



Opportunities of Citizen Science in Monitoring

Summer School Energy, Lüneburg, 30.08.2023


Dr. Thomas Bartoschek



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C-Suite

Weather means Business: Weather Data as a Driver for Digital Innovation





Advancing weather science with accurate forecasting products & technology for businesses everywhere

IBM strives to combine accurate weather data with industry-leading science and technology to better inform consumers' daily actions and support smarter decision-making for businesses.

↓ Weather impacts you

↓ Democratizing weather

↓ Weather solutions

↓ Weather on IBM Cloud

↓ Customer success stories

Weather impacts everything, including you

Universal and powerful, weather has a serious effect on people's emotions and behaviors. From food and clothing choices to taking shelter after a tornado alert, millions of decisions are made every day based on the weather.

As part of IBM's commitment to being essential, we are focused on using our knowledge, scale, technology and trust to advance the science of accurate weather forecasting and help people everywhere make better decisions



Sylt

Zingst

Norderney

Lüneburg

Salzgitter

Lindenberg

Dortmund

Melpitz

Langen

Kulmbach

München

Schauinsland

Zugspitze



Index of /

../	
climate_environment/	13-Mar-2022 22:57
test/	06-Oct-2022 08:00
weather/	30-Aug-2023 06:51
LIESMICH.txt	03-Feb-2022 15:52
README.txt	03-Feb-2022 15:52
erklaerung_barrierefreiheit.txt	18-Sep-2020 10:59

19°C

AR
BOA



Qualidade do Ar

CETESB - Companhia Ambiental do Estado de São Paulo

Ar

Qualidade do Ar » Rede Automática

Mapa de qualidade do ar: RMSP - Interior e Litoral | Dados horários | Resumo da última hora |
Boletins diários: Resumo do dia - Por poluente | Configuração e localização das estações

Região Metropolitana de São Paulo

Clique no ponto para obter informações da estação desejada

25-11-2016 06:00

Condição atual da RMSP

Qualidade **N1 - Boa**

A qualidade refere-se a uma estação com o índice mais alto na RMSP

Efeitos à saúde

--

Como proteger sua saúde

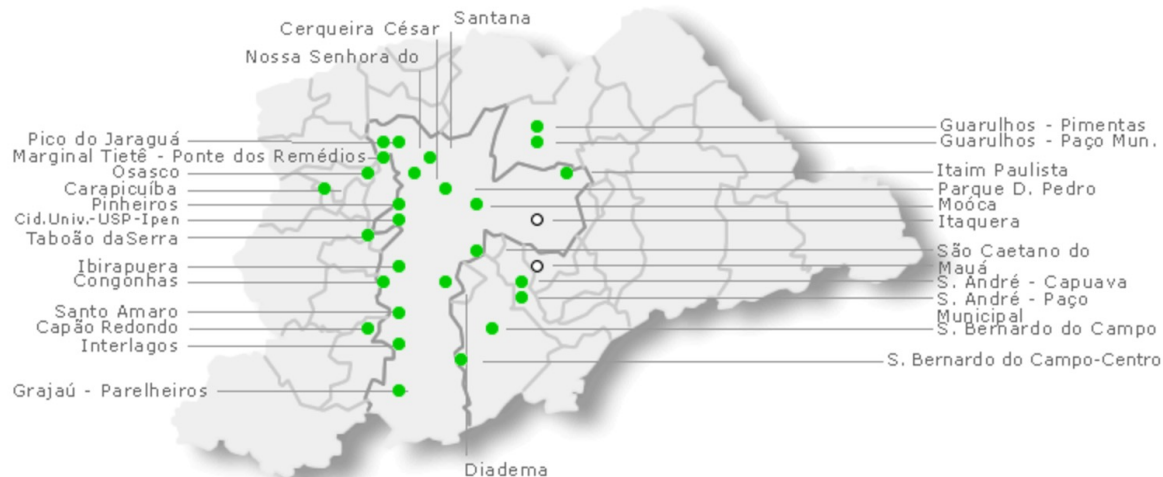
--

Previsão meteorológica diária

FAVORÁVEIS à dispersão dos poluentes:
Dióxido de Enxofre, Partículas Inaláveis,
Partículas Inaláveis Finas, Dióxido de Nitrogênio, Monóxido de Carbono e
FAVORÁVEIS para Ozônio.



Acesse aqui as estações de Interior e Litoral



qualidade índice	● N1 Boa 0 - 40	● N2 Moderada 41 - 80	● N3 Ruim 81 - 120	● N4 Muito Ruim 121 - 200	● N5 Péssima > 200	○ Sem dados
------------------	--------------------	--------------------------	-----------------------	------------------------------	-----------------------	-------------

Entenda o índice de qualidade do ar

Veja aqui como está a qualidade do ar em todas as estações



Three approaches for geosensor networks

- **Authorities** => high standards (WMO, OGC), high costs, low numbers
- ***Businesses (for Authorities)*** => high costs, Smart City applications
- **Citizens** => low costs, citizen science



#CITIZENSCIENCE



Is Wikipedia Citizen Science?



WIKIPEDIA
Die freie Enzyklopädie

- Hauptseite
- Themenportale
- Zufälliger Artikel
- Mitmachen
- Artikel verbessern
- Neuen Artikel anlegen
- Autorenportal
- Hilfe
- Letzte Änderungen
- Kontakt
- Spenden

- Werkzeuge
- Links auf diese Seite
- Änderungen an verlinkten Seiten
- Spezialseiten
- Permanenter Link
- Seiteninformationen
- Artikel zitieren

Nicht angemeldet [Diskussionsseite](#) [Beiträge](#) [Benutzerkonto erstellen](#) [Anmelden](#)

Artikel [Diskussion](#)

Lesen

[Bearbeiten](#)

[Quelltext bearbeiten](#)

[Versionsgeschichte](#)

Wikipedia durchsuchen



Koordinaten: 49° 54′ N, 10° 54′ O

Bamberg



Der Titel dieses Artikels ist mehrdeutig. Weitere Bedeutungen sind unter [Bamberg \(Begriffsklärung\)](#) aufgeführt.

Bamberg (mittelalterlich: **Babenberg**, *bambergisch*: *Bambärch*) ist eine [fränkische kreisfreie Stadt](#) im [bayerischen](#) Regierungsbezirk [Oberfranken](#) und Standort des [Landratsamtes Bamberg](#). Sie ist die größte [Mittelstadt](#) Bayerns, [Universitäts-](#), Schul- und Verwaltungsstadt, Sitz eines [Oberlandesgerichtes](#) und der [Generalstaatsanwaltschaft Bamberg](#), wichtiges Wirtschaftszentrum Oberfrankens sowie Sitz des gleichnamigen [Erzbistums](#). Das bekannteste Bauwerk ist der viertürmige [Bamberger Dom](#), einer der früheren [Kaiserdome](#).

Die Stadt ist in der Landesplanung als [Oberzentrum](#) des westlichen Oberfrankens ausgewiesen und zählt zur [Metropolregion Nürnberg](#). Bamberg hat rund 77.000 Einwohner und ist damit die größte Stadt Oberfrankens, die [Agglomeration](#) hat rund 117.000 Einwohner.^[3]

Die [Altstadt](#) ist einer der größten weitgehend unversehrt erhaltenen historischen Stadtkerne in Deutschland und seit 1993 als [Weltkulturerbe](#) in die Liste der [UNESCO](#) eingetragen.^[4] Darüber hinaus ist Bamberg überregional bekannt für seine vielfältige [Biertradition](#) ebenso wie für die traditionellen Gärtnereibetriebe mit großen Anbauflächen inmitten der Stadt.

Inhaltsverzeichnis [\[Verbergen\]](#)

- Geografie
 - Geografische Lage
 - Ausdehnung des Stadtgebiets
 - Stadtgliederung
 - Klima
 - Schutzgebiete

Wappen



Deutschlandkarte



Basisdaten

Bundesland:	Bayern
Regierungsbezirk:	Oberfranken
Höhe:	262 m ü. NHN
Fläche:	54,62 km ²
Einwohner:	76.674 <i>(31. Dez. 2020)</i> ^[1]
Bevölkerungsdichte:	1404 Einwohner je km ²



What about OpenStreetMap?

The screenshot shows the OpenStreetMap website interface. At the top, there is a navigation bar with the OpenStreetMap logo, buttons for 'Bearbeiten', 'Chronik', and 'Export', and a search bar. The main content area is divided into a left sidebar and a main map area. The sidebar contains a search bar, a welcome message, and navigation options. The main map area displays a detailed street map of a city, with various landmarks and buildings labeled. The map is color-coded to show different types of features, such as roads, parks, and buildings. The interface is clean and user-friendly, with a clear focus on the map and its data.

Suchen [Wo ist das?](#) [Los](#) [\[Icon\]](#)

Willkommen bei OpenStreetMap!

