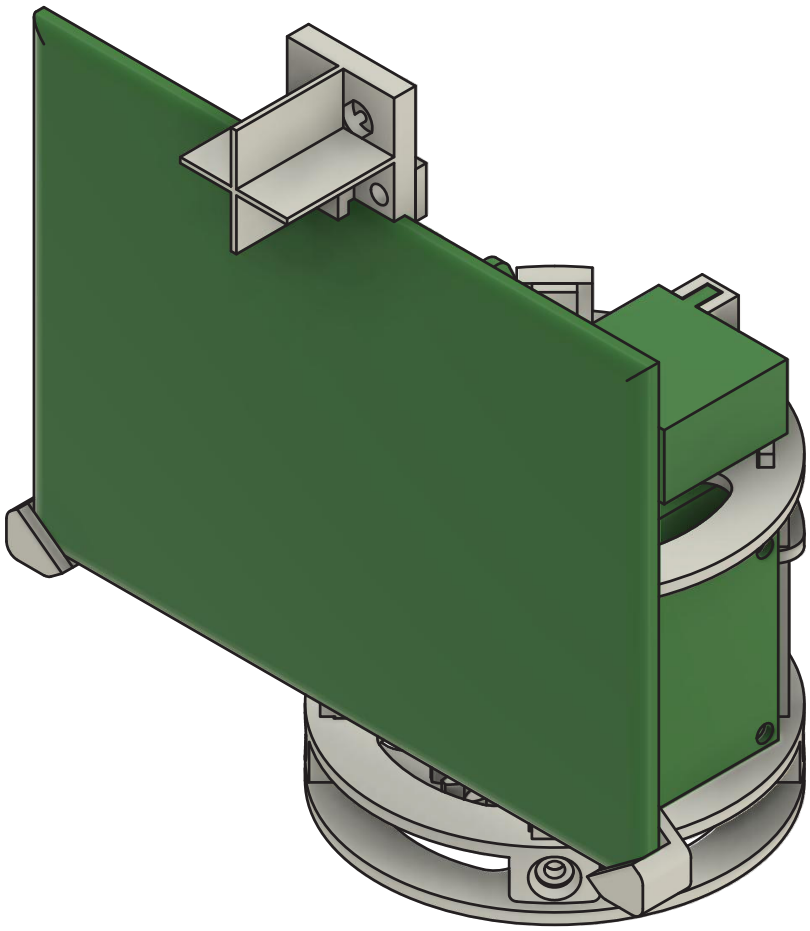
HS PF

24.05.2023

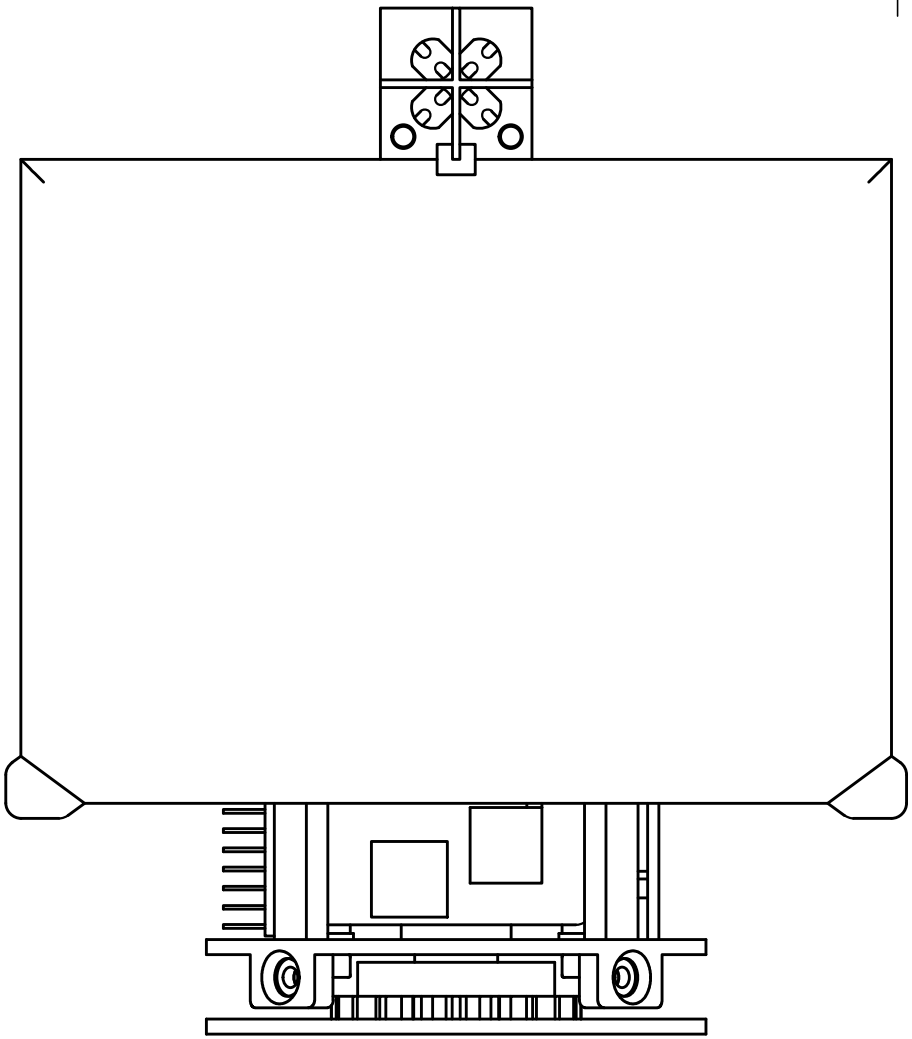
Solartracker
Prototyp V1.0.32

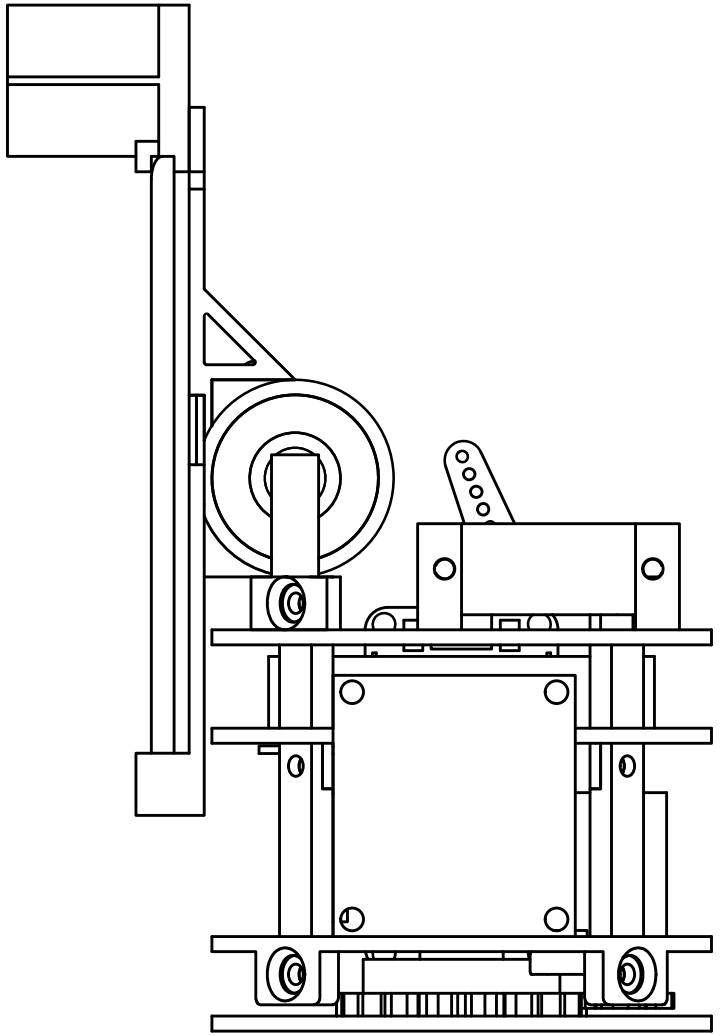
Projekt Methoden Kreativität
Gruppe D3-2



Adrian Haury
Thomas Käfer
Robin Krüger
Deniz Müller
Serap Ünsal

Prüfer/Auftraggeber:
Prof. Dr. Uwe Dittmann
Irina Schönhals
Rene Triebenstein





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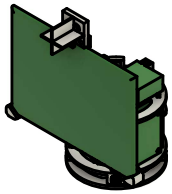		Document type	Document status
