EDU|days 2018

PH NÖ

EDUCATION INNOVATION STUDIO

Pädagogische Hochschule Niederösterreich

Oliver KASTNER-HAULER

BBC micro:bit

Temperaturmessung

micro:bit

Let's Code Ideas Meet micro:bit Teach Buy English

GET CREATIVE
GET CONNECTED
GET CODING

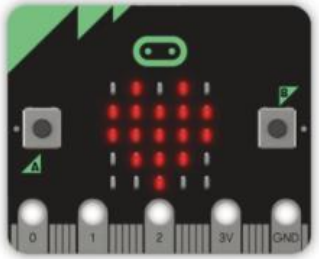
micro:bit is a tiny programmable computer, designed to make learning and teaching easy and fun!

http://microbit.org

I'm a teacher

How do I use micro:bit in school?

Learn more



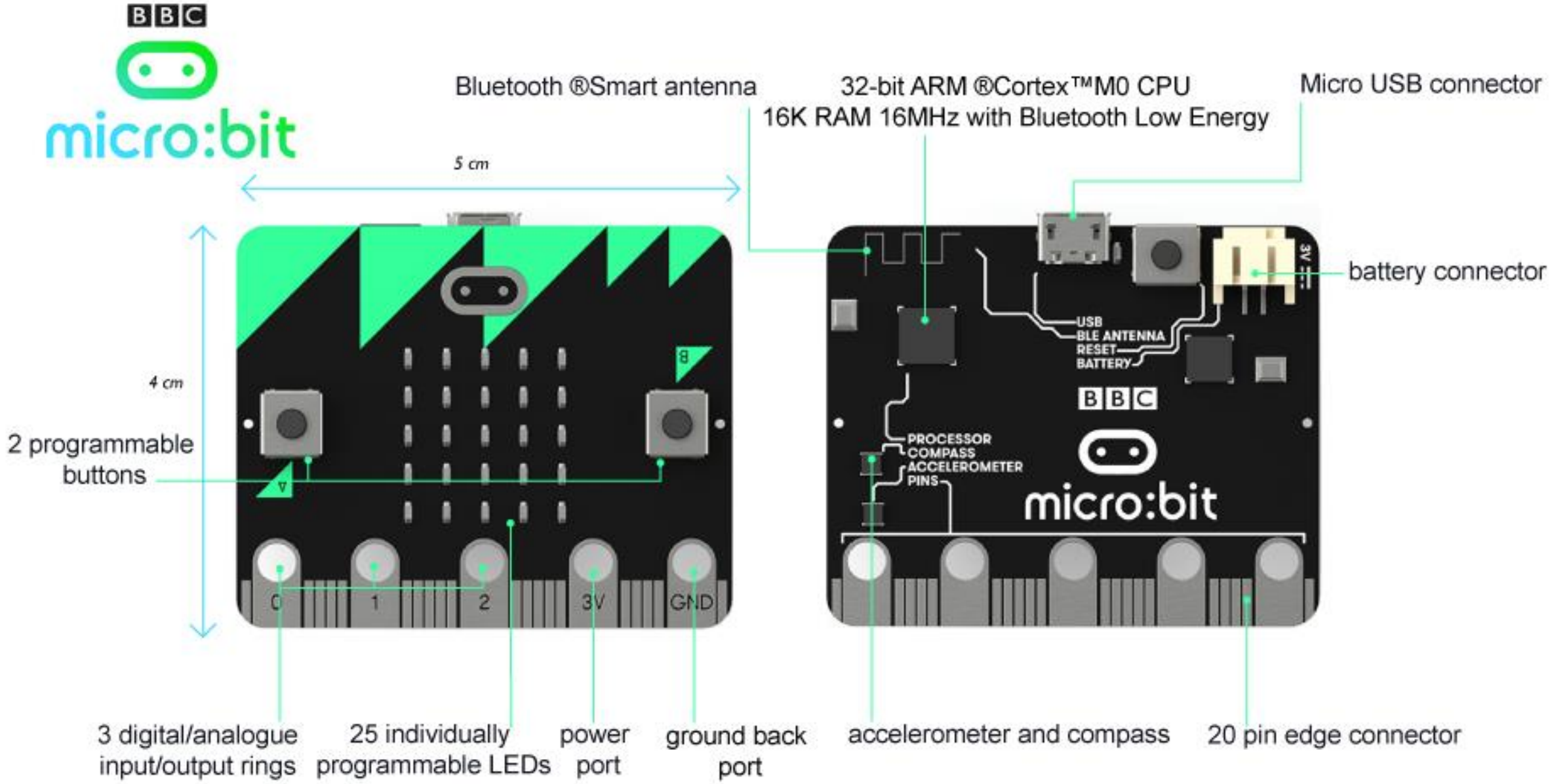
I've got my micro:bit

What do I need to get started?

Get started

„Was ist ein micro:bit?“

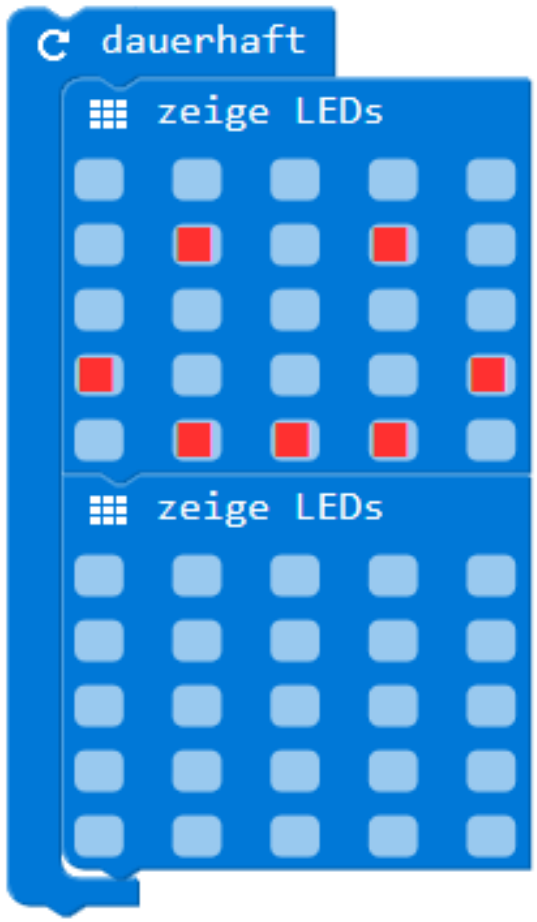
- ambitionierteste Education Initiative der letzen 30 Jahre
  - **BBC Micro** (1981 Acorn BBC Microcomputer)
  - 6502 Prozessor (2 MHz) – 16, 21 od. 64 KB Speicher
  - Heimcomputer und vor allem in Schulen eingesetzt
  - vergleichbar mit Commodore C64, Sinclair ZX-Spectrum, etc.
- BBC Initiative in UK
- > 30 Partner
- kids für ***coding*** zu interessieren
- digitale Kreativität
- neue Generation an Technik Pionieren


BBC
micro:bit
Bluetooth ®Smart antenna
32-bit ARM ®Cortex™M0 CPU
16K RAM 16MHz with Bluetooth Low Energy
Micro USB connector
5 cm
4 cm
2 programmable buttons
battery connector
3V
USB
BLE ANTENNA
RESET
BATTERY
PROCESSOR
COMPASS
ACCELEROMETER
PINS
0
1
2
3V
GND
3 digital/analogue input/output rings
25 individually programmable LEDs
power port
ground back port
accelerometer and compass
20 pin edge connector
FRONT
BACK

