4. You will be prompted that the content on the SSD will be erased. Make sure to back up your data before clicking Yes.



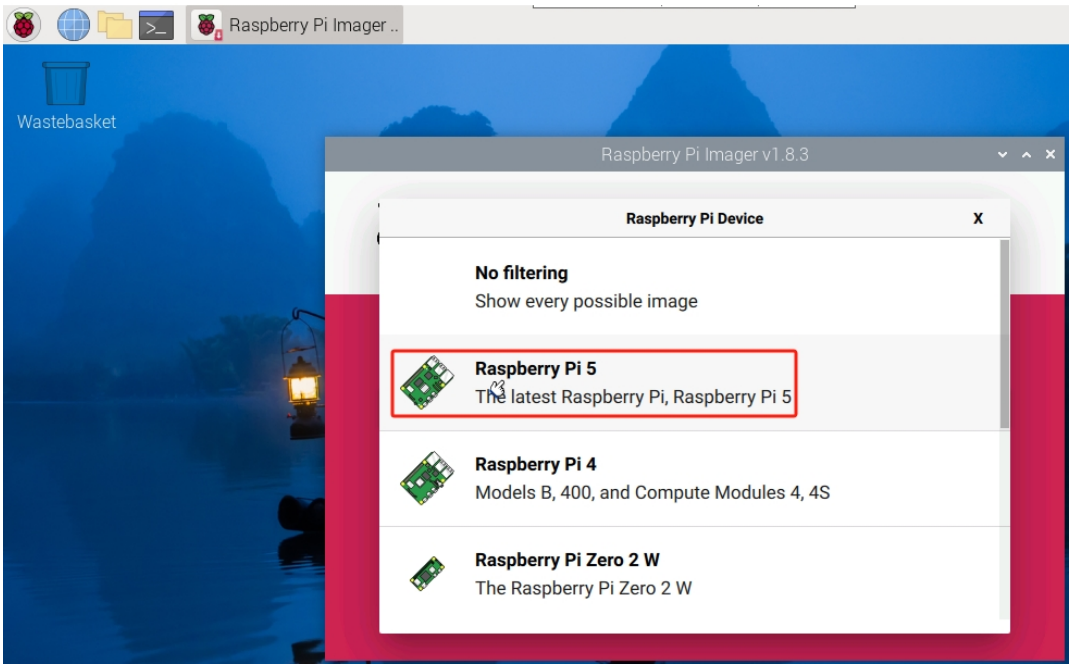
5. Wait for some time, and the copying will be completed.

Installing the System with Raspberry Pi Imager

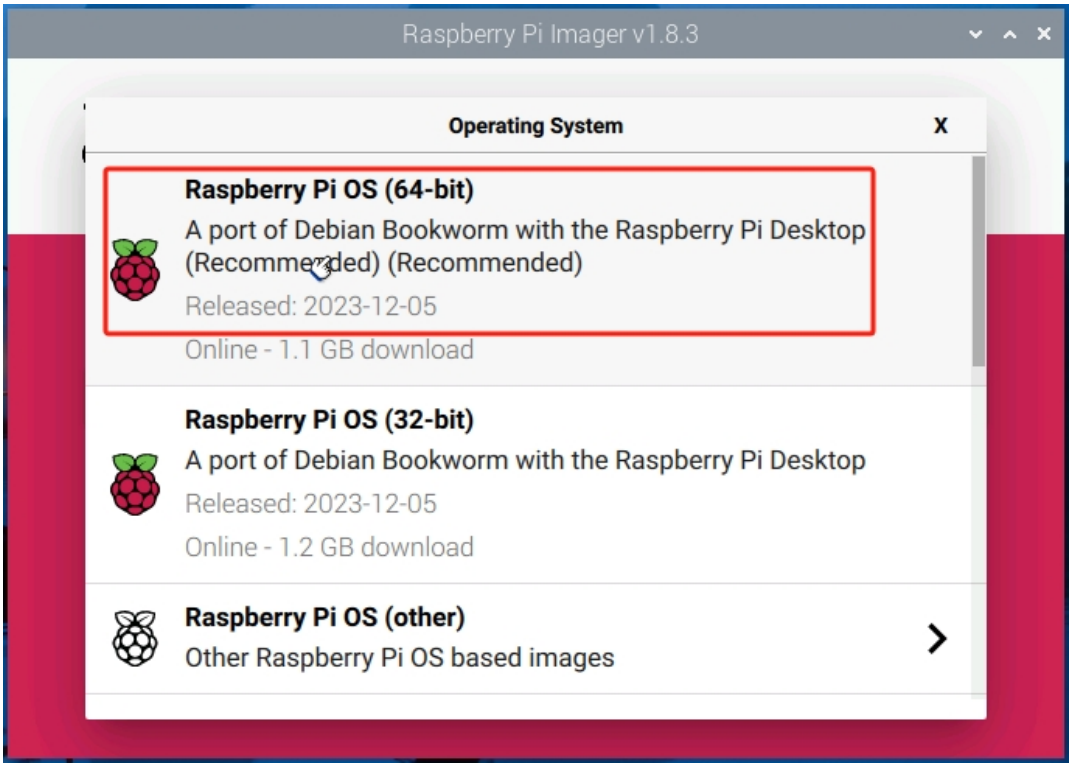
1. If your MicroSD card has a desktop version of the system installed, you can use an imaging tool (like Raspberry Pi Imager) to burn the system to the SSD. This example uses Raspberry Pi OS bookworm, but other systems might require installing the imaging tool first.



2. Select Pi 5.



3. Choose an operating system.



4. Select the NVMe SSD card.
5. After configuration, click Yes.

3. Restart Pironman 5

After restarting the Raspberry Pi, it will boot from the SSD.

```
sudo reboot
```

Note: If you are using the **Raspberry Pi Imager** to install the system on the SSD, you will need to reconfigure the setup after the Raspberry Pi boots up by following the steps to *5. Quick User Guide*.

6.4 18650 Battery

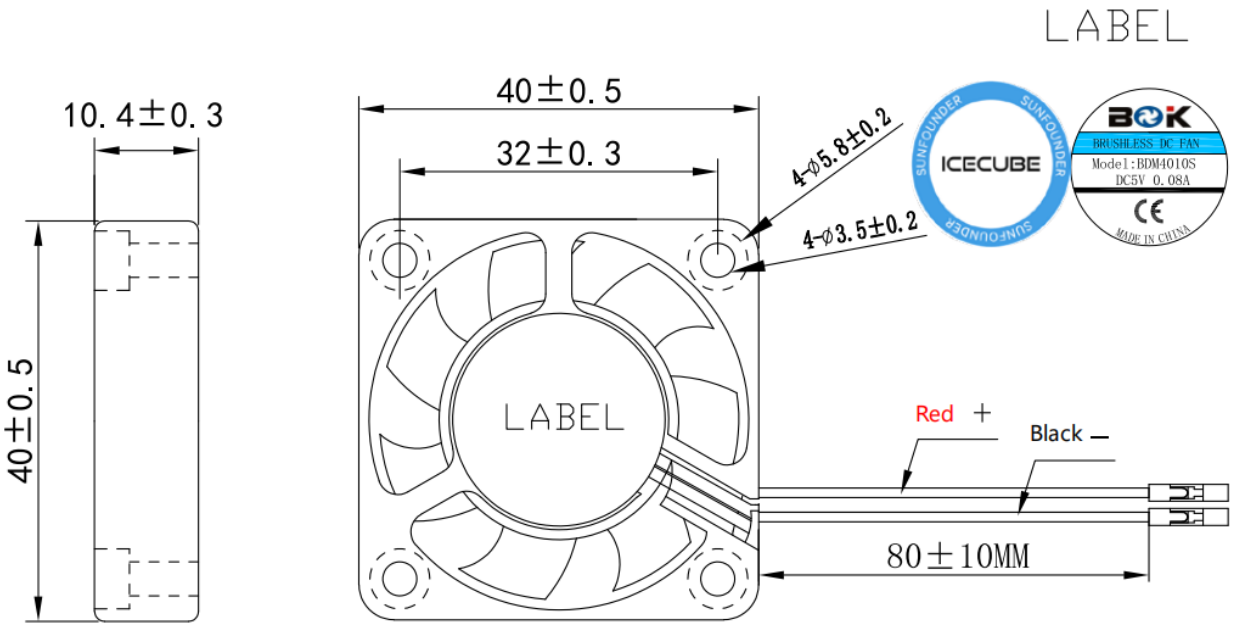
- **VCC**: Battery positive terminal, here there are two sets of VCC and GND is to increase the current and reduce the resistance.
- **Middle**: To balance the voltage between the two cells and thus protect the battery.
- **GND**: Negative battery terminal.

This is a custom battery pack made by SunFounder consisting of two 18650 batteries with a capacity of 2000mAh. The connector is XH2.54, 3P, which can be charged directly after being inserted into the board.

Features

- Battery charge: 5V/2A
- Battery output: 5V/5A
- Battery capacity: 3.7V 2000mAh x 2
- Battery life: 90min
- Battery charge time: 130min
- Connector: XH2.54, 3P
- Over-discharge protection: 2.6V
- Overcharge protection: 4.2V

6.5 Fan



- **Extermal dimension**: 40*40*10MM
- **Weight**: 13.5±5g/pcs
- **Life**: 40,000 hours (room temperature 25°C)
- **Maximum Air Flow**: 2.46CFM
- **Max.Air Pressure**: 0.62mm-H2O
- **Accoustic Sound**: 22.31dBA
- **Rated Input power**: 5V/0.1A
- **Rated Speed**: 3500±10%RPM
- **Operating Temperature**: -10℃~+70℃
- **Storage Temperature**: -30℃~+85℃

6.6 Power Button

Button Operations

- **Power On**: Press the button until the light turns green, indicating the system is powering on. You can then release the button.
- **Shutdown**: After powering on, press and hold the button for 2 seconds until the light turns purple, then release. When the power button's light begins to flash purple, the Raspberry Pi will receive a shutdown signal and proceed to shut down. After the shutdown is complete, the Pironman U1 will turn off. If the **RTCEN** is connected, the Pironman U1 will enter RTC standby mode. If not connected, the Pironman U1 will power off completely. The power button's light will turn off once the shutdown process is complete.

- **Power Cut**: If you haven't configured software on the Raspberry Pi, or for other reasons, you can opt for a power cut shutdown. Press and hold the button for 5 seconds and turns red, indicating a direct power cut. Be cautious with this method as it may damage data.

RGB

The RGB is a common-cathode RGB. Once the RGB button is connected, the RGB light will display the current status, which includes:

RGB	Status
Green Light	External Power Input Status
Yellow Light	Battery Power Status
Orange Light Cycling from Dim to Bright	Charging
Red Light Flashing	Low Battery (and not charging)
Purple	Long Press 2 Seconds, Soft Shutdown
Red	Long Press 5 Seconds, Hardware Shutdown
Off	Sleep/Not Powered

Wiring

The button interface is MX1.25 5P. Use the MX1.25 5P reverse cable to connect the button to the Pironman U1 HAT. The button pin definitions are:

K	Button Signal
B	Blue Positive Signal
G	Green Positive Signal
R	Red Positive Signal
C	GND

CHAPTER

SEVEN

HOME ASSISTANT(PI 4)

This section will guide you in installing the Home Assistant operating system on your Raspberry Pi. Please note that this process will result in the loss of all existing content on your Raspberry Pi system. It is important to backup your data before proceeding.

7.1 1. Install the Home Assistant OS

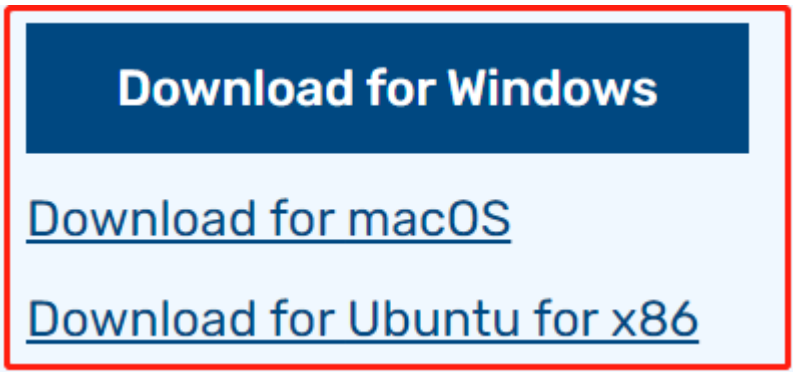
Required Components

- Raspberry Pi 5B
- A Personal Computer
- A 16G Micro SD card

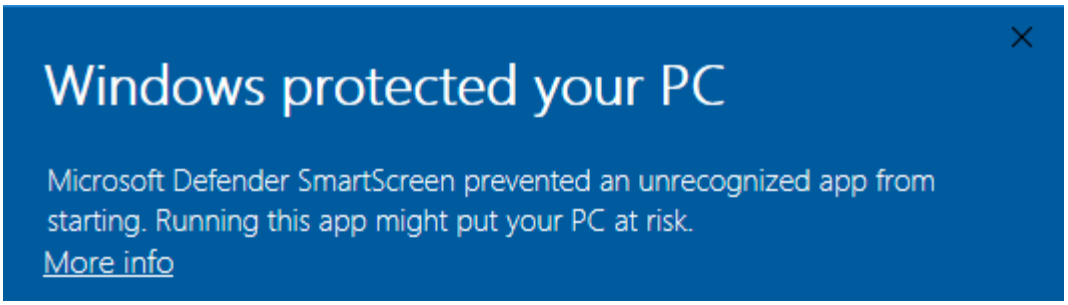
Note: To install Home Assistant OS and add some add-ons, 8GB of Micro SD card memory is not sufficient. It is recommended to use a 16GB Micro SD card.

Installation Steps

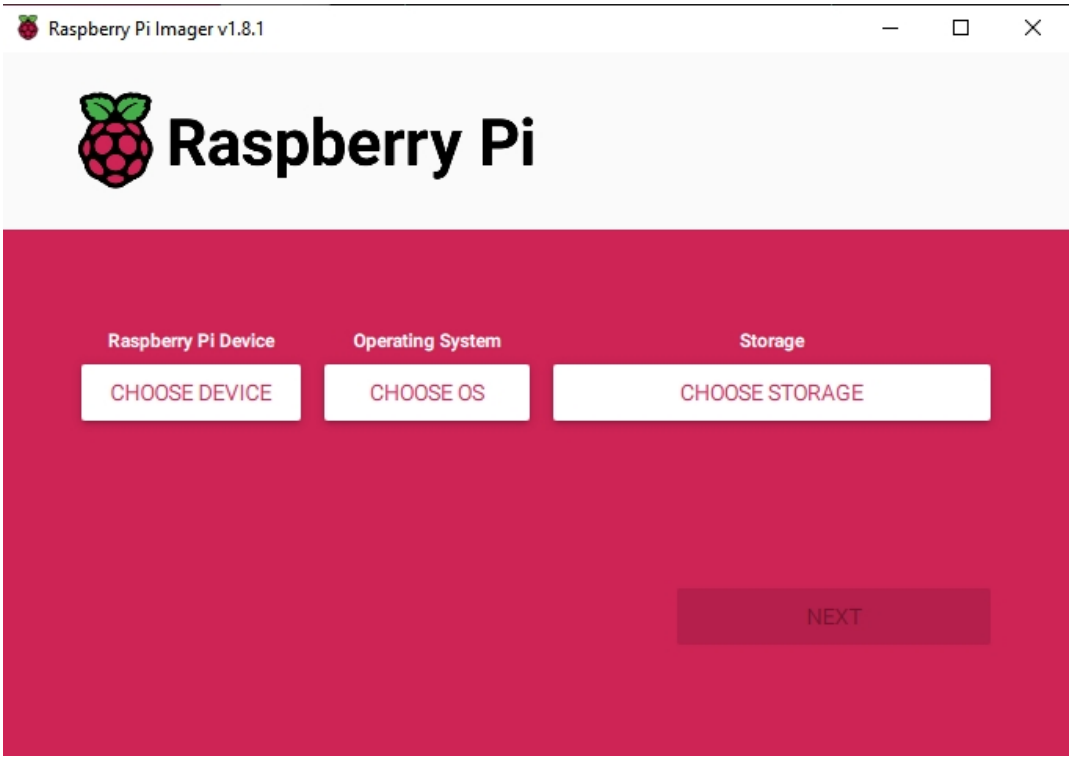
1. Visit the Raspberry Pi software download page at Raspberry Pi Imager. Choose the Imager version compatible with your operating system. Download and open the file to initiate installation.



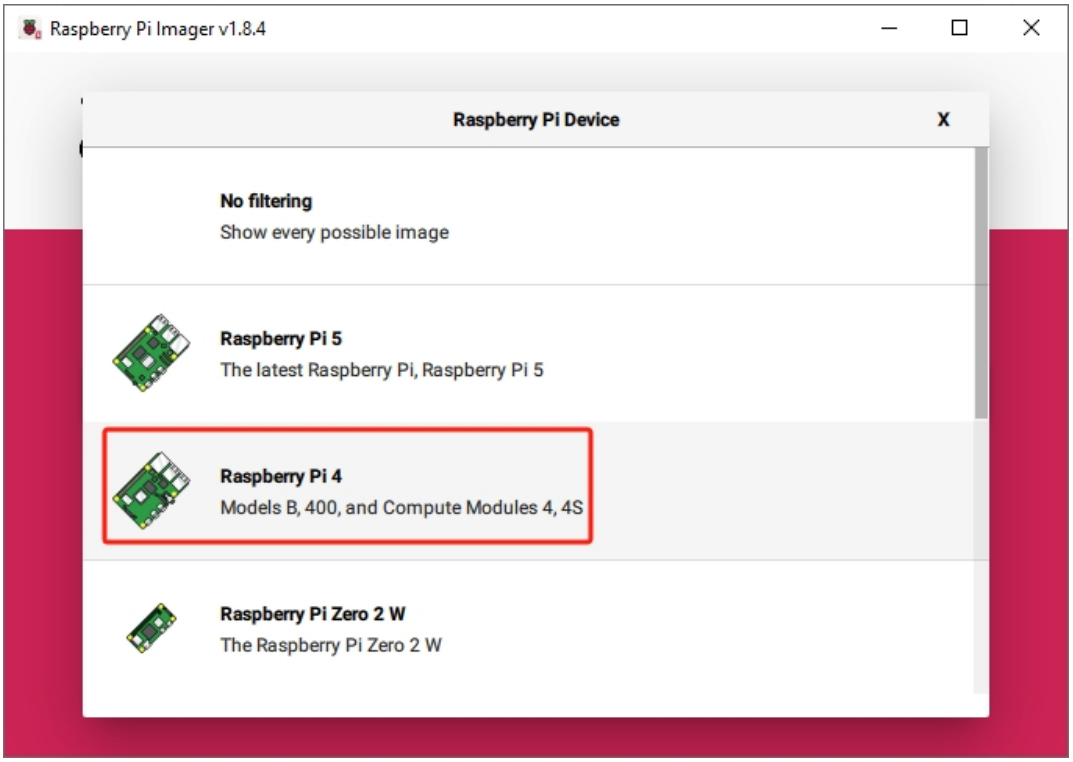
2. A security prompt may appear during installation, depending on your operating system. For example, Windows might display a warning message. In such cases, select **More info** and then **Run anyway**. Follow the on-screen guidance to complete the installation of the Raspberry Pi Imager.



