



## **Workshop**

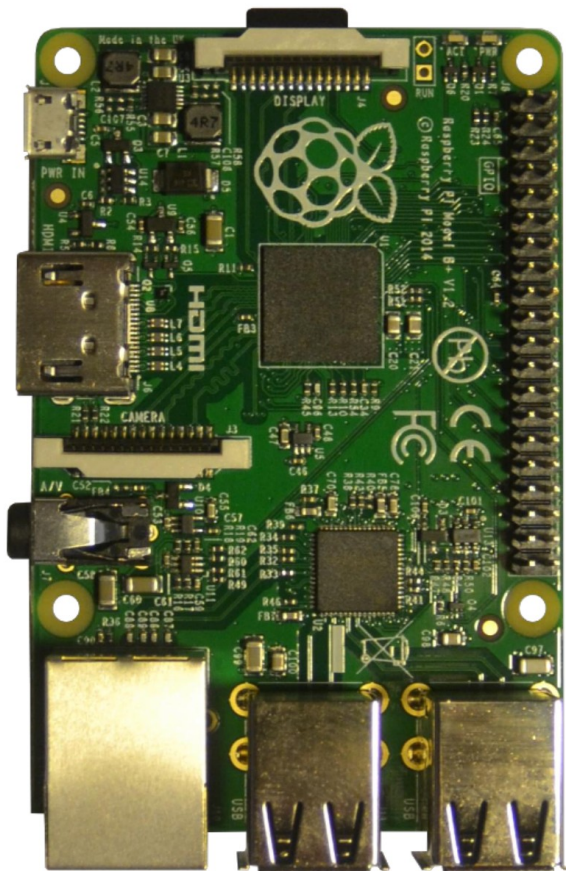
### Knoppix-Tage

### 1. Sept. 2018

*Klaus Misof*

- 
- Grundlagen
- Chassis und Motoren
- Sensoren
- Steuersoftware
- Websteuerung

# GPIO Header



## Raspberry Pi2 GPIO Header

Pin#	NAME	NAME	Pin#
01	3.3v DC Power	DC Power 5v	02
03	GPIO02 (SDA1 , I <sup>2</sup> C)	DC Power 5v	04
05	GPIO03 (SCL1 , I <sup>2</sup> C)	Ground	06
07	GPIO04 (GPIO_GCLK)	(TXD0) GPIO14	08
09	Ground	(RXD0) GPIO15	10
11	GPIO17 (GPIO_GEN0)	(GPIO_GEN1) GPIO18	12
13	GPIO27 (GPIO_GEN2)	Ground	14
15	GPIO22 (GPIO_GEN3)	(GPIO_GEN4) GPIO23	16
17	3.3v DC Power	(GPIO_GEN5) GPIO24	18
19	GPIO10 (SPI_MOSI)	Ground	20
21	GPIO09 (SPI_MISO)	(GPIO_GEN6) GPIO25	22
23	GPIO11 (SPI_CLK)	(SPI_CE0_N) GPIO08	24
25	Ground	(SPI_CE1_N) GPIO07	26
27	ID_SD (I <sup>2</sup> C ID EEPROM)	(I <sup>2</sup> C ID EEPROM) ID_SC	28
29	GPIO05	Ground	30
31	GPIO06	GPIO12	32
33	GPIO13	Ground	34
35	GPIO19	GPIO16	36
37	GPIO26	GPIO20	38
39	Ground	GPIO21	40

Rev. 1  
26/01/2014

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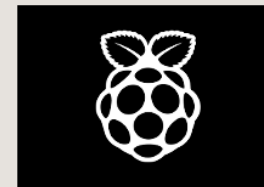
# Betriebssystem Raspian



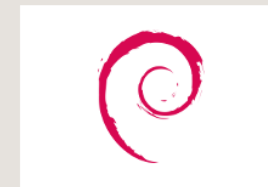
<https://www.raspberrypi.org/downloads/>

## DOWNLOADS

**Raspbian** is the Foundation's official supported Operating System. Download it here, or use **NOOBS**, our easy installer for Raspbian and more.



NOOBS



RASPBIAN

## RASPBERRY PI DESKTOP (FOR PC AND MAC)

Debian with Raspberry Pi Desktop is the Foundation's operating system for PC and Mac. You can create a live disc, run it in a virtual machine, or even install it on your computer.



RASPBERRY PI DESKTOP

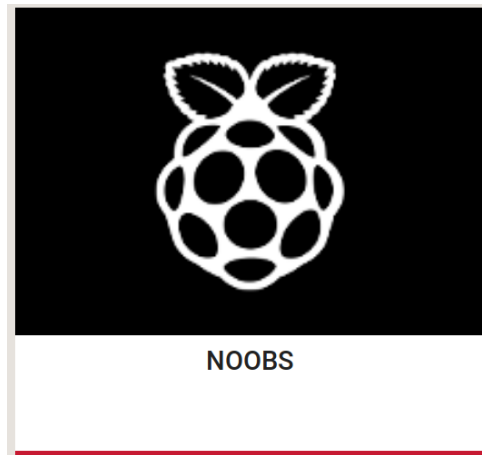
# Betriebssystem Raspian



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

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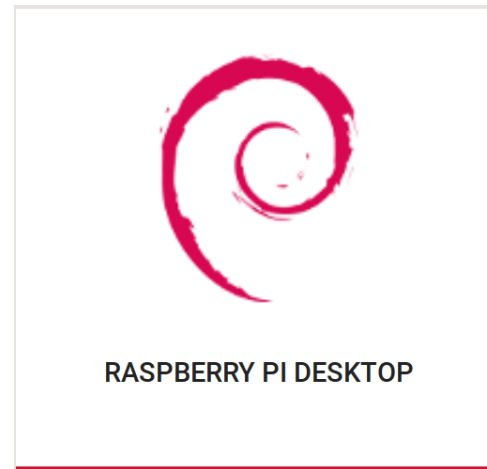
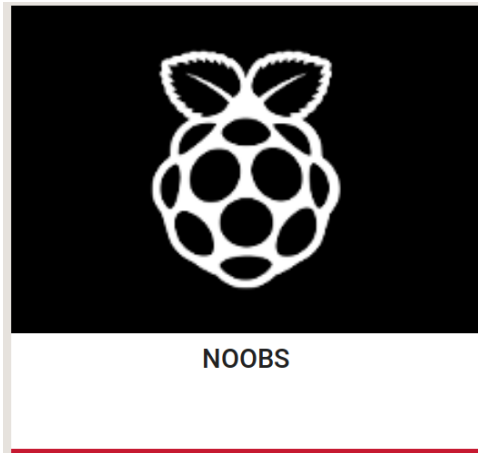
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New Out Of The Box Software

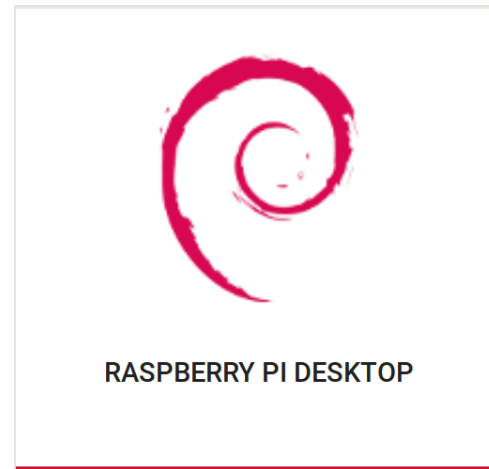
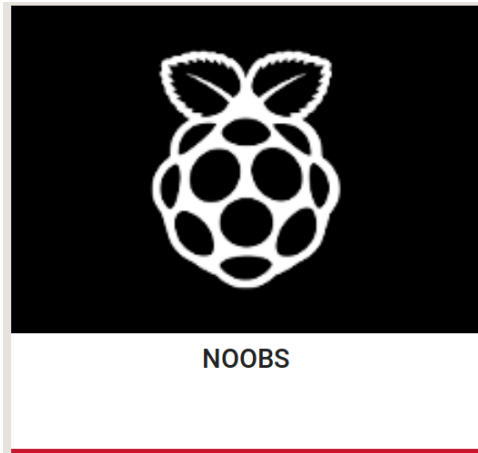
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# Betriebssystem Raspian

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



2017-09-07-raspbian-stretch.  
zip

1,8 GB

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zip

1,8 GB



2017-09-07-raspbian-stretch-  
lite.zip

362,9 MB

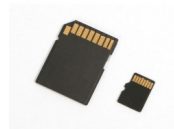
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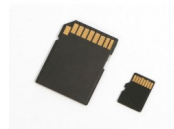
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```
dd bs=4M if=2017-09-07-raspbian-stretch.img of=/dev/sdX conv=fsync
```

# Betriebssystem Raspian

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



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2017-09-07-raspbian-stretch-  
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```
dd bs=4M if=2017-09-07-raspbian-stretch.img of=/dev/sdX conv=fsync
```

```
unzip -p 2017-09-07-raspbian-stretch.zip | sudo dd of=/dev/sdX bs=4M conv=fsync
```

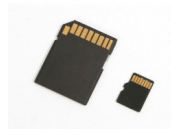
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<https://www.raspberrypi.org/downloads/>



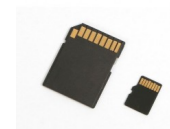
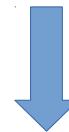
2017-09-07-raspbian-stretch.  
zip

1,8 GB



2017-09-07-raspbian-stretch-  
lite.zip

362,9 MB



```
dd bs=4M if=2017-09-07-raspbian-stretch.img of=/dev/sdX conv=fsync
```

```
unzip -p 2017-09-07-raspbian-stretch.zip | sudo dd of=/dev/sdX bs=4M conv=fsync
```

```
dd bs=4M if=2017-09-07-raspbian-stretch.img of=/dev/sdX status=progress conv=fsync
```

# Problem: /dev/sdX?

- Ohne ssd Karte: df -h

```
dd bs=4M if=2017-09-07-raspbian-stretch.img of=/dev/sdX conv=fsync
```

# Problem: /dev/sdX?

- Ohne ssd Karte: df -h

Dateisystem	Größe	Benutzt	Verf.	Verw%	Eingehängt auf
udev	3,9G	0	3,9G	0%	/dev
tmpfs	787M	9,7M	778M	2%	/run
/dev/sda2	57G	11G	44G	20%	/
tmpfs	3,9G	51M	3,8G	2%	/dev/shm
tmpfs	5,0M	4,0K	5,0M	1%	/run/lock
tmpfs	3,9G	0	3,9G	0%	/sys/fs/cgroup
/dev/sda3	161G	80G	74G	52%	/home
/dev/sda1	511M	4,6M	507M	1%	/boot/efi
tmpfs	787M	68K	787M	1%	/run/user/1000
/dev/sdc1	15G	13G	2,7G	83%	/media/misof/KLAUS1
/dev/sdb2	691G	406G	251G	62%	/media/misof/casper-rw
/dev/sdb3	686G	240G	446G	35%	/media/misof/KLAUS-DATEN-A

```
dd bs=4M if=2017-09-07-raspbian-stretch.img of=/dev/sdX conv=fsync
```



# Problem: /dev/sdX?



- Mit ssd Karte: df-h

# Problem: /dev/sdX?

- Mit ssd Karte: df-h

Dateisystem	Größe	Benutzt	Verf.	Verw%	Eingehängt auf
udev	3,9G	0	3,9G	0%	/dev
tmpfs	787M	9,8M	778M	2%	/run
/dev/sda2	57G	11G	44G	20%	/
tmpfs	3,9G	51M	3,8G	2%	/dev/shm
tmpfs	5,0M	4,0K	5,0M	1%	/run/lock
tmpfs	3,9G	0	3,9G	0%	/sys/fs/cgroup
/dev/sda3	161G	80G	74G	52%	/home
/dev/sda1	511M	4,6M	507M	1%	/boot/efi
tmpfs	787M	68K	787M	1%	/run/user/1000
/dev/sdc1	15G	13G	2,7G	83%	/media/misof/KLAUS1
/dev/sdb2	691G	406G	251G	62%	/media/misof/casper-rw
/dev/sdb3	686G	240G	446G	35%	/media/misof/KLAUS-DATEN-A
<b>/dev/sdd1</b>	<b>15G</b>	<b>9,8G</b>	<b>5,1G</b>	<b>66%</b>	<b>/media/misof/DR-40</b>

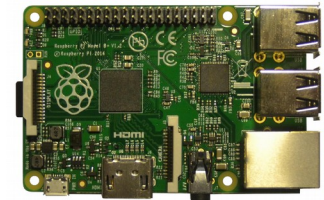
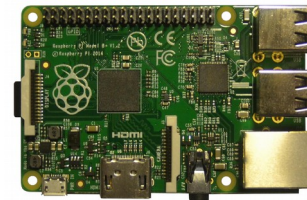
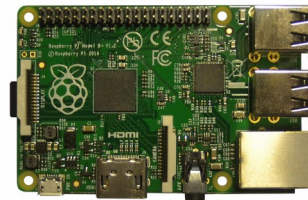
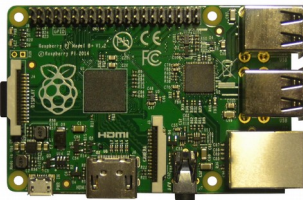
# Problem: /dev/sdX?