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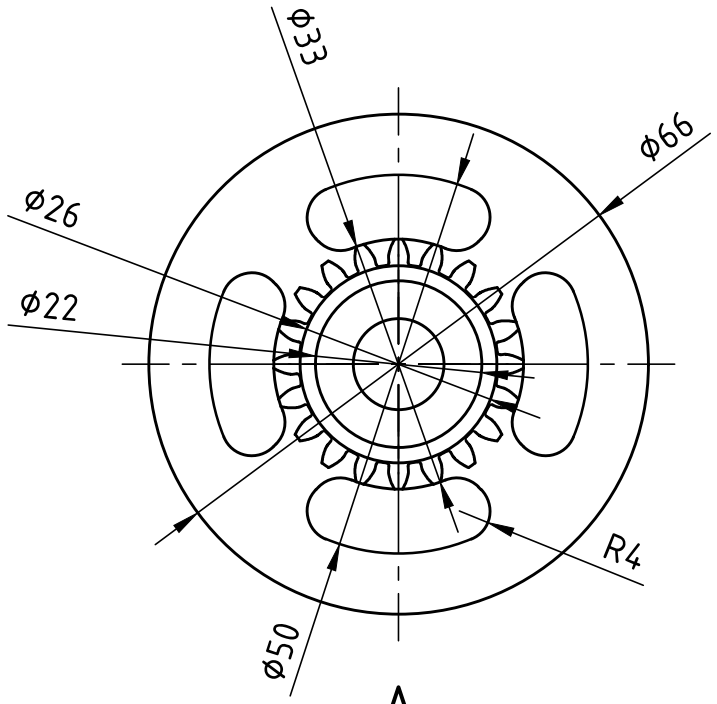
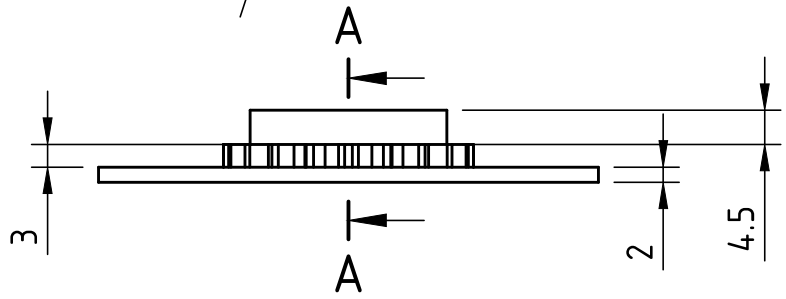


Zeichnung nicht normgerecht
und nicht vollständig bemaßt

Zahnrad mit
Modul 1,5
20 Zähne



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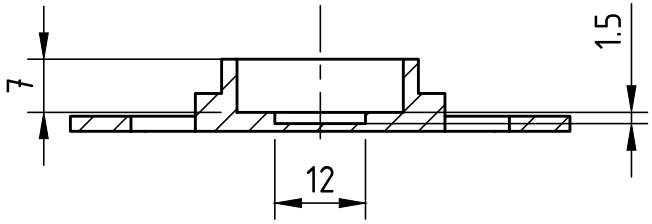

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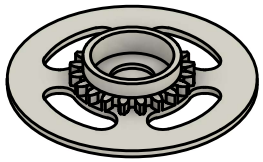		Document type	Document status
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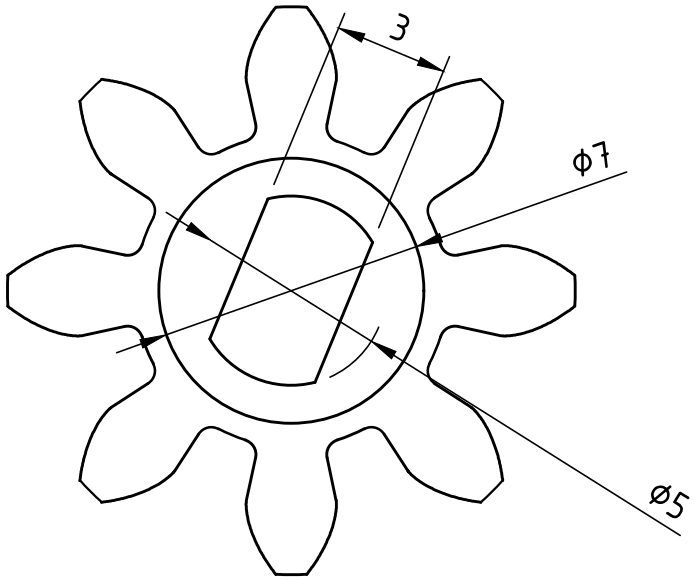

