



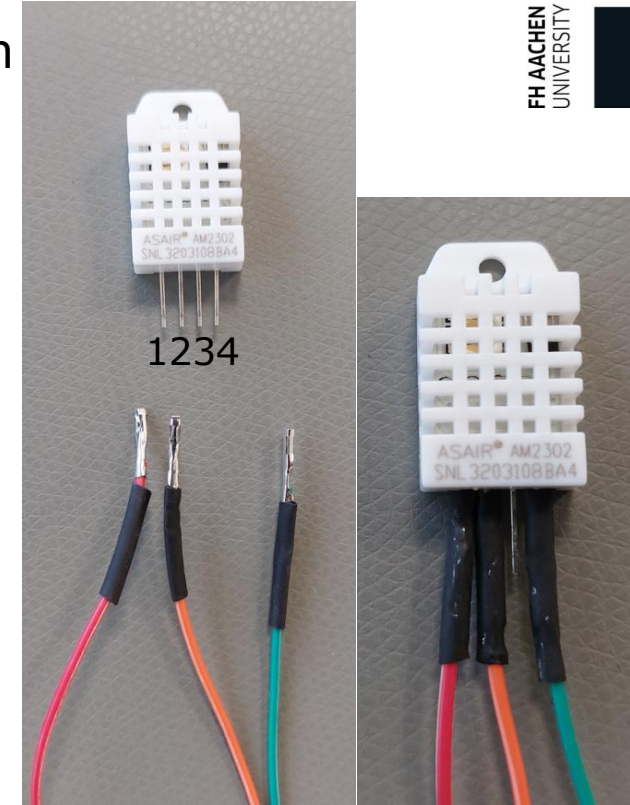
Bauanleitung für das Smart Meter

Benötigte Hardware/Software

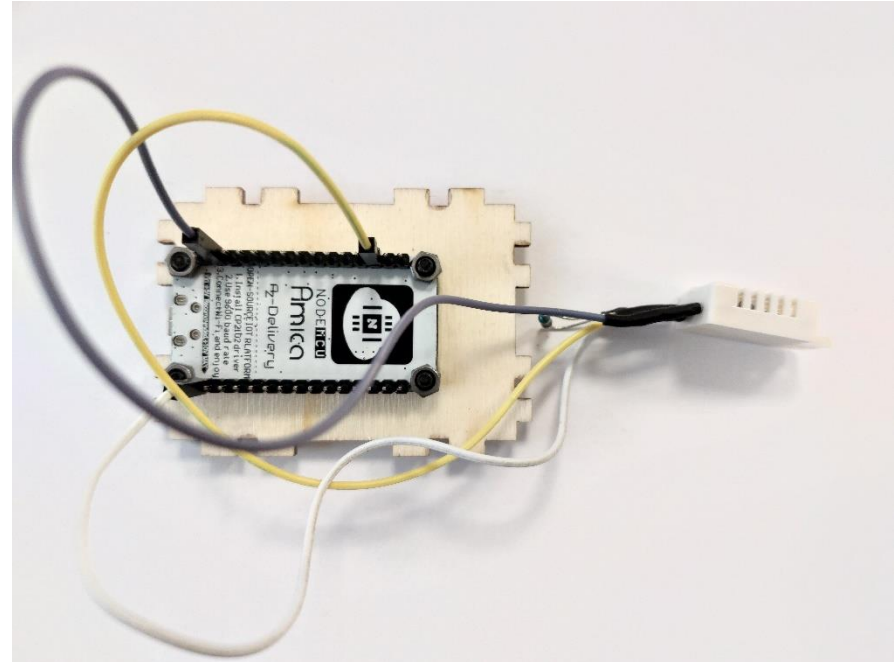
- Software
 - Putty
 - Filezilla
 - Arduino DIE
 - Raspberry Pi Imager
- Hardware
 - Innensechskant
Schraubendreher Größe 5.5

