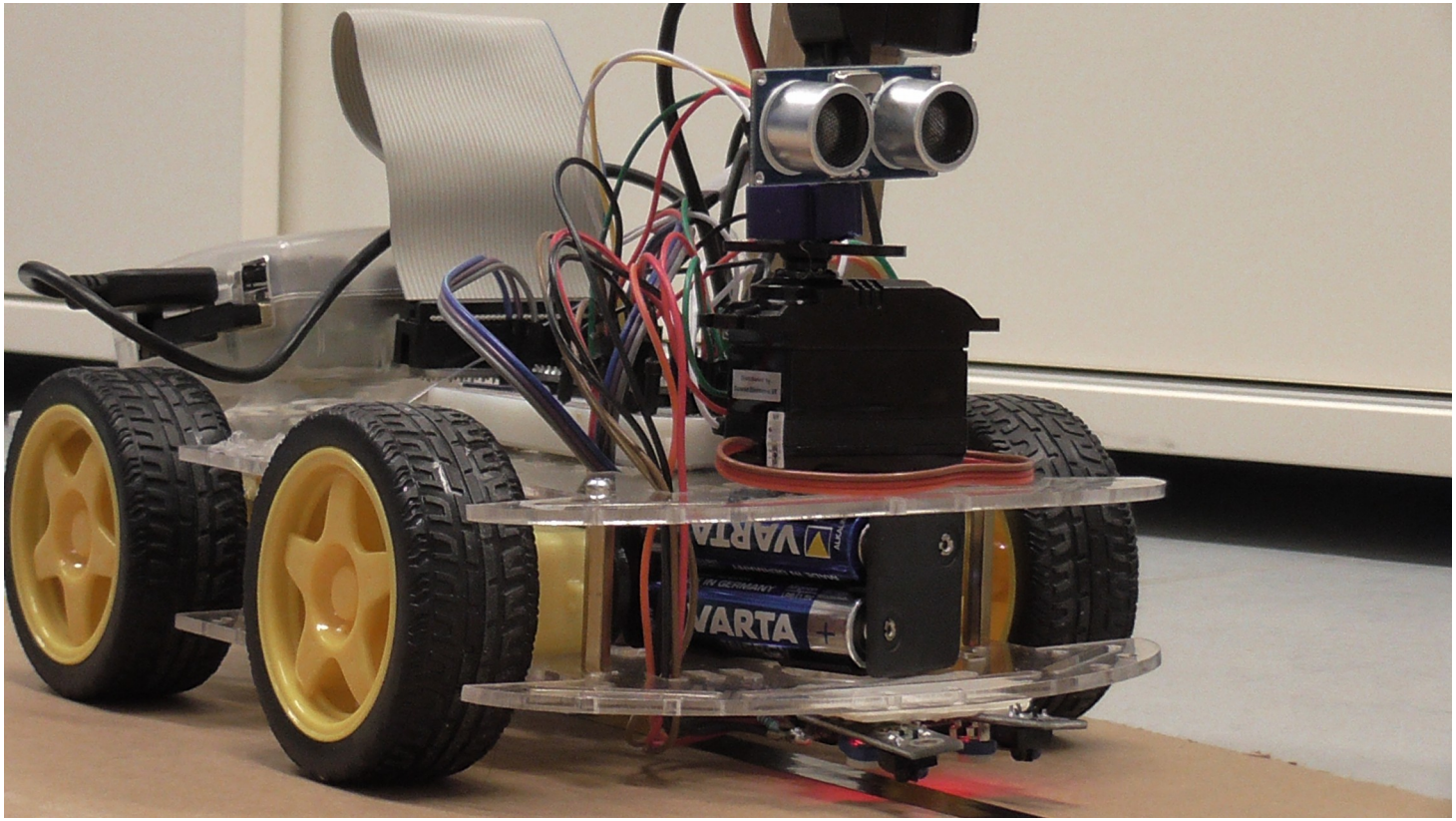
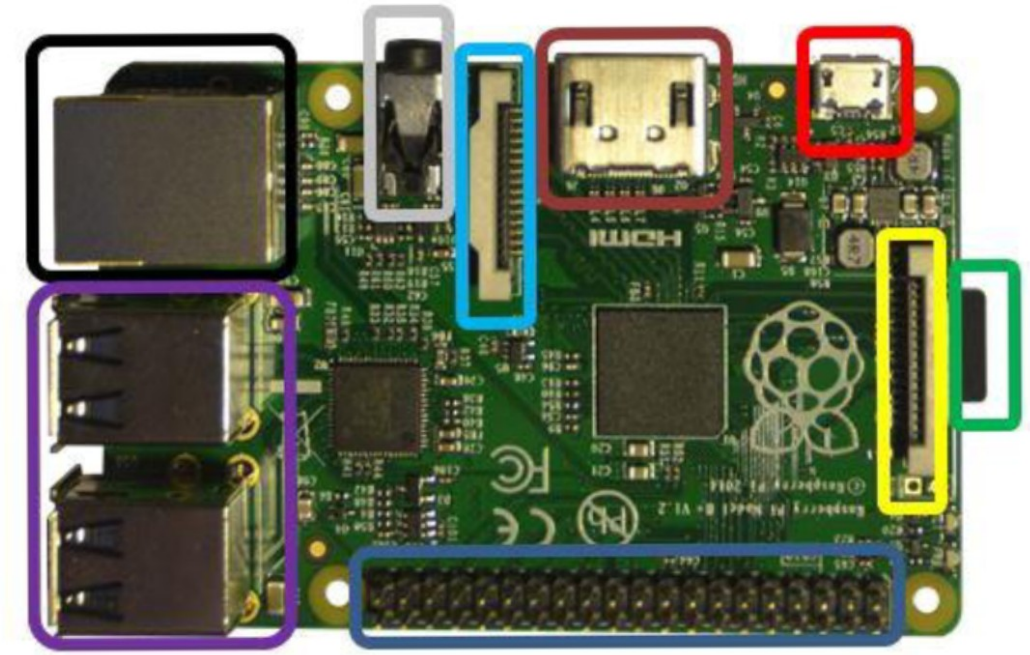
Roboter-Workshop -AG INF 2016

Roboter mit dem Raspberry PI 2



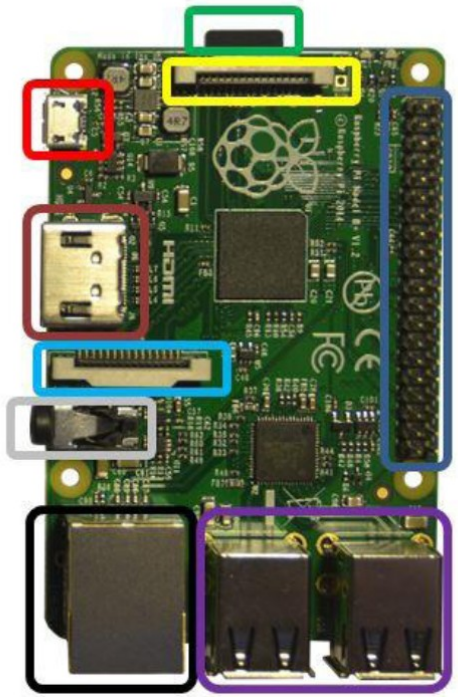
K. Misof & M. Gruber

Raspberry PI 2



- SD-Karte
- Micro-USB (Power)
- Display
- GPIO
- HDMI
- Camera
- RJ-45 (Netzwerk)
- USB
- Audio/Video

