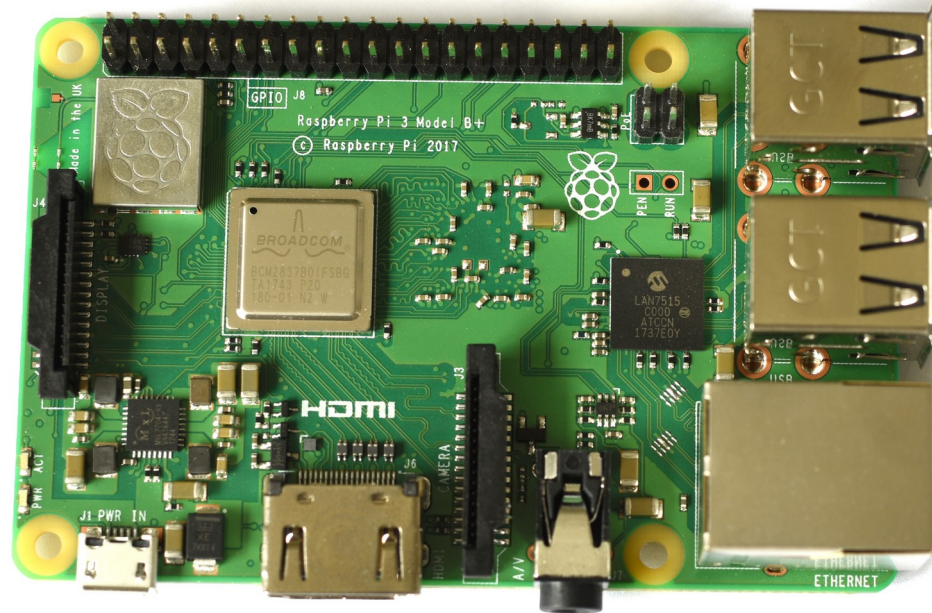


Geniale Tipps & Tricks zum Raspberry Pi



Martin Strohmayer

Grazer Linuxtage 2021

Raspberry Pi 4 Modell B

Broadcom BCM2711, Quad core Cortex-A72 (ARM v8) 64-bit SoC @ 1.5GHz
Inkl. Heatspreader

1Gb, 2GB, 4GB or 8GB LPDDR4-3200 SDRAM

Kontakte für PoE

LAN Chip

2 x USB 3.0

2 x USB 2.0

2 x Micro-HDMI

Neue Spannungsversorgung (PMIC)

USB-C (OTG)

2,4 GHz und 5 GHz
802.11b/g/n/ac WiFi
Bluetooth 5.0, BLE
(Modular Compliance
Certificate)



Performance

<https://magpi.raspberrypi.org/articles/raspberry-pi-4-specs-benchmarks>

WLAN (AC 5 GHz) [Mbps]

Raspberry Pi 3+	98	
Raspberry Pi 4	114	~15%

LAN [Mbps]

Raspberry Pi 2/3	95	
Raspberry Pi 3+	237	
Raspberry Pi 4	943	x4

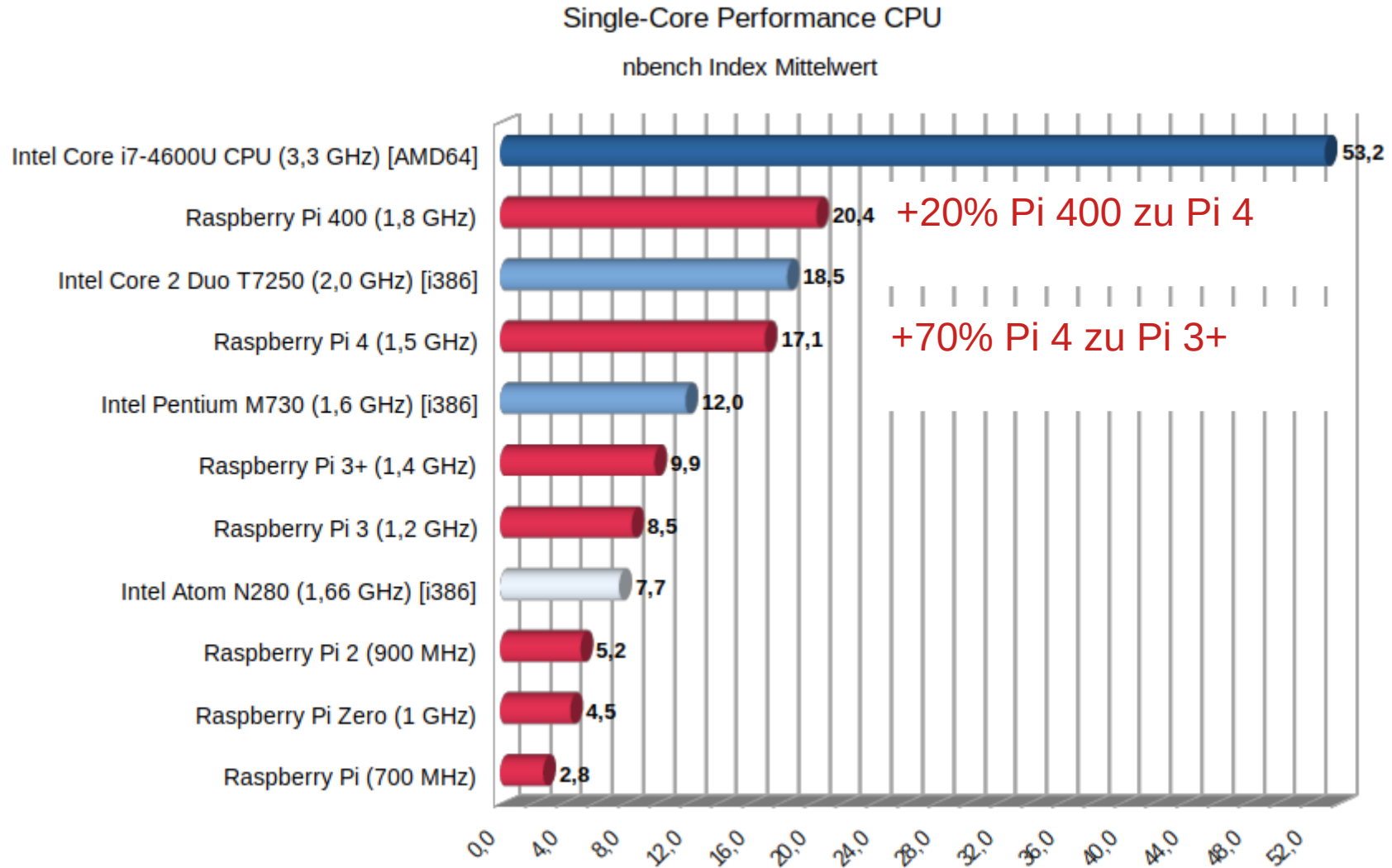
CPU Linpack [SP, MIPS]