Programmieren

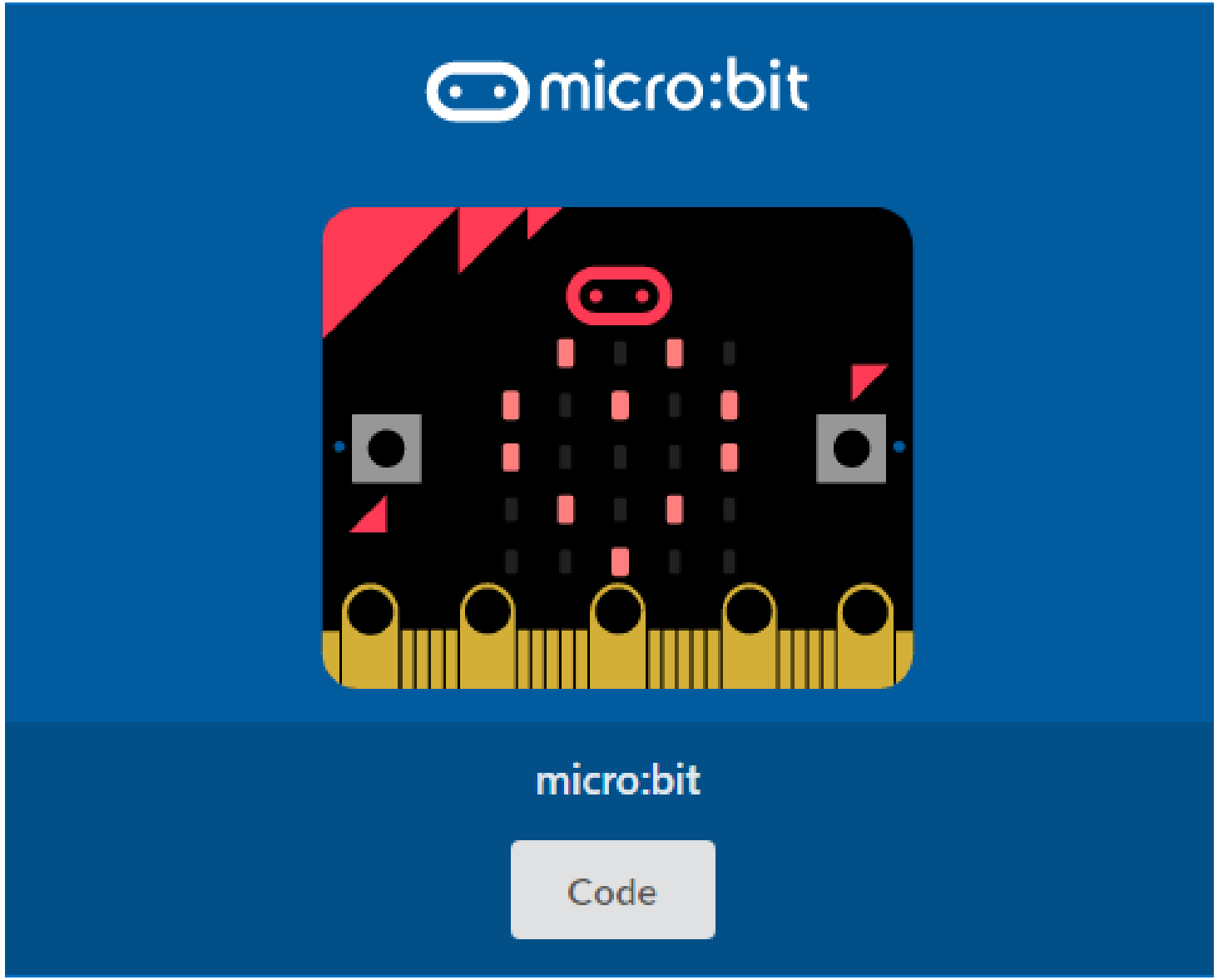
Code Editoren

- PXT Editor
  → makecode.microbit.org
  - Programming Experience Toolkit
  - Microsoft
  - JavaScript / block-based
- MicroPython
  → python.microbit.org
  - Python Language Subset

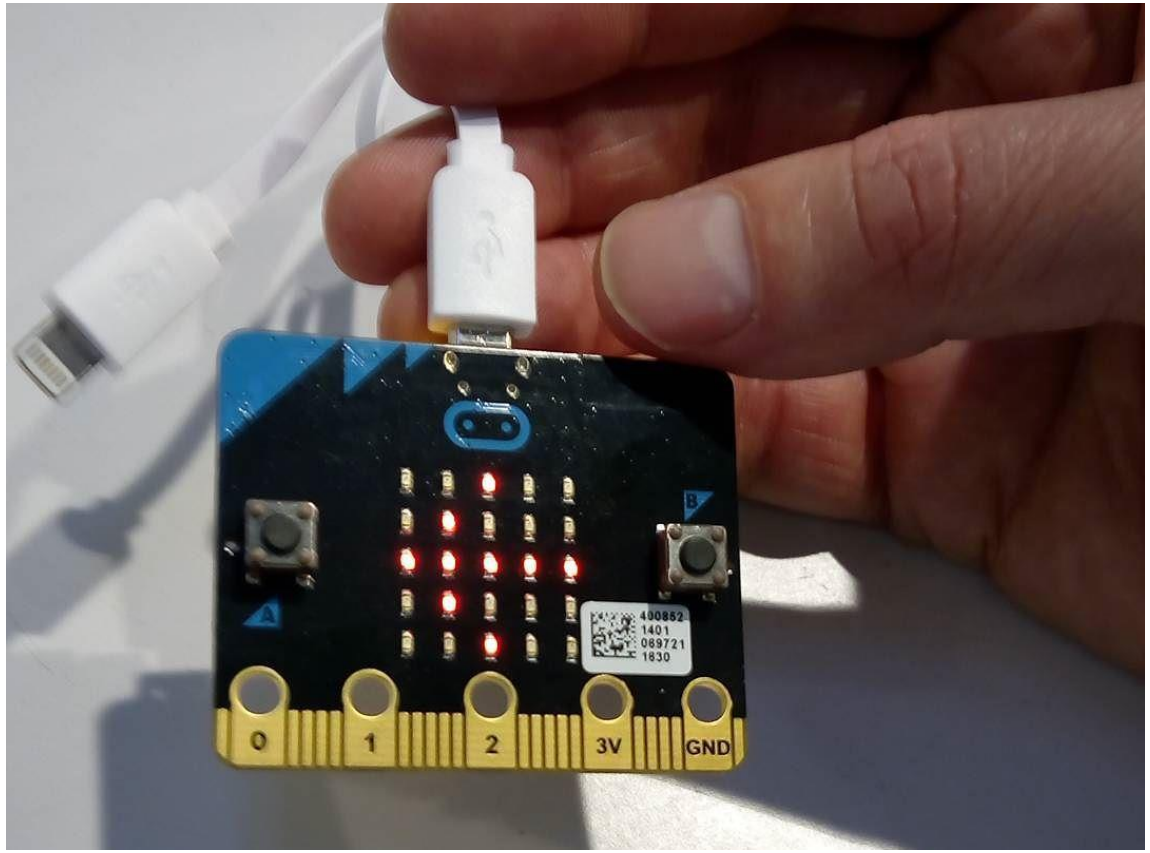



```
basic.forever(() => {
    basic.showLeds(`
        . . . . .
        . # . # .
        . . . . .
        # . . . #
        . # # # .
        `)
    basic.showLeds(`
        . . . . .
        . . . . .
        . . . . .
        . . . . .
        . . . . .
        `)
})
```