GPIO



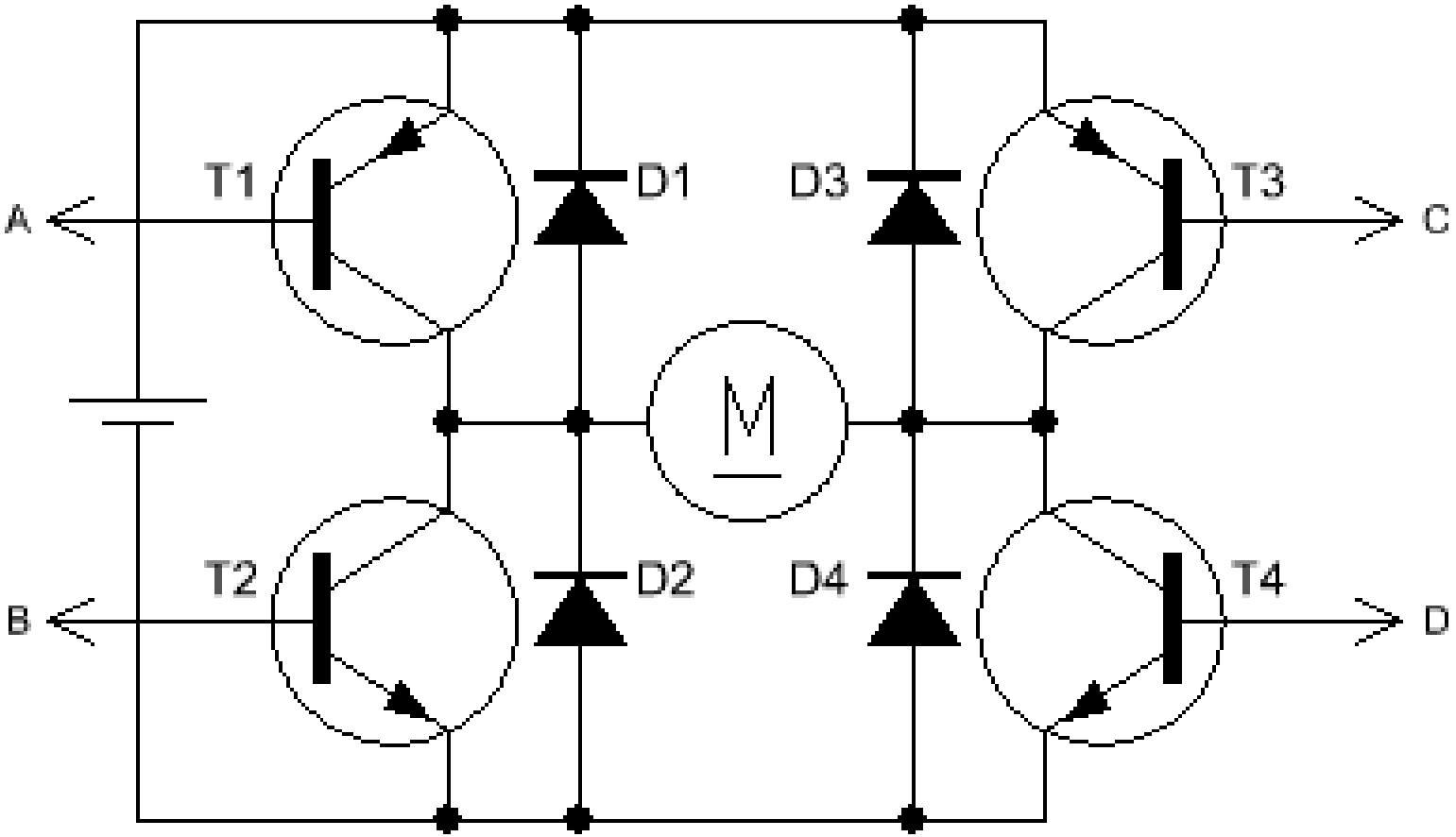
Raspberry Pi2 GPIO Header

Pin#	NAME		NAME	Pin#
01	3.3v DC Power		DC Power 5v	02
03	GPIO02 (SDA1 , I²C)		DC Power 5v	04
05	GPIO03 (SCL1 , I²C)		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 (I²C ID EEPROM)		(I²C 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

