

Collaborative Climate Detectives



School year 2025-'26



LICEUL TEORETIC
„EMIL RACOVITĂ”,
BAIA MARE
MARAMUREȘ



INSTITUTO TECNOLÓGICO DE DROBETA-TURNU SEVERIN



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Premise

This document can be considered a shared draft for the realization of the ESA Climate Detectives project. For this reason, any form of collaboration from the project participants is welcome.

Abstract

The basic idea is to create a weather station for each school/class participating in the project. The station can take any form (simple artifact, micro:bit, Arduino, Raspberry, etc. etc.) to collect data over time and in the different places where the schools belong and draw conclusions about the climate changes taking place based on their observation. Collaborations, online meetings and, if possible, visits between participating schools are encouraged in a spirit of sharing, collaboration and mutual growth.

In this second year of the Collaborative Climate Detectives project, we would like to improve the weather stations already built last year to jointly seek a satisfactory model that can then be implemented by all schools and build a European network of school weather stations.

We also intend to explore the effects of climate change on our territory using satellite data made available by Copernicus Browser.

In this way, we would like to raise awareness among our students and local communities about the phenomenon of climate change.

The aim is to participate in the ESA Climate Detectives 2025-26 project.

Participants

School name and address	Classes involved	Age of students	Teacher in charge
Istituto Comprensivo 1 Chieti Via G.C. Spatocco, 46 66100 Chieti - Italy	2A, 2B, 2C, 2E, 2F 3A, 3B, 3E, 3F	11-14	Giovanni Cielo



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School name and address	Classes involved	Age of students	Teacher in charge
Externato Cooperativo da Benedita Rua Externato Cooperativo 2475 - 204 Benedita - Portugal	10th grade of the Mechatronics Technician vocational course	14-16	Samuel Branco
Budapest I. Kerületi Petőfi Sándor Gimnázium - Budapest 1013. Attila út 43 - Hungary	A selection of students from classes 9A, 9B, 9C, 10A, 10B and 10C	14-16	David Balazs Lukacs
Piaget Polytechnic Institute Alameda Jean Piaget, 106 4405-678 — Vila Nova de Gaia - Portugal	Primary Education Teachers	19-21	Celestino Magalhães
IC Don Lorenzo Milani Via A. Montanucci 138 00053 Civitavecchia (RM) - Italy	2A, 2C	11-14	Violetta Menichini
AE Dr. Francisco Fernandes Lopes Av. Dr. Francisco Sá Carneiro,3 8700-853 Olhão - Portugal	Upper secondary school	15-18	Emanuel Bettencourt Rui Soares António Espadaneira
Liceul Teoretic Emil Racoviță Bulevardul Republicii 8, Baia Mare 430264 - România	High school students.	14-18	Anițaș Cornelia Lăcrămioara Podină Camelia



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Liceul Tehnologic Decebal, strada Antoniniei nr. 2, Drobeta Turnu Severin - România	High school students.	15-18	Breazu Doina Iordache Mariana Mirela
IES Ategorri BHI, tartanga 11, Erandio, Basque Country - Spain	High school students.They are also studying computer science as a subject.	16-17	Jurgi Aguilar
Liceul Teoretic Tudor Vianu, str. Tudor Vianu nr.36, Giurgiu - România	High school students	16-17	Cristina Iulia Anghel
IC Portella della Ginestra Via G. Pascoli, 27 Vittoria (RG), Sicily- Italy	Primary school	8	Maria Giovanna Battaglia
Escola Básica e Secundária Josefa de Óbidos Rua Coronel Ribeiro Viana 1350-298 Lisboa, Portugal	Primary and secondary school students	13-17	Maria Celestina Henriques
Kırıklı İlkokulu Kırıklı mah Merkez sok No 38 Karaisalı Adana Türkiye	Pre-Primary School pupils	3-11	Burcu Yüksek
Heilig Graf	Secondary school pupils	12-14	Emmy Daems



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School name and address	Classes involved	Age of students	Teacher in charge
Apostoliekenstraat 26/Patersstraat 28 2300 Turnhout Belgium	(modern sciences and STEM)		Liesbeth Hofkens
Istituto comprensivo 2 Selargius	2A	12-13	Stefania Utzeri
Liceo Scientifico e delle Scienze Umane S. Cantone	3dsa-5dsa	16-18	Rosanna Busiello

Agenda

When	What	Where	Owner	Notes
Friday, November 21th 11:00-12:30	Project Presentation	online	Giovanni Cielo Letizia Tartaglia	Online meeting between all participants to get to know each other and to illustrate the main phases of the project.
From May 4th to 8th 2026	Job shadowing	Istituto Comprensivo 1 Chieti	Giovanni Cielo Letizia Tartaglia Emmy Daems	A delegation of teachers from the Heilig Graf School in Turnhout, Belgium, will visit the Istituto Comprensivo 1 in Chieti to observe



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Heilig Graf



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When	What	Where	Owner	Notes
				the working methods used to build the meteorological station. This opportunity will also include a tour of the CETEMPS-University of L'Aquila laboratories.

The project

[Reference to the 2024-25 school year project](#)

Phase 1: The discovery

Friday, November 21th 11:00-12:30

1. A preliminary online meeting to illustrate the entire project and introduce the children from the different schools involved.

Phase 2: The The knowledge

Each class developed, independently and collaboratively through the eTwinning platform, the knowledge needed to understand the phenomenon of climate change and how to best build their own weather station.

Phase 3: The realization

until November 2025/May 2026



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The pupils build their own weather station and install it in their school.

Phase 4: The analysis

From May 2026

Students collect data from the constructed weather station and record it.

Phase 5: The sharing

Waiting to decide the date

All the children share the collected data, compare them and draw conclusions.

Saturday, April 4th

Submission of the project to ESA for participation in the Climate Detectives project. By Giovanni Cielo.

Which parameters to measure and compare

Mandatory: Temperature, Humidity, Amount of rainwater, Wind speed and direction.

Optional: Air quality, ...



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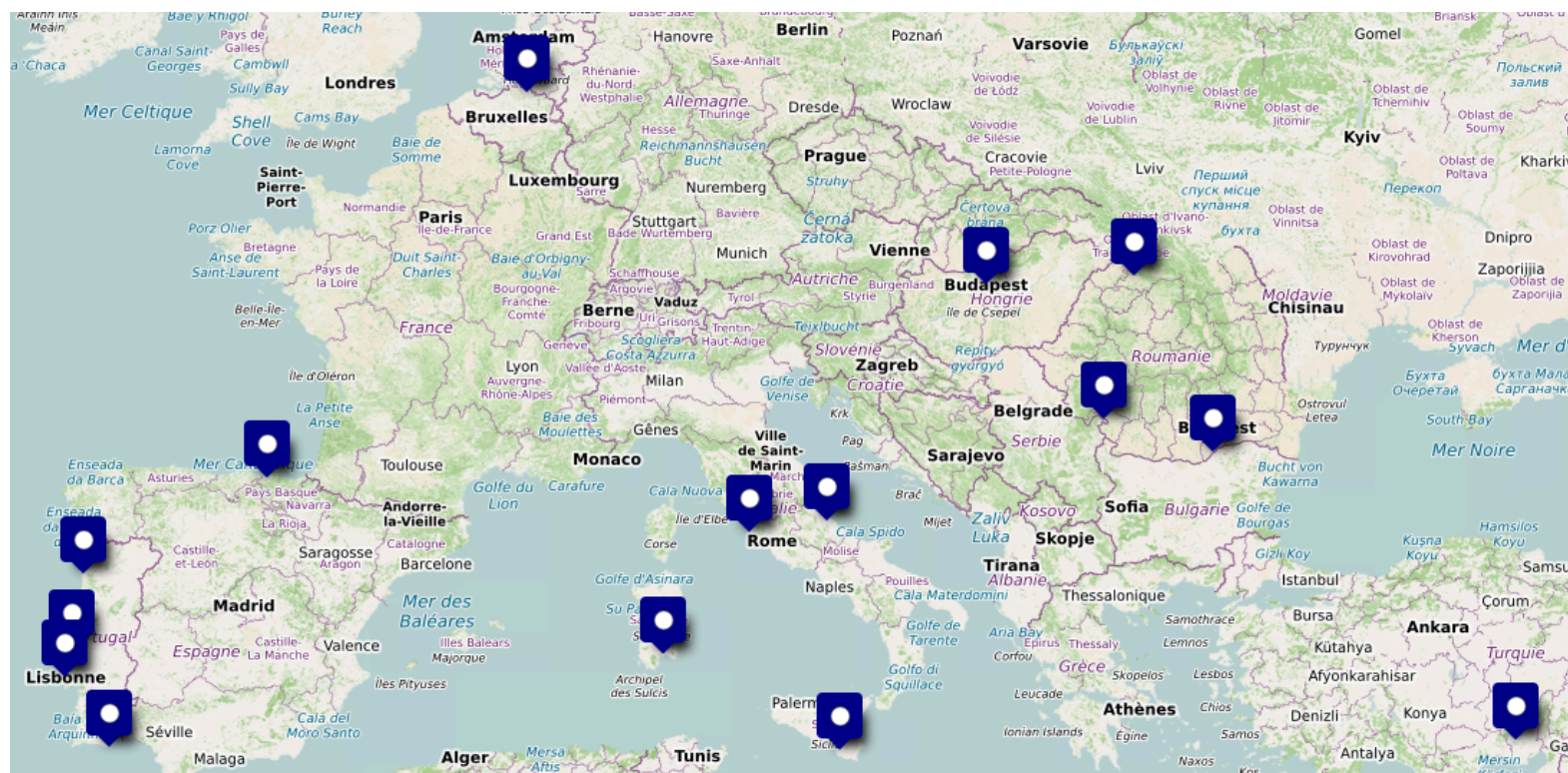


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Construction details of individual school projects

Below are the manufacturing details of the measuring instruments built by the individual schools. The map shows their geographical location.