OpenStreetMap ist eine Karte der Welt, erstellt von Menschen wie dir und frei verwendbar unter einer offenen Lizenz.

Das Hosting wird von UCL, Bytemark Hosting, dem Imperial College London und weiteren Partnern unterstützt.

[Mehr erfahren](#) [Mit dem Kartieren anfangen](#)

50 m
200 ft

© OpenStreetMap-Beiträger & Sponsoren



Lessons learned from VGI

OpenStreetMap Bearbeiten Chronik Export GPS-Tracks Benutzer-Blogs Urheberrecht Hilfe Über Anmelden Registrieren

Suchen Wo ist das? Los

30 km
20 mi

© OpenStreetMap-Mitwirkende Spenden



Lessons learned from VGI

- OpenStreetMap launched in 2004
- Criticized by authorities for a long time (and still)
- Very relevant for science
- Very useful and powerful
- Impact! (Humanitarian OSM-Team)



OpenStreetMap

OpenStreetMap Bearbeiten Chronik Export GPS-Tracks Benutzer-Blogs Urheberrecht Hilfe Über thomasbarbo

Objekttyp auswählen

Suchen

- > Straßen...
- > Eisenbahnanlagen...
- > Weg, Mehrzweckweg...
- > Wasserstraßen...
- > Barrieren...
- > Natürliche Linien...
- Stromleitung-Hochspannung
- Linie

Punkt Linie Fläche Speichern

Map labels: Magdalenenplatz, Aegidienweg, Voßgasse, Aegidienplatz, Domplatz, Aegidienmarkt / LWL-Museum, Wilmergasse, Aegidienweg, Voßgasse, Aegidienplatz, Domplatz, Aegidienmarkt / LWL-Museum.

Map scale: 100 m

Map metadata: Bearbeitet von T248, joo-rox, desgilla und 187 anderen. 1956 versteckte Objekte.



Humanitarian OpenStreetMap Team



TASKING MANAGER

Contribute

Learn

About

What is New?

English

Login

Instructions

Map

Validate

Questions and Comments

Instructions

Entities to map

Buildings

Changeset Comment

#hotosm-project-4773 #DRONEBIRD #OsakaQuake2018 #AOYAMAVISION

Imagery

tms[22]:https://cyberjapandata.gsi.go.jp/xyz/seamlessphoto/{z}/{x}/{y}.jpg

• Building Only

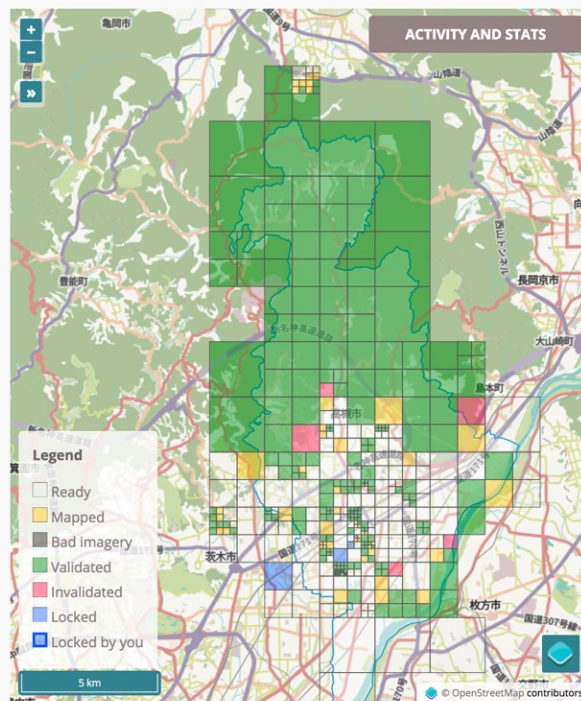
How to use Tasking Manager >> <https://www.youtube.com/watch?v=Arco-pvxf88>

Ready to get started?

Contribute by mapping or validating work that has already been done.

MAP

VALIDATE





CITIZEN SCIENCE



December 14 2012 – January 5 2013

Christmas Bird Count

A close-up photograph of a blue jay perched on a snow-covered branch. The bird has vibrant blue feathers on its head and back, and a white chest.

 COUNT WITH US
THIS HOLIDAY SEASON



Citizen Science (observations)

🏠 / Tiere, Pilze & Pflanzen / Aktionen & Projekte / Stunde der Gartenvögel

🔊 Vorlesen

Mehr aus dieser Rubrik

DOWNLOADS

Flyer und Meldebogen 2023

📄 PDF (0.4 MB)

Zählhilfe 2023

📄 PDF (0.3 MB)

Stunde der Gartenvögel

Die große Vogelzählung

Vögel in der Nähe beobachten, an einer bundesweiten Aktion teilnehmen und dabei tolle Preise gewinnen – all das vereint die „Stunde der Gartenvögel“. Jedes Jahr am zweiten Maiwochenende sind alle Naturliebhaber*innen aufgerufen, Vögel zu notieren und zu melden. Nächster Termin: **10. bis 12. Mai 2024**.



AKTION IN BAYERN



Citizen Science (observations)





Citizen Science (observations)

- **Smart bird feeder „birdiary“**
 - Camera + species recognition (AI)
 - Scale
 - Movement sensor
 - (Raspberry PI based)



<https://wiediversistmeingarten.org/view/station/62e67d48-9a0b-4f9f-a6be-4547c2e2f5bd>



Citizen Science (observations)

The New York Times

EUROPE | KREFELD JOURNAL

The German Amateurs Who Discovered 'Insect Armageddon'

By SALLY McGRANE DEC. 4, 2017



Thomas Hörren, a member of the Entomological Society Krefeld, collecting beetles from a soil sample.
Gordon Welters for The New York Times

RELATED COVERAGE



Trillions of Flies Can't All Be Bad

NOV. 13, 2017



Opinion | Editorial
Insect Armageddon

OCT. 29, 2017



Can You Pick the Bees Out of This Insect Lineup?

SEPT. 11, 2017



Citizen Science (observations)

Monitoring biodiversity Change through Citizen Science

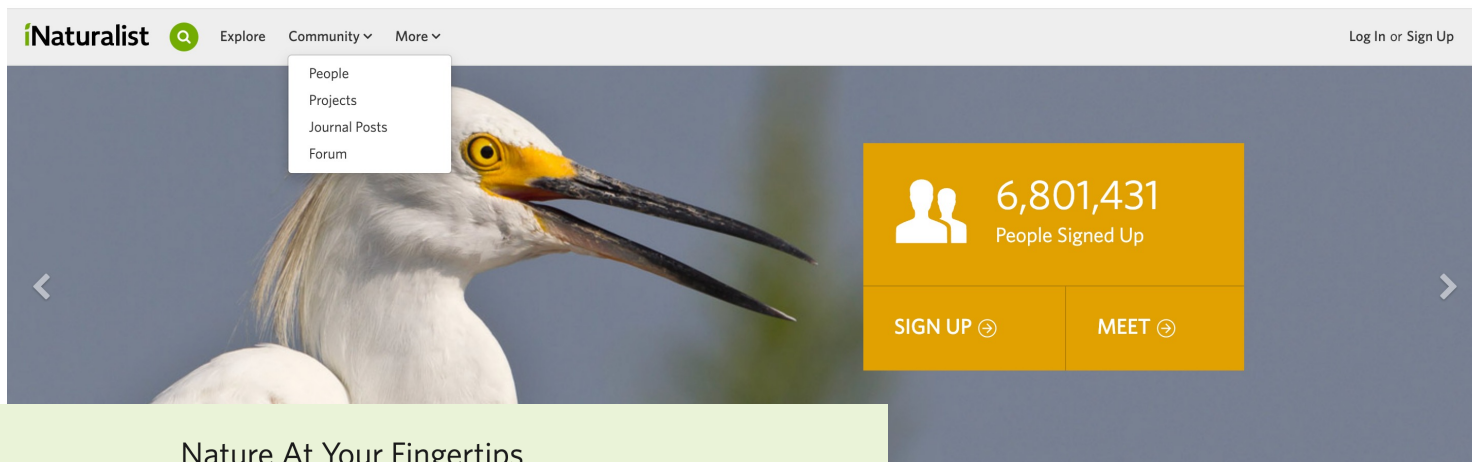


Short description

Biodiversity change is one of the biggest challenges facing mankind. To understand the complex patterns of this change, ecologists are dependent on the availability of monitoring data and the development of statistical tools to analyse these data. For most organisms, the available data that can inform on past trends are a heterogeneous mix of data types of varying accessibility.



Citizen Science (biodiversity monitoring)



Nature At Your Fingertips



Keep Track

Record your encounters with other organisms and maintain life lists, all in the cloud.



Crowdsource Identifications

Connect with experts who can identify the organisms you observe.



Learn About Nature

Build your knowledge by talking with other naturalists and helping others.