- Mit ssd Karte: df-h

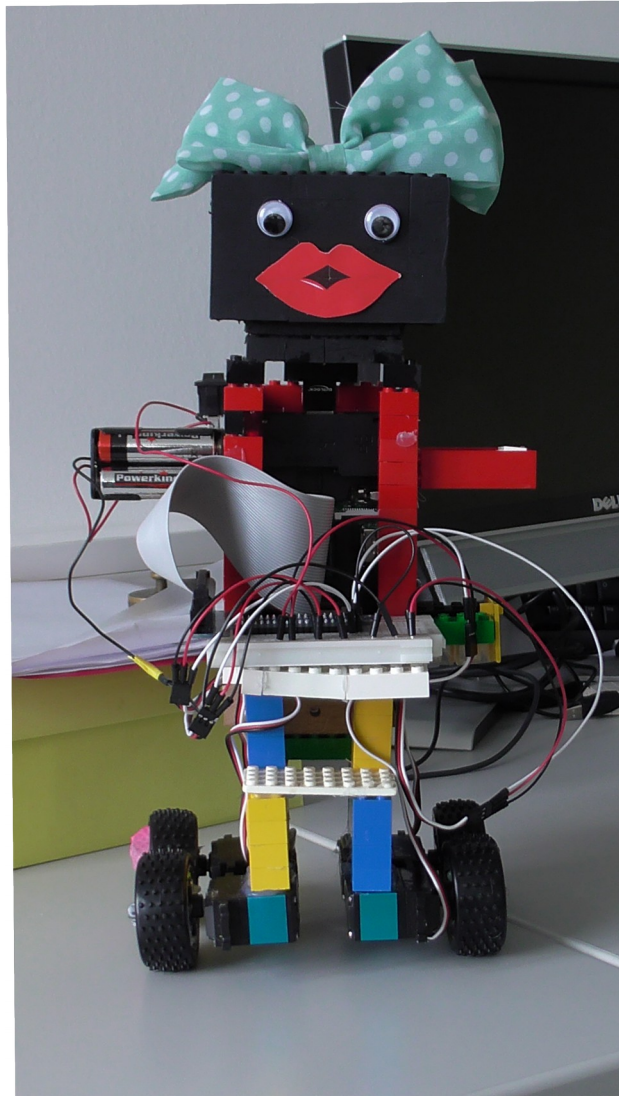
Dateisystem	Größe	Benutzt	Verf.	Verw%	Eingehängt auf
udev	3,9G	0	3,9G	0%	/dev
tmpfs	787M	9,8M	778M	2%	/run
/dev/sda2	57G	11G	44G	20%	/
tmpfs	3,9G	51M	3,8G	2%	/dev/shm
tmpfs	5,0M	4,0K	5,0M	1%	/run/lock
tmpfs	3,9G	0	3,9G	0%	/sys/fs/cgroup
/dev/sda3	161G	80G	74G	52%	/home
/dev/sda1	511M	4,6M	507M	1%	/boot/efi
tmpfs	787M	68K	787M	1%	/run/user/1000
/dev/sdc1	15G	13G	2,7G	83%	/media/misof/KLAUS1
/dev/sdb2	691G	406G	251G	62%	/media/misof/casper-rw
/dev/sdb3	686G	240G	446G	35%	/media/misof/KLAUS-DATEN-A
<b>/dev/sdd1</b>	<b>15G</b>	<b>9,8G</b>	<b>5,1G</b>	<b>66%</b>	<b>/media/misof/DR-40</b>

```
dd bs=4M if=2017-09-07-raspbian-stretch.img of=/dev/sdd conv=fsync
```

