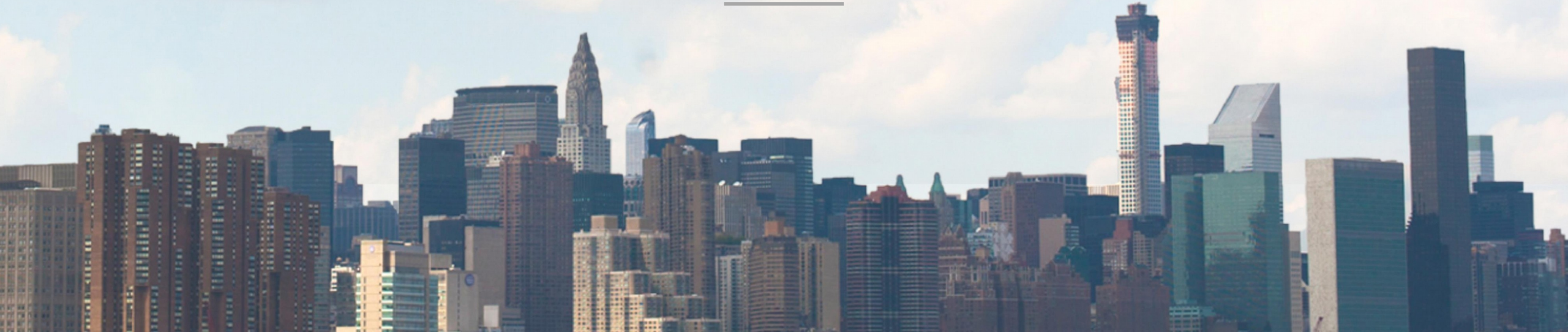
THE THINGS NETWORK

JKG Workshop

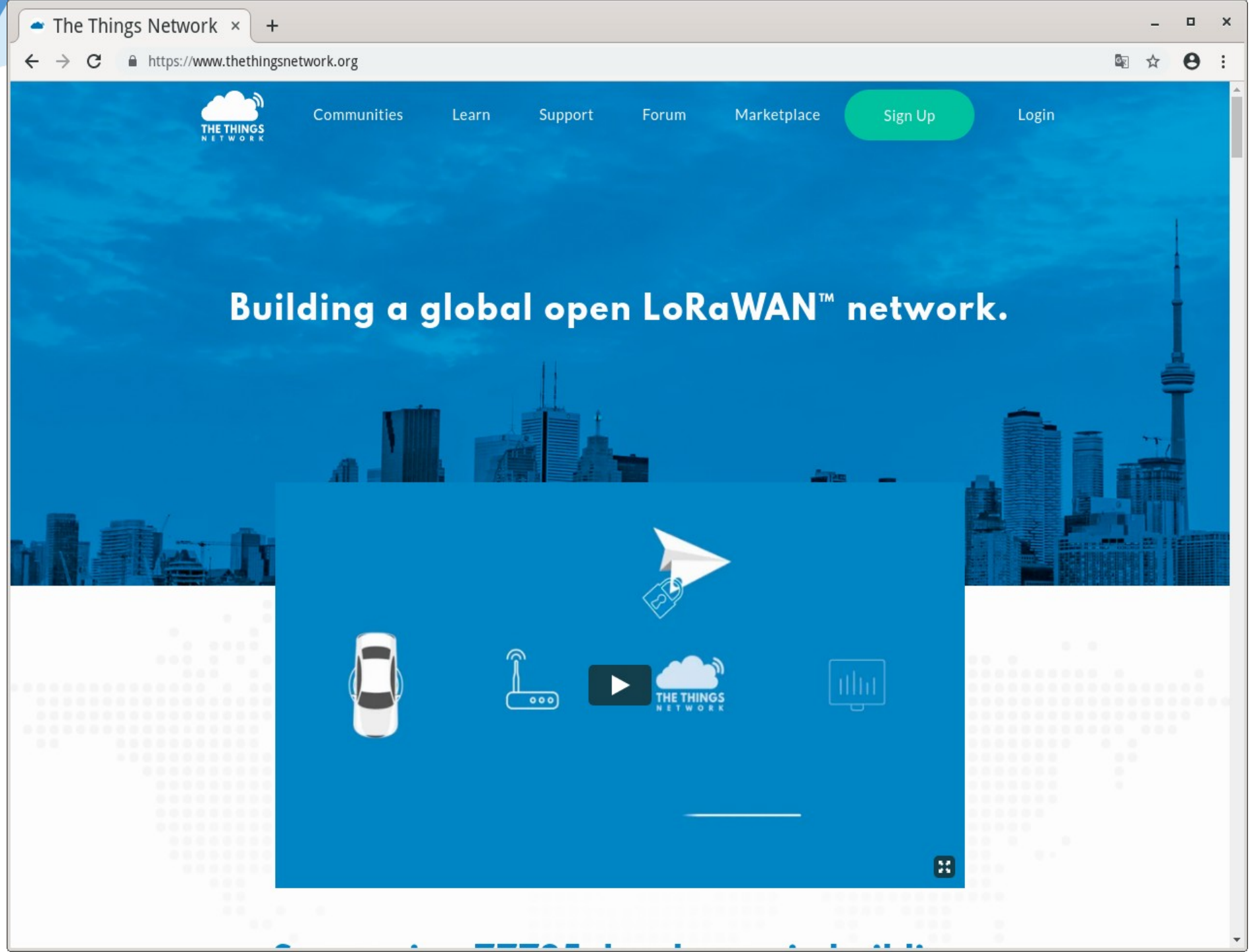
2019



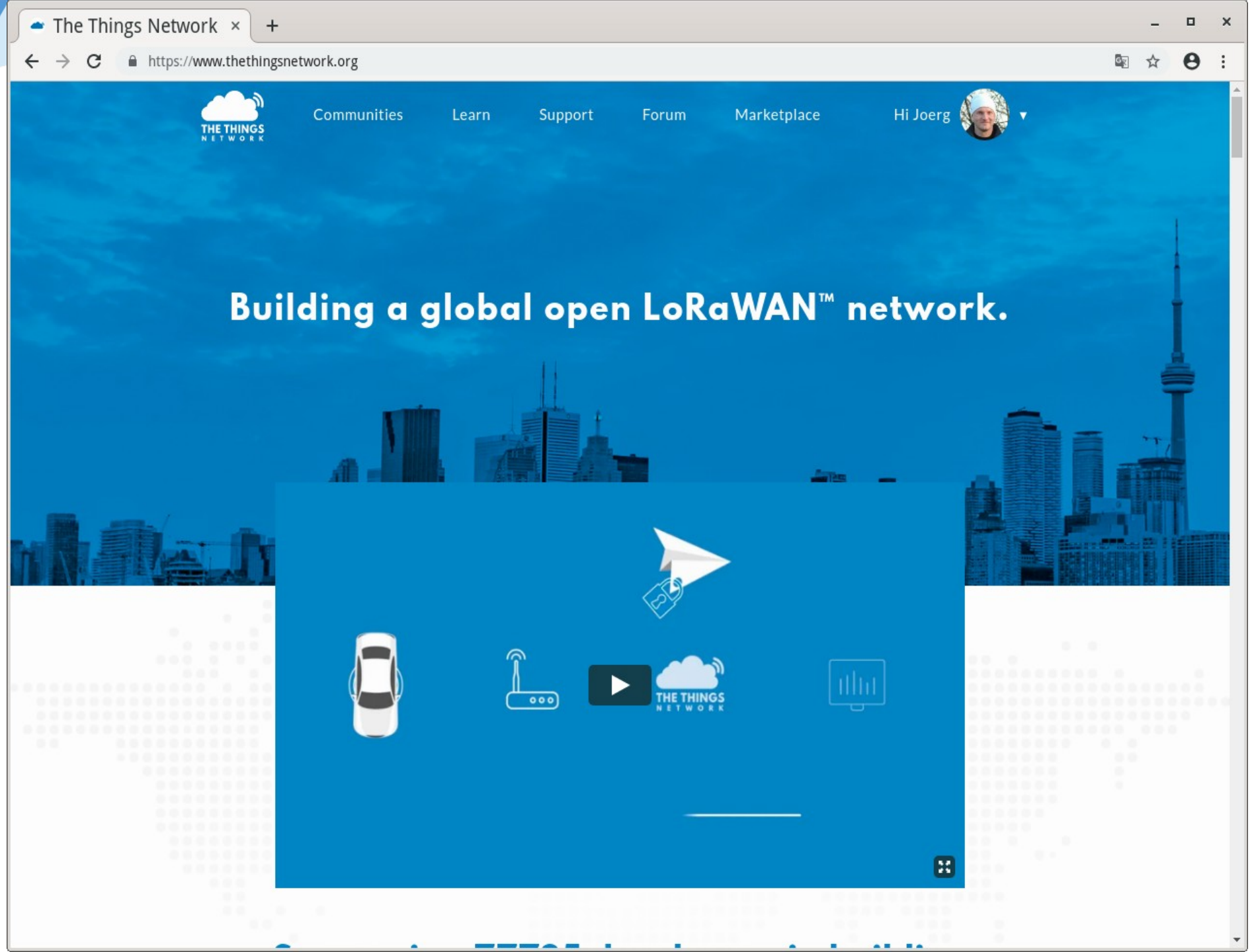
AGENDA

1. Zugang zum TTN
2. TTN Device anlegen
3. Arduino Config
4. Device Hardware
5. Visualisierung

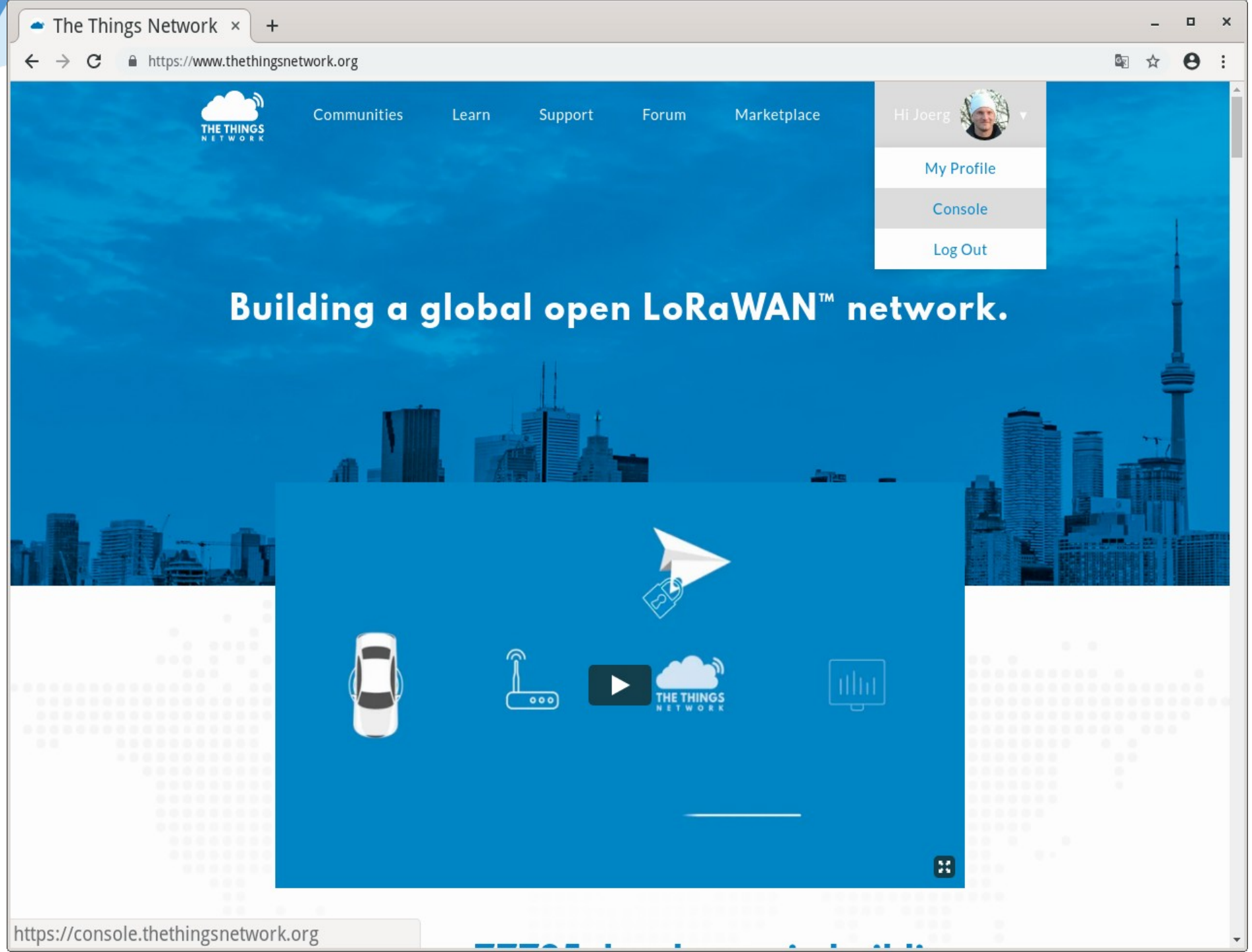
THE THINGS NETWORK



THE THINGS NETWORK



THE THINGS NETWORK



THE THINGS NETWORK

The Things Network

https://console.thethingsnetwork.org

THE THINGS NETWORK CONSOLE COMMUNITY EDITION

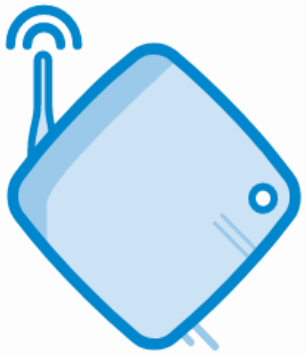
Applications Gateways Support JoergHennig

Hi, Joerg!

Welcome to The Things Network Console.

This is where the magic happens. Here you can work with your data. Register applications, devices and gateways, manage your integrations, collaborators and settings.

APPLICATIONS



GATEWAYS

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The Things Network

https://console.thethingsnetwork.org/applications

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Applications Gateways Support JoergHennig

Applications

APPLICATIONS

add application

[illegible]	[illegible]	ttn-handler-eu	[illegible]
[illegible]	[illegible]	ttn-handler-eu	[illegible]
[illegible]	[illegible]	ttn-handler-eu	[illegible]
[illegible]	[illegible]	ttn-handler-eu	[illegible]
simple_weather_node	Simple Cayenne Weather Node	ttn-handler-eu	70 B3 [illegible]

THE THINGS NETWORK

The Things Network

https://console.thethingsnetwork.org/applications/simple_weather_node