Raspberry Pi 3+	226	
Raspberry Pi 4	925	x4

Leistungsaufnahme Max [Watt]

Raspberry Pi 3+	5,4	
Raspberry Pi 4	7,6	+40%

CPU Performance



Raspberry Pi Compute Module 4

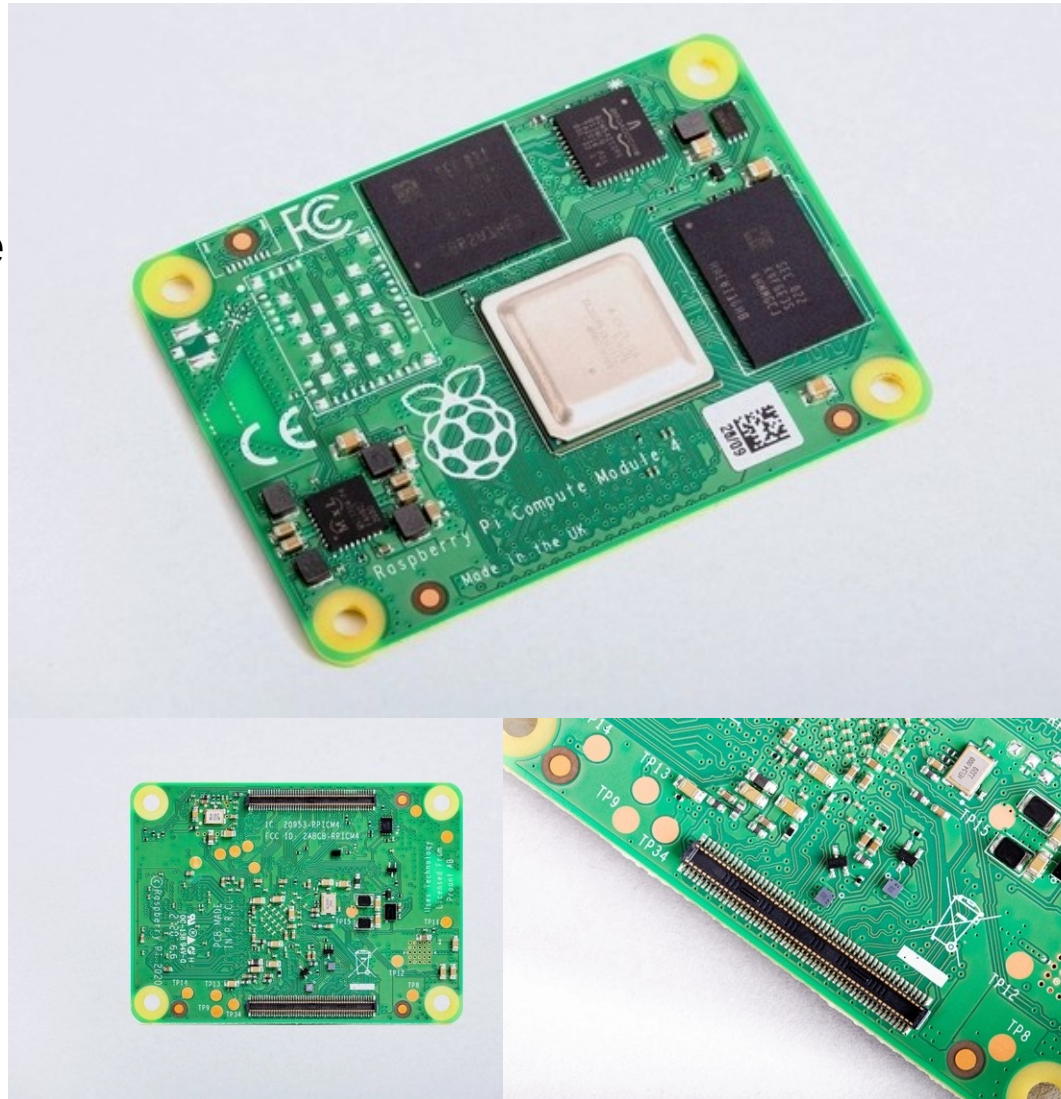
<https://www.raspberrypi.org/products/compute-module-4/>

Broadcom BCM2711, Quad core Cortex-A72 (ARM v8) 64-bit SoC @ 1.5GHz

Inkl. Heatspreader

1Gb, 2GB, 4GB or 8GB LPDDR4-3200 SDRAM

2,4 GHz und 5 GHz
802.11b/g/n/ac WiFi
Bluetooth 5.0, BLE
(Modular Compliance
Certificate)