Create Useful Data

Help scientists and resource managers understand when and where organisms occur.



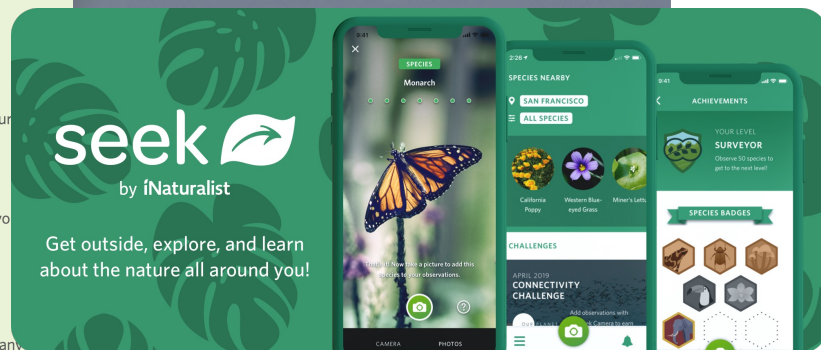
Become a Citizen Scientist

Find a project with a mission that interests you and start your own.



Run a Bioblitz

Hold an event where people try to find as many species as possible.





Citizen Science (biodiversity monitoring)

Nature At Your Fingertips



Keep Track

Record your encounters with other organisms and maintain life lists, all in the cloud.



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Learn About Nature

Build your knowledge by talking with other naturalists and helping others.



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Hold an event where people try to find as many species as possible.



Citizen Science (classifications)

CLASSIFY

SCIENCE

STORY



ASTRONOMERS

DISCUSS

PROFILE

Few have witnessed what you're about to see

Experience a privileged glimpse of the distant universe, observed by the Sloan Digital Sky Survey and Hubble Space Telescope

Classify Galaxies

To understand how galaxies formed we need your help to classify them according to their shapes. If you're quick, you may even be the first person to see the galaxies you're asked to classify.

[Begin Classifying](#)





Citizen Science (interpretations)

HMS Bacchante
Active: Gibraltar, West Africa

0% COMPLETE

arfon is the Captain and 2 volunteers are following this vessel

Jump Aboard

Old Weather: Our Weather's Past, the Climate's Future

H.M.S. "Torch" 5th day of July, 1918.

Time	Barom	Wind	Temp	Direction	Force	Clouds	Visibility	Remarks
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
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14								
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23								
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26								
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28								
29								
30								
31								

649

12th Boardwalk from 12th
 13th Boardwalk from 12th
 14th Boardwalk from 12th
 15th Boardwalk from 12th
 16th Boardwalk from 12th
 17th Boardwalk from 12th
 18th Boardwalk from 12th
 19th Boardwalk from 12th
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 21th Boardwalk from 12th
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 23th Boardwalk from 12th
 24th Boardwalk from 12th
 25th Boardwalk from 12th
 26th Boardwalk from 12th
 27th Boardwalk from 12th
 28th Boardwalk from 12th
 29th Boardwalk from 12th
 30th Boardwalk from 12th
 31th Boardwalk from 12th



Citizen Science (Gamification)

Full Mode

Rank: 4 Score: 9587.911
Soloist Beginner Puzzle: Streptococcal Protein
Expires 3/27/2013 17:00 MZ (2 days, 17 hours)
▶ No bonuses or conditions

Shake Mutate Wiggle All Wiggle Backbone Wiggle Sidechains Help Glossary

Freeze Protein Remove Bands Disable Bands Reset Structures Reset Puzzle Align Guide

▶ Chat - Group ▶ Chat - Puzzle ▶ Chat - Global ▶ Notifications

X auto show
X auto show
X auto show
X auto show

Actions Undo Social Modes Behavior View Menu



Citizen Science (measurements)



THE GLOBE PROGRAM



The Next Generation of Climate Scientists in Peru

Students from the National Agrarian University-La Molina, interested in the Student Climate Research Campaign (SCRC) and the 2013 GLOBE Learning Expedition, have worked hard to disseminate the SCRC in Peru and to consolidate their knowledge and research skills. They built instrument shelters out of wooden



Citizen Science (with sensors)



Air Quality Egg

community-led sensing network

Serial Number

ADD MY EGG





Citizen Science (platforms)

WELCOME TO THE ZOONIVERSE

People-powered research

[See All Projects](#)

FEATURED PROJECT



Seabird Watch

THE ZOONIVERSE WORKS

83.171.080

CLASSIFICATIONS SO FAR BY

1,500,000 REGISTERED VOLUNTEERS



Citizen Science (platforms)



Mitforschen Blog Citizen Science Über uns

Projekte entdecken

Sammler- oder Spielertyp? Berlin, Bamberg oder bundesweit?
Hier gibt es alle Citizen Science-Projekte im Überblick.

Themen Ort

- Für Kinder geeignet
 Auch abgeschlossene Projekte anzeigen



Die Wanderung des Admiralfalters

für Kinder geeignet mit App

Admiralfalter wandern ähnlich wie Zugvögel jeden Herbst in den Süden? Meldet eure Sichtungen und helft dabei, die Wege des



Sample das Saarland

Hebe den mikrobiellen Schatz im Saarland und leiste einen Beitrag zur Erforschung neuer Medikamente. Mit dem Probensammel-Kit ausgestattet, kann sofort



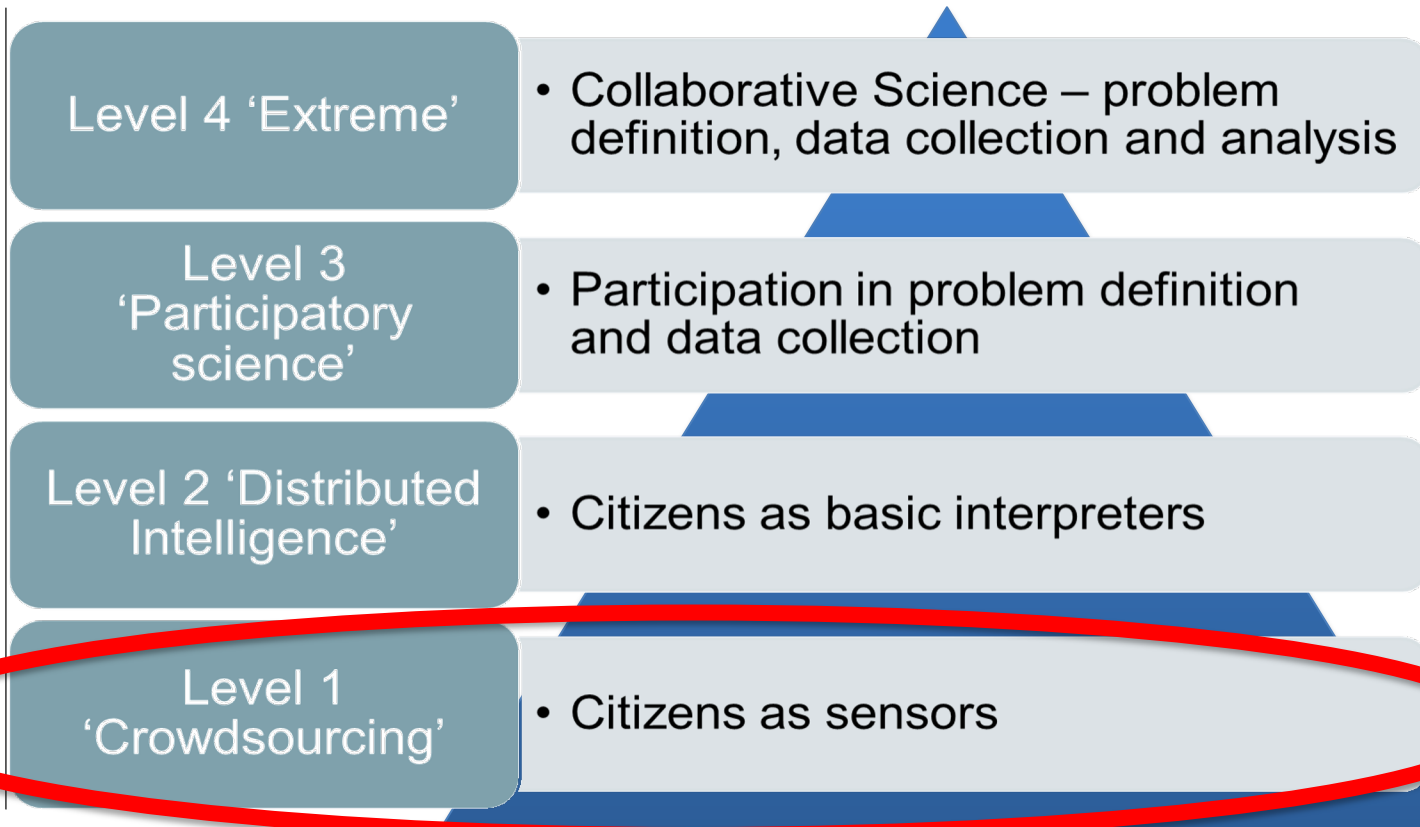
Clusterkopfschmerzen erforschen (CLUE)

mit App

Leidest du unter Clusterkopfschmerzen oder Migräne? Beteilige dich jetzt an einem Forschungsprojekt zum Thema Clusterkopfschmerzen