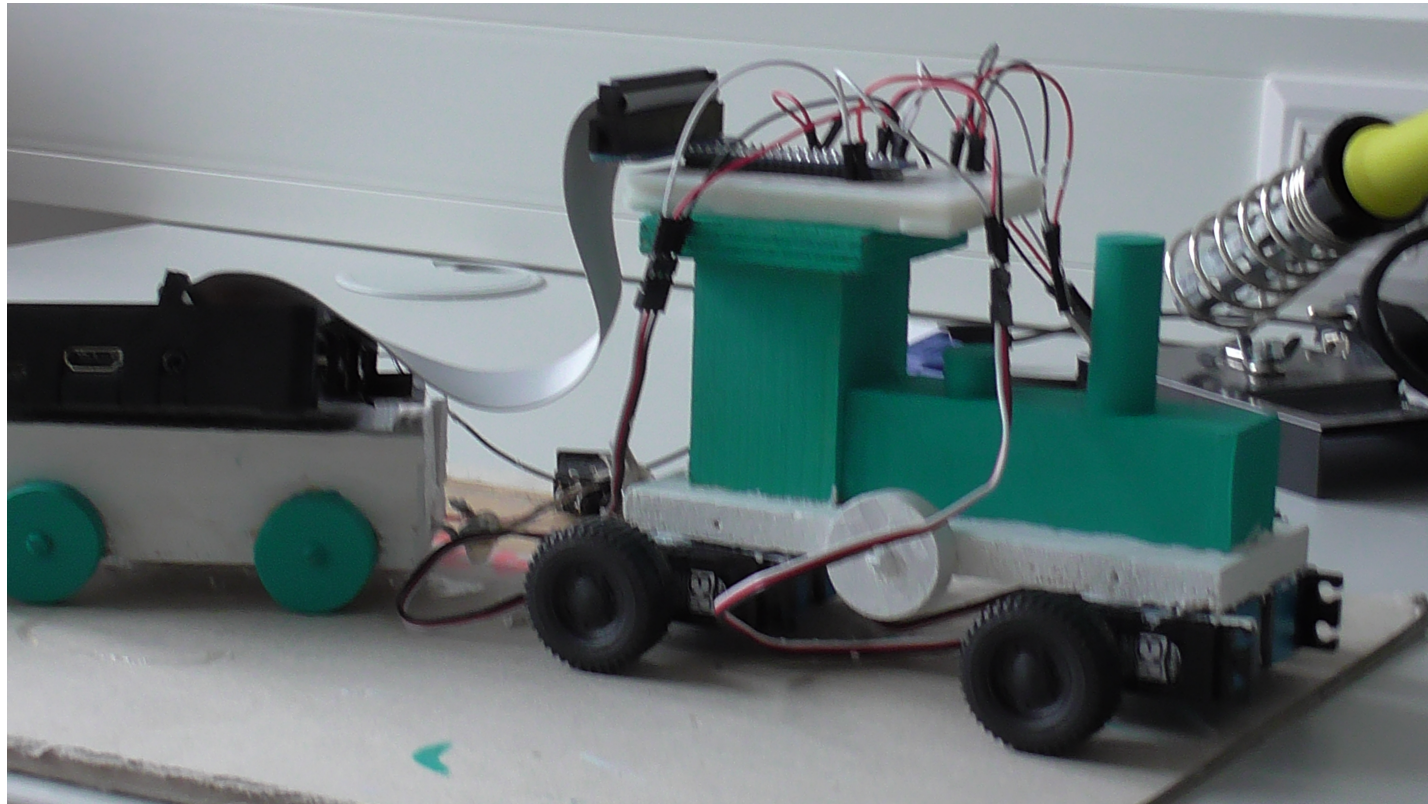
# SSH Verbindung -Terminal



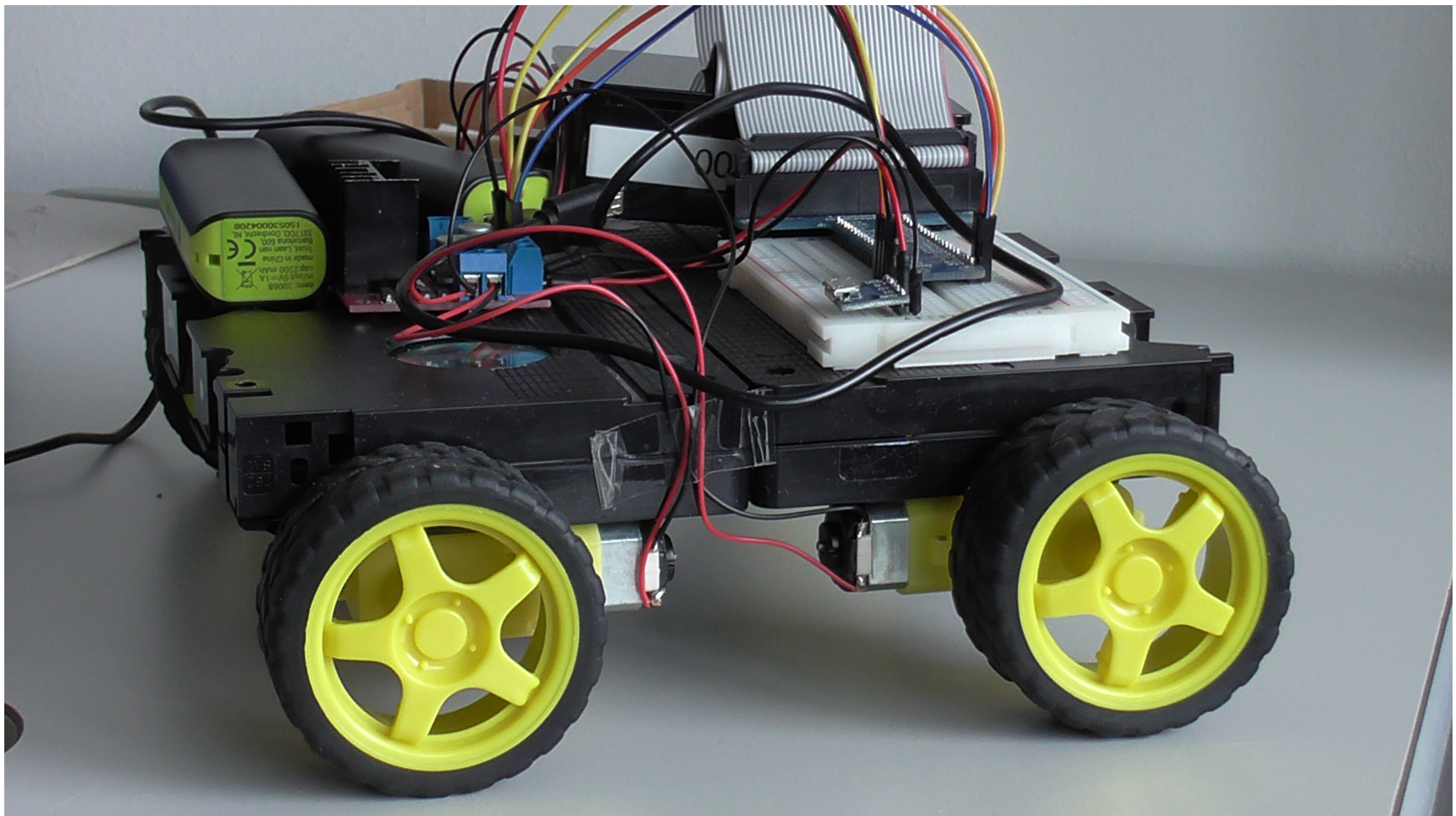
# Diverse kreative Chassis



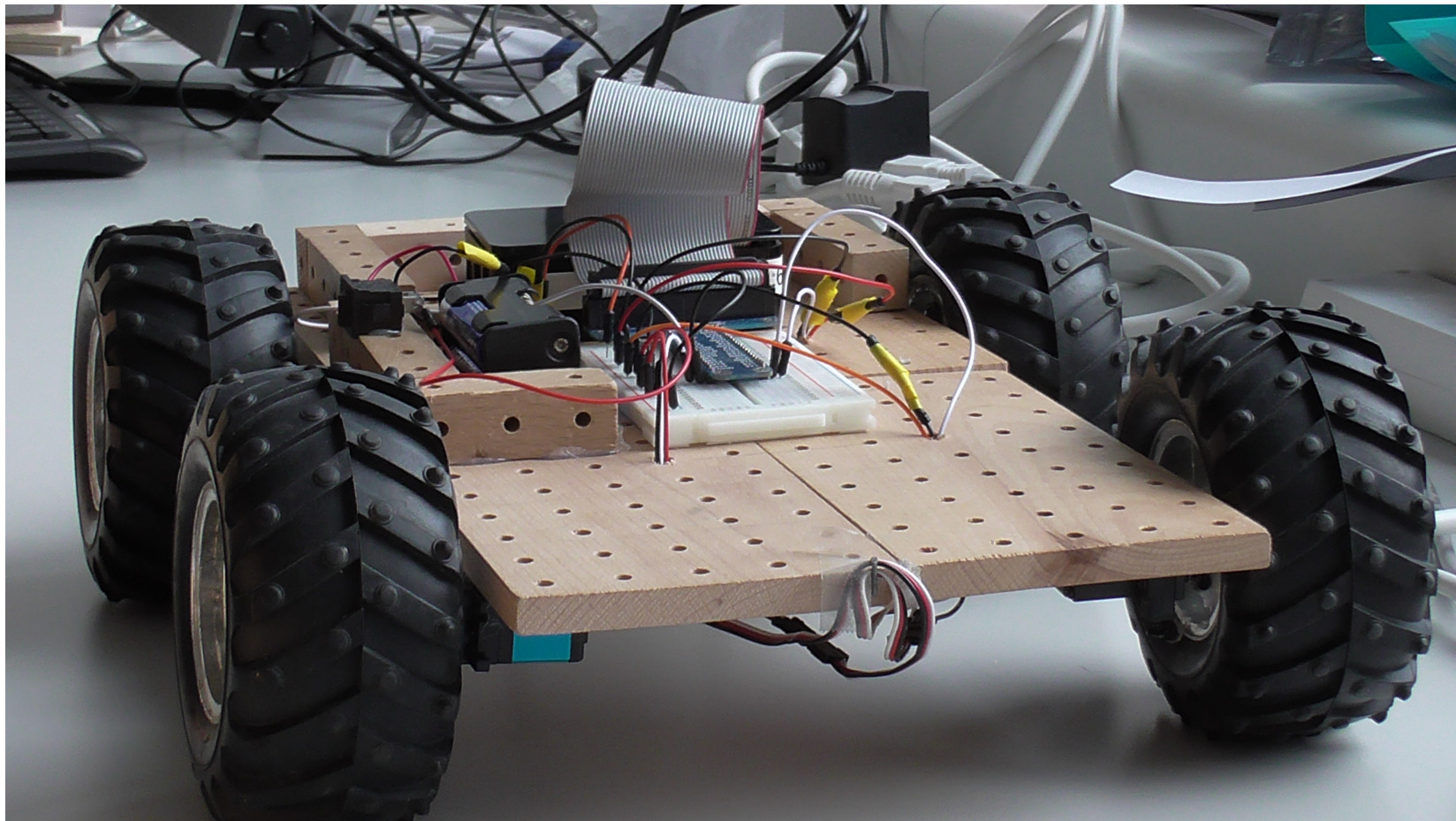
# Diverse kreative Chassis



# Diverse kreative Chassis



# Diverse kreative Chassis





# Diverse kreative Chassis



# Diverse kreative Chassis



# DC-Motoren, H-Brücke



- DC-Motor mit Getriebe

# DC-Motoren, H-Brücke

- DC-Motor mit Getriebe



# DC-Motoren, H-Brücke

- DC-Motor mit Getriebe

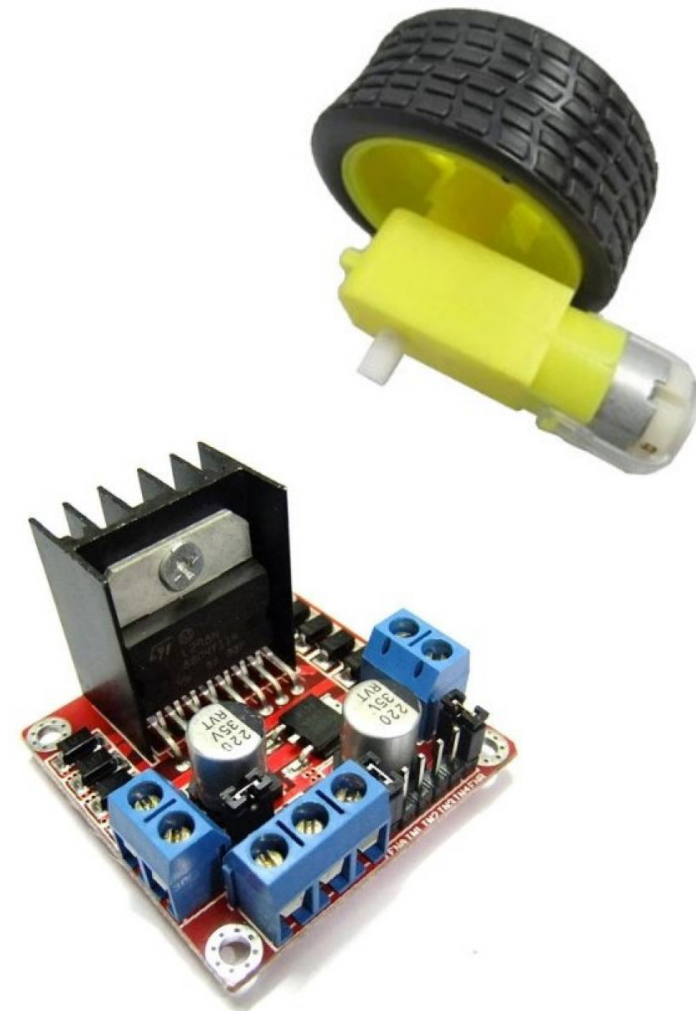


# DC-Motoren, H-Brücke

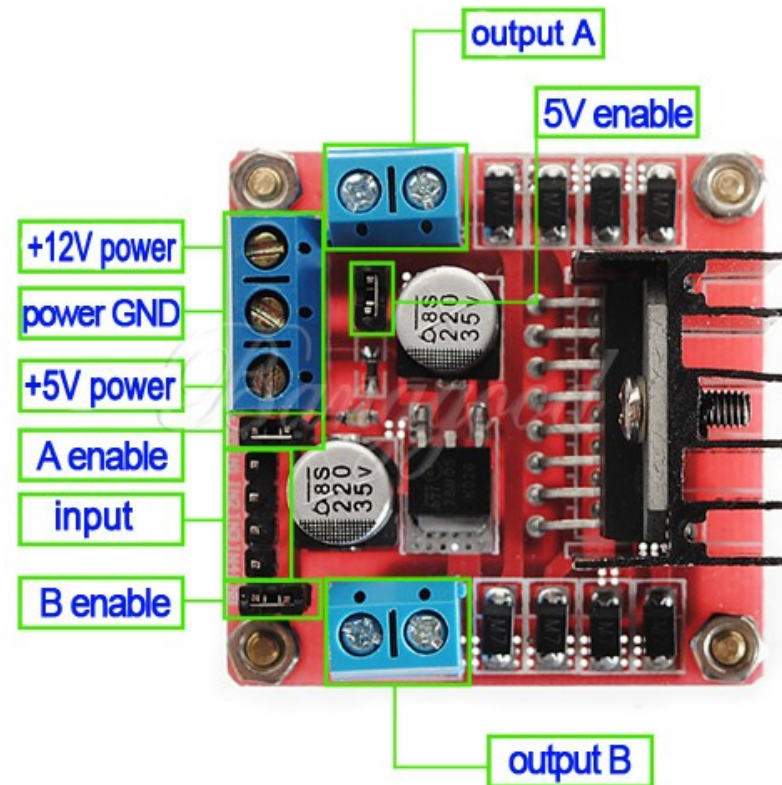
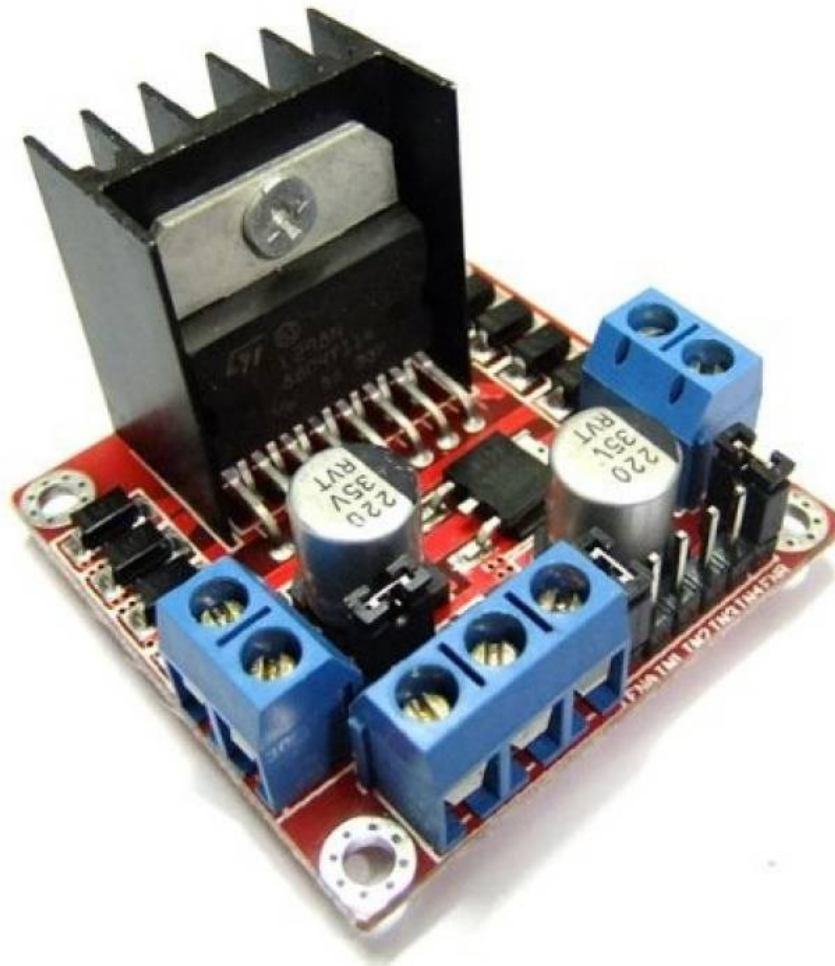
- DC-Motor mit Getriebe