Optional
eMMC Flash Memory
8GB, 16GB oder 32GB

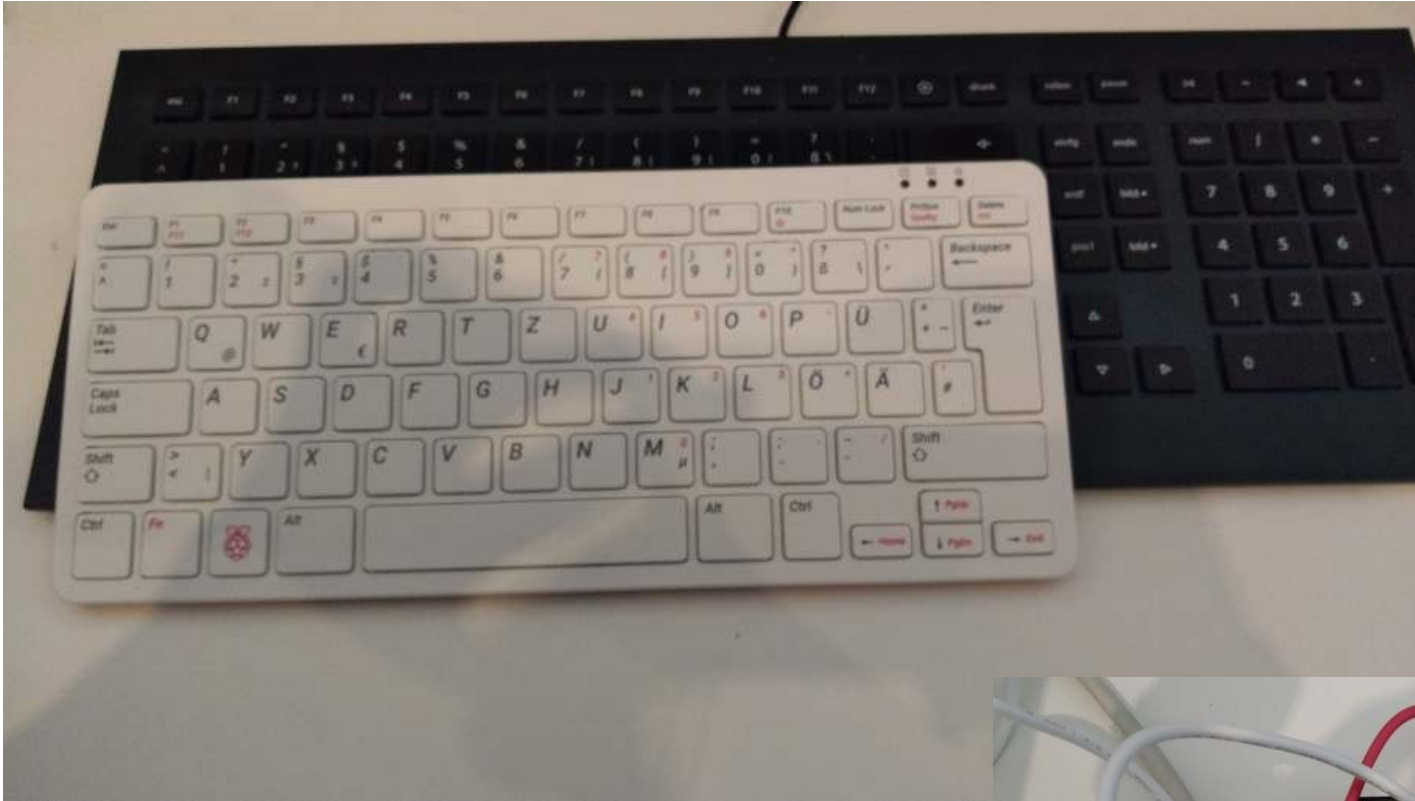
Compute Module 4 IO Board

<https://www.raspberrypi.org/products/compute-module-4-io-board/>



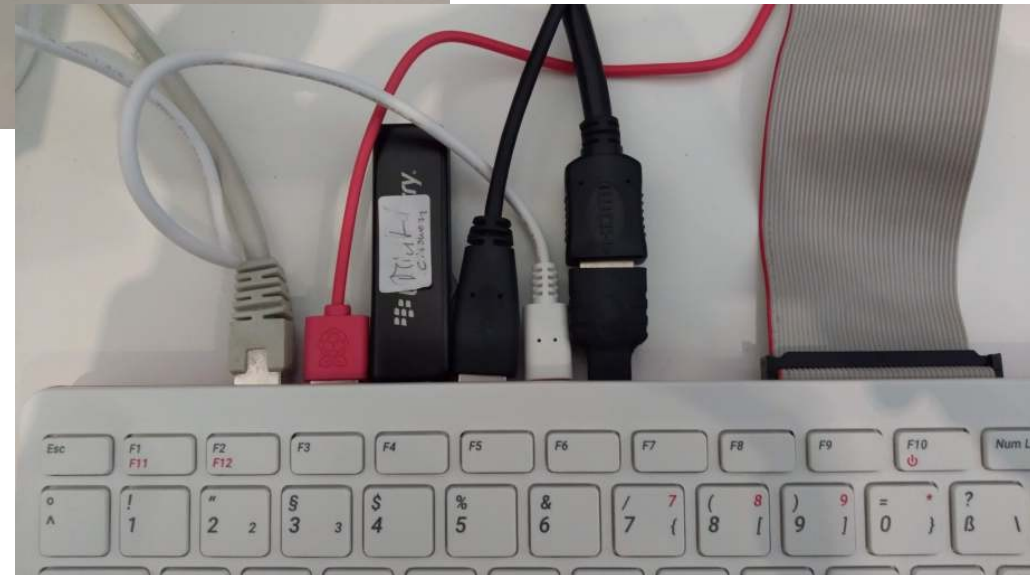
Raspberry Pi 400

<https://www.raspberrypi.org/products/raspberry-pi-400/>



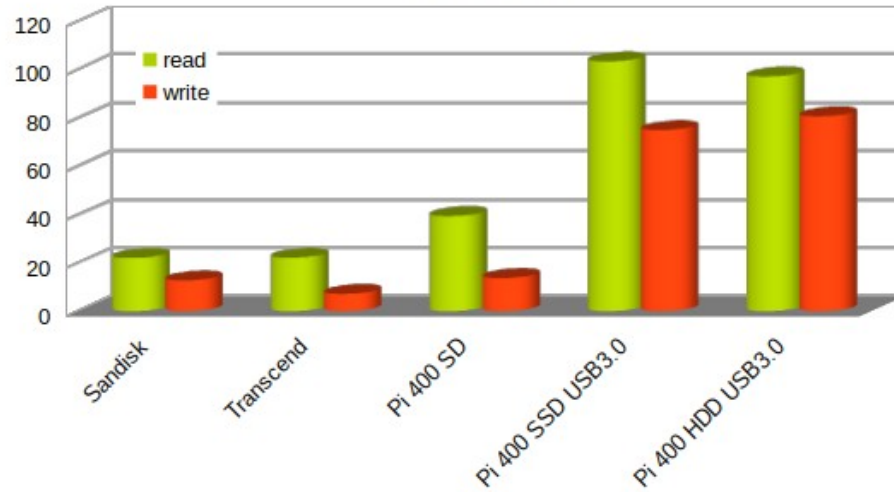
- Keine Kamera Anschluss
- Keine Display Anschluss
- 1 x USB 2.0 weniger

- Raspberry Pi 4 mit 1,8 GHz
- Im Tastaturgehäuse
- Integrierte passive Kühllösung

