



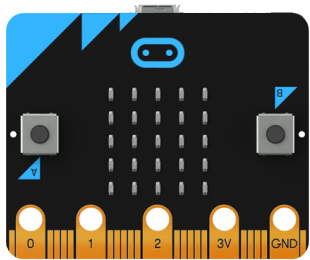
Coding und Robotik

Programmieren und Robotik für Kinder

Simon Haller

Technical Specifications:

BBC micro:bit (02/2016)

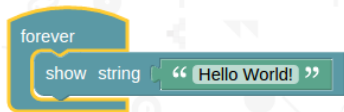


- Processor: Nordic NRF51822 (ARM Cortex M0 32bit, 16KB RAM, 256KB Flash-Memory)
- Sensors: NXP/Freescale MMA8652, MAG3110 (Accelerometer and Magnetometer), Temperature (CPU), Brightness (Light intensity using LED)
- Other: LED Array (5x5), 2 Buttons, IO: three ring connectors, 23-pin edge-connector (up to 3) PWM outputs, 6 to 17 GPIO pins, 6 Analog Inputs, Serial, SPI, and I^2C
- CCA 4.0 Hardware and Open Source Software (MIT License)

Software

- Core Drivers (MIT License) can be used for C/C++ development
- Microsoft Block and Javascript Editor
- MicroPython, Reference

Let's Code: Hello World

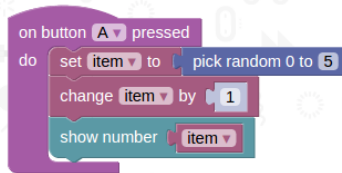


Screenshot from <https://microbit.org/code/>

Hello World (python programming)

```
# micro python hello world:  
from microbit import *  
  
while True:  
    display.scroll('Hello World!')
```

Let's Code: ein Würfel Beispiel



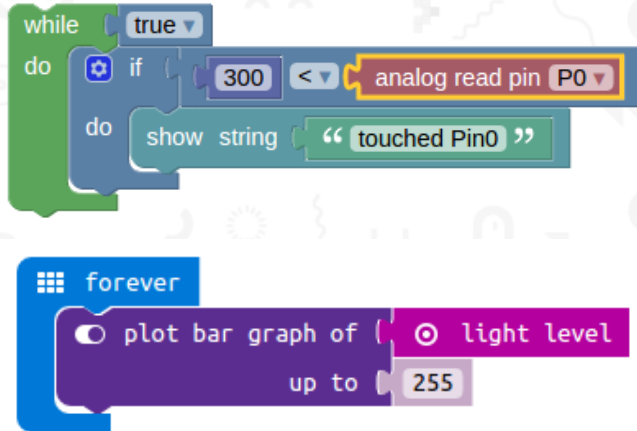
in python:

```
from microbit import *  
from random import *
```

```
while True:  
    if button_a.is_pressed():  
        display.show(str(randint(1,6)))
```

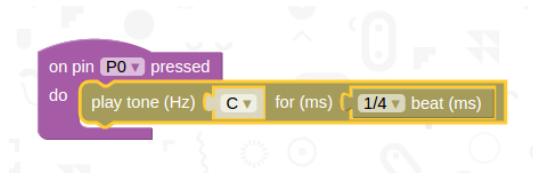
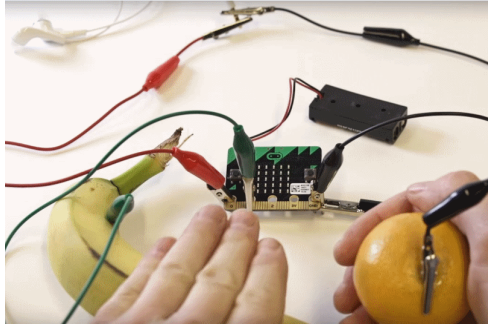
Screenshot from <https://microbit.org/code/>

Let's Code: Analog Pins und LEDs



Screenshots from <https://microbit.org/code/>

Let's Code: Musik



Screenshots from <https://microbit.org/code/>

Let's Code: Funk

Micro:bit zu Micro:bit

```
from microbit import *  
import radio  
  
# The radio won't work unless turned on.  
radio.on()  
  
while True:  
    # Button A send message.  
    if button_a.was_pressed():  
        radio.send('HEART')  
        display.clear()  
    # Read any incoming messages.  
    incoming = radio.receive()  
    # If there's an incoming message 'HEART' display it  
    if incoming == 'HEART':  
        display.show(Image.HEART, delay=100, wait=False)
```

