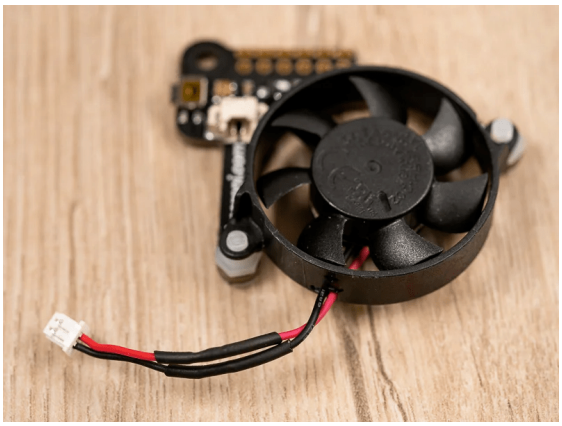
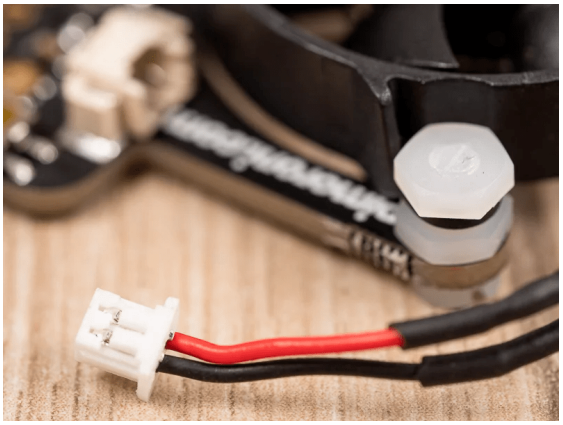
Raspberry Pi fan SHIM installation and setup

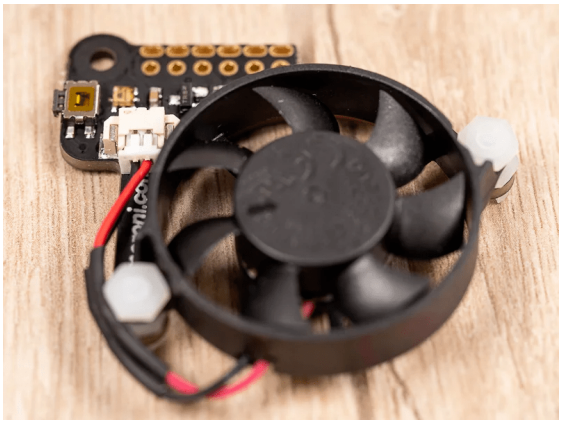
1. Assembling and mounting fan SHIM

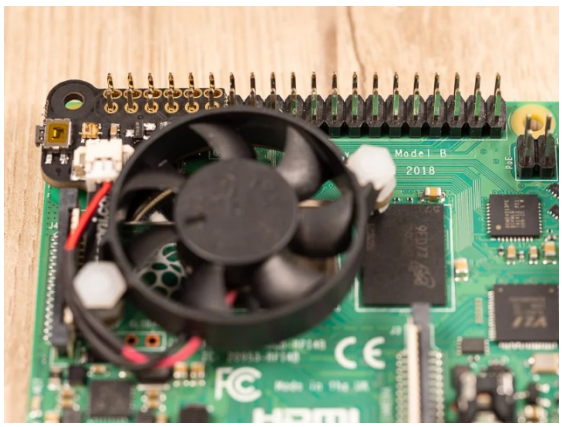
Do this with your Pi shut down and powered off, i.e. with the power supply not plugged in, just in case you make a mistake when you're mounting it.





All you have to do is to carefully slip the Fan SHIM down (don't push the fan) onto the GPIO pins on your Pi.





Caution: Make sure that get the Fan SHIM on the correct pins and that you don't accidentally

shift them over one pin to the left or one row down, or you're highly likely to damage your Fan SHIM and possibly your Pi.

2. Install the fan SHIM software

```
git clone https://github.com/pimoroni/fanshim-python

cd fanshim-python

sudo ./install.sh
```

3. set the temperature thresholds

```
cd examples

sudo ./install-service.sh --on-threshold 65 --off-threshold 55 --delay 2
```

turns the fan on at 65°C and cools it down until 55°C is reached. The delay between that action takes 2 seconds (for more information https://github.com/pimoroni/fanshim-python/blob/master/examples/install-service.sh).