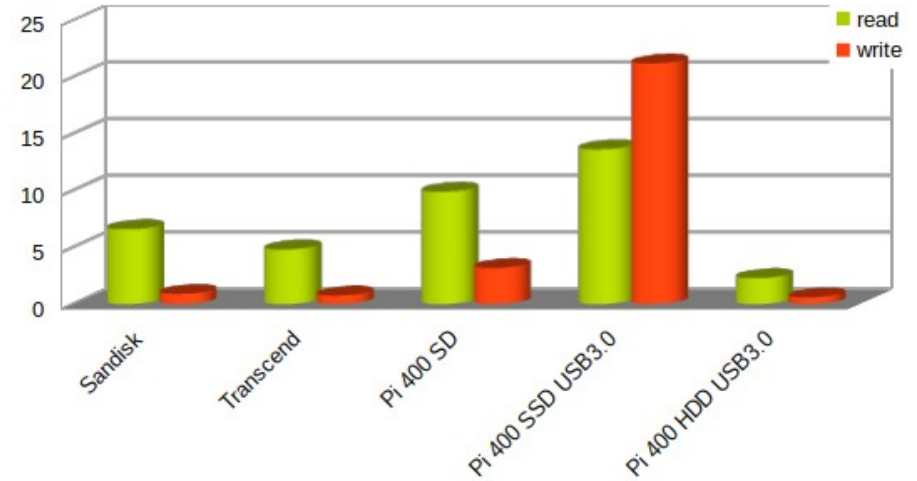


Raspberry Pi 400

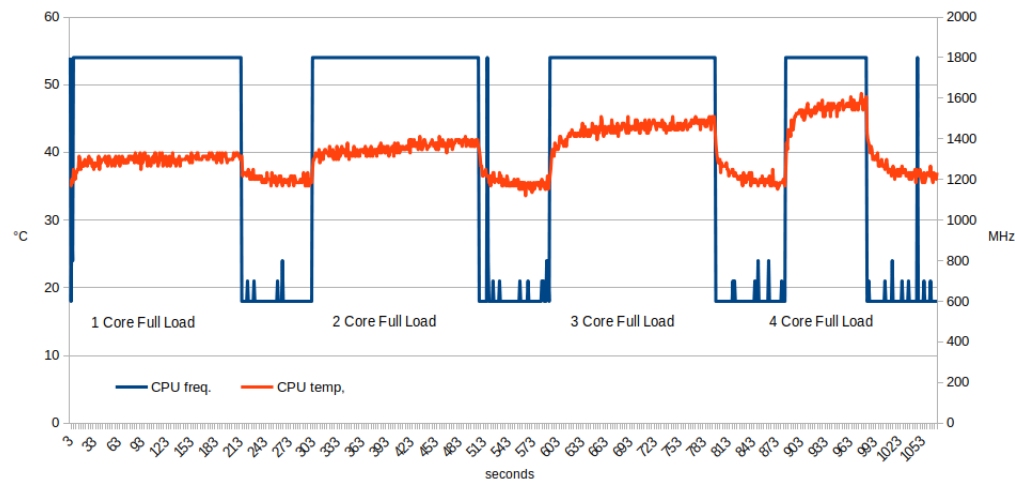
512 kB transfer



4 kB random transfer



Pi 400 temperature with full load condition
20,5 °C ambient temp



Raspberry Pi Pico

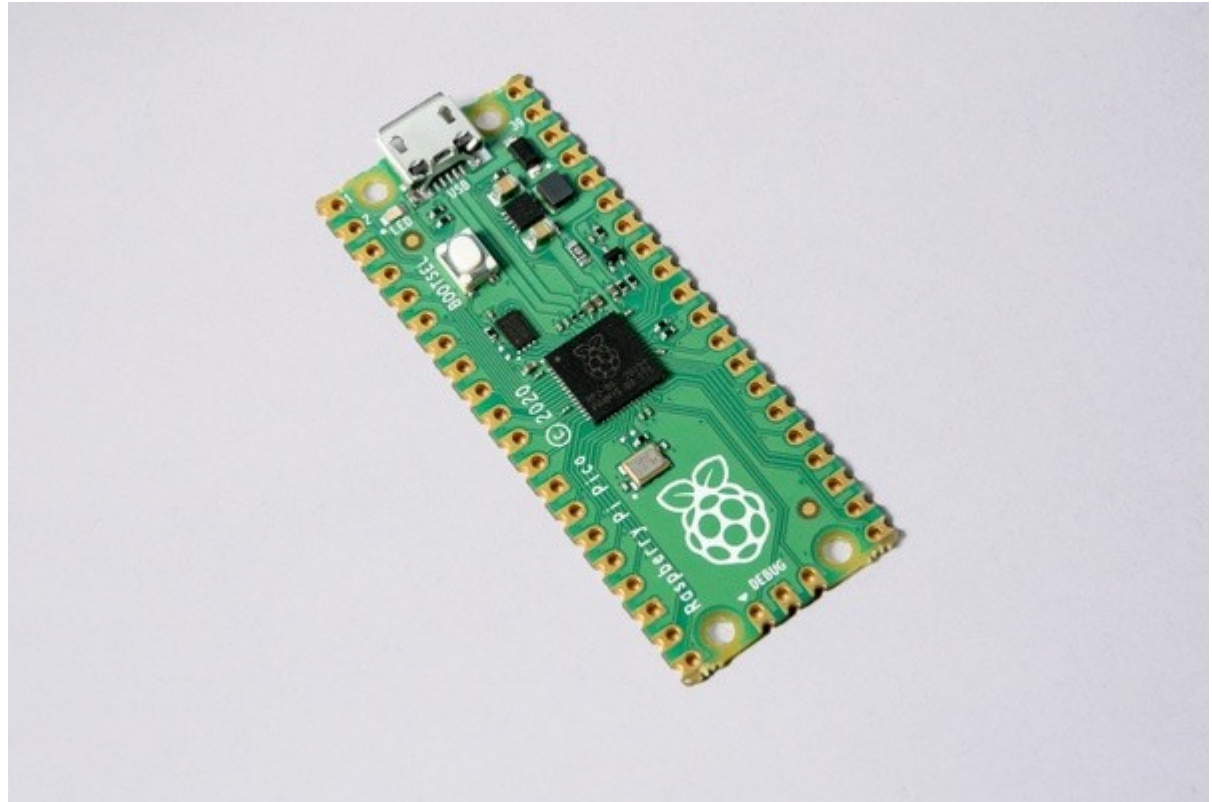