Robot Hardware und Coding

- Verschiedene Erweiterungs-Set's (z.B. von Kitronics)
- **Extensions:** <https://makecode.microbit.org/extensions>
- Motortreiber, Motoren und Sensoren in Eigenregie

Sensor Classification

- Exteroceptive Sensors
relating to stimuli that are external
- Proprioceptive Sensors
relating to stimuli of self-movement
and body position
- Active Sensors (e.g. Infrared,
Ultrasonic,...)
- Passive Sensors (e.g. Camera,...)
- Analog (Analogvalue, PWM)
- Digital (I^2C /TWI, 1-Wire, PWM,...)

Sensor Types

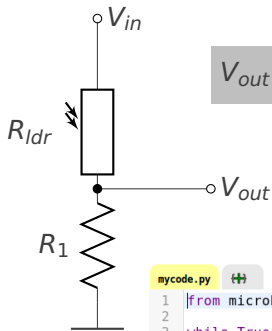
Temperature, Humidity, Lightintensity Sound, UV-Radiation, (RGB) Color, Distance, Position Force, Pressure, Speed, Acceleration, ...

Attention

Range/Scope, Resolution, Relative/Absolute Precision, Non-Linearity, Response-Time,...

Light/Color Sensor

Cadmium Sulfid (CdS) LDR Sensor (~0,3 Euro) and optional LED (~0,2 Euro)

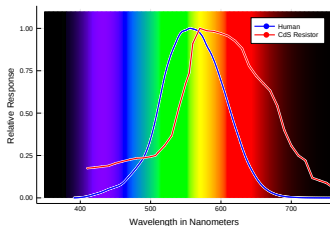
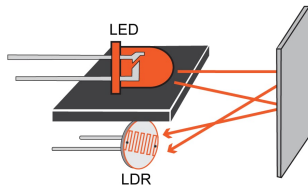


$$V_{out} = V_{in} * \frac{R_1}{R_{ldr} + R_1}$$

mycode.py

```
1 from microbit import *
2
3 while True:
4     if button_a.is_pressed():
5         display.show(str(pin1.read_analog()))
6
7 display.clear()
```

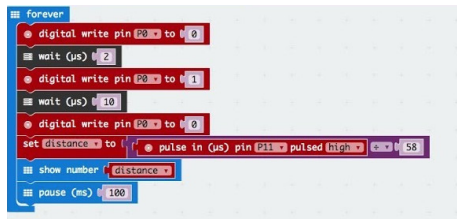
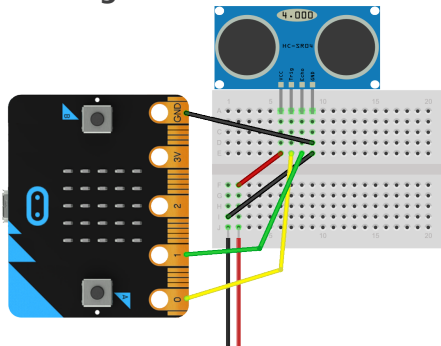
Code Snippet Screenshot from <https://create.withcode.uk/>



HCSR04 (Standard Ultrasonic Sensor)

Ultrasonic Distance Sensor (Range: 2cm to 4m).

Programming



(Pictures created with fritzing.org / <https://microbit.org/code/>)

Documentation for Raspberry Pi, BBC MicroBit, Arduino: [here](#)

Ideen und Links

Ideen und Lehrmaterialien

- Uhr, Kompass
- Pflanzenwächter
- Musikinstrumente wie zB: Trommel oder eine Gitarre
- Einfache Wetterstation
- Einige Beispiele auf Deutsch + Lehrbuch:
<https://microbit.eeducation.at/wiki/Hauptseite>
- Viele Materialien für Lehrer auf Englisch: <https://microbit.org/teach/>



Kaufen in Österreich

- Farnell:
<https://at.farnell.com/bbc-microbit>
- Semaf Electronics:
<https://electronics.semaf.at/Micro-bit-Education-Computer-Boards>