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Istituto Comprensivo 1 Chieti, Italy



Having already participated last school year with a self-built weather station made from recycled materials, we thought we'd improve it by solving some problems that arose during its use. In particular, that type of weather station required us to go and take measurements every day, and on school holidays, this wasn't done. Furthermore, the measuring instruments weren't very precise and required constant maintenance. So we thought about making an automatic and more precise weather station using micro:bit and some temperature, humidity, water level and pressure sensors.

We involved the third-year classes—who had already participated in the project last year—and the second-year classes who joined this year in order to create a sort of continuity over time.

We thought of creating a master-slave system in which one micro:bit acts as the "master" and other micro:bits, one for each environmental parameter to be measured, act as "slaves". The master's task is to cyclically interrogate the individual slaves to request the value of the individual atmospheric quantities detected. Each slave, when queried by the master, will measure, through a specific sensor, the quantity it is dealing with and transmit its value to the master. Finally, the master will store all the received values in a .csv file saved in its memory and available for subsequent analysis.

Micro:bit “Master”

The "master" part of the weather station system consists of a single micro:bit that transmits 6 different characters via Bluetooth to query the corresponding "slaves" responsible for reading environmental parameters. The master must also be able to receive the values of the measurements taken from the slaves, which it will save in a dedicated .csv file contained within its memory.



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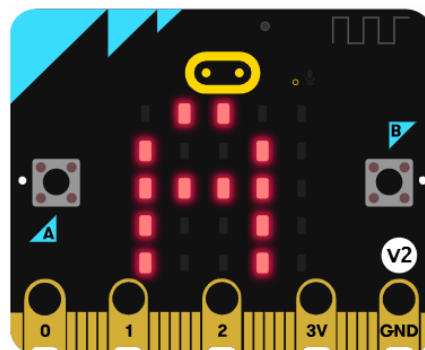


Fig. 1: The micro:bit master



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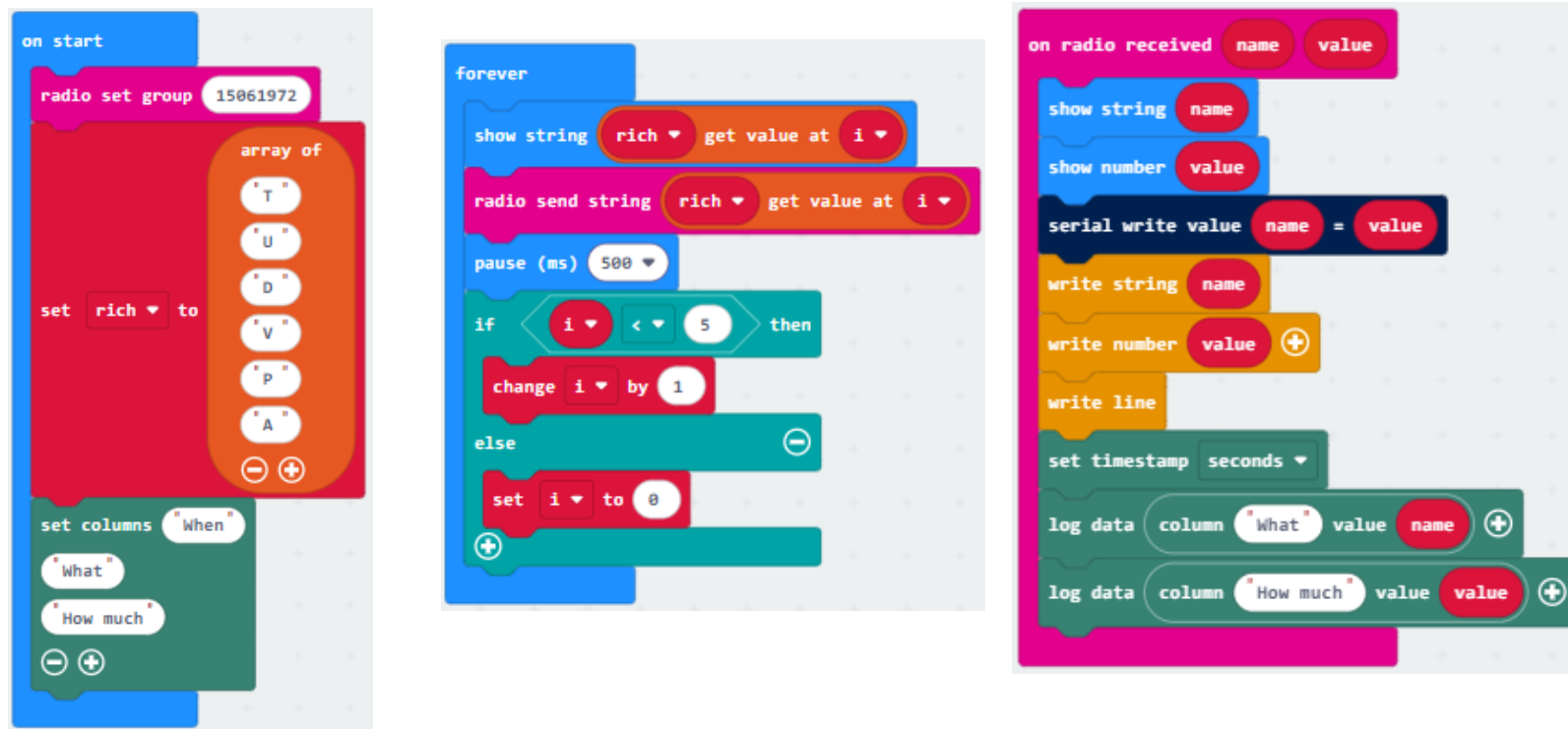


Fig. 2: The micro:bit program blocks for the master



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Thermometer

The thermometer is made by connecting a TMP36 temperature sensor to the micro:bit according to the diagram shown in Fig. 3. The analog signal is read through PIN 0 of the micro:bit. Care must be taken to convert the value reported by the sensor into degrees Celsius using the formula:

$$T(^{\circ}\text{C}) = \frac{PIN0 \cdot \frac{3000}{1023.0} - 100.0}{10} - 40.0$$