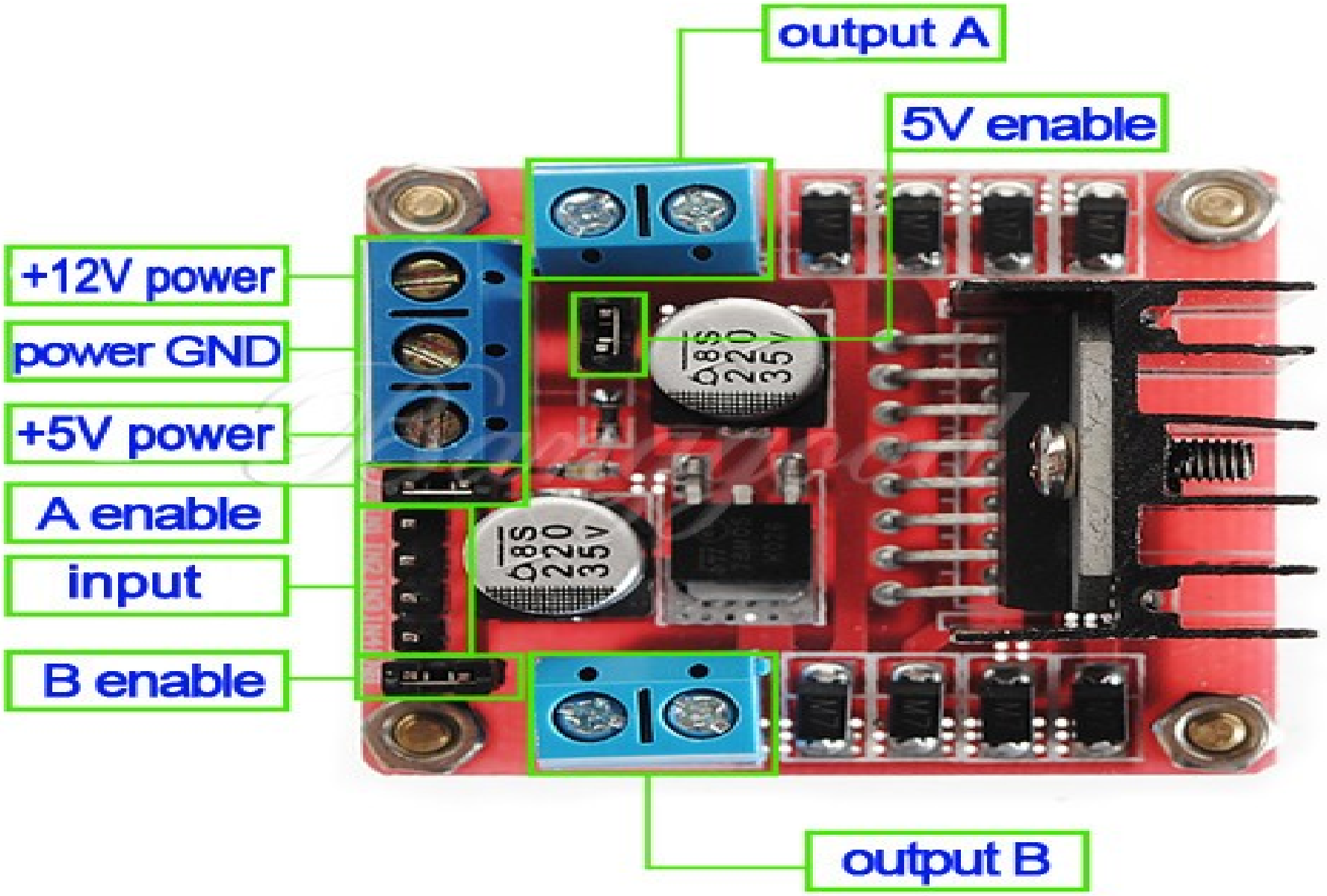
Rev. 1
26/01/2014

http://www.element14.com

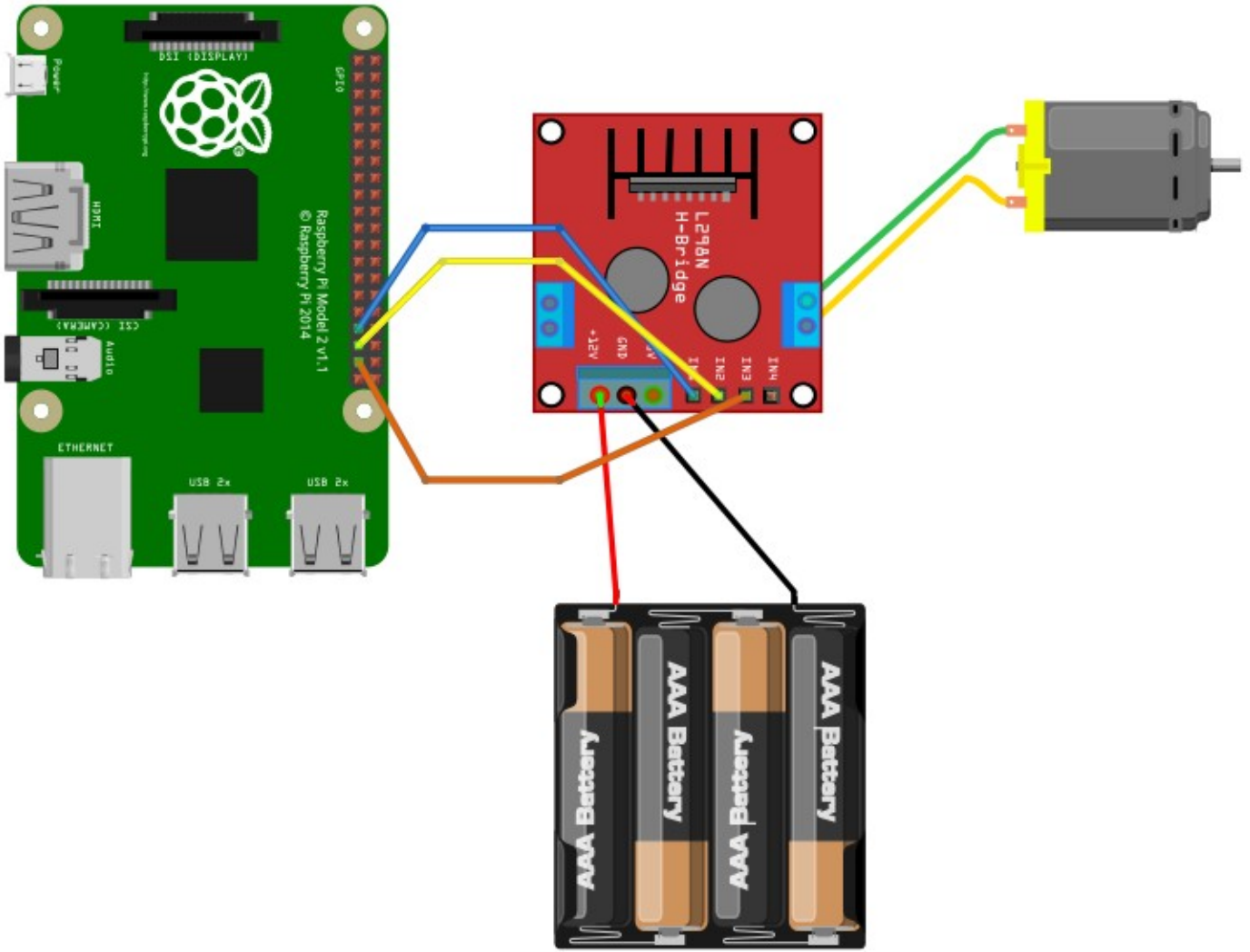
H-BRÜCKE



H-BRÜCKE


output A
5V enable
+12V power
power GND
+5V power
A enable
input
B enable
output B