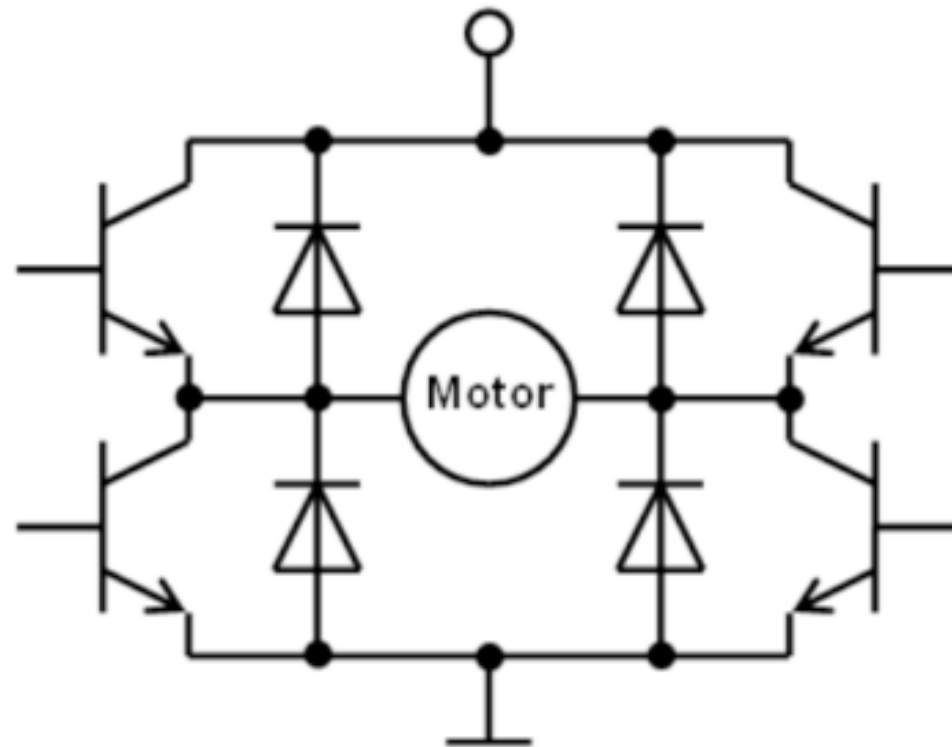
- H-



# H-Brücke L298n

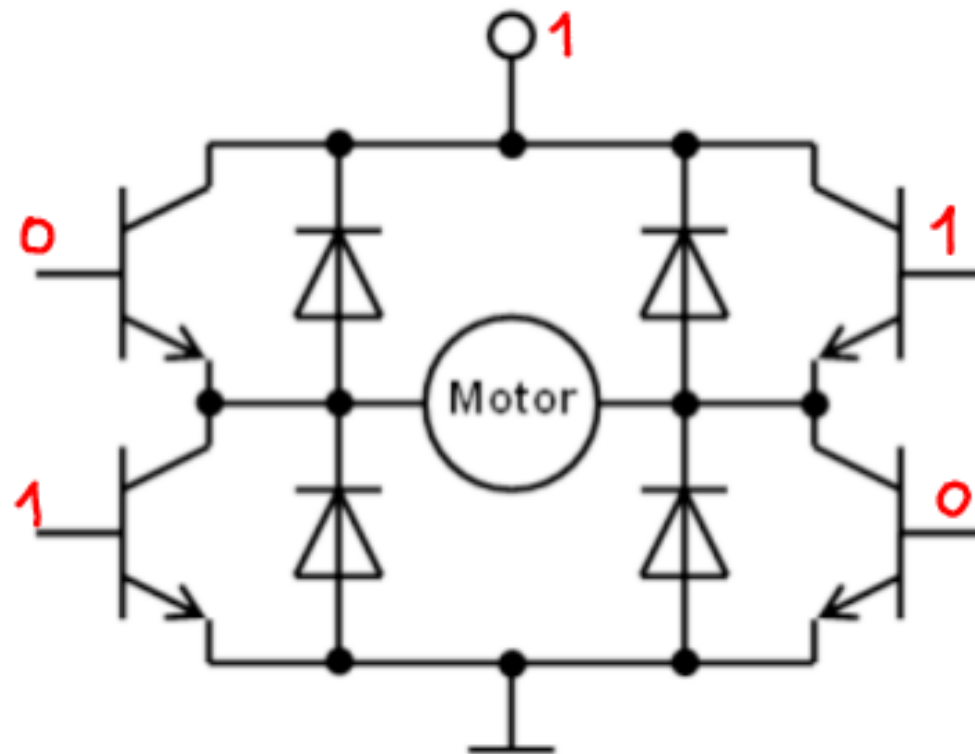


# H-Brücke L298n

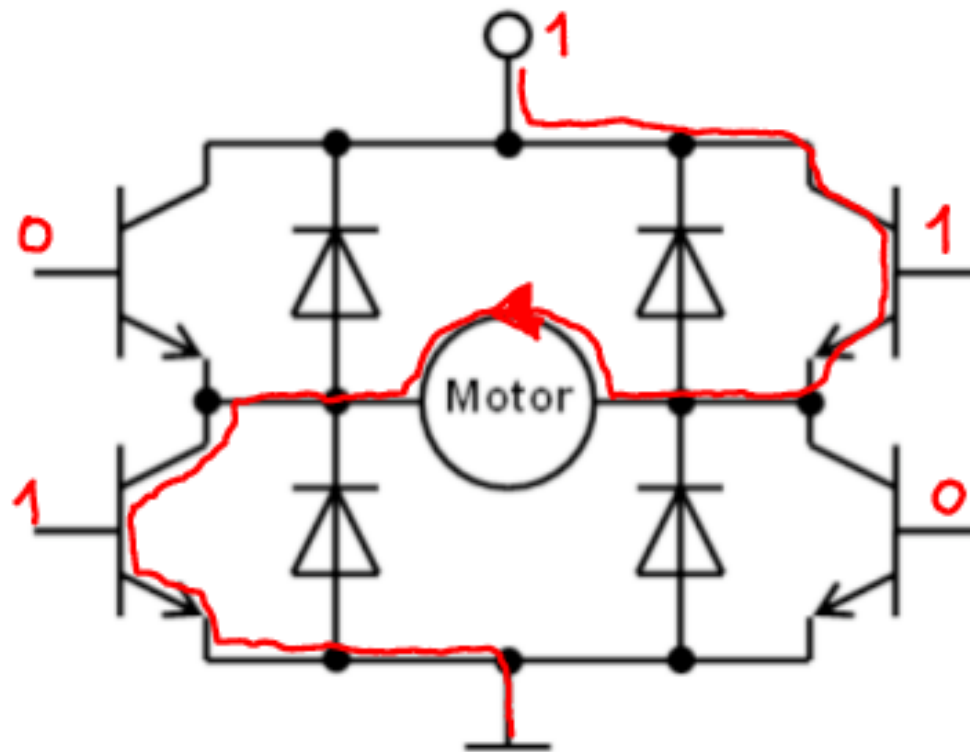




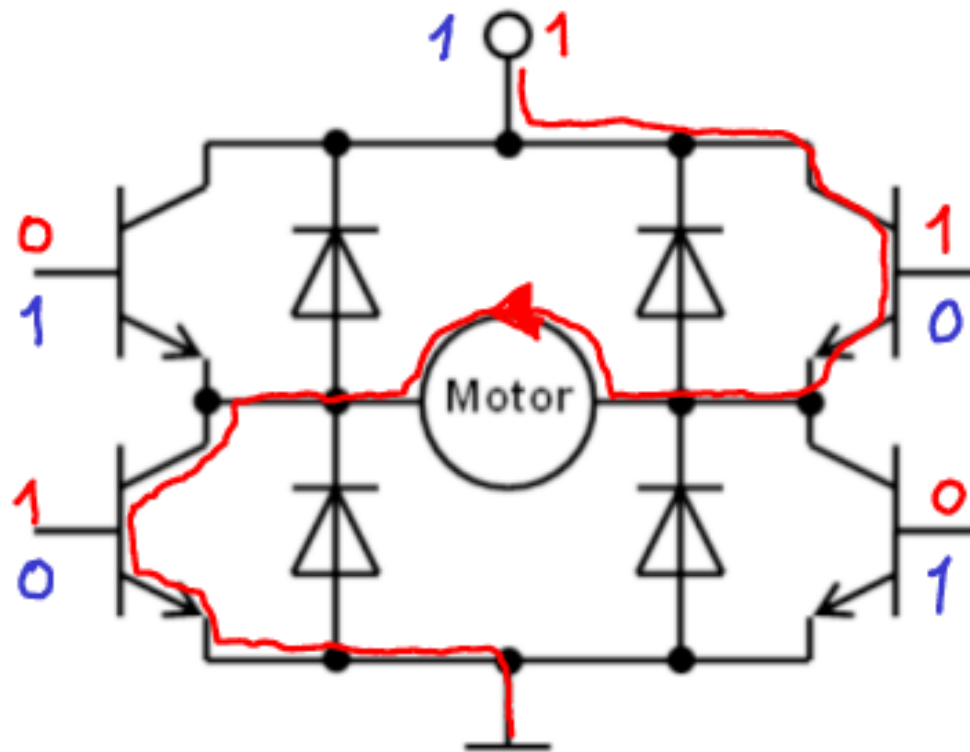
# H-Brücke L298n



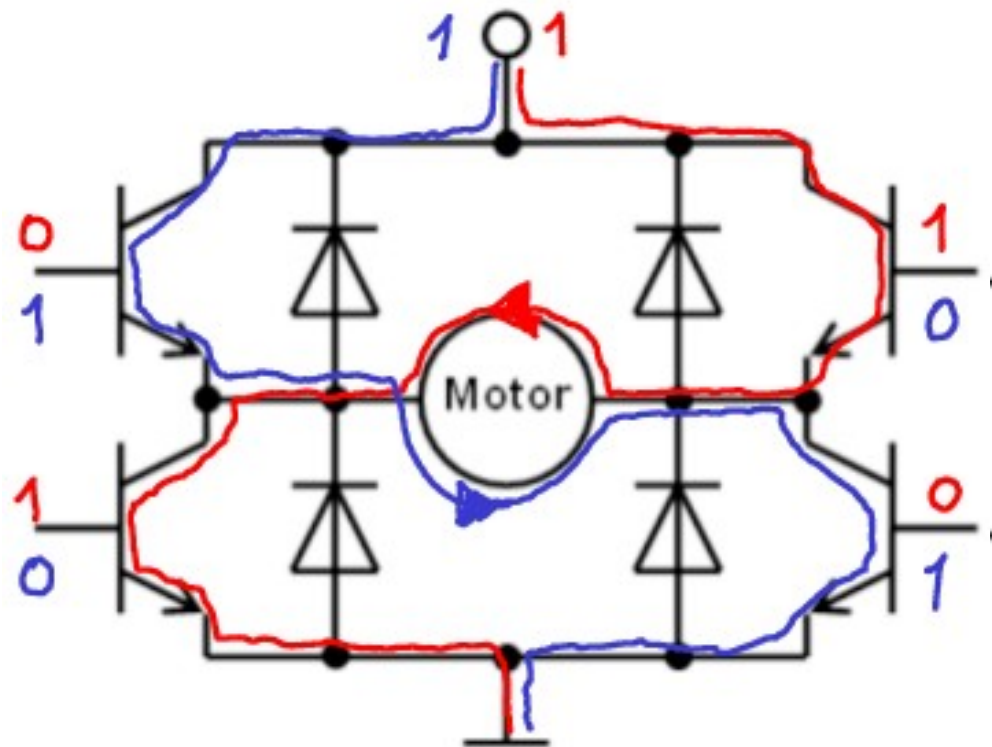
# H-Brücke L298n



# H-Brücke L298n

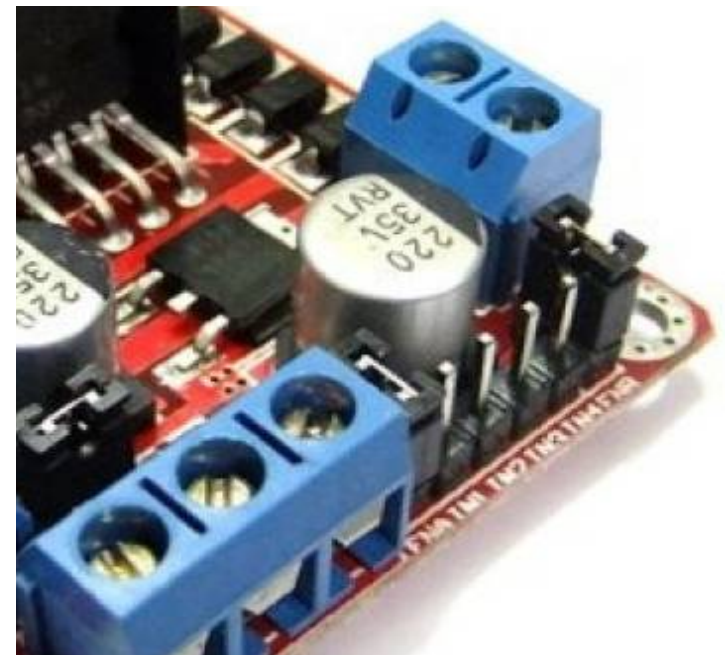


# H-Brücke L298n



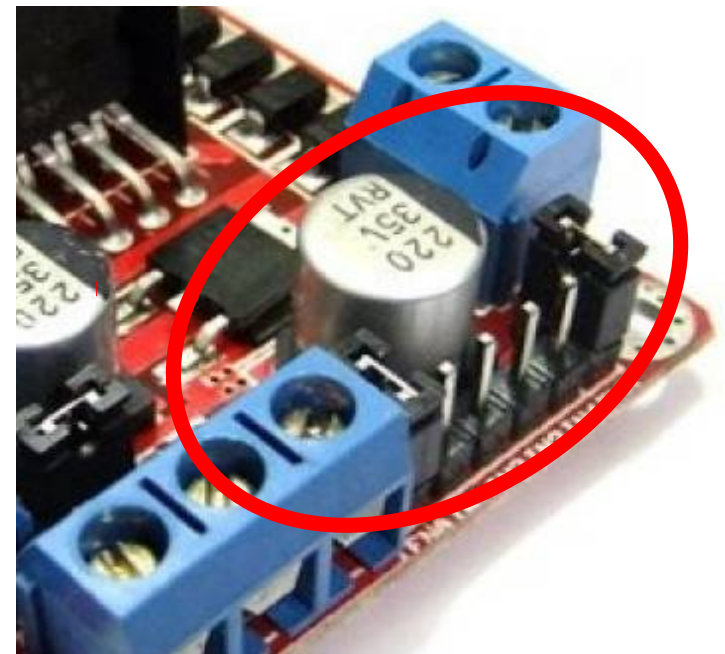
# H-Brücke L298n

EnableA	MotorA1	MotorA2	Wirkung
0	0	0	Motor läuft aus
1	1	1	Motor stoppt
1	1	0	Motor dreht nach links
1	0	1	Motor dreht nach rechts
1	0	0	Motor stoppt



# H-Brücke L298n

EnableA	MotorA1	MotorA2	Wirkung
0	0	0	Motor läuft aus
1	1	1	Motor stoppt
1	1	0	Motor dreht nach linkis
1	0	1	Motor dreht nach rechts
1	0	0	Motor stoppt



# H-Brücke L298n





















```
#!/usr/bin/python
import RPi.GPIO as GPIO
```

```
GPIO.setmode(GPIO.BOARD)
GPIO.setwarnings(False)
```

```
MotorEnableA = 37
Motor1A      = 35
Motor2A      = 33
```

```
GPIO.setup(MotorEnableA,GPIO.OUT)
GPIO.setup(Motor1A,GPIO.OUT)
GPIO.setup(Motor2A,GPIO.OUT)
```

## Raspberry Pi2 GPIO Header

Pin#	NAME		NAME	Pin#
01	3.3v DC Power		DC Power 5v	02
03	GPIO02 (SDA1 , I <sup>2</sup> C)		DC Power 5v	04
05	GPIO03 (SCL1 , I <sup>2</sup> C)		Ground	06
07	GPIO04 (GPIO_GCLK)		(TXD0) GPIO14	08
09	Ground		(RXD0) GPIO15	10
11	GPIO17 (GPIO_GEN0)		(GPIO_GEN1) GPIO18	12
13	GPIO27 (GPIO_GEN2)		Ground	14
15	GPIO22 (GPIO_GEN3)		(GPIO_GEN4) GPIO23	16
17	3.3v DC Power		(GPIO_GEN5) GPIO24	18
19	GPIO10 (SPI_MOSI)		Ground	20
21	GPIO09 (SPI_MISO)		(GPIO_GEN6) GPIO25	22
23	GPIO11 (SPI_CLK)		(SPI_CE0_N) GPIO08	24
25	Ground		(SPI_CE1_N) GPIO07	26
27	ID_SD (I <sup>2</sup> C ID EEPROM)		(I <sup>2</sup> C ID EEPROM) ID_SC	28
29	GPIO05		Ground	30
31	GPIO06		GPIO12	32
33	GPIO13		Ground	34
35	GPIO19		GPIO16	36
37	GPIO26		GPIO20	38
39	Ground		GPIO21	40

Rev. 1  
26/01/2014

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# H-Brücke L298n





















```
#!/usr/bin/python
import RPi.GPIO as GPIO

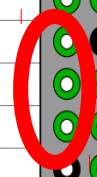
GPIO.setmode(GPIO.BOARD)
GPIO.setwarnings(False)

MotorEnableA = 37
Motor1A = 35
Motor2A = 33

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09	Ground		(RXD0) GPIO15	10
11	GPIO17 (GPIO_GEN0)		(GPIO_GEN1) GPIO18	12
13	GPIO27 (GPIO_GEN2)		Ground	14
15	GPIO22 (GPIO_GEN3)		(GPIO_GEN4) GPIO23	16
17	3.3v DC Power		(GPIO_GEN5) GPIO24	18
19	GPIO10 (SPI_MOSI)		Ground	20
21	GPIO09 (SPI_MISO)		(GPIO_GEN6) GPIO25	22
23	GPIO11 (SPI_CLK)		(SPI_CE0_N) GPIO08	24
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31	GPIO06		GPIO12	32
33	GPIO13		Ground	34
35	GPIO19		GPIO16	36
37	GPIO26		GPIO20	38
39	Ground		GPIO21	40



Rev. 1  
26/01/2014

<http://www.element14.com>



# H-Brücke L298n

```
#!/usr/bin/python
import RPi.GPIO as GPIO

GPIO.setmode(GPIO.BOARD)
GPIO.setwarnings(False)

MotorEnableA = 37
Motor1A = 35
Motor2A = 33

GPIO.setup(MotorEnableA,GPIO.OUT)
GPIO.setup(Motor1A,GPIO.OUT)
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```

## Raspberry Pi2 GPIO Header

Pin#	NAME		NAME	Pin#
01	3.3v DC Power		DC Power 5v	02
03	GPIO02 (SDA1 , I <sup>2</sup> C)		DC Power 5v	04
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# H-Brücke L298n

```
#!/usr/bin/python
import RPi.GPIO as GPIO

GPIO.setmode(GPIO.BOARD)
GPIO.setwarnings(False)

MotorEnableA = 27
Motor1A = 35
Motor2A = 33

GPIO.setup(MotorEnableA,GPIO.OUT)
GPIO.setup(Motor1A,GPIO.OUT)
GPIO.setup(Motor2A,GPIO.OUT)
```

## Raspberry Pi2 GPIO Header

Pin#	NAME	NAME	Pin#
01	3.3v DC Power	DC Power 5v	02
03	GPIO02 (SDA1 , I <sup>2</sup> C)	DC Power 5v	04
05	GPIO03 (SCL1 , I <sup>2</sup> C)	Ground	06
07	GPIO04 (GPIO_GCLK)	(TXD0) GPIO14	08
09	Ground	(RXD0) GPIO15	10
11	GPIO17 (GPIO_GEN0)	(GPIO_GEN1) GPIO18	12
13	GPIO27 (GPIO_GEN2)	Ground	14
15	GPIO22 (GPIO_GEN3)	(GPIO_GEN4) GPIO23	16
17	3.3v DC Power	(GPIO_GEN5) GPIO24	18
19	GPIO10 (SPI_MOSI)	Ground	20
21	GPIO09 (SPI_MISO)	(GPIO_GEN6) GPIO25	22
23	GPIO11 (SPI_CLK)	(SPI_CE0_N) GPIO08	24
25	Ground	(SPI_CE1_N) GPIO07	26
27	ID_SD (I <sup>2</sup> C ID EEPROM)	(I <sup>2</sup> C ID EEPROM) ID_SC	28
29	GPIO05	Ground	30
31	GPIO06	GPIO12	32
33	GPIO13	Ground	34
35	GPIO19	GPIO16	36
37	GPIO26	GPIO20	38
39	Ground	GPIO21	40