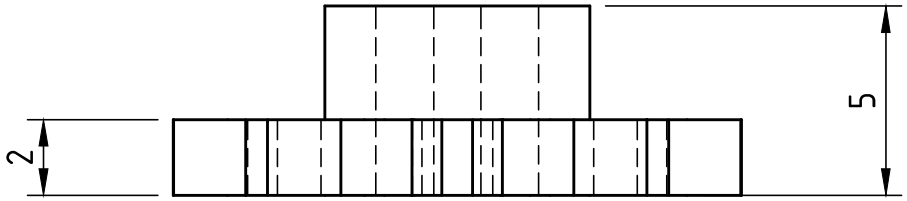

Ritzel
Modul 1,5
8 Zähne

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		Document type	Document status
		Title **Ritzel**	DWG No.
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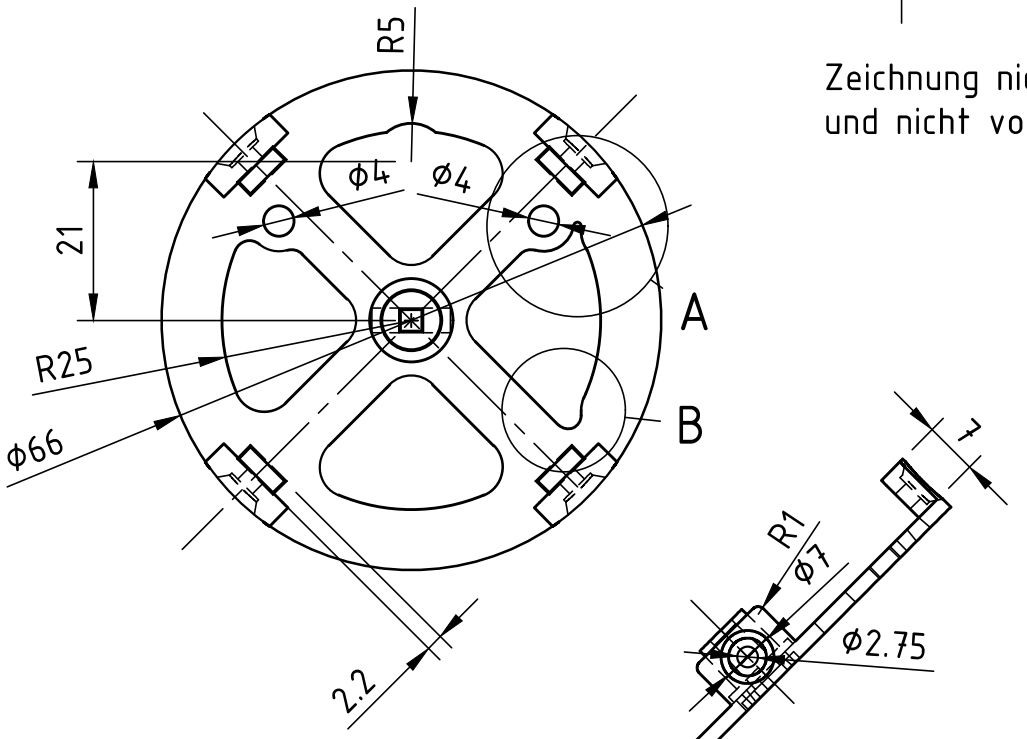

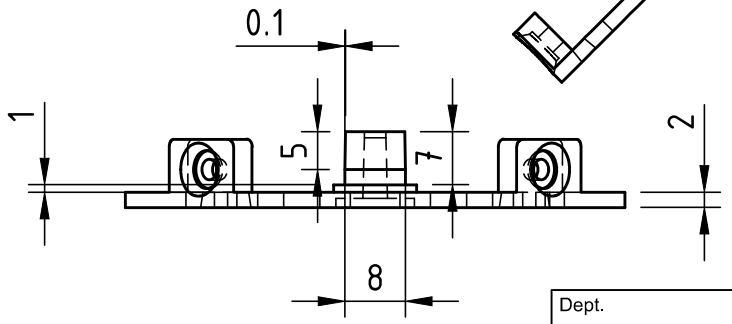

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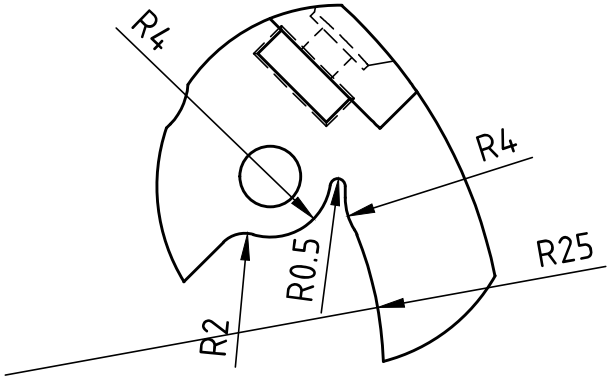

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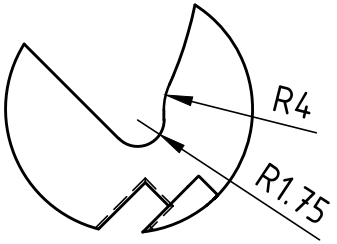

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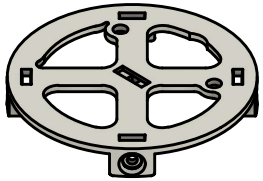		Document type	Document status
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			Rev. / Date of issue / Sheet 1/1