Löten und Verkabeln

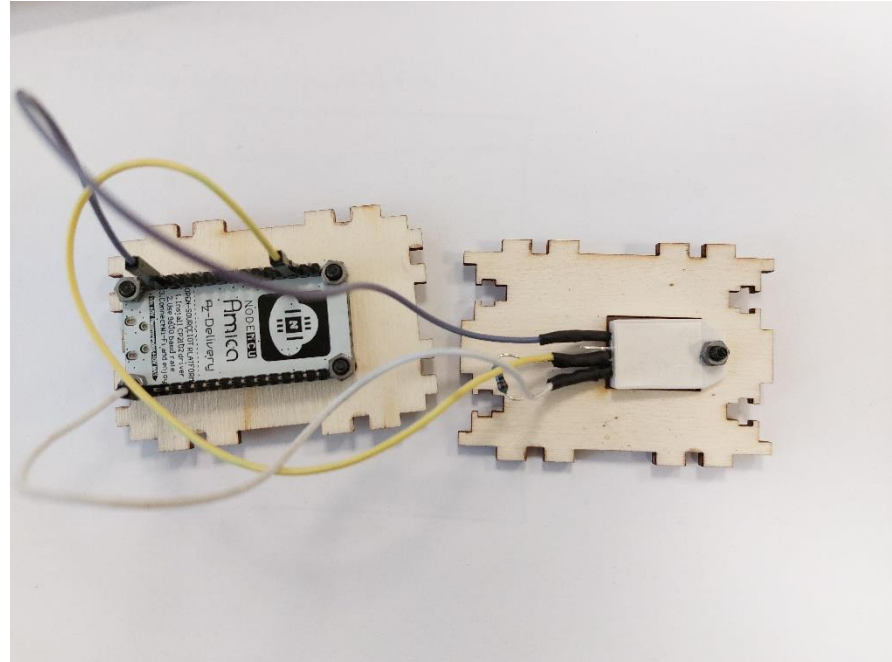
- Kunststoffkappen von den Kabeln entfernen
- Schrumpfschlauch zuschneiden und Überziehen
- Kabel an die Pins anlöten
- An Pin 1 kommt die Spannungsversorgung
- An Pin 2 kommt das Signal Kabel
- Pin 3 wird ausgelassen
- An Pin 4 kommt GND

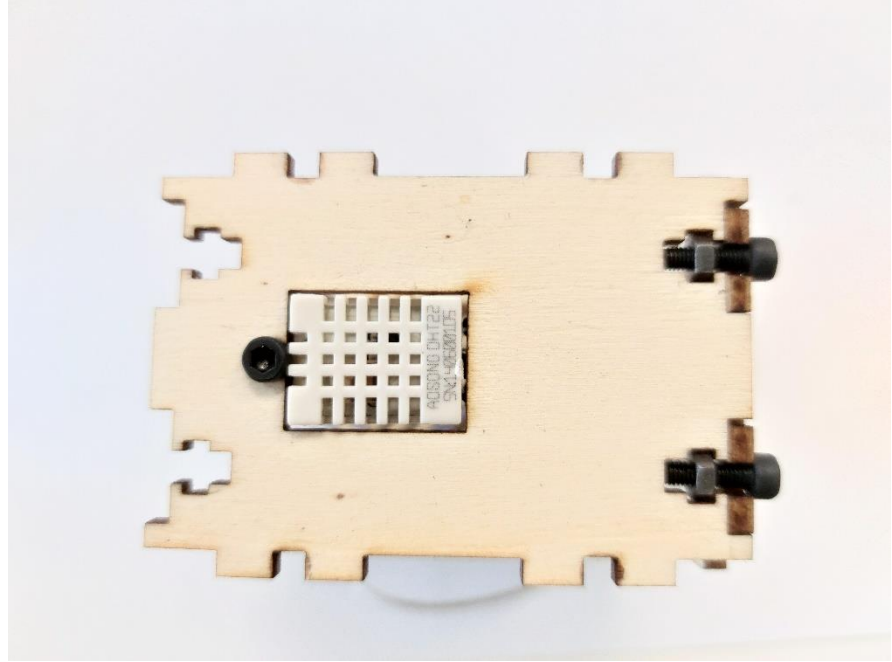


- Der Pin 1 des DHT wird mit dem Pin Vin des Mikrocontrollers verbunden
- Der Pin 2 des DHT wird mit dem Pin D2 des Mikrocontrollers verbunden
- Der Pin 4 des DHT wird mit dem Pin GND des Mikrocontrollers verbunden
- Den verkabelten Mikrocontroller richtig platzieren und verschrauben