Rev. 1  
26/01/2014

<http://www.element14.com>

# H-Brücke L298n

```
#!/usr/bin/python
import RPi.GPIO as GPIO

GPIO.setmode(GPIO.BOARD)
GPIO.setwarnings(False)

MotorEnableA    = 37
Motor1A         = 35
Motor2A         = 33

GPIO.setup(MotorEnableA,GPIO.OUT)
GPIO.setup(Motor1A,GPIO.OUT)
GPIO.setup(Motor2A,GPIO.OUT)
```

```
def all_off() :
    GPIO.output(Motor1A,GPIO.LOW)
    GPIO.output(Motor2A,GPIO.LOW)
    GPIO.output(MotorEnableA,GPIO.LOW)

def forward():
    GPIO.output(MotorEnableA,GPIO.HIGH)
    GPIO.output(Motor1A,GPIO.LOW)
    GPIO.output(Motor2A,GPIO.HIGH)

def back():
    GPIO.output(MotorEnableA,GPIO.HIGH)
    GPIO.output(Motor1A,GPIO.HIGH)
    GPIO.output(Motor2A,GPIO.LOW)
```

# Chassis, Motoren, Energie



- Servos aus dem RC Bereich

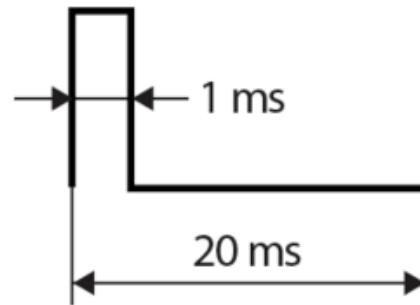
# Servo-Motoren, PWM



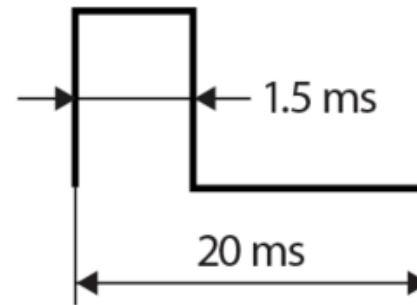
# Servo-Motoren, PWM



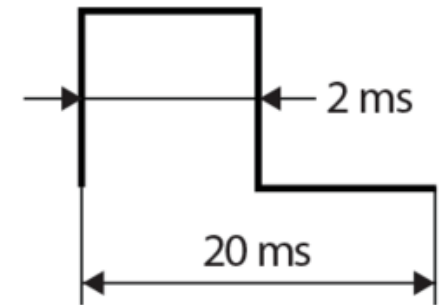
# Servo-Motoren, PWM



-90°



neutral

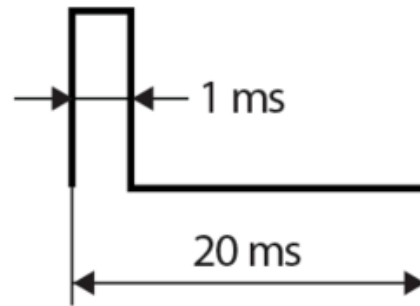


90°

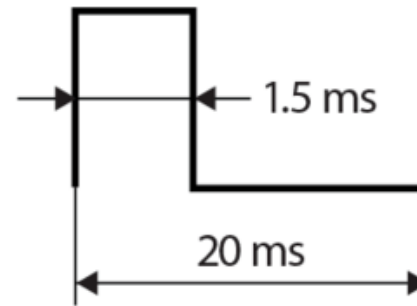
# Servo-Motoren, PWM



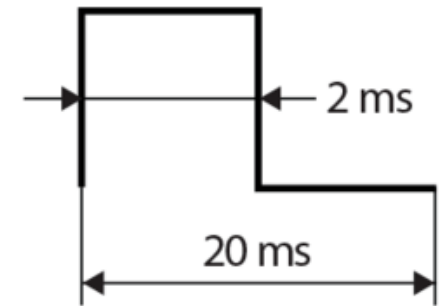
5%



-90°



neutral



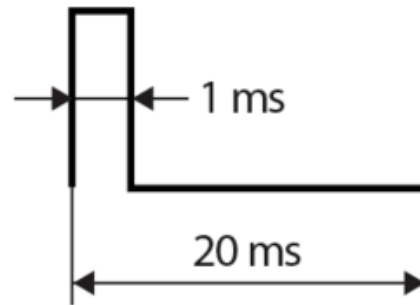
90°



# Servo-Motoren, PWM

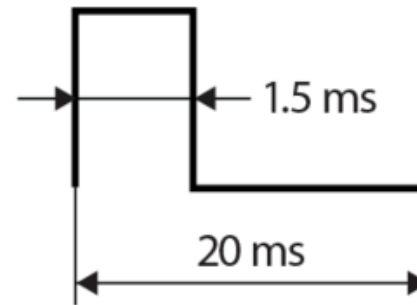


5%

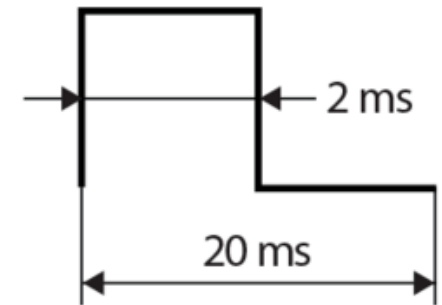


-90°

7,5%



neutral

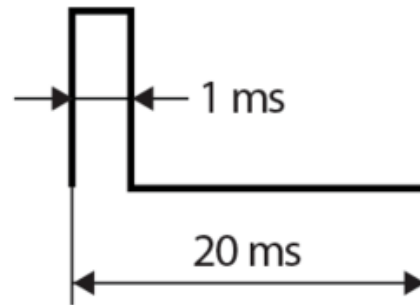


90°

# Servo-Motoren, PWM

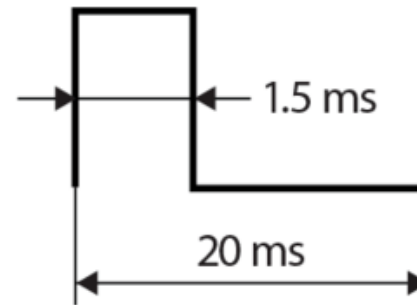


5%



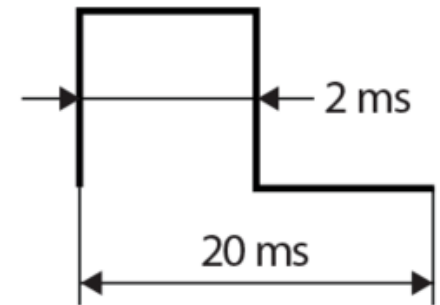
-90°

7,5%



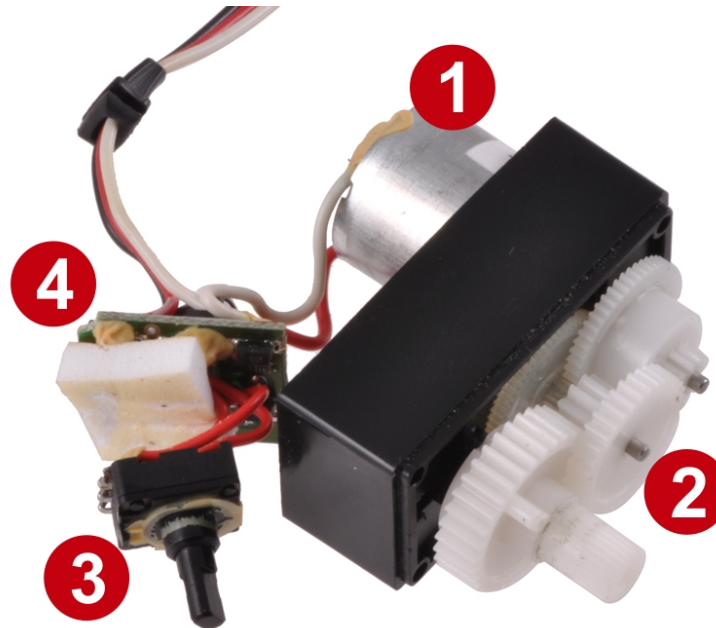
neutral

10%

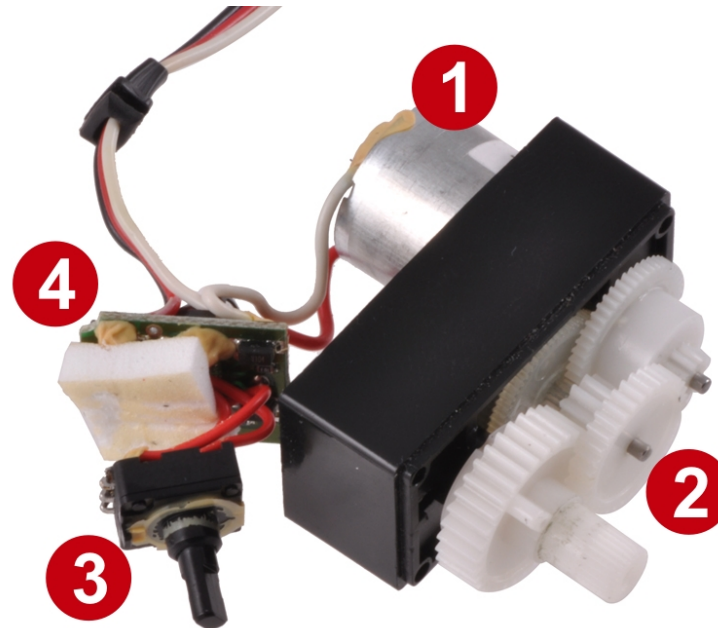


90°

# 360° Servo Umbau



# 360° Servo Umbau



# Python Code

```
#!/usr/bin/python
import time
import RPi.GPIO as GPIO
GPIO.setmode(GPIO.BOARD)
GPIO.setwarnings(False)

ServoA = 37
FrequA = 50
GPIO.setup(servoA,GPIO.OUT)
pwmA = GPIO.PWM(servoA,frequA)
Neutral = 7.5

def servoA(velocity):
    wert = neutral + velocity
    pwmA.start(wert)

#GPIO.cleanup
```



# Sensoren



- IR Sensor

# Sensoren

- IR Sensor
- Ultrasconic Sensor

# Sensoren

- IR Sensor
- Ultrasconic Sensor
- Temperatur Sensor



# Sensoren

- IR Sensor
- Ultrasonic Sensor
- Temperatur Sensor
- Luftfeuchtigkeits Sensor

# Sensoren

- IR Sensor
- Ultrasonic Sensor
- Temperatur Sensor
- Luftfeuchtigkeits Sensor
- Relais

# Sensoren

- IR Sensor
- Ultrasonic Sensor
- Temperatur Sensor
- Luftfeuchtigkeits Sensor
- Relais
- Funkmodul

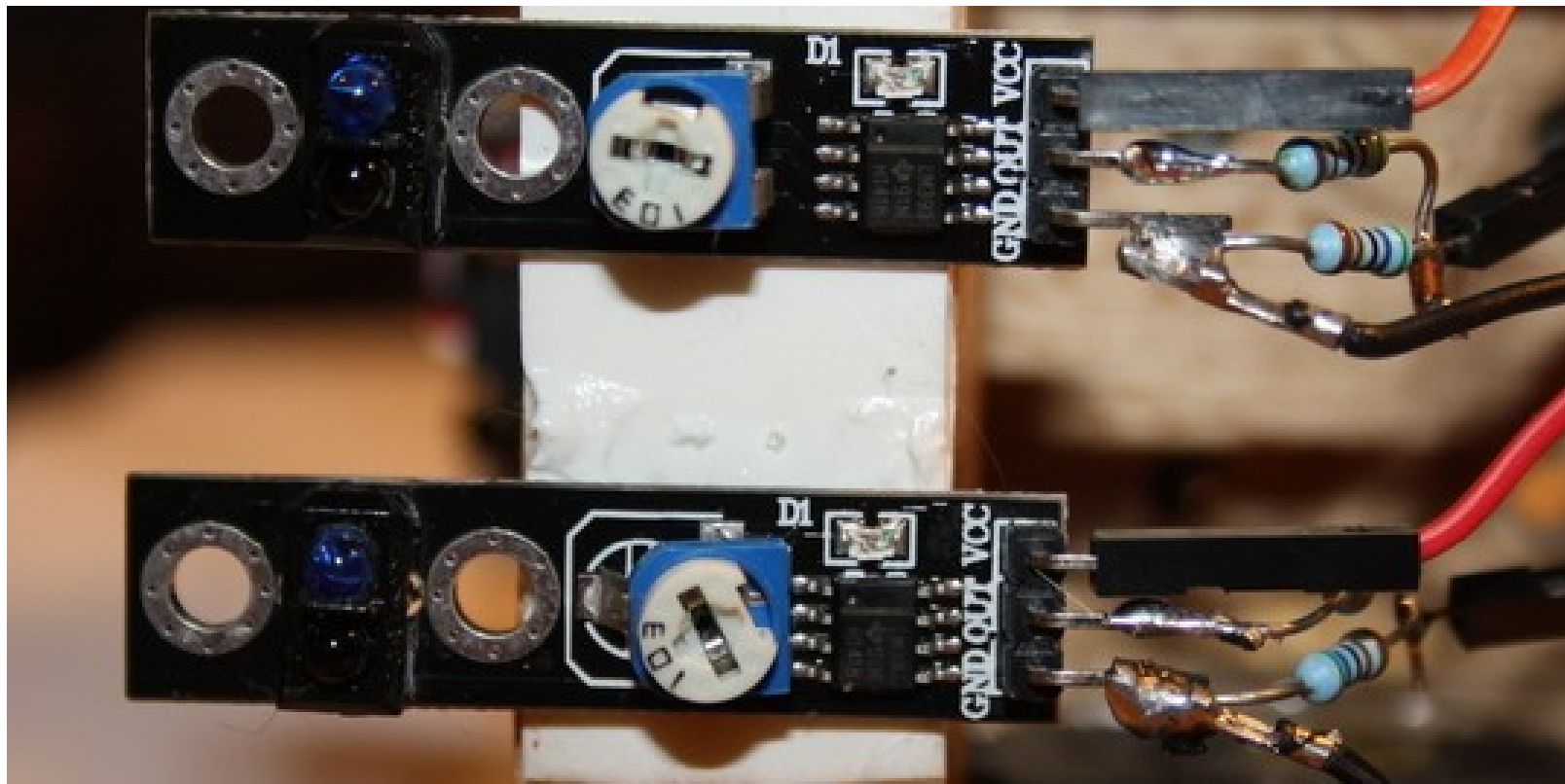
# Sensoren

- IR Sensor
- Ultrasonic Sensor
- Temperatur Sensor
- Luftfeuchtigkeits Sensor
- Relais
- Funkmodul
- Webcam