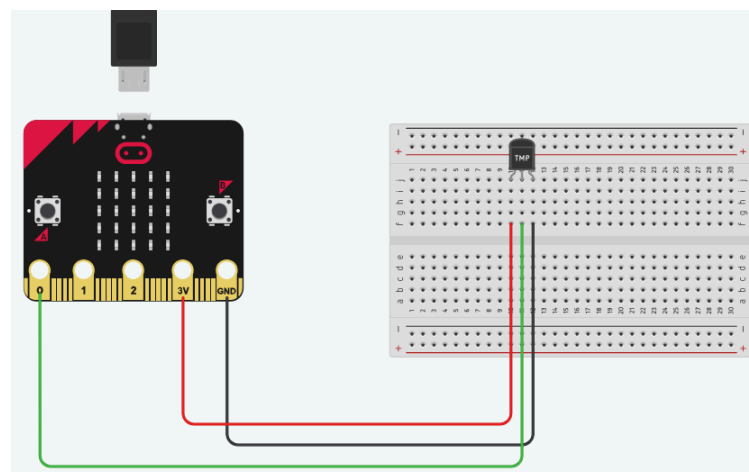


Fig. 3: Thermometer assembly diagram



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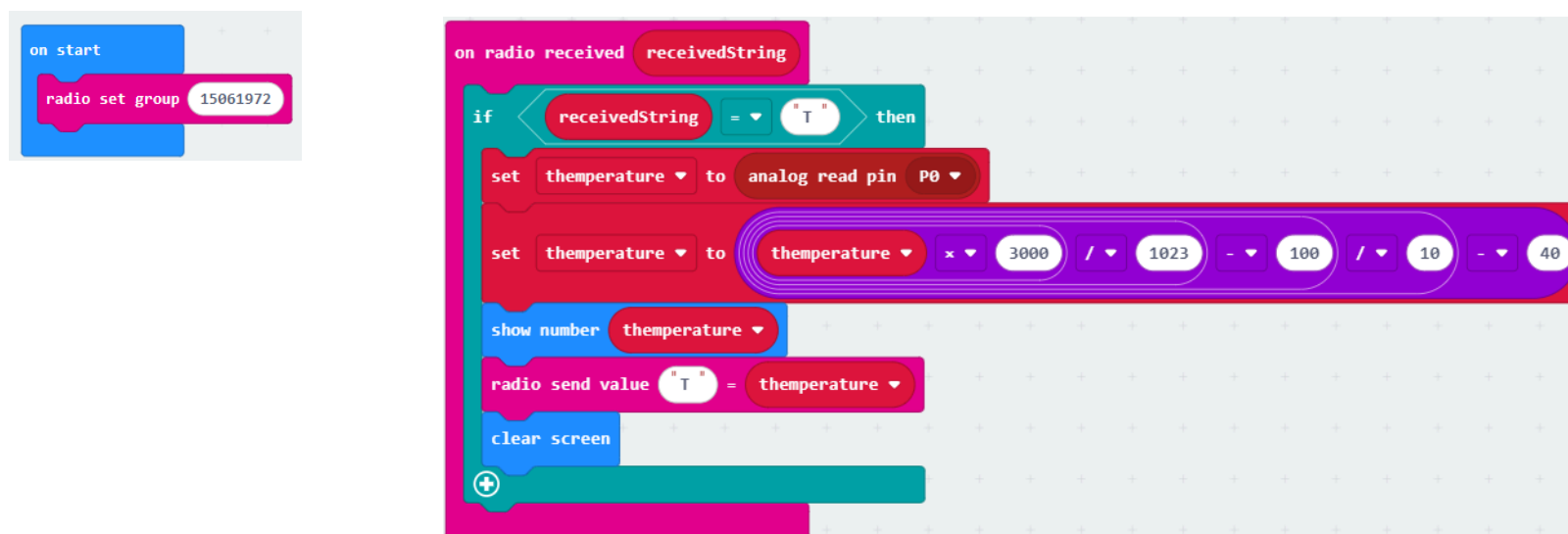


Fig. 4: The micro:bit program blocks for the thermometer

Hygrometer

The thermometer is made by connecting a humidity sensor to the micro:bit according to the diagram shown in Fig. 5. The analog signal is read through PIN 0 of the micro:bit.



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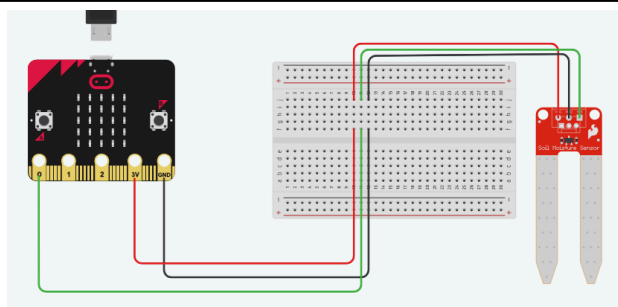


Fig. 5: Hygrometer assembly diagram



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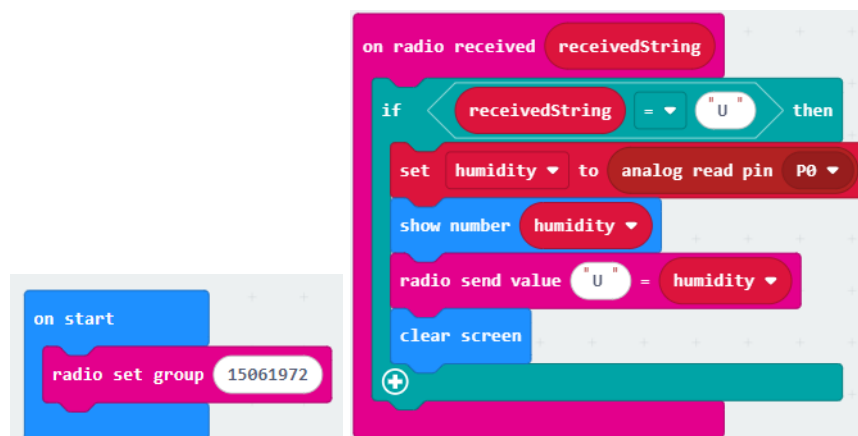


Fig. 6: The micro:bit program blocks for the hygrometer

Rain gauge

The rainwater meter is made with a simple container to collect rainwater to which a liquid level sensor is attached and connected to the micro:bit. It is important that the cross-section of the container that collects rainwater is constant along its entire height. For this reason, it is particularly advisable to use a plastic bottle without any grooves or bulges, from which the neck is cut and then turned upside down and used as a funnel to collect rainwater.



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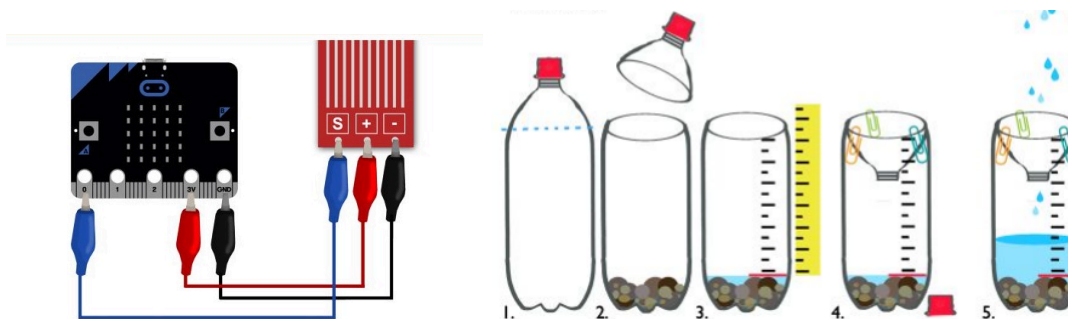


Fig. 7: Rain gauge assembly diagram



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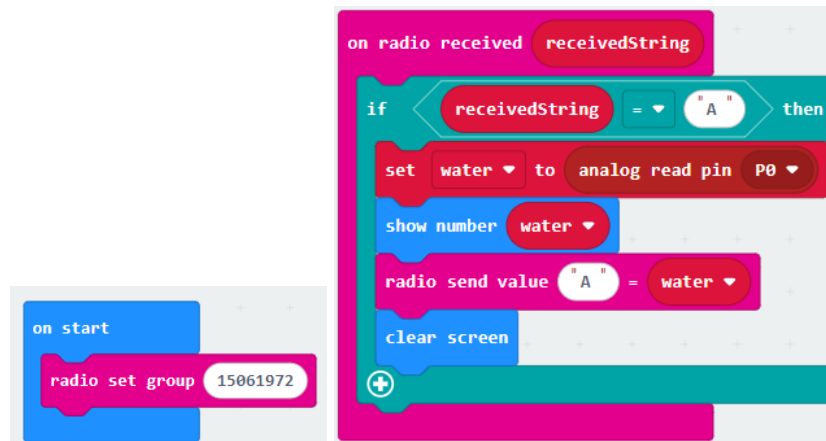


Fig. 8: The micro:bit program blocks for the rain gauge

Wind direction

To measure the wind direction, a wind vane is built and a micro:bit is attached to it. This micro:bit is used as a compass, thus measuring the angle that the vane makes with respect to North, or the direction of the wind.



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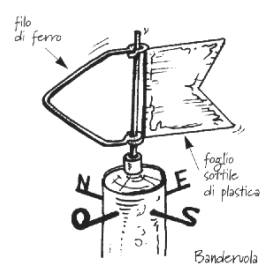
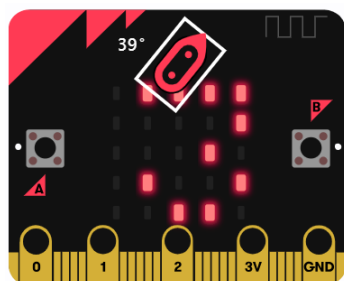


Fig. 9: Wind direction assembly diagram



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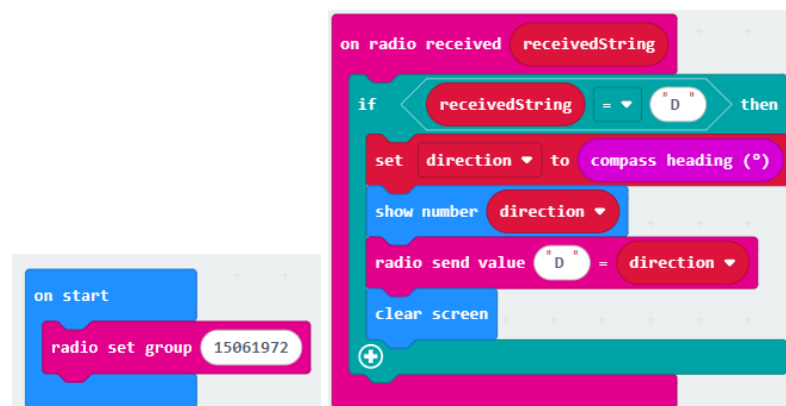


Fig. 10: The micro:bit program blocks for the wind direction

Anemometer

An anemometer is an instrument that measures wind speed. It can be made by building a panel that tilts when struck by the wind, so that the higher the wind speed, the greater the panel's pitch angle. A micro:bit attached to the panel is used to measure the pitch angle (tilt of the panel).