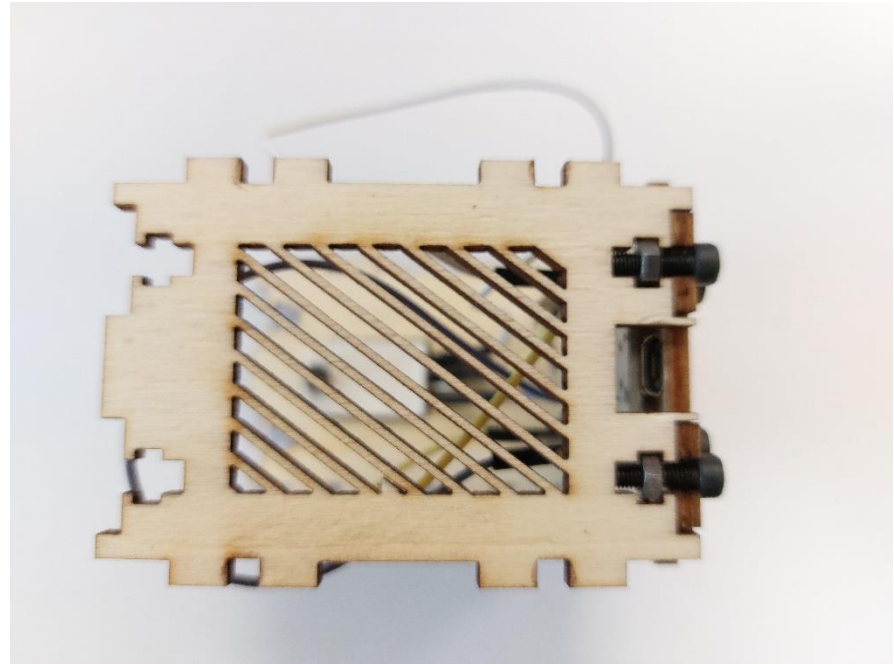


- Den DHT22 in das Seitenteil mit der passenden Aussparung platzieren und verschrauben





- Das gegenüberliegende Seitenteil verschrauben

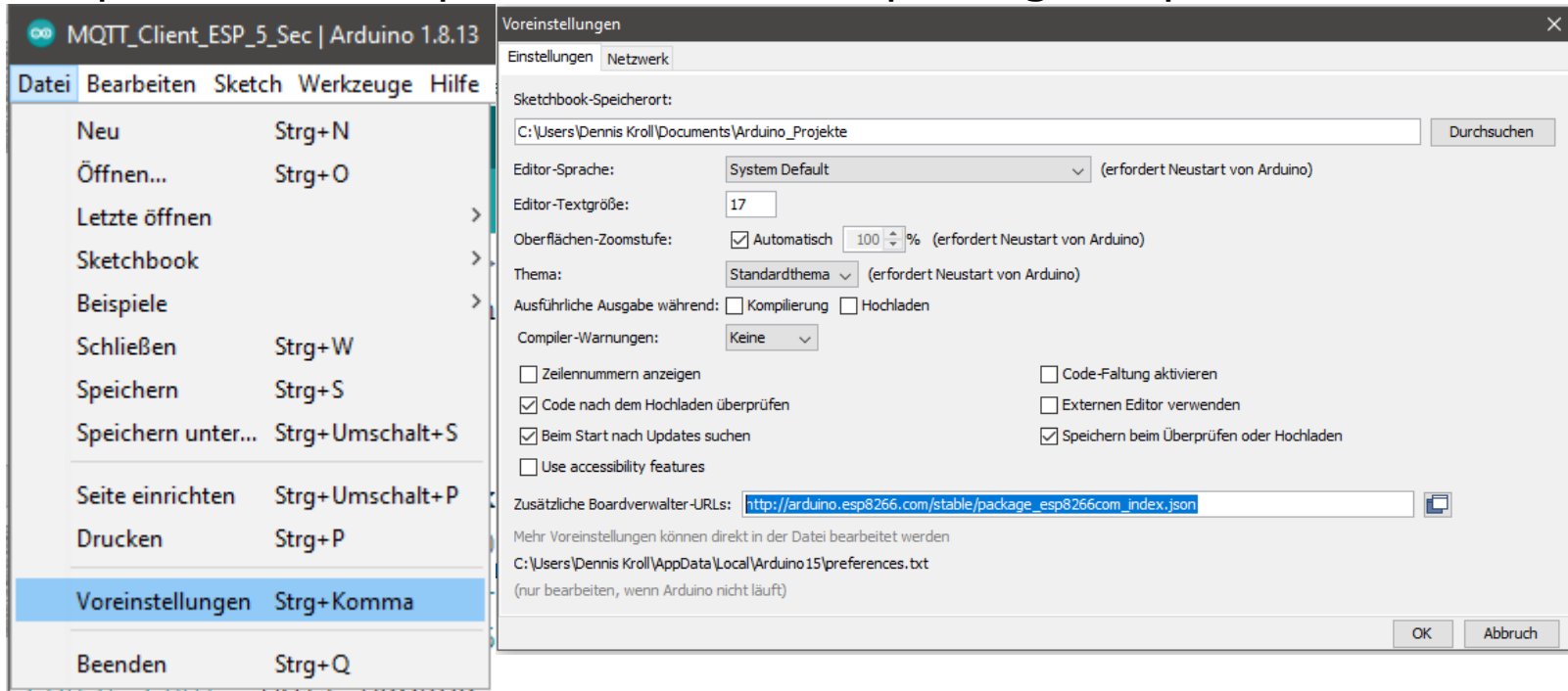


- Die restlichen Seiten montieren und verschrauben



Software Installation ESP8266

- Arduino IDE Starten
- ESP8266 Bibliothek installieren
- http://arduino.esp8266.com/stable/package_esp8266com_index.json



Software Installation ESP8266

The screenshot shows the Arduino IDE interface with the 'Tools' menu open, highlighting 'Board: "Generic ESP8266 Module"'. The 'Board Manager' window is also open, displaying the 'esp8266' package by the ESP8266 Community, version 2.7.4, which is installed. The window lists various boards included in the package, such as the Generic ESP8266 Module, Lively Agrumino Lemon v4, ESPDuino (ESP-13 Module), Adafruit Feather HUZZAH ESP8266, and others. The 'Online Help' and 'More Info' links are visible, along with buttons for 'Version auswählen', 'Installieren', 'Update', and 'Entfernen'.

