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Power of Digitalization in Fighting Against Climate Change

IMPRESS

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BILIM VE SANAT MERKEZI

IC2LODI GIOVANNI SPEZZAFERRI

MiLat

ASSOCIATION HEXAGONALE de l'Innovation Sociale et de l'Education

5th HIGH SCHOOL Agrinio · Greece

OUR PARTNERS

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What is our GOAL?

To raise awareness about climate change and find ways to solve this problem with **21st Century Digital Competences** and **Innovative Teaching Approaches**

Working Packages

1 Project Management

2 Increasing GREEN in education

3 Design development to prevent climate change

4 POfDigi Guide to Best Practices for eduactors

5 Announcing and Promoting

Power of digitalization in fighting againt climate change

[redacted] Arduino [redacted]

Hexagonale Association

Collège Pierre Curie, Goussainville-France

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Arduino

Introduction

Digital technology offers powerful tools to address climate change challenges.

This report explores how Arduino, an accessible electronic platform, enables students across Europe to create innovative environmental solutions.

Through seven country-specific projects, we demonstrate how simple technology can have meaningful environmental impact.

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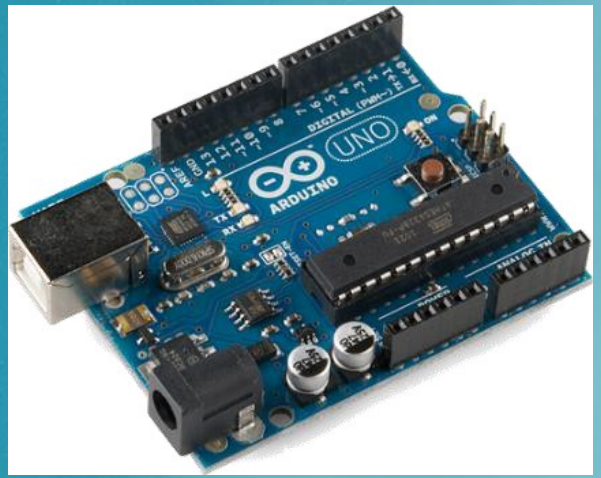
Arduino

What is Arduino:

Arduino is a printed circuit board in **free hardware** (The plans of the board itself are accessible by everyone, for free) on which there is a **microcontroller (tiny computer)** that can be programmed to analyze and produce electrical signals (An electrical signal is a passage of electricity in a part of the circuit. Here the electricity produced by the arduino will always be 5V DC)

It usually looks like this



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[redacted] Arduino [redacted]

Creative artists

They came from a design school near the city of Turin in Italy.

Their students could not give free rein to their creativity, too often, the level of electronics, programming and cost limited them to projects that were too simple.

But these creative artists have managed to create a link between the real and digital world.

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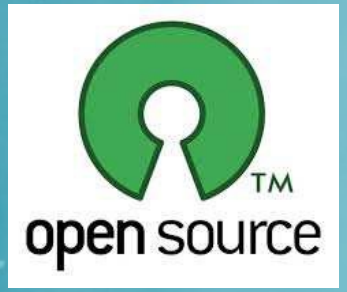
[redacted] Arduino [redacted]

Arduino: a philosophy

The hardware is open source:
- Can be copied, manufactured and modified Freely.

The software is free:
- It can be used and modified freely.

On the Internet, we find:
- A community of users.
- User guides.
- Examples : forums of mutual assistance.



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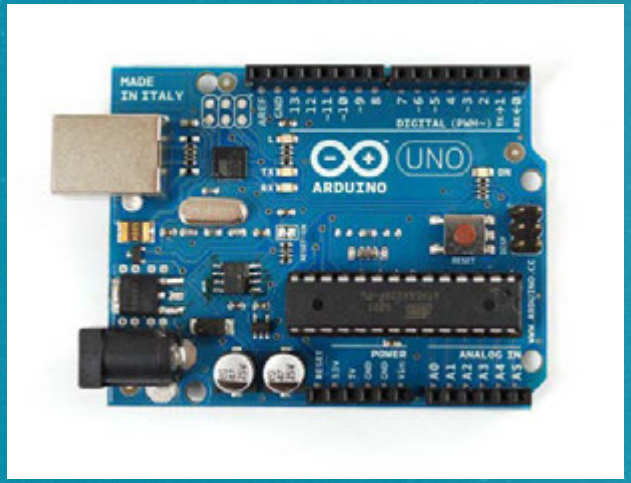
[redacted] Arduino [redacted]

Arduino in summary

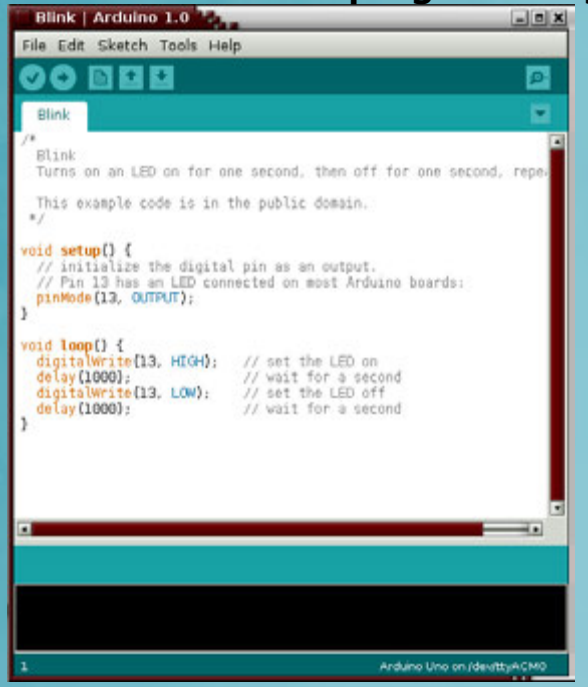
An electronic board



A community that exchanges

http://arduino.cc/

An environment of programming



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[redacted] Arduino [redacted]

Arduino is very popular

Arduino has become popular worldwide because:

Easy to learn: Simple programming language suitable for beginners
Affordable: Basic kits cost around €20-30
Creative: Can be used for countless applications
Educational: Teaches electronics, programming, and problem-solving
Community-supported: Extensive online resources and examples

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[redacted] Arduino [redacted]

Benefits for Students and Schools

Arduino provides exceptional educational value, particularly for students aged 13-18:

Hands-on learning: Students create working devices that solve real problems
Cross-disciplinary: Combines science, technology, engineering, mathematics, and even arts
Collaborative: Encourages teamwork and knowledge sharing
Future-focused: Develops digital skills essential for tomorrow's careers
Inclusive: Accessible to students with different learning styles and abilities
Motivating: Immediate results keep students engaged and interested

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[redacted] Arduino [redacted]

Area of use

Physical computing: building physical systems interactive applications that use software and hardware that can interface with **sensors and actuators.**

Industrial and embedded electronics
Art / Spectacle
Home automation
Robotics
Modelling
DIY (Do-It-Yourself), Hacker,
Education, etc.

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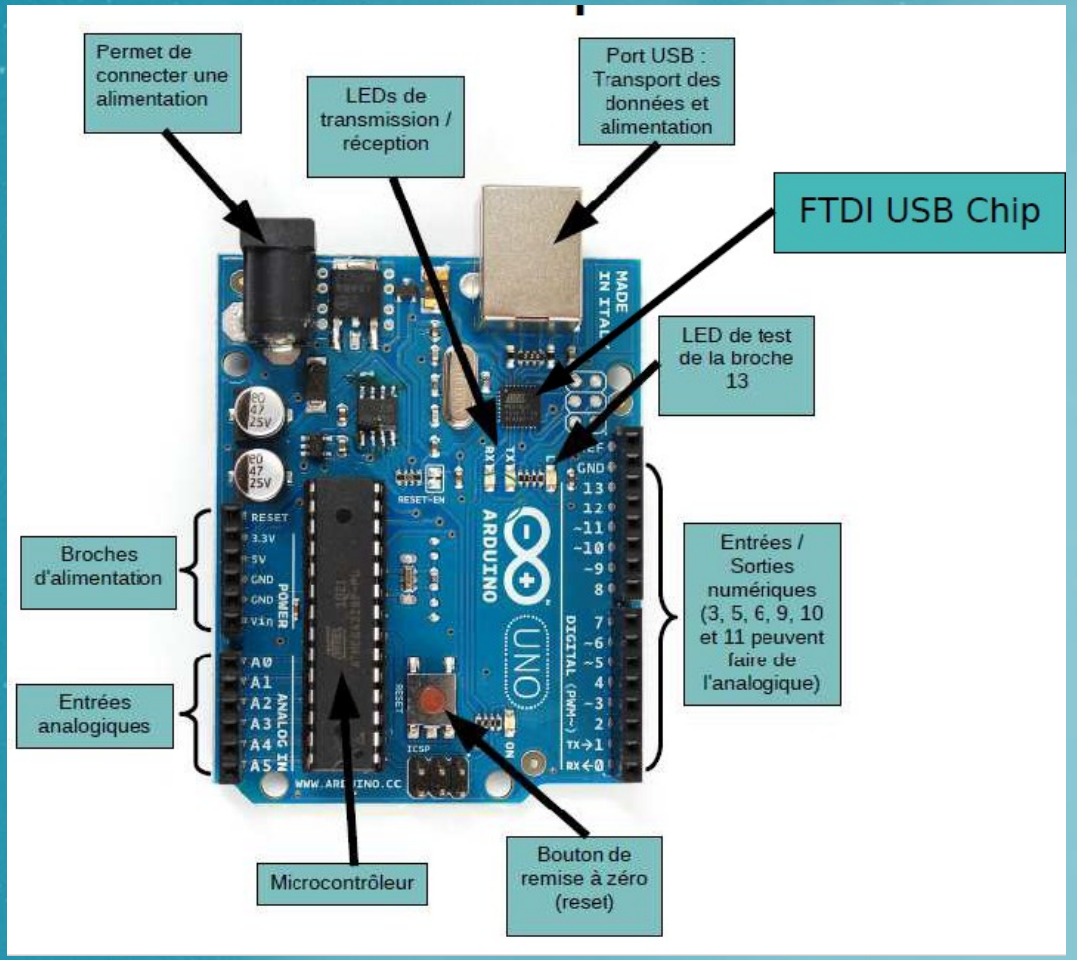
[redacted] Arduino [redacted]

The Arduino electronic board



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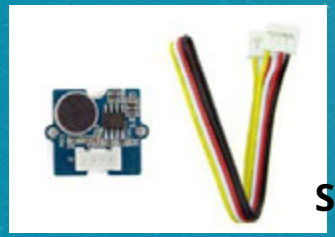
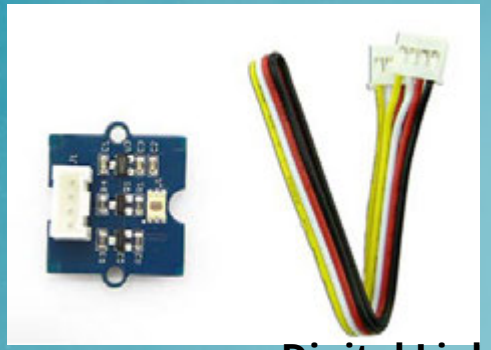
[redacted] Arduino [redacted]

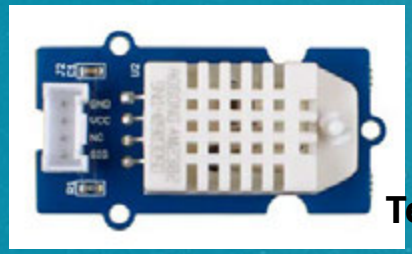
Examples of sensors



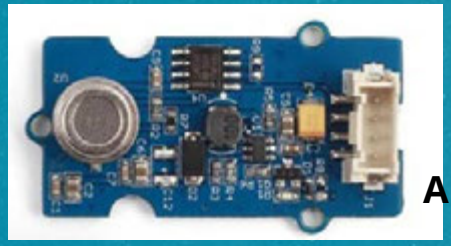
Sound Sensor



Digital Light Sensor



Temperature & Humidity Sensor



Air quality sensor

The sensors provide information so they connect directly to the inputs and this without soldering using a connector.