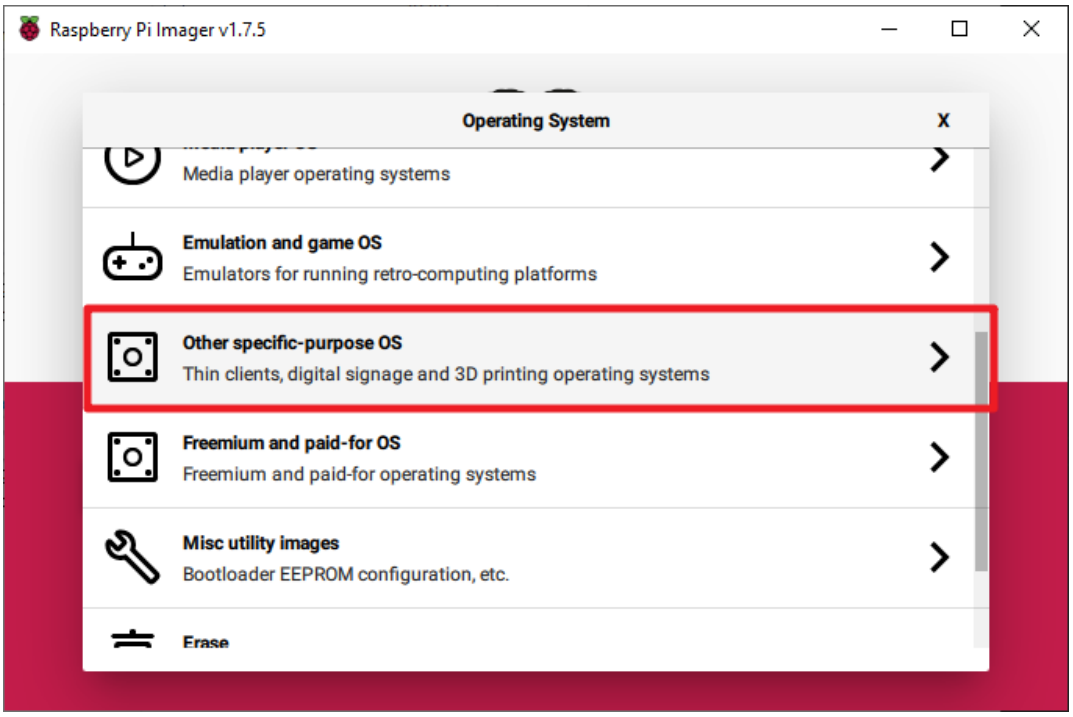
3. Insert your SD card into your computer or laptop's SD card slot.
4. Launch the Raspberry Pi Imager application by clicking its icon or typing `rpi-imager` in your terminal.

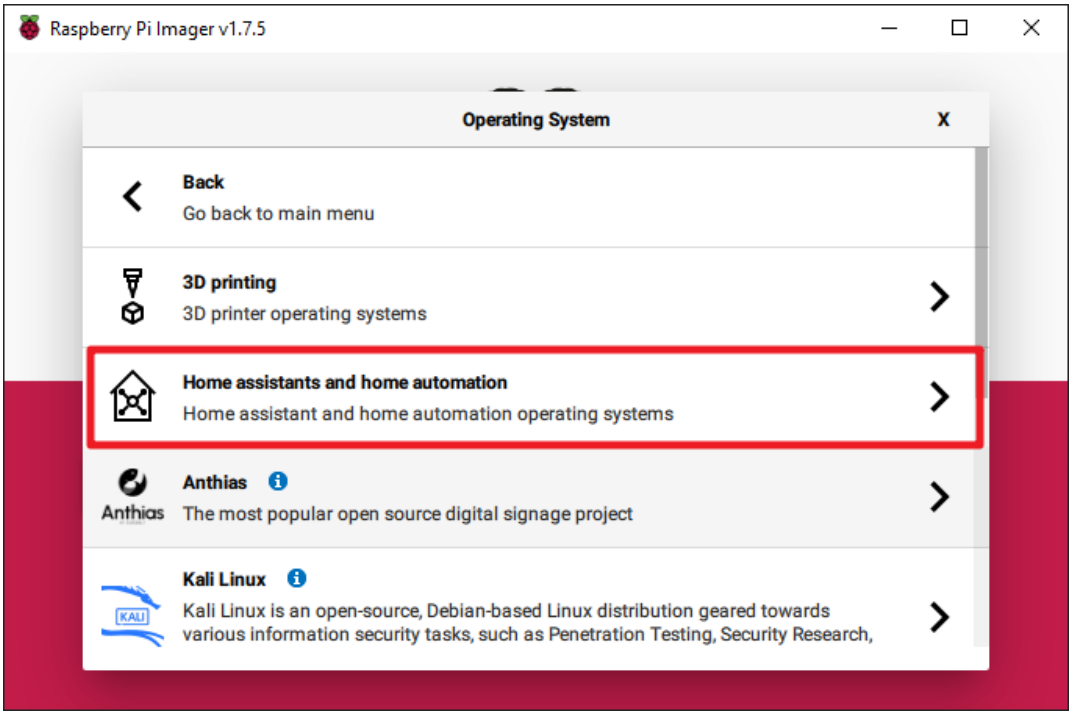


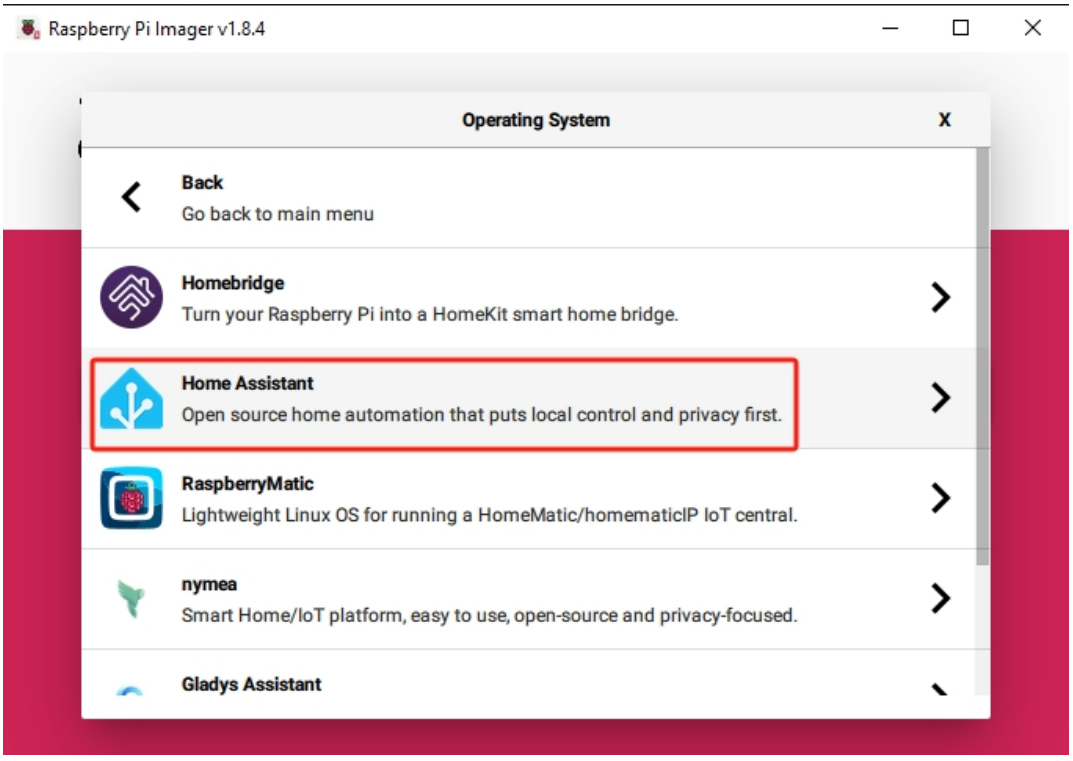
5. Within the Imager, click **CHOOSE DEVICE** and select the Raspberry Pi model from the dropdown list.

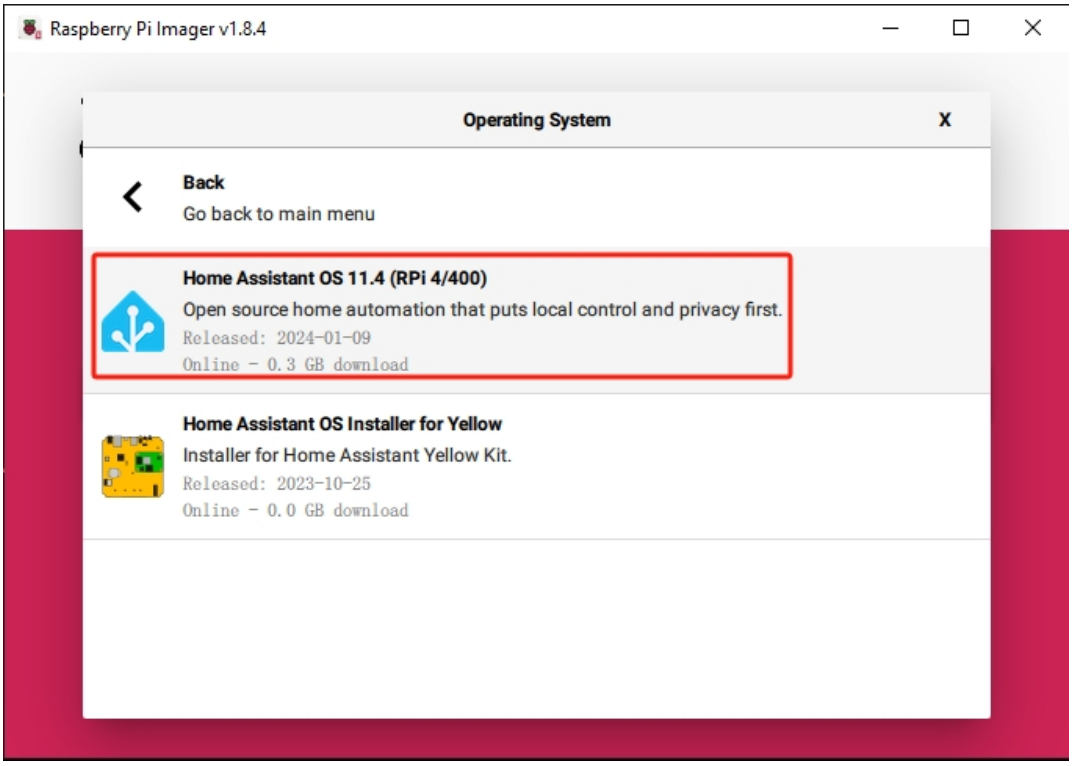


6. Click on **CHOOSE OS**, and finish select **Home Assistant OS xx(xxxx)** as shown in the images below.



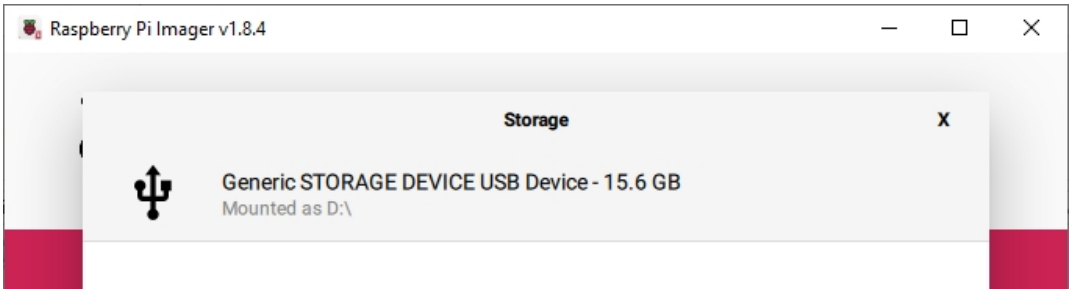

Raspberry Pi Imager v1.7.5
Operating System
X
Back
Go back to main menu
3D printing
3D printer operating systems
Home assistants and home automation
Home assistant and home automation operating systems
Anthias
The most popular open source digital signage project
Kali Linux
Kali Linux is an open-source, Debian-based Linux distribution geared towards
various information security tasks, such as Penetration Testing, Security Research,


Raspberry Pi Imager v1.8.4
Operating System
X
Back
Go back to main menu
Homebridge
Turn your Raspberry Pi into a HomeKit smart home bridge.
Home Assistant
Open source home automation that puts local control and privacy first.
RaspberryMatic
Lightweight Linux OS for running a HomeMatic/homematicIP IoT central.
nymea
Smart Home/IoT platform, easy to use, open-source and privacy-focused.
Gladys Assistant

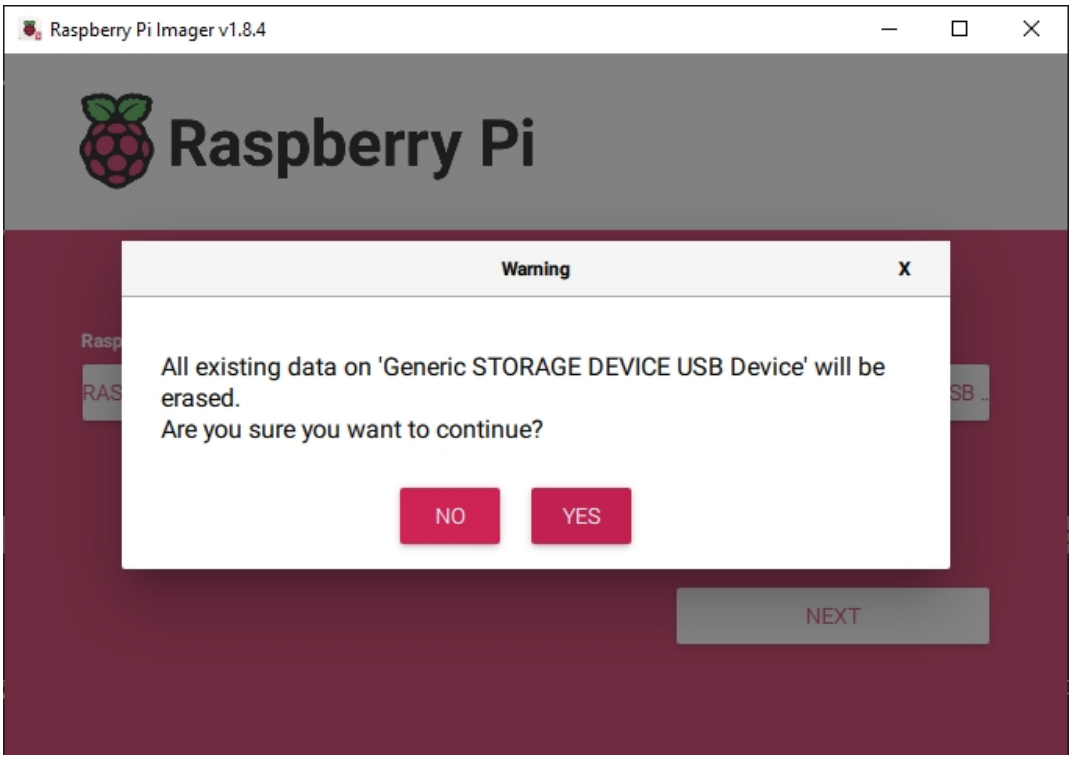


7. Click **Choose Storage** and select the appropriate storage device for the installation.

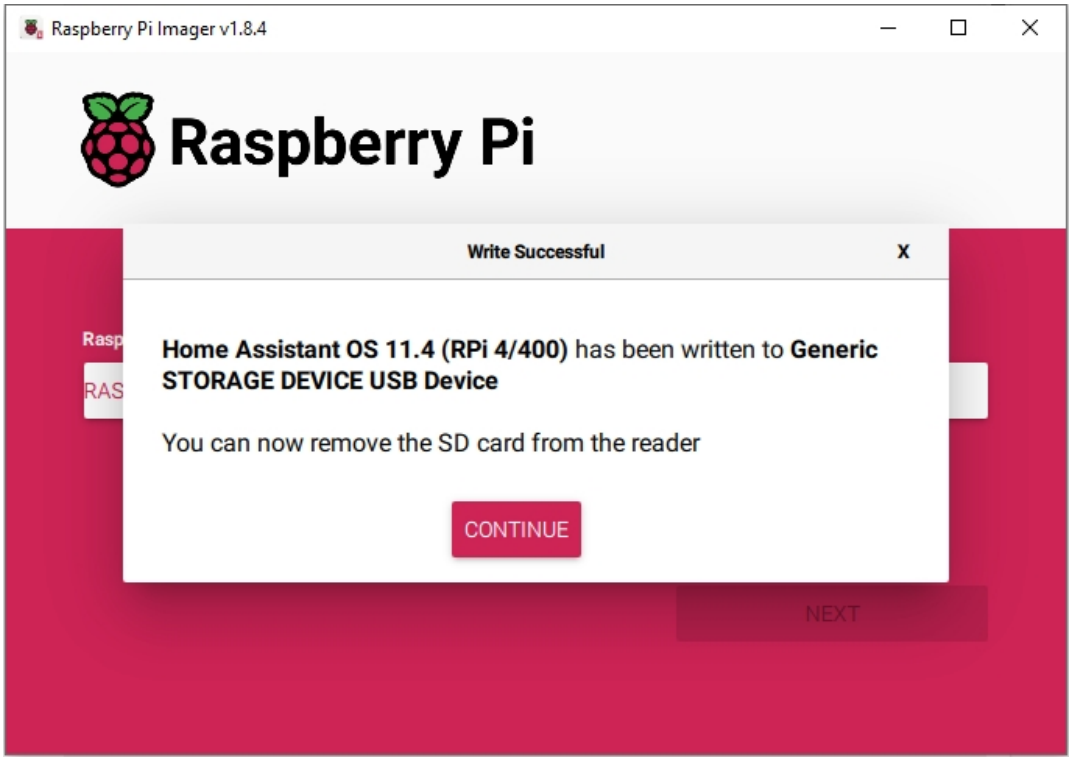
Note: Ensure you select the correct storage device. To avoid confusion, disconnect any additional storage devices if multiple ones are connected.



8. Click **Next**. If your SD card currently has any files on it, you may wish to back up these files first to prevent you from permanently losing them. If thereis no file to be backed up, click **Yes**.



9. After waiting for a period of time, the following window will appear to represent the completion of writing.

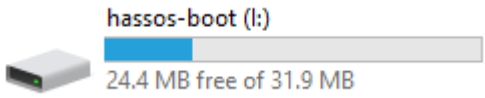


7.2 2. Configuring Your Home Assistant

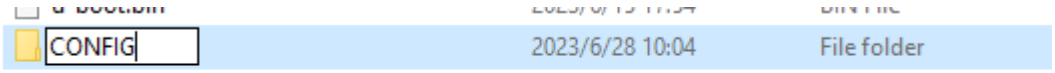
1. Enable the I2C Interface

This involves activating the I2C interface on your device.

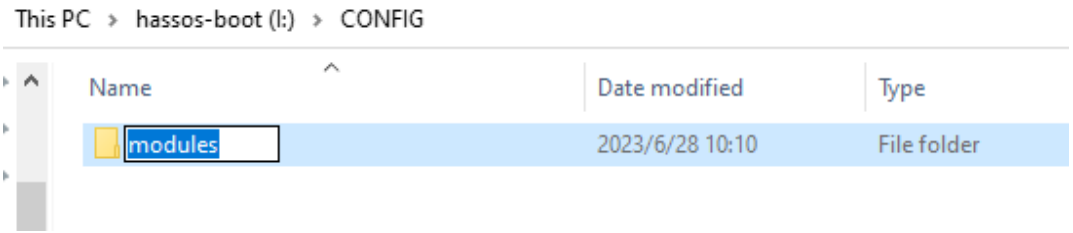
1. Remove and then reinsert the SD card into your computer. Open the **File Explorer** and locate the SD card named `hassos-boot`.



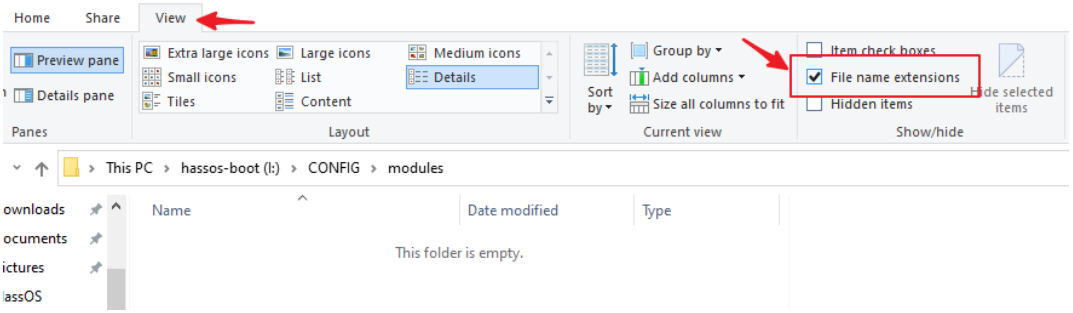
2. In the root directory, create a new folder named `CONFIG`.