MQTT_Client_ESP_5_Sec | Arduino 1.8.13

Datei Bearbeiten Sketch Werkzeuge Hilfe

Automatische Formatierung Strg+T

Sketch archivieren

Kodierung korrigieren & neu laden

Bibliotheken verwalten...

Serieller Monitor Strg+Umschalt+I

Serieller Plotter Strg+Umschalt+L

WiFi101 / WiFININA Firmware Updater

Board: "Generic ESP8266 Module"

Boardverwalter...

Builtin Led: "2"

Upload Speed: "921600"

CPU Frequency: "80 MHz"

Crystal Frequency: "26 MHz"

Flash Size: "1MB (FS:64KB OTA:~470KB)"

Flash Mode: "DOUT (compatible)"

Flash Frequency: "40MHz"

Reset Method: "dtr (aka nodemcu)"

Debug port: "Disabled"

Debug Level: "Keine"

lWIP Variant: "v2 Lower Memory"

VTables: "Flash"

Exceptions: "Legacy (new can return nullptr)"

Erase Flash: "Only Sketch"

Espressif FW: "nonos-sdk 2.2.1+100 (190703)"

SSL Support: "All SSL ciphers (most compatible)"

Port: "COM5"

Boardinformationen holen

Programmer

Bootloader brennen

Boardverwalter

Typ Alle ESP8266

esp8266

by ESP8266 Community Version 2.7.4 INSTALLED

In diesem Paket enthaltene Boards:

Generic ESP8266 Module, Generic ESP8285 Module, Lively Agrumino Lemon v4, ESPDuino (ESP-13 Module), Adafruit Feather HUZZAH ESP8266, WiFi Kit 8, Invent One, XinaBox CW01, ESPresso Lite 1.0, ESPresso Lite 2.0, Phoenix 1.0, Phoenix 2.0, NodeMCU 0.9 (ESP-12 Module), NodeMCU 1.0 (ESP-12E Module), Olimex MOD-WIFI-ESP8266(-DEV), SparkFun ESP8266 Thing, SparkFun ESP8266 Thing Dev, SparkFun Blynk Board, SweetPea ESP-210, LOLIN(WEMOS) D1 R2 & mini, LOLIN(WEMOS) D1 mini (clone), LOLIN(WEMOS) D1 mini Pro, LOLIN(WEMOS) D1 mini Lite, LOLIN(WeMos) D1 R1, ESPino (ESP-12 Module), ThaiEasyElec's ESPino, WiFiInfo, Arduino, 4D Systems gen4 IoT Range, Digistump Oak, WiFiduino, Amperka WiFi Slot, Seeed Wio Link, ESPectro Core, Schirmilabs Eduino WIFI, ITEAD Sonoff, DOIT ESP-Mx DevKit (ESP8285).

Online Help

More Info

Version auswählen Installieren Update Entfernen

Schließen

Software Installation ESP8266

The image displays two screenshots of the Arduino IDE interface, showing the process of selecting an ESP8266 board and a serial port for software installation.

Left Screenshot: The IDE is open with a sketch named "MQTT_Client_ESP_5_Sec" for Arduino 1.8.13. The "Tools" menu is open, and the "Board" submenu is selected. The "ESP8266 Boards (2.7.4)" option is highlighted. The "Port" submenu is also open, showing "COM5" selected.

Right Screenshot: The IDE is open with the same sketch. The "Tools" menu is open, and the "Board" submenu is selected. The "ESP8266 Boards (2.7.4)" option is highlighted. The "Port" submenu is also open, showing "COM5" selected.