Fritzing-Software

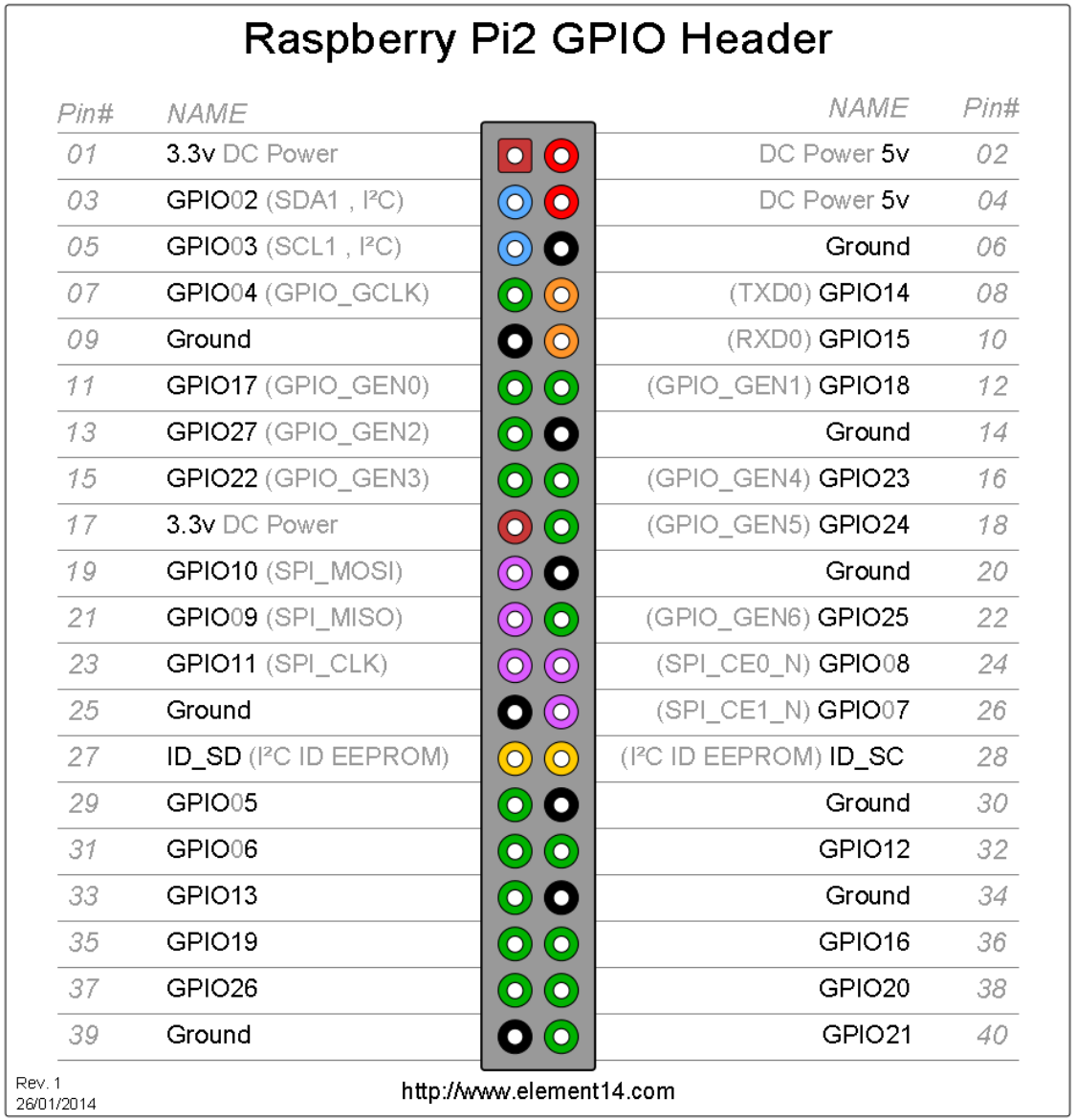


L298N -Dual- H-Brücke

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

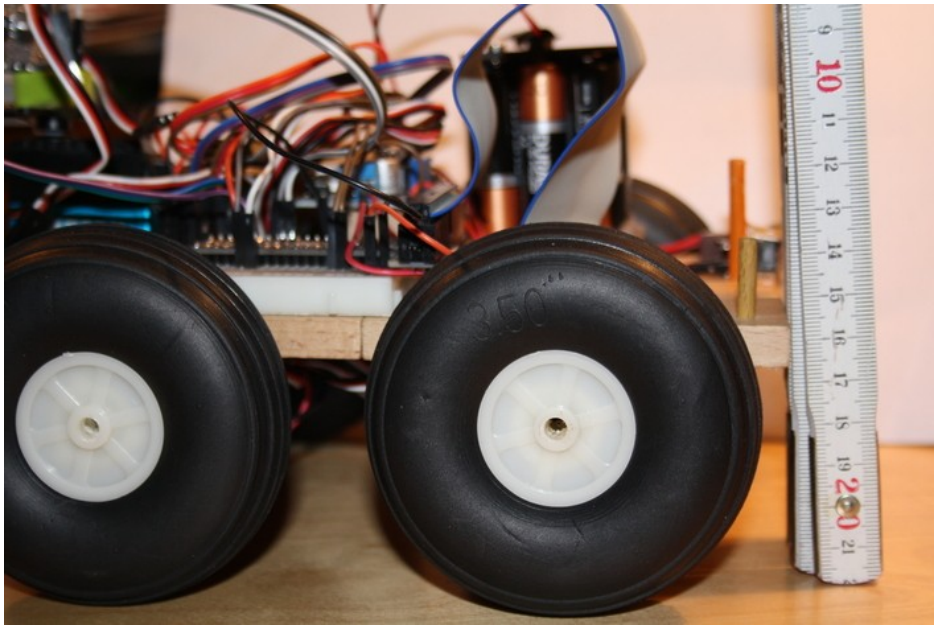
Code: PIN-Nummern

```
#!/usr/bin/python

import RPi.GPIO as GPIO

MotorEnableA     = 37
Motor1A          = 35
Motor2A          = 33

MotorEnableB     = 40
Motor2B          = 38
Motor1B          = 36
GPIO.setmode(GPIO.BOARD)
GPIO.setwarnings(False)
```



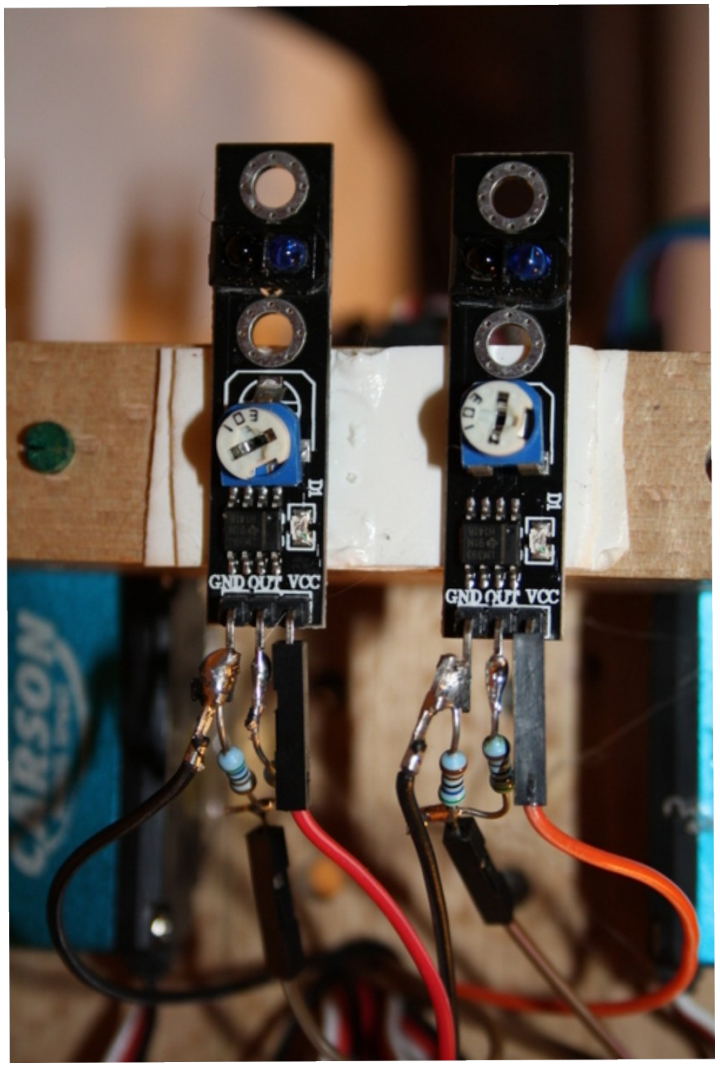
Code: PIN-Setup

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

GPIO.setup(MotorEnableB,GPIO.OUT)
GPIO.setup(Motor1B,GPIO.OUT)
GPIO.setup(Motor2B,GPIO.OUT)

pulsA=GPIO.PWM(MotorEnableA,100)
pulsB=GPIO.PWM(MotorEnableB,100)