<https://www.raspberrypi.org/products/raspberry-pi-pico/>

Dual-Core ARM Cortex-M0+
133 MHz
264 KB internal RAM
2 MB Flash Memory

26 GPIO pins

2× SPI
2× I2C
2× UART
3× 12-bit ADC
16× PWM

8× Programmable IO (PIO)



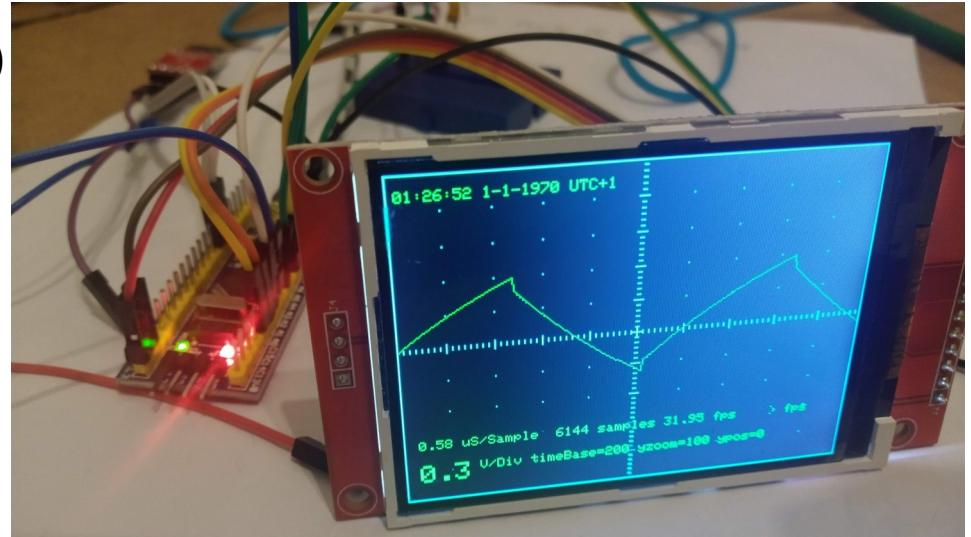
<https://kofler.info/raspberry-pi-pico-micropython-programmierung/>