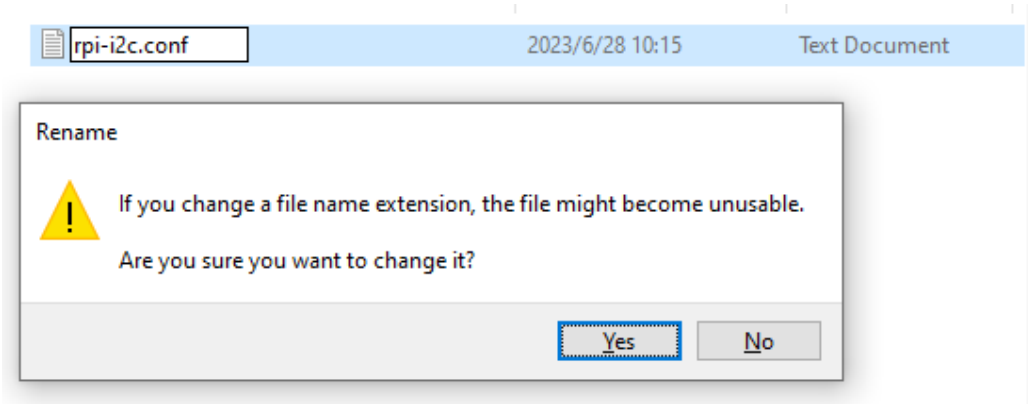
3. Within the `CONFIG` folder, make a subfolder titled `modules`.



4. Turn on the display of file extensions in your settings.



5. Inside the `modules` subfolder, create a text file and rename it to `rpi-i2c.conf`. Confirm the extension change when prompted.



6. Edit `rpi-i2c.conf` to include the following line:

```
i2c-dev
```

7. Save and exit the file.

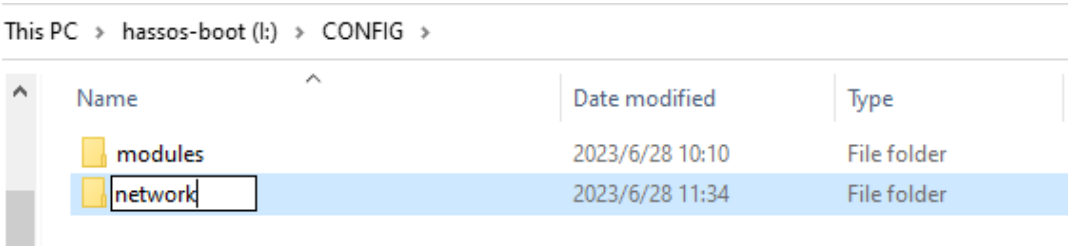
2. Setting Up WiFi

Now, let's set up the WiFi connection.

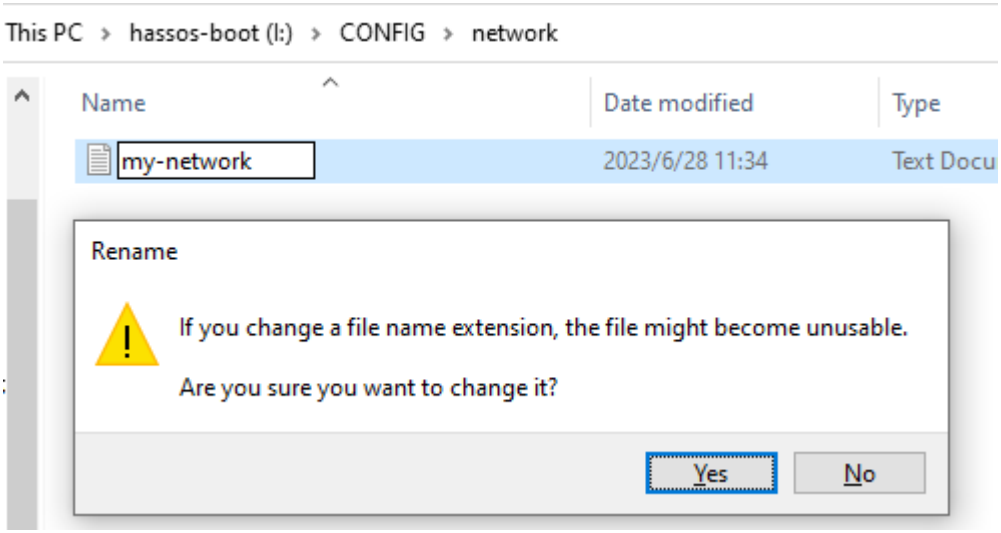
Note: Skip this step if you prefer using a wired network connection.

---

1. In the `CONFIG` folder, create a new folder named `network`.



2. Inside the `network` folder, create a text file and name it `my-network` (leave out the file extension).



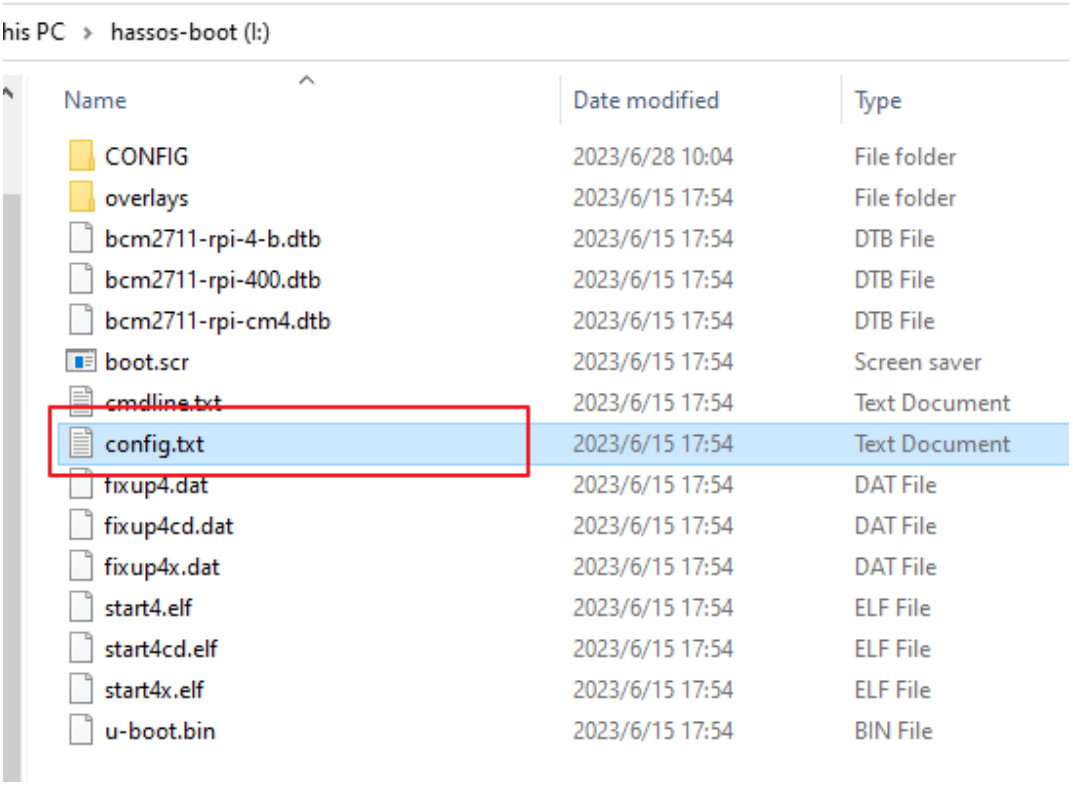
3. Enter the following configuration in the `my-network` file, substituting `MY_SSID` and `MY_WLAN_SECRET_KEY` with your WiFi network's details:

```
[connection]
id=my-network
uuid=72111c67-4a5d-4d5c-925e-f8ee26efb3c3
type=802-11-wireless

[802-11-wireless]
mode=infrastructure
ssid=MY_SSID
# Uncomment if your SSID is hidden
#hidden=true

[802-11-wireless-security]
auth-alg=open
key-mgmt=wpa-psk
psk=MY_WLAN_SECRET_KEY

[ipv4]
method=auto

[ipv6]
addr-gen-mode=stable-privacy
method=auto
```

4. Save and close the file.

3. Adjusting Configuration

1. In the `hassos-boot` directory, find and open the `config.txt` file.



2. Append the following settings at the end of the file:

```
dtparam=i2c_vc=on
dtparam=i2c_arm=on
dtoverlay=gpio-poweroff,gpio_pin=26,active_low=0
dtoverlay=gpio-ir,gpio_pin=13
```

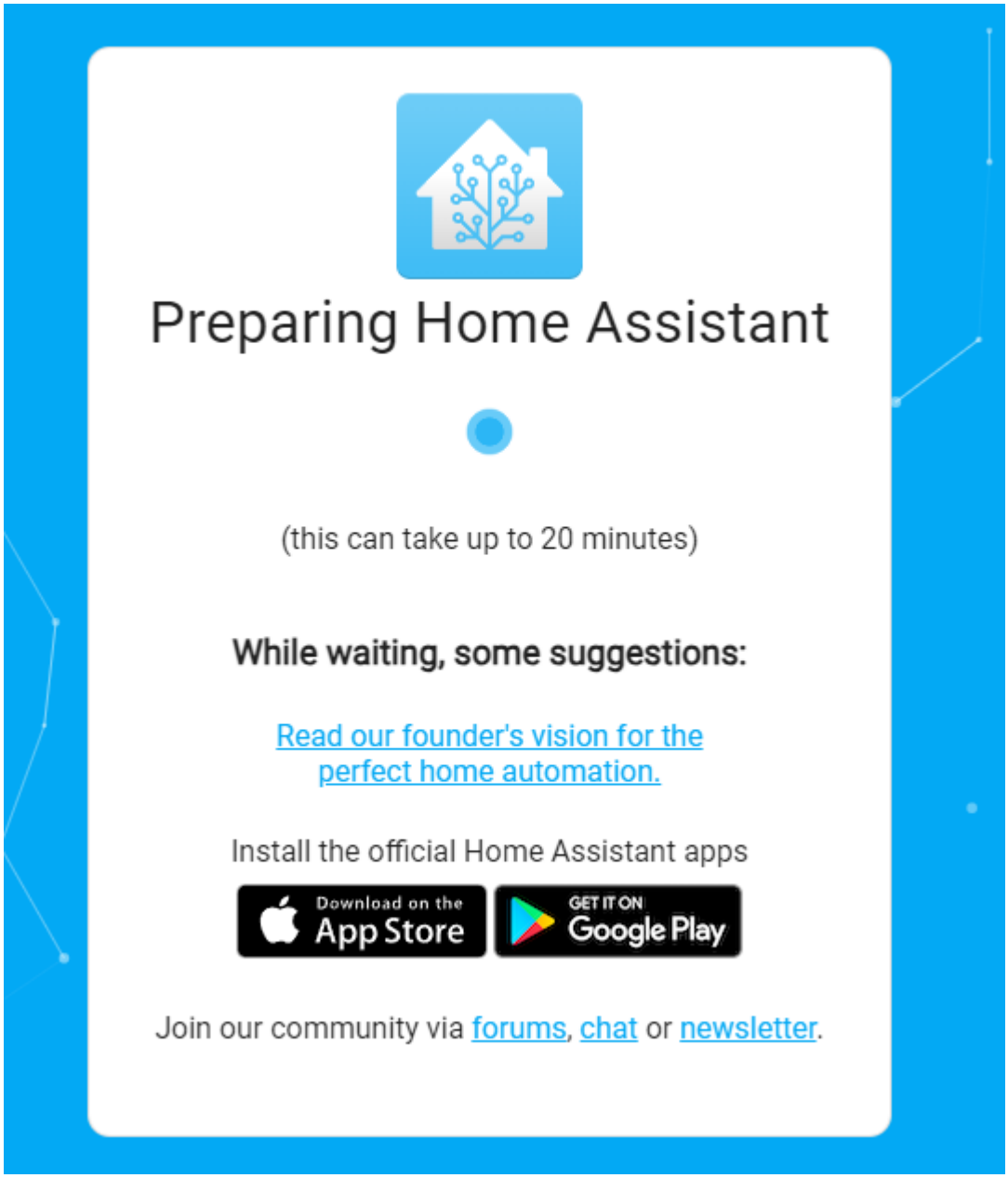
3. Save and close the file.

4. Accessing Home Assistant

Eject the microSD card from your computer and insert it into your Raspberry Pi. Connect the power supply (and Ethernet cable, if applicable).

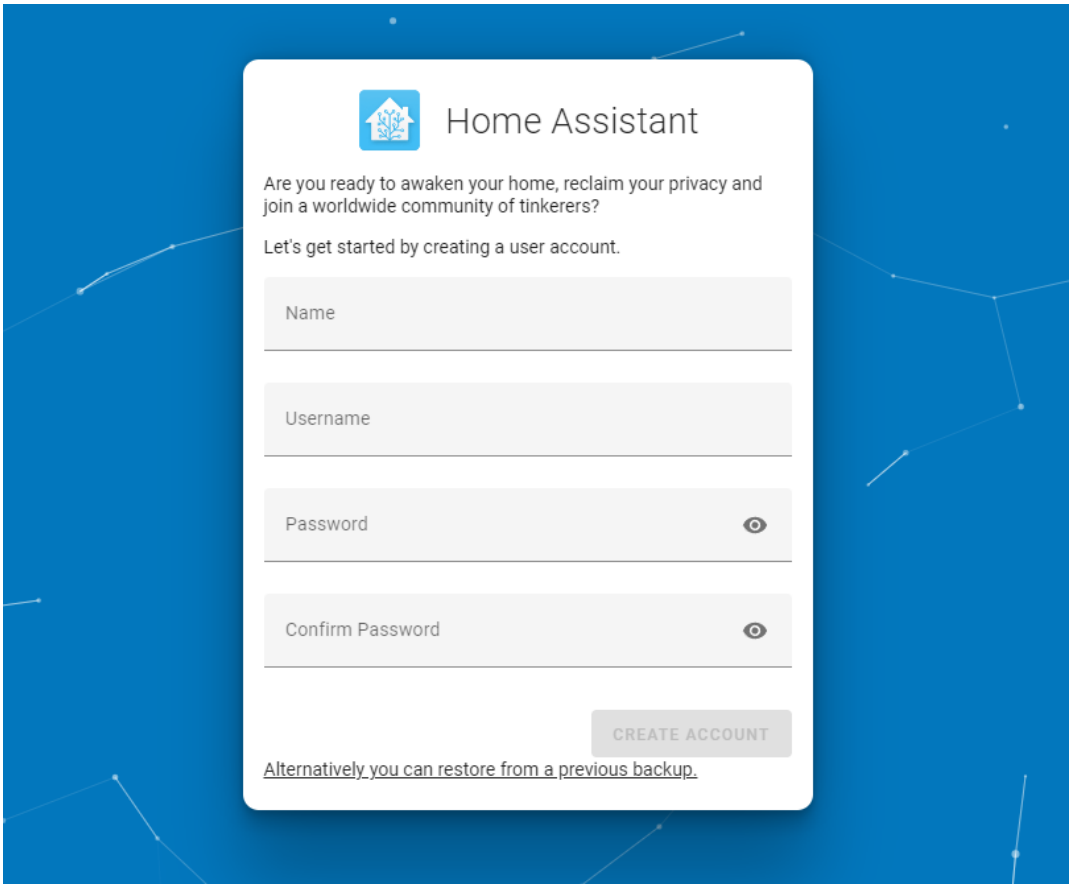
From your computer, go to `homeassistant.local:8123`.

Initial setup of Home Assistant may take some time during first use.

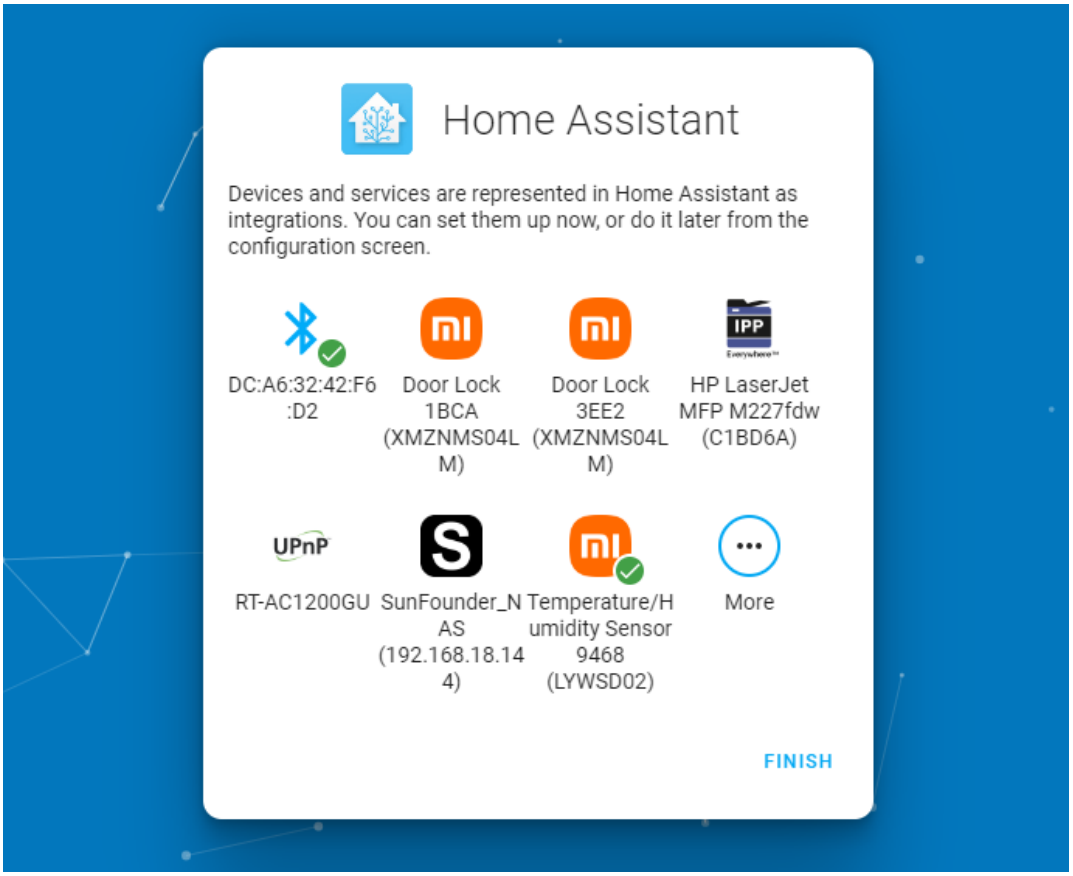


5. Creating Your Account

1. Follow the on-screen instructions to create your user account. This is the account you'll use to access the Home Assistant interface.



2. Proceed through the prompts to set your location and other preferences. You may be asked to install detected devices; you can choose to skip this for now by selecting **FINISH**.



7.3 3. Home Assistant Addon

Pironman U1 offers a Home Assistant addon, facilitating the use of Pironman U1 for Home Assistant users.

Note: The addon only supports direct installation of the Home Assistant system on Raspberry Pi, and does not support installing Home Assistant as a Docker container on a Raspberry Pi system.

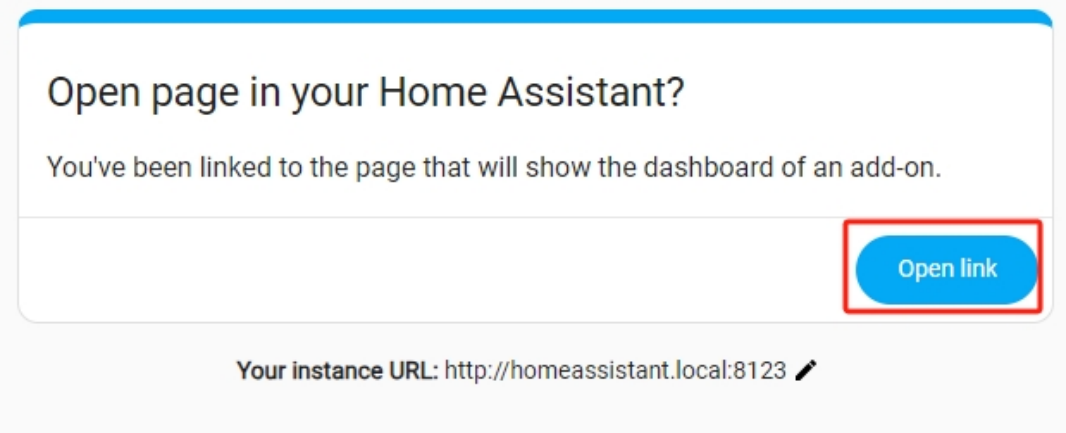
For this scenario, please directly *1. Download and Install SPC*.