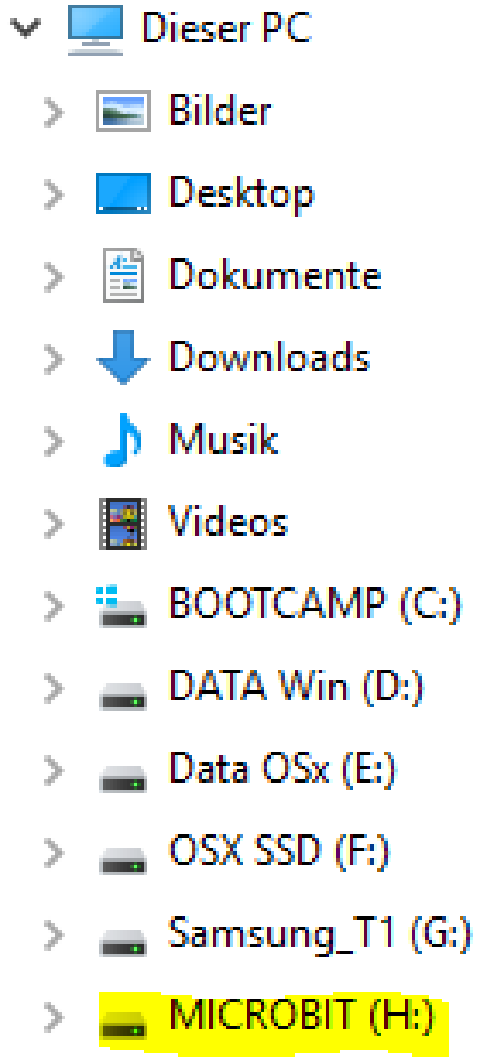
makecode.com

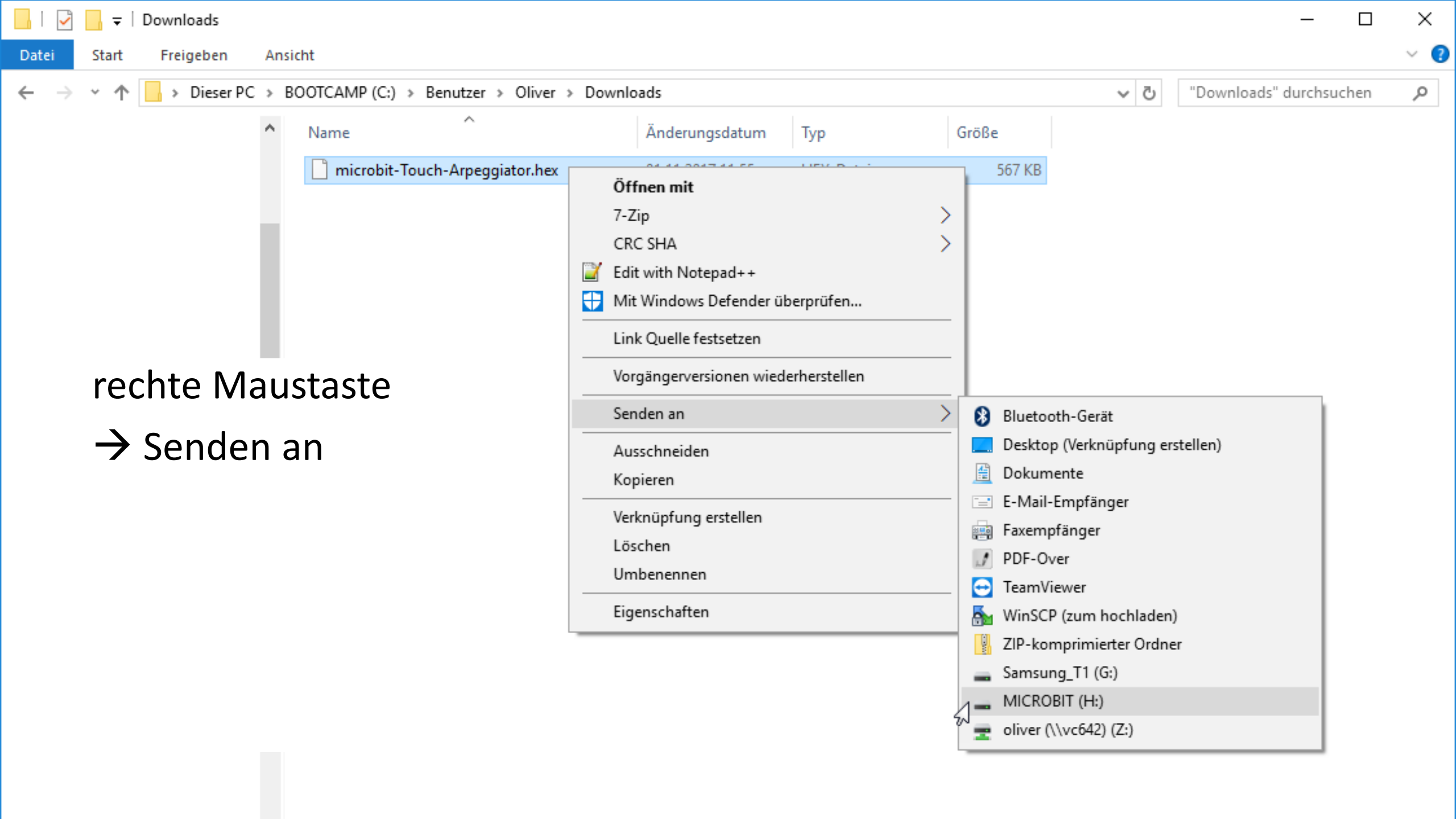


Installieren eines Programmes mit Starter-Kit


0
1
2
3V
GND

Download

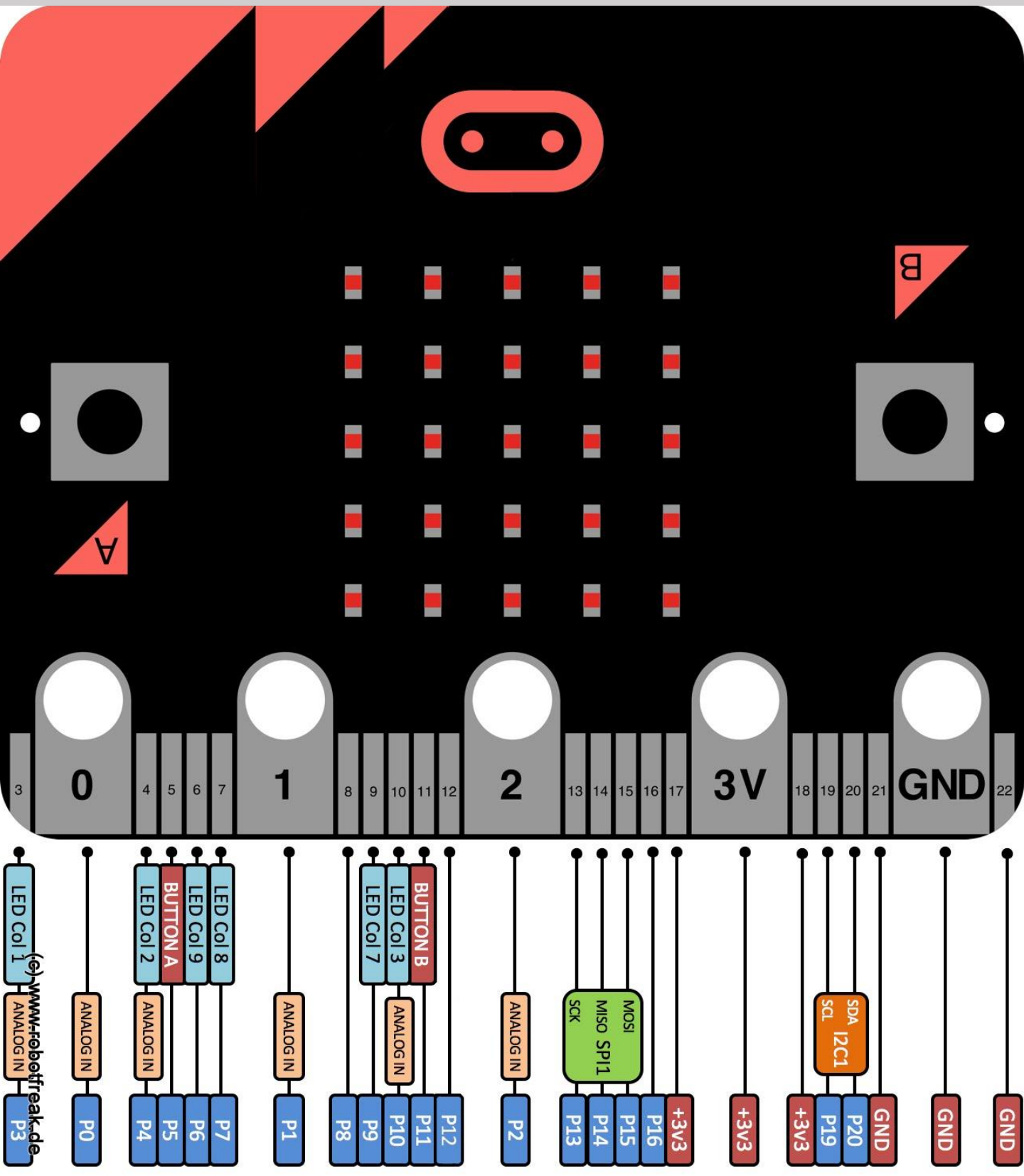

Dieser PC
Bilder
Desktop
Dokumente
Downloads
Musik
Videos
BOOTCAMP (C:)
DATA Win (D:)
Data OSx (E:)
OSX SSD (F:)
Samsung_T1 (G:)
MICROBIT (H:)