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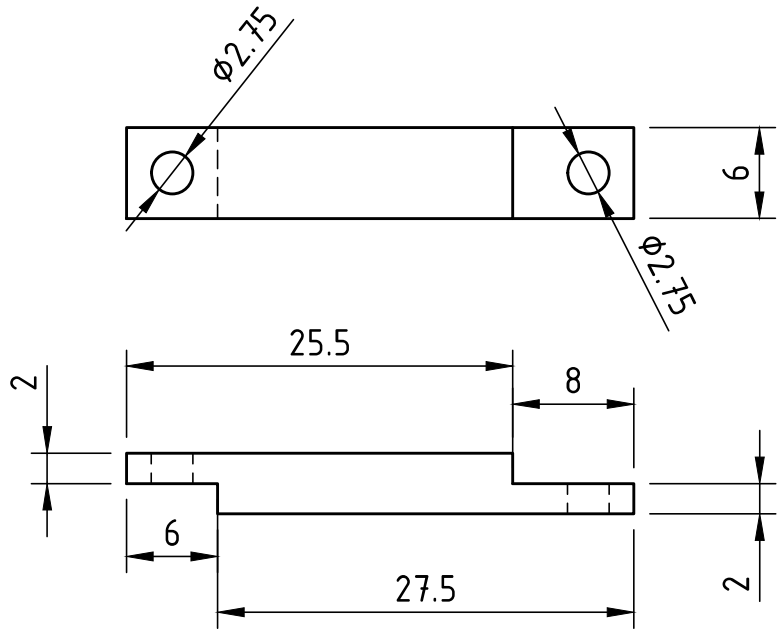

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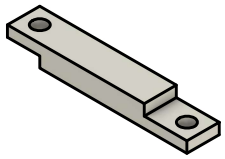		Document type	Document status
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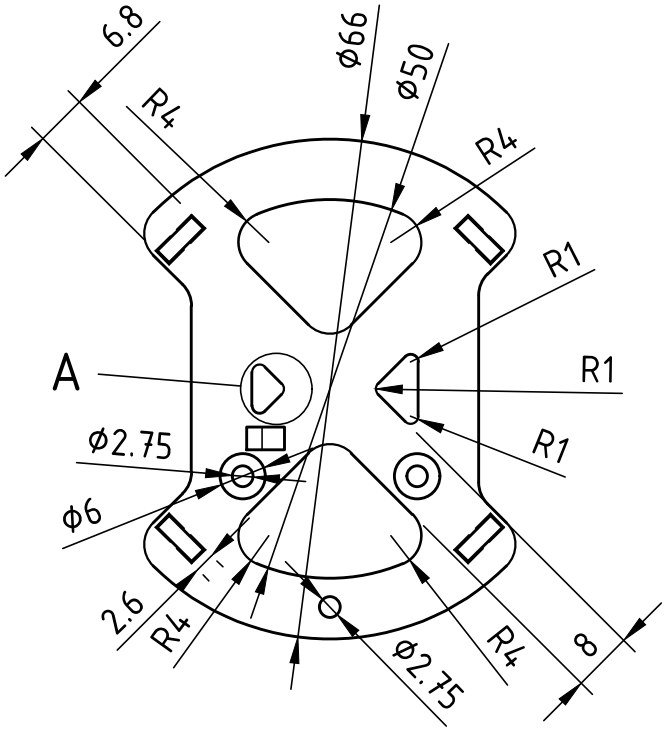

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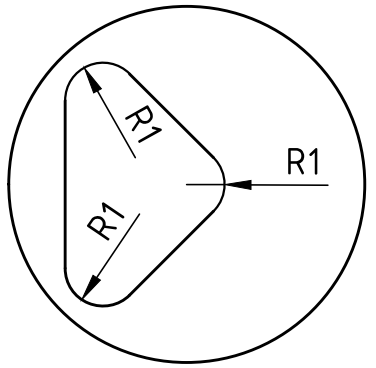

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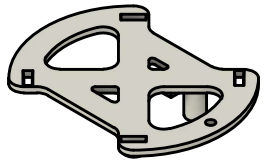		Document type	Document status
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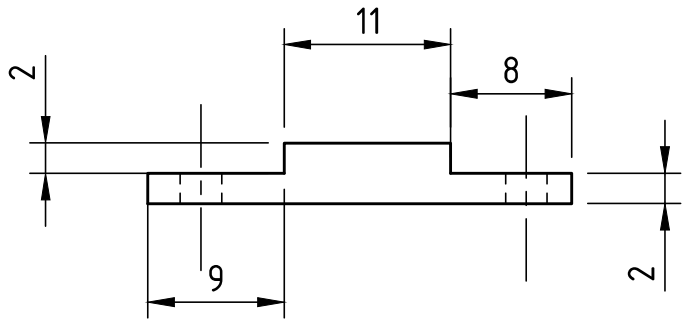

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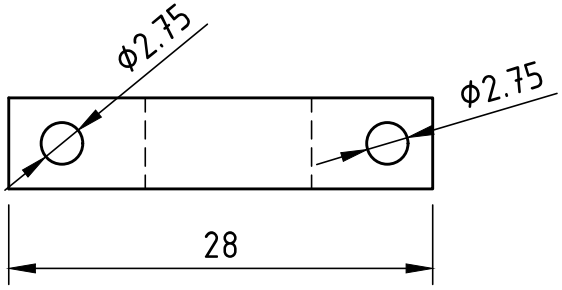
Zeichnung
1 x gekürzt



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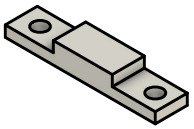		Document type	Document status
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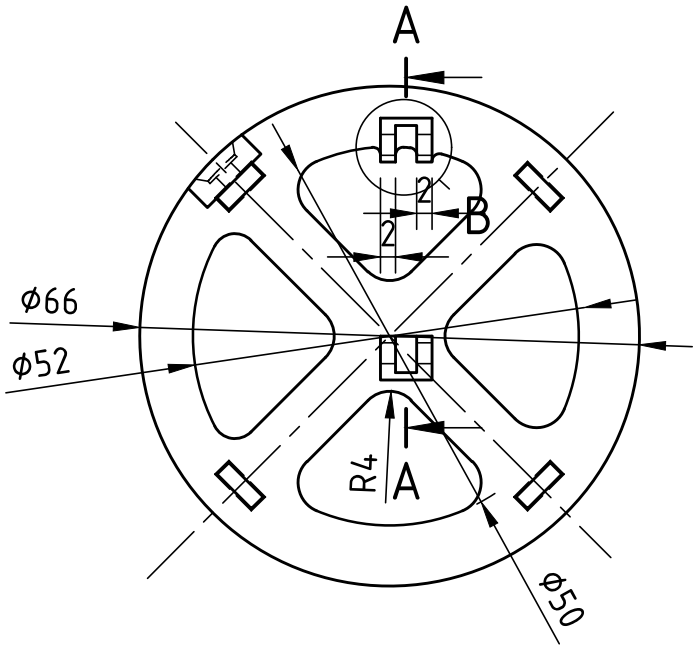