Now we will install the Pironman U1 addon for Home Assistant. Choose one of the following two methods to add it.

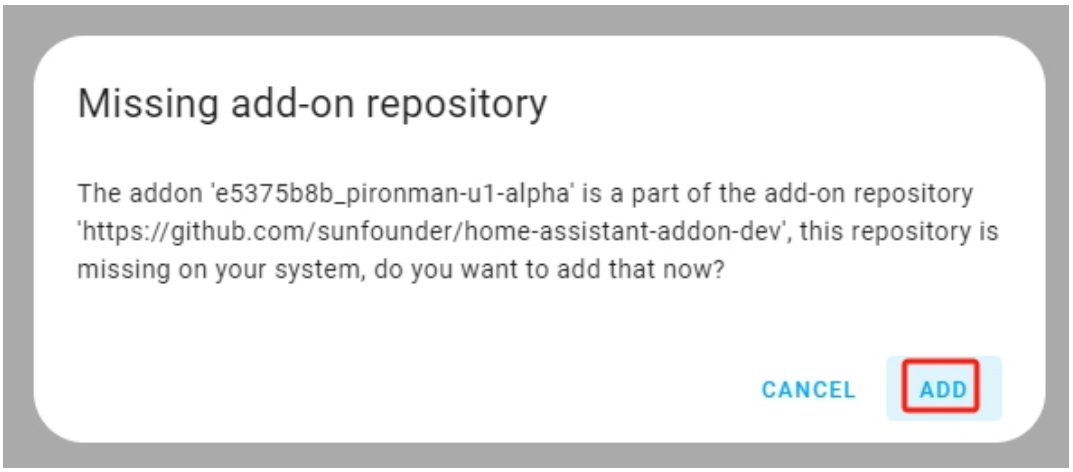
7.3.1 1. Automatic Addition

1. Please click the button below to quickly add it.

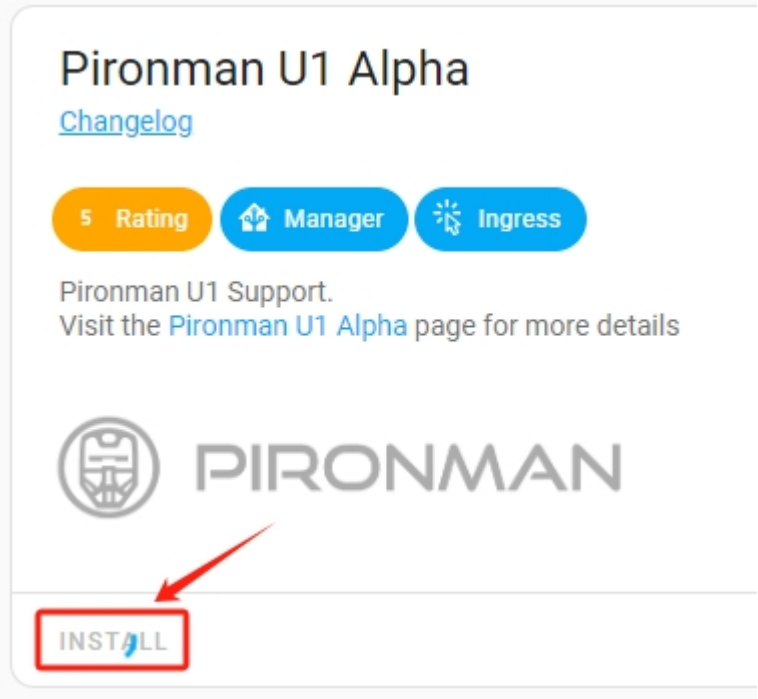
2. After visiting the link above, a popup will prompt to open a page in Home Assistant, click **Open link**.



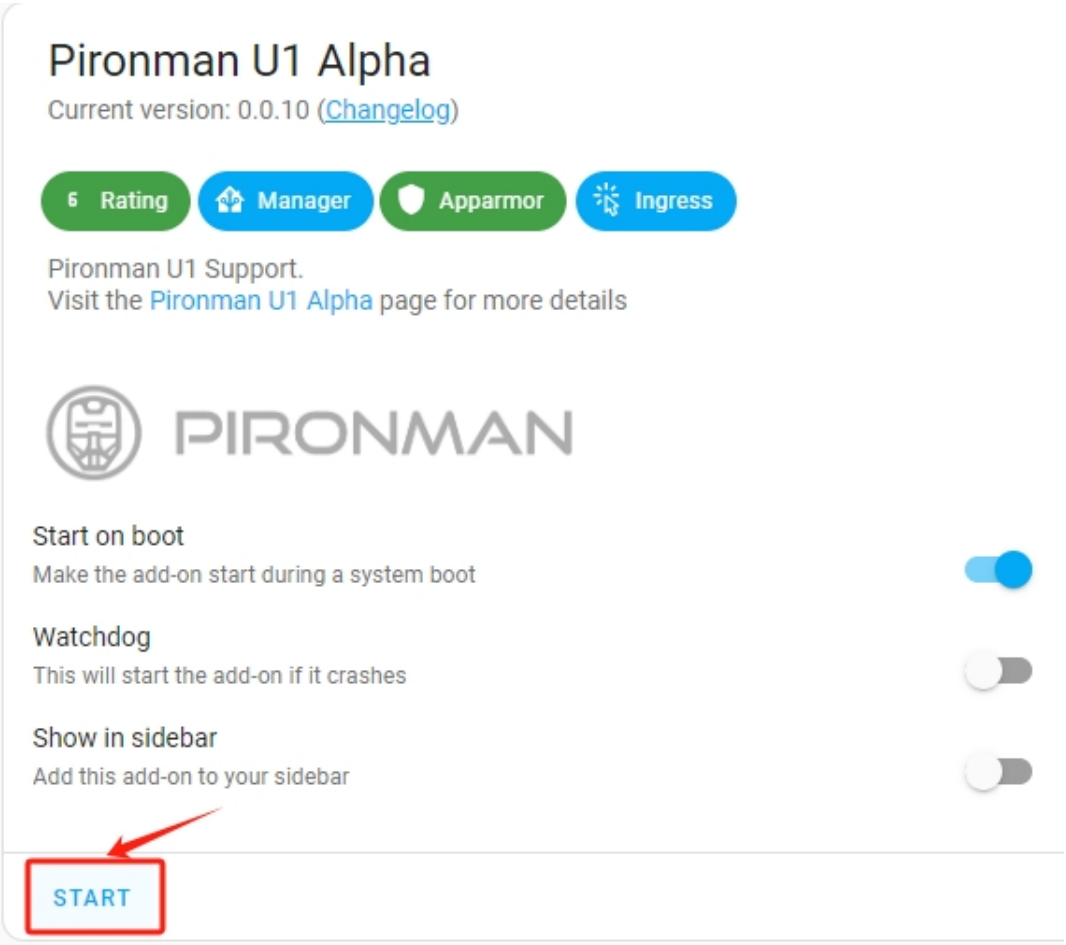
3. Then, you will be prompted to add the Addon. Choose **ADD**.



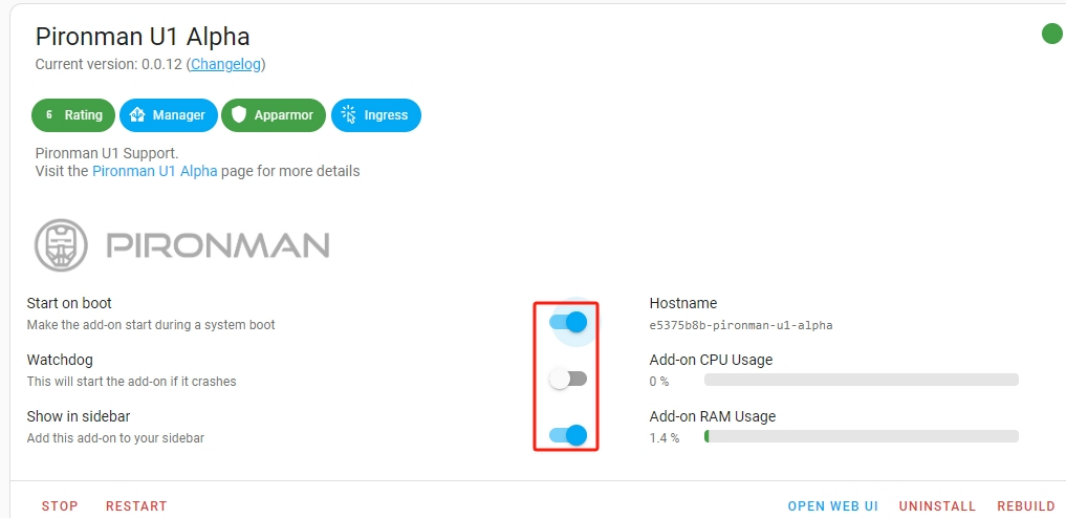
4. After a few seconds, the **Pironman U1** addon will appear.



5. Then, start (or restart) the addon.



6. Now you can select these options, such as **Start on boot** to enable Pironman U1 to start when the system boots up. Or **Show in sidebar** to show the dashboard specially designed for Pironman U1 in the sidebar.



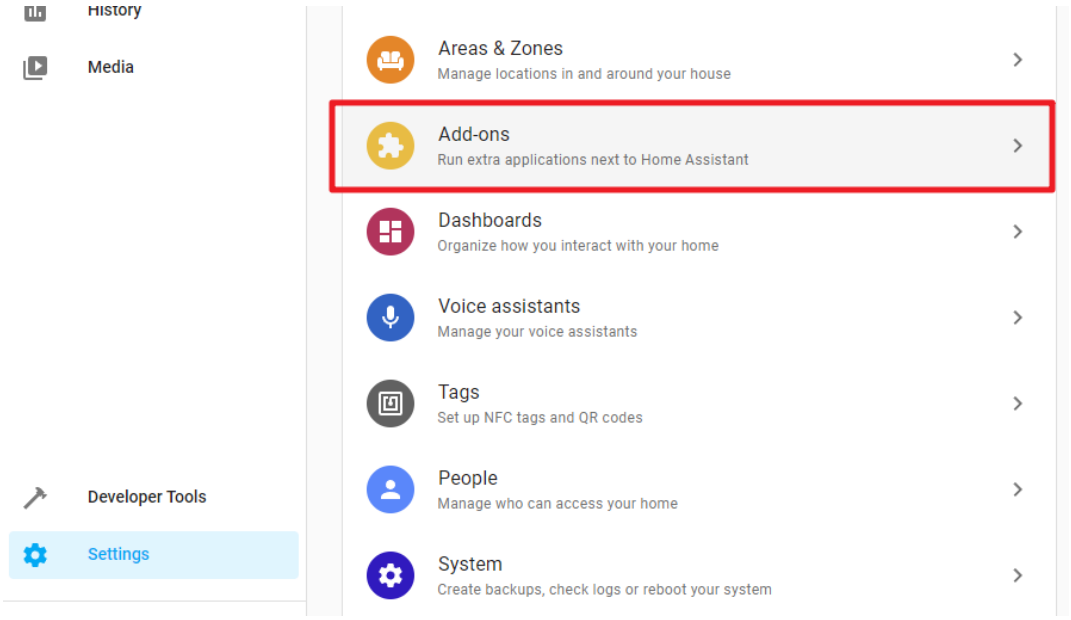
7. Instructions for Powering On and Off:

- **Power On**: Press the button until the light turns green, indicating the system is powering on. You can then release the button.
- **Shutdown**: Press and hold the button for 2 seconds until the light turns purple, then release. When the power button's light begins to flash purple, the Raspberry Pi will receive a shutdown signal and proceed to shut down. The power button's light will turn off once the shutdown process is complete.
- **Power Cut**: If you haven't configured software on the Raspberry Pi, or for other reasons, you can opt for a power cut shutdown. Press and hold the button for 5 seconds and turns red, indicating a direct power cut. Be cautious with this method as it may damage data.

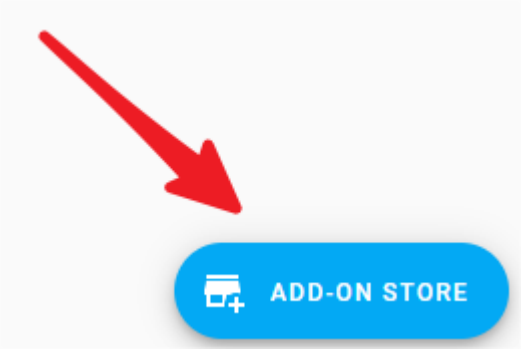
7.3.2 2. Manual Addition

Alternatively, follow the steps below to install manually:

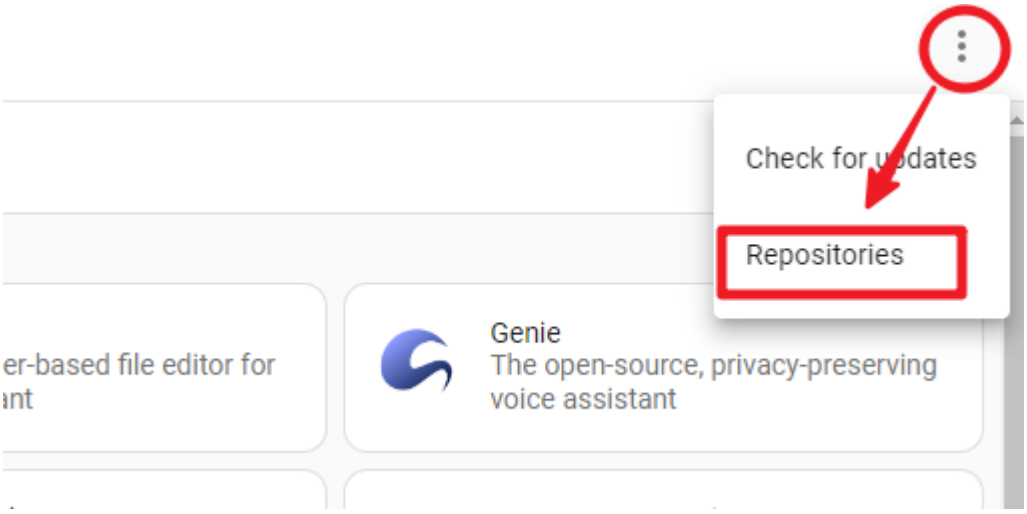
1. In Home Assistant, navigate to **Settings** -> **Addons**.



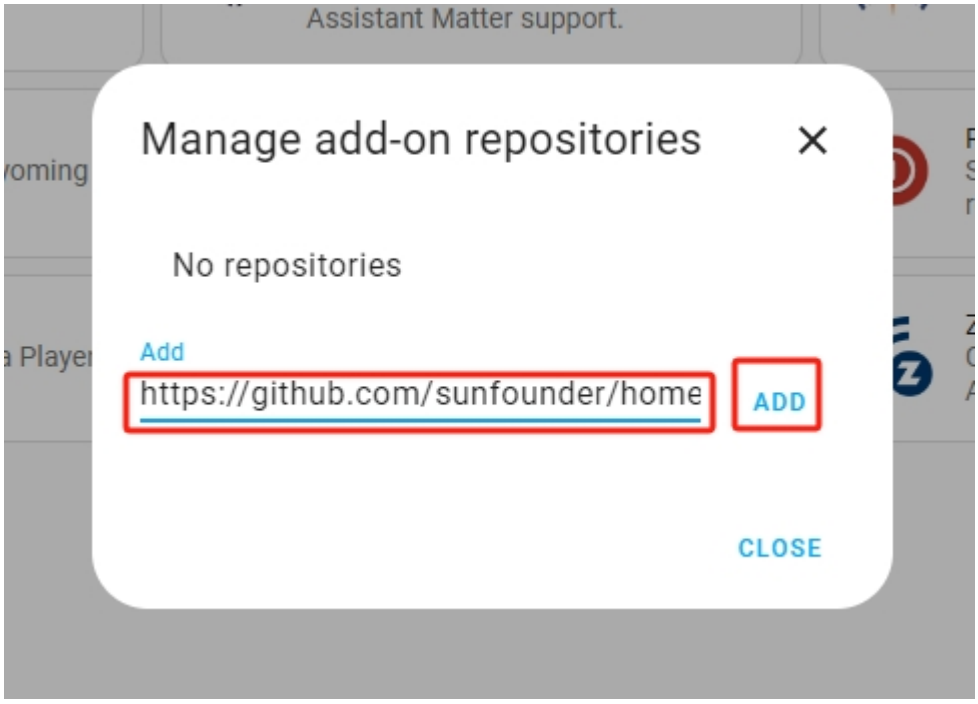
2. Navigate to the **ADD-ON STORE** tab.



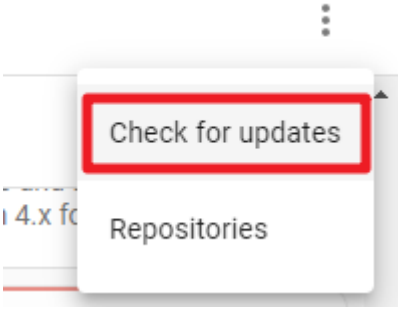
3. In the top right corner, find and click on the **Repositories** button.



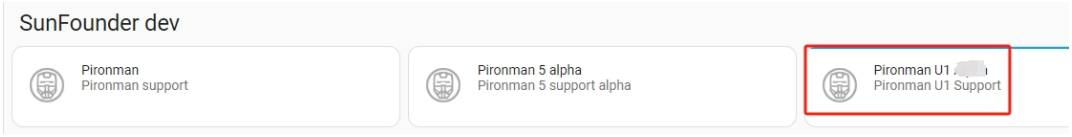
4. Type the repository URL: `https://github.com/sunfounder/home-assistant-addon-dev`, and click **ADD**. After adding the SunFounder repository, close the popup window.



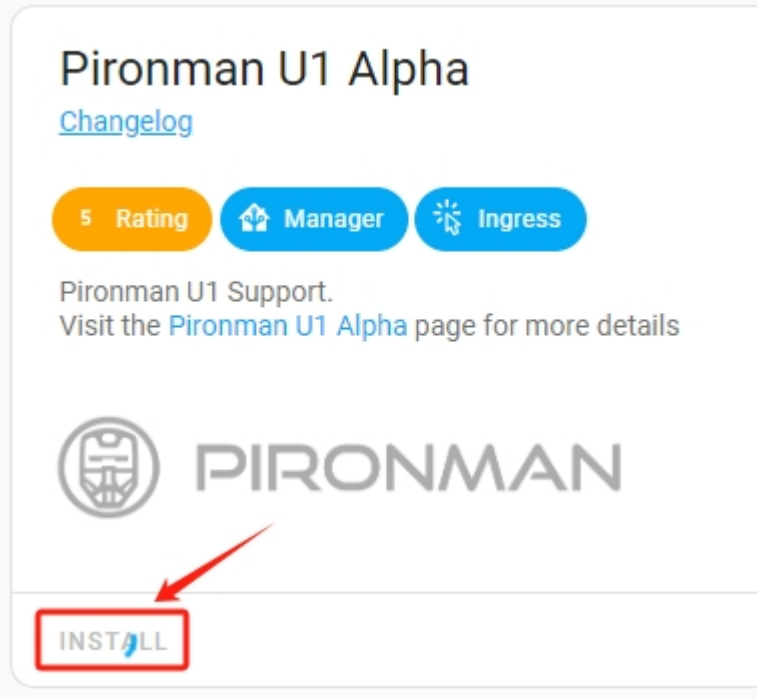
5. Click the menu button again, and click **Check for updates**.