GeschwindigkeitA=100
GeschwindigkeitB=100
geschwindigkeitA_langsam=100
geschwindigkeitB_langsam=100
```

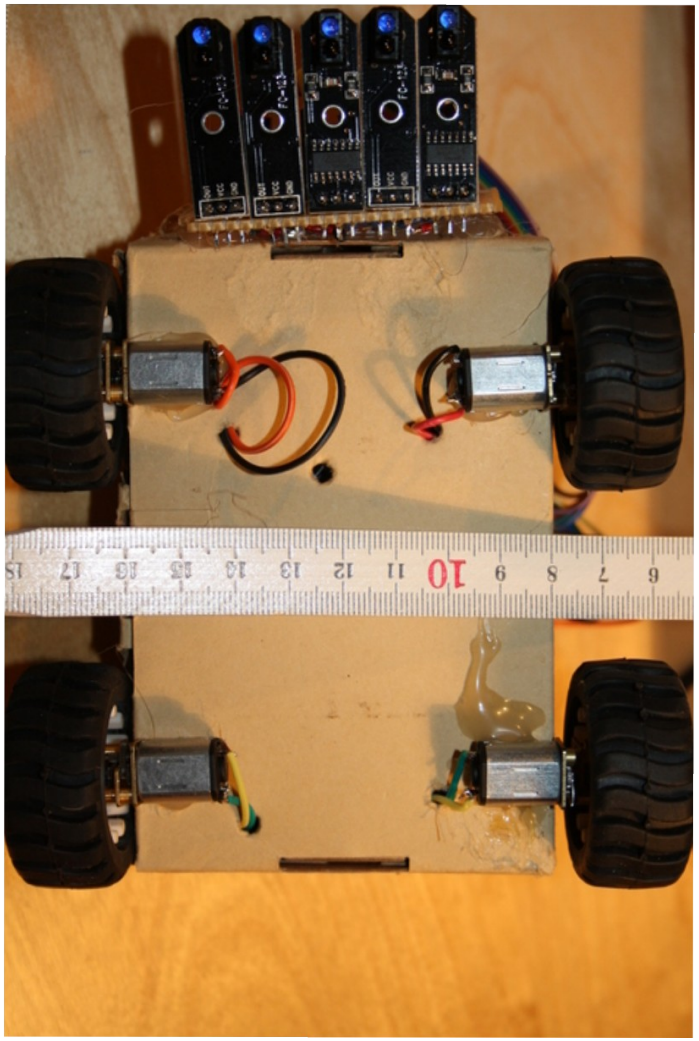


Code: DC-Ansteuerung

```
def all_off() :
        GPIO.output(Motor1A,GPIO.LOW)
        GPIO.output(Motor2A,GPIO.LOW)
        GPIO.output(Motor1B,GPIO.LOW)
         GPIO.output(Motor2B,GPIO.LOW)
        GPIO.output(MotorEnableA,GPIO.LOW)
        GPIO.output(MotorEnableB,GPIO.LOW)

def motorA(move):
        if move == 0 :
                GPIO.output(Motor1A,GPIO.LOW)
                GPIO.output(Motor2A,GPIO.LOW)

        #MotorA vorwaerts
        if move == 1 :
                GPIO.output(Motor1A,GPIO.LOW)
                GPIO.output(Motor2A,GPIO.HIGH)
        #MotorA rueckwerts
        if move == 2 :
                 GPIO.output(Motor1A,GPIO.HIGH)
                GPIO.output(Motor2A,GPIO.LOW)
```



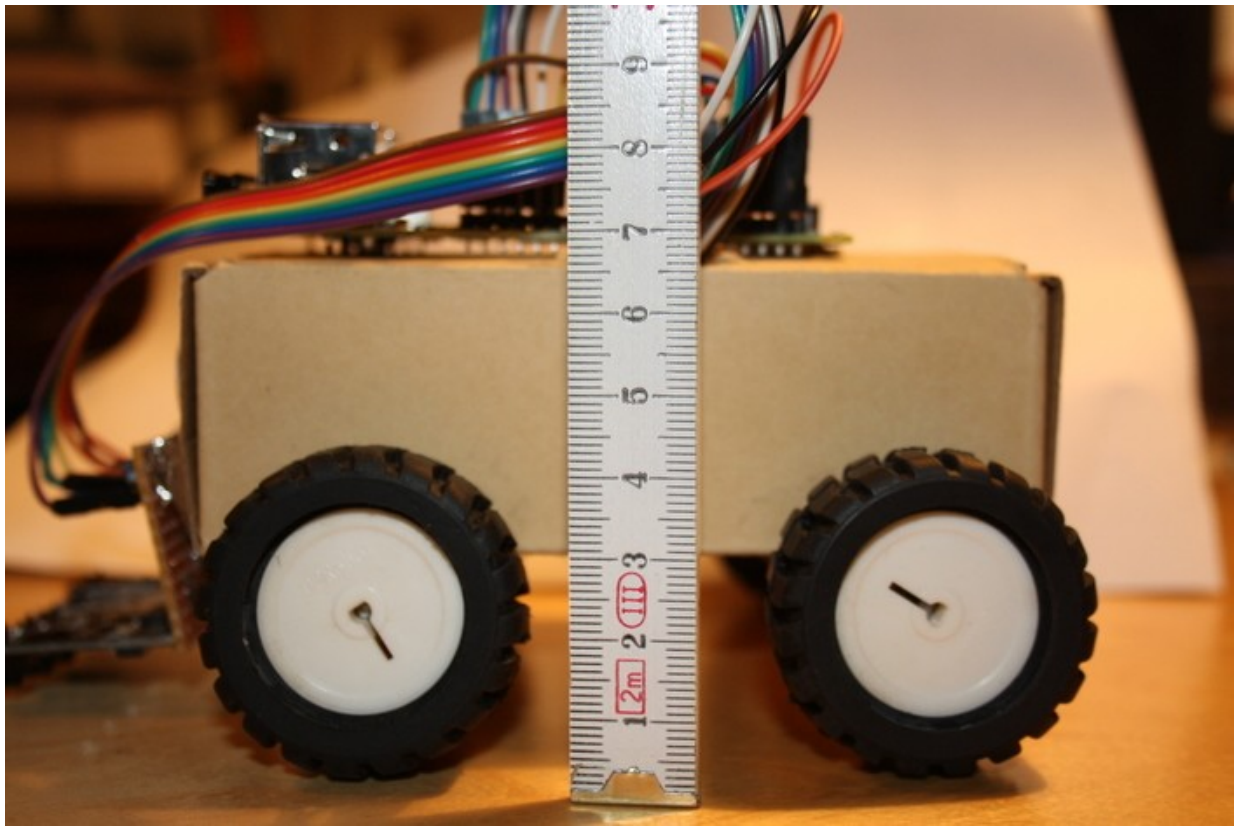
Code: DC-Funktionen



```
def forward():
        pulsA.start(geschwindigkeitA)
        pulsB.start(geschwindigkeitB)
        motorA(1)
        motorB(1)

def back():
        pulsA.start(geschwindigkeitA)
        pulsB.start(geschwindigkeitB)
        motorA(2)
        motorB(2)

def stop():
        #pulsA.start(geschwindigkeitA)
        #pulsB.start(geschwindigkeitB)
        motorA(0)
        motorB(0)

def right():
        pulsA.start(geschwindigkeitA_langsam)
        pulsB.start(geschwindigkeitB_langsam)
        motorA(2)
        motorB(1)