THE THINGS NETWORK CONSOLE COMMUNITY EDITION

Applications Gateways Support JoergHennig

Applications > simple_weather_node

Overview | Devices | Payload Formats | Integrations | Data | Settings

APPLICATION OVERVIEW

documentation

Application ID simple_weather_node

Description Simple Cayenne Weather Node

Created 3 months ago

Handler ttn-handler-eu *(current handler)*

APPLICATION EUIS

manage euis

THE THINGS NETWORK

The Things Network

https://console.thethingsnetwork.org/applications/simple_weather_node

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Live

APPLICATION EUIS

manage euis

THE THINGS NETWORK

The Things Network

https://console.thethingsnetwork.org/applications/simple_weather_node

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Applications Gateways Support JoergHennig

Applications > simple_weather_node

Handler ttn-handler-eu *(current handler)*

APPLICATION EUIS

manage euis

DEVICES

register device manage devices

4 registered devices

Click

COLLABORATORS

manage collaborators

THE THINGS NETWORK

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https://console.thethingsnetwork.org/applications/simple_weather_node/devices/register

THE THINGS NETWORK CONSOLE COMMUNITY EDITION

Applications Gateways Support JoergHennig

Applications > simple_weather_node > Devices

REGISTER DEVICE

bulk import devices

Device ID

This is the unique identifier for the device in this app. The device ID will be immutable.