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[redacted] Arduino [redacted]

Examples of actuators

Mini Servo motor 120 degrees

Buzzer

Led

LCD display

The actuators receive an electrical signal to act if the software requests it. They are connected directly to the **output pins**.

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[redacted] Arduino [redacted]

1. Let’s program our Arduino

The strength of the Arduino is to offer us the microcontroller, I/O, connectivity and power supply on a single board. The Arduino board is built around a microcontroller

The Arduino is therefore a board that **connects to the computer to be programmed**, and **can then operate on its own if it is supplied with energy.** It allows to receive information and transmit from or to electronic equipment: diodes, potentiometers, receivers, servomotors, motors, detectors... The Arduino is therefore able to produce or pick up these signals at our request through programming.

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[redacted] Arduino [redacted]

2. Let’s program our Arduino

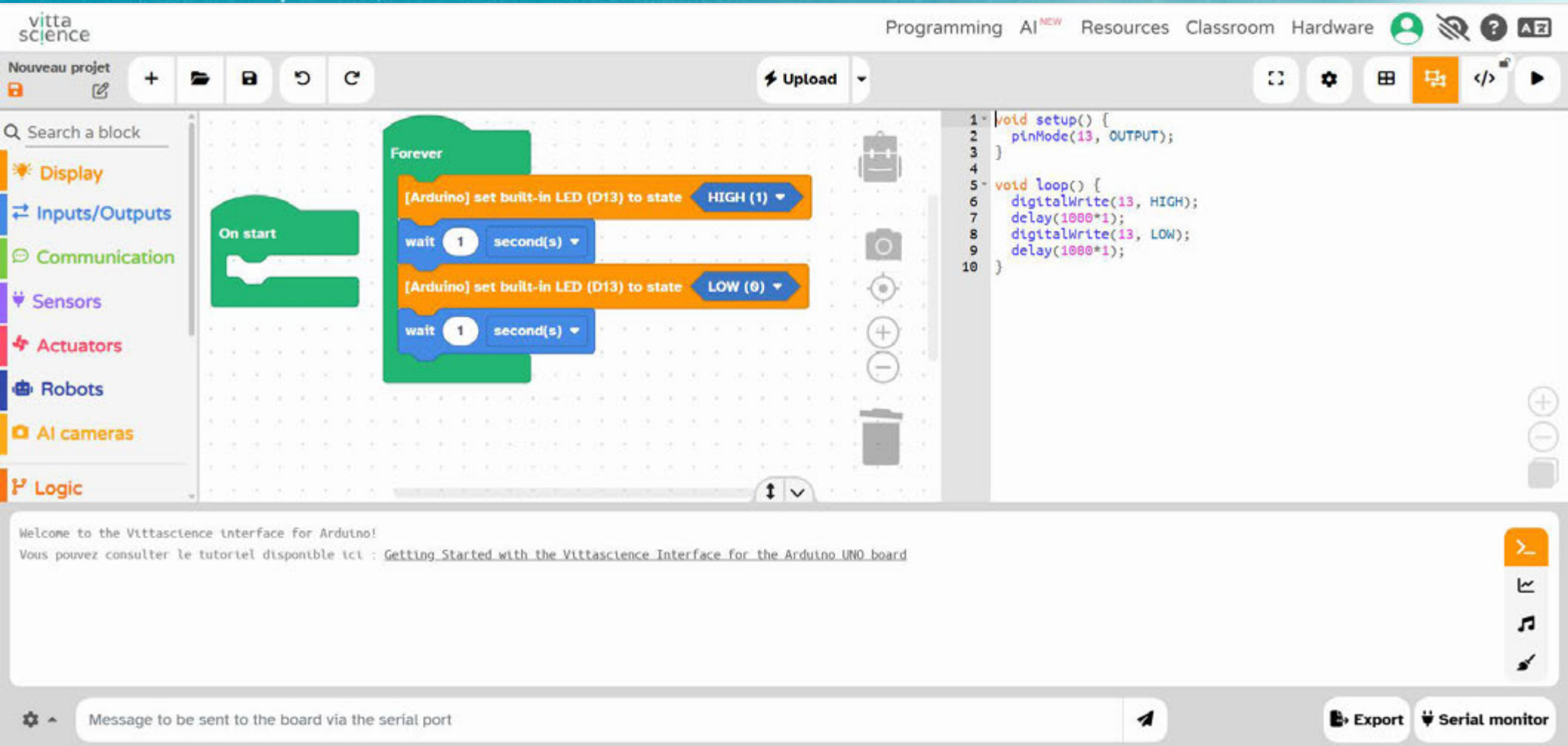
The Arduino **language is based on C/C++.**

In high schools, students generally use language c.

For students aged 11 to 14 cannot understand these languages, we use interfaces that allow programming in graphic form using blocks.

To program the Arduino UNO board, we use the Vittascience interface, available at: **https://fr.vittascience.com/arduino/**

3. Let’s program our Arduino



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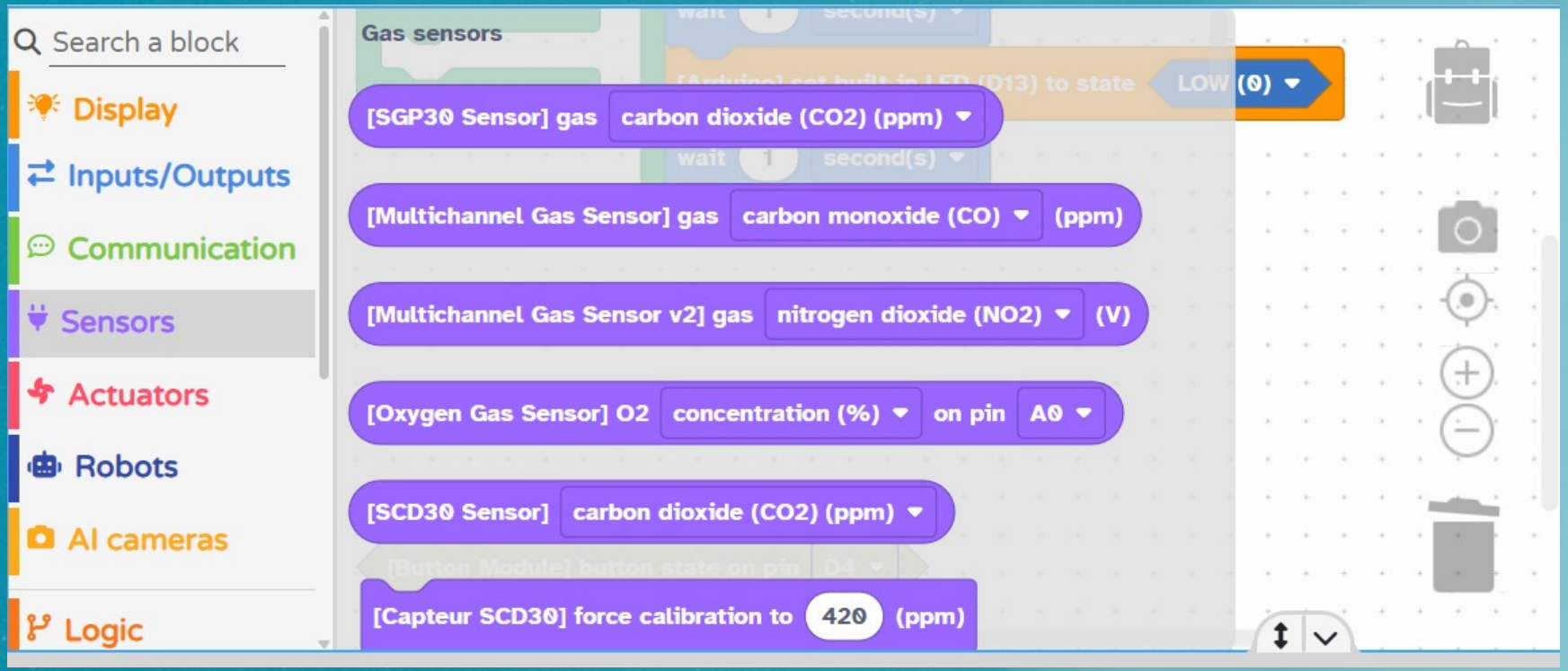
[redacted] Arduino [redacted]

3. Let’s program our Arduino



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[redacted] Arduino [redacted]

4. Let’s program our Arduino

-we connect our sensors and actuators on the inputs and outputs of our arduino board;

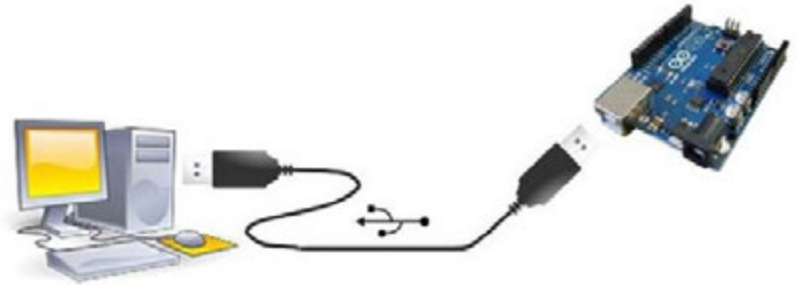
-the Vittascience arduino interface is installed on the PC to access programming blocks;

-we connect our Arduino board to the PC;

-the program is done on the PC;

- the program is uploaded to the arduino board;

-we test our program on the card by intervening on the sensors.



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[redacted] Arduino [redacted]

1. Environmental Projects Across Europe

Austria: Smart Irrigation Management

Concept: A system that waters plants only when they actually need it, based on soil moisture levels.

How it works:

Soil moisture sensors measure water content at different depths

Arduino processes this data to determine irrigation needs

System activates watering only when necessary and stops when soil is sufficiently moist

Environmental impact:

Up to 60% water savings compared to traditional irrigation

Reduced soil erosion and fertilizer runoff

Healthier plants with optimized water usage

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[redacted] Arduino [redacted]

2. Environmental Projects Across Europe

Italy: Autonomous Smart Greenhouse

Concept: A self-regulating greenhouse that creates optimal growing conditions while minimizing resource use.

How it works:

Sensors monitor temperature, humidity, light levels, and water availability

Arduino automatically activates ventilation, irrigation, or lighting as needed

System adapts conditions based on plant type requirements

Environmental impact:

90% less water usage than traditional farming

Enables local food production year-round, reducing transportation emissions

Optimizes plant growth with minimal resources

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[redacted] Arduino [redacted]

3. Environmental Projects Across Europe

Turkey: Intelligent Street Lighting

Concept: Street lights that automatically activate only when vehicles or pedestrians are present.