def left():
        pulsA.start(geschwindigkeitA_langsam)
        pulsB.start(geschwindigkeitB_langsam)
        motorA(1)
        motorB(2)
```

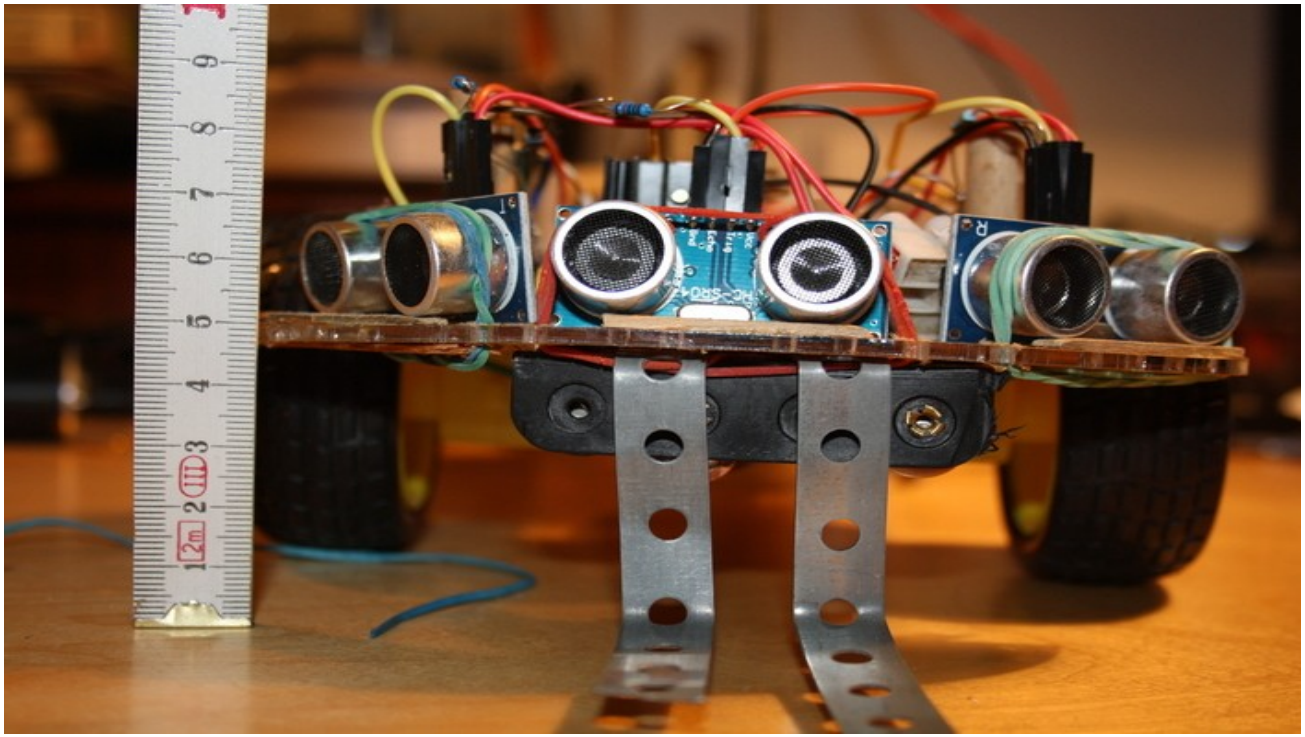
Code: Funktionen testen

```
#main

forward()
time.sleep(2)
stop()
Back()
time.sleep2)
stop()
left()
time.sleep(2)
stop()
right()
time.sleep(2)
stop()


GPIO.cleanup()
```



Cursor-Tasten

```
import curses

stdscr = curses.initscr()
while 1:
    c = stdscr.getch()
    if c == ord('q'):
       stop()
        break
    if c == 65:
        #print "Vorwaerts"
        forward()
    if c == 66:
        #print "Rueckwaerts"
       back()
    if c == 67:
        #print "Rechts"
       right()
    if c == 68:
        #print "Links"
       left()
curses.endwin()
```

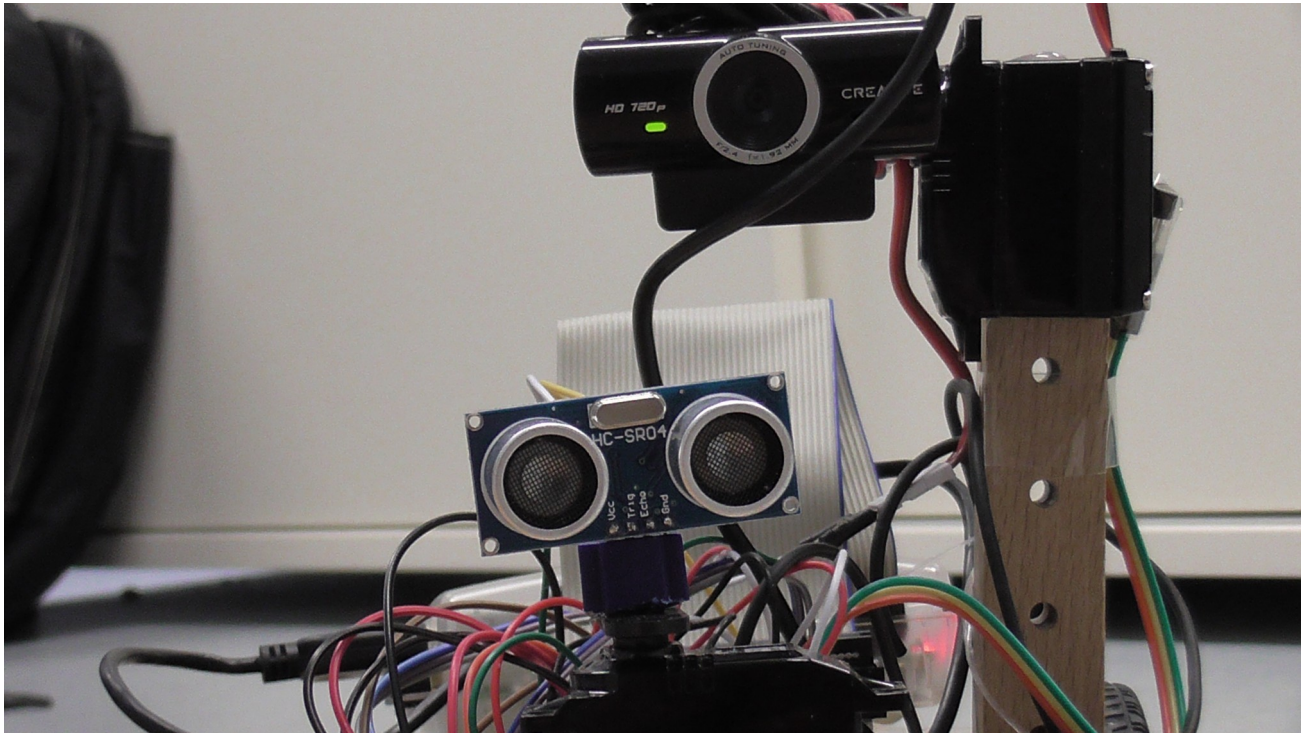


Code: Command Web

```
import sys


if sys.argv[1] == "forward" :
    kmmotor.forward()
if sys.argv[1] == "back" :
    kmmotor.back()
if  sys.argv[1] == "left" :
    kmmotor.left()
if  sys.argv[1] == "right" :
    kmmotor.right(l)

if  sys.argv[1] == "stop" :
    kmmotor.stop()