Code Snippets:

```
MQTT_Client_ESP_5_Sec | Arduino 1.8.13
Datei Bearbeiten Sketch Werkzeuge Hilfe

//MQTT_Client_ESP_5_Sec
long lastMsg = 0;
char msg[50];
int value = 0;

uint8_t readByte() {
  Wire.begin();
  Wire.write(msg);
  Wire.endTransmission();
  //request 1
  if (Wire.available()) {
    return Wire.read();
  }
  else {
    return 0;
  }
}

bool writeByte(uint8_t data) {
  Wire.beginTransmission();
  Wire.write(data);
  Wire.write(data);
  if (Wire.endTransmission() != 0) {
    return false;
  }
  else {
    return true;
  }
}

void setup() {
  Serial.begin(115200);
  // Read ID
  Wire.begin();
  uint8_t id = readByte(0x00);
  Serial.print("ID: ");
}
```

Board Selection Menu (Left Screenshot):

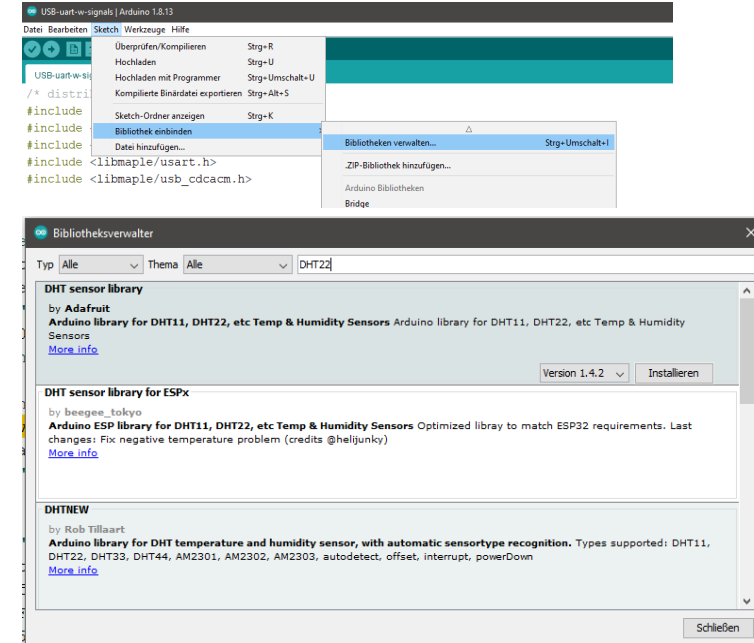
- Board: "Generic ESP8266 Module"
- Built-in Led: "2"
- Upload Speed: "921600"
- CPU Frequency: "80 MHz"
- Crystal Frequency: "26 MHz"
- Flash Size: "1MB (FS:64KB OTA:~470KB)"
- Flash Mode: "DOUT (compatible)"
- Flash Frequency: "40MHz"
- Reset Method: "dtr (aka nodemcu)"
- Debug port: "Disabled"
- Debug Level: "Keine"
- I2C Variant: "v2 Lower Memory"
- VTables: "Flash"
- Exceptions: "Legacy (new can return nullptr)"
- Erase Flash: "Only Sketch"
- Espressif FW: "nonos-sdk 2.2.1+100 (190703)"
- SSL Support: "All SSL ciphers (most compatible)"
- Port: "COM5"
- Boardinformationen holen
- Programmer
- Bootloader brennen

Port Selection Menu (Right Screenshot):

- Port: "COM5"
- Boardinformationen holen
- Programmer
- Bootloader brennen

Software Installation ESP8266

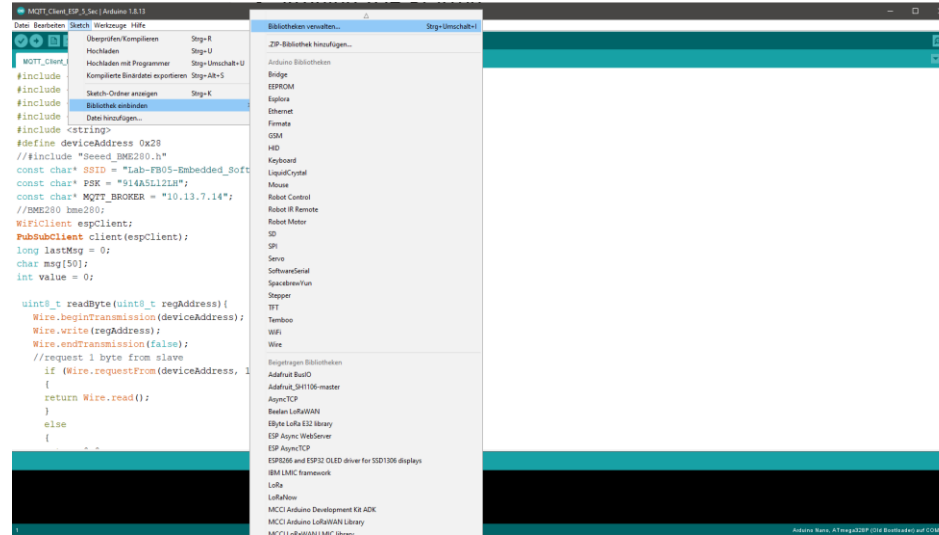
- Arduino IDE Starten
- Programmcode MQTT_Client_ESP_5_Sec reinladen
- Fehlende Bibliotheken installieren
 - PubSubClient
 - BME280
 - DHT sensor library (Abhängigkeiten mit installieren)
 - ~~Adafruit Unified Sensor~~
- Programm auf dem Mikrocontroller flashen