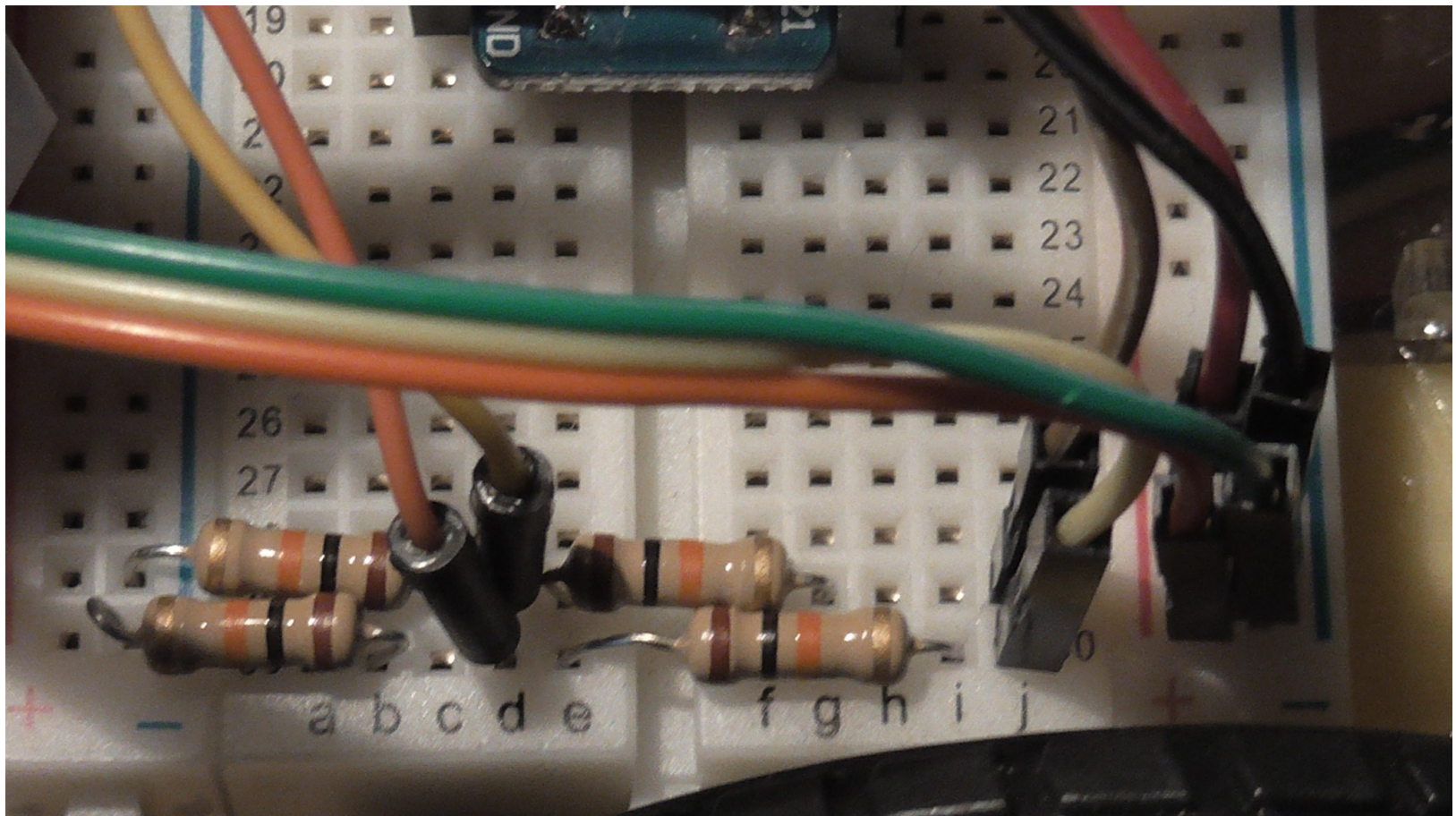
# Sensoren

- IR Sensor
- Ultrasonic Sensor
- Temperatur Sensor
- Luftfeuchtigkeits Sensor
- Relais
- Funkmodul
- Webcam
- .....

# IR Sensoren



# IR Sensor, Spannungsteiler



# IR Sensor

```
#!/usr/bin/python
import RPi.GPIO as GPIO
import time
import sys

GPIO.setmode(GPIO.BOARD)
lineright = 29
lineleft = 31

GPIO.setup(lineright,GPIO.IN)
GPIO.setup(lineleft,GPIO.IN)
```



# IR Sensor

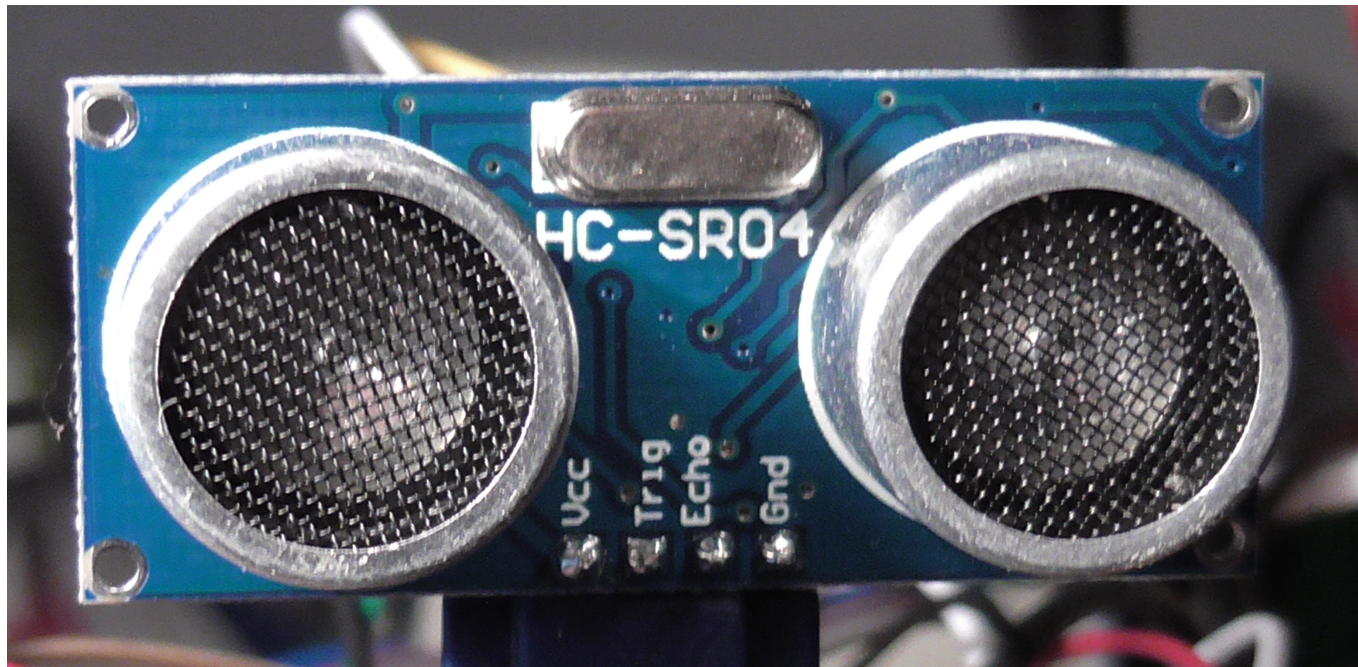
```
#!/usr/bin/python
import RPi.GPIO as GPIO
import time
import sys

GPIO.setmode(GPIO.BOARD)
lineright = 29
lineleft = 31

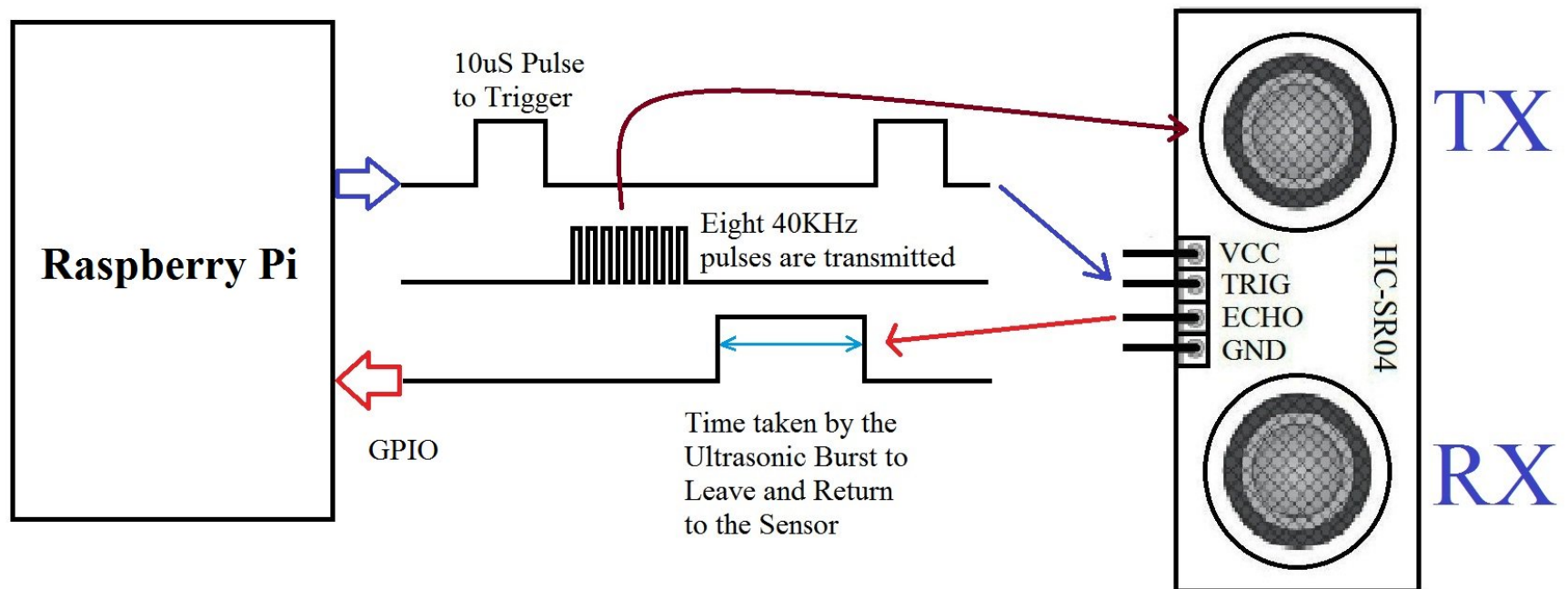
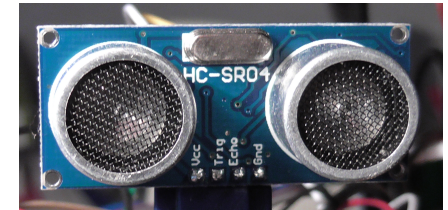
GPIO.setup(lineright,GPIO.IN)
GPIO.setup(lineleft,GPIO.IN)
```

```
def erkennung():
    if GPIO.input(lineright) == True and ↓
        GPIO.input(lineleft) == False:
            ausgabe = "TRUE_RIGHT"
    elif GPIO.input(lineright) == False and ↓
        GPIO.input(lineleft) == True:
            ausgabe = "TRUE_LEFT"
    elif GPIO.input(lineright) == True and ↓
        GPIO.input(lineleft) == True:
            ausgabe = "BOTH_TRUE"
    elif GPIO.input(lineright) == False and ↓
        GPIO.input(lineleft) == False:
            ausgabe = "BOTH_FALSE"
    else:
        ausgabe = "NOINFO"
    return ausgabe
```

# Ultrasonic Sensor



# Ultrasonic Sensor



# Ultrasonic Sensor

```
#!/usr/bin/python
import RPi.GPIO as GPIO
import time
import os

GPIO.setmode(GPIO.BOARD)
TRIG = 29
ECHO = 31
GPIO.setup(TRIG,GPIO.OUT)
GPIO.setup(ECHO,GPIO.IN)
GPIO.output(TRIG,0)

# Konstante
ruhezeit = 0.1
siglength = 0.000001
```