#GPIO.cleanup()
```

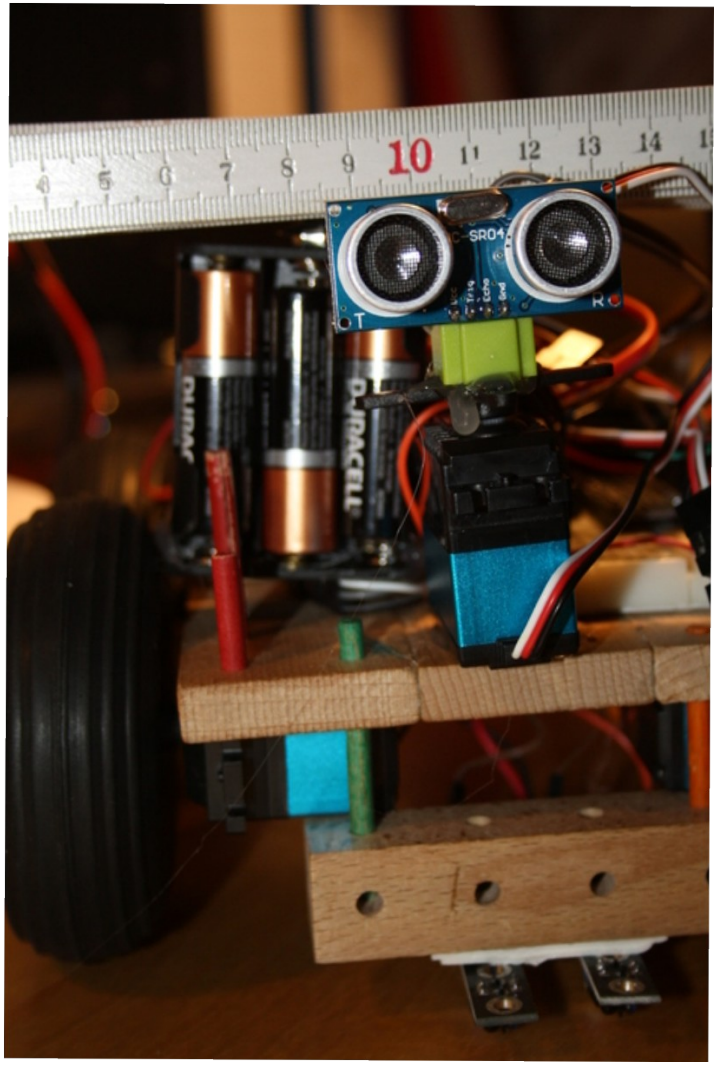
Code: Ultraschallsensor

```
import RPi.GPIO as GPIO
import time
import os

GPIO.setmode(GPIO.BOARD
)
TRIG = 29 #PIN 29
ECHO = 31 #PIN 31

GPIO.setup(TRIG,GPIO.OUT)
GPIO.setup(ECHO,GPIO.IN)
GPIO.output(TRIG,0)

maxabstand=50
ruhezeit=0.2
maxzeit=1
```



Code: Ultraschallsensor

```
def distance():
    abstand = 0
    zeit = time.time()
    start = time.time()
    #GPIO.output(TRIG,0)
    #time.sleep(0.1)
    GPIO.output(TRIG,1)
    time.sleep(0.000001)
    GPIO.output(TRIG,0)
    #start = time.time()
    while (GPIO.input(ECHO) == 0):
        start = time.time()
    while (GPIO.input(ECHO) == 1):
        stop = time.time()
    abstand=(stop-start)*17000
    time.sleep(ruhezeit)
    print(int(abstand))
    return int(abstand)