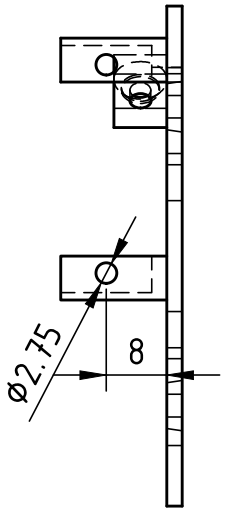

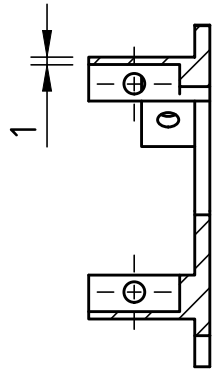

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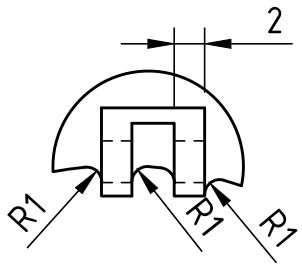

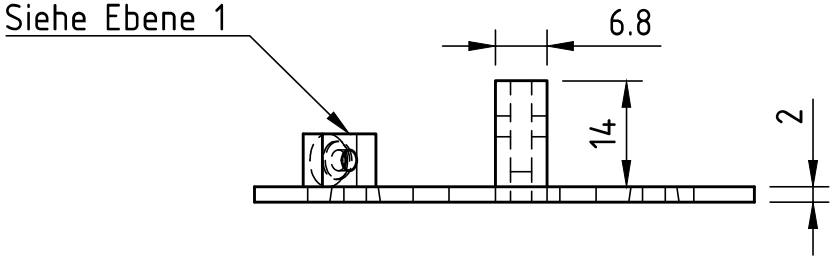

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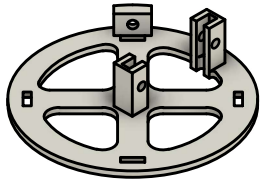		Document type	Document status
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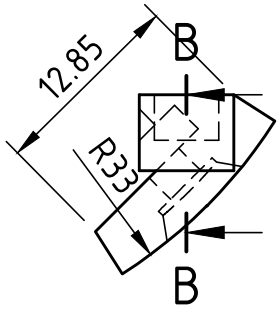

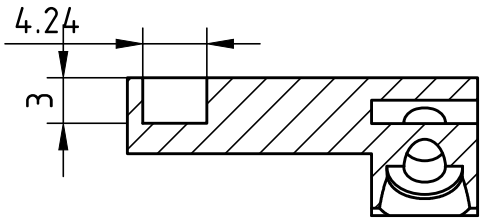

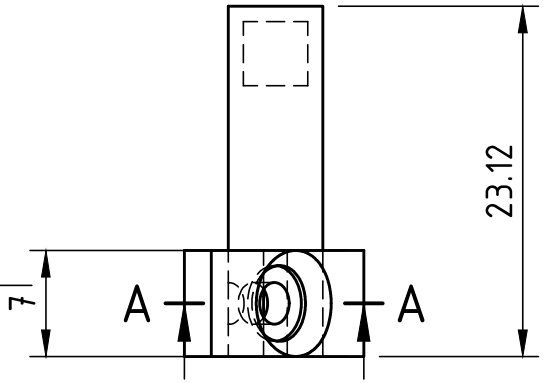

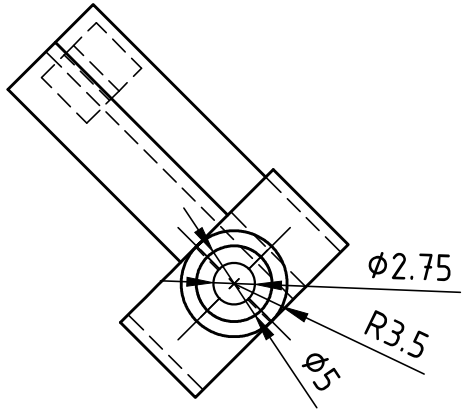

Zeichnung nicht normgerecht
und nicht vollständig bemaßt

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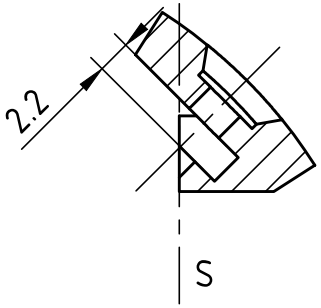

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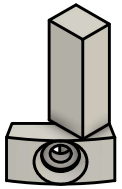		Document type	Document status
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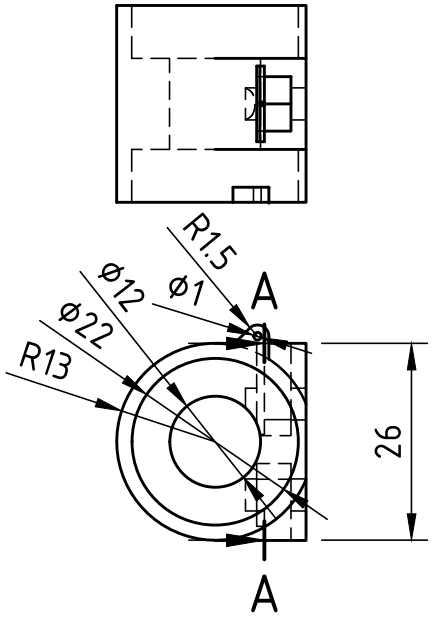

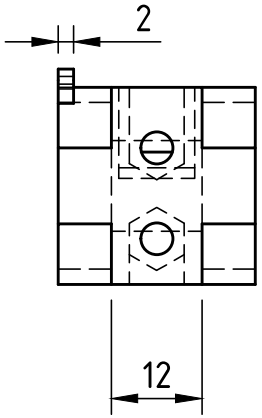

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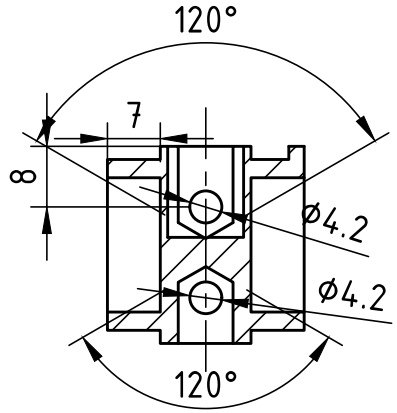