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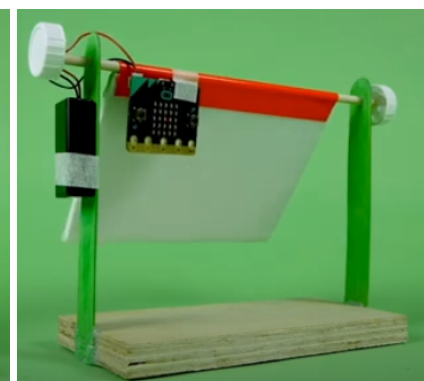
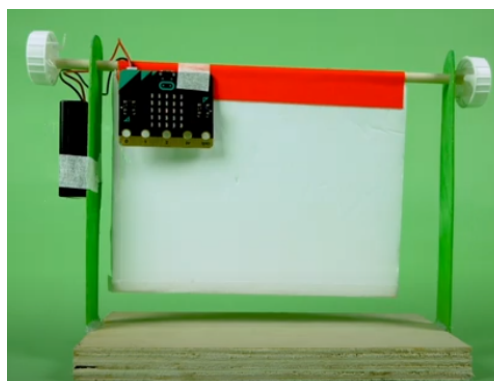
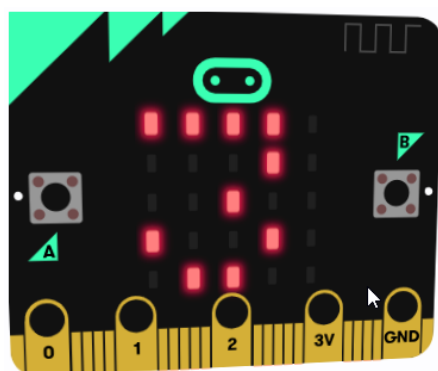


Fig. 11: Anemometer assembly diagram



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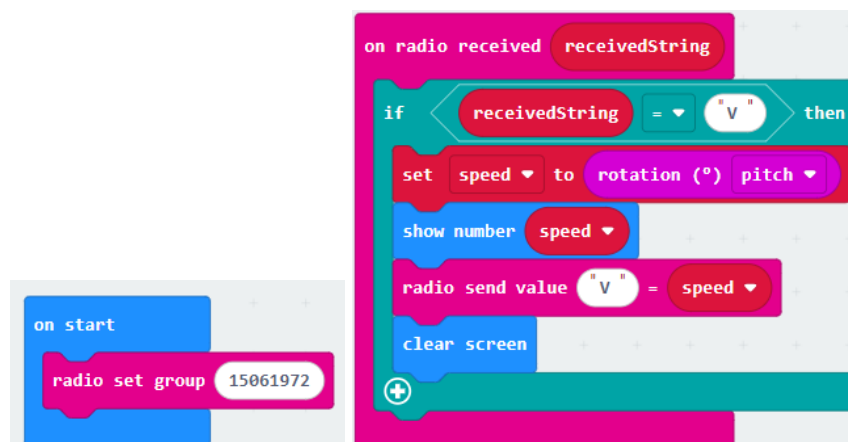


Fig. 12: The micro:bit program blocks for the anemometer

Hunting for climate change

In addition to measuring environmental parameters with the built weather station, the students researched the effects of climate change in their immediate area and around the world using the Copernicus Browser to try to relate climate trends and the resulting effects. The most significant images and timelapses have been collected in the following digipad: <https://digipad.app/p/1361425/e4d7c39fbc7a3>

Conclusions

The project has proved more challenging than expected, and we have not yet completed the construction of the weather station. We're certainly managing to build a more effective and precise automatic station than last year's. The accuracy of the individual instruments and the battery life of the various micro:bits remain to be verified.



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1. Anemometers

Tenth-grade students (aged 16) from the “Emil Racoviță” Theoretical High School in Baia Mare, Romania, collaborated with their peers from last year.

Since in physics we studied the changes of state of matter, state parameters (pressure, temperature, volume), and the laws of gases—which are also covered in 9th-grade chemistry—we thought it would be interesting to build several types of anemometers. We planned to visit the weather station to see other devices. We built anemometers using recyclable materials, cups, and spoons. In the future, we will try working with Micro:bit and Arduino.

They were divided into four working groups, and each group built a measuring instrument: a water thermometer and an anemometer.



Using the instruments they created, the children then recorded weekly measurements of environmental parameters, compiling them into a log.

The goal of the activity is to introduce students to these fields and educate them about the physical phenomena underlying the instruments, as well as the concept of measurement.

2. Arduino-based temperature and humidity sensor

Passionate students from the two schools collaborated on the construction with Arduino. The aim of the activity is to form a robotics group in each school that will attract other students. They discovered that the instruments they created



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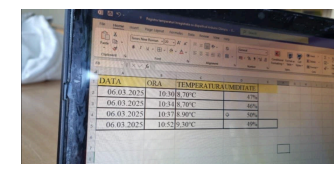
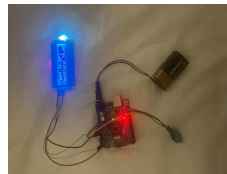
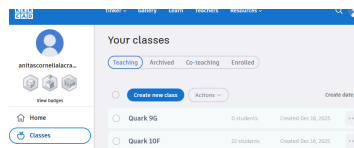


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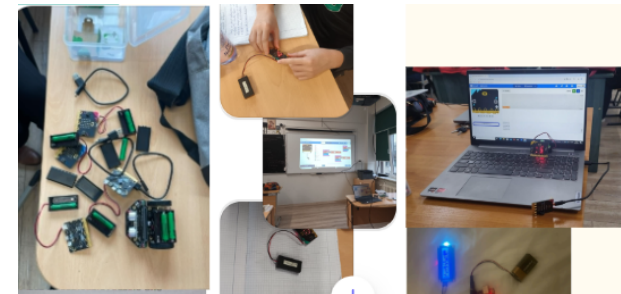
needed constant supervision. We have to not move to make measurements. Therefore, we thought of modifying it so that it can read after time intervals. Our problem is how to store data.

I created classes on Tinkercad so we can work with Arduino circuits and cover the topic of electricity



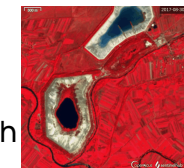
3. Work with microbit

One small group from Liceul Teoretic "Emil Racoviță" Baia Mare, Romania work with microbit after school. We have used the materials procured from the three projects carried out by the Rotary Club Baia Mare together with the "Emil Racoviță" High School "Emil Racoviță" Baia Mare, which won funding through the Meet and Code program supported at European level by the software company SAP. In Romania, the program is coordinated for the 5th and 6th consecutive year by AsociatiaTechsoup and supports technology and programming events aligned with the mission of the European Commission's initiative Europe Code Week. (September 2021, September 2022) STEM with ARDUINO Return to the Moon Better understanding the STEM UNIVERSE using the micro:bit <https://www.meet-and-code.org/ro/ro/event-show/8938>, <https://www.meet-and-code.org/ro/ro/event-show/9480>, <https://www.meet-and-code.org/ro/ro/event-show/7067>



4. Satellite maps made with EO Browser by Gabriel, 10 th grade

We practiced using EO Browser to monitor the negative effects of local mines on water bodies. We discovered through





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media reports that on January 30, 2000, a serious accident occurred involving a cyanide spill near the city of Baia Mare, which affected the Săsar, Lăpuș, Someș, and Tisa rivers, as well as the Danube before it reached the Black Sea, causing the death of a large number of fish and water pollution in Hungary and Yugoslavia. <https://apps.sentinel-hub.com/eo-browser/>

Decebal Technological High School, Drobeta-Turnu Severin, Romania



The basic idea of the project is to create a weather station for each school/class participating in the project. The station can take any form (simple artifact, micro:bit, Arduino, Raspberry etc. etc.) but collect data over time and in the different places where schools belong and draw conclusions

about climate change that is taking place based on their observations.