#while True:
#    test=distance()
#    print(test)
#GPIO.cleanup
```



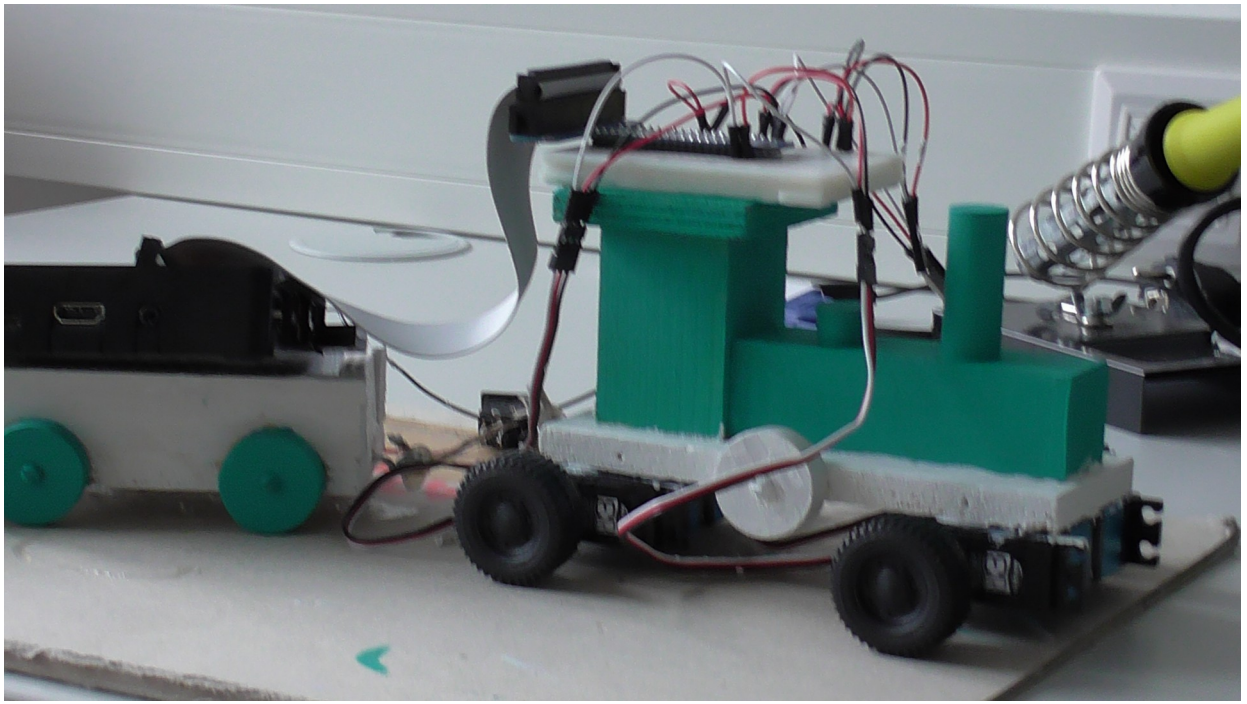
MJPG-STREAMER

apt-get install subversion

apt-get install libv4l-dev

apt-get install libjpeg8-dev

apt-get install imagemagick



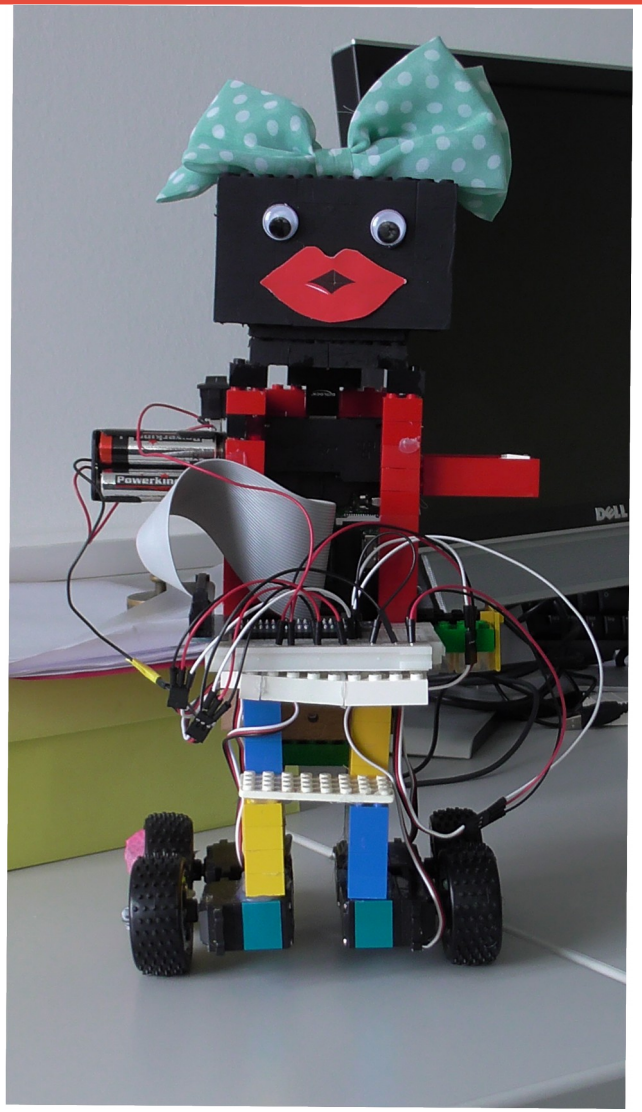
MJPG-STREAMER

svn co https://svn.code.sf.net/p/mjpg-streamer/code/

cd mjpg-streamer/mjpg-streamer

make USE_LIBV4L2=true clean all

make DESTDIR=/usr install



Bilder Gallerie

sudo nano /usr/sbin/webcam.sh

mjpg_streamer -i "/usr/lib/input_uvc.so -d /dev/video0 -r 640x480 -f 1" -o "/usr/lib/output_http.so -p 8090 -w /var/www/mjpg_streamer"

Save the file and give it exec permission

sudo chmod 755 /usr/sbin/webcam.sh

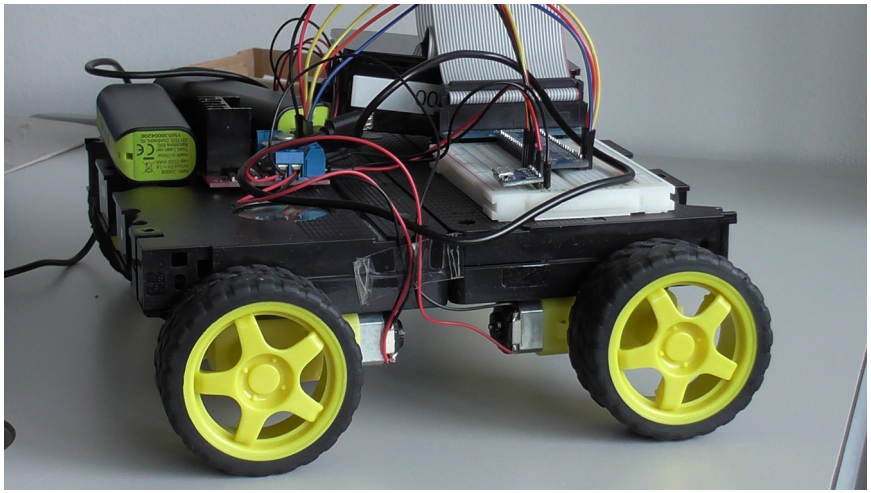
Create a link to global applications folder so you can run it from any folder

sudo ln -s /usr/sbin/webcam.sh /etc/init.d/webcam.sh

Make sure it gets executed during boot

update-rc.d webcam.sh defaults 94 6

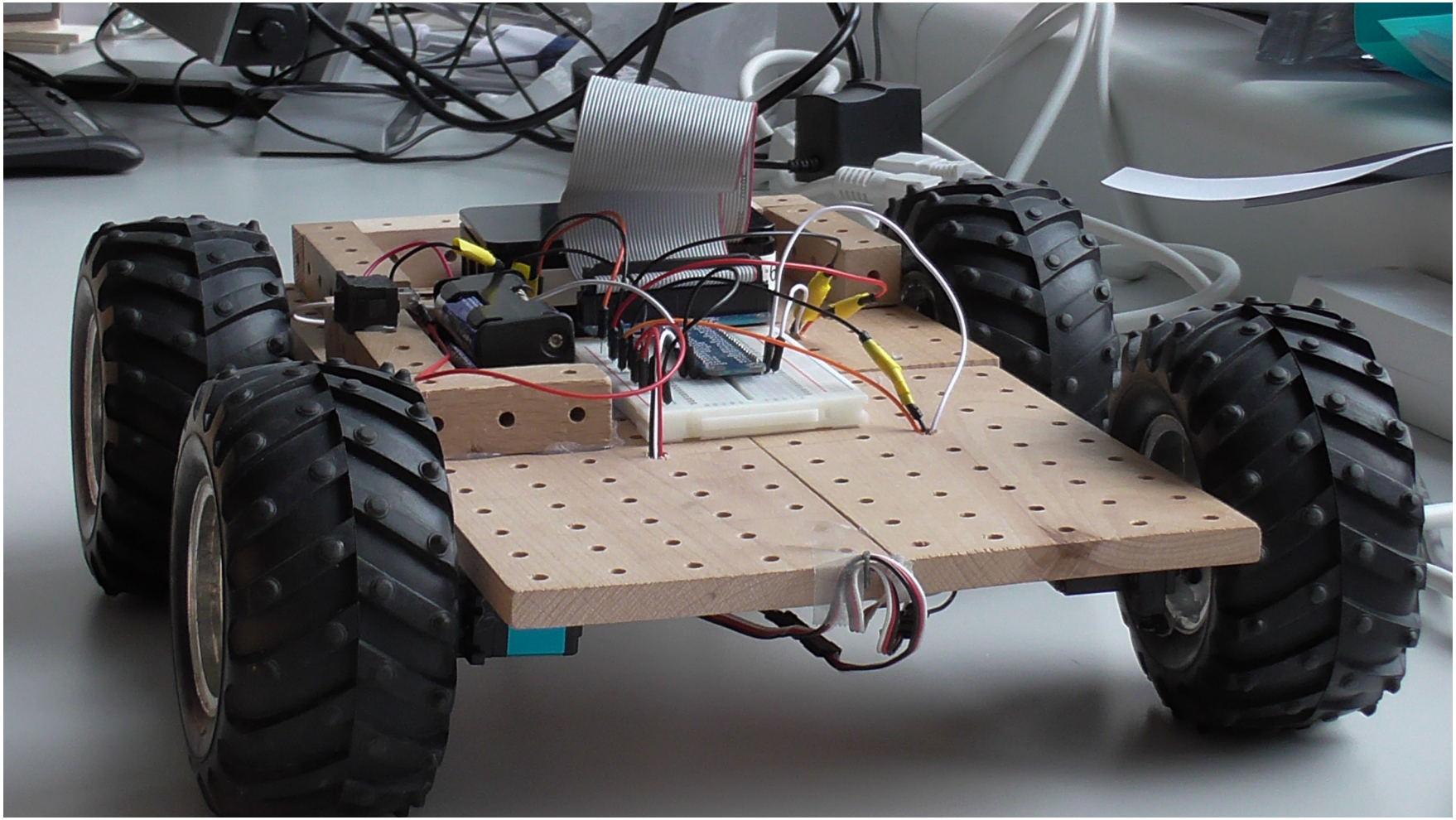
Webpage-Example



sudo nano /var/www/video.html

```
<html>

   <head><title>MJPG Streamer</title></head>

   <body>
      <h1>MJPG video of ELMTREE Lounge Room</h1>
      <img src=”http://10.0.0.38:8090/?action=stream” width=”752″>
      <br><a href=”http://10.0.0.38:8090/?action=stream”>View</a>

  <body>
</html>
```

Bilder Gallerie



Bilder Gallerie