Pi Pico Alternativen

<https://www.raspberrypi.org/products/raspberry-pi-pico/>

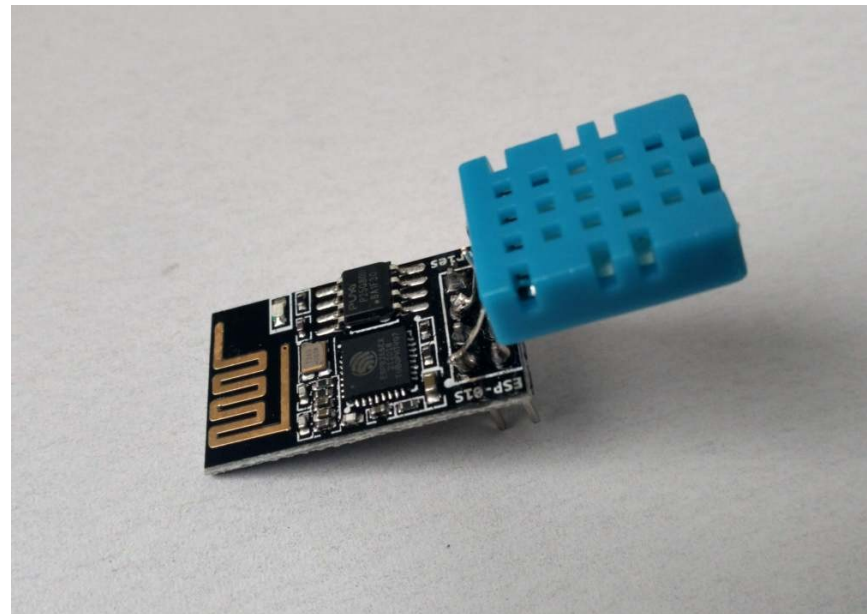
- STMicroelectronics STM32 F1 (Blue Pill)
 - ARM-Cortex-M3
 - 72 MHz
 - 20 KB RAM
 - 128 kB Flash

Ca. 2 Euro



- Espressif 8266 / ESP-01
 - L106 32-bit RISC microprocessor
 - 80 MHz
 - 80 KB RAM
 - 1 MB Flash (blau 512 kB)
 - **WiFi**

Ca. 2 Euro



Tipps für Programme

- raspi2png

<https://github.com/GrazerComputerClub/raspi2png>

- dispmanx_vnc https://github.com/patrikolausson/dispmanx_vnc

- Triggerhappy

- htop

<https://github.com/GrazerComputerClub/htop>

- Raspberry Pi Imager / USB Imager

<https://www.raspberrypi.org/software/>

<https://bztsrc.gitlab.io/usbimager/>

- SPI LCD-TFT

<https://github.com/juj/fbcp-ili9341>

Quellen

- Blog, Michael Kofler

<https://kofler.info/blog/>

- Youtube, Andreas Spiss (Schweizer)

https://www.youtube.com/channel/UCu7_D0o48KbfhpEohoP7YSQ

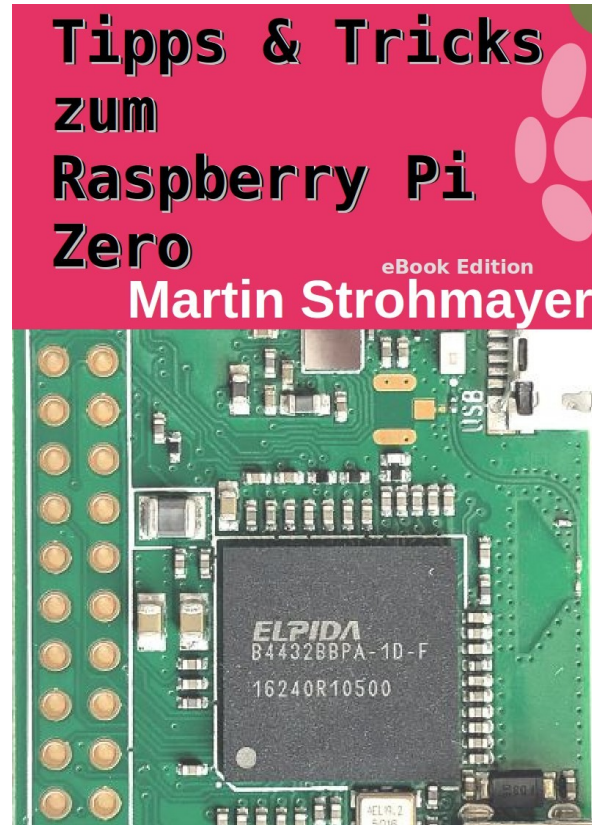
- Web, CNX Software – Embedded Systems News

<https://www.cnx-software.com/>

- Twitter, GC2 – Grazer Computer Club

[@_GC2_](https://twitter.com/_GC2_)

E-Book Tipp



<https://www.amazon.de/dp/B08R25BTW7/>

<https://blog.gc2.at/>

Device Tree

<https://blog.gc2.at/post/device-tree/>

- Device Tree ist eine Datenstruktur zur Beschreibung von Hardware. Anstatt alle Details im Betriebssystem fest zu kodieren, können viele Aspekte der Hardware in einer Datenstruktur beschrieben werden, die beim Booten an das Betriebssystem übergeben wird.