4. Additional commands

Stop the background script:

```
sudo systemctl stop pimoroni-fanshim.service
```

change thresholds:

```
sudo systemctl stop pimoroni-fanshim.service

sudo ./install-service.sh --on-threshold 75 --off-threshold 60 --delay 5
```

stop permanently:

```
sudo systemctl stop pimoroni-fanshim.service

sudo systemctl disable pimoroni-fanshim.service
```

re-enable the service again:

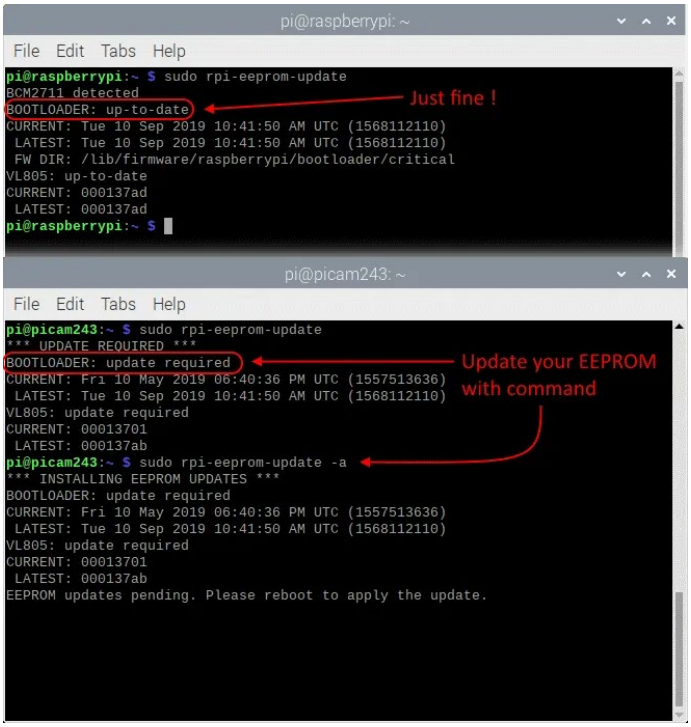
```
sudo systemctl enable pimoroni-fanshim.service

sudo systemctl start pimoroni-fanshim.service
```

Increase performance

1. EEPROM check (decrease temperature of CPU)

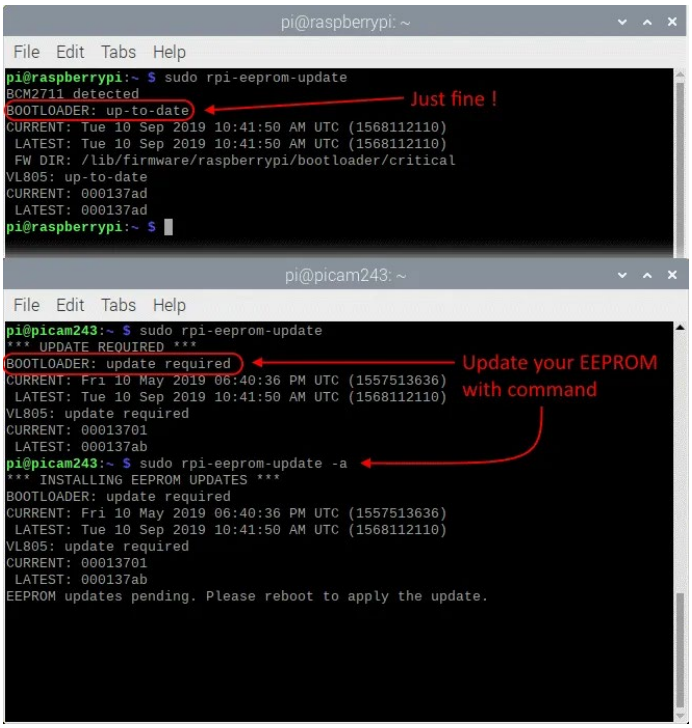
```
sudo rpi-eeprom-update
```



if update required:

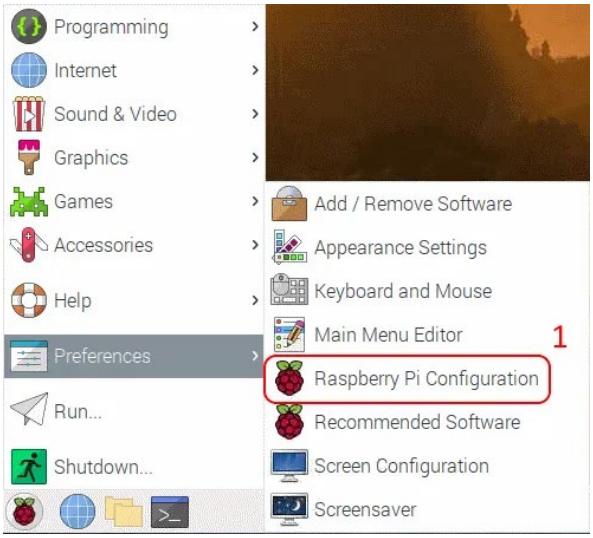
```
sudo rpi-eeprom-update -a
```

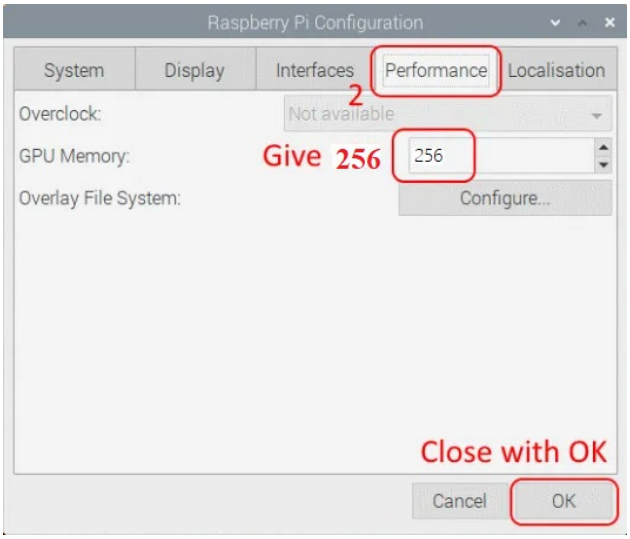
```
sudo reboot
```



2. GPU memory and frequency (only for intensive use e.g. ML projects)

only for **older OS** where legacy camera stack (old camera system) is used:






```
sudo reboot
```

The physical RAM chip is used both by the CPU and the GPU. The Raspberry Pi 4 has a 76 Mbyte GPU memory size. It can be somewhat small for vision projects, better to change this now to 256 Mbyte or 512 Mbyte (depending on your task).

For the **new OS** (Bullseye) you need to increase the amount of CMA memory in the config.txt file:

```
sudo nano /boot/config.txt

dtoverlay=vc4-kms-v3d,cma-320 //320MB

or

dtoverlay=vc4-kms-v3d,cma-384  //384MB

or

dtoverlay=vc4-kms-v3d,cma-512  //512MB
```

Note: If you're using the *fkms* driver you can continue to use it

3. Increase Swap memory (only for RPI version > 8GB)

32 bit OS: https://qengineering.eu/install-opencv-4.5-on-raspberry-pi-4.html

64 bit OS: https://qengineering.eu/install-raspberry-64-os.html

4. Overclock the CPU (recommended only with heat sinks and fan)

Enter the config file:

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

Add your lines where the cpu frequency is set to default (700 MHz):

```
over_voltage=3

arm_freq=1850

gpu_freq=550 (max. 650 recommended by Q-engineering)
```

make sure under [pi4]:

```
arm_boost=1
```

save the config file and then reboot:

```
sudo reboot
```

Recommendations for clock and overvoltage:

Clock (MHz)	**Overvoltage**	**Vcore**	**Max temp. (°C | °F)**	**Power (Watt)**	**Preformance increase**
1500	0	0.8625	82 | 180	7	default
1600	1	0.8875	80 | 176	7.6	6.6 %
1700	2	0.9125	78 | 172	8.3	13.3 %
1800	3	0.9375	77 | 170	8.9	20 %
1900	4	0.9625	75 | 167	9.5	26.6 %
2000	6	1.0125	72 | 162	11	33.3 %
2100	6	1.0125	72 | 162	11	40 %