How it works:

Motion sensors detect approaching cars or pedestrians

Arduino turns on lights just ahead of movement

Lights dim gradually after passage

Environmental impact:

60-80% reduction in electricity usage

Decreased light pollution affecting nocturnal animals

Extended lifespan of lighting equipment

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[redacted] Arduino [redacted]

4. Environmental Projects Across Europe

Croatia: Low-Cost Seismic Detection Network

Concept: An affordable earthquake early warning system that helps communities prepare for seismic events.

How it works:

Vibration sensors (accelerometers) detect early seismic waves

Arduino analyzes vibration patterns to identify earthquakes

System triggers alarms and sends alerts when needed

Climate change connection:

Climate change increases geological instability in some regions

Early warning systems are crucial for adaptation to extreme events

Prevents secondary disasters like fires or chemical spills

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[redacted] Arduino [redacted]

5. Environmental Projects Across Europe

Poland: Eco-Friendly Airship Monitor

Concept: A solar-powered mini-airship equipped with sensors to monitor air quality and detect pollution.

How it works:

Arduino controls motors and propellers for movement

Sensors measure CO_2, particulate matter, and other pollutants

Camera captures images of monitored areas

Solar panels provide clean energy for operation

Environmental impact:

Maps air pollution patterns in different areas

Identifies pollution sources for targeted action

Zero-emission monitoring solution

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[redacted] Arduino [redacted]

6. Environmental Projects Across Europe

Greece: Self-Regulating Climate-Adaptive Building

Concept: A system that automatically adapts a building to weather conditions by controlling windows, blinds, and ventilation.

How it works:

Sensors measure temperature, humidity, light, wind, and rain

Arduino decides when to open/close windows and blinds

System prioritizes natural solutions (ventilation, daylight) before mechanical systems

Environmental impact:

40-60% reduction in energy consumption

Decreased reliance on artificial air conditioning

Better adaptation to extreme weather events related to climate change

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[redacted] Arduino [redacted]

7. Environmental Projects Across Europe

France: Smart Thermal Regulation System

Concept: A system that automatically optimizes heating and cooling based on indoor and outdoor temperature sensors.

How it works:

Temperature sensors measure conditions in different areas

Arduino compares these readings and controls heating/cooling systems

Energy is used only when truly necessary

Environmental impact:

15-30% reduction in energy consumption

Lower CO_2 emissions from heating and cooling

Prevents energy waste through precise regulation

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[redacted] Arduino [redacted]

Why are these projects important?

They show how technology can help:

- **Saving resources:** water, energy, materials
- **Reduce** our environmental impact
- **Adapting** to climate change already underway
- **Educate others** about the importance of taking action
- **Create** local solutions to global problems

Above all, they prove that:

- **You don’t need** to be an expert to get started
- **Every small project counts** in the fight against climate change
- **Young people have a crucial role** to play in green innovation
- **International collaboration** (such as Erasmus) to share best ideas

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[redacted] Arduino [redacted]

Conclusion

Arduino represents an accessible entry point to ecological innovation for students of all backgrounds. The projects showcased demonstrate how relatively simple technology can address complex environmental challenges.

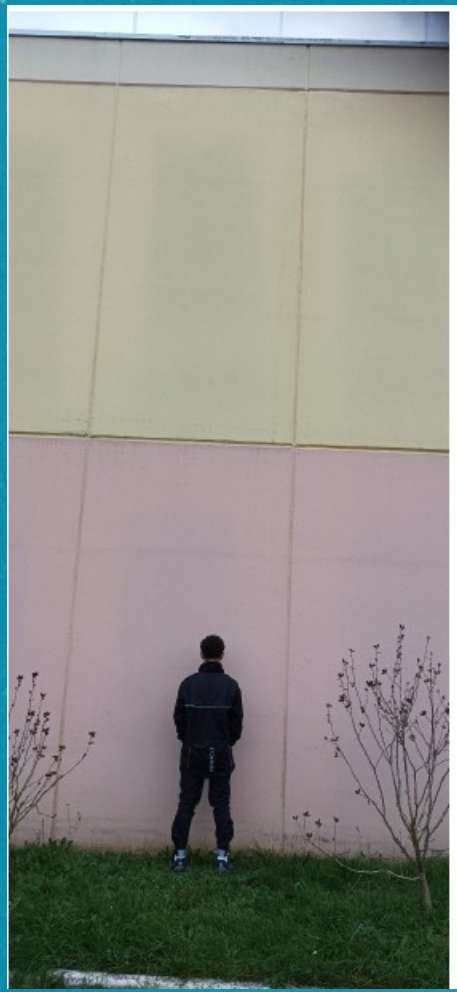
Each country has brought its unique perspective to solving environmental problems using the same basic technology. **This perfectly embodies the Erasmus spirit: sharing cultures and ideas to create a better future together.**

These Arduino-based solutions prove that fighting climate change doesn't always require complex, expensive technology. Sometimes, the most powerful innovations come from accessible tools in the hands of creative young minds.

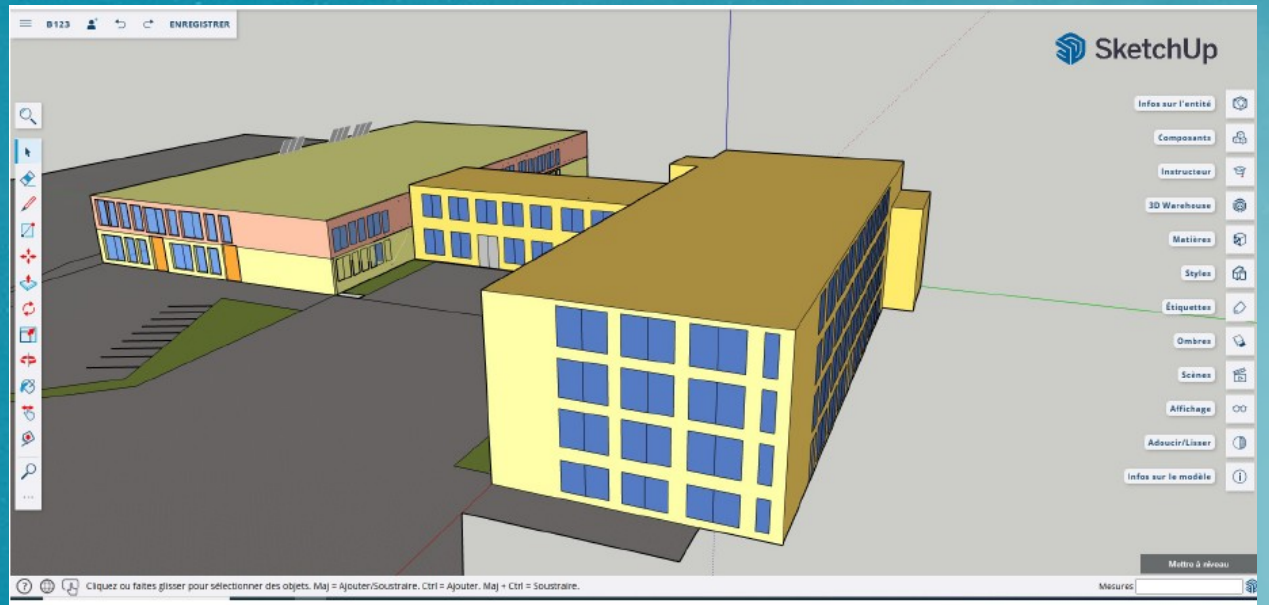
By combining these approaches, an integrated and coherent strategy can emerge, where each solution contributes to the collective effort of reducing our environmental footprint while preparing our societies to adapt to the already inevitable consequences of climate change.

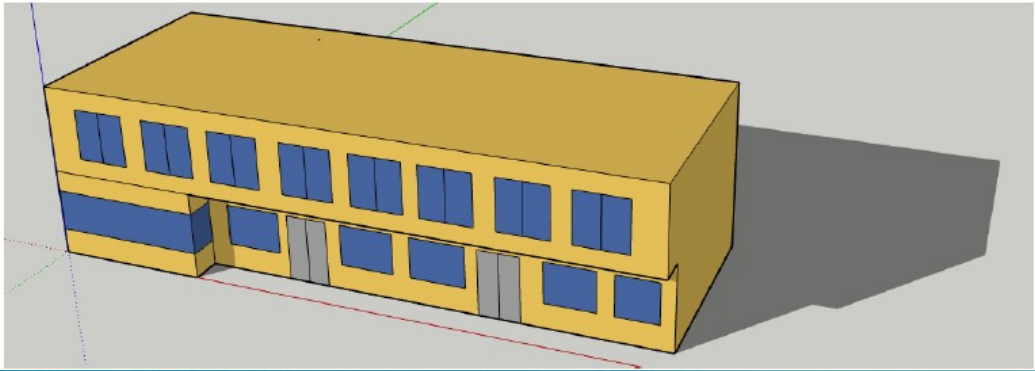
Our students from the robotics club during a departmental competition

Deduce the dimensions of our school



Creation of the model with the SketchUp





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Work package n°3 | 3° LTT's
Agrinio (Greece) | 10/16 December 2023

Italy

Istituto Comprensivo Lodi 2° "Giovanni Spezzaferri"

Sofia, Fabio, Federico, Elisa

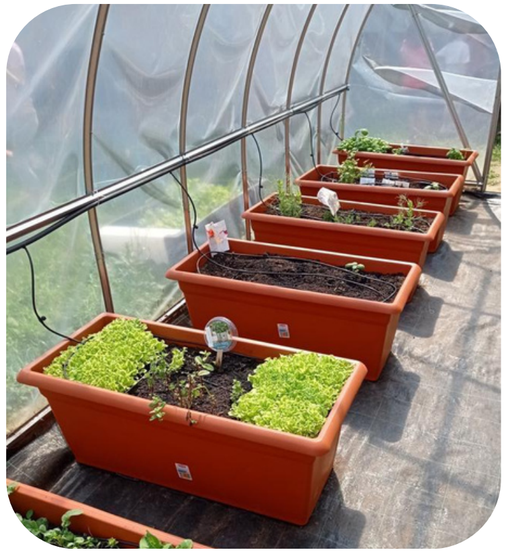
We are students of a Comprehensive school in Lodi, a town close to Milan.

We attend the third year of our Secondary school and we are 13 years old.