We had online meetings with the teams from the participating schools as well as a meeting with researchers from the ESA-ESRIN centre in Frascati, Italy. Schools were encouraged to work together for mutual growth. The aim is to participate in the ESA Climate Detectives 2024-2025 project.

We involved the students from the ninth grade (15-16 years old) from the Decebal Technological High School, Romania, in the construction of a weather station. We purchased Arduino materials and together with some of the students we built a temperature and humidity sensor with them. With the help of this sensor we can determine the air temperature and humidity automatically and accurately.

During the activities, students also made a sensor for determining the water level, as well as a sensor for detecting raindrops, in order to understand the relationship between precipitation and water level.

Another part of the students built an anemometer to determine the wind speed. All this will be perfected along the way. We would like to purchase a solar radiation sensor (BH 1750 or TSL 2561) and a pressure sensor (BMP 280 or BME 280).



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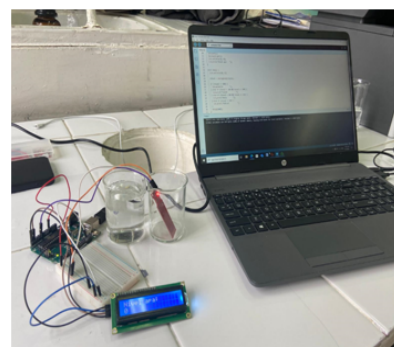
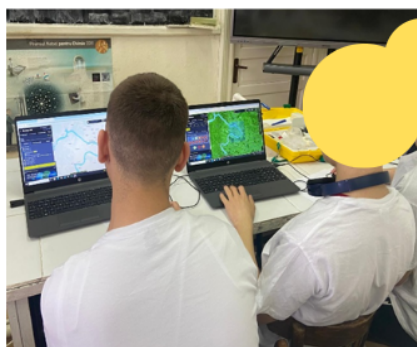
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Using the EO Browser platform we searched the area of our school using the Sentinel-3 satellite (for the temperature of the earth's surface) and compared the temperature read by our Arduino sensor with the temperature indicated by the satellite on the same day/hour.

Our project explores the intersection of accessible technology and sustainability to better understand climate change at the local level. Students built a monitoring station using the Arduino platform, integrating sensors for temperature, humidity and liquid levels. An innovative element of the project is the use of recyclable materials to create artisanal anemometers, turning waste into precision instruments for studying wind speed and direction. By collecting data in real-time, students become "climate detectives," looking at how environmental factors interact in their local ecosystem.

Compared to last year, we would like to use satellite data and a rain sensor to better understand climate change in our city. Using the EO Browser platform we searched the area of our school using the Sentinel-3 satellite (for the temperature of the earth's surface) and compared the temperature read by our Arduino sensor with the temperature indicated by the satellite on the same day/hour. Based on this data, we discussed why differences occur.





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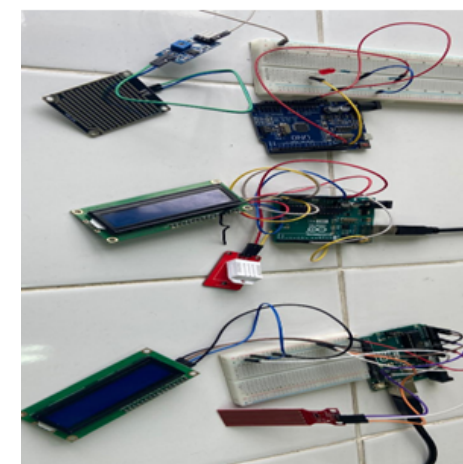
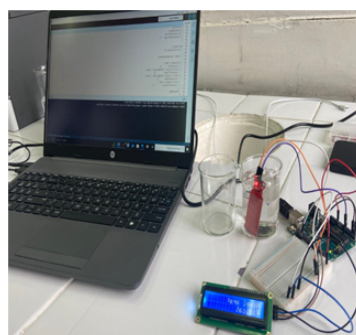


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Escola Básica e Secundária Josefa de Óbidos, Lisboa, Portugal



Students at our school are developing a project based on data collected from the school's weather station, which is available on the Weathercloud platform under the name AR_EJO. As our school is located in a busy urban area with high traffic, students are not only analysing weather parameters such as temperature, humidity, and wind, but also studying air quality using the KUNAT station, which measures particles, carbon dioxide (CO₂), and ozone levels. By comparing these data with information from stations located in more rural areas, students are able to investigate the impact of human activity on air quality and better understand the differences between urban



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and rural environments. They also compare their results with satellite images from the *Copernicus* platform, which helps them better understand environmental patterns and validate their observations.



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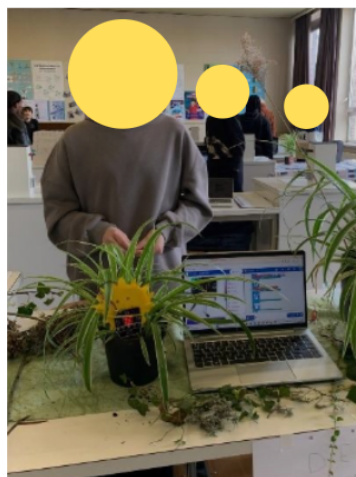
Heilig Graf, Turnhout, Belgium



Heilig Graf

Our students made an “invention” in preparation for installing our weather station.
This student built a device using a micro:bit to measure soil moisture.

With the setup below we want to measure the amount of precipitation:





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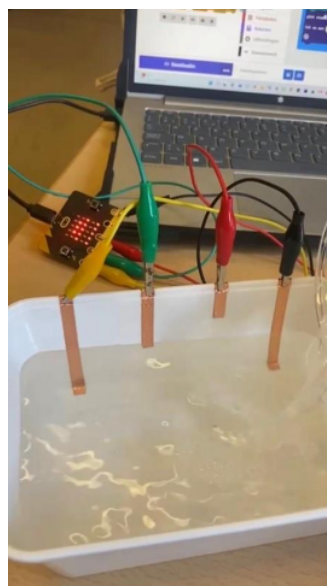


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At a later stage, we want to integrate these designs into a weather station that we will install at the school.

To build a functional weather station, we want to start by teaching our students how to perform data logging using the micro:bit (both directly on the device and via the IoT:bit, which enables data collection over Wi-Fi). Afterwards, we will guide our students in building their own rain gauge, anemometer, and soil moisture sensor. The data collected through the micro:bit will then be used for further analysis.



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Below you will find a lesson that has already been developed on data logging with the micro:bit. The lessons on building the different measuring instruments for the weather station are still being further developed.

Data logging with micro:bit

1. What is data logging?

Datalogging is the automatic measurement of data and its storage over a period of time.

Examples:

- Measuring temperature in a room
- Measuring light in different places
- Measuring movement during a school day

2. Data logging by reading data from micro:bit

2.1 Programming

First, we create the following programme (as a class). This programme does two things:

- The micro:bit measures the temperature every 10 seconds
- The data is automatically saved



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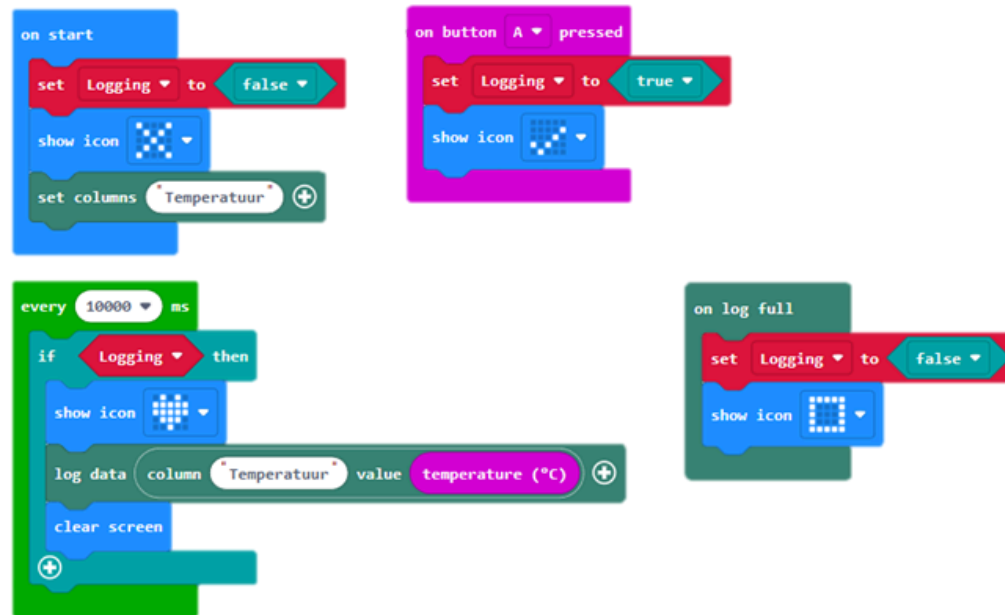


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2.2 Performing measurements

Allow pupils to take measurements for 5 – 10 minutes:

- Place the micro:bit in different locations
- by the window



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- in a bag
- outside

2.3 Read the data

We read the data and make it available in Excel:

- Connect the micro:bit with USB
- Open the micro:bit (as a USB-stick)
- Download the .CSV file
- Open it in Excel

The results can be processed and dicussed:

- What stands out?
- When dit the temperature rise or fall?
- Can you explain why?