Z.B. swn-lalala...

Device EUI

The device EUI is the unique identifier for this device on the network. You can change the EUI later.

0 bytes

Click

App Key

The App Key will be used to secure the communication between you device and the network.

this field will be generated

App EUI

THE THINGS NETWORK

The Things Network

https://console.thethingsnetwork.org/applications/simple_weather_node/devices/swn-lalala

THE THINGS NETWORK CONSOLE COMMUNITY EDITION

Applications Gateways Support JoergHennig

Applications > simple_weather_node > Devices > swn-lalala

Overview Data Settings

Click

DEVICE OVERVIEW

Application ID simple_weather_node

Device ID swn-lalala

Activation Method OTAA

Device EUI [redacted]

Application EUI [redacted]

App Key •

Status *never seen*

Frames up 0 reset frame counters

THE THINGS NETWORK

The Things Network

https://console.thethingsnetwork.org/applications/simple_weather_node/devices/swn-lalala/settings

THE THINGS NETWORK CONSOLE COMMUNITY EDITION

Applications Gateways Support JoergHennig

Applications > simple_weather_node > Devices > swn-lalala > Settings

Overview Data Settings

DEVICE SETTINGS

General

Location

SETTINGS

Description

A human-readable description of the device

My new device...

Enter description

Device EUI

The serial number of your radio module, similar to a MAC address

8 bytes

Application EUI

Activation Method

OTAA ABP

Click (select ABP)

THE THINGS NETWORK

The Things Network

https://console.thethingsnetwork.org/applications/simple_weather_node/devices/swn-lalala/settings

THE THINGS NETWORK CONSOLE COMMUNITY EDITION

Applications Gateways Support JoergHennig

Applications > simple_weather_node > Devices > swn-lalala > Settings

OTAA ABP

Device Address

The device address will be assigned by the network server

Network Session Key

Network Session Key will be generated

App Session Key

App Session Key will be generated

Frame Counter Width

16 bit 32 bit

Click (disable Checks)

Frame Counter Checks

Disabling frame counter checks drastically reduces security and should only be used for development purposes

THE THINGS NETWORK

The Things Network

https://console.thethingsnetwork.org/applications/simple_weather_node/devices/swn-lalala

THE THINGS NETWORK CONSOLE COMMUNITY EDITION

Applications Gateways Support JoergHennig

Applications > simple_weather_node > Devices > swn-lalala

DEVICE OVERVIEW

Application ID simple_weather_node

Device ID swn-lalala

Description My new device...

Activation Method ABP

Device EUI [redacted]

Application EUI [redacted]

Device Address 26[redacted]

Network Session Key msb { 0x97, [redacted]

App Session Key msb { 0xDB, [redacted]

Click (msb {...})

Später...

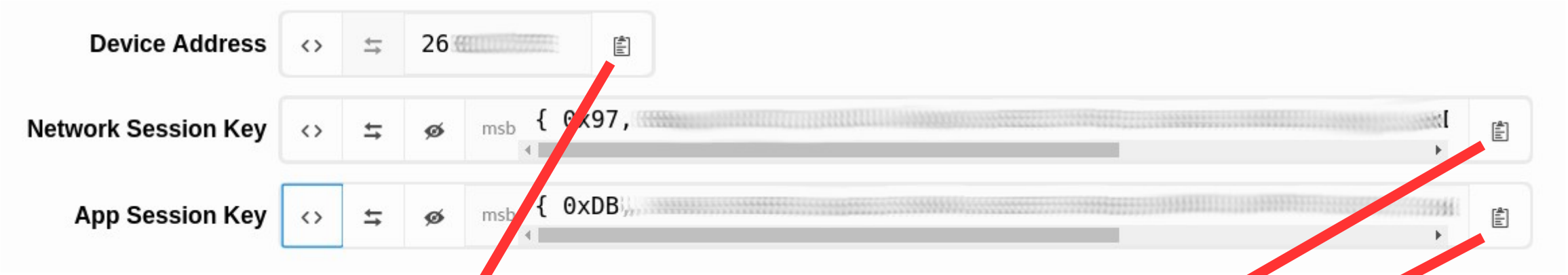
THE THINGS NETWORK

ARDUINO

- Arduino IDE starten (Fehlermeldung ignorieren)
- ~/Tausch_auf_Server/TTN/TTNweatherNode.zip nach ~/Arduino kopieren
- ~/Arduino/TTNweatherNode.zip entpacken
- Mit Arduino IDE ~/Arduino/TTNweatherNode/TTNweatherNode.ino öffnen