CITIZEN SCIENCE



EMPOWERMENT



Zoe Romano

@zoescop

Folgen



citizens without data have an opinion,
citizens with data have evidence

@MakingSenseEU @marabales

#citizenscience #SocialInnovEU #Grassroots

🌐 Original (Englisch) übersetzen

13:19 - 28. Nov. 2017 aus [Lissabon, Portugal](#)

22 Retweets 37 „Gefällt mir“-Angaben

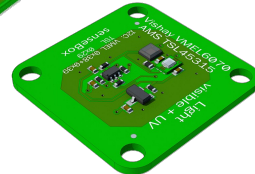
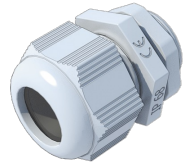
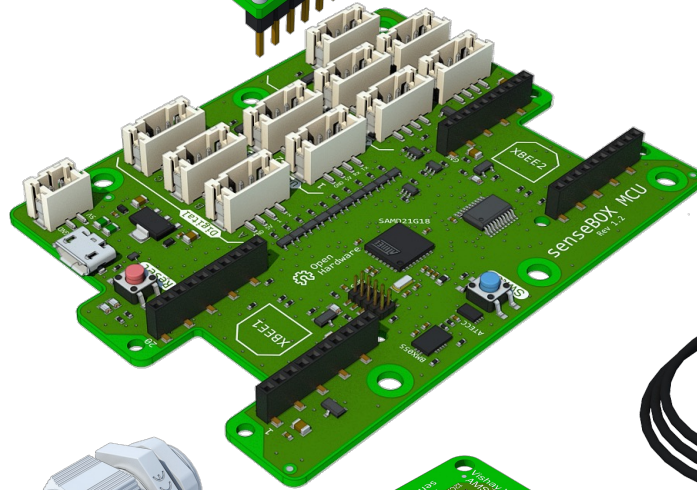
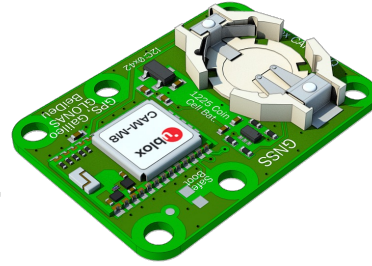
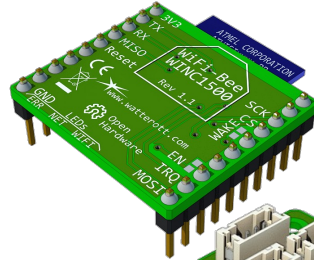