2.4 Extra

- Multiple sensors simultaneously (light + temperature)
- Movement logger during PE
- Noise level in the classroom



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3. Direct data logging using the IOT:bit (wifi)

3.1 What is IOT?

IOT stands for: Internet of Things. This refers to everyday devices that communicate with each other and exchange data via internet, often without you having to do anything.

Examples include:

- a smart thermostat that adjusts the heating itself
- a smartwatch that measures your heart rate
- sensor in a factory that predict malfunctions
- smart traffic lights that respond to traffic congestion

They all work according to the same principle:

- Sensor: measuring something (temperature, movement, light, heart rate)
- Internet connection: Wi-Fi, 4G/5G, Bluetooth, etc.
- Software: analyses the data
- Action: sends a notification or adjusting something

Example: A sensor detects that it is cold → sends data → system sees that no one is home → heating remains off.

3.2 Connecting Micro:bit to wifi via the IOT:bit

In the following, we will not read the data recorded by the micro:bit via USB, but we will read the data directly via the internet. This means that we can follow the data live online, unlike normal data logging, where we only read the data later.

To connect the micro:bit to the internet, we need an extra tool: the IOT:bit.

Connecting the IOT:bit:



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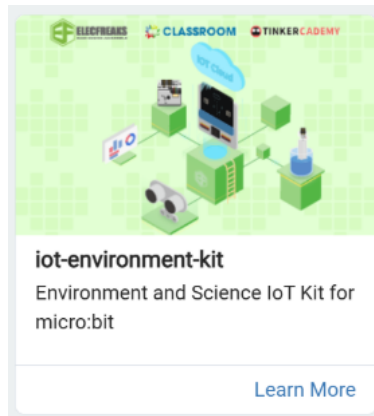
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- Place the micro:bit in de IOT:bit
- Connect USB
- Check that the Wi-Fi module light is on

In Makecode:

- Add the IOT:bit extension:



- Set: wifi-naam (SSID), password:



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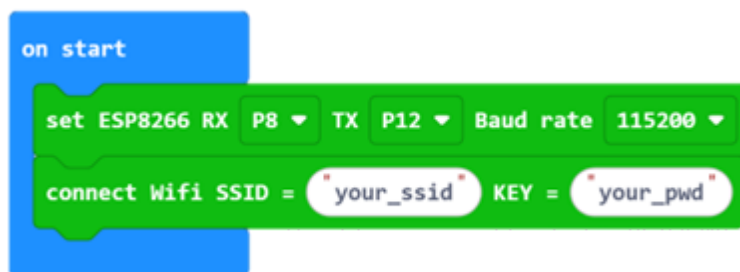


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3. Programming

Use the following programme to measure the temperature and send the data to ThingSpeak:



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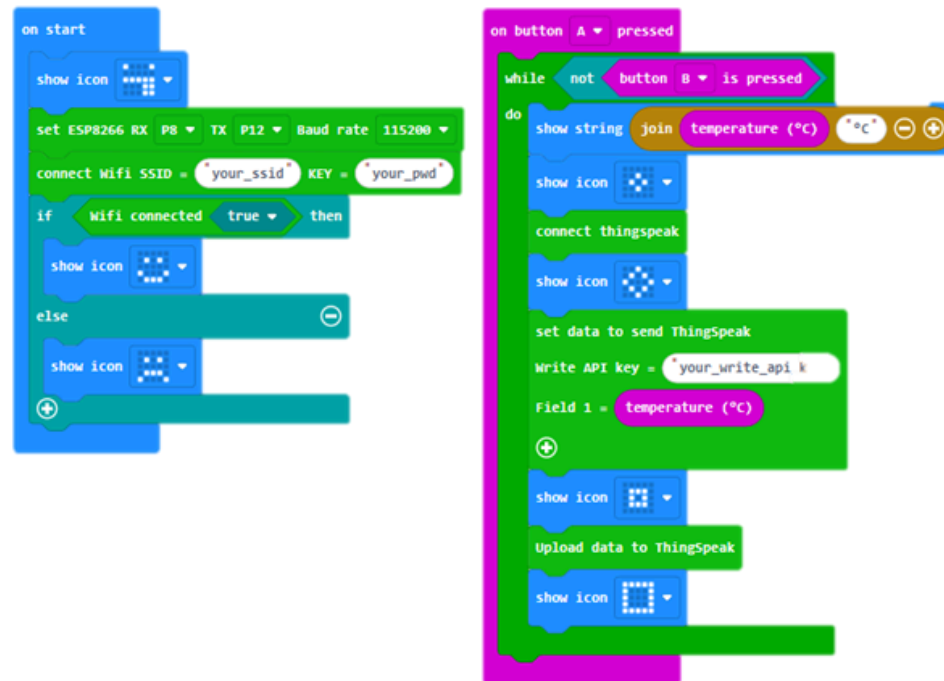


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Connect the micro:bit to a battery if you want to take measurements for a longer period of time further away (not connected to a computer).



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4. Reading data

To read data, we use ThingSpeak (<https://thingspeak.mathworks.com/>)

Create a new channel here in which you display the measurements (numerical and graph)

You will see that the values are updated and the graph continues to evolve.

5. Extra

- Multiple sensors simultaneously (light + temperature)
- Noise level in the classroom

Building and programming a tippet bucket

1. Introduction: Urban floating

Weather seems to be becoming increasingly extreme. We are facing more prolonged droughts on the one hand and heavy rainfall on the other. Cities in particular appear to be vulnerable to this problem. In this STEM project, we will focus on the phenomenon of “urban flooding” or urban water nuisance. We will investigate the contribution of rainfall intensity.

2. Official measurements in Belgium and abroad

Various sectors such as agriculture, urban planning, climatology, etc., aim to measure precipitation over the long term in order to assess the risk of flooding and drought. Therefore, official measurements are mapped.

In recent years, not only scientists have been taking measurements, but citizens have also contributed to measuring precipitation. The following websites will be useful to compare with our own measurements afterwards.

On the website waterinfo.be, you can follow precipitation measurements in Flanders online.

- Go to the website waterinfo.be
- Select on the left: Stations > Precipitation > Precipitation total (24h moving total)



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- Find on the map the measurement station closest to your school. How much precipitation is currently being measured there?

For more information, check the following websites:

- [weather underground](https://weatherunderground.com/): Worldwide citizen science project: “improve people's access to meaningful weather data from around the globe”;
- [CoCoRaHS: Community Collaborative Rain, Hail and Snow Network](https://coco-rs.org/): “Volunteers working together to measure precipitation across the nations”.

Rain is measured in a unit of length (mm) and not in a unit of volume (ml). This video explains why: <https://youtu.be/WyMabcRzUcw>

3. Measuring rain yourself

One of the key aspects of flood risk is the intensity of rainfall. We ask ourselves: how much precipitation falls during a rain shower?

3.1 Build the micro:bit weather station

<https://microbit.org/news/2020-07-06/make-a-microbit-weather-station/>

3.2 Build a conductivity sensor

<https://www.youtube.com/watch?v=KnRa07dalhA>

4. Tipping bucket

In practice, scientists very often use the “tipping bucket”.