THE THINGS NETWORK

KEYS ÜBERTRAGEN



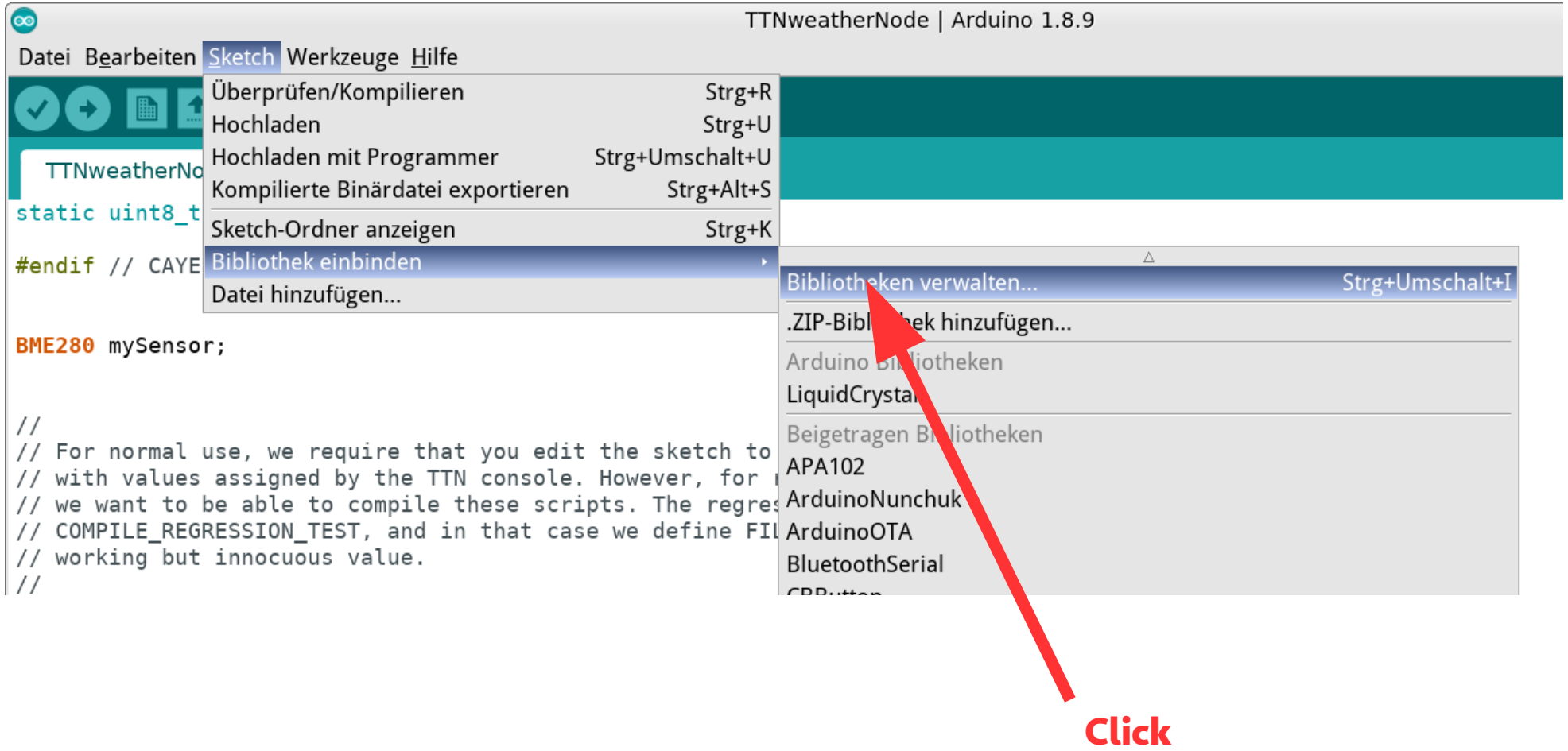

```
// LoRaWAN NwkSKey, network session key
static const PROGMEM u1_t NWKSKEY[16] = { 0x3A,                                                    };

// LoRaWAN AppSKey, application session key
static const u1_t PROGMEM APPSKEY[16] = { 0x25,                                                    };

// LoRaWAN end-device address (DevAddr)
// See http://thethingsnetwork.org/wiki/AddressSpace
// The library converts the address to network byte order as needed.
static const u4_t DEVADDR = 0x26                  ; // <-- Change this address for every node!
```

0x... nicht vergessen!

; am Ende der Zeile nicht vergessen!