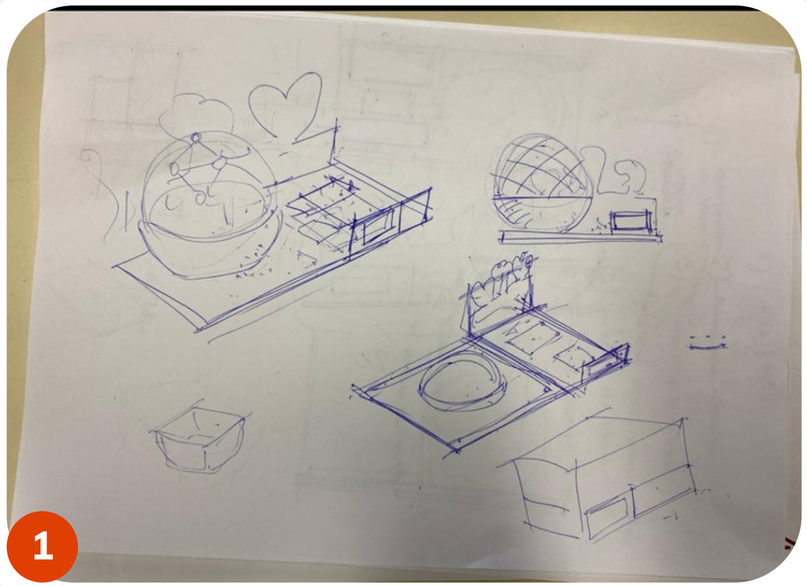
We created a system that helps in fighting against climate changing

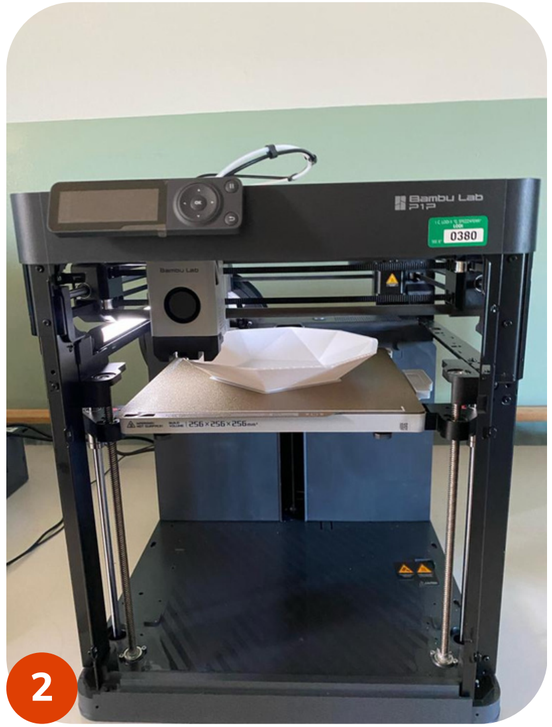
Our project

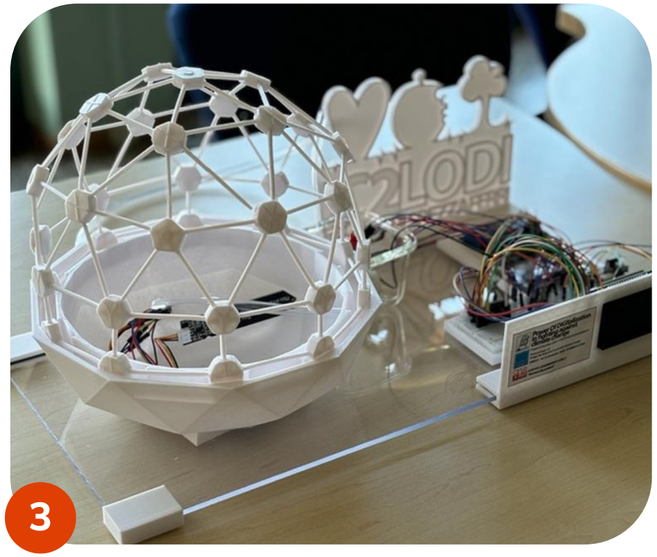
We took inspiration from the greenhouse of our primary school G. Pascoli it was impossible to us to bring it to Agrinio so we have reproduced it on small scale and we automated it using Arduino and we reproduced it with the 3D printer



Process

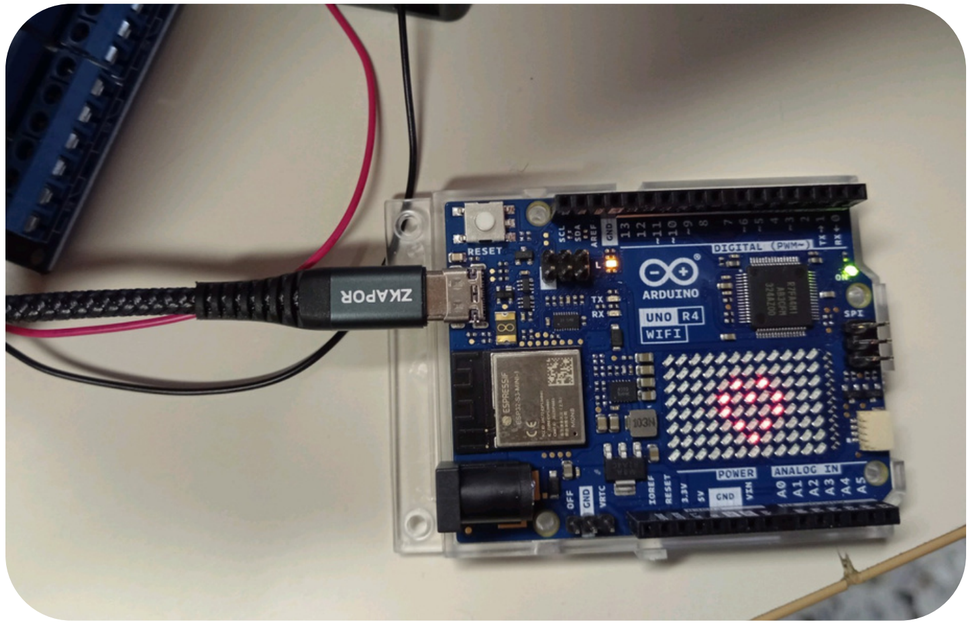






Arduino

It's an italian project born in 2005 in Ivrea, a city in Piedmont in province of Turin, in the Arduino bar (from where it took its name).
It was invented by Massimo Banzi. He, wanted to create something to permit the students to program without spending much money

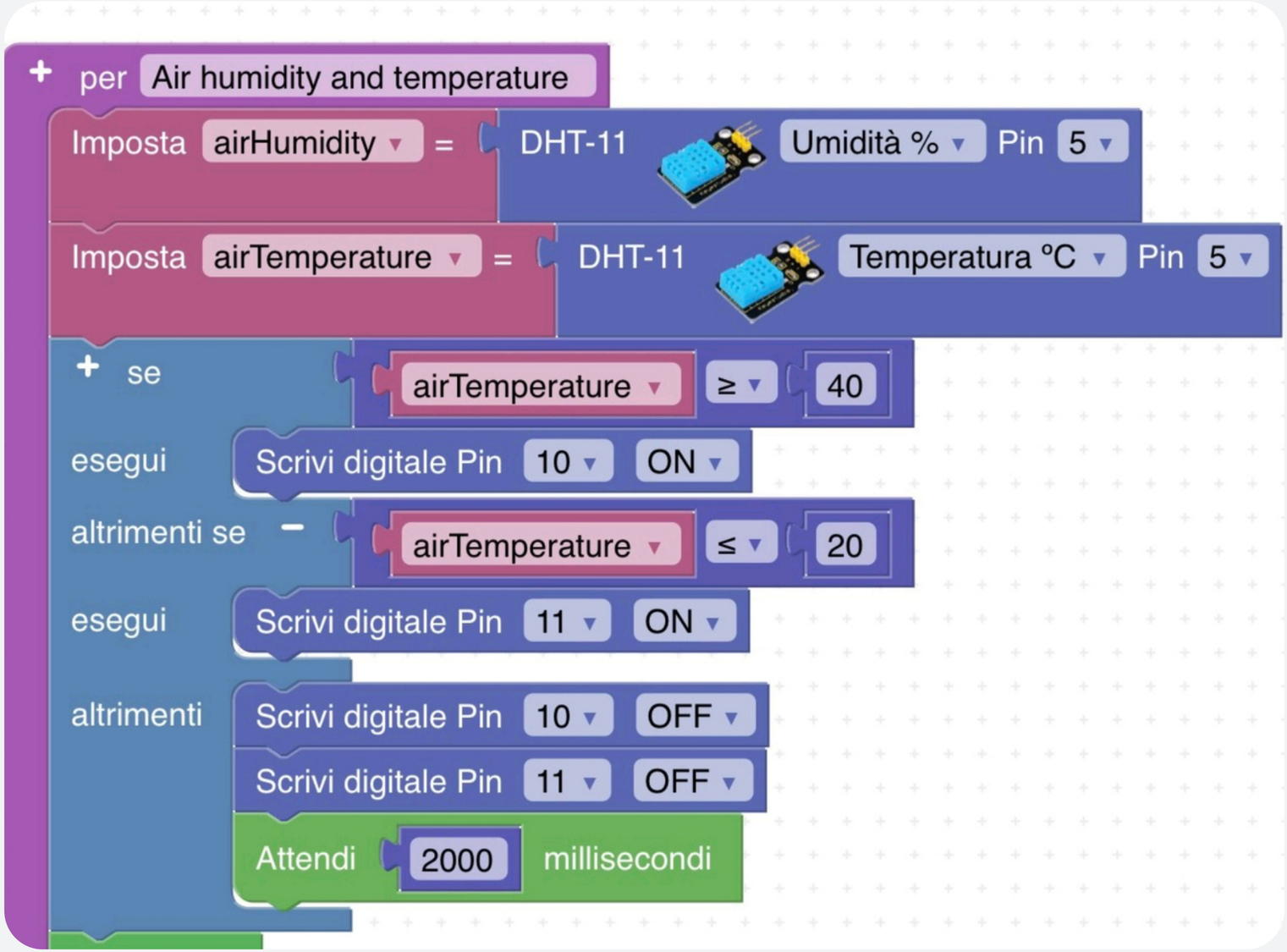


Arduino
functions

Arduino is a hardware platform that can be applied in many areas like: home automation, drone programming , 3D printers and a lot of other areas.

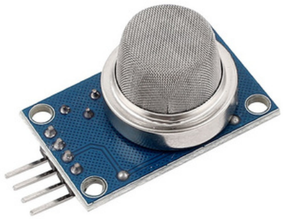
Programming

To program Arduino, we used arduino blocks, a simple and intuitive program that uses blocks instead of computer language in code



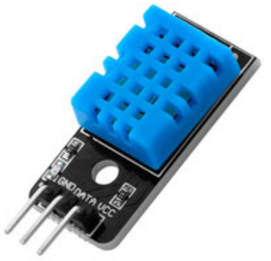
Sensors

GAS SENSOR (MQ135)



WATER SENSOR

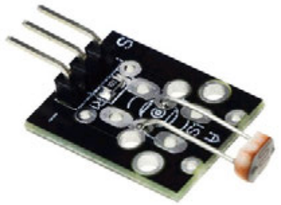
DHT11



Sensors

SOIL HUMIDITY SENSOR

PHOTORESISTENCE



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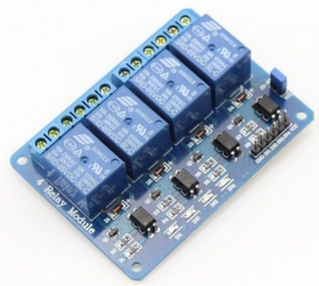


Components

LCD DSPLAY

FAN

WATER PUMP

Our 3D printer

Our BAMBU LAB P1P printer is very fast, but to make the base of the greenhouse it took 6 hours. In addition, our greenhouse is formed by detachable parts that when assembled form an icosahedron

Greenhouse organization

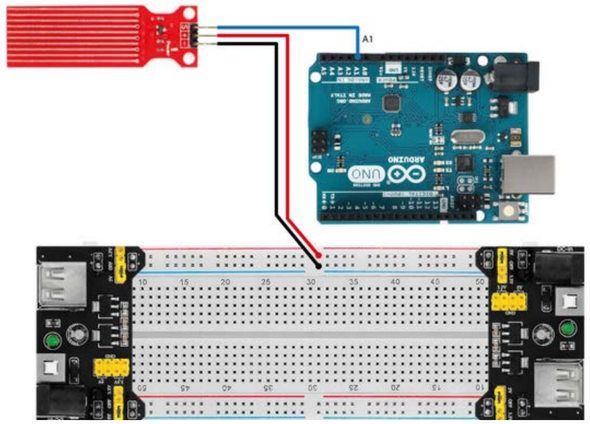
The greenhouse is equipped with the sensors listed above.
It is able to completely dress itself: from rainwater storage to automatic management of air temperature and humidity to lighting and irrigation.
Doing so reduces water consumption (with drip irrigation system) and creates an ideal environment for a certain plant species.