4.1 What components does a tipping bucket consist of?

Task: Remove the casing and examine the inside. Can you identify the following components? <https://www.youtube.com/watch?v=vpcqEtKT9-k>



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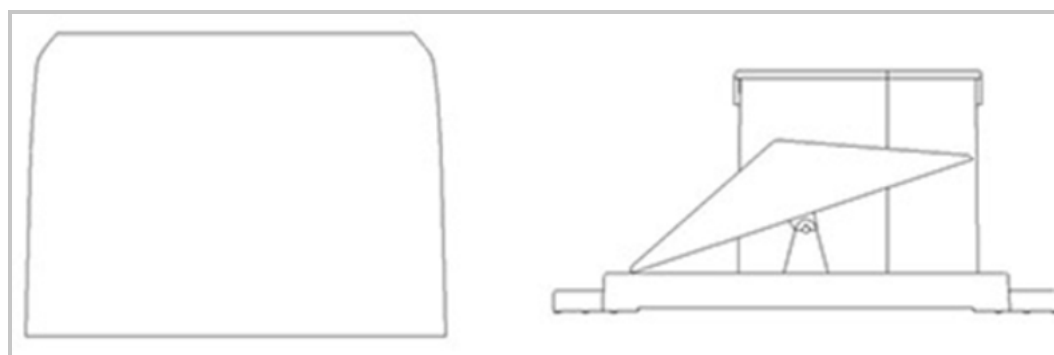


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Name	Photo	Function
Magnet		Works together with the reed switch



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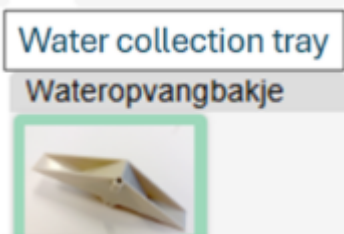
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Name	Photo	Function
Drain holes		Allow the water to drain away
Water collection container		Collects the rainwater



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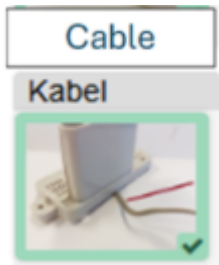
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Name	Photo	Function
Rod		Allows the water container to tip
Cable		Sends data to the computer



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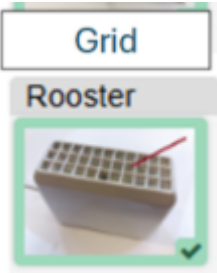
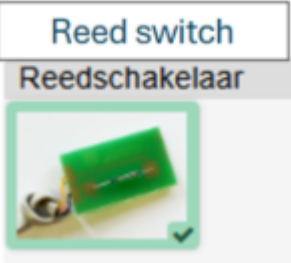
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Name	Photo	Function
Grid		Protects against dirt such as leaves, insects, etc.
Reed switch		A type of magnetic switch that detects when the magnet is nearby



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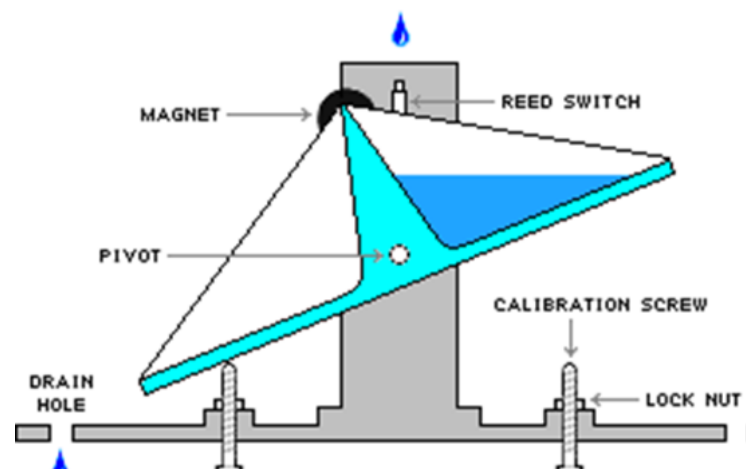


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4.2 Why do we call this a “tipping bucket”?

Rainfall is measured using two triangular water containers. When one container fills with collected rainwater, it becomes heavier and eventually tips downward. The triangular containers rotate around a hinge axis (rod). After that, the second container can fill up. From English, “tipping” means tilting and “bucket” means container.



Task: Explain the role of the reed switch in the sensor.



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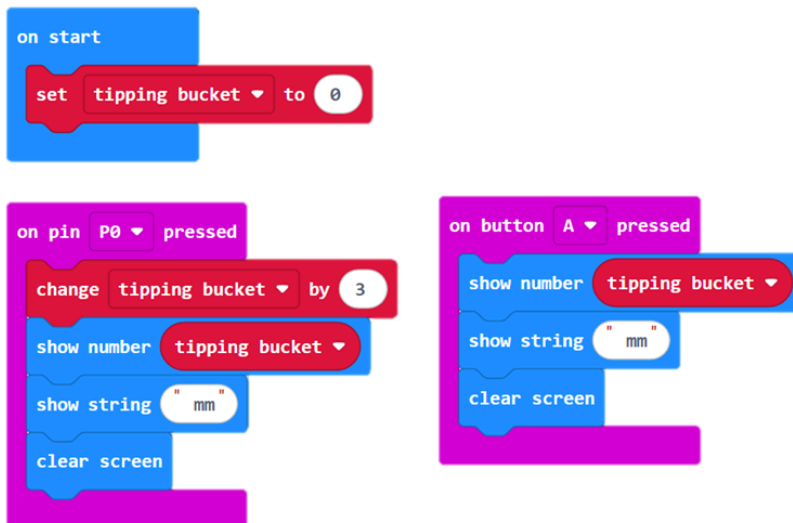
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The reed switch is a switch that is open or closed depending on the proximity of a magnet. The switch is normally open. When a magnet comes close, the switch closes. This allows the rain sensor to detect when the water container tips and convert this into an electrical signal.

4.3 The micro:bit counts the number of tips

We use the tipping bucket as a sensor and connect it to the micro:bit to count the number of tips. Connect the black wire to the GND pin and the red wire to pin P0.

Taks: Create the following program:





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At the moment the water container tips, the new value is shown on the screen. If it takes too long, you can press button A to display the amount of rainfall.

We have set the tipping bucket value to 0.3 mm. This is just an example. We can determine this ourselves.

Task: On a rainy day, place your setup outside. Make sure your micro:bit and battery holder are protected from the rain. The next day, check how many times the tipping bucket has tipped by pressing button A.

We can now see how much it has rained after a rain shower or at the end of the day, but we do not know how intense the rainfall was or at what times it occurred. To do this, we still need a data logger that can store the data.

<https://rvo-eclassroom.be/brightlab/waterstad/mod6part3.aspx>

Liceo delle scienze umane “Salvatore Cantone”, Pomigliano D’Arco (NA), Italy



Monitoring of subsidence in Volturno river plain

The students work on the land subsidence in the Volturno river plain and its relations with landscape alteration and climatic changes due to antropological activity, in particular the he recent evolution of the plain has been mostly influenced by anthropic impacts, which began with the Bourbon reclamation of the delta and coastal plain . The impact on the river courses leads to a negative sedimentary balance and to an increase in the erosion rates, that coupled with the subsidence phenomenon and the sea level rise, represents a serious hazard.

Results

This territory is characterized by a subsidence of the land which, combined with the rise in sea level and coastal erosion, significantly increases the risk of flooding and groundwater salinisation. In detail the study was performed with the use of Sentinel-1 (Copernicus/ESA): Currently the main source of free and regular data for continuous monitoring. The images were analyzed with the free ESA SNAP software. Subsidence rates were determined through InSAR data analysis. The results shown the vertical ground deformation raster in the last 2 years.



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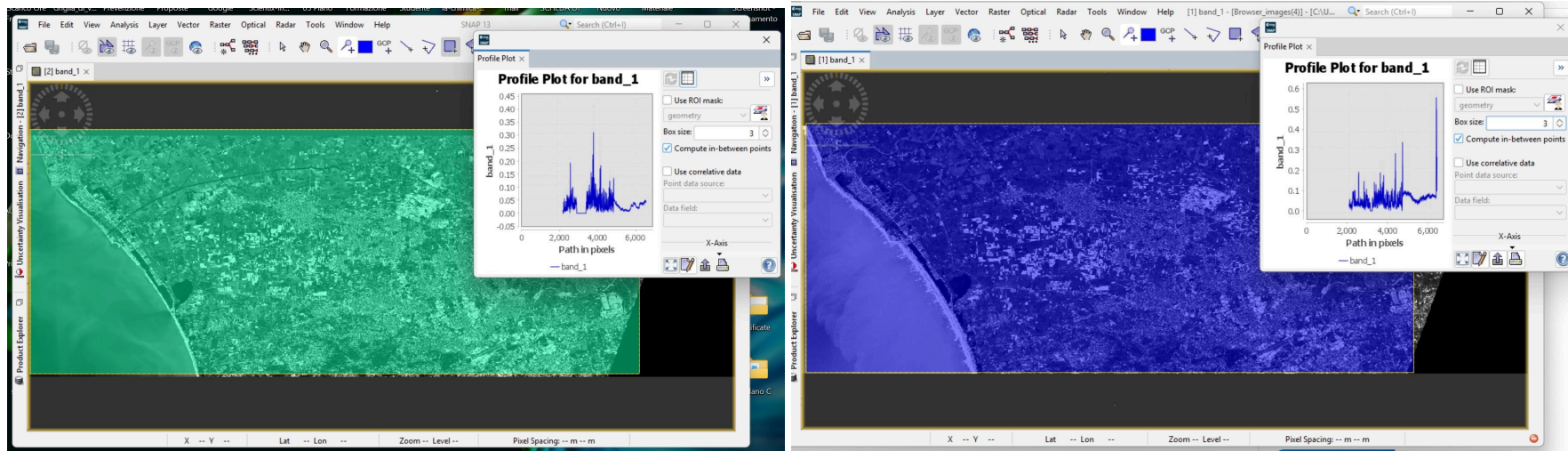