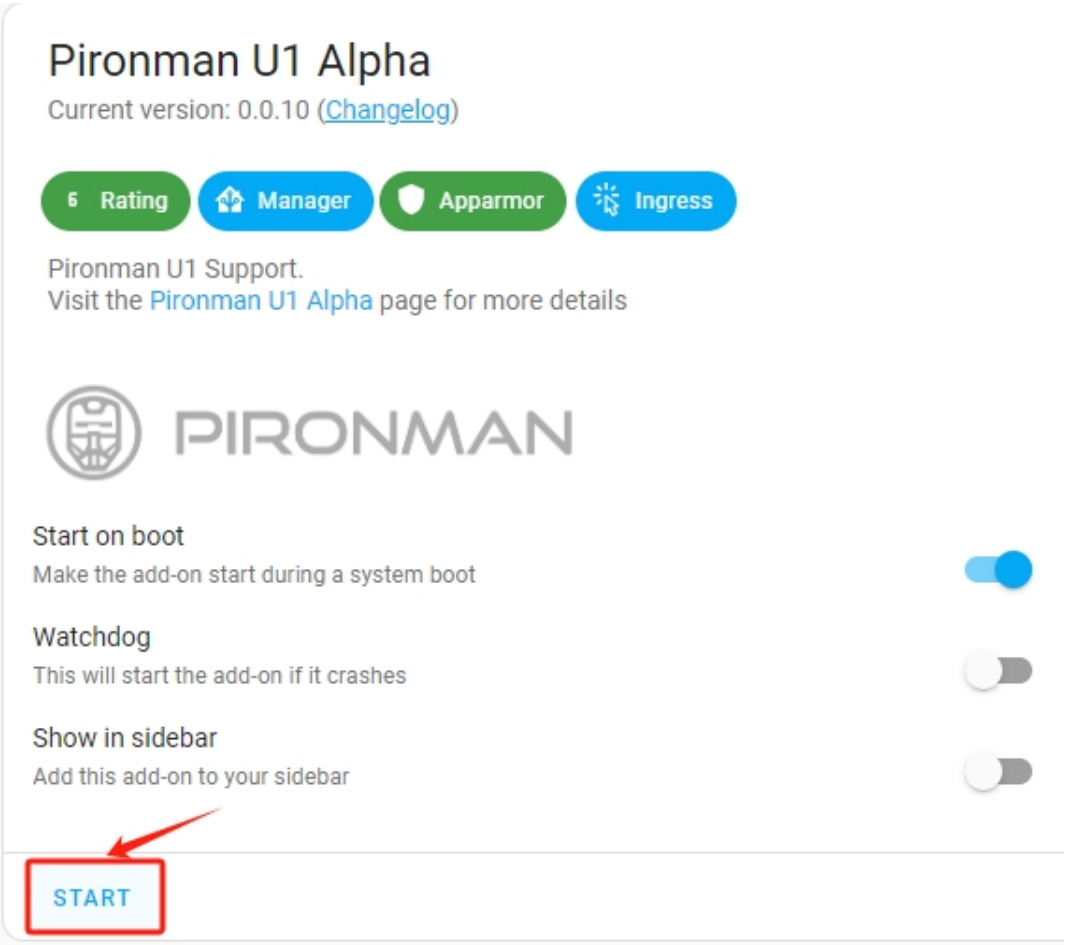
6. After a few seconds, the **Pironman U1** addon will appear at the end of the addon store. If not, try refreshing the page.



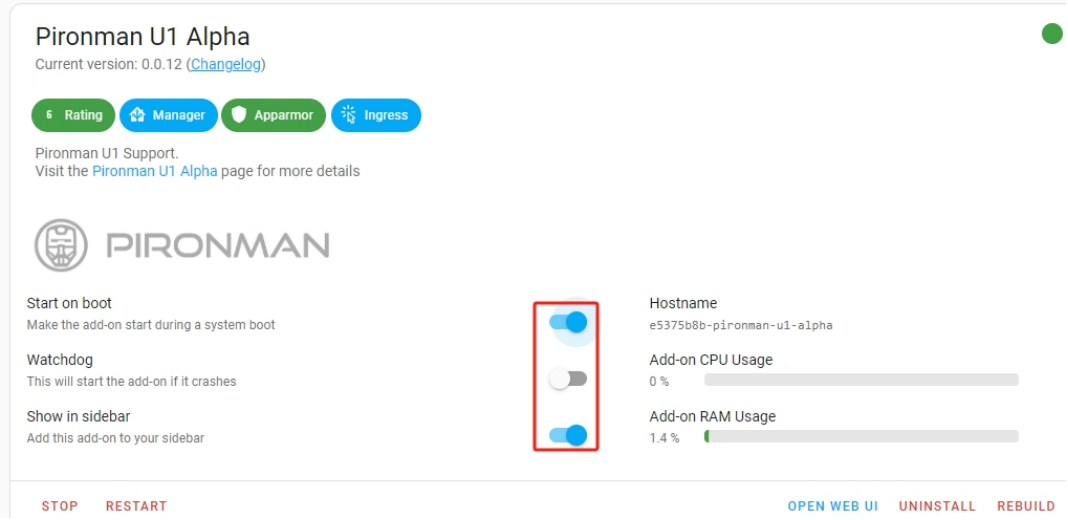
7. Enter the **Pironman U1** addon and click **INSTALL**. This process may take a few minutes.



8. Then, start (or restart) the addon.



9. Now you can select these options, such as **Start on boot** to enable Pironman U1 to start when the system boots up. Or **Show in sidebar** to show the dashboard specially designed for Pironman U1 in the sidebar.

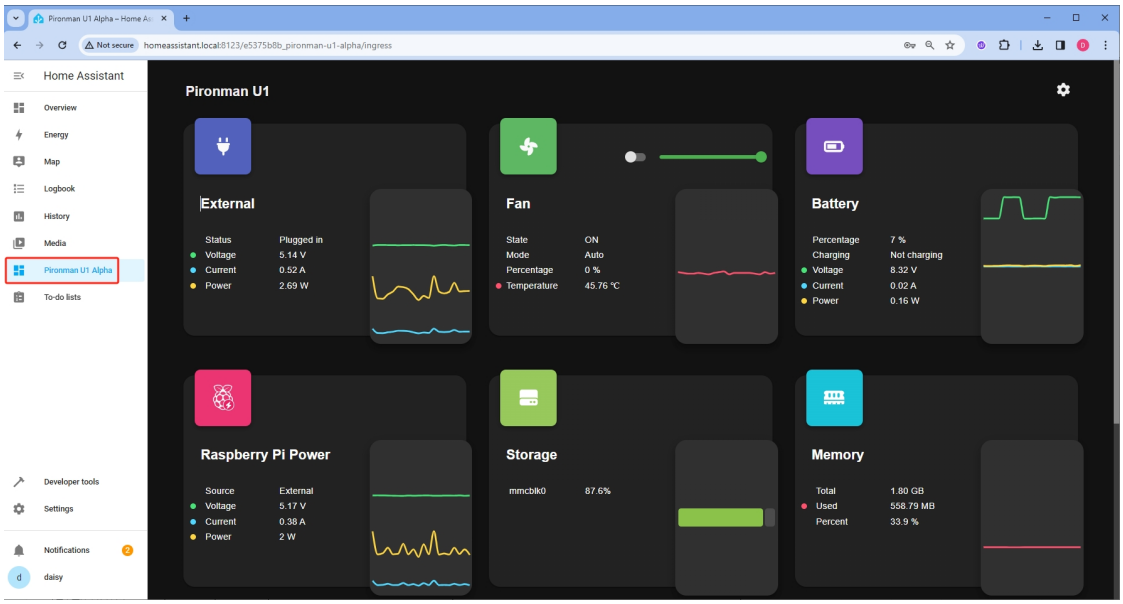


10. Instructions for Powering On and Off:

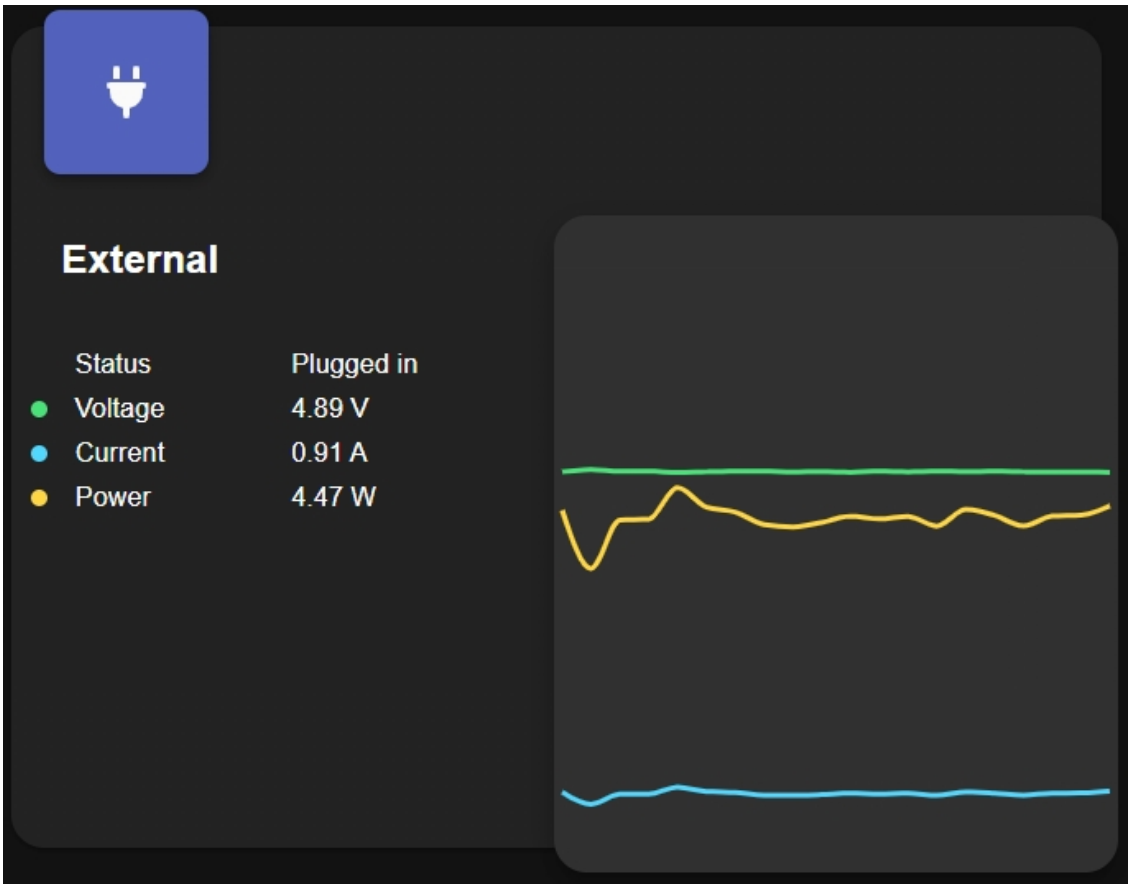
- **Power On**: Press the button until the light turns green, indicating the system is powering on. You can then release the button.
- **Shutdown**: Press and hold the button for 2 seconds until the light turns purple, then release. When the power button's light begins to flash purple, the Raspberry Pi will receive a shutdown signal and proceed to shut down. The power button's light will turn off once the shutdown process is complete.
- **Power Cut**: If you haven't configured software on the Raspberry Pi, or for other reasons, you can opt for a power cut shutdown. Press and hold the button for 5 seconds and turns red, indicating a direct power cut. Be cautious with this method as it may damage data.

7.4 4. View Data from SPC Dashboard

If you select the **Show in sidebar** option in the Pironman U1 add-on and then refresh the webpage, you will be able to open the Pironman U1 dashboard from the sidebar.



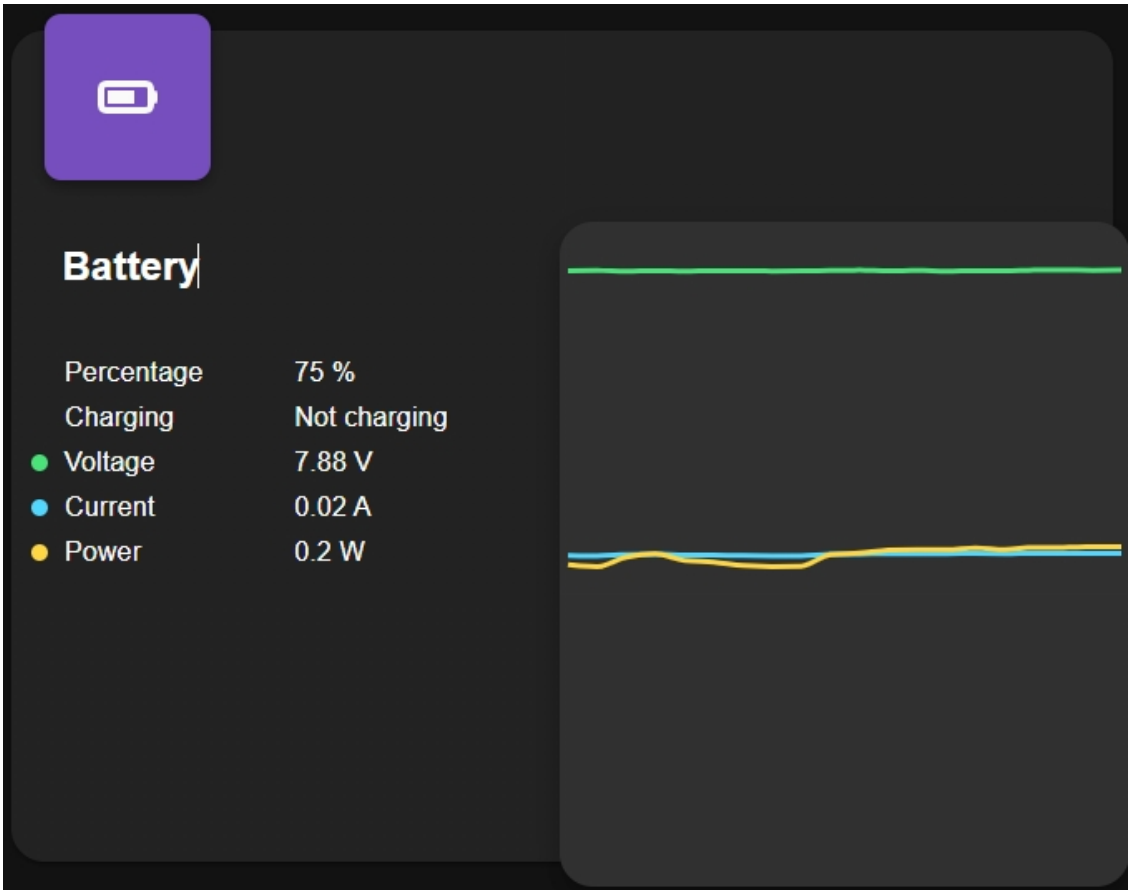
- The Dashboard will include the following:
  - **External**: Displays the status of the external USB power (Plugged in or Unplugged), its voltage, current, and power.



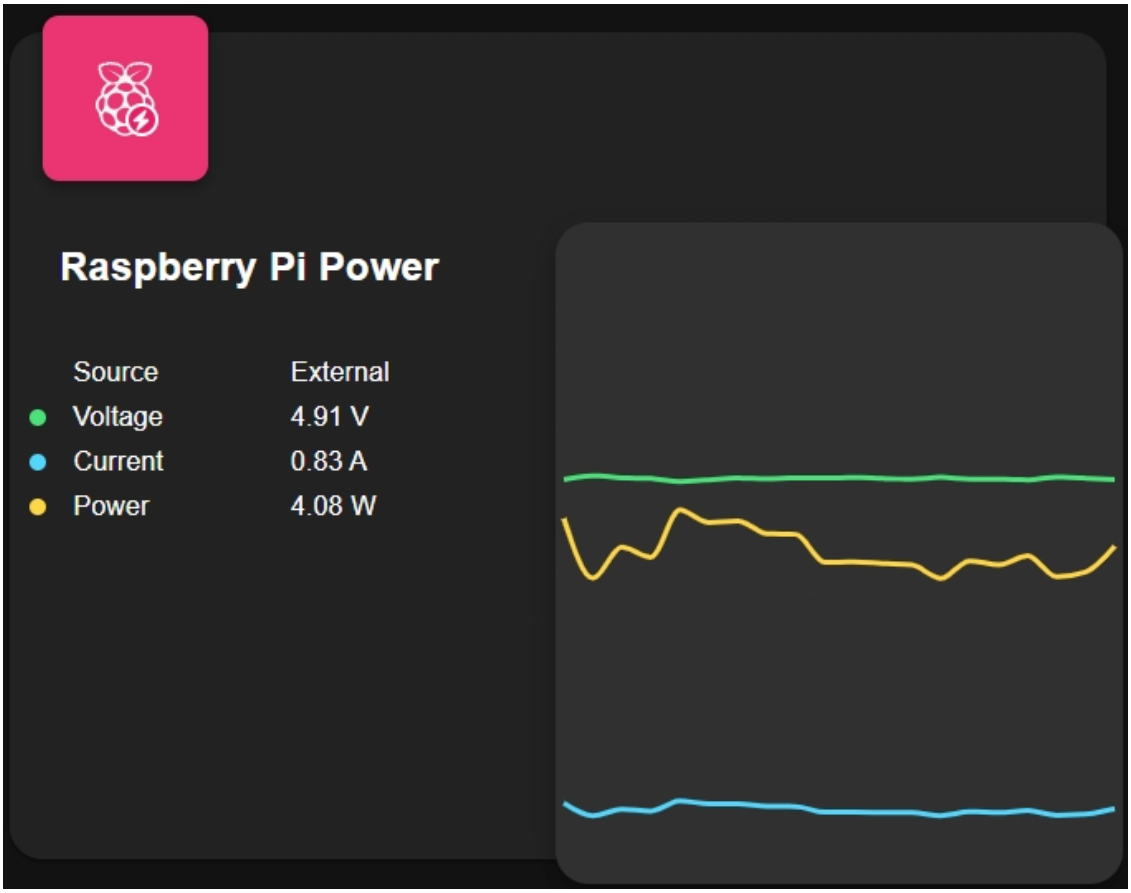
  - **Fan**: Shows the fan status, mode, speed, and the current temperature of the Raspberry Pi.
    - You can manually turn the fan on or off and select different rotation modes for it.

– **Battery**: Displays the battery's percentage, charging status, voltage, current, and power.

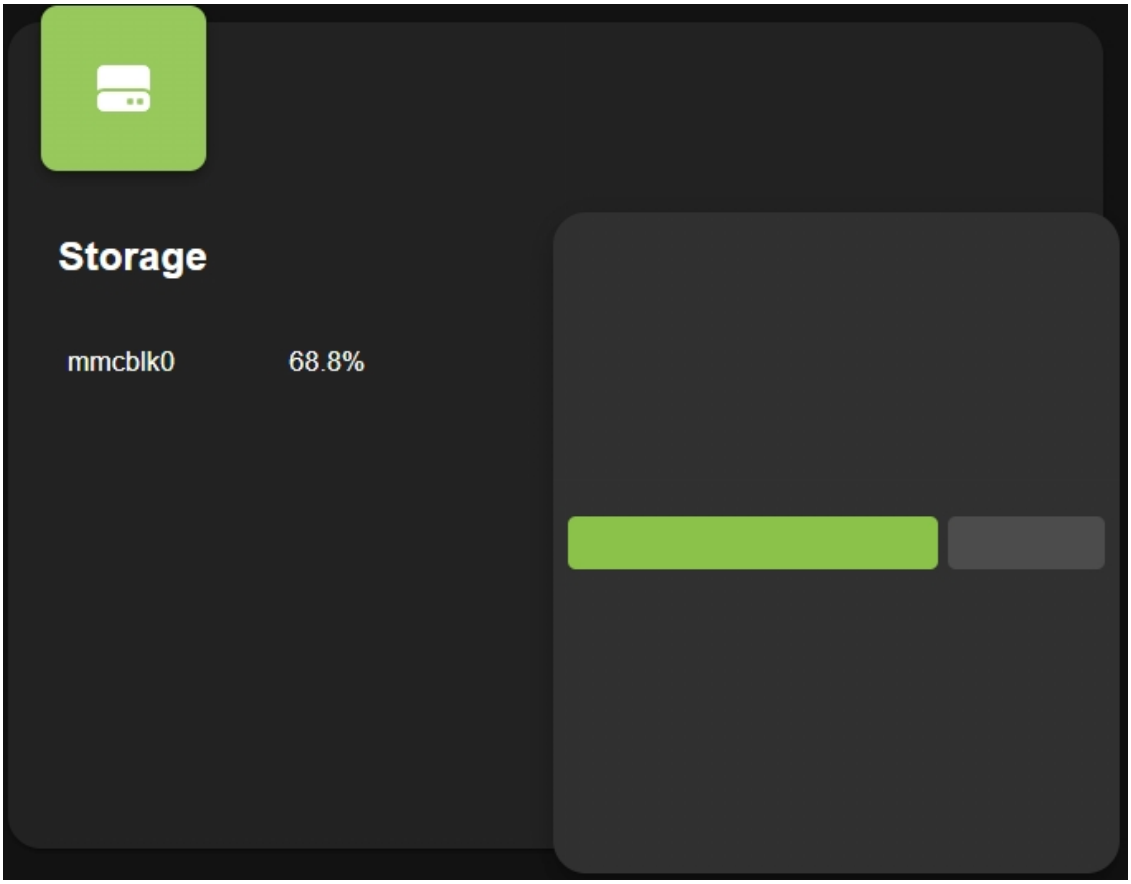
  * When an external USB power source is plugged in, the battery is in charging mode, showing its voltage, charging current, and power.
  * When the external USB is not plugged in, the current and power are negative, indicating the battery's output current and power.