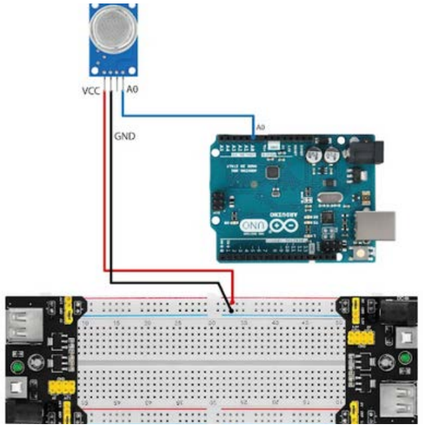
Our project

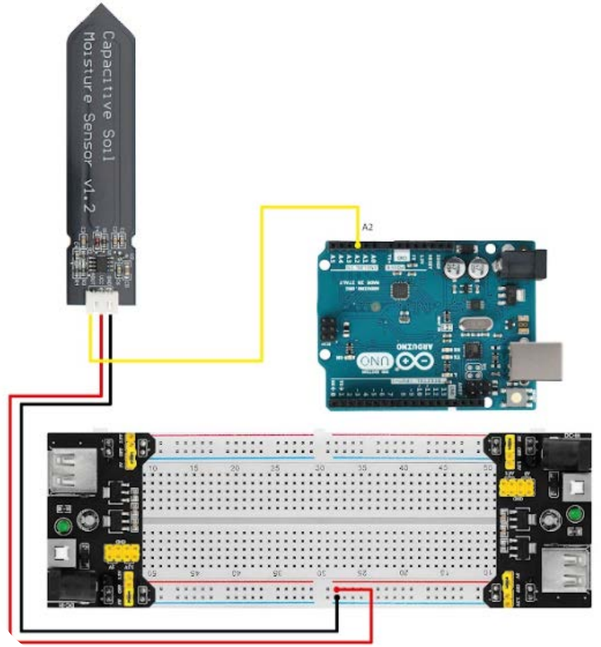
To make the greenhouse, we 3D printed the various elements and assembled them, then added components to ensure stability and a comfortable environment for the plants

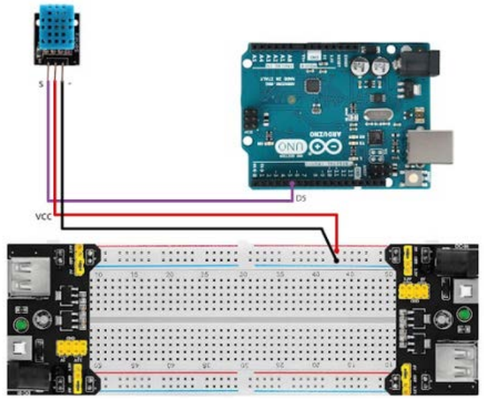
NOW WE'LL SHOW YOU THE GREENHOUSE'S FUNCTIONING

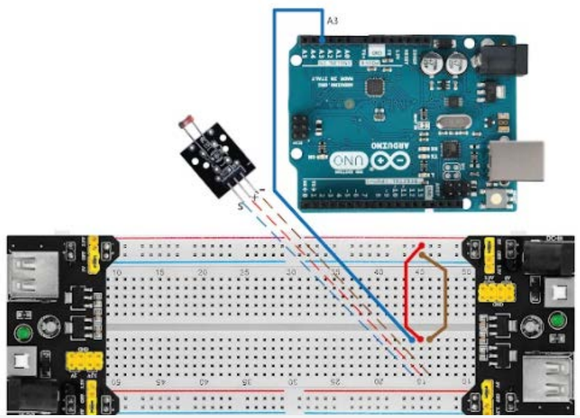
ADOBE ILLUSTRATOR

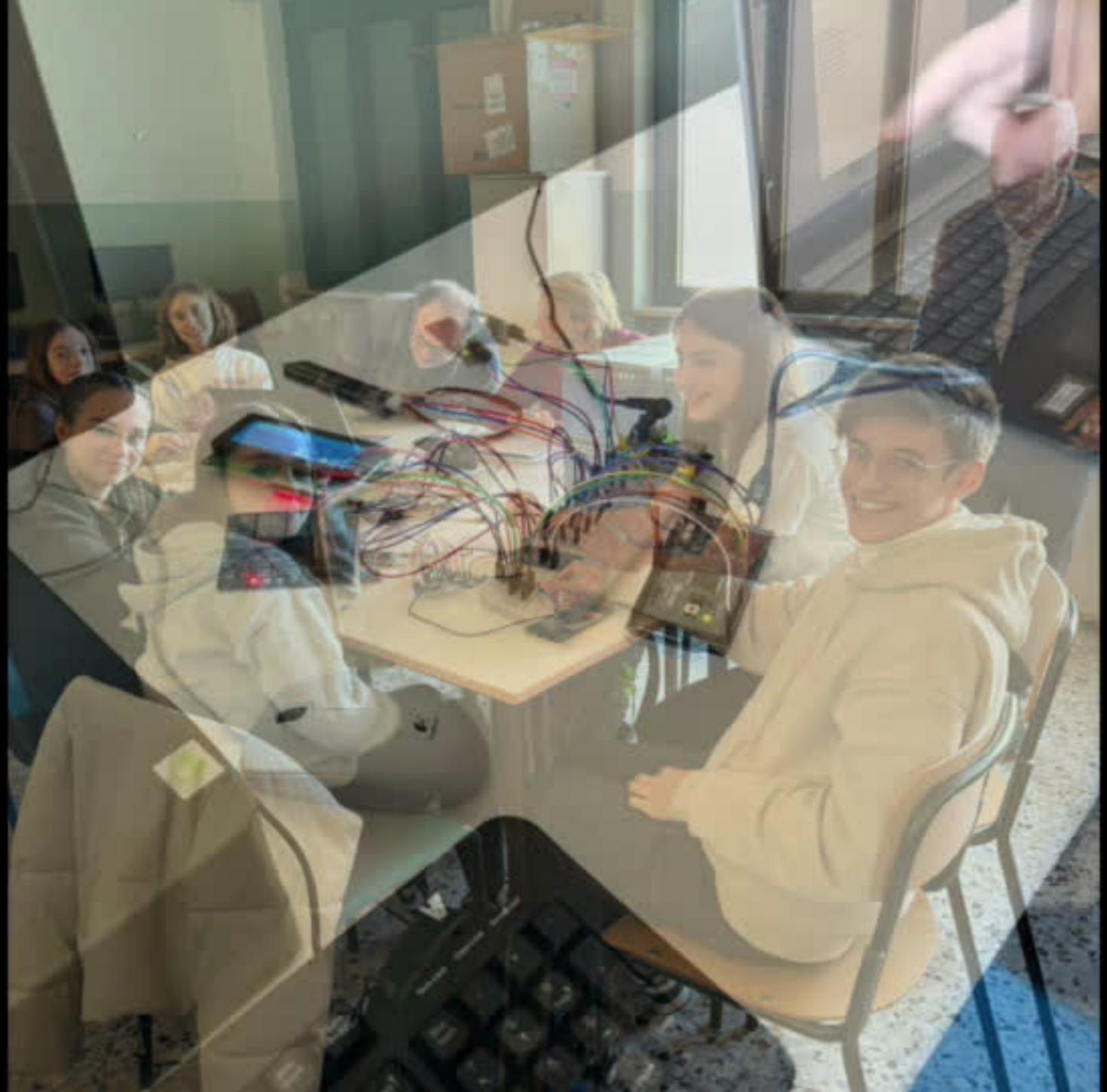












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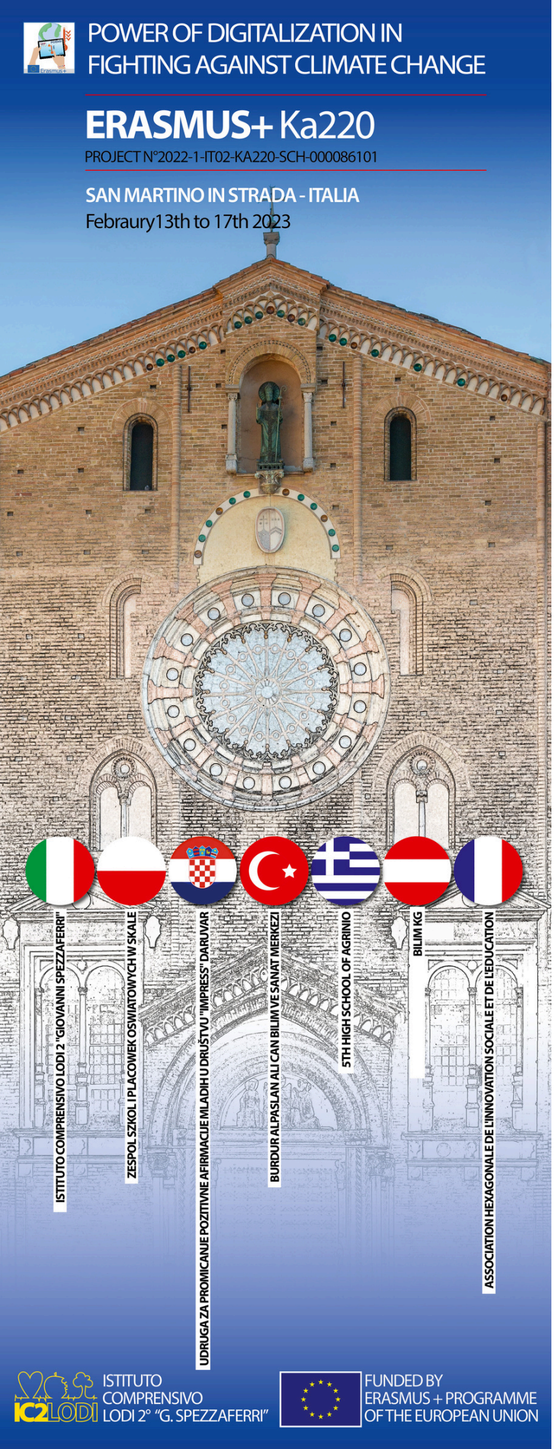
ERASMUS+ KA220 | PROJECT N°2022-1-IT02-KA220-SCH-000086101



First mobility in Lodi
Febraury 13th to 17th
2023

first mobility in Lodi

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GIOVANNI SPEZZAFERRI

our institute

Primary school in Lodi with the administrative and management offices

Istituto Comprensivo Lodi 2° “Giovanni Spezzaferri” is a big Comprehensive school (ages 3-14) in Lodi (North of Italy, Lombardy, 30 kmt from Milan).