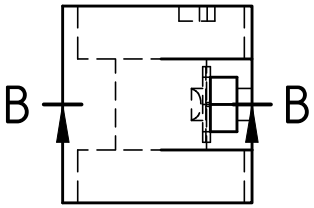

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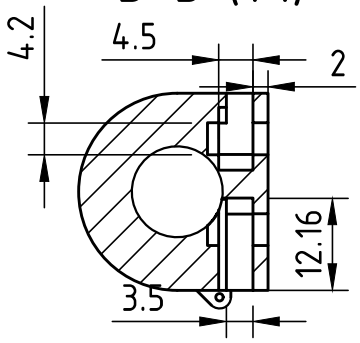

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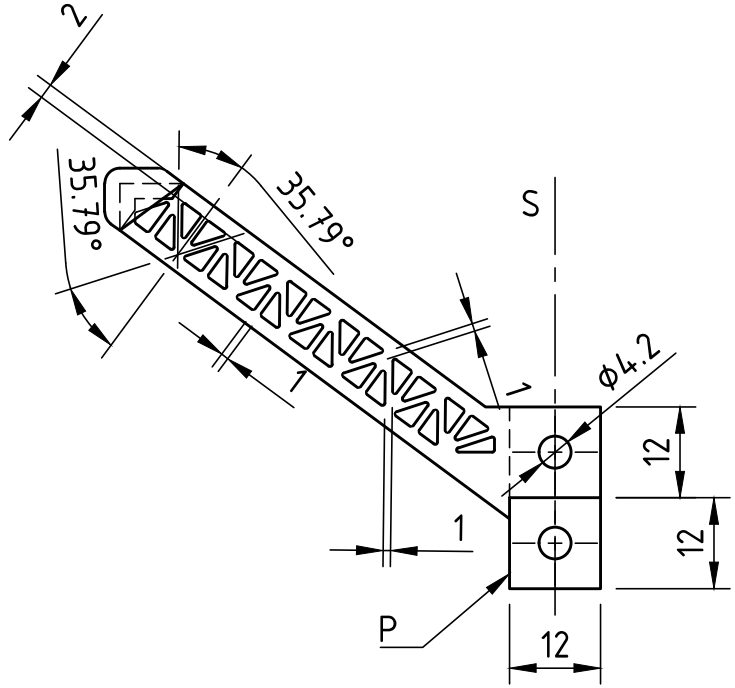

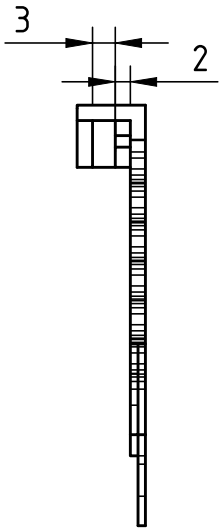

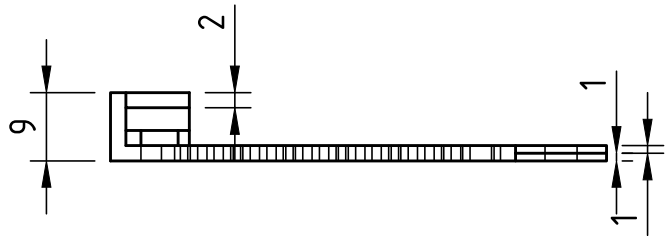

Zeichnung nicht normgerecht
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Ausleger Rechts an S gespiegelt mit
berer und unterer "Befestigungsplatte"
P in Anordnung gestauscht

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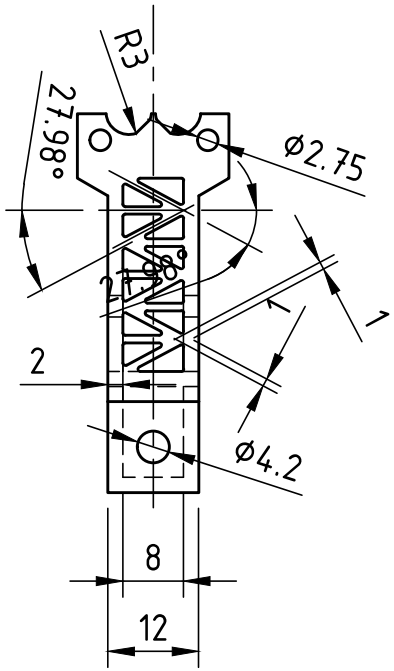

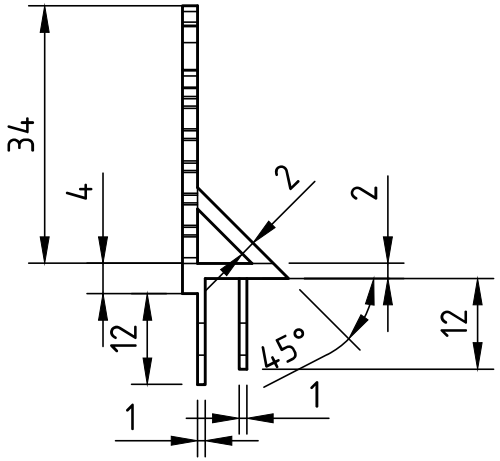

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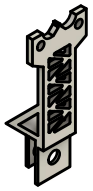		Document type	Document status
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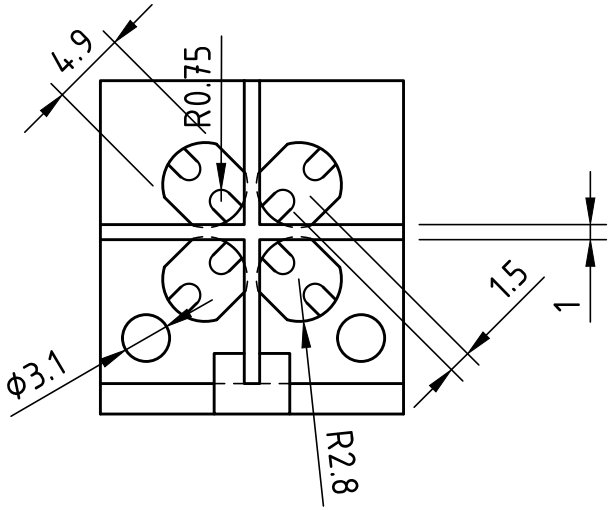