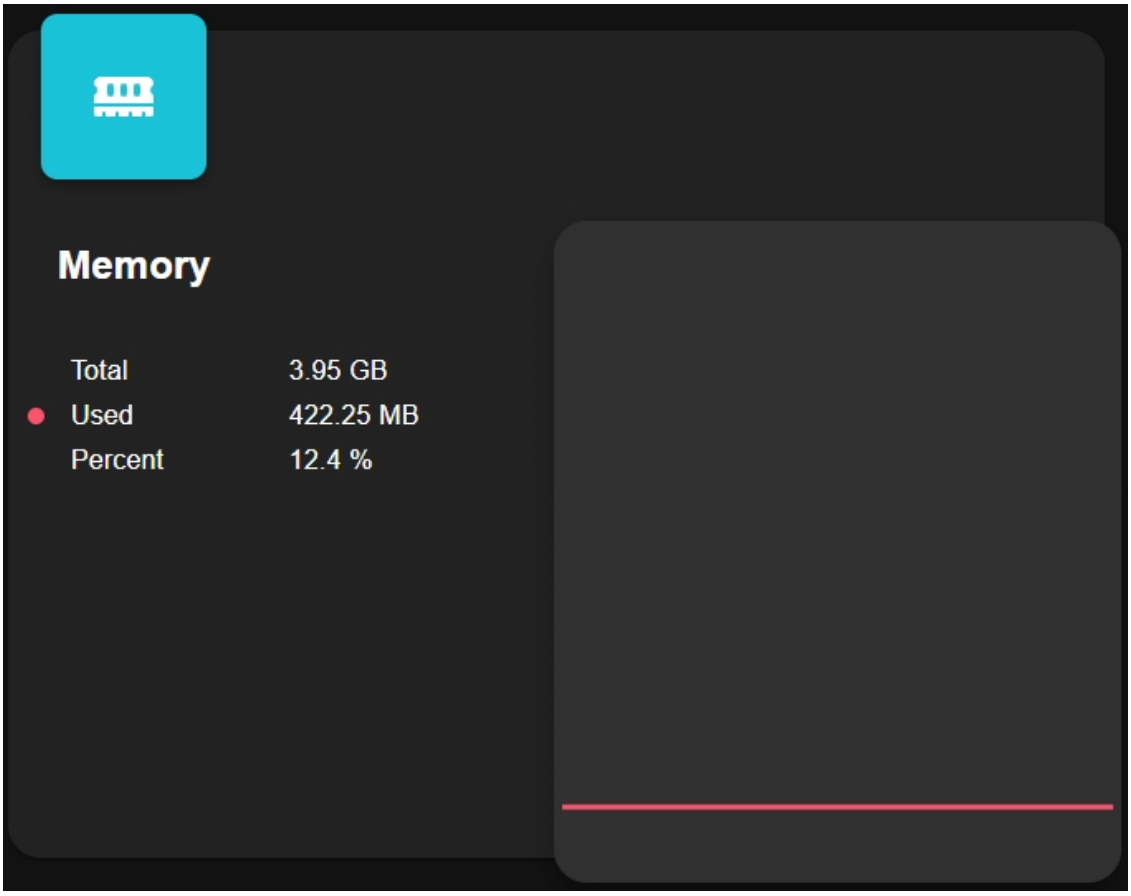
– **Raspberry Pi Power**: Displays the power supply to the Raspberry Pi (External or battery), its voltage, current, and power.



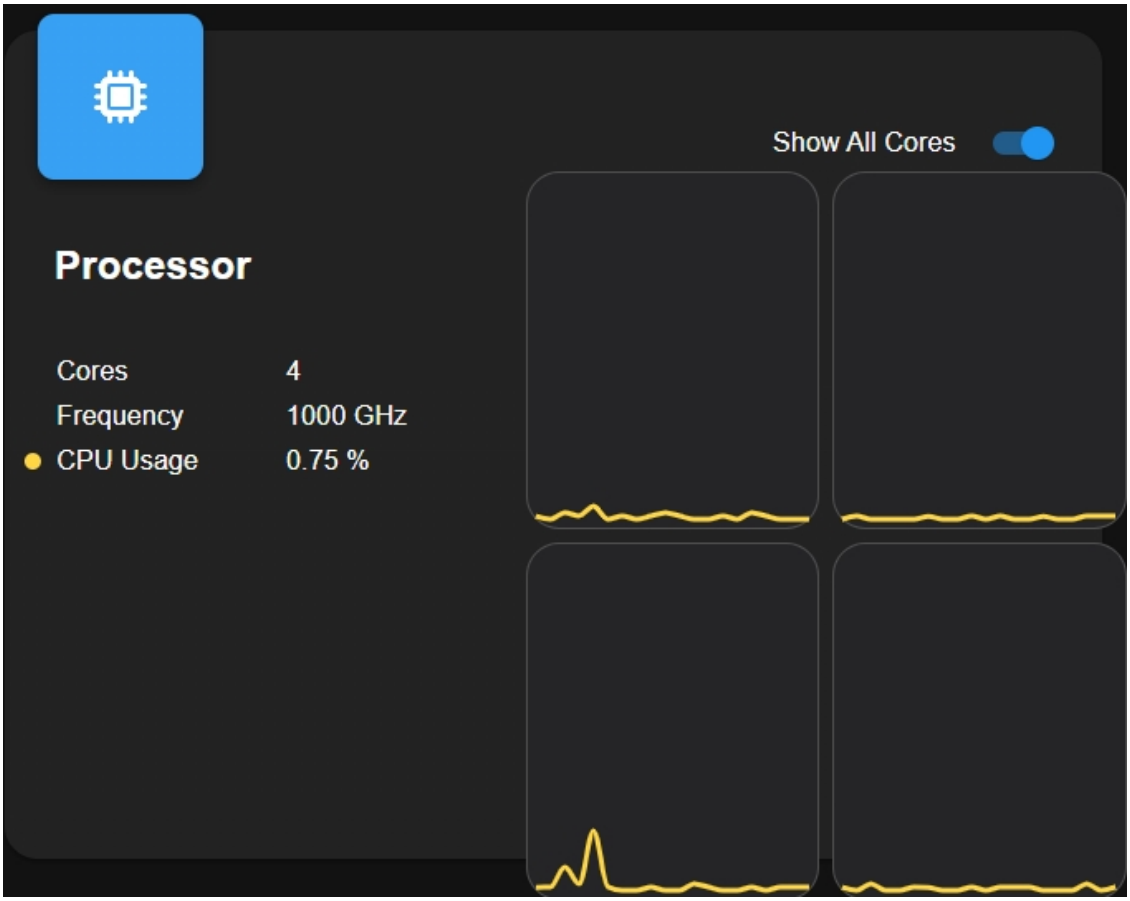
– **Storage**: Displays the storage capacity of a Raspberry Pi, showing various disk partitions with their used and available space.



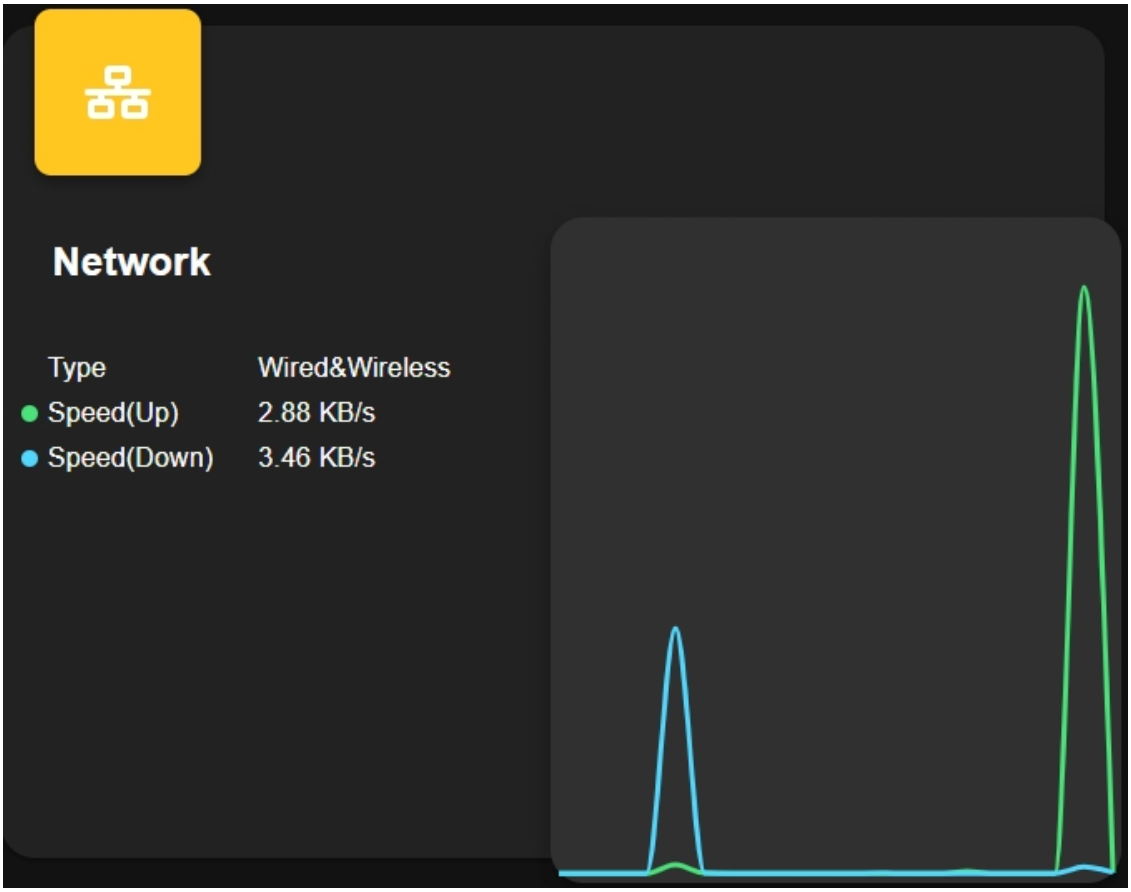
- **Memory**: Shows the Raspberry Pi's RAM usage and percentage.



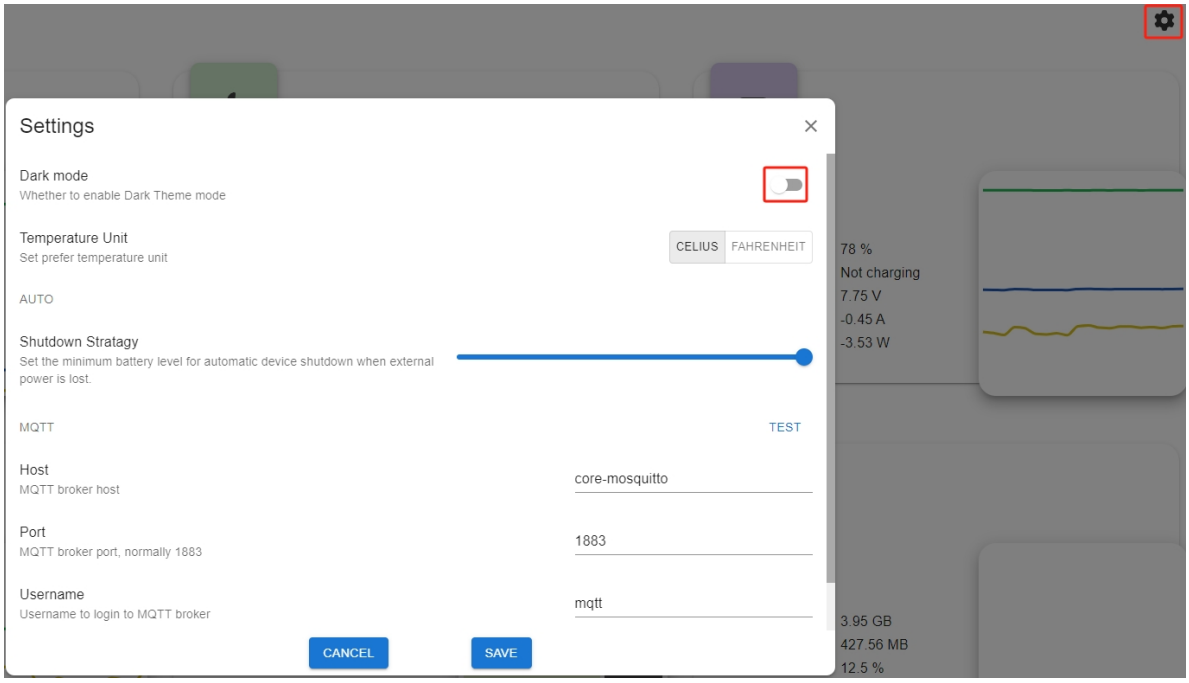
– **Processor**: Illustrates the Raspberry Pi's CPU performance, including the status of its four cores, operating frequencies, and CPU usage percentage.



– **Network**: Displays the current network connection type, upload, and download speeds.



- You can also switch this page to a white mode.



7.5 5. Home Assistant MQTT Integration

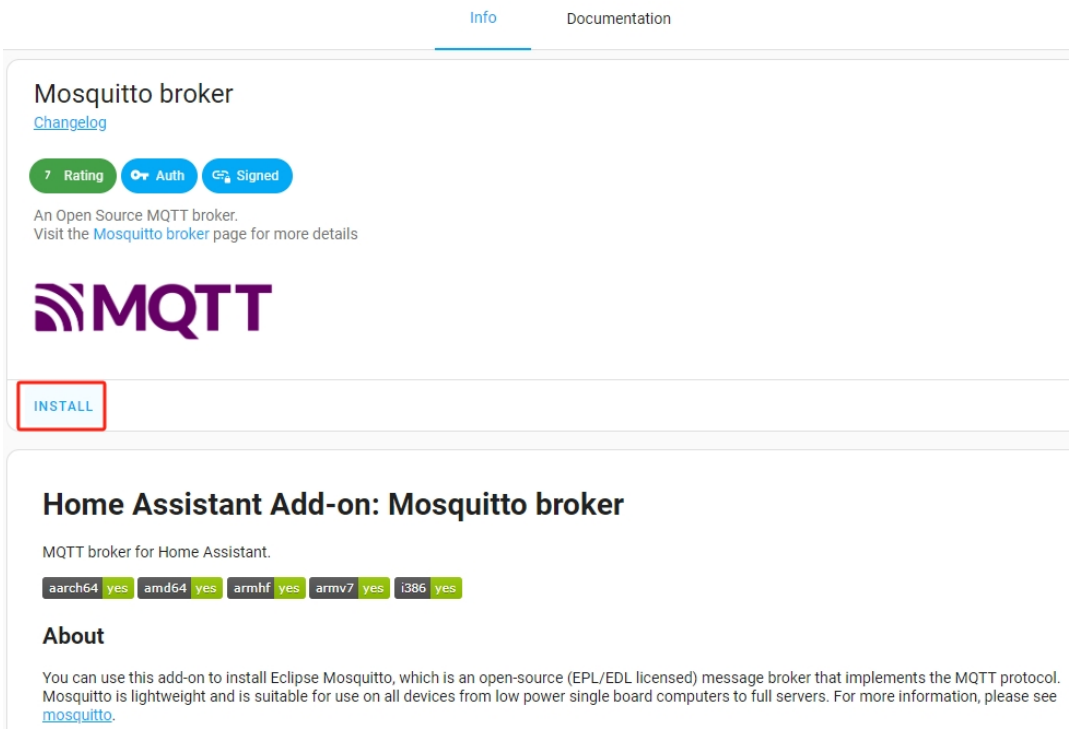
Here, we will guide you through the essential steps required to set up MQTT (Message Queuing Telemetry Transport) within your Home Assistant environment. MQTT is a crucial protocol often used for IoT devices and home automation. By following these steps, you'll seamlessly integrate MQTT into your Home Assistant system, allowing for efficient communication and control.

Since MQTT operates within your local network, it's not limited to running Home Assistant on the same Raspberry Pi as the Pironman U1. If you have a separate Home Assistant server or Pironman U1 is running on a different system, you can still configure Home Assistant to monitor Pironman U1.

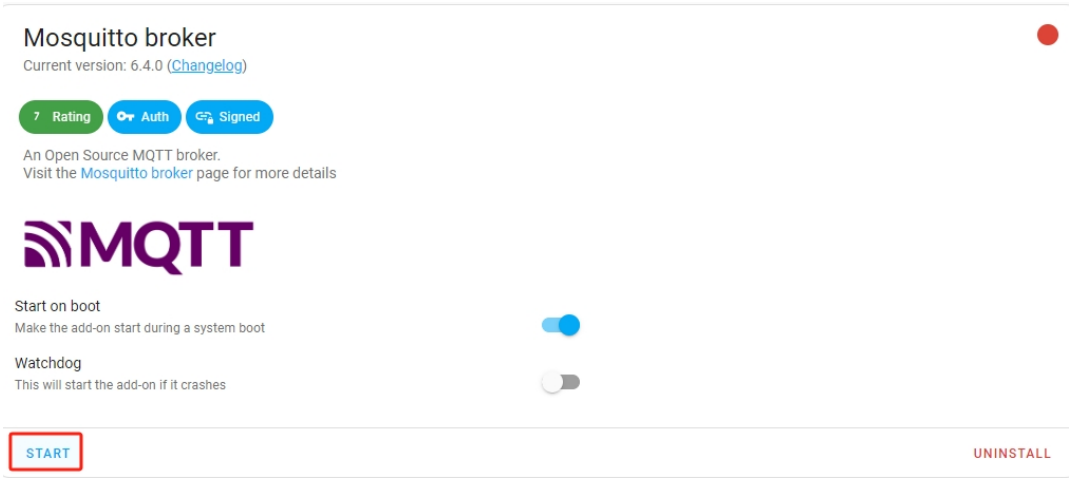
1. Installing MQTT on Home Assistant

1. Click the button to navigate to the **Mosquitto broker** homepage.

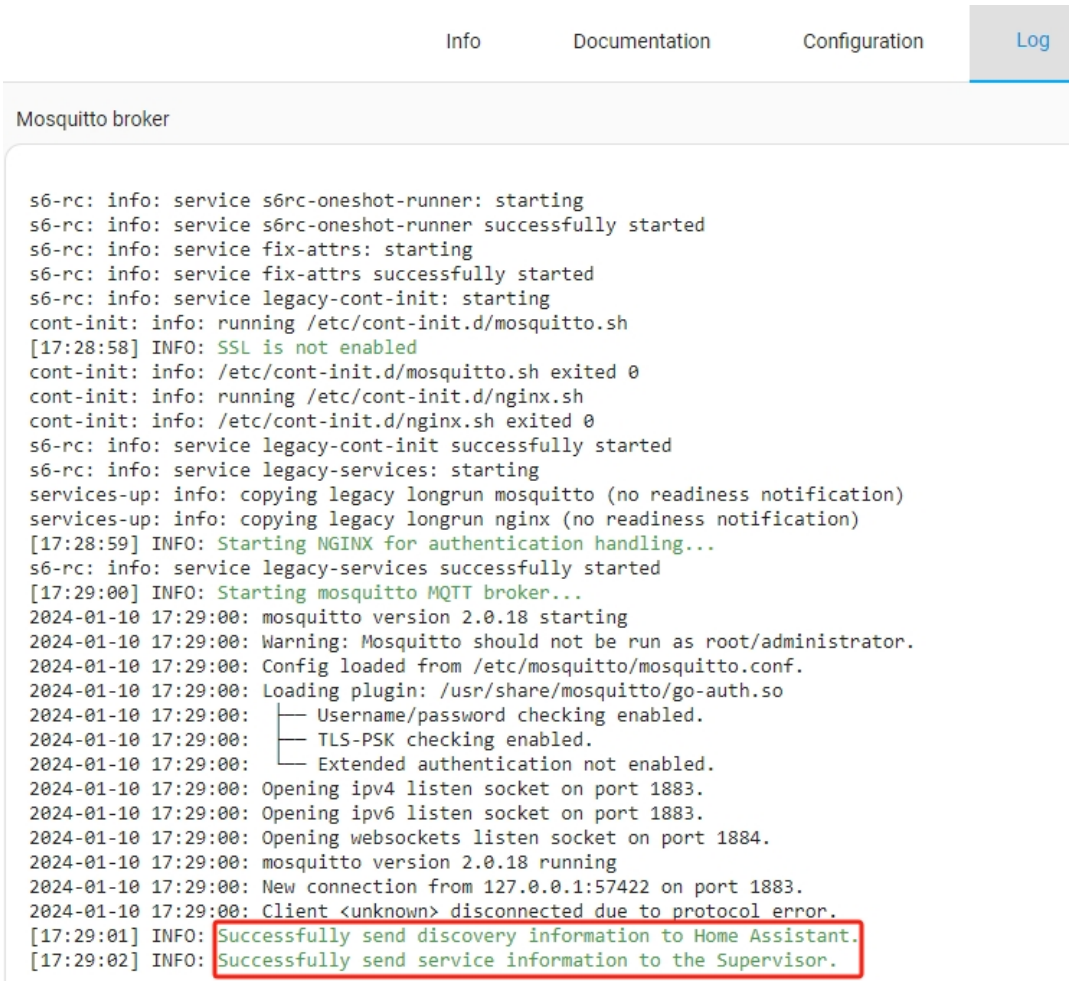
2. Click to **INSTALL** the Mosquitto broker.