Software Installation ESP8266

- Arduino IDE Starten
- Programmcode MQTT_Client_ESP_5_Sec reinladen
- Fehlende Bibliotheken installieren

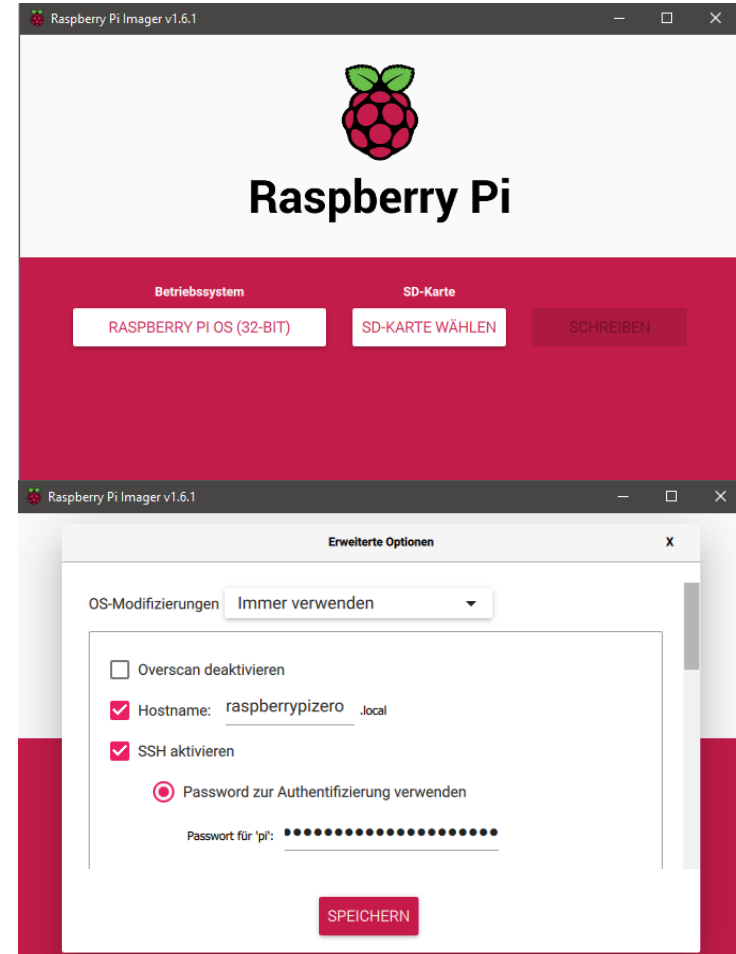
- PubSubClient
- BME280



- Programm auf dem Mikrocontroller flashen

Raspberry Pi Installation

- Raspberry Pi Imager
 - Strg+Shift+x



- Putty ausführen
 - Ip des Raspberry Pi eingeben
 - Benutzer:pi
 - Password:(euer Passwort eingeben)
- MQTT Installation
 - `sudo pip3 install paho-mqtt python-etcd`
 - `python3 -m pip install influxdb`
 - `sudo apt-get update`
 - `sudo apt-get upgrade -y`
 - `sudo apt-get install mosquitto mosquitto-clients -y`
 - `mosquitto_sub -d -t /home/`

- Installation von InfluxDB
 - `wget -qO- https://repos.influxdata.com/influxdb.key | sudo apt-key add`
 - `source /etc/os-release`
 - `echo "deb https://repos.influxdata.com/debian $(lsb_release -cs) stable" | sudo tee /etc/apt/sources.list.d/influxdb.list`
 - `sudo apt update && sudo apt install -y influxdb`
 - `sudo systemctl unmask influxdb.service`
 - `sudo systemctl start influxdb`
 - `sudo systemctl enable influxdb.service`

- Installation von InfluxDB
 - influx
 - create database home
 - use home
 - create user grafana with password '<123456>' with all privileges
 - grant all privileges on home to grafana
 - show users
 - Exit
 - `sudo nano /etc/influxdb/influxdb.conf`
 - -> unter [http] # enable = true kommentar entfernen zu `enable = true`
 - # bind -address = ":8086" Kommentar entfernen zu `bind -address = ":8086"`

- Installation von InfluxDB für den PI Zero
 - `sudo apt-get install -y adduser libfontconfig1`
 - `wget https://dl.grafana.com/oss/release/grafana-rpi_7.5.4_armhf.deb`
 - `sudo dpkg -i grafana-rpi_7.5.4_armhf.deb`
 - `sudo /bin/systemctl daemon-reload`
 - `sudo /bin/systemctl enable grafana-server`
 - `sudo /bin/systemctl start grafana-server`