# Ultrasonic Sensor

```
#!/usr/bin/python
import RPi.GPIO as GPIO
import time
import os

GPIO.setmode(GPIO.BOARD)
TRIG = 29
ECHO = 31
GPIO.setup(TRIG,GPIO.OUT)
GPIO.setup(ECHO,GPIO.IN)
GPIO.output(TRIG,0)

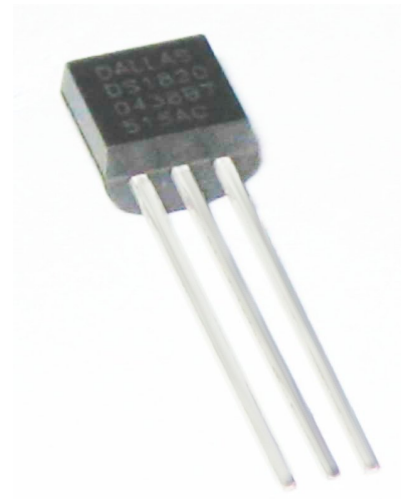
# Konstante
ruhezeit = 0.1
siglength = 0.000001
```

```
def distance():
    abstand = 0
    zeit = time.time()
    start = time.time()

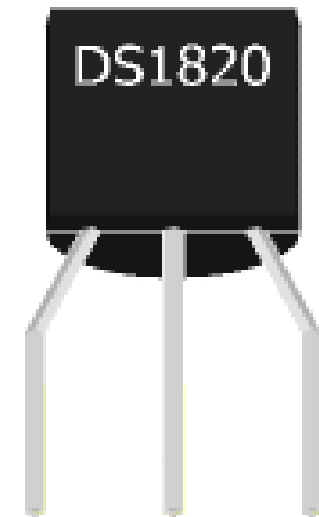
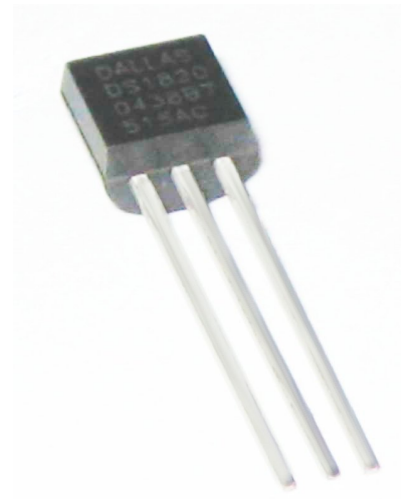
    GPIO.output(TRIG,1)
    time.sleep(siglength)
    GPIO.output(TRIG,0)

    while (GPIO.input(ECHO) == 0):
        start = time.time()
    while (GPIO.input(ECHO) == 1):
        stop = time.time()
    # Abstandsberechnung
    abstand = (stop - start) * 17000
    time.sleep(ruhezeit)
    # Abstand in cm zurueckliefern
    return int(abstand)
```

# Temperatur Sensor



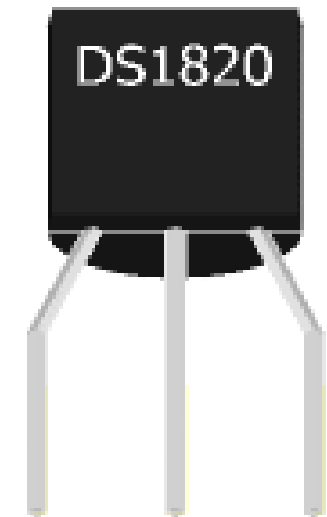
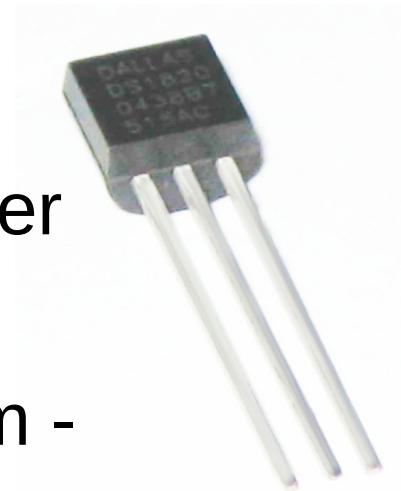
# Temperatur Sensor



GND DATA VCC

# Temperatur Sensor

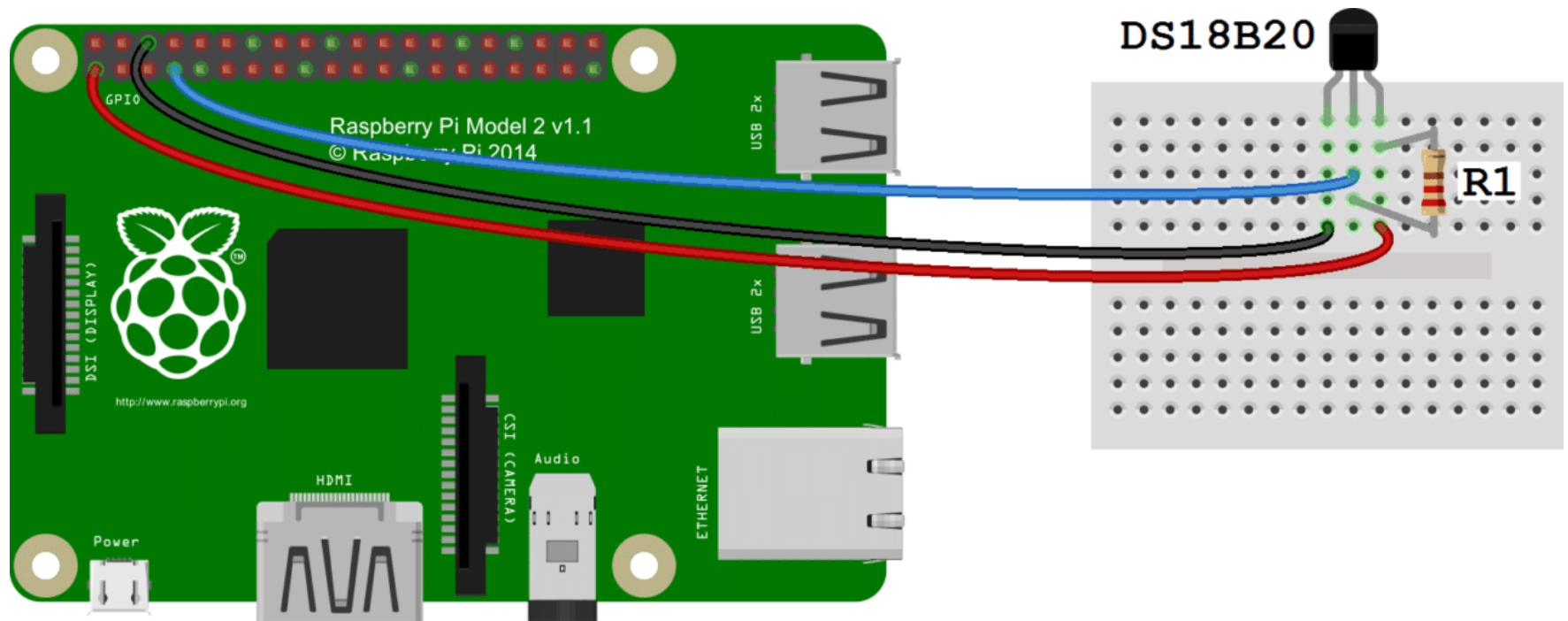
- Digitales Thermometer
- 9-bit Auflösung
- $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- $\pm 0.5^{\circ}\text{C}$  Accuracy from  $-10^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$



GND DATA VCC



# Temperatur Sensor



fritzing

# DS18S20 Kernelmodul

- **1-Wire Bus Aktivierung (alt):**

```
sudo modprobe wire  
sudo modprobe w1-gpio  
sudo modprobe w1-therm
```

- **1-Wire Bus Aktivierung (alt):**

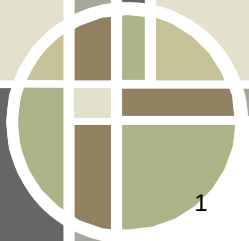
```
sudo modprobe wire  
sudo modprobe w1-gpio  
sudo modprobe w1-therm
```

- **Ab Kernel 3 (neu):**

- sudo nano /boot/config.txt:

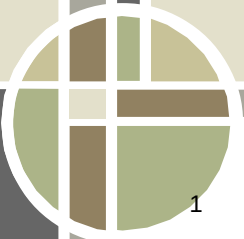
```
dtoverlay=w1-gpio  
gpiopin=4
```

# DS18S20 Kernelmodul



```
cat /sys/bus/w1/devices/28-000005d2e508/w1_slave:
```

# DS18S20 Kernelmodul

A decorative graphic on the left side of the slide, consisting of a circle divided into four quadrants by a cross. The quadrants are colored in shades of green and brown. A small number "1" is located at the bottom right of the circle.

cat /sys/bus/w1/devices/28-000005d2e508/w1\_slave:

```
33 00 4b 46 ff ff 02 10 f4 : crc=f4 YES  
33 00 4b 46 ff ff 02 10 f4 t=25625
```

# DS18S20 Kernelmodul

1  
cat /sys/bus/w1/devices/28-000005d2e508/w1\_slave:

```
33 00 4b 46 ff ff 02 10 f4 : crc=f4 YES
```

```
33 00 4b 46 ff ff 02 10 f4 t=25625
```

# DS18S20 Kernelmodul

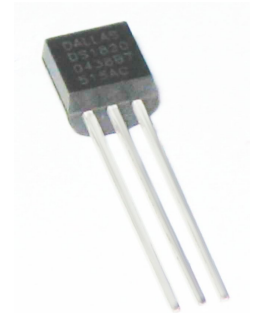
1

```
#!/usr/bin/python
import os, sys, time

def aktuelleTemperatur():
    file = open('/sys/bus/w1/devices/28-000005d2e508/w1_slave')
    fileinhalt = file.read()
    file.close()

    wert = fileinhalt.split("\n")[1].split(" ")[9]
    temperatur = float(wert[2:]) / 1000

    rueckgabewert = '%6.2f' % temperatur
    return(rueckgabewert)
```