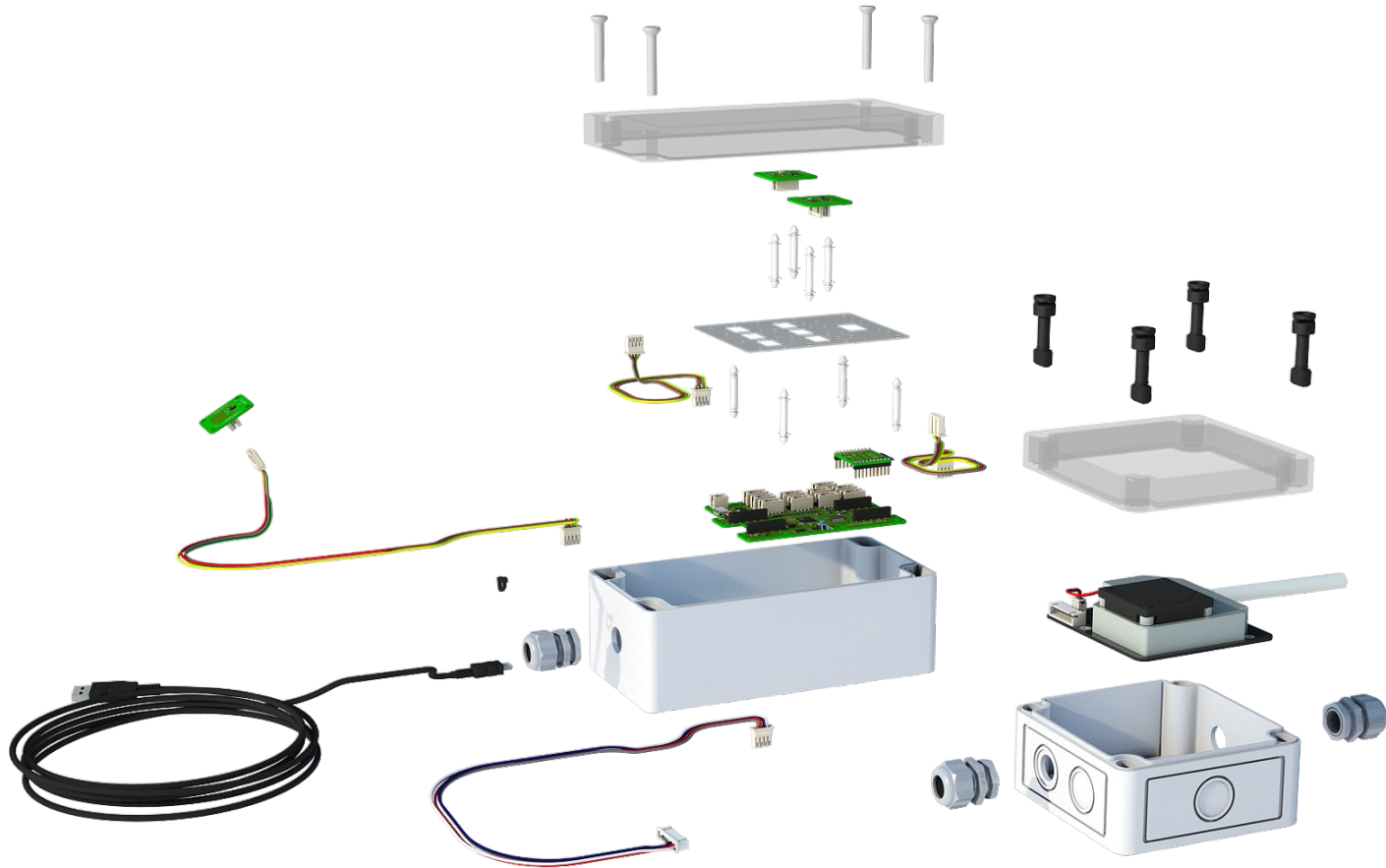
senseBox





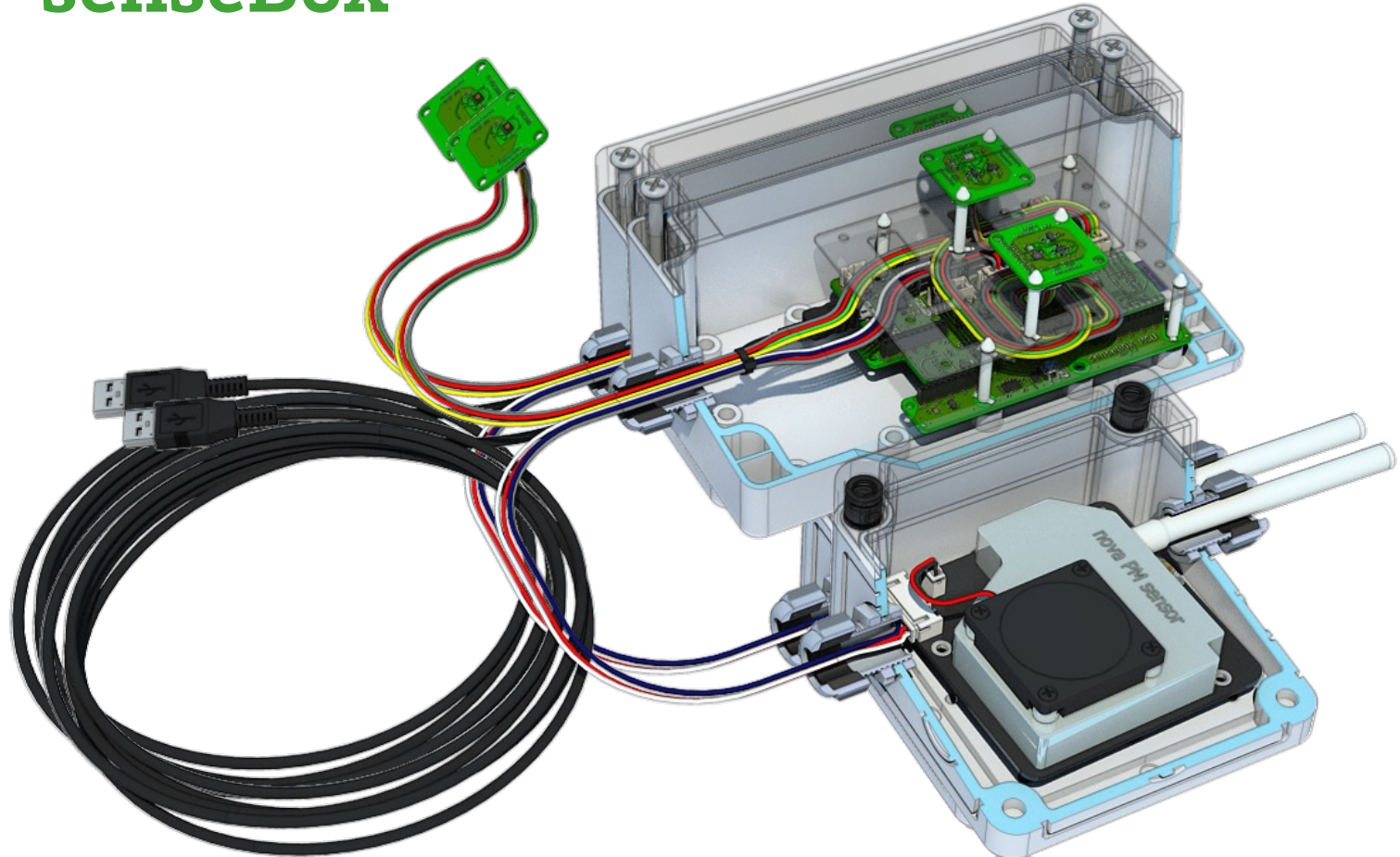
senseBox







senseBox





senseBox 



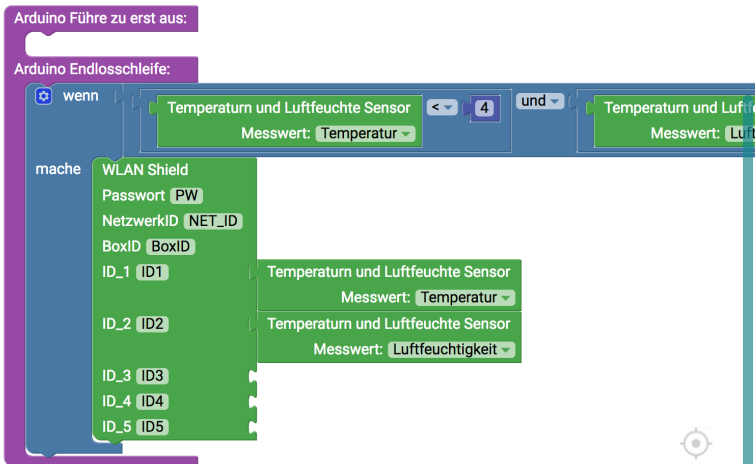


Visual Programming (Blockly)

☰ senseBox: *Sketch_Nan*

↑ Blöcke öffnen ↓ Blöcke speichern 📄 Code speichern 🗑️ Alles Löschen

- senseBox Sensoren
- senseBox Ausgabe
- Logik
- Schleifen
- Mathematik
- Text
- Variablen
- Funktionen
- Eingang/Ausgang
- Zeit
- Audio
- Motoren
- Kommunikation



```
{ } Arduino Quellcode

#include <SenseBox.h>

HDC100X hdc;
OpenSenseMap shield("BoxID");

void setup() {
  hdc.begin();

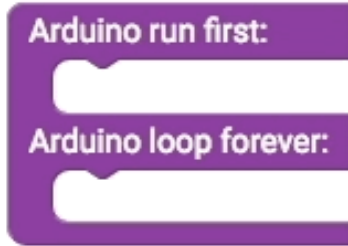
  shield.beginWiFi("NET_ID","PW");
}

void loop() {
  if (hdc.getTemp() < 4 && hdc.getHumi() > 80) {
    shield.uploadValue(hdc.getTemp(),"ID1");
    shield.uploadValue(hdc.getHumi(),"ID2");
    //kein Sensor an Port 3
    //kein Sensor an Port 4
    //kein Sensor an Port 5
  }
}
```

<> Blöcke XML



Visual Programming (Blockly)



Suche nach Boxen und Orten

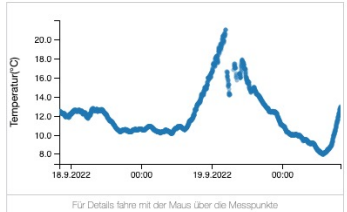


senseBox hängt auf Höhe 220cm an der Nordseite einer Gartenhütte aus Holz.
 senseBox is mounted 220cm above ground at the north side of a wooden garden hut.

Temperatur ⓘ
 12.94 °C vor einer Minute ^

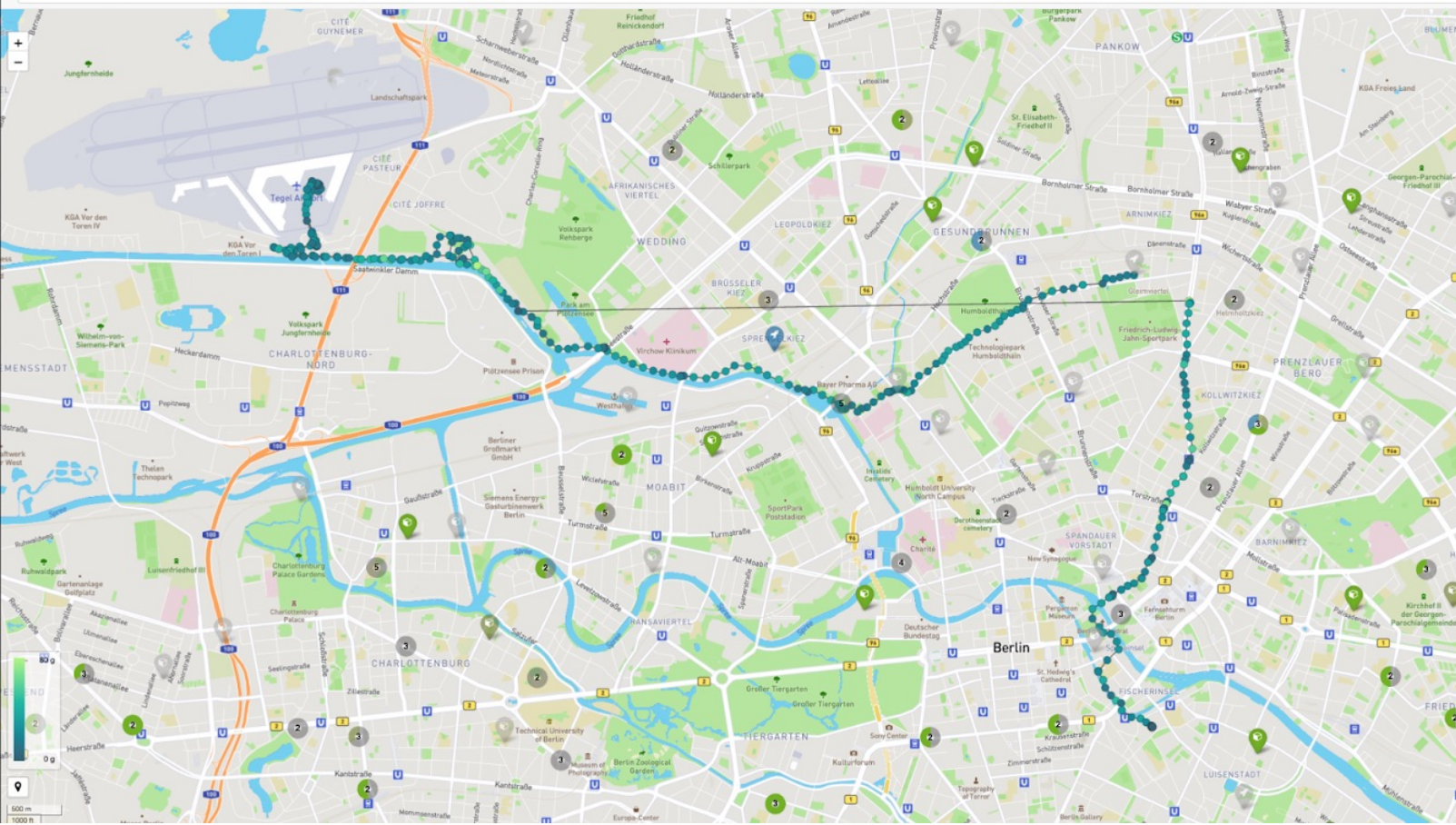
Was ist Temperatur?

