# Arduino via Networks

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## Arduino via networks

$\rightarrow$ WiFi, Bluetooth

- Arduino MKR WiFi 1010* $\approx>$ 30 Euro
  also suitable for starters
- Arduino Nano 33 IoT* $\approx>$ 20 Euro
  also suitable for starters
- "overpriced" shields

* ⚠ processor: 3.3V, not 5V

## WiFi

WiFi: many different network topologies

⚠ forget about knowing everything, just go for a working solution

via external routers $\rightsquigarrow$ always trouble

⚠ schools, courses, installations:
go for a solution where you have the network completely under your control

## WiFi and Arduino

- we need the WiFiNINA library
- ⚠ maybe even the firmware of the board requires an update:
  (menu) `Tools/WiFi101 / WiFiNINA Firmware Updater`
- insert access data in the file `arduino_secrets.h` of your sketch:

```
// Both SSID and password must be 8 characters or longer
#define SECRET_SSID "NameOfNetwork"
#define SECRET_PASS "WhatTheF*ckIsThePassword"
```

## WiFi and Arduino — simple example without external router

Idea: use Arduino as an access point
primitive web server there

- (menu) `File/Examples/WiFiNINA/AP_SimpleWebServer`
- create a local copy — we still have to add the access data in `arduino_secrets.h`
- load to Aduino board
- from end device: connect to this access point
(access data according to `arduino_secrets.h`)
- start a browser, call website (should be `192.168.4.1`) according to hint in Arduino serial monitor
- now the Arduino programm can be controlled from the website (e.g. switch an LED on / off)

## Bluetooth® — Overview

- fits well for communication at a distance of a few meters
- standard on PCs / Smartphones
- – Bluetooth classic (before version 4.0)
  - – Bluetooth Low Energy = BLE (since verion 4.0)
    (this is not an energy saving mode — this is just the name of the modern version)
    Apple iOS-devices only use this

  ⚠ Bluetooth classic and Bluetooth Low Energy are not compatible

## Bluetooth® and Arduino

- Arduino MKR WiFi 1010*, BLE, ≈> 30 Euro
  also suitable for starters
- Arduino Nano 33 IoT*, BLE, ≈> 20 Euro
  also suitable for starters
- Bluetooth modules
  ⚠ configuration difficult, rather something for specialists
  - HC05 / HC06, ≈ Bluetooth Version 2.0+, ≈ 5-6 Euro
    HC05 more flexible, but hardly expensive ⇝ prefer this!
  - HM-10 ≈ HC05, but BLE – ≈ 8 Euro
    ⚠ lots of imitations with somehow reduced functionality
  - HM-18 ≈ HM-10, advanced – <≈ 10 Euro
- "overpriced" shields

* ⚠ processor: 3.3V, not 5V

## BLE

2 types of devices:

- peripheral
  Always send data.
- central
  Read data from the peripheral devices.

Configuration / programming determines type of device.

⚠ Arduino: we need the ArduinoBLE library

## BLE

just one interesting example:

`File/Examples/Examples from Custom Libraries/ArduinoBLE/Central/ScanCallback`

Hint: RSSI = Received Signal Strength Indication

`https://www.uuidtools.com/decode?`

some ideas for extensions (requires some programming work):

- reaction to newly seen device
  (new person entering the room?)
- reaction to disappeared device
  (anti-theft warning, however this also reacts to turning the device off)