3. After installation, click **START**.



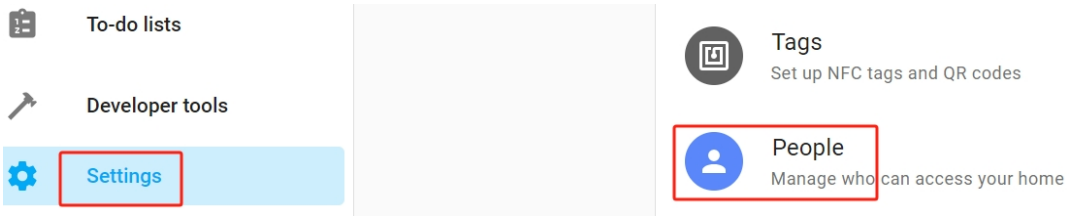
4. Wait for it to start up, then check the log tab for errors. Logs do not auto-refresh, so you need to manually refresh. Successful startup logs should look like this:



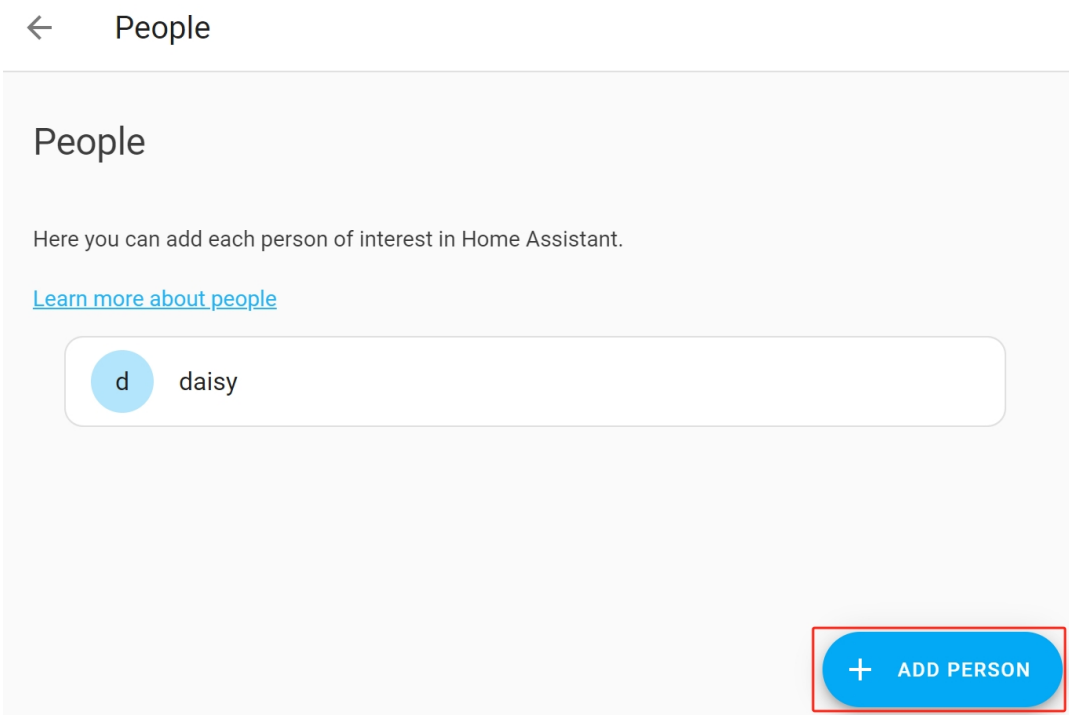
2. Adding a Dedicated User for MQTT

Create a separate account specifically for MQTT access.

1. Click the **Settings** button, then select **People**.



2. Click **ADD PERSON**.

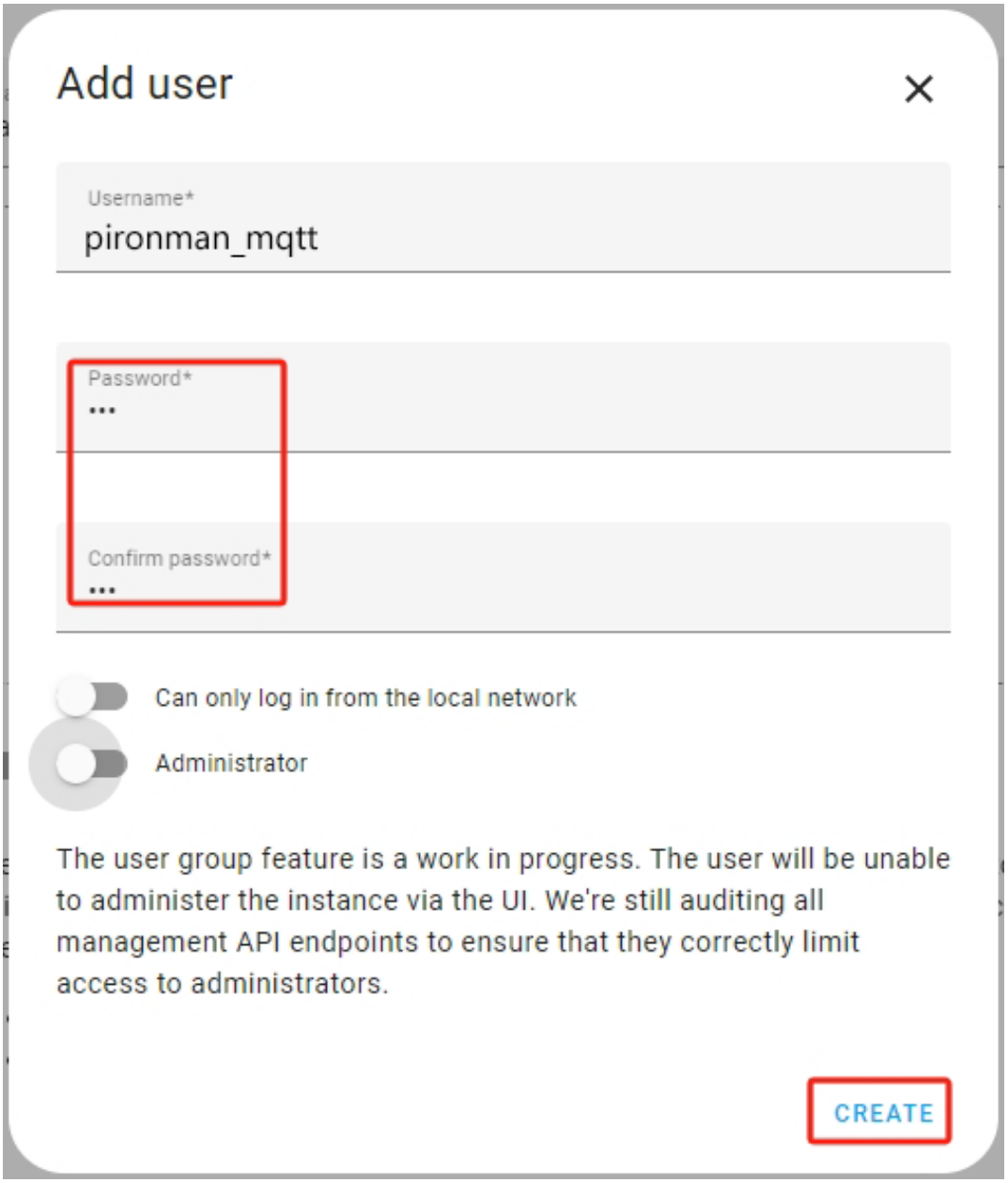


3. Enter a **Name**, and make sure to check **Allow person to login**.

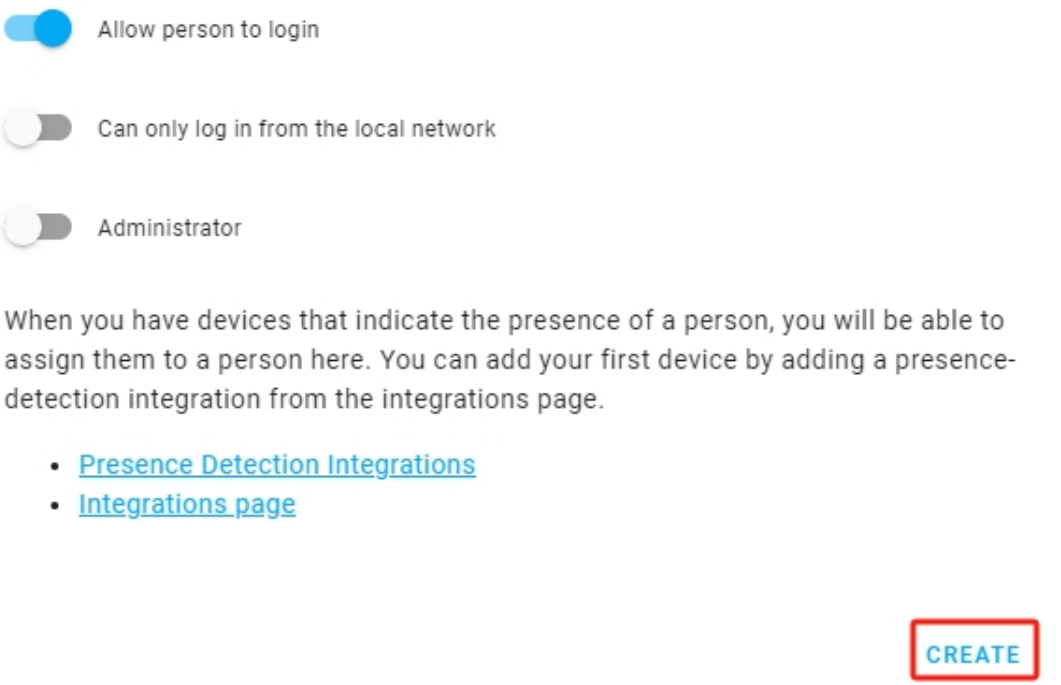
Note:

- The name cannot be `homeassistant` or `addons`, as these are reserved usernames.
- If you can't see the option to create a new user, ensure that **Advanced Mode** is enabled in your Home Assistant profile.

4. In the popup, enter a password, confirm it, and then click **CREATE**.

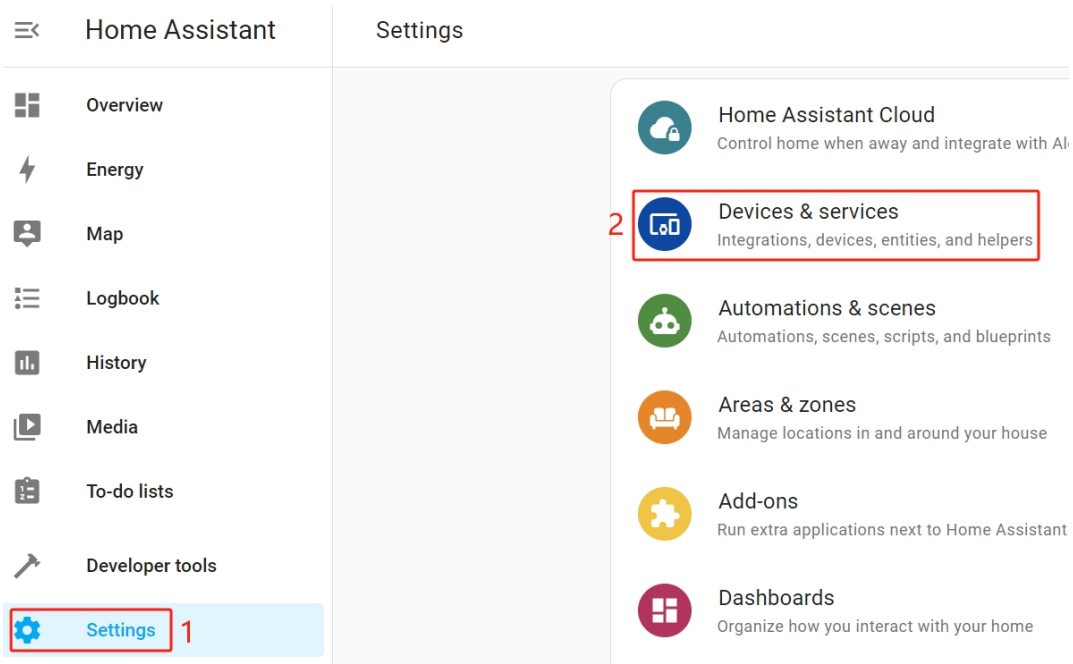


5. Finally, click **CREATE** again to finish adding the user.

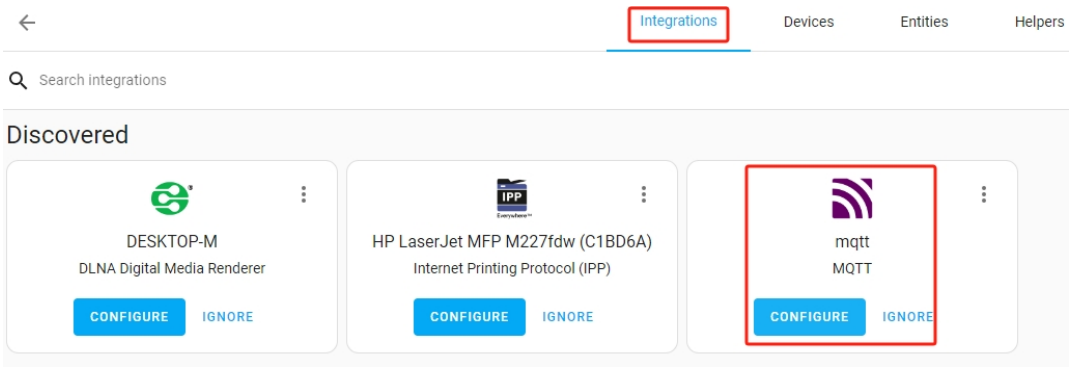


3. Adding MQTT Integration

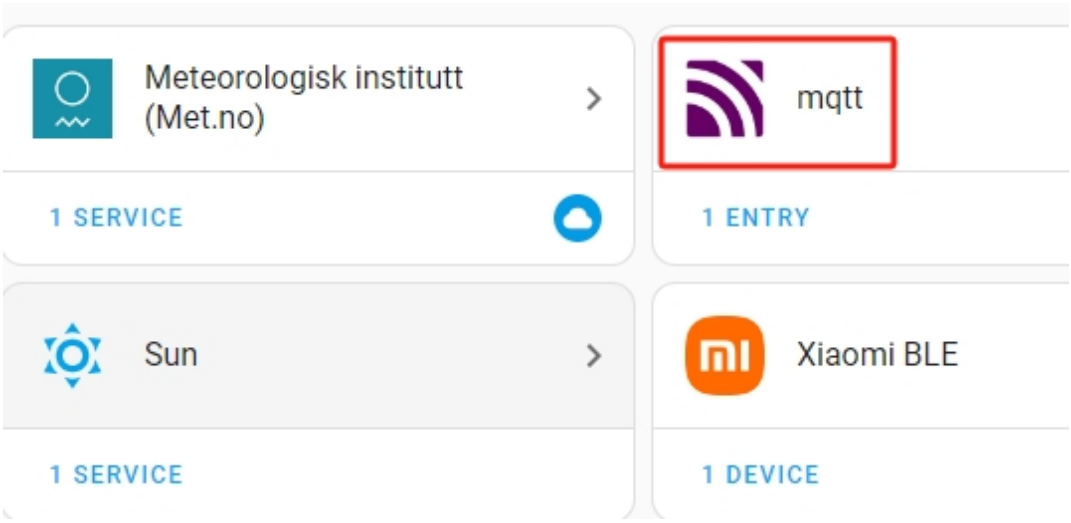
1. Navigate to **Settings** -> **Devices & Services**.



2. On the **Integrations** page, you should see the MQTT integration.



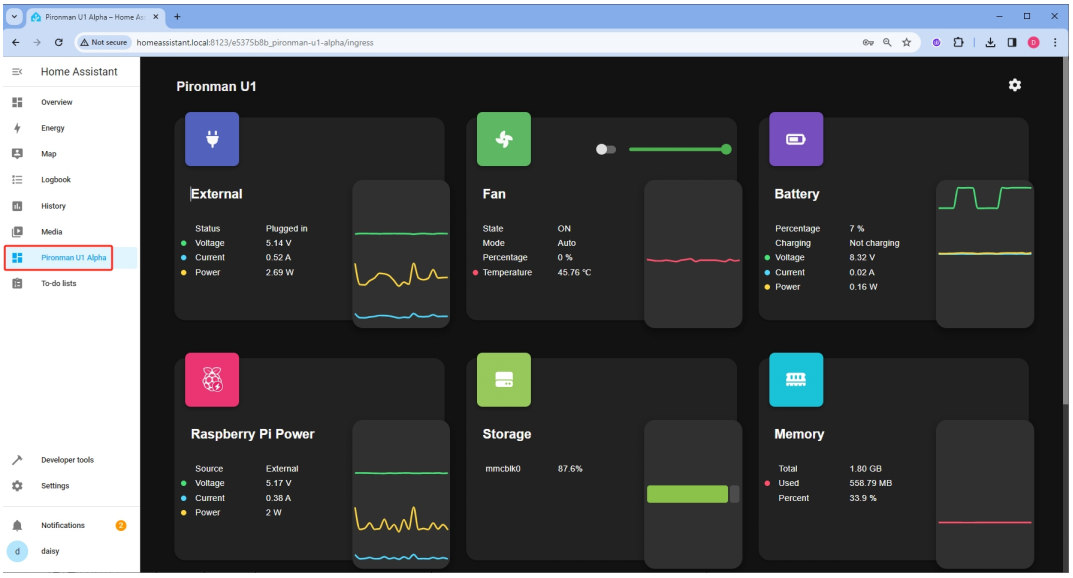
3. Click **CONFIGURE** -> **SUBMIT** -> **FINISH**. Afterward, you will see **mqtt** under **Configured**.