our middle schools

Basiasco

Lodi “Spezzaferri”

San Martino in Strada

Work Package n. 2
2° LTT's
Burdur (Turkey) | 15/19 May 2023

SuperBobo Bio

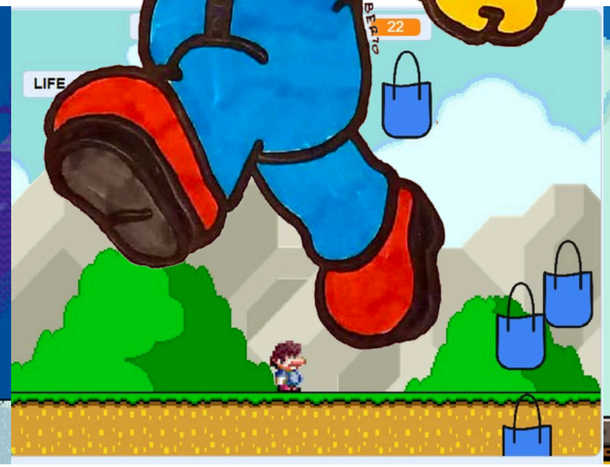
a stratch videogame

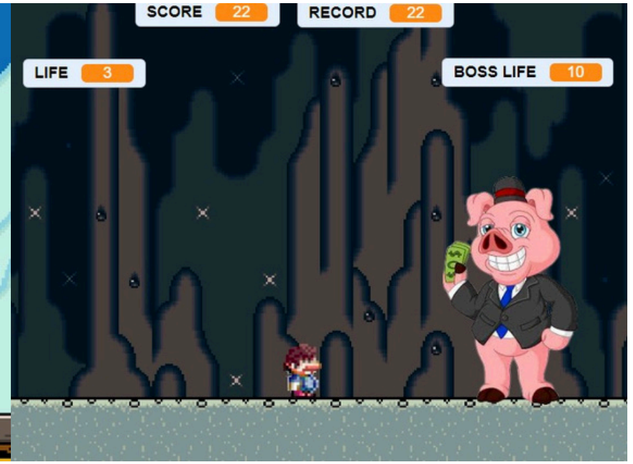
And now, let us go into the details of the projects that our students prepared and then exhibited in the various WPs. The first event was in Turkey, in May 2023: our students, trained in the use of Scratch, made an educational video game with a special protagonist: Super BoboBio

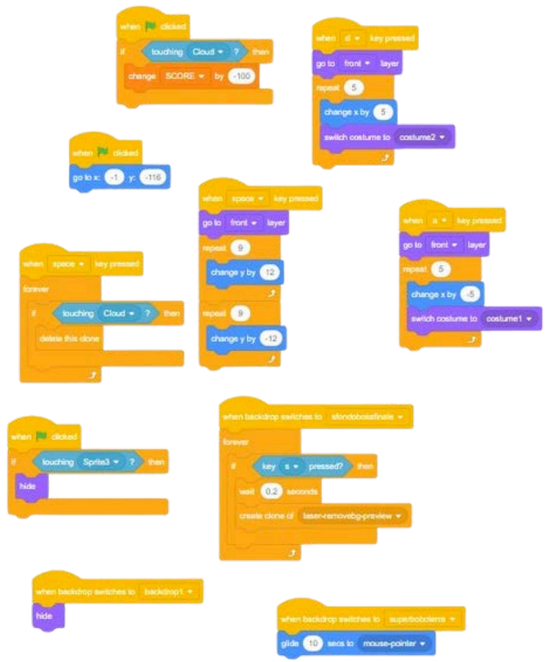
SuperBobo Bio

the levels

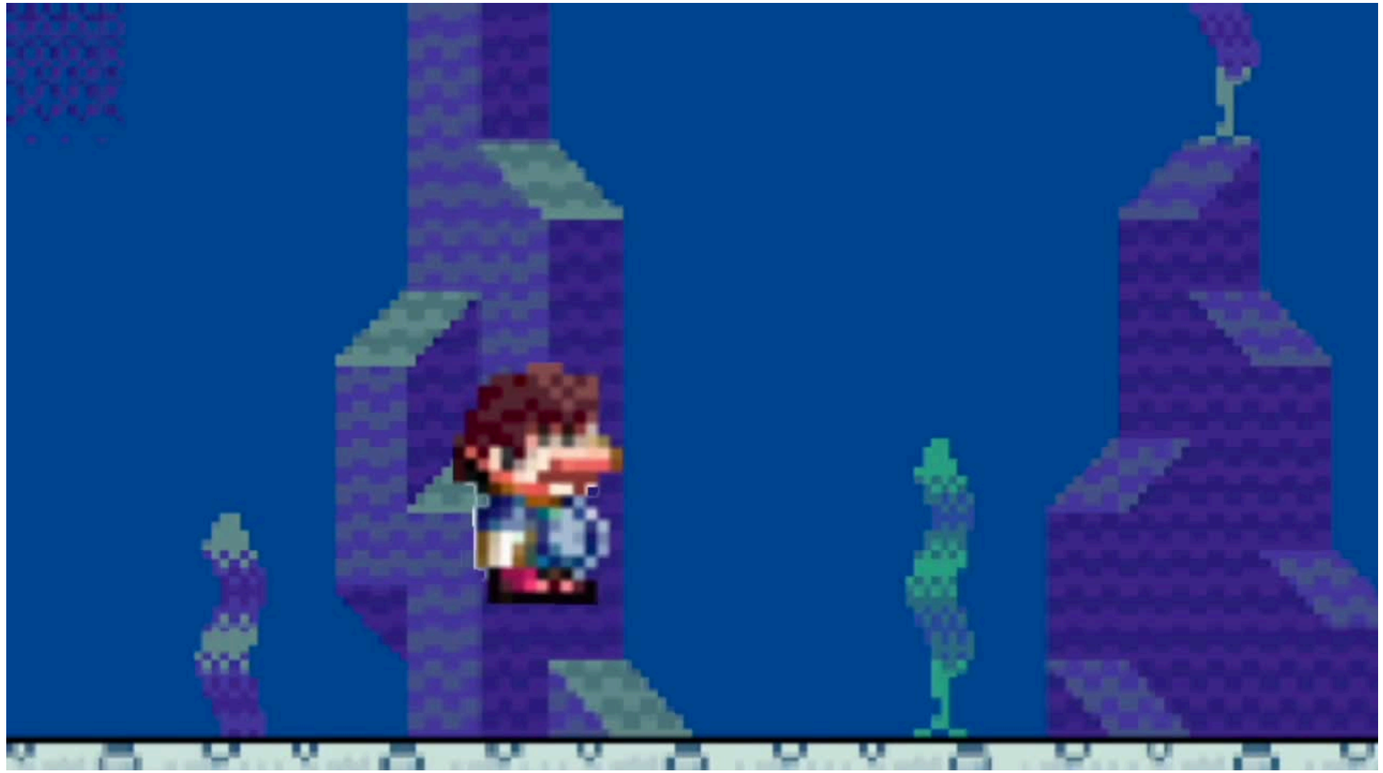
Super Bobobio is a school keeper who wants to clean up the world, and to do so he has to face 3 levels, representing natural environments: the sea, the land and the air. The boys made both the backgrounds and the sprite, inspired by Super Mario. During the game, Super Bobobio must reach a certain score in order to advance to the next level.







game walkthrough



During the game, Super Bobobio must reach a certain score in order to advance to the next level. The first level is the sea, the second the land, and finally the air. The goal of the game is to capture, from time to time, plastic bottles, plastic bags, and then CO2. Having passed the three levels, we arrive at the final challenge, characterized by a Boss. Super Bobobio has to shoot to the Boss to eliminate him, and, like this, finally win the game.

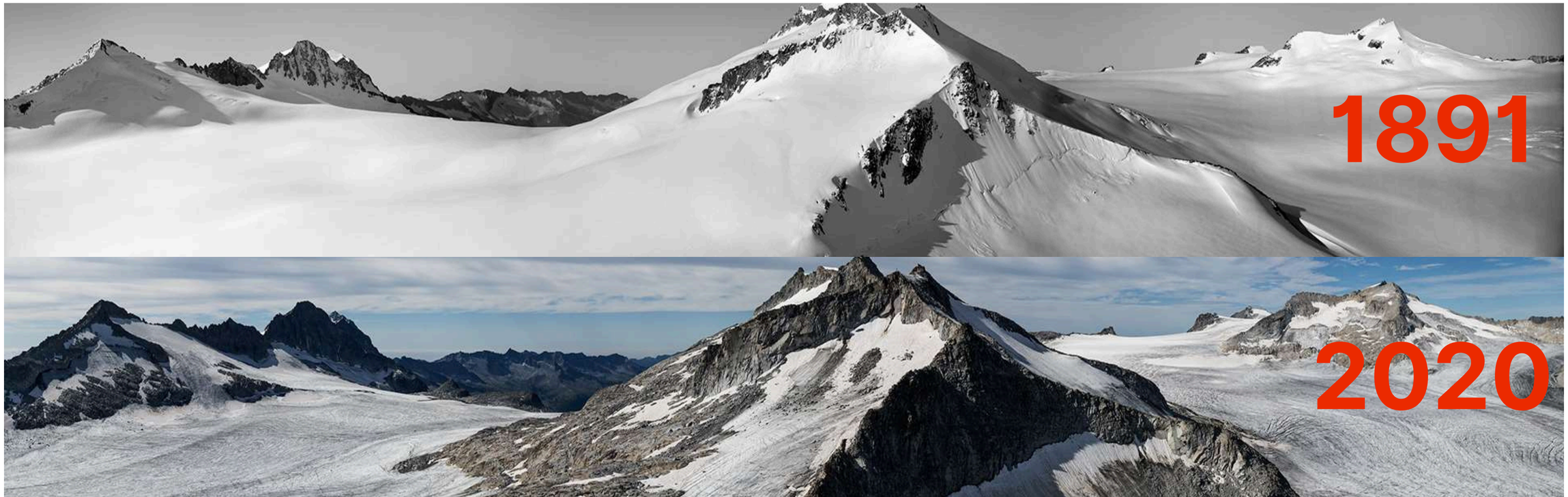
Work Package n. 2
2° LTT's
Burdur (Turkey) | 15/19 May 2023

poster
with canva

Our kids also made a poster in Canva, which was to focus on an effect of global warming in our area: we decided to concentrate our attention on the melting of glaciers.
Due to global warming, Italian glaciers have reduced by 40% in less than 50 years, the Alpine glaciers below 3000 m are going to disappear within 20-30 years. This would cause very serious damage, because glaciers are the reservoir of fresh water during the summer and dry seasons, and are essential for agriculture and industry; moreover, the melting of the ice contributes to the increase in sea level, a phenomenon in great increase in recent years. If the process of rising seas is not slowed down, the possible scenery for the future is the one shown in this graph, where it is clear what cities would gradually be submerged.