Anfangsdatum → Enddatum ✕
 Letzte 24 Std. Letzte Woche Letzter Monat



rel. Luftfeuchte ⓘ
 81.27 % vor einer Minute v

Futurum Fahrrad senseBox #30



📉 Temperatur	6.819153 °C	a month ago
💧 rel. Luftfeuchte	95.239258 %	a month ago
↔️ Abstand nach links	83 cm	2 months ago
↔️ Abstand nach rechts	11 cm	2 months ago
🌫️ Feinstaub PM10	3.900000 µg/m³	a month ago
🌫️ Feinstaub PM25	10.100000 µg/m³	a month ago
↔️ Beschleunigung X-Achse	18.835938 g	a month ago
↔️ Beschleunigung Y-Achse	14.512695 g	a month ago
↔️ Beschleunigung Z-Achse	20.163086 g	a month ago

📌 What is Beschleunigung Z-Achse?

Starting date → Ending date ✕

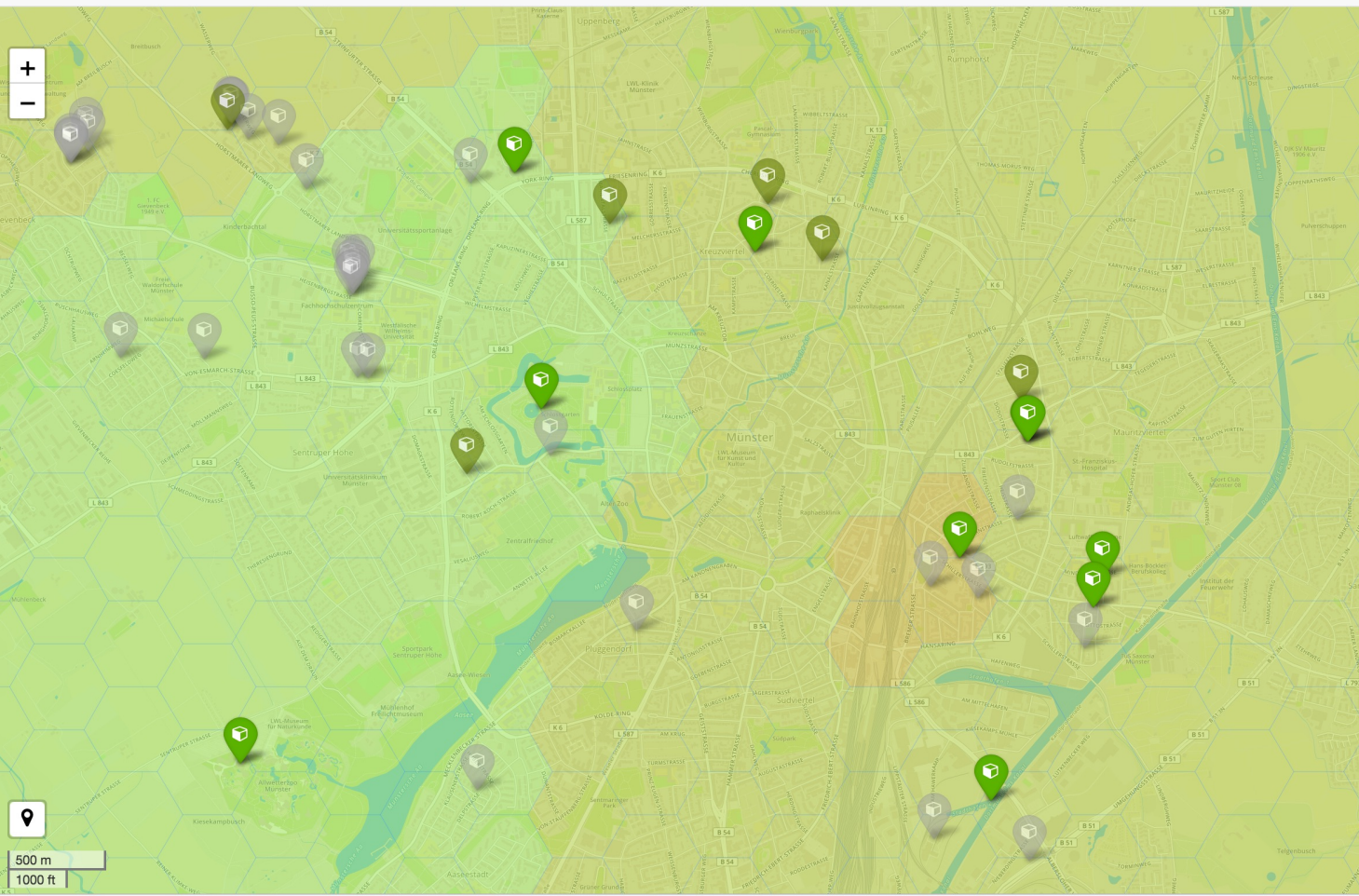
Last 24 hours | Last week | Last month

For details move the mouse over the datapoints

+ - ✕ ↓



Münster, Regierungsbezirk Münster, Nordrhein-Westfalen, Deutschland



Interpolation

📍 Hier kannst du senseBox Messungen visualisieren. Interpolation wird die Inverse Distanzgewichtung (IDW) genutzt. Standardmäßig wird für den Parameter p (Pow) Wert 3 genutzt.

Phänomen

Temperatur

Beginn

31/08/2017 10:01



Ende

31/08/2017 16:06

Zeitschritte

- 7 +

Aufstellungsort

Drinne Draußen

Zellgröße in km

0,5

Power

- 3

Erstelle Interpolation

Entferne Interpolation



openSenseMap

- Ca. 12.000 devices on openSenseMap
- > 11.500.000.000 measurements
- >50% live



openSenseMap: SensorWiki (sensors.wiki)

Phenomena ▾ Sensors ▾ Devices ▾ Domains ▾ Sign up Log in

Welcome to the
SENPH Ontology Web Application.

This web application offers a wiki platform to create and access crowd sourced explicit information about instances of sensors, phenomena, devices and domains.

[Get Started](#)



SENPH  **ontology**
Sensors and Environmental Phenomena Ontology

Explore Senph
Ontology Web
Application:

1-10 of 10 results

FILTER OPTIONS

<input checked="" type="checkbox"/> Phenomena
<input checked="" type="checkbox"/> Sensors
<input checked="" type="checkbox"/> Domains
<input checked="" type="checkbox"/> Devices
Reset all filters

	Label ↕	URI	Type	Verified
1	BMP280	http://www.opensensemap.org/SENPH#BMP280	Sensor	
2	HDC1080	http://www.opensensemap.org/SENPH#HDC1080	Sensor	
3	LuftdatenInfo Device	http://www.opensensemap.org/SENPH#Luftdaten_Info	Device	
4	PM10 concentration	http://www.opensensemap.org/SENPH#pm10concentration	Phenomenon	
5	PM2.5	http://www.opensensemap.org/SENPH#PM2.5	Phenomenon	
6	SDS011	http://www.opensensemap.org/SENPH#SDS011	Sensor	
7	senseBox:edu	http://www.opensensemap.org/SENPH#sensebox_edu	Device	



openSenseMap: SensorWiki

Gerät Allgemein Sensoren Erweitert Zusammenfassung

Wähle dein Gerät aus

Was für Hardware benutzt du?



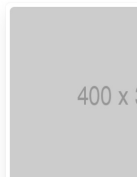
senseBox:edu



senseBox:home



LuftdatenInfo
Device



CUSTOM
ICE

Wähle deine Sensoren aus

Was misst deine Messstation?