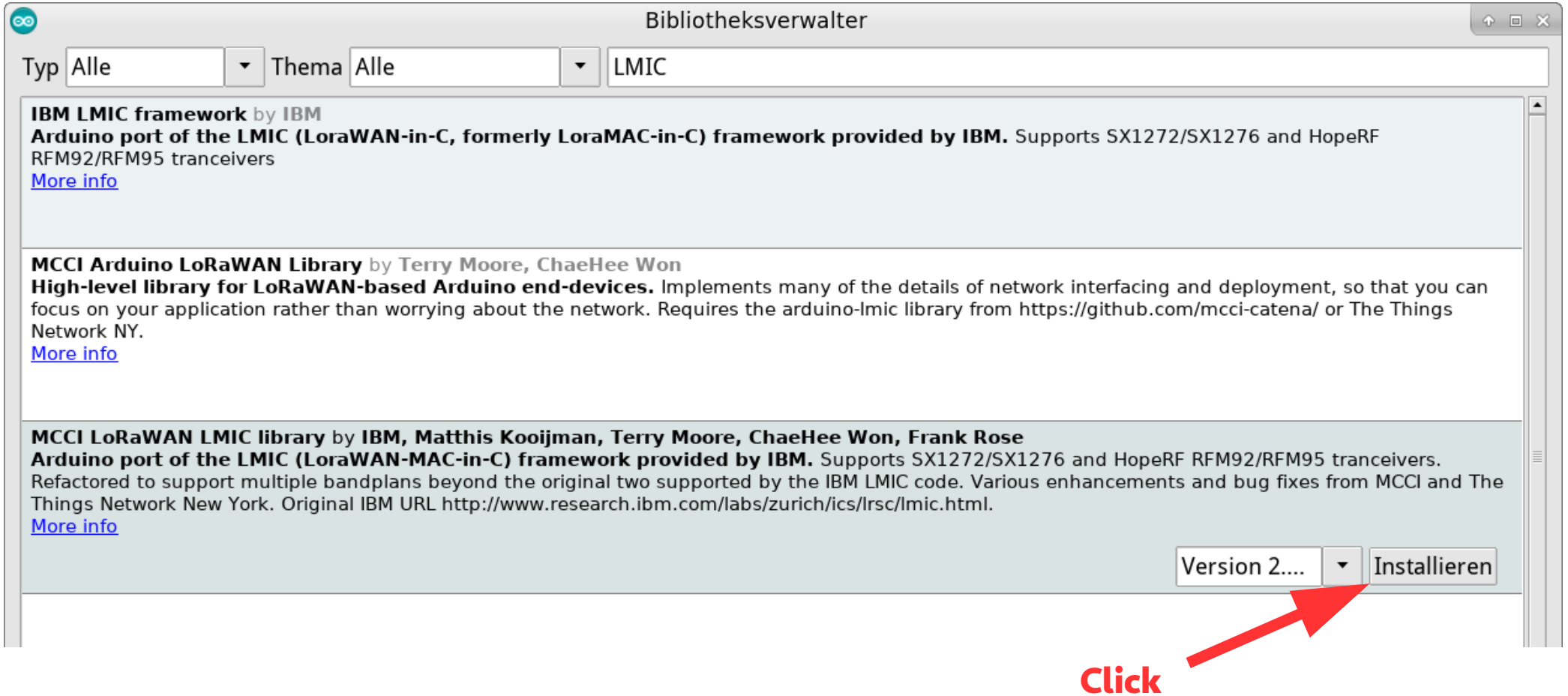
THE THINGS NETWORK

LIBRARIES INSTALLIEREN



Click

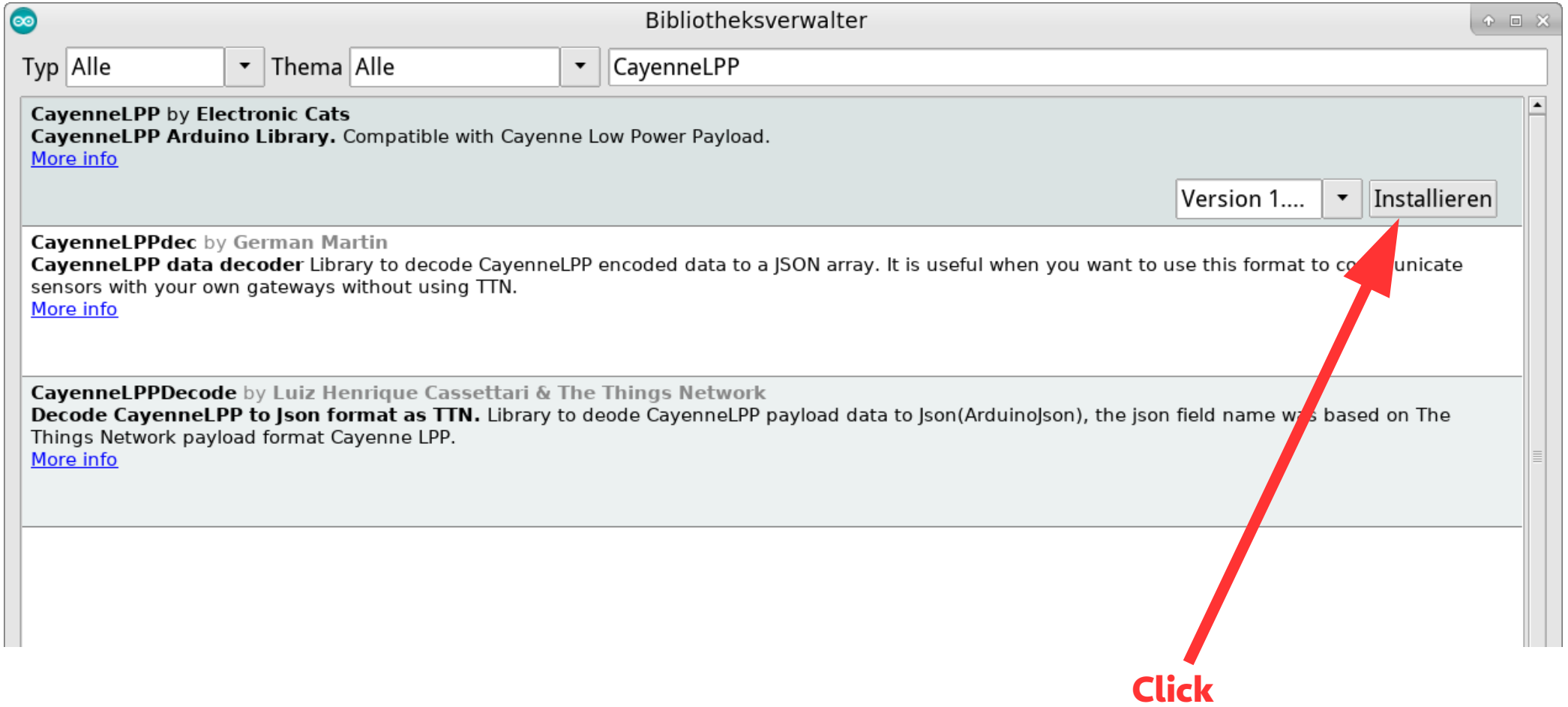
MCCI LoRaWAN LMIC by IBM



THE THINGS NETWORK

SPARKFUN BME280

CAYENNE LPP

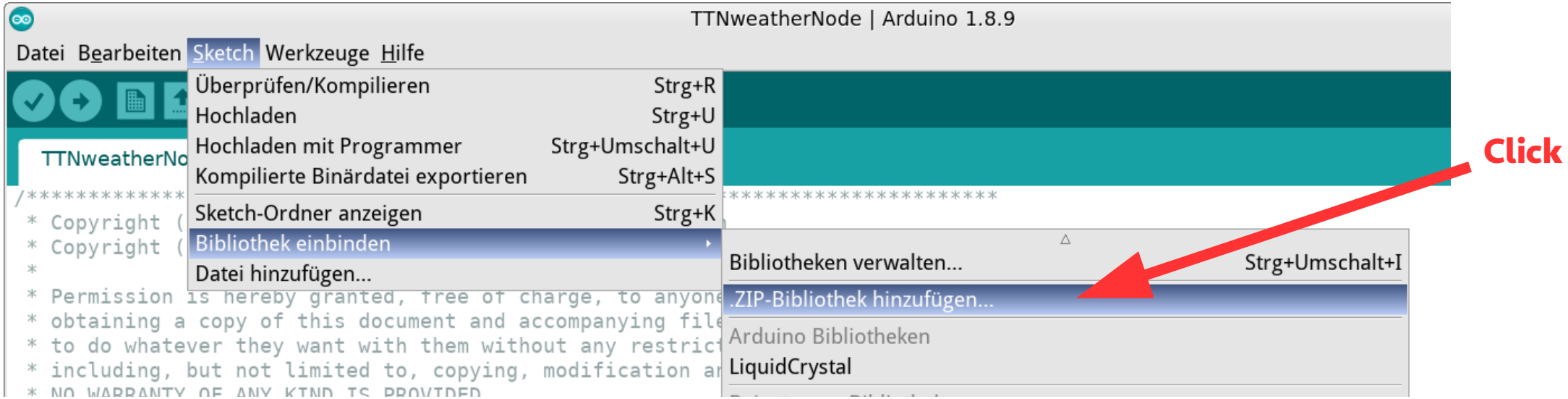


Click

THE THINGS NETWORK

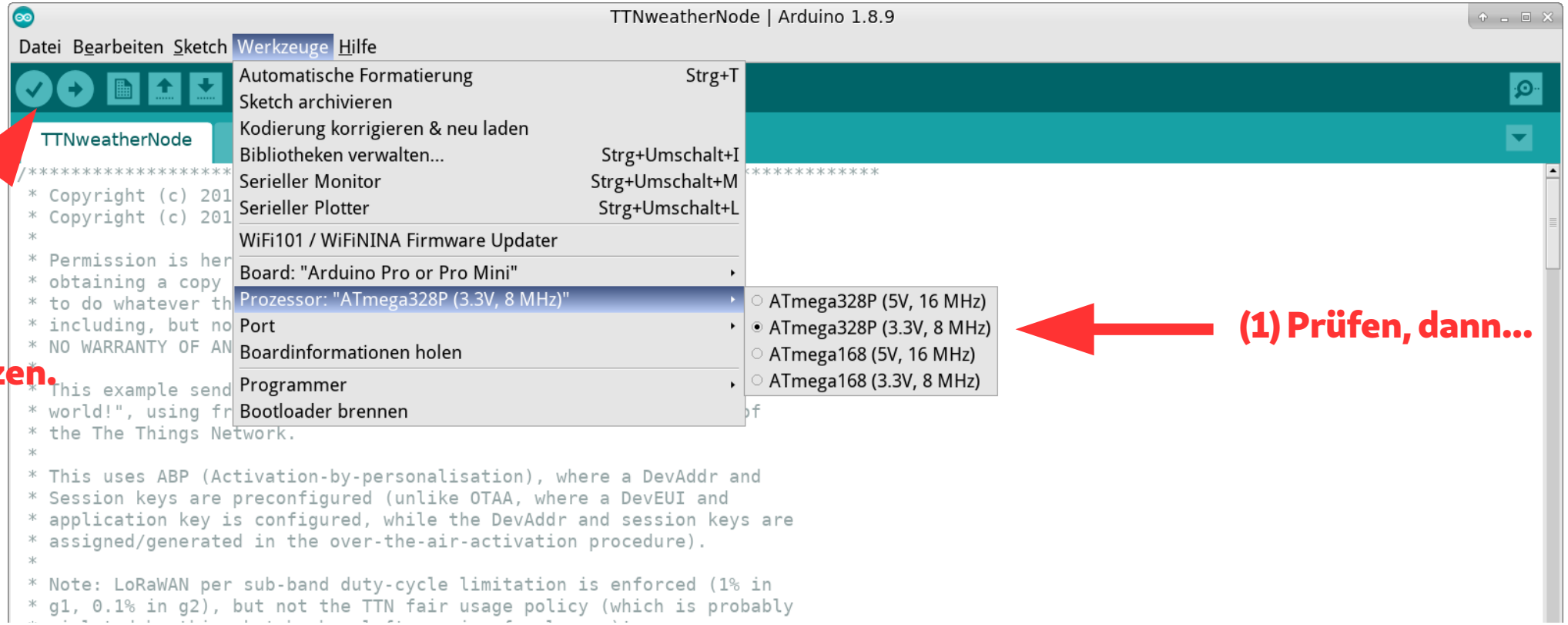
ROCKETSCREAM LOWPOWER

- ~/Tausch_auf_Server/TTN/Low-Power-master.zip



Quelle: https://github.com/rocketscream/Low-Power

BOARD CONFIG + COMPILE



THE THINGS NETWORK

PUUUUUH und jetzt?