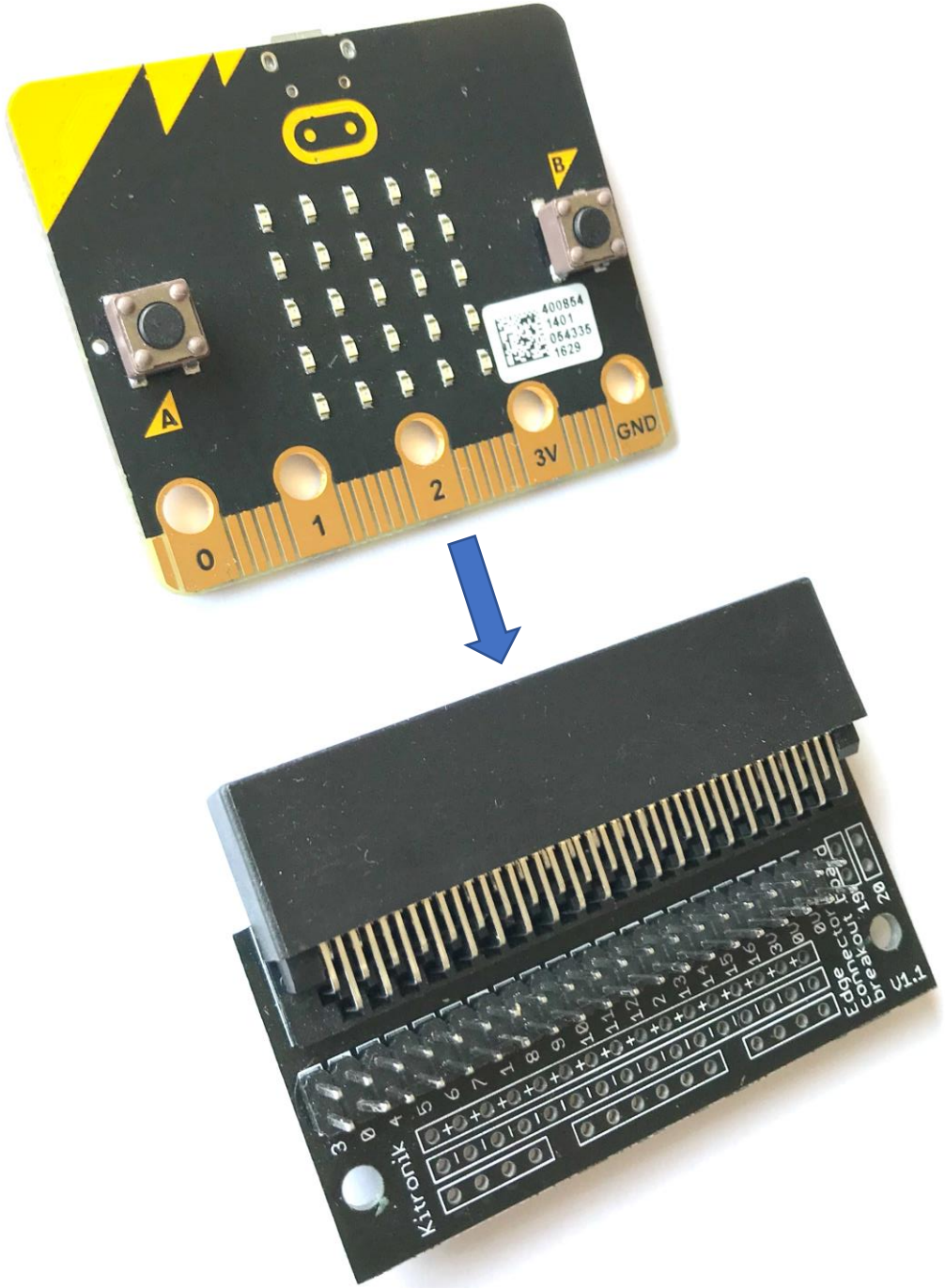


rechte Maustaste

→ Senden an

PIN Belegung



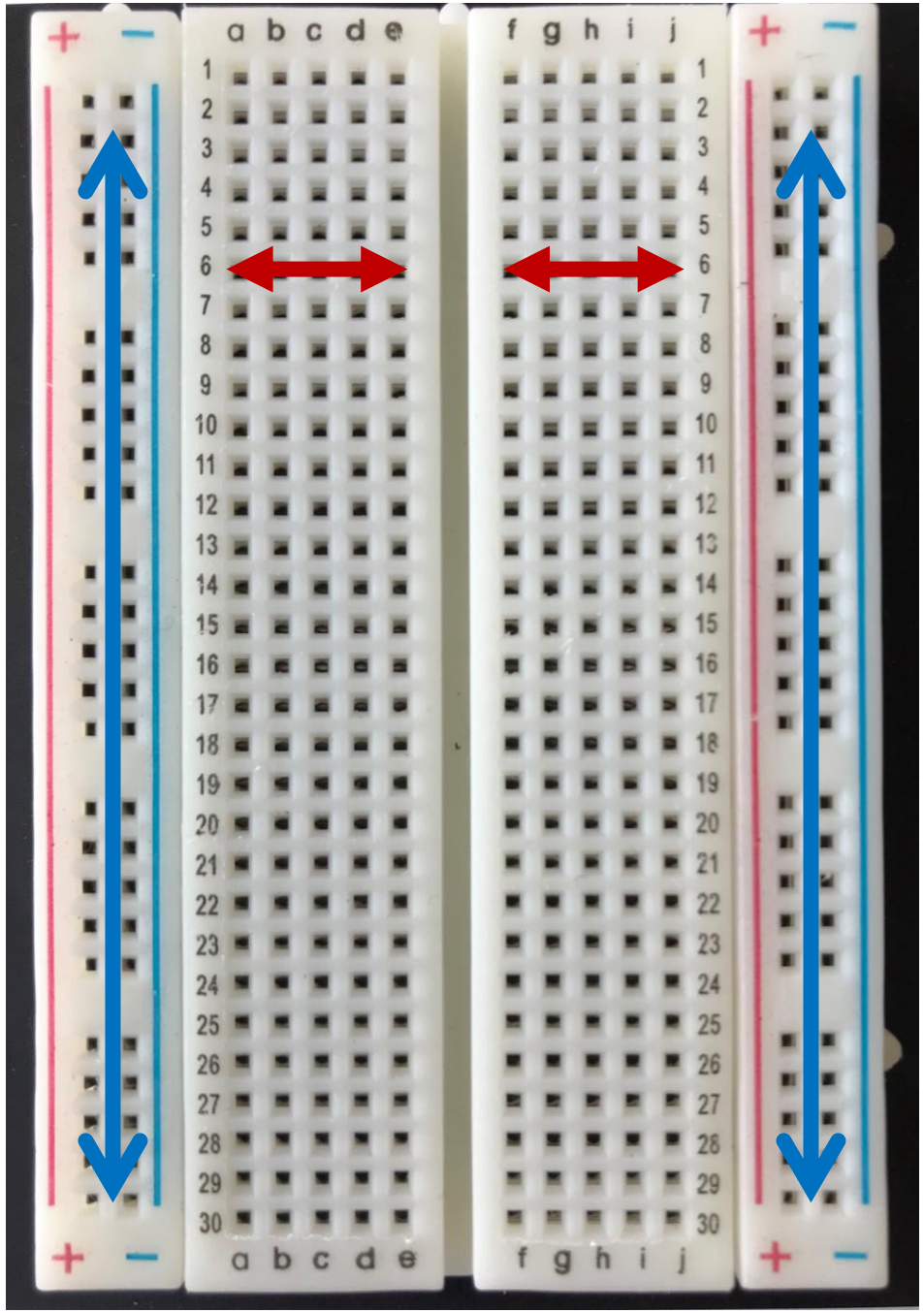


Steckkontakte mit Edge Connector

→ einfachst erweiterbar

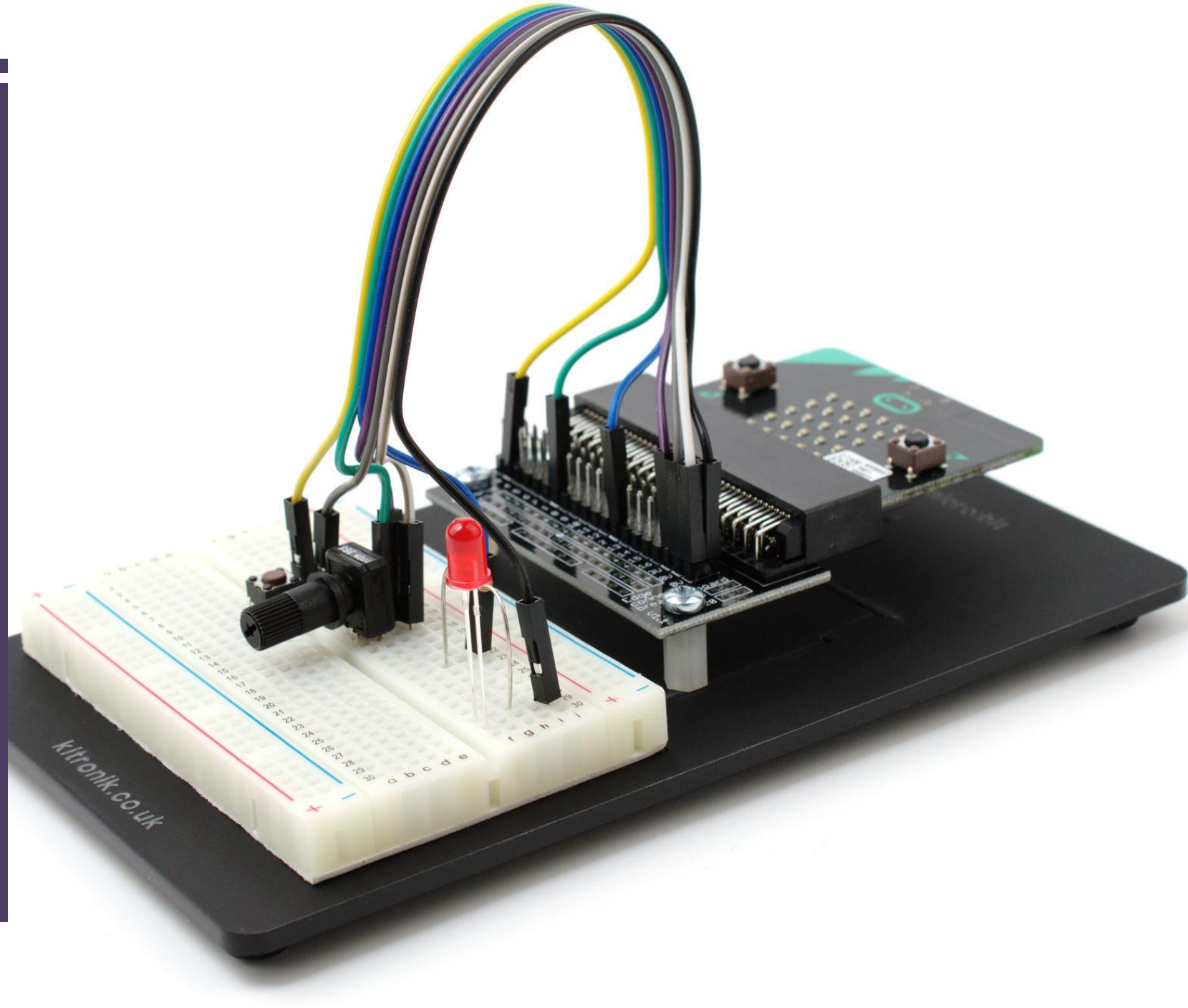
Breadboard

mit internen Verbindungen



Breadboard
+ Edge
Connector

→ einfache
Schaltungen
OHNE Löten