- Installation von InfluxDB für den PI 4B/3B/2B
 - `wget -q -O - https://packages.grafana.com/gpg.key | sudo apt-key add -`
 - `echo "deb https://packages.grafana.com/oss/deb stable main" | sudo tee -a /etc/apt/sources.list.d/grafana.list`
 - `sudo apt-get update`
 - `sudo apt-get install -y grafana`
 - `sudo /bin/systemctl enable grafana-server`
 - `sudo /bin/systemctl start grafana-server`

- Installation Data Bridge
 - Starten von Filezilla
 - Upload des Scripts Sensor_software_pi.py in den Ordner home/pi/
 - Starten des Scripts mit python3
/home/pi/Sensor_software_pi.py
- Script in den Startup Einfügen
 - crontab -e
 - Den ersten Reiter auswählen
 - In die letzte Zeile
@reboot python3 /home/pi/Sensor_software_pi.py

Grafana einstellen

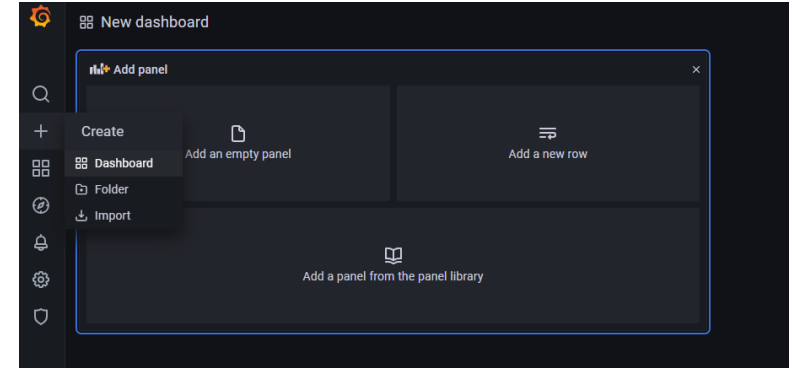
- Im Browser die IP eures Raspberry Pi eingeben und :3000/login anhängen
- Bei Benutzernamen und Passwort admin eingeben und neues Passwort erstellen
- Bei configuration auf Data sources klicken
- Add Data source und Influx DB auswählen
- Bei URL: <http://localhost:8086> eingeben
- bzw. localhost:8086
- Database:home
- User:grafana
- Password:123456

The screenshot shows the Grafana web interface. At the top, there's a 'General / Home' header. Below it, a 'Welcome to Grafana' message is displayed. A 'Basic' section indicates that the steps below will guide the user. A 'TUTORIAL' link for 'DATA SOURCE AND DASHBOARDS' is visible. The main part of the screen is the 'InfluxDB Details' configuration form. It includes a 'Database Access' section with explanatory text and an example query: `SHOW MEASUREMENTS ON _internal` or `SELECT * FROM "_internal".."database" LIMIT 10`. Below this, there are input fields for 'Database' (set to 'home'), 'User' (set to 'grafana'), and 'Password' (set to 'configured'). A 'Reset' button is next to the password field. At the bottom, there are dropdown menus for 'HTTP Method' (set to 'Choose'), 'Min time interval' (set to '10s'), and 'Max series' (set to '1000').

InfluxDB Details	
Database Access Setting the database for this datasource does not deny access to other databases. The InfluxDB query syntax allows switching the database in the query. For example: <code>SHOW MEASUREMENTS ON _internal</code> or <code>SELECT * FROM "_internal".."database" LIMIT 10</code> To support data isolation and security, make sure appropriate permissions are configured in InfluxDB.	
Database	home
User	grafana
Password	configured <button>Reset</button>
HTTP Method	<input type="radio"/> Choose
Min time interval	<input type="radio"/> 10s
Max series	<input type="radio"/> 1000

Grafana neues Dashboard hinzufügen

- Auf + Dashboard klicken
- Add an empty panel anklicken



Grafana neues Dashboard hinzufügen

New dashboard / Edit Panel

Table view ☐ Fill Actual Last 6 hours

Panel Title

No data in response

Query 1 Transform 0 Alert 0

Data source: Umwelt Sensor

MD = auto = 1156 Interval = 20s Query inspector

▼ A (Umwelt Sensor)

FROM default select measurement WHERE +

SELECT field(value) mean() +

GROUP BY time(\$__interval) fill(null) +

TIMEZONE (optional) ORDER BY TIME ascending

LIMIT (optional) SLIMIT (optional)