Hardware

(Boah, endlich...)

THE THINGS NETWORK

SENSOR NODE

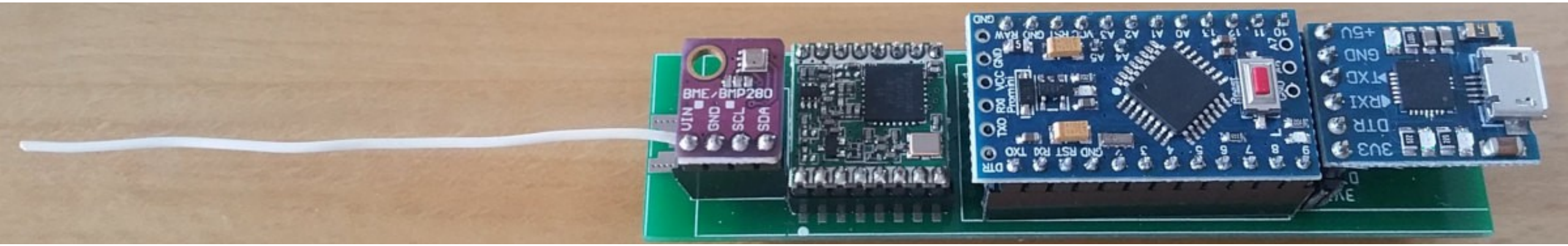
Antenne

BME280
Temperatur
Feuchte
Luftdruck

RFM95W
Lora Modul

Arduino Pro Mini

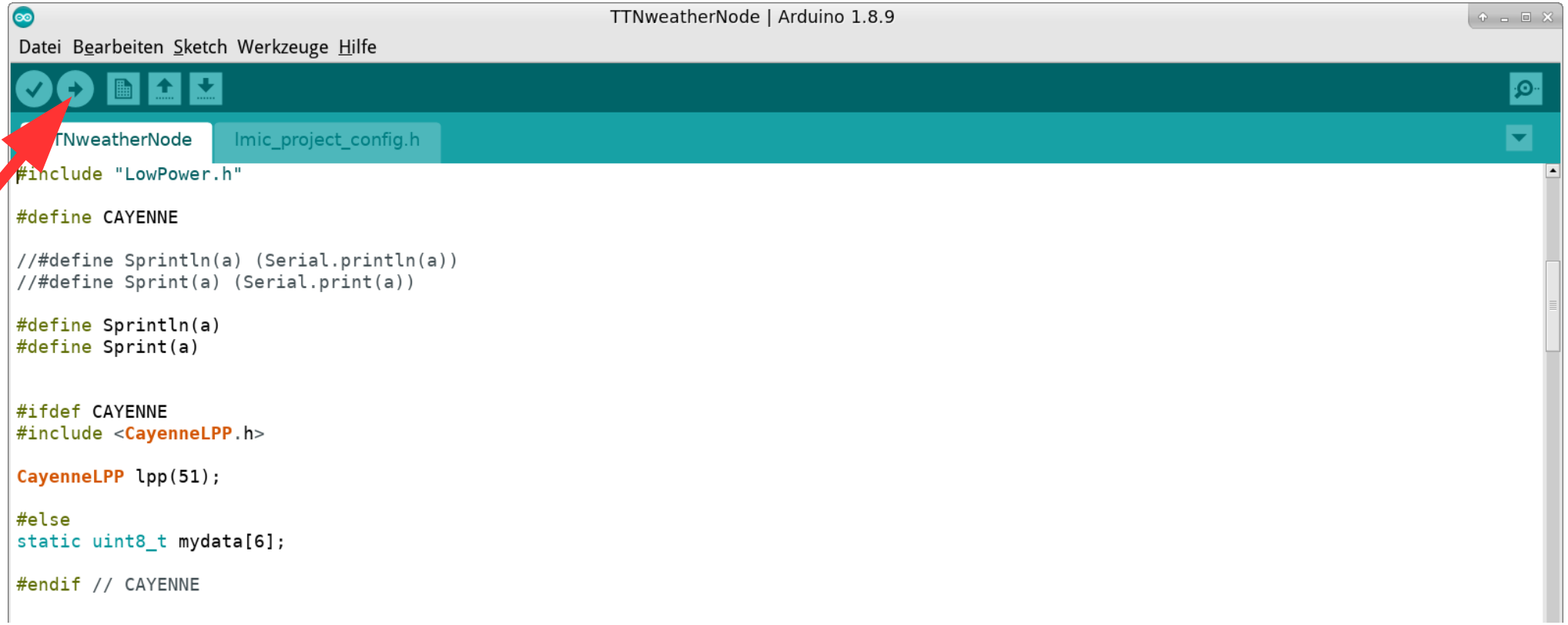
CP2102
USB TTL Konverter



- https://www.bosch-sensortec.com/bst/products/all_products/bme280
- https://www.hoperf.com/modules/lora/RFM95.html
- https://store.arduino.cc/arduino-pro-mini
- CP2101 Modul (googeln...)

THE THINGS NETWORK

SKETCH UPLOAD



Sketch hochladen

THE THINGS NETWORK

The Things Network

https://console.thethingsnetwork.org/applications/simple_weather_node/devices/swn-lalala/data

THE THINGS NETWORK CONSOLE COMMUNITY EDITION

Applications Gateways Support JoergHennig

Applications > simple_weather_node > Devices > swn-lalala > Data

Overview Data Settings

APPLICATION DATA

pause clear

Filters: uplink downlink activation ack error

time	counter	port		payload:	barometric_pressure_3:	relative_humidity_2
10:53:24	0	1	*retry*	01 67 00 F2 02 68 68 03 73 27 34	1003.6	

THE THINGS NETWORK

The Things Network

https://console.thethingsnetwork.org/applications/simple_weather_node/devices/swn-lalala/data

THE THINGS NETWORK CONSOLE COMMUNITY EDITION

Applications Gateways Support JoergHennig

Applications > simple_weather_node > Devices > swn-lalala > Data

10:53:24 0 1 retry payload: 01 67 00 F2 02 68 68 03 73 27 34 barometric_pressure_3: 1003.6 relative_humidity

Uplink

Payload

01 67 00 F2 02 68 68 03 73 27 34

Fields


```
{
  "barometric_pressure_3": 1003.6,
  "relative_humidity_2": 52,
  "temperature_1": 24.2
}
```


Metadata


```
{
  "time": "2019-07-13T08:53:24.93830907Z",
  "frequency": 867.7,
  "modulation": "LORA",
  "data_rate": "SF7BW125",
  "coding_rate": "4/5",
```


THE THINGS NETWORK

Visualisierung

Cayenne (MyDevices):

- https://cayenne.mydevices.com
- Sehr schnelle Einrichtung
- App im AppStore

TagoIO

- https://www.tagoio.net
- Schnelle Einrichtung
- Hübsches Frontend
- App im AppStore

NodeRed

- https://nodered.org/
- Flexibelste Nutzung
- Flow basierte „Programmierung“
- Integration versch. Systeme
- Home Automation
- …

THE THINGS NETWORK

The Things Network | Log in to Cayenne

https://accounts.mydevices.com/auth/realms/cayenne/protocol/openid-connect/auth?response_type=code&scope=email+profile&client_id=cayenne...

myDevices

myDevices Cayenne

LOG IN

EMAIL

PASSWORD

Forgot Password?