herstellbar

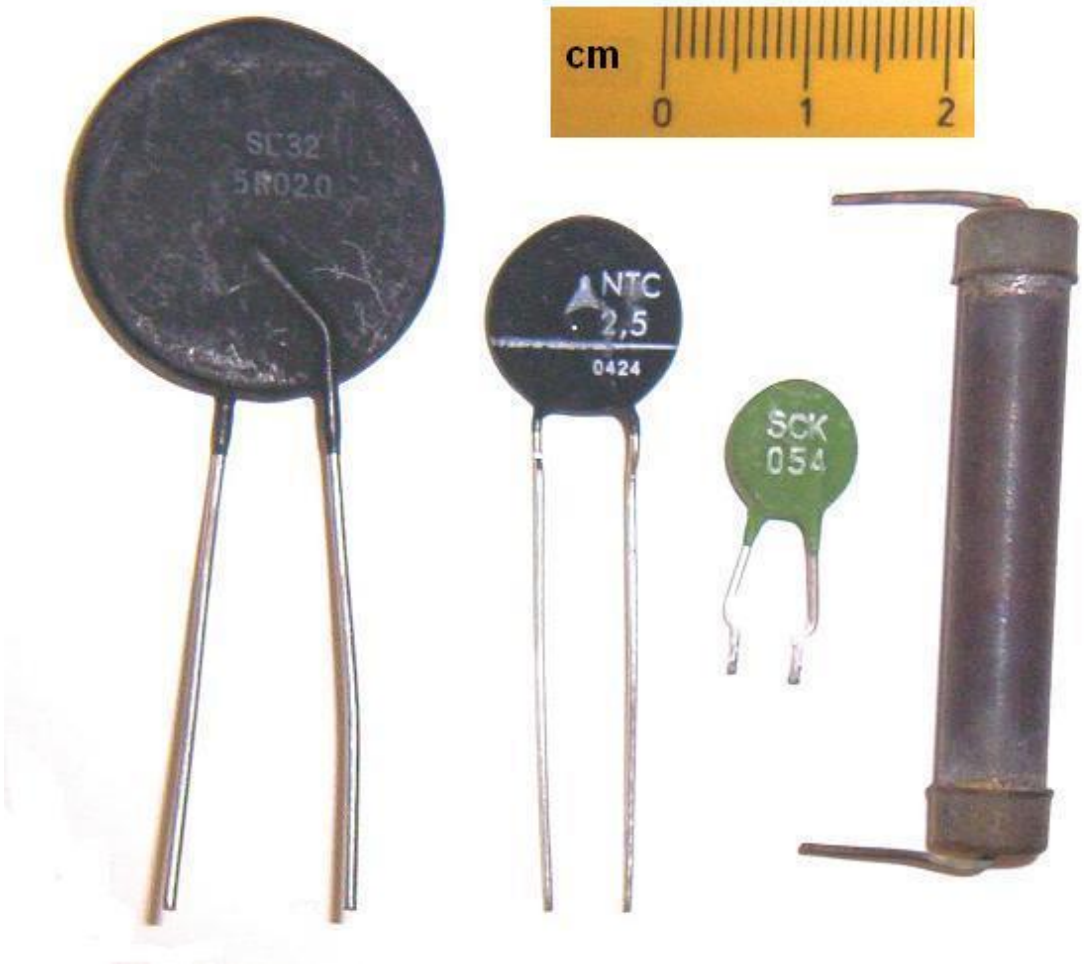


Microbit Inventors-Kit

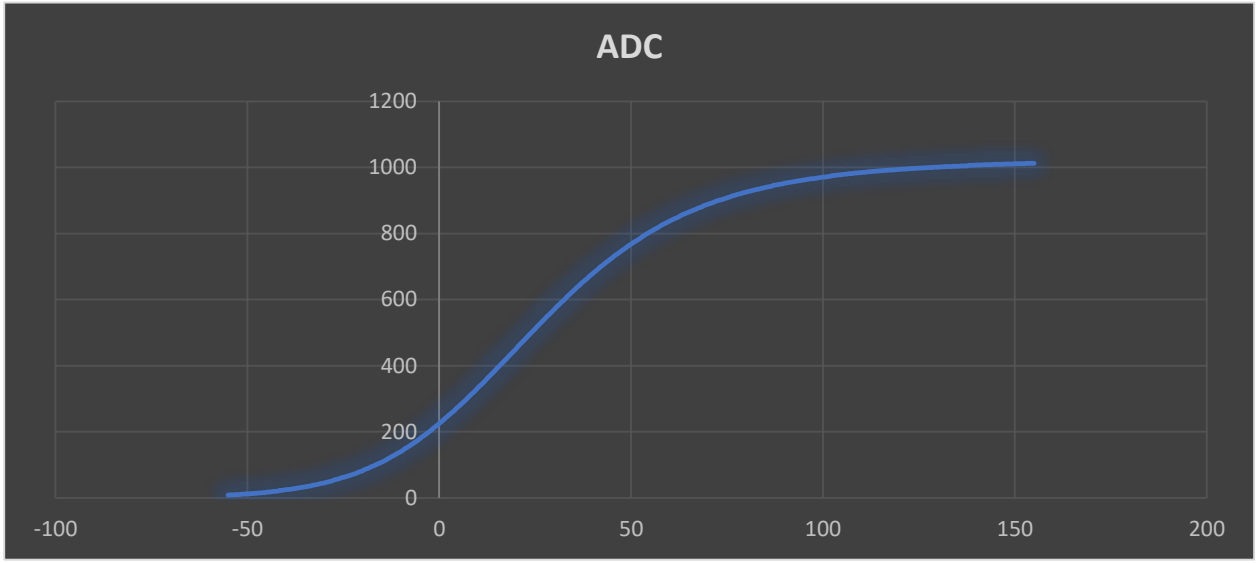
- https://www.youtube.com/watch?v=lmdzM74XyHw

Beispiel: Temperaturmessung (1)

- Widerstand – elektronisches Bauteil
- NTC Thermistor
- temperaturabhängige Änderung des Widerstands → Spannung verändert sich
- +10 kOhm Widerstand