CO2

Ambient light

VEML6070 / VEML6070V2

Einheit

lux



Barometric pressure

relative Humidity

Soil Moisture

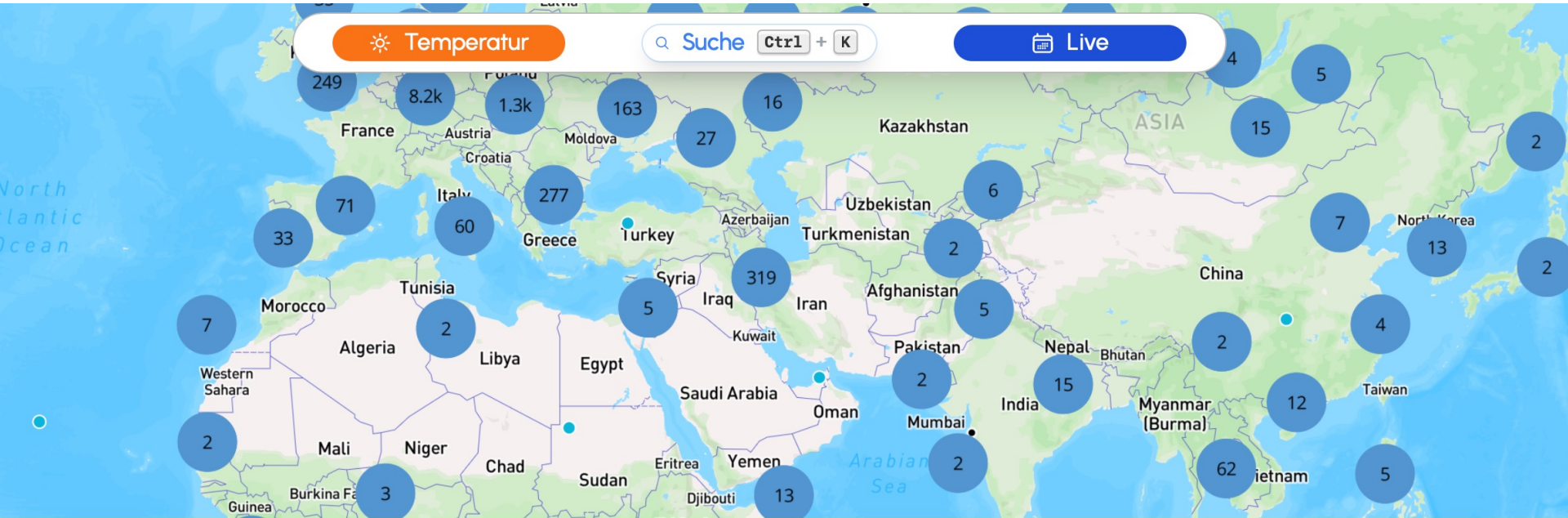
Temperature

Dein Gerät ist nicht in der Liste? Füge es im [Sensor-Wiki](#) hinzu um es auf der openSenseMap zu benutzen:

[Anleitung](#)

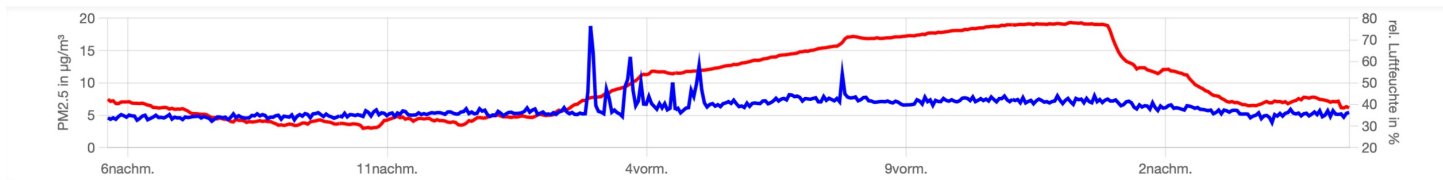
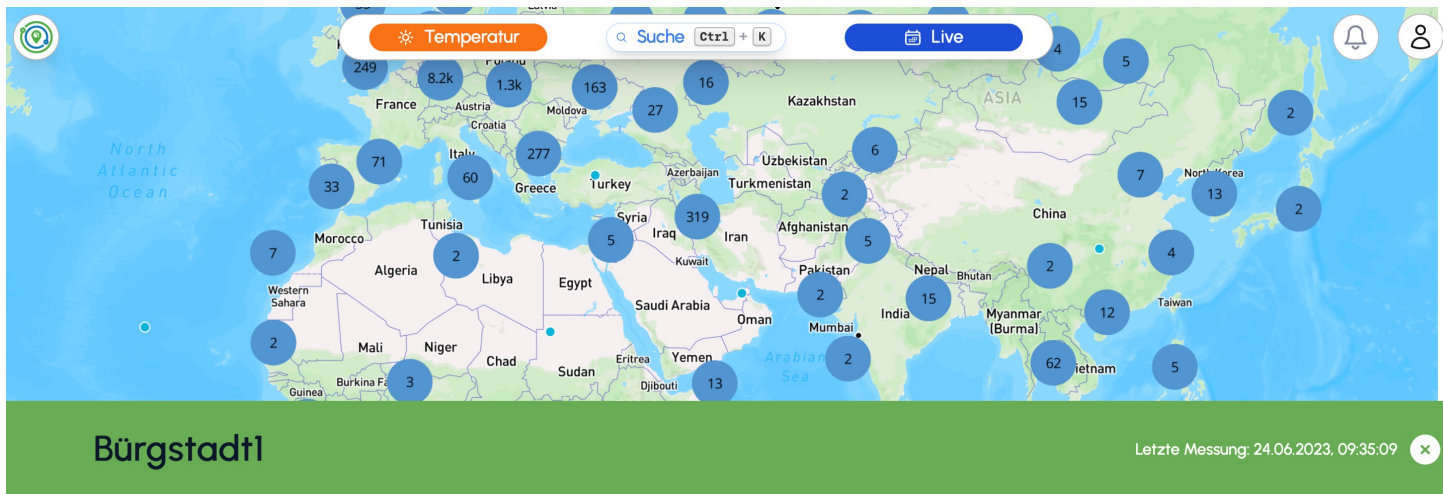


openSenseMap: SensorWiki



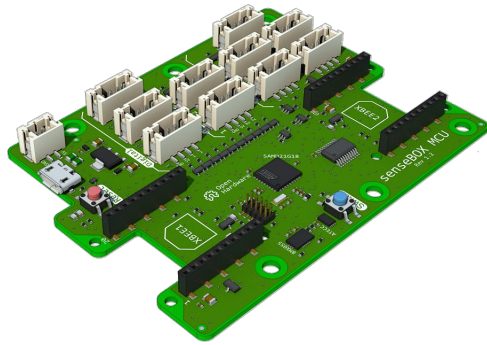


2. a) openSenseMap: SensorWiki



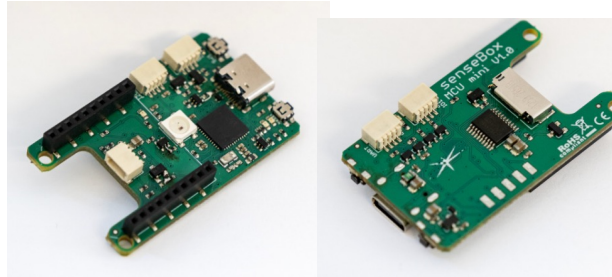


senseBox Microcontrollers



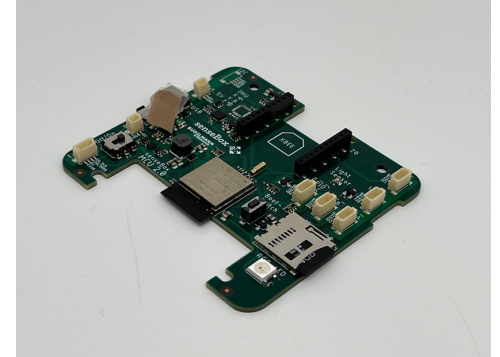
senseBox MCU

- Arduino SAMD D21
- 5x I2C-Anschlüsse JST
- 2x UART/Seriell JST
- 3x Digital/Analog JST
- 2x Xbee Port
- IMU-Sensor 9 Achsen
- LEDs, Knöpfe
- Separater Stromanschluss



senseBox MCU mini

- Arduino SAMD D21
- 2x I2C-Anschlüsse QWIIC, verkettbar
- 1x UART/Seriell
- 1x Digital/Analog (2 Pins)
- 1x Xbee Port
- RGB-LED
- SD-Slot



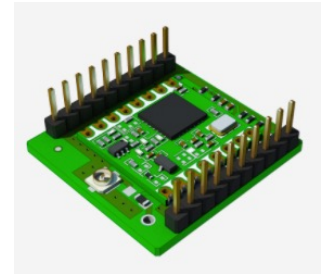
senseBox MCU ESP

- ESP
- 2x I2C-Anschlüsse QWIIC, verkettbar
- 1x UART/Seriell
- 3x Digital/Analog
- 1x Xbee Port
- WiFi
- RGB-LED
- SD-Slot
- **Laderegler**
- Schalter/Knöpfe



Data transfer

- XBEE-Standard
- Lora
- ~~NB-IoT~~
- (GSM)
- Bluetooth...