Log In

KEEP ME LOGGED IN

Would you like to create an account? SIGN UP

THE THINGS NETWORK

The Things Network | First Visit | myDevic

https://cayenne.mydevices.com/cayenne/dashboard/first-visit/devices

Cayenne
Powered by myDevices

Create App | Submit Project | Community | Docs | User Menu

Step 1: Choose a device to start a project

Raspberry Pi

Arduino

Need One?

LoRa

What's This?

Cayenne API

Bring Your Own Thing

What's This?

All Devices

Click

THE THINGS NETWORK

The Things Network | LoRa Get Started

https://cayenne.mydevices.com/cayenne/dashboard/first-visit/lora

Cayenne
Powered by myDevices

Create App | Submit Project | Community | Docs | User Menu

- Everynet
- Kerlink
- Loriot
- Objenious
- OrbiWise
- Pixel Networks
- Sagemcom
- Semtech
- Senet
- SenRa
- Spark
- Stream
- Swisscom
- The Things Network
- X-Telia

AAEON AIOT-ILNDU1
Industrial LoRa Node platform

Abeeway MasterTracker
Low Power Industrial GPS Tracker

AC Outlet and Switch
Tektelic AC Control and Energy Monitoring

AcSiP EK-S76SXB
S76S EVB in X-Bee Form Factor

AcSiP S76S
LoRa development board

Adeunis Analog EU
Giving IoT connectivity to wired sensors

Adeunis Analog PWR EU
Giving IoT connectivity to wired sensors

Click

Back

THE THINGS NETWORK

The Things Network | LoRa Get Started | m

https://cayenne.mydevices.com/cayenne/dashboard/first-visit/lora

Cayenne
Powered by myDevices

Create App | Submit Project | Community | Docs | User Menu

Butano24 Gas Cylinder Ultrasonic Sensor
Gas level and temperature sensor

careband
CareBand Generic Test Device
Generic Test Device

LPP
Cayenne LPP
Cayenne Low Power Payload

China Ultrasound Ultrasonic Water Meter
Ultrasonic Water Meter

Chinastar Parking Lot Sensor
Parking lot car detector

Chinastar Parking sensor
over-ground parking sensor

Click

Back

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The Things Network | LoRa Get Started

https://cayenne.mydevices.com/cayenne/dashboard/first-visit/lora

Cayenne
Powered by myDevices

Create App | Submit Project | Community | Docs | User Menu

Network

Search

- Acklio
- Actility
- CityKinect
- Everynet
- Kerlink
- Loriot
- Objenious
- OrbiWise
- Pixel Networks
- Sagemcom
- Semtech
- Senet
- SenRa

The Things Network

1M2M ED1608
Generic with many sensors and connectors

AAEON AIOT-ILND01
Industrial LoRa Node platform

Abeeway MasterTracker
Low Power Industrial GPS Tracker

AC Outlet and Switch
Tektelic AC Control and Energy Monitoring

AcSiP EK-S76SXB
S76S EVB in X-Bee Form Factor

Enter Settings

LPP

Cayenne Cayenne LPP
Cayenne Low Power Payload

This device uses Cayenne LPP

Name
swn_lalala

DevEUI

Activation Mode
Already Registered

Tracking

Location
This device doesn't move

Moltkestraße 3, 76646 Bruchsal, Deutschland

Add device

Back

Ausfüllen

THE THINGS NETWORK

The Things Network | LoRa Get Started

https://console.thethingsnetwork.org/applications/simple_weather_node/devices/swn-lalala

THE THINGS NETWORK CONSOLE COMMUNITY EDITION

Applications Gateways Support JoergHennig

Applications > simple_weather_node > Devices > swn-lalala

DEVICE OVERVIEW

Application ID simple_weather_node

Device ID swn-lalala

Description My new device...

Activation Method ABP

Device EUI [redacted]

Application EUI [redacted]

Device Address [redacted]

Network Session Key ••••••••••••••••••••••••••••••••

App Session Key ••••••••••••••••••••••••••••••••

DevEUI

THE THINGS NETWORK

The Things Network | swn_lalala - LoRa

https://cayenne.mydevices.com/cayenne/dashboard/lora/7d7f4410-a550-11e9-9636-f9904f7b864b

Cayenne
Powered by myDevices

test +

Create App | Submit Project | Community | Docs | User Menu

Add new...

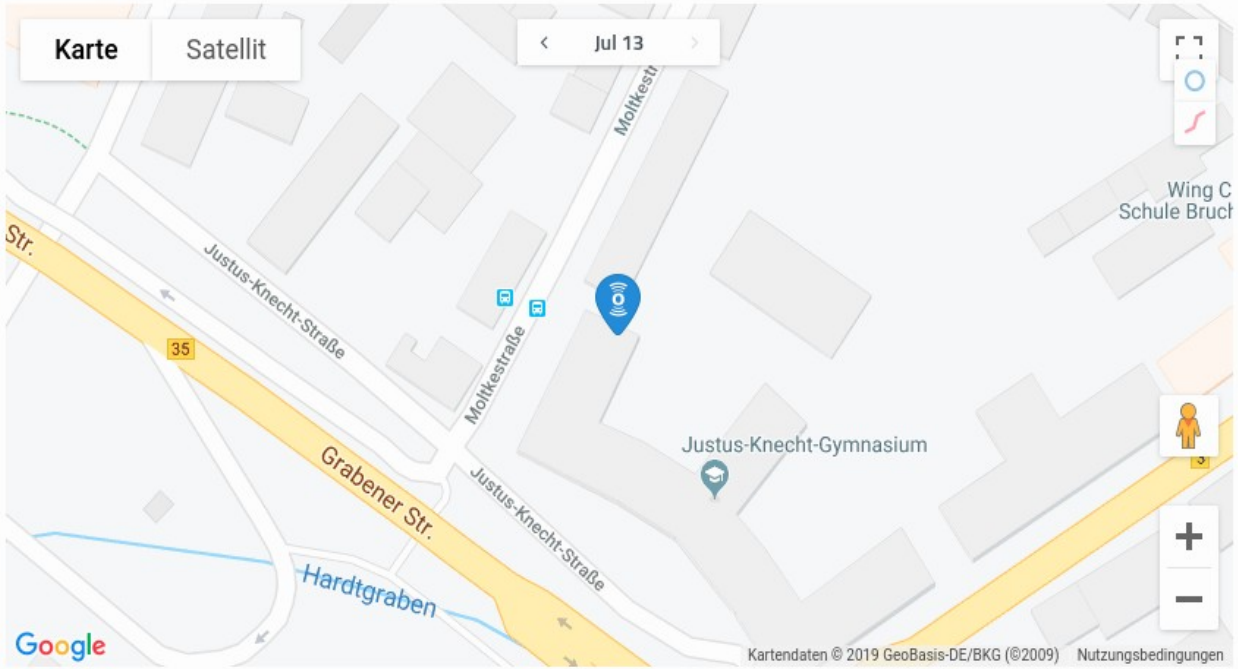
swn_lalala
- Barometer (3)
- Humidity (2)
- Location
- RSSI
- SNR
- Temperature (1)