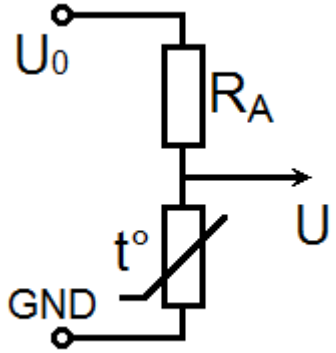
Messpunkte



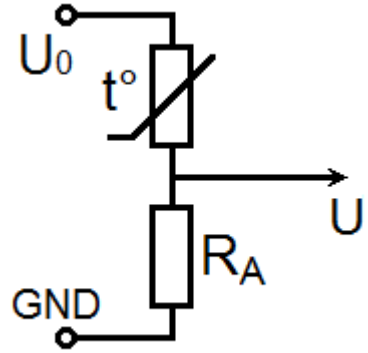
- Glättung und Annäherung der Kurve an eine Gerade
- Widerstand gleicher Stärke dazwischen
- Gute Annäherung im mitteleren Bereich

Schaltung - Schematisch

Schema A (PTC)



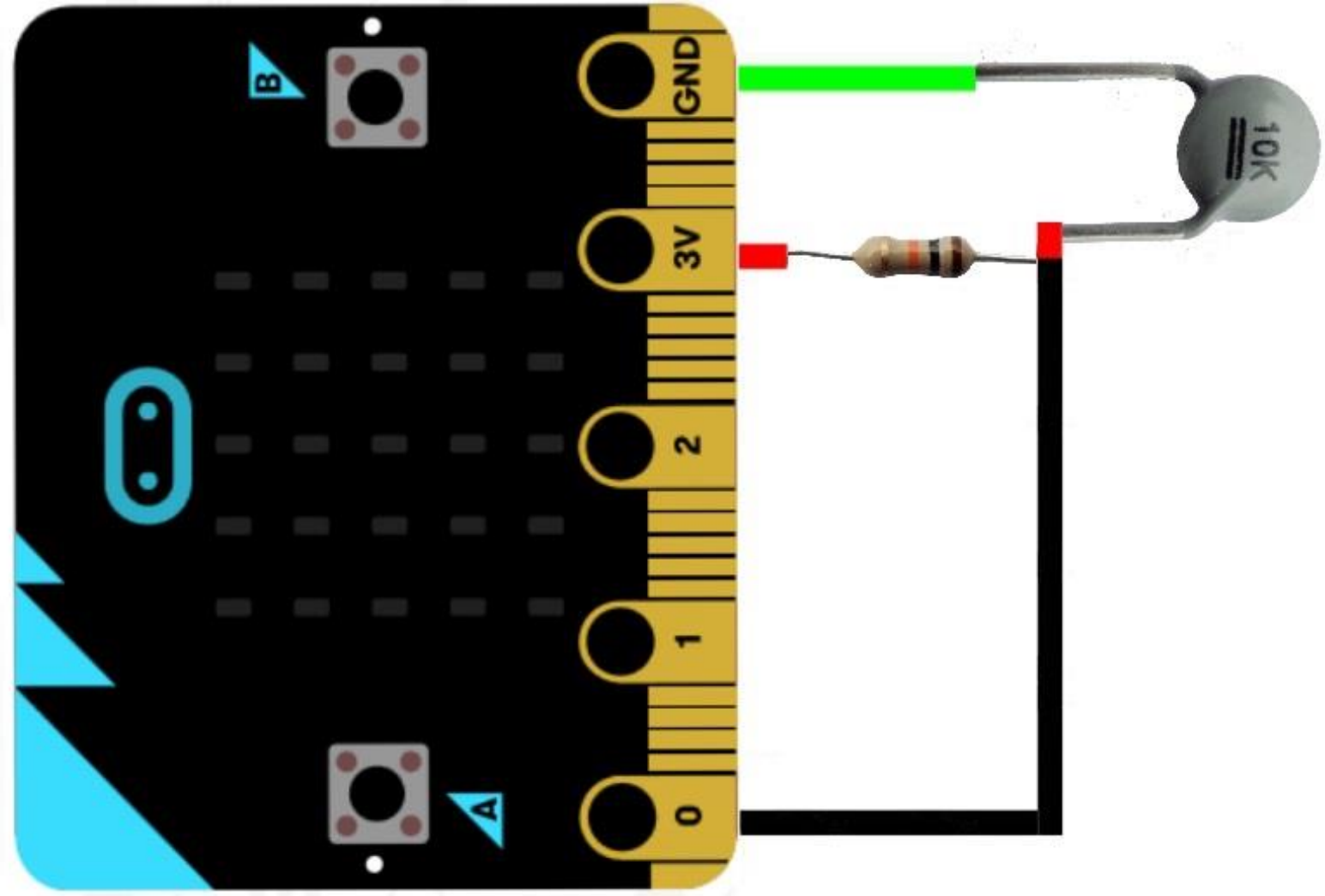
Schema B (NTC)