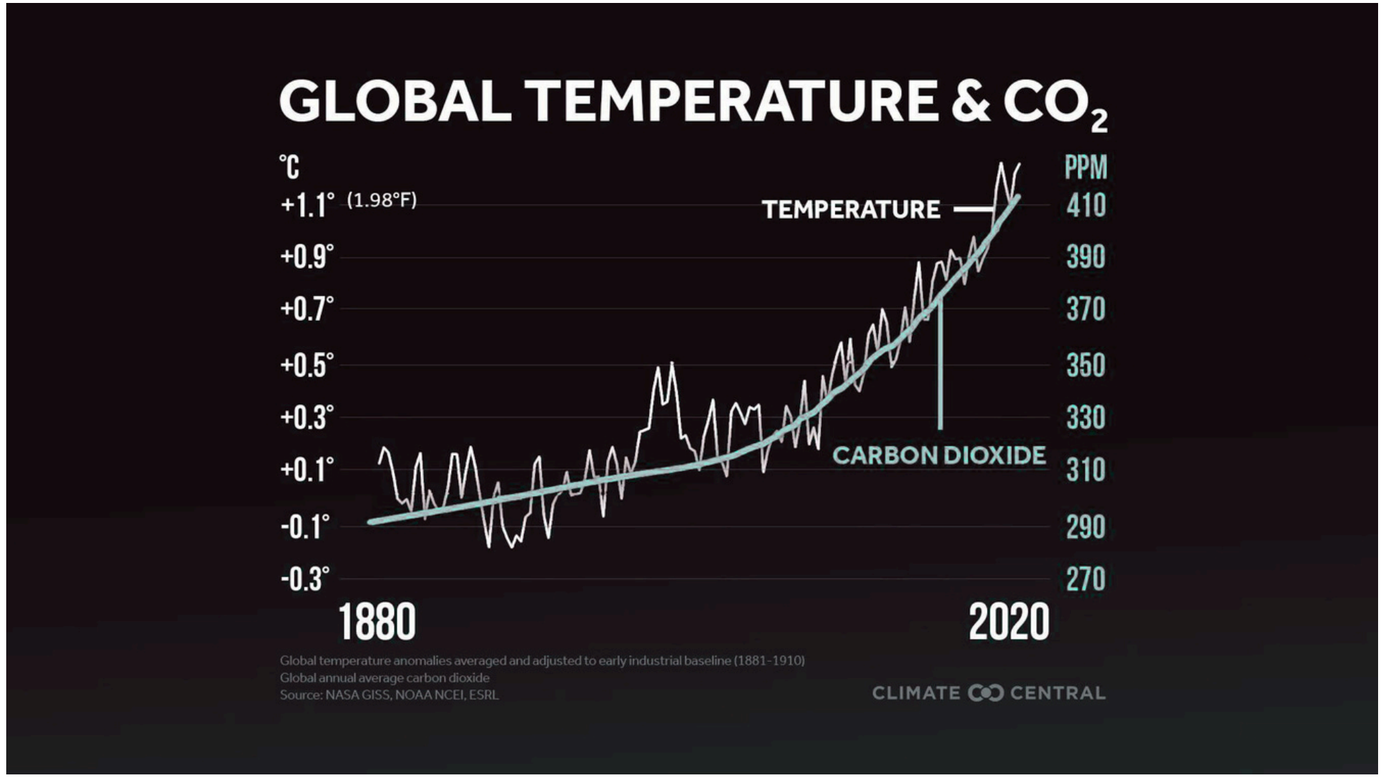
the Adamello’s glacier melting

This picture is from the photographic-scientific project “on the trail of the glaciers”, that combines photographic comparison and scientific research in order to disclose the effects of the climate changes, thanks to the observation of the variations of the glacial masses in the last 150 years. The strong power communication of photographic comparisons, combined with the results of scientific research, represents a contribution to the development of greater awareness of the impact of anthropic activities on the climate, and on the need to safeguard natural resources for the protection of future generations. In this picture, you can see the comparison between the glacier closest to us (Adamello) in 1891 and in 2020: we can see the loss of ice surface .



PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

global temperature & CO_2



This graph (graph of correlation) clearly shows the correlation between the rising temperatures and rising of atmospheric CO2.

Carbon Capture and Storage

We have to find and implement solutions to climate change as soon as possible; a possibility is offered by the CCS, Carbon Capture and Storage or capture and storage of fossil fuel combustion fumes.
One example is in Iceland, where ORCA, (the largest system in the world of CCS went into operation in 2021. It is consisting of fans that draw in air and separate the CO2 present in the atmosphere then conveying it to over 1000 meters deep in the ground where there is the process of mineralization.

Alex Bellini

In order to sensitise public opinion, in Italy and beyond, to the question of the melting of glaciers the explorer Alex Bellini has decided to take on a challenge: the crossing on foot of the largest glacier in Iceland, the Vatnajökull glacier. Alex Bellini says: If the ice disappears, our history disappears. There is a problem that prevents people from taking a stand position towards the environment, that is the separation between their actions and their consequences. The further the consequences are from the actions, the less you perceive the problem as urgent and taking responsibility is difficult.

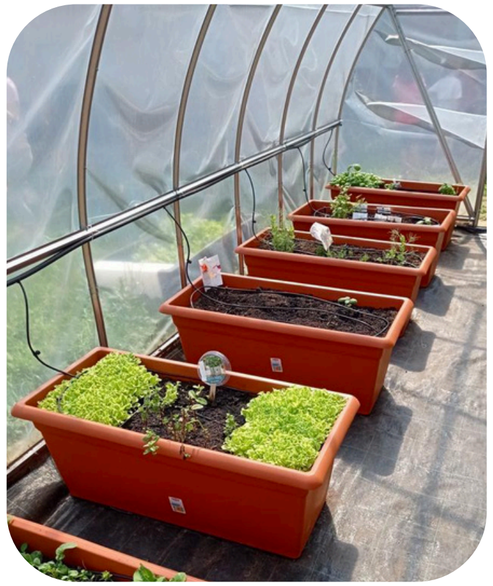
Work package n°3
3° LTT's
Agrinio (Greece) | 10/16
December 2023

Smart Greenhouse with Arduino

During our mobility in France, in Goussainville, we teachers received training on the use of Arduino.

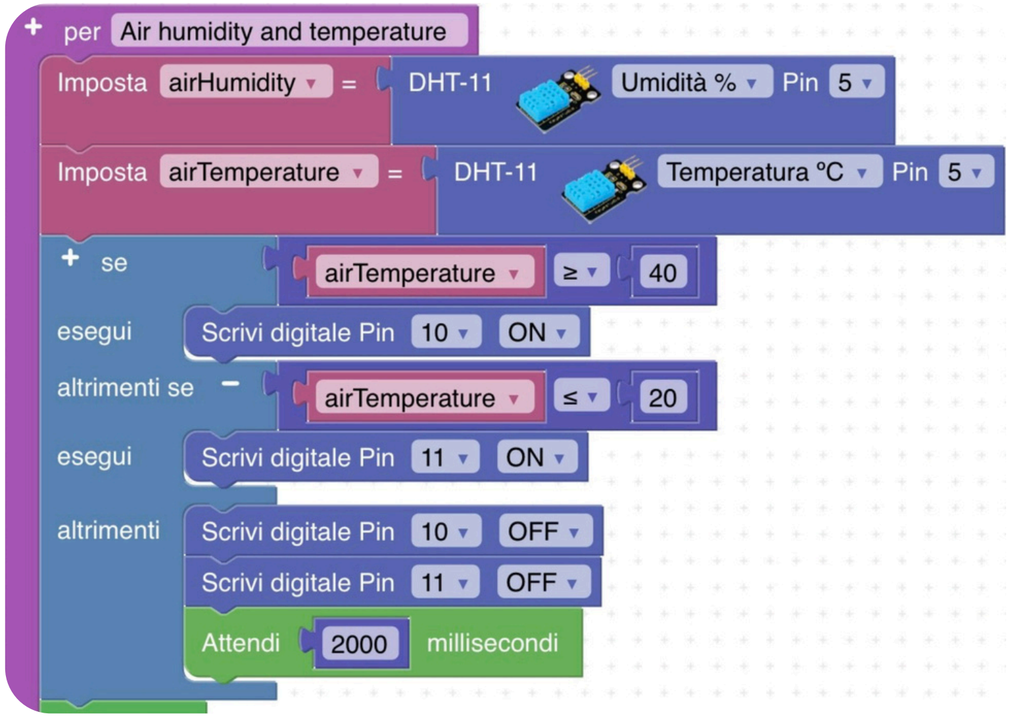
the greenhouse of our school

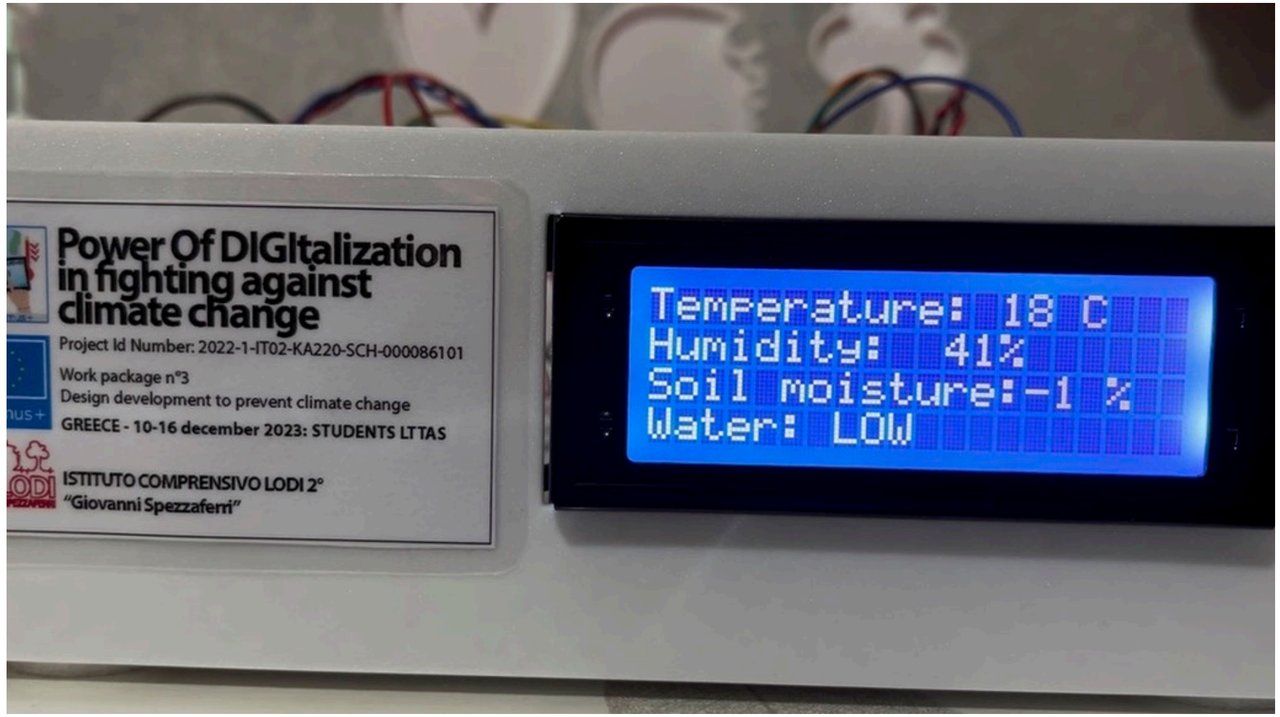
Back at school, we decided to develop a project to help protect the environment: a smart greenhouse, inspired by the one at our primary school, G. Pascoli.



3D printing

We designed and automated the greenhouse using Arduino, while also 3D printing its structure.