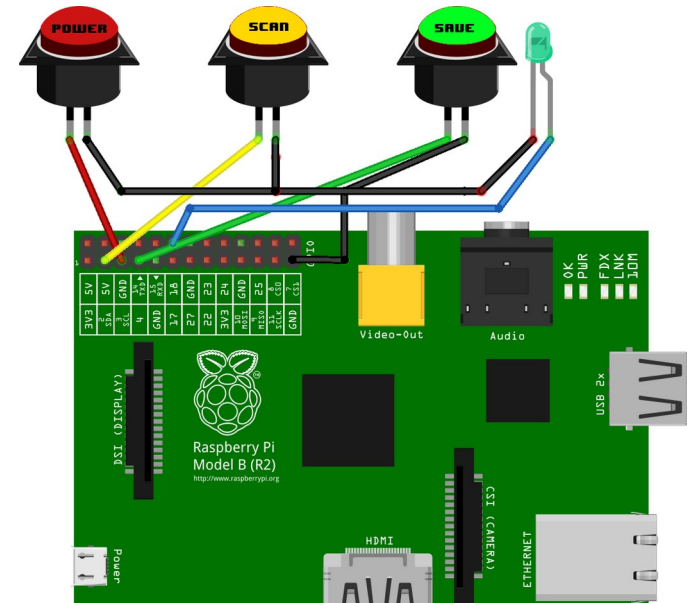
Herunterfahren

<https://blog.gc2.at/post/pi-herunterfahren/>

Config.txt

dtoverlay=gpio-shutdown,gpio_pin=3,active_low=1,gpio_pull=up

Parameter	Funktion
gpio_pin	GPIO-Nummer (BCM), 3 ist Standard-Einstellung
gpio_pull	Aktivierung Pull-up/Pull-down Widerstand; off = Keiner; down = Pull-down; up = Pull-up (Standard-Einstellung)
active_low	Logikpegel für Tastendruck; 0 = Active High, Schalter verbindet nach 3,3 V; 1 = Active Low (Standard-Einstellung), Schalter verbindet nach GND



Raspberry Pi Zero

- Übertakten -

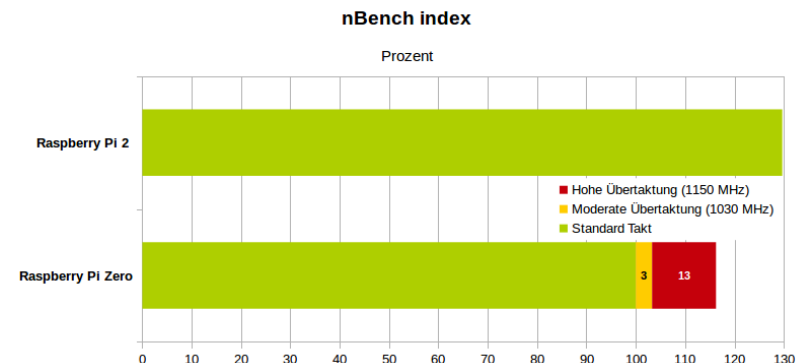
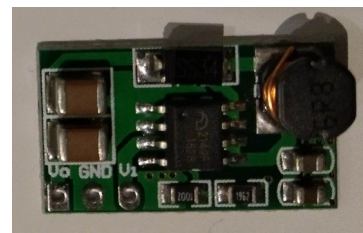
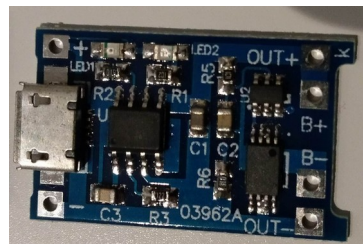
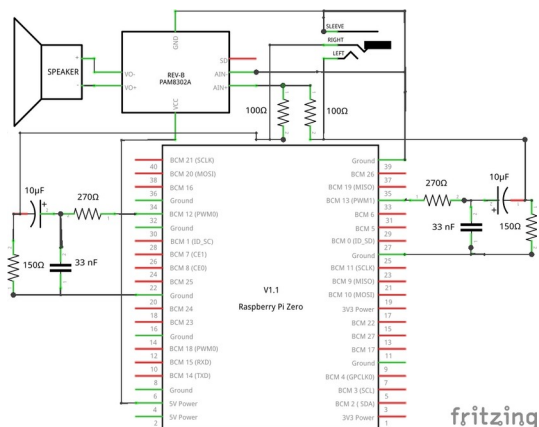
<https://blog.gc2.at/post/raspberry-pi-zero-hardcore-overclocking/>