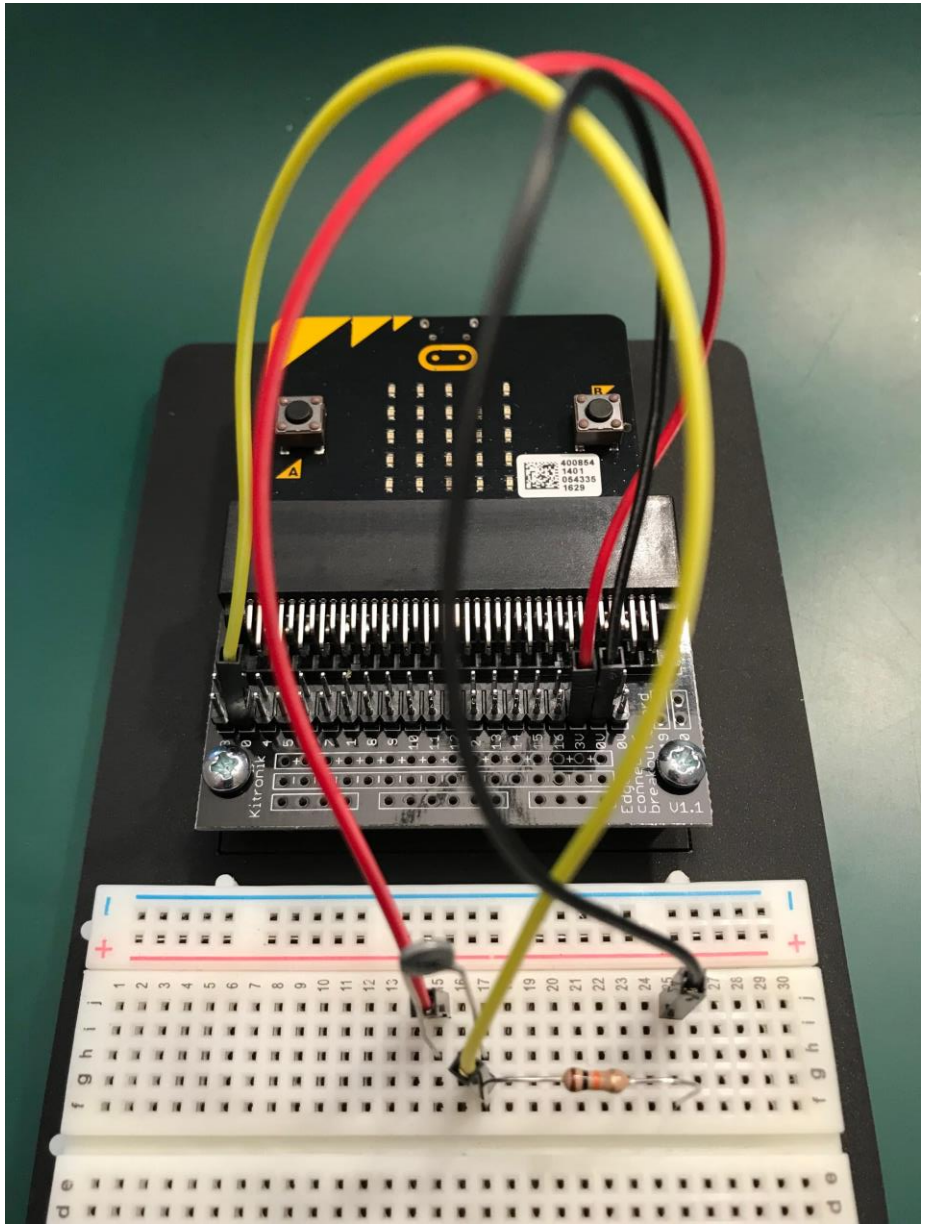


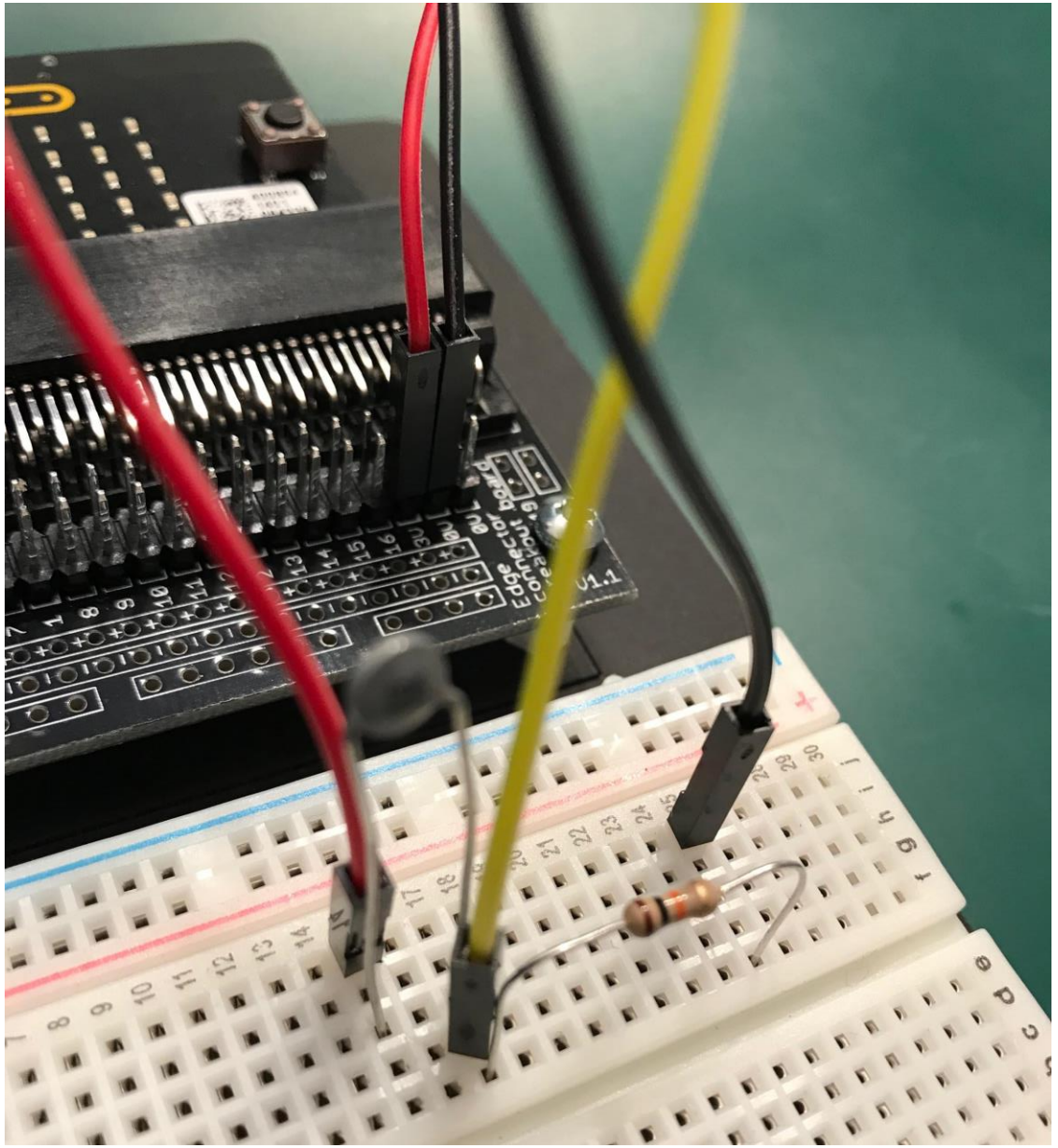
The simplest way to connect thermistor to a MCU (or an ADC IC).

To minimize measurement error, the R_A value should be close to thermistor resistance value in the measurement range – that makes ADC values changing closer to linear, and consequently, allows to minimize error while linear interpolation.