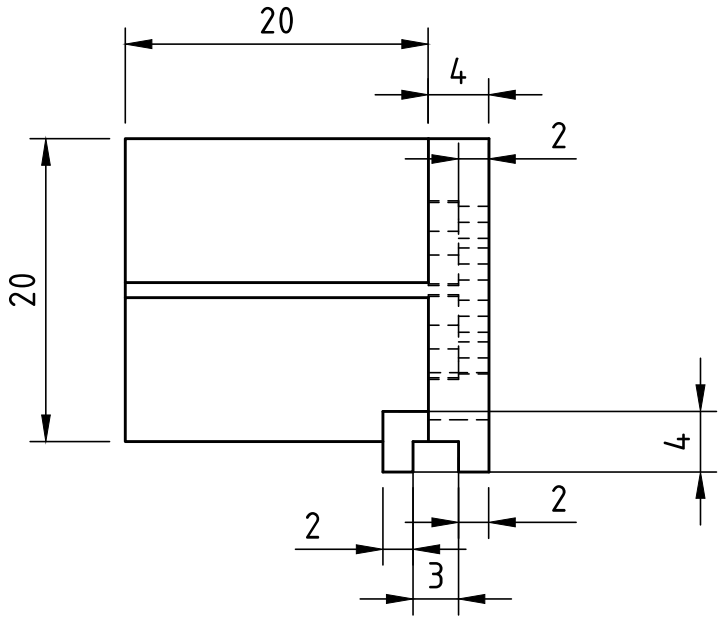

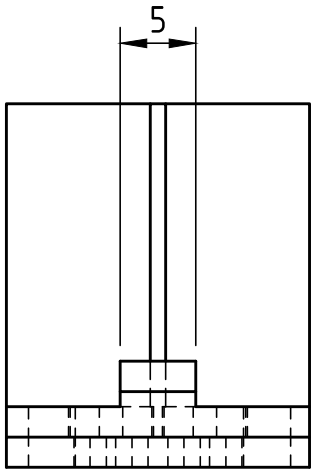

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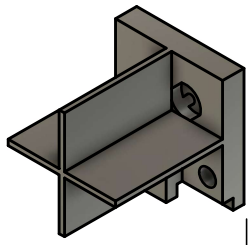		Document type	Document status
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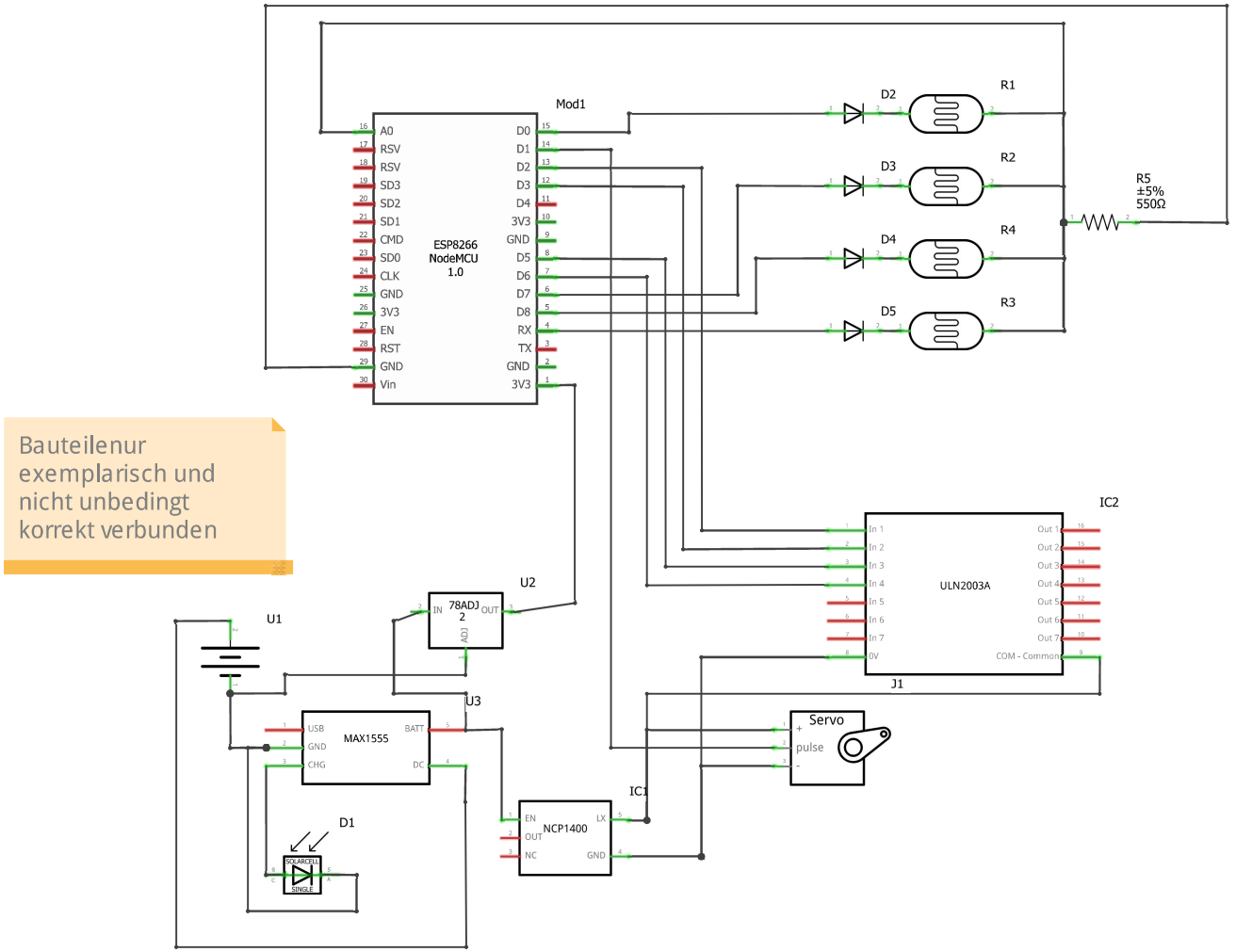
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RSV
SD3
SD2
SD1
CMD
SD0
CLK
GND
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GND
Vin
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D1
D2
D3
D4
3V3
GND
D5
D6
D7
D8
RX
TX
GND
3V3
D2
D3
D4
D5
R1
R2
R4
R3
R5
±5%
550Ω
IC2
ULN2003A
In 1
In 2
In 3
In 4
In 5
In 6
In 7
0V
Out 1
Out 2
Out 3
Out 4
Out 5
Out 6
Out 7
COM - Common
J1
U2
78ADJ
2
IN
OUT
ADJ
U1
U3
MAX1555
USB
GND
CHG
BATT
DC
D1
IC1
NCP1400
EN
OUT
NC
LX
GND
Servo
pulse
Bauteilenur
exemplarisch und
nicht unbedingt
korrekt verbunden
fritzing

```
from machine import Pin, PWM, ADC
import utime


# define the pins connected to the ULN2003 driver board
IN1 = Pin(4, Pin.OUT)
IN2 = Pin(0, Pin.OUT)
IN3 = Pin(14, Pin.OUT)
IN4 = Pin(12, Pin.OUT)


#setup servo
p1 = Pin(5, Pin.OUT)
servo = PWM(p1, freq=50)
currDuty = 75
servo.duty(currDuty)



# 3 16


#setup LDRs out pins 13 15 3 1
ulLDR = Pin(13, Pin.OUT)
urLDR = Pin(15, Pin.OUT)
llLDR = Pin(16, Pin.OUT)
lrLDR = Pin(3, Pin.OUT)


#setup a0
a0 = ADC(0)


# define the sequence of steps for the 28BYJ-48 motor
step_sequence = [
    (1, 0, 0, 1),
    (1, 0, 0, 0),
    (1, 1, 0, 0),
    (0, 1, 0, 0),
    (0, 1, 1, 0),
    (0, 0, 1, 0),
    (0, 0, 1, 1),
    (0, 0, 0, 1)
]


# define the delay between steps (in seconds)
step_delay = 0.002


def stepper_rotate(steps):
    # initialize the step counter
    step_delay = 0.002


    if(steps > 0):
        step_count = 0
        while step_count < steps:
            step = step_sequence[step_count % 8]


            IN1.value(step[0])
            IN2.value(step[1])
            IN3.value(step[2])
            IN4.value(step[3])

            step_count += 1
            utime.sleep(step_delay)

    else:
        step_count = abs(steps)
        while step_count > 0:
            step = step_sequence[step_count % 8]


            IN1.value(step[0])
            IN2.value(step[1])
            IN3.value(step[2])
            IN4.value(step[3])


            step_count -= 1
            utime.sleep(step_delay)


    # loop through the step sequence to rotate the motor 90 degrees
    # while step_count < steps:
    #     # get the next step
    #     step = step_sequence[step_count % 8]


    #     # set the pins to the current step
    #     IN1.value(step[0])
    #     IN2.value(step[1])
    #     IN3.value(step[2])
    #     IN4.value(step[3])


    #     # increment the step counter
    #     step_count += 1
    #     print(step_count)


    #     # wait for the specified delay
    #     utime.sleep(step_delay)


def readLDRs():
    print("read LDRs")