- Versorgen

<https://blog.gc2.at/post/raspberry-pi-zero-versorgung/>

- Analog Audio

<https://blog.gc2.at/post/pi-zero-audio/>



ZRAM

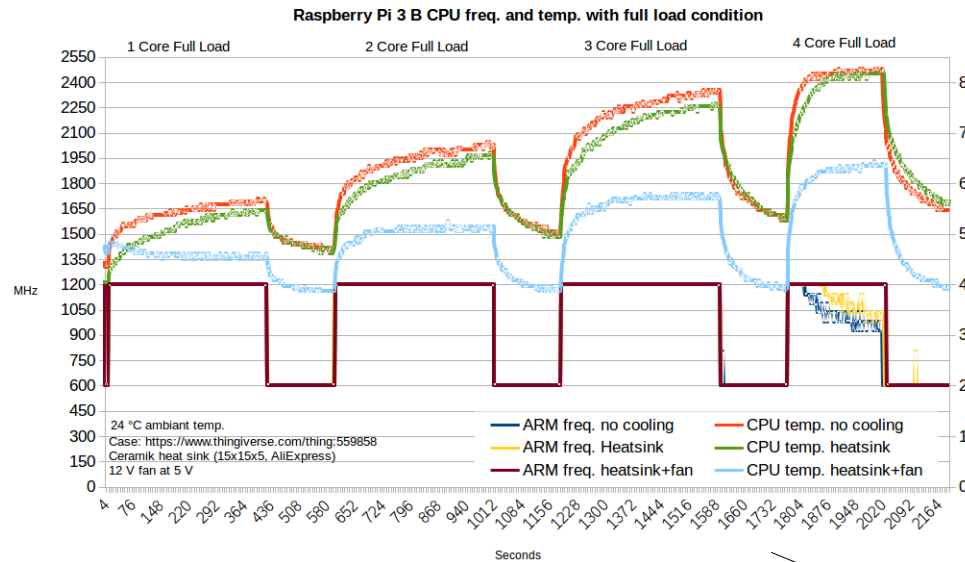
<https://blog.gc2.at/post/zram/>

Auslagerungsspeicher nutzt komprimierten Speicher statt Datei auf SD-Karte

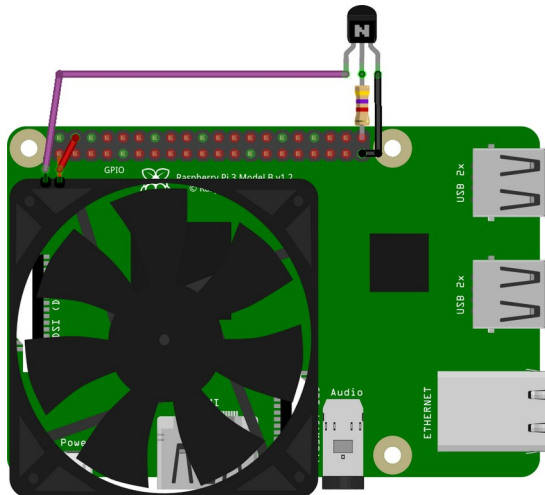
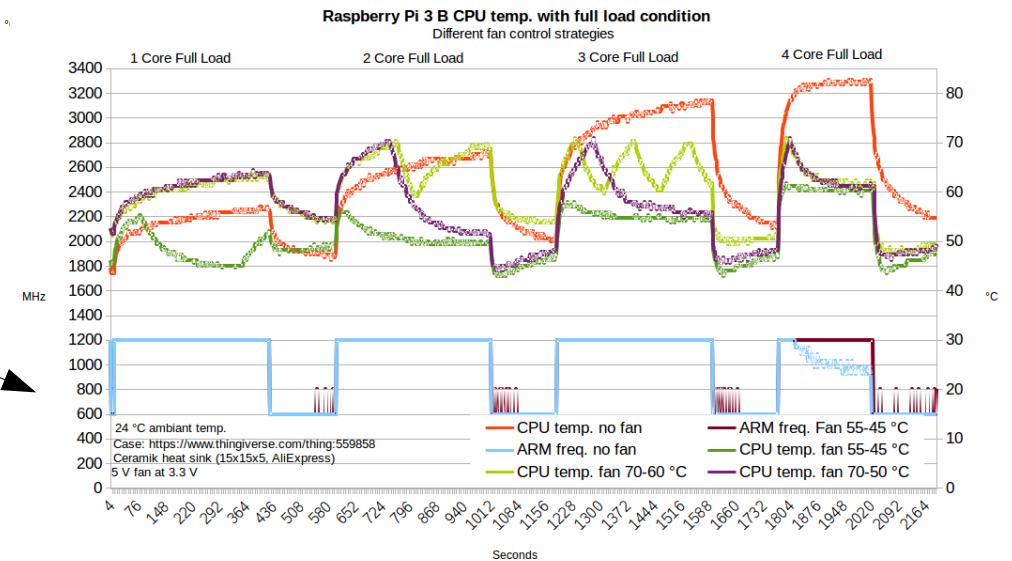
Installation: `apt-get install zram-tools`

Konfiguration: `/etc/default/zramswap`

Lüftersteuerung



dtoverlay=gpio-fan,gpiopin=21,temp=70000

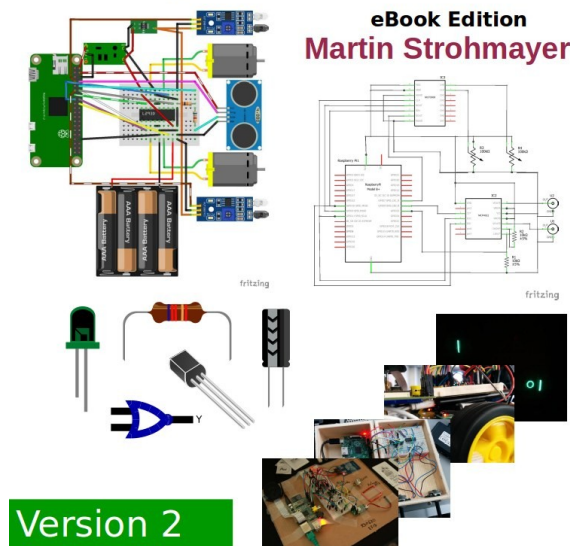


fritzing

```
cd /boot/overlays
sudo dtc -O dts -I dtb gpio-fan.dtbo -o gpio-fan.dts
sudo cp gpio-fan.dts gpio-fanH20.dts
sudo sed -i 's/temperature = < 0xd6d8 >/temperature = < 0xfde8 >/g' gpio-fanH20.dts
sudo sed -i 's/hysteresis = < 0x2710 >/hysteresis = < 0x4e20 >/g' gpio-fanH20.dts
sudo dtc -O dtb -I dts gpio-fanH20.dts -o gpio-fanH20.dtbo
```

E-Book Tipp

Raspberry Pi Elektronik Projekte



- Flachbettscanner
<https://twitter.com/i/status/1335124737337548803>
- Vector-Gaming
<https://www.youtube.com/watch?v=a1Rmvid1bpY>
- GBA-Dumper
- <https://www.youtube.com/watch?v=v8-PXBbhPfY>
- RFID-Steuerung für Kodi
- Robotcar (Line-Follower)
<https://twitter.com/i/status/1335595957514362881>
<https://www.youtube.com/watch?v=0H7P9PS6R0o>

<https://www.amazon.de/dp/B07G9Q7H8M/>