FORMAT AS Time series ALIAS Naming pattern

+ Query + Expression

Time series

Search options

All Overrides

Panel options

Title: Panel Title

Description

Transparent background ☐

Panel links

Repeat options

Tooltip

Tooltip mode: Single All Hidden

Legend

Legend mode: List Table Hidden

Legend placement: Bottom Right

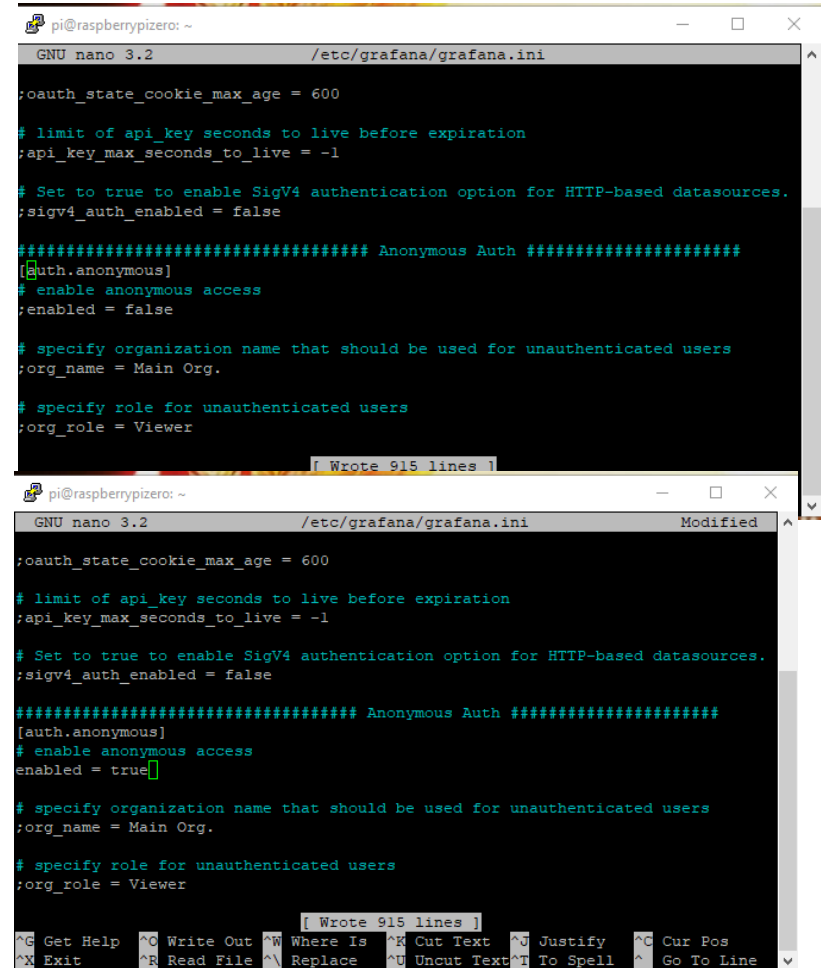
Legend values: Choose

Graph styles

Style

Grafana Dashboard zugriff für alle

- `sudo nano /etc/grafana/grafana.ini`
 - Strg+w
 - `auth.anonymous`
 - `enable = true`
 - Strg+x
 - y
 - Sudo reboot now



The image shows two screenshots of a terminal window on a Raspberry Pi, editing the file `/etc/grafana/grafana.ini` using the `nano` editor. The top screenshot shows the initial state where `enable anonymous access` is set to `false`. The bottom screenshot shows the same file after modification, where `enable anonymous access` has been changed to `true`. The terminal window title is `pi@raspberrypizero: ~` and the editor status bar at the bottom indicates "[Wrote 915 lines]".

```
pi@raspberrypizero: ~
GNU nano 3.2 /etc/grafana/grafana.ini

;oauth_state_cookie_max_age = 600

# limit of api_key seconds to live before expiration
;api_key_max_seconds_to_live = -1

# Set to true to enable SigV4 authentication option for HTTP-based datasources.
;sigv4_auth_enabled = false

##### Anonymous Auth #####
[auth.anonymous]
# enable anonymous access
;enabled = false

# specify organization name that should be used for unauthenticated users
;org_name = Main Org.

# specify role for unauthenticated users
;org_role = Viewer

[ Wrote 915 lines ]
```

```
pi@raspberrypizero: ~
GNU nano 3.2 /etc/grafana/grafana.ini Modified

;oauth_state_cookie_max_age = 600

# limit of api_key seconds to live before expiration
;api_key_max_seconds_to_live = -1

# Set to true to enable SigV4 authentication option for HTTP-based datasources.
;sigv4_auth_enabled = false

##### Anonymous Auth #####
[auth.anonymous]
# enable anonymous access
enabled = true

# specify organization name that should be used for unauthenticated users
;org_name = Main Org.

# specify role for unauthenticated users
;org_role = Viewer

[ Wrote 915 lines ]
^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify ^C Cur Pos
^X Exit ^R Read File ^\ Replace ^U Uncut Text ^T To Spell ^_ Go To Line
```