Schaltung für Temp-Messung




Kitronik
V1.1


V1.1

Messpunkte: Ergebnis → Umrechnung

- Starter-Thermistor-Overview-Handout → Link im Anhang
- Read Pin → 0 bis 1023 ≈ 0 bzw. 3 V

$y = m * x + c$

→c = (-12*23,4)+482=201,2

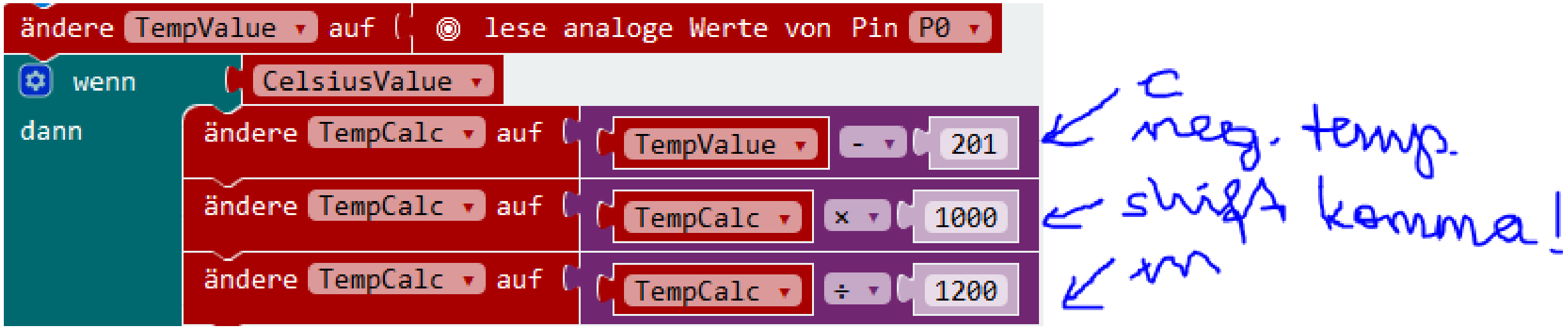
→c = (-12*8,4)+302=201,2

Korrkete Umrechnung

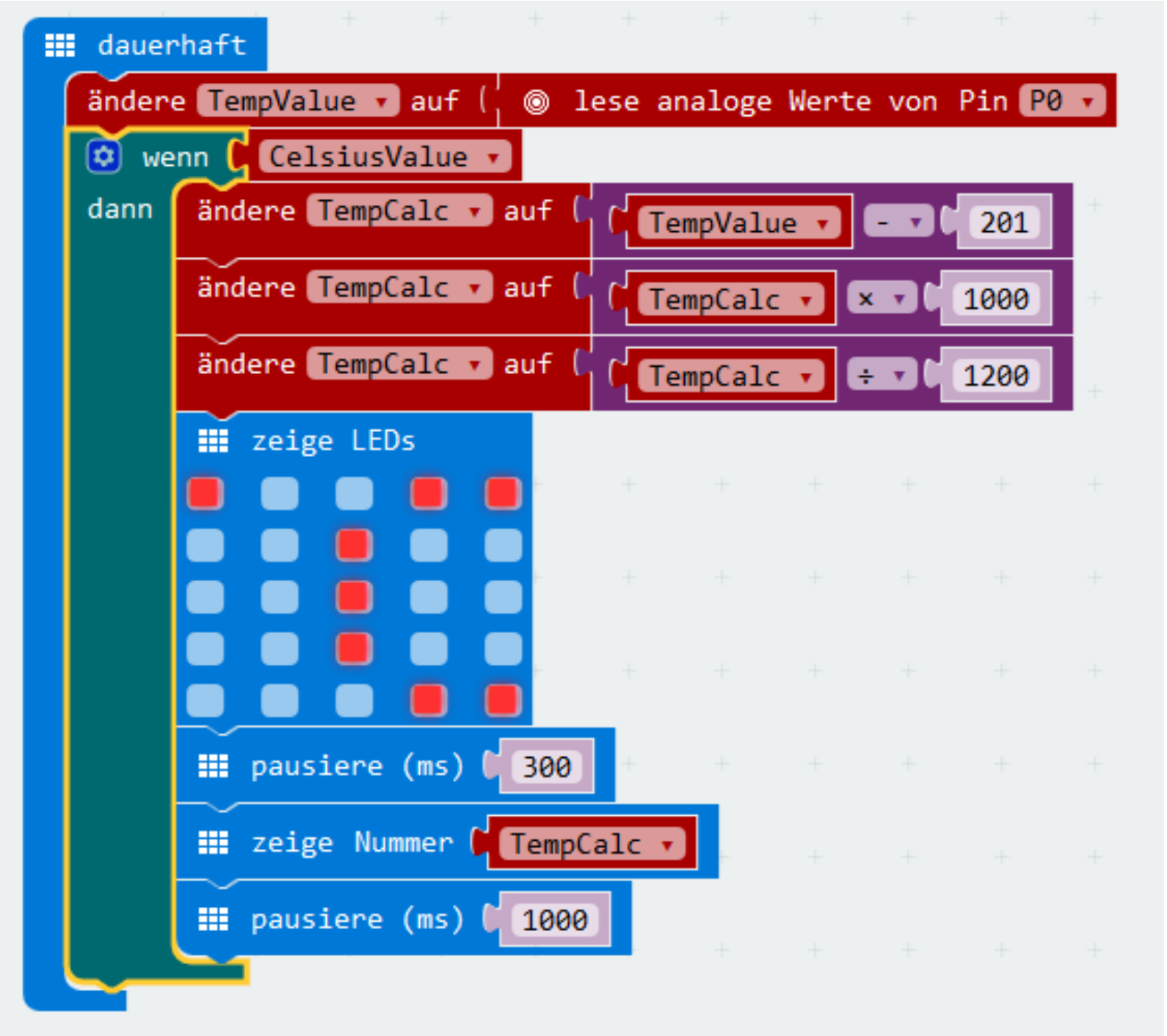
im gemessenen Bereich! ✓

Thermometer	Microbit	Berechnung
23,4 °	482	
8,4 °	302	m = r/t
t = 15	r = 180	m = 180/15 = 12

Umrechnung


ändere TempValue auf lese analoge Werte von Pin P0
wenn CelsiusValue
dann
ändere TempCalc auf TempValue - 201
ändere TempCalc auf TempCalc x 1000
ändere TempCalc auf TempCalc ÷ 1200
neg. temp.
shift komma!
m

Programm (fertig)



Bildnachweis

- S. 1 Michael Semeliker (PH NÖ)
- S. 2, 6, 18, 21, 22 http://microbit.org
- S. 4, 13, 14 Gereth Halfacree https://www.flickr.com/photos/120586634@N05/
- S. 7 SparkFun Electronics https://www.flickr.com/photos/sparkfun/
- S. 8 Fotero https://www.flickr.com/photos/fotero/
- S. 10 https://os.mbed.com/platforms/Microbit/#pinout
- S. 15 https://de.wikipedia.org/wiki/User:Ulfbastel https://commons.wikimedia.org/wiki/File:Heissleiter2.jpg
- S. 17 http://aterlux.ru/article/ntcresistor-en
- restliches Bildmaterial (ohne Seitenangabe): Oliver Kastner-Hauler (PH NÖ)

Links

- Microbit
  http://microbit.org und http://microbit.co.uk
- Kitronik – Microbit Inventorskit
  https://www.kitronik.co.uk/5603-inventors-kit-for-the-bbc-microbit.html
- Makecode PXT
  https://makecode.microbit.org/
- Thermistor Funktionsweise - Handout
  https://microbit0.blob.core.windows.net/pub/njbelwlw/Starter-Thermistor-Overview-Handout.pdf
  aus dem Projekt https://www.microbit.co.uk/iet/temperature-monitoring
- Thermistor Conrad.at Best.Nr. 500622 → siehe Bild
  https://www.conrad.at/de/heissleiter-k164-10-k-epcos-b57164k103j-1-st-500622.html
  Thermistor = PTC 10kOhm
  Widerstand = 10 kOhm
- Folien http://link.ph-noe.ac.at/a