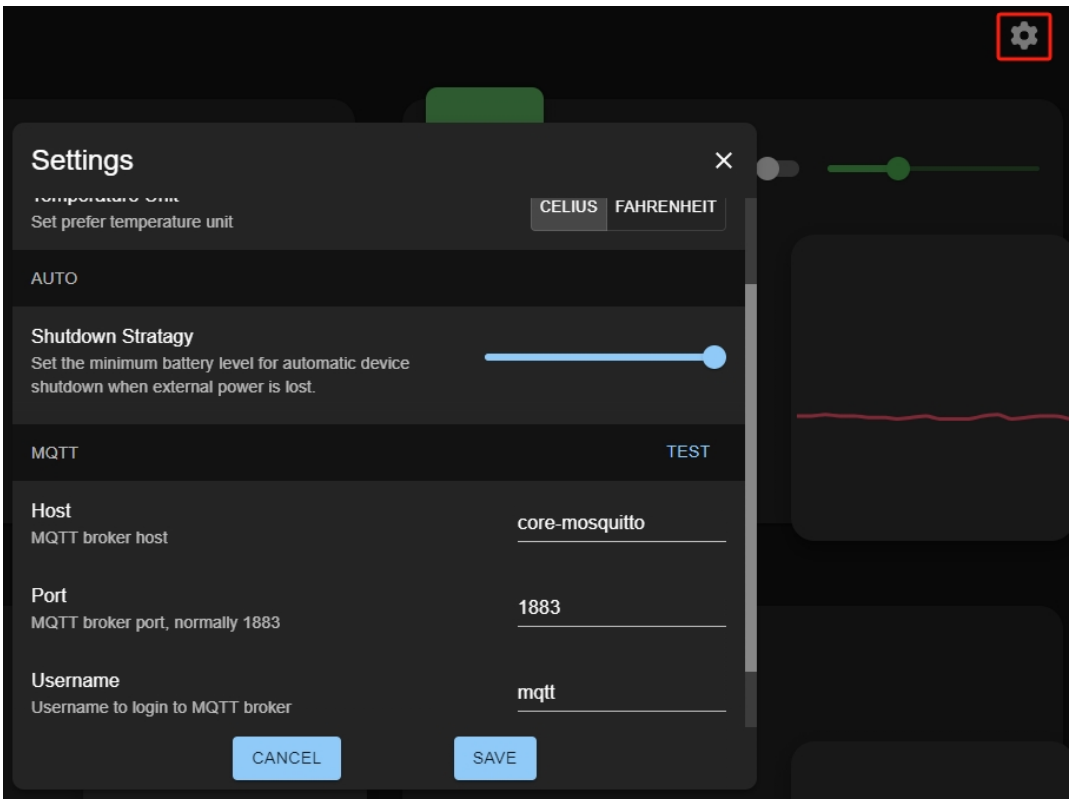
4. Configuring MQTT Using the Dashboard

To set up MQTT for Pironman U1, you have two options: configuring it through the dashboard or via the command line. We recommend using the dashboard for ease of use.

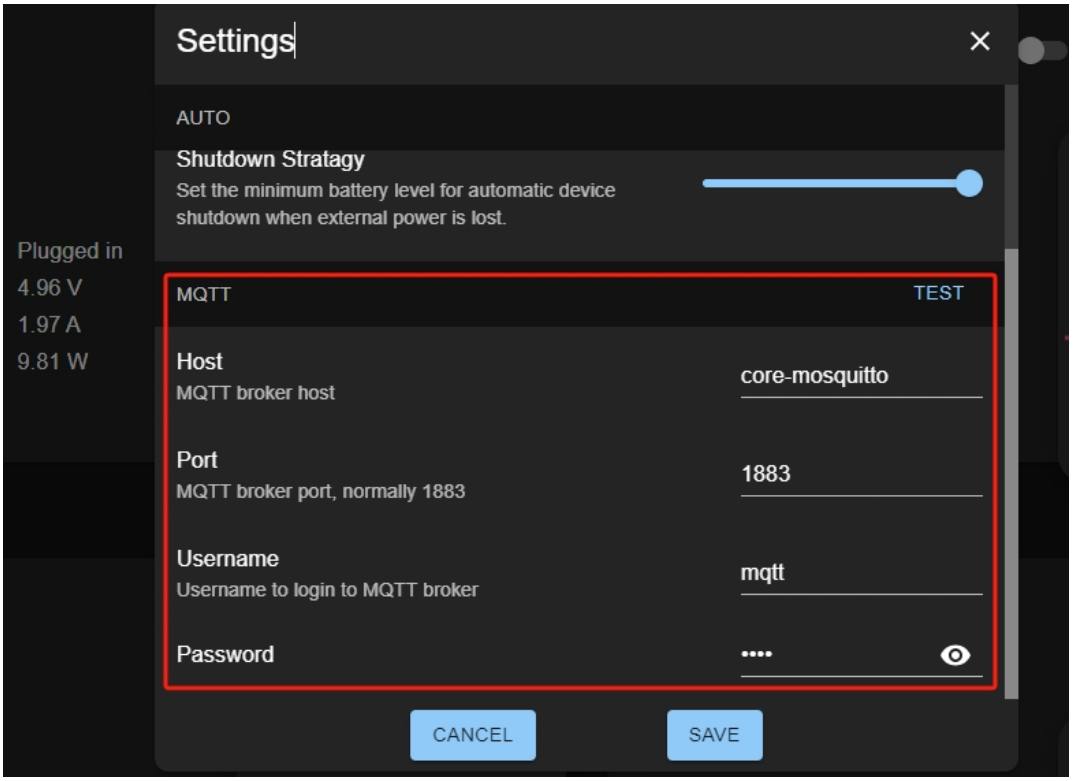
1. If you select the **Show in sidebar** option in the Pironman U1 add-on and then refresh the webpage, you will be able to open the Pironman U1 dashboard from the sidebar.



2. Click on the settings icon located in the upper right corner.

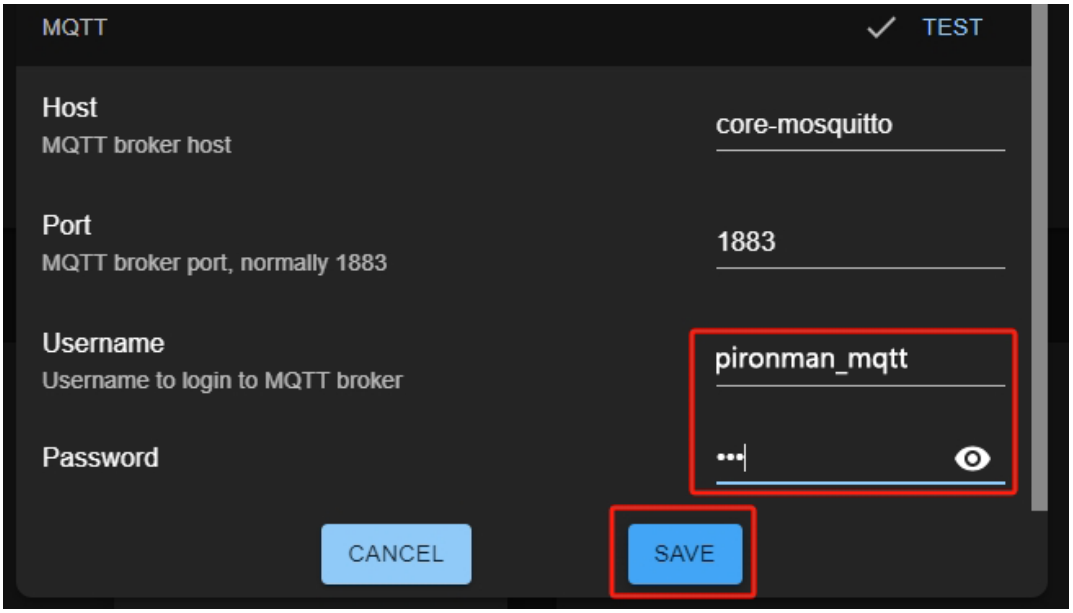


3. Here are some MQTT parameters you need to configure:



- The default value for host is `core_mosquitto`. If your Home Assistant is on Pironman U1, leave it as is; it points directly to the Home Assistant's MQTT plugin. If it's on another Home Assistant server, enter that server's hostname or IP.
- The default value for port is `1883`. You can leave this unchanged unless you've modified the MQTT broker's settings.
- Fill in the `username` and `password` you created earlier.

4. Then click on the **TEST** button next to MQTT to test the connection to the MQTT server. A checkmark (✓) will appear if the connection is successful. If it fails, you'll see an error message: "Connection failed, Check hostname and port." Make sure your MQTT Addon is running correctly.



5. You can now view data for Pironman U1's battery, fan, and other data in the **Overview**.

Configuring MQTT via Command Line

If your Home Assistant is not installed on Pironman U1, you can configure MQTT using the command line.

Replace the placeholders in the following command with your desired values for `host`, `username`, and `password`. Use the `username` and `password` you created earlier. Running this command will restart the service.

```
/opt/spc/spc_server \
--mqtt-host <hostname or ip> \
--mqtt-port 1883 \
--mqtt-username <username> \
--mqtt-password <passowrd> \
restart
```

After the service restarts, you can add Pironman U1's sensors to the dashboard.

CHAPTER

EIGHT

7. APPENDIX

8.1 Get the IP address

There are many ways to know the IP address, and two of them are listed as follows.

Checking via the router

If you have permission to log in the router(such as a home network), you can check the addresses assigned to Raspberry Pi on the admin interface of router.

The default hostname of the Raspberry Pi OS is raspberrypi, and you need to find it. (If you are using ArchLinuxARM system, please find alarmpi.)

Network Segment Scanning

You can also use network scanning to look up the IP address of Raspberry Pi. You can apply the software, **Advanced IP scanner** and so on.

Scan the IP range set, and the name of all connected devices will be displayed. Similarly, the default hostname of the Raspberry Pi OS is raspberrypi, if you haven't modified it.

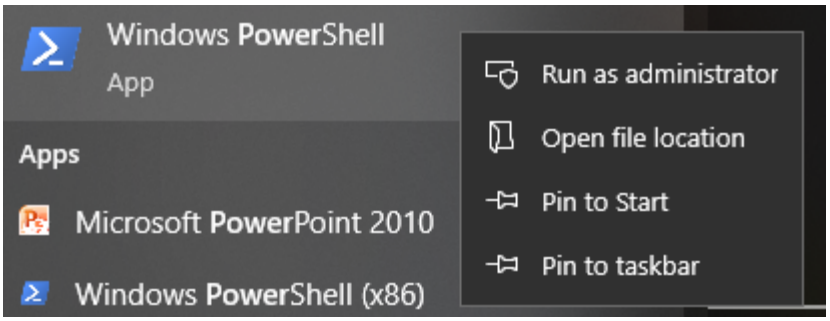
8.2 Install OpenSSH via Powershell

When you use `ssh <username>@<hostname>.local` (or `ssh <username>@<IP address>`) to connect to your Raspberry Pi, but the following error message appears.

```
ssh: The term 'ssh' is not recognized as the name of a cmdlet, function,␣
↪script file, or operable program. Check the
spelling of the name, or if a path was included, verify that the path is␣
↪correct and try again.
```

It means your computer system is too old and does not have OpenSSH pre-installed, you need to follow the tutorial below to install it manually.

1. Type `powershell` in the search box of your Windows desktop, right click on the `Windows PowerShell`, and select `Run as administrator` from the menu that appears.



2. Use the following command to install `OpenSSH.Client`.

```
Add-WindowsCapability -Online -Name OpenSSH.Client~~~~0.0.1.0
```

3. After installation, the following output will be returned.

```
Path          :
Online        : True
RestartNeeded : False
```

4. Verify the installation by using the following command.

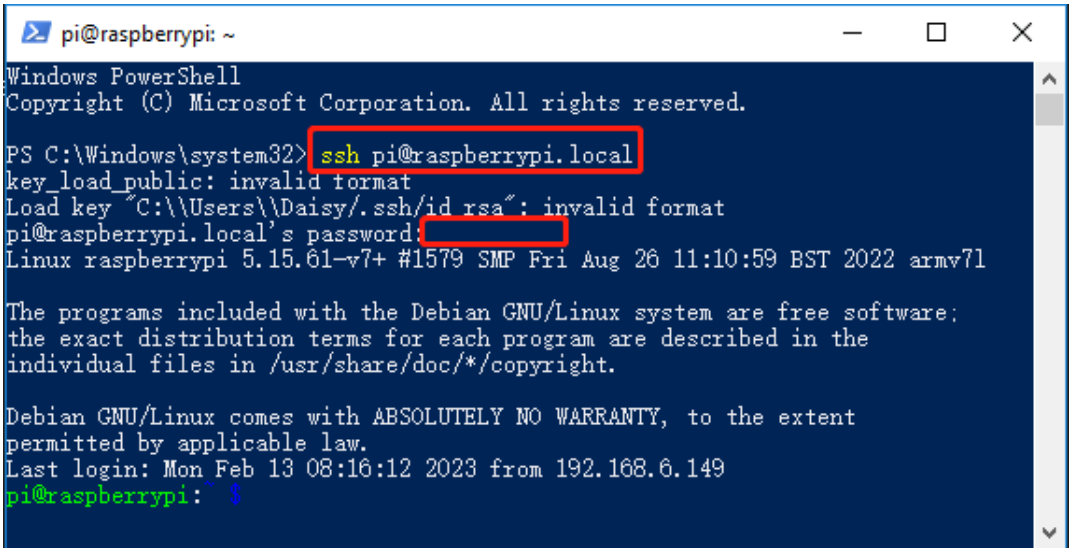
```
Get-WindowsCapability -Online | Where-Object Name -like 'OpenSSH*'
```

5. It now tells you that `OpenSSH.Client` has been successfully installed.

```
Name  : OpenSSH.Client~~~~0.0.1.0
State : Installed

Name  : OpenSSH.Server~~~~0.0.1.0
State : NotPresent
```

> **Warning:** If the above prompt does not appear, it means that your Windows system is still too old, and you are advised to install a third-party SSH tool, like *PuTTY*.

6. Now restart PowerShell and continue to run it as administrator. At this point you will be able to log in to your Raspberry Pi using the `ssh` command, where you will be prompted to enter the password you set up earlier.



8.3 PuTTY

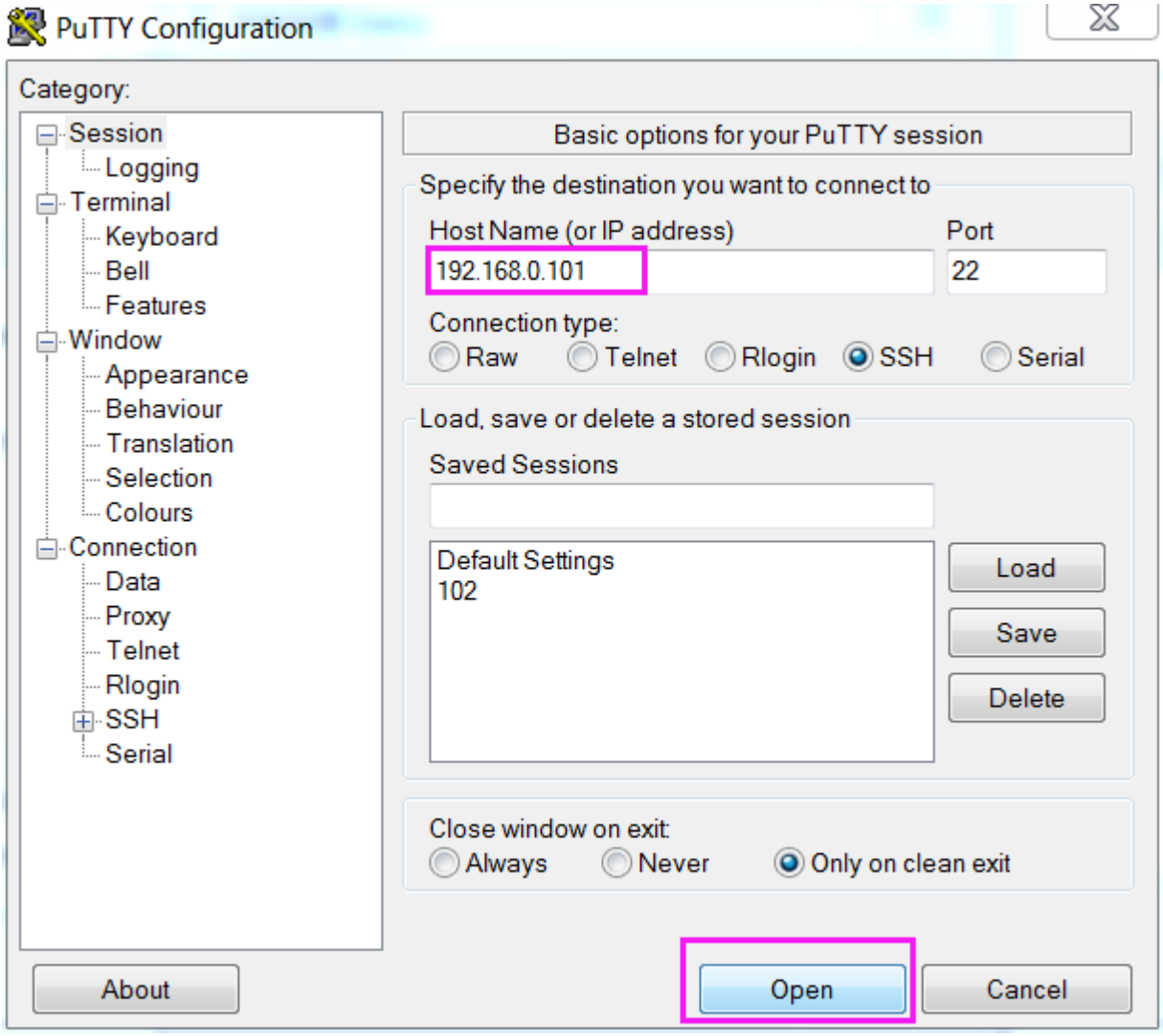
If you are a Windows user, you can use some applications of SSH. Here, we recommend PuTTY.

Step 1

Download PuTTY.

Step 2

Open PuTTY and click **Session** on the left tree-alike structure. Enter the IP address of the RPi in the text box under **Host Name (or IP address)** and **22** under **Port** (by default it is 22).



Step 3

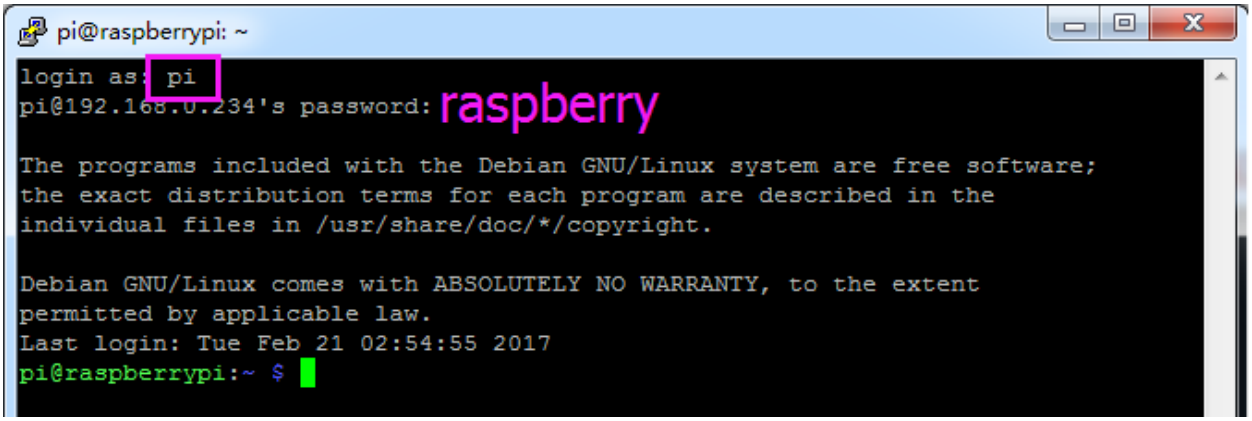
Click **Open**. Note that when you first log in to the Raspberry Pi with the IP address, there prompts a security reminder. Just click **Yes**.

Step 4

When the PuTTY window prompts "**login as:**", type in "**pi**" (the user name of the RPi), and **password**: "raspberry" (the default one, if you haven't changed it).

Note: When you input the password, the characters do not display on window accordingly, which is normal. What you need is to input the correct password.

If inactive appears next to PuTTY, it means that the connection has been broken and needs to be reconnected.



Step 5

Here, we get the Raspberry Pi connected and it is time to conduct the next steps.