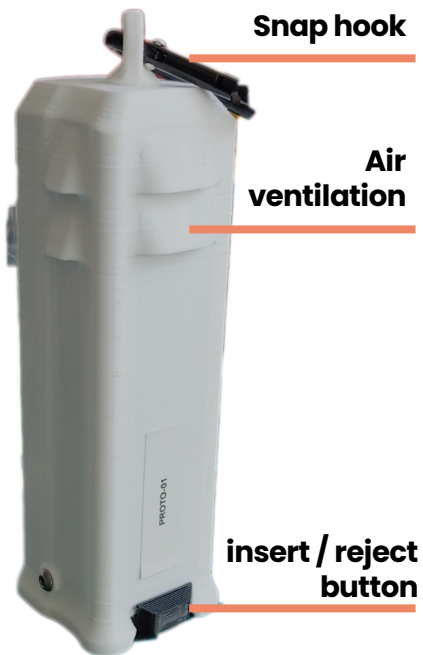


senseBox mobile Data logger



20 cm

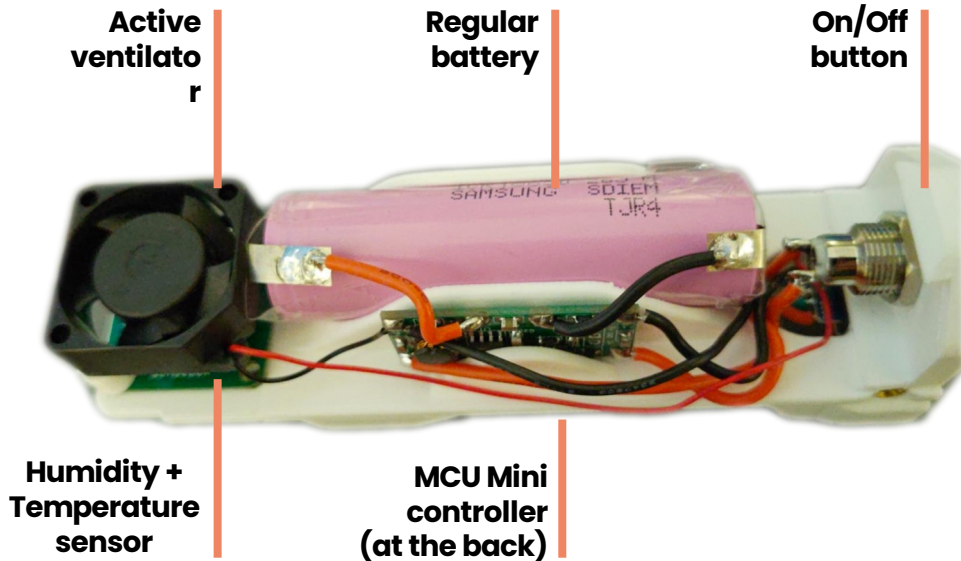
5 cm



Snap hook

Air ventilation

insert / reject button



Active ventilator

Regular battery

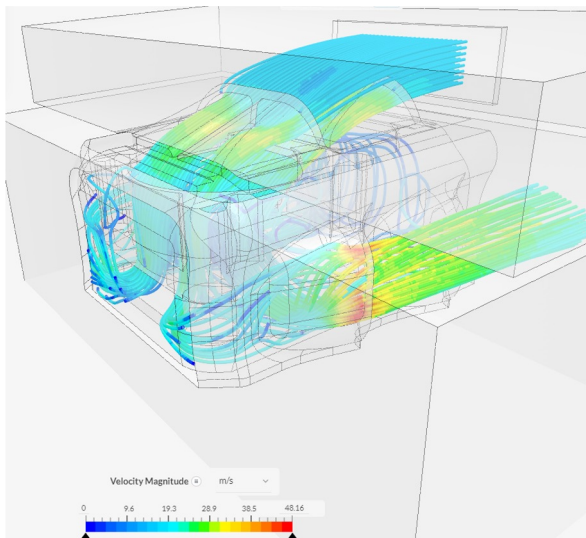
On/Off button

Humidity + Temperature sensor

MCU Mini controller (at the back)



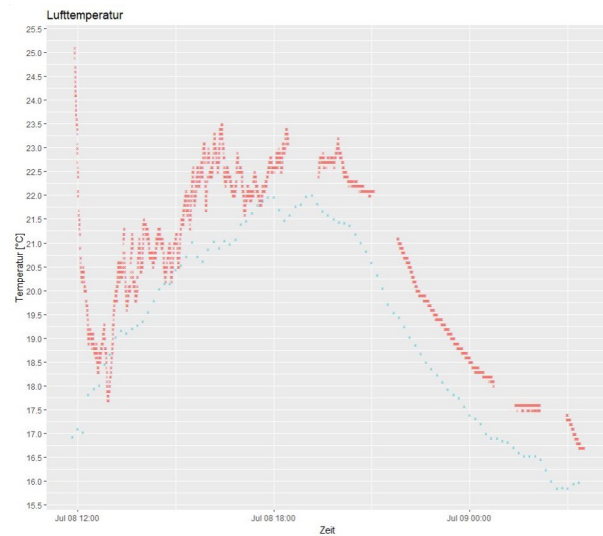
senseBox mobile Data logger



**senseBox temperature
air flow simulation**



**senseBox
vs
meteorological station**



**On average
the difference < 1°**

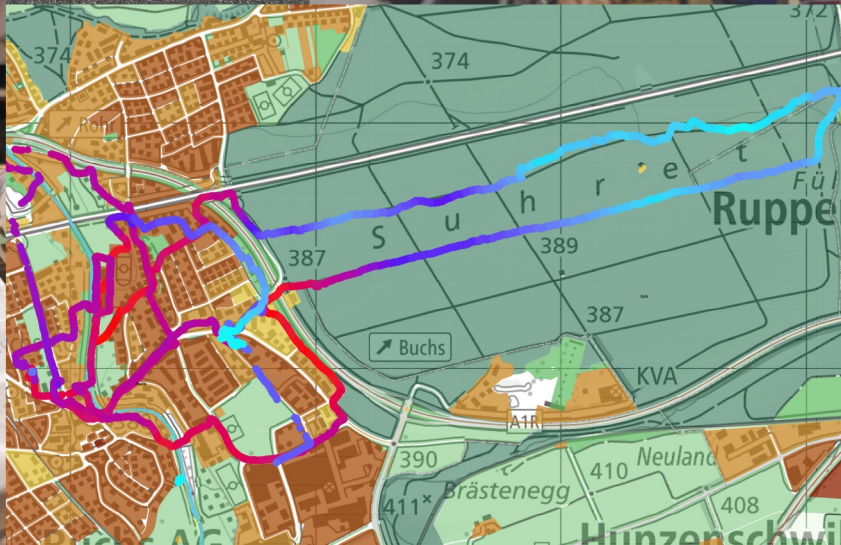
3-2-1-heiss!"

Checkliste Gemeinden

Alle Vorlagentexte, Bilder, Logos etc. finden Sie unter:
[Link zu google drive o.ä.](#)

VORBEREITUNGEN

Posten	Beschreibung
Kickoff	Zuständige Person(en) definieren
	Doodle für Terminsuche ausfüllen
	Durchführung Kickoff (online) evtl. Termin mit catta abmachen für gemeindespezifisches Folgetreffen
Organisation	Klimaspatzierung buchen (im Juni) bei





senseBox bike

- Ziel: Mobilitätswende
- Zielgruppe: Städte
- Datenbasierte Fahrradinfrastrukturmaßnahmen
- Erschütterung, Abstand zu Autos, Feinstaub, Temp(o)





senseBox Sensors

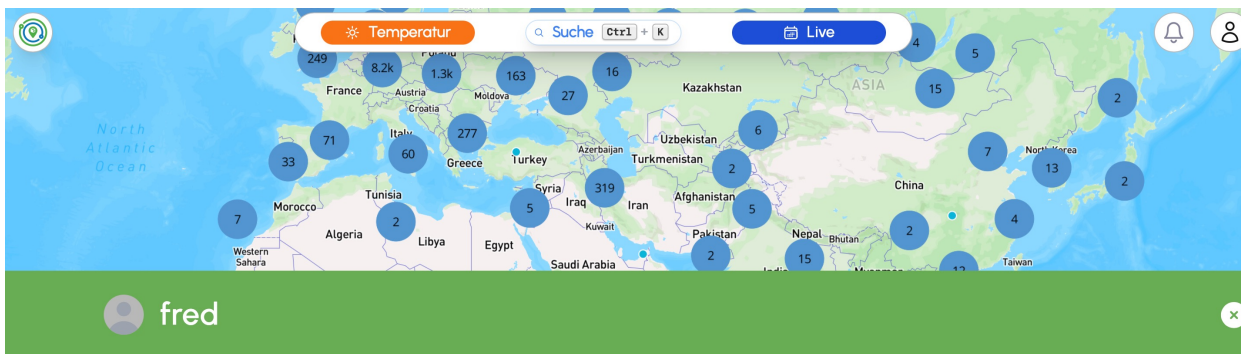
- Temperature
- Rel. humidity
- Air pressure
- Illuminance
- CO2-concentration
- UV-Intensity
- VOC
- Particular matter (PM10, PM2.5, PM 1)
- loudness
- ...





3. a) Open Photonics Network

MyBadges in openSenseMap




Boxes

senseBox am Aasee
Letzte Aktivität: vor 13min



Box am IFGI

Badges



Register device




Measure temperature



Verify E-Mail



Measure air humidity



Complete profile information



CITIZEN SCIENCE

as a tool / method / accelerator for

DIGITAL LEARNING



DIGITAL LEARNING

as a tool / method / accelerator for

CITIZEN SCIENCE



Thank you for your attention!

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