Overview | Data

swn_lalala
Network: The Things Network

Location

Karte | Satellit | Jul 13



11:30 AM

12:00 AM | 03:00 AM | 06:00 AM | 09:00 AM | 12:00 PM | 03:00 PM | 06:00 PM | 09:00 PM | 12:00 AM

RSSI
-68.00
dBm

SNR
10.00
Decibels

Temperature...
24.00
Celsius

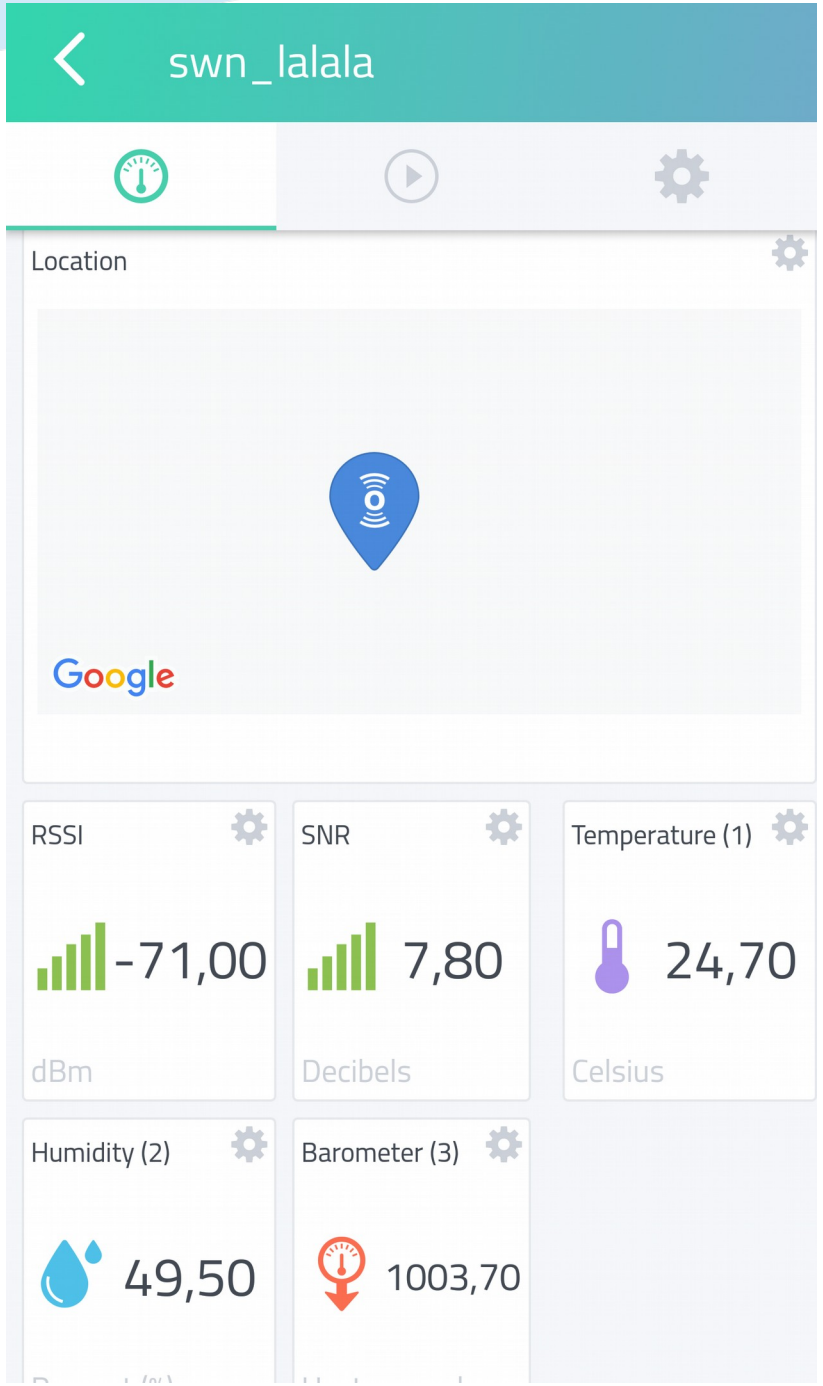
Humidity (2)
51.50
Percent (%)

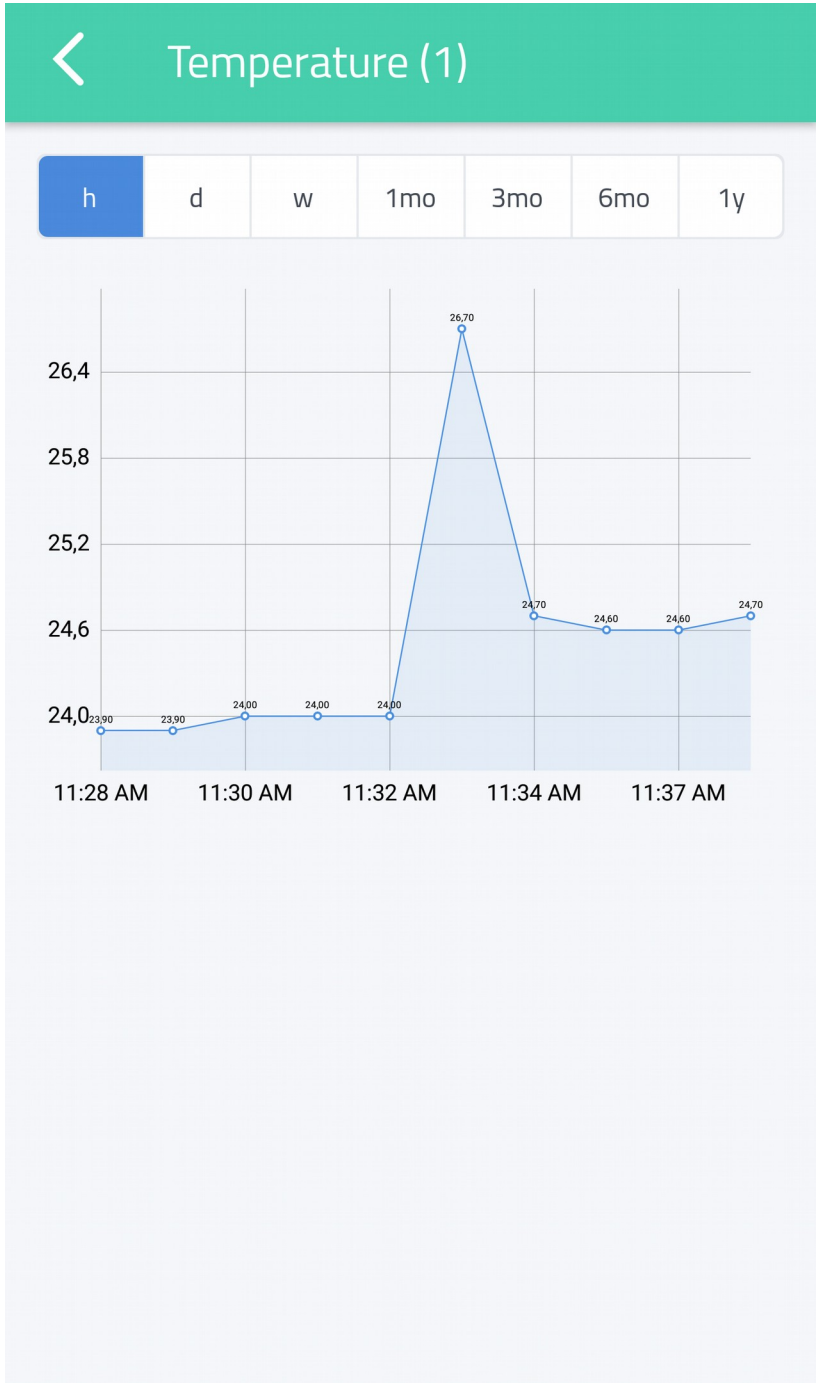
Barometer (3)
1003

Search Devices

Last data packet sent: July 13, 2019 11:30:20 AM

THE THINGS NETWORK





THE THINGS NETWORK

TagoIO

THE THINGS NETWORK

NodeRed

THE THINGS NETWORK

Das war’s!

... für heute.

THE THINGS NETWORK