    print("reading LDRs")
    ulLDR.value(255)
    utime.sleep(0.01)
    ulVal = a0.read_u16()
    ulLDR.value(0)
    utime.sleep(0.01)
    urLDR.value(255)
    utime.sleep(0.01)
    urVal = a0.read_u16()
    urLDR.value(0)
    utime.sleep(0.01)
    llLDR.value(255)
    utime.sleep(0.01)
    llVal = a0.read_u16()
    llLDR.value(0)
    utime.sleep(0.01)
    lrLDR.value(255)
    utime.sleep(0.01)
    lrVal = a0.read_u16()
    lrLDR.value(0)
```

```
    utime.sleep(0.01)

    print("UL: ", ulVal)
    print("UR: ", urVal)
    print("LL: ", llVal)
    print("LR: ", lrVal)


    #return an array with the values
    return [ulVal, urVal, llVal, lrVal]


def compareLDRVals(ldrVals):
    # meanUpper = (ldrVals[0] + ldrVals[1])/2
    # meanLower = (ldrVals[2] + ldrVals[3])/2
    # meanLeft = (ldrVals[0] + ldrVals[2])/2
    # meanRight = (ldrVals[1] + ldrVals[3])/2
    maxUpper = max(ldrVals[0], ldrVals[1])
    maxLower = max(ldrVals[2], ldrVals[3])
    maxLeft = max(ldrVals[0], ldrVals[2])
    maxRight = max(ldrVals[1], ldrVals[3])


    x = 0
    z = 0


    if ((maxUpper / maxLower) >  1.05):
        x = 1
    elif ((maxLower / maxUpper) > 1.05):
        x = -1


    if ((maxLeft / maxRight) > 1.05):
        z = -1
    elif ((maxRight / maxLeft) > 1.05):
        z = 1


    return [x, z]


def moveX(diff):
    if(servo.duty() + diff < 105 and servo.duty() + diff > 55):
        print("move x", servo.duty())
        servo.duty(servo.duty() + diff)
        utime.sleep(0.01)


        # currDuty += diff
        # servo.duty(currDuty)
        # print(currDuty)
    return


def moveZ(diff):
    if(diff > 0):
        stepper_rotate(256)
    else:
        stepper_rotate(-256)


axis = "x"
```

```
def controllZAndX(directions):
    print (directions)
    if(directions[1] == -1):
        moveZ(-1)
        print("move left")
    elif (directions[1] == 1):
        moveZ(1)
        print("move right")
    elif (directions[0] == -1):
        moveX(-1)
        print("move down")
    elif (directions[0] == 1):
        moveX(1)
        print("move up")


while True:
    readLDRs()
    # utime.sleep(0.01)
    ldrVals = readLDRs()
    print (ldrVals)
    controllZAndX(compareLDRVals(ldrVals))
    # utime.sleep(0.01)
```

Kalkulation PT

Anzahl	Equipment	Preis/Stück	Gesamt
4	Fotowiderstand LDR	0,29 €	1,16 €
1	Lipo Akku	13,00 €	13,00 €
1	DC-DC Step Up Boost Converter	0,83 €	0,83 €
1	Micro USB 5V 1A Laderegler	0,75 €	0,75 €
3	Kugellager	0,50 €	1,50 €
1	Linear-Spannungsregler	0,48 €	0,48 €
1	Kondensator	0,75 €	0,75 €
1	NodeMCU Amica Modul	5,16 €	5,16 €
1	Schrittmotor	2,60 €	2,60 €
1	Servomotor	5,79 €	5,79 €
1	Solarpanel	7,49 €	7,49 €
1	Kabel und Zubehör pausch.	2,00 €	2,00 €
1	3D-Fertigung pausch.	5,00 €	5,00 €
250h	Zeitaufwand Fertigung		
		Summe	**46,51 €**
	Zukunft		
1	Display Modul	19,92 €	19,92 €
2	Erweiterungsplatine	6,99 €	13,98 €
		Summe	**80,41 €**