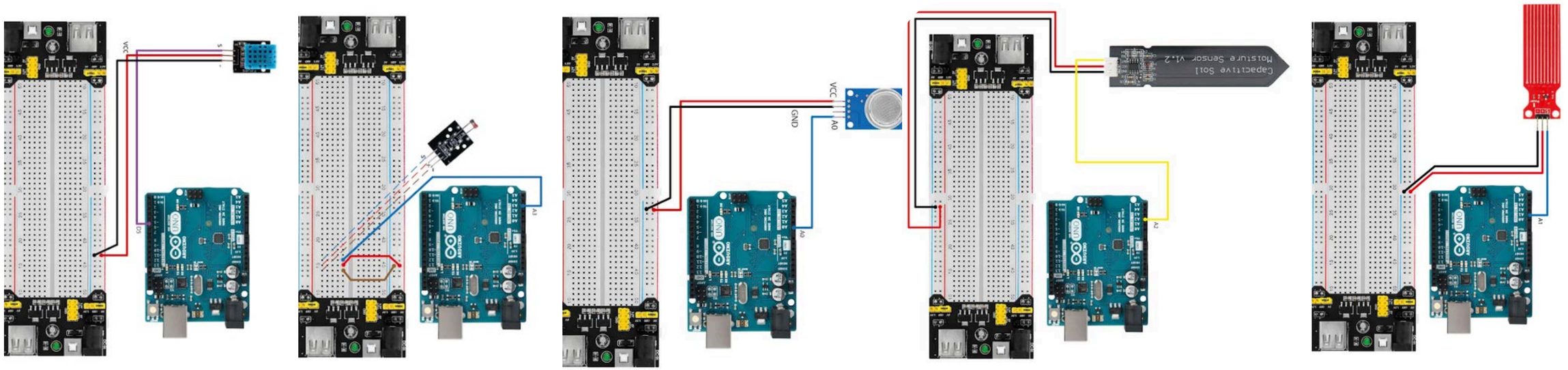


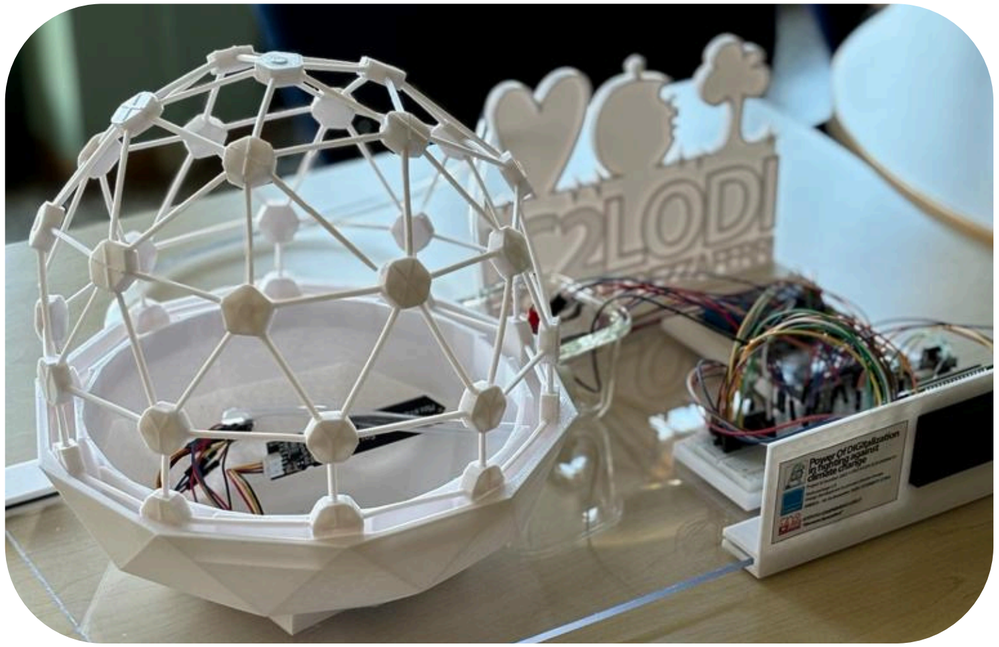
the features of greenhouse

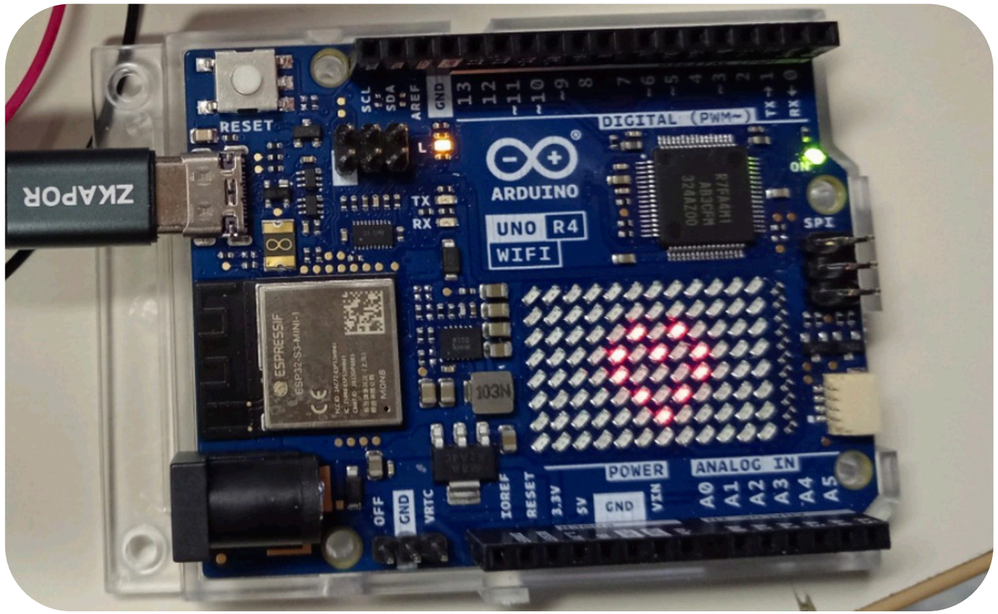
Our greenhouse is fully self-sufficient: it collects rainwater, regulates temperature and humidity, manages lighting, and controls drip irrigation, reducing water consumption and creating an optimal environment for plants.

the sensors of greenhouse

To achieve this, we integrated various sensors: temperature and humidity sensors to monitor the internal climate, a light sensor to adjust illumination, and a rainwater collection and utilization system for automated irrigation.







arduino platform

Arduino is a versatile hardware platform used in various fields, from home automation to robotics. Thanks to this technology, we successfully built a modular and functional greenhouse.

our greenhouse

We 3D-printed the components, assembled them, and integrated the sensors to ensure stability and optimal growing conditions for the plants.

Work Package n.4
4° LTTA's | Skale (Poland)
01/06 December 2024

the ecoland

And finally we share with you the Ecoland project, presented with great dedication by our students, as part of a broader reflection that embraces technology, art, and architecture.

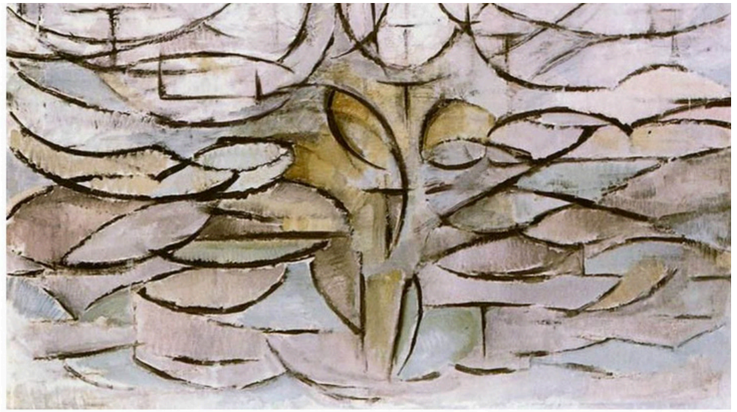
First of all, I would like to highlight that the students took as their starting point the concept of technology, understood as the set of techniques that humankind has perfected and studied over the centuries to adapt the world and its resources to its own needs.

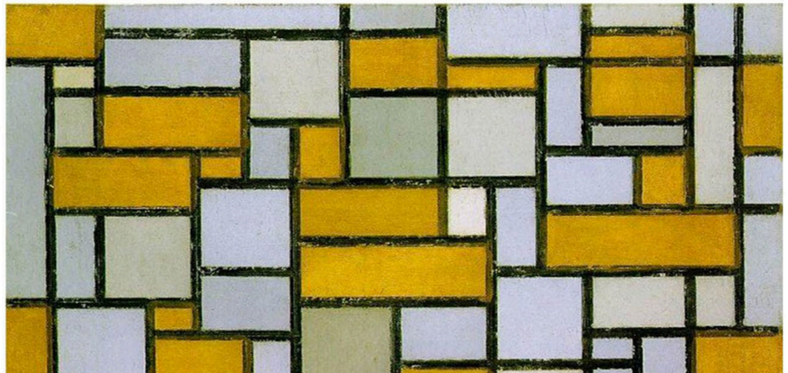
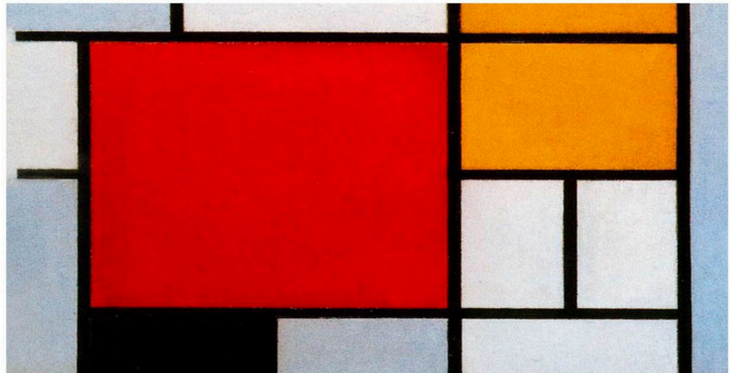
In other words, they recognized technology as the tool through which humanity has transformed reality to improve its life and satisfy its needs, modifying not only the territory but also the way it perceives nature itself.

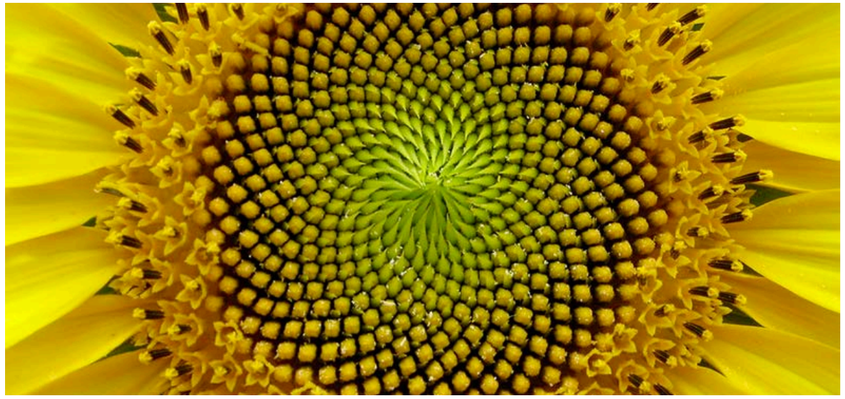
piet mondrian
the red three