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The images show an increase in sedimentation rise at the bottom of the area seen with sentinels 1 and 2 with the NDV index which gives us data on the health status of the vegetation in that area



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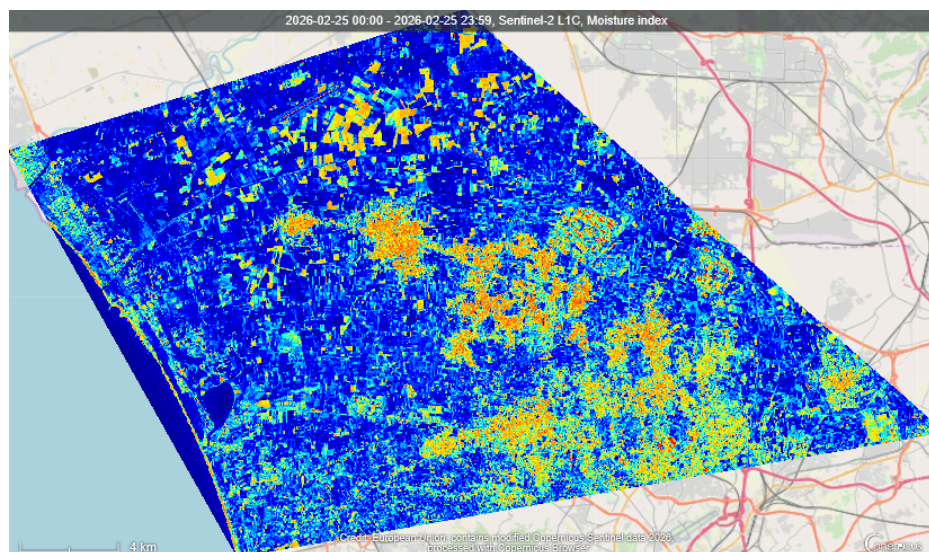


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eTwinning

The project is hosted on the eTwinning platform: <https://school-education.ec.europa.eu/en/etwinning/projects/collaborative-climate-detectives>

Some ideas to fight climate change

During the course, all students and teachers were encouraged to reflect on the climate changes taking place across the planet and a discussion was opened on Tricider where everyone could write an idea to try to overcome them and indicate what the pros and cons of each proposal made could be: <https://www.tricider.com/brainstorming/2p2q9Y2uepp>

Conclusions

As stated in the introduction, the project was born with the idea of being continuously "work in progress" and, in fact, both the schools involved and the technical proposals that everything is constantly updated. At present we have managed to set up a small network of schools that are trying to equip themselves with self-built weather stations to measure the main environmental parameters and create a public database. It would be nice if in the future we could set up an increasingly larger network of schools with increasingly precise tools that can contribute to the study of climate change. It would also be useful to find funding for the purchase of a better performing weather station for each school.

References

General purposes

[ESA Climate Detectives website](#)

[micro:bit website](#)



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[Arduino website](#)

[Raspberry PI website](#)

“Unplugged” weather station

[Unplugged weather station \(in Italian\)](#)

[Anemometer \(in Italian\)](#)

[Rain gauge \(in Italian\)](#)

[Hygrometer \(in Italian\)](#)

[Weather station \(in Italian\)](#)

Thermometer

<https://www.sciencebuddies.org/stem-activities/homemade-thermometer>

Hygrometer

<https://www.sciencebuddies.org/stem-activities/humidity-meter-hygrometer>

Rain gauge

<https://www.education.com/science-fair/article/DIY-rain-gauge/>

Anemometer

<https://www.education.com/science-fair/article/make-anemometer/>



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Anemoscope

<https://www.amnh.org/explore/ology/earth/make-your-own-weather-station/make-a-wind-vane>

<https://www.wikihow.com/Make-a-Wind-Vane>

Weather station with Arduino

[How to build a weather station with Arduino \(in Italian\)](#)

[Weather Station Kit with Solar Panel](#)

[Let's study the climate let's build a weather station \(in Italian\)](#)

[Build an analogic-digital "Thermohygrometer" with Arduino \(in Italian\)](#)

Lego and Raspberry Pi

[Lego Spike Prime Weather Station with Raspberry Pi](#)



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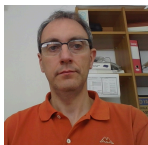
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Who we are

	Giovanni Cielo Technology teacher in the lower secondary school of the Comprehensive Institute 1 of Chieti. Graduated in electronic engineering at the University of L'Aquila, curious about robotics and space.
	Samuel Branco Computer Science teacher at a secondary school in Portugal. I mainly teach web programming, digital systems and robotics. I'm also coordinator of the school's programming and robotics club, Erasmus+ coordinator and etwinner.
	Celestino Magalhães Adjunct Professor and Coordinator of the Postgraduate Course in ICT: Hybrid Learning Ecosystems at ESDE – Higher School of Sports and Education at the Piaget Institute of Vila Nova de Gaia. Areas of interest include Artificial Intelligence, Virtual Reality, Educational Technology, Mathematics and Science.
	Violetta Menichini Math and Science teacher in the lower secondary school IC Don Milani in Civitavecchia (Rome) - Italy. Graduated in Geology at the “la Sapienza” University in Rome. Areas of interest: geology; Space; teaching with Space; GNU-Linux.



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	Jurgi Aguilar Computer Science teacher at a upper secondary school Ategorri BHI in Erandio (Basque Country) Graduated in Computer engineering at the University of Deusto.
	Maria Giovanna Battaglia Primary school teacher at IC Portella della Ginestra - Vittoria (RG), and teacher trainer. STEM teacher teaching math and science with a strong focus on digital innovation and sustainability. Coordinator of environmental projects, advocate for creative and inclusive education.
	Cristina Iulia Anghel Physics teacher at Tudor Vianu High School - Giurgiu, Romania. Scientix ambassador.
	Emanuel Bettencourt Upper secondary Physics and Chemistry teacher at AEFFL, Olhão, Portugal. Portuguese Scientix Ambassador Science, Astronomy, Space, robotics, electronics, STE(A)M, eTwinning and Erasmus!! I love teaching!!! Email: emanuelsantos124@aeffl.pt



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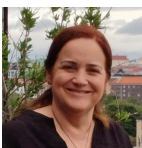
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	Anițaș Cornelia Lăcrămioara Physics teacher at “Emil Racoviță” Theoretical High School, Baia Mare (România). Scientix Ambassador for Romania, etwinner. Graduate of the Faculty of Physics and Chemistry at the University of Bucharest and the Faculty of Computer Science at the Technical University of Cluj-Napoca. Areas of interest: STEM; space; teaching with space; sustainability; healthy living; curious about robotics.
	Maria Celestina Henriques I am a teacher of Biology and Geology, Natural Sciences, and Citizenship. I work with students from 9th to 12th grade. I enjoy working with my students through projects, where they can learn in a practical and active way. I am especially interested in topics such as climate change, the environment, and sustainability, and I like to help my students understand these important global challenges and become more responsible citizens.
	Burcu YÜKSEK I m preschool teacher and Scientix Ambassador, eTwinner, Erasmus+ coordinator. https://burcuyuksek.weebly.com/
	Emmy Daems Teacher at the first grade of secondary school Heilig Graf, Turnhout, Belgium. Subjects: (natural) sciences, math Interests: nature, climate, environment (but also: hiking, cycling, skiing, playing music,...)



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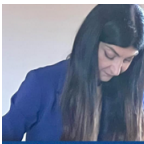


Heilig Graf



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	Liesbeth Hofkens Teacher at the first grade of secondary school Heilig Graf, Turnhout, Belgium. Subjects: STEM teaching
	Rosanna Busiello Science Teacher of Liceo Scientifico e delle Scienze Umane S. Cantone di Pomigliano d'Arco Subjects: Science Interests: biology, genetics, biodiversity, earth science
	Utzeri Stefania Teacher at the first grade of secondary school Istituto comprensivo 2 Selargius. Subjects: (natural) sciences, math Interests: nature, climate, environment.
	Doina Breazu Chemistry teacher at the “Decebal” Technological High School in Drobeta-Turnu Severin, Romania, and Scientix Ambassador for Romania. Interest: nature, climate, earth science.



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Iordache Mariana Mirela

Physics teacher at the “Decebal” Technological High School in Drobeta-Turnu Severin, Romania,

Interest: climate, nature exploring, earth science