# Luftfeuchtigkeit/Temperatur Sensor

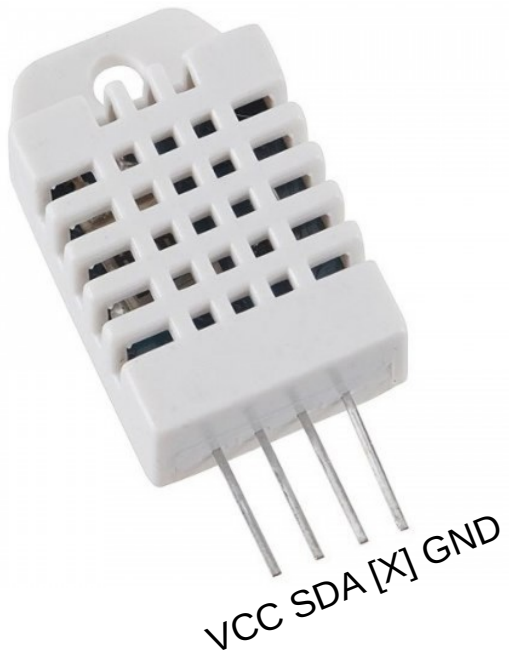
## DHT22 oder DHT11





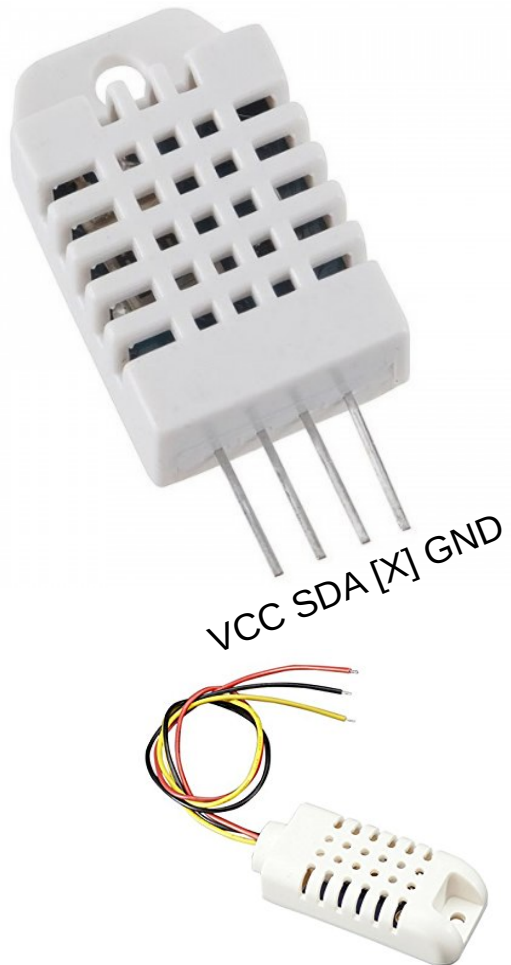
# Luftfeuchtigkeit/Temperatur Sensor

## DHT22 oder DHT11



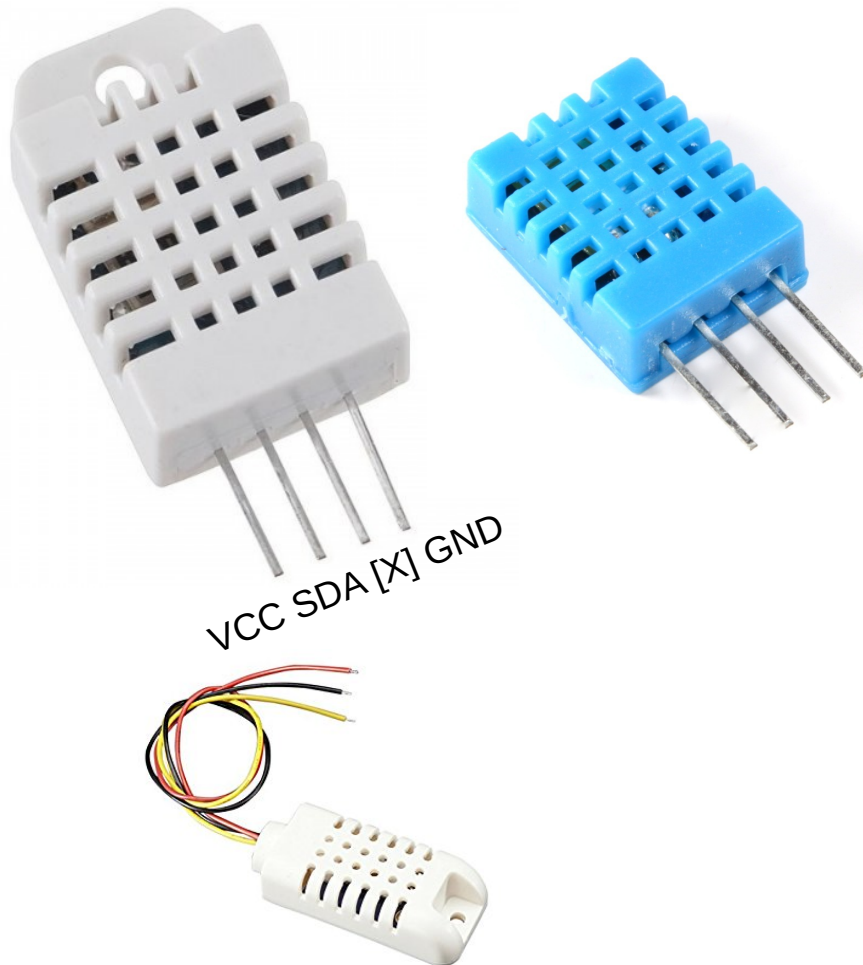
# Luftfeuchtigkeit/Temperatur Sensor

## DHT22 oder DHT11

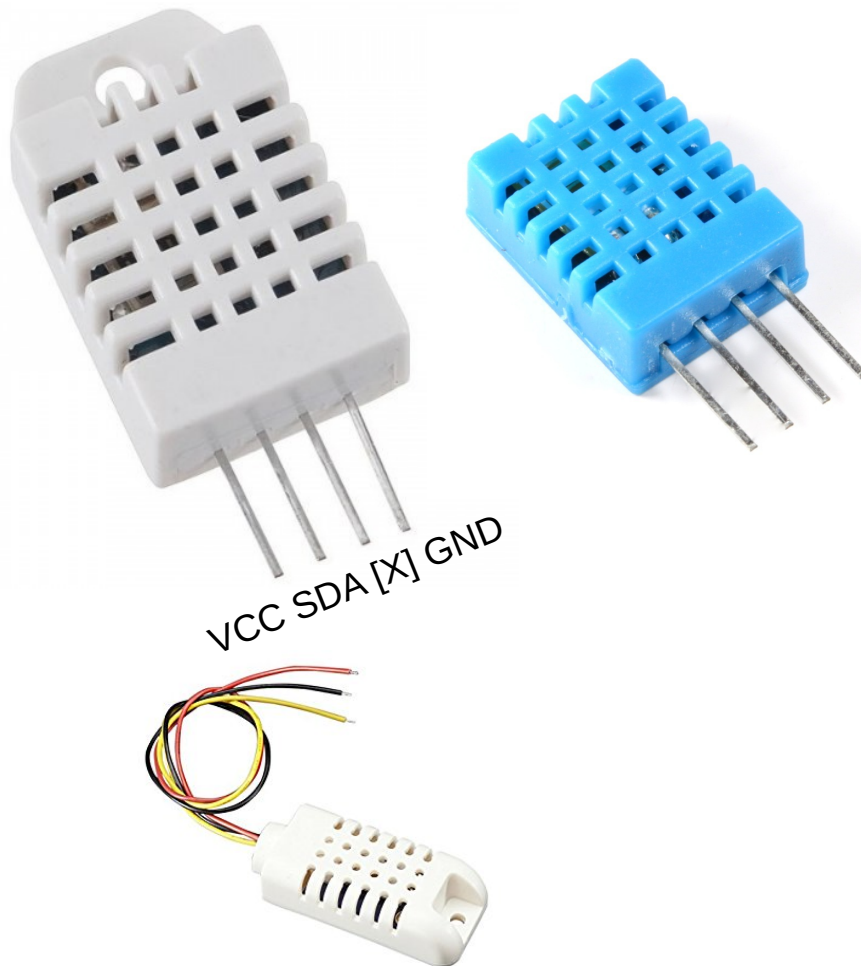


# Luftfeuchtigkeit/Temperatur Sensor

## DHT22 oder DHT11

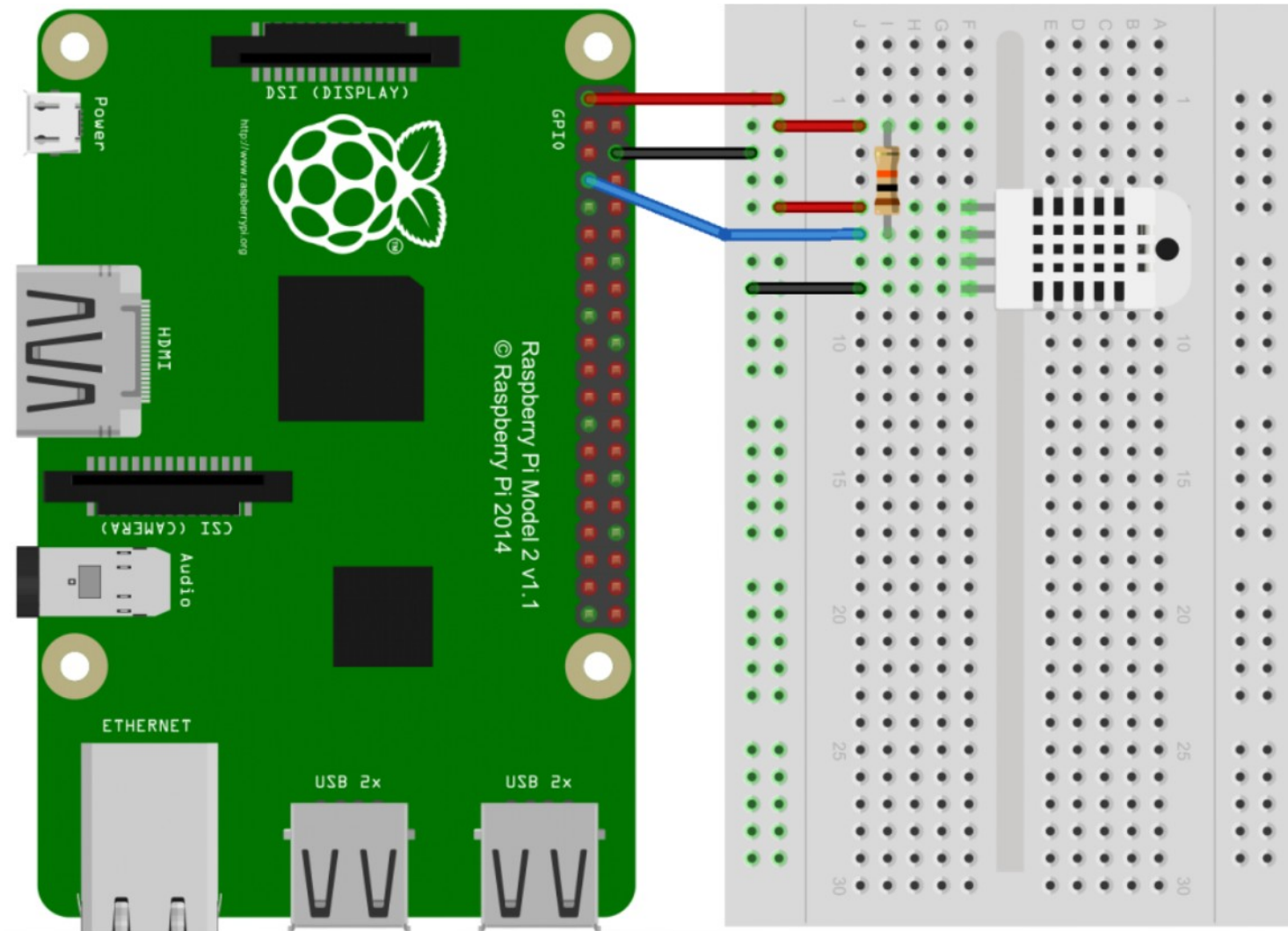


## DHT22 oder DHT11



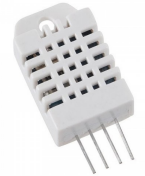
- **DHT11:**  
20-80% (5% Genauigkeit) und  
im Temperaturbereich von ca.  
0-50°C (2°C Genauigkeit)
- **DHT22:**  
0-100% (2-5% Genauigkeit)  
und bei der Temperatur im  
Bereich von -40 bis 125°C  
(0,5°C Genauigkeit)

# Luftfeuchtigkeit/Temperatur Sensor



# Luftfeuchtigkeit/Temperatur Sensor

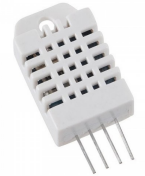
- Installation der Software:



```
git clone https://github.com/adafruit/Adafruit_Python_DHT.git  
cd Adafruit_Python_DHT  
sudo python setup.py install
```

# Luftfeuchtigkeit/Temperatur Sensor

- Installation der Software:



```
git clone https://github.com/adafruit/Adafruit_Python_DHT.git  
cd Adafruit_Python_DHT  
sudo python setup.py install
```

- Werte Auslesen:

```
sudo ./AdafruitDHT.py 22 4
```

# Luftfeuchtigkeit/Temperatur Sensor



```
#!/usr/bin/python
import Adafruit_DHT

sensor = Adafruit_DHT.DHT22
gpio = 4

humidity, temperature = Adafruit_DHT.read_retry(sensor, gpio)

print 'Temperatur: {0:0.1f}°C Luftfeuchtigkeit: {1:0.1f}
%'.format(temperature, humidity)
```



# Wiring PIN Belegung

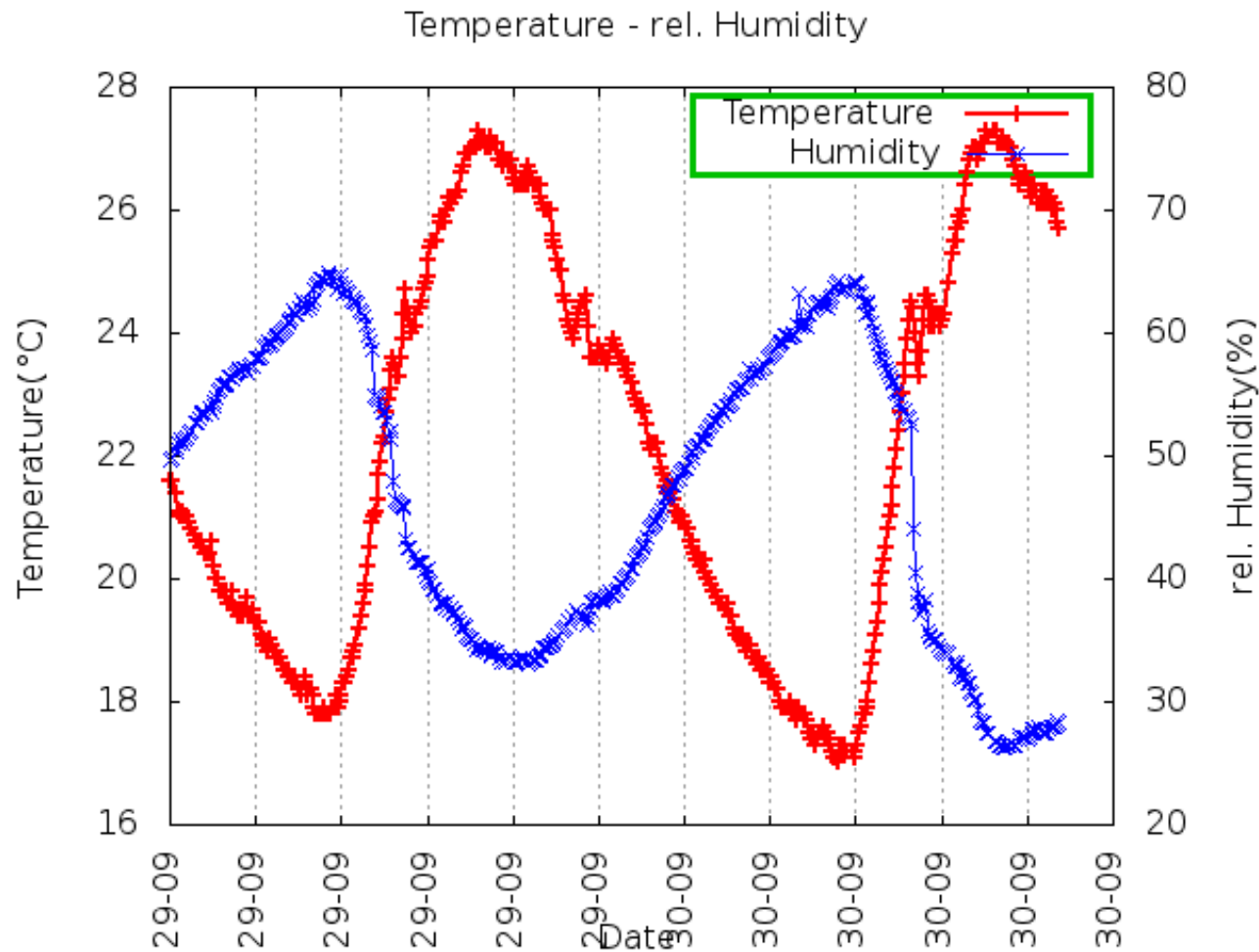
Raspberry Pi GPIO Header

BCM	WiringPi	Name	Physical	Name	WiringPi	BCM
		3.3v	1	2	5v	
2	8	SDA.1	3	4	5v	
3	9	SCL.1	5	6	0v	
4	7	1-Wire	7	8	TxD	15 14
		0v	9	10	RxD	16 15
17	0	GPIO.0	11	12	GPIO.1	1 18
27	2	GPIO.2	13	14	0v	
22	3	GPIO.3	15	16	GPIO.4	4 23
		3.3v	17	18	GPIO.5	5 24
10	12	MOSI	19	20	0v	
9	13	MISO	21	22	GPIO.6	6 25
11	14	SCLK	23	24	CE0	10 8
		0v	25	26	CE1	11 7
0	30	SDA.0	27	28	SCL.0	31 1
5	21	GPIO.21	29	30	0v	
6	22	GPIO.22	31	32	GPIO.26	26 12
13	23	GPIO.23	33	34	0v	
19	24	GPIO.24	35	36	GPIO.27	27 16
26	25	GPIO.25	37	38	GPIO.28	28 20
		0v	39	40	GPIO.29	29 21
BCM	WiringPi	Name	Physical	Name	WiringPi	BCM

Figure 6: GPIO connector on RPi

## 5) DSI Connector

# Messungen im Klimagarten



# Das Team



Martin Gruber  
Rene Schwarzingger  
Benedikt Gottsbachner  
Klaus Misof

*email: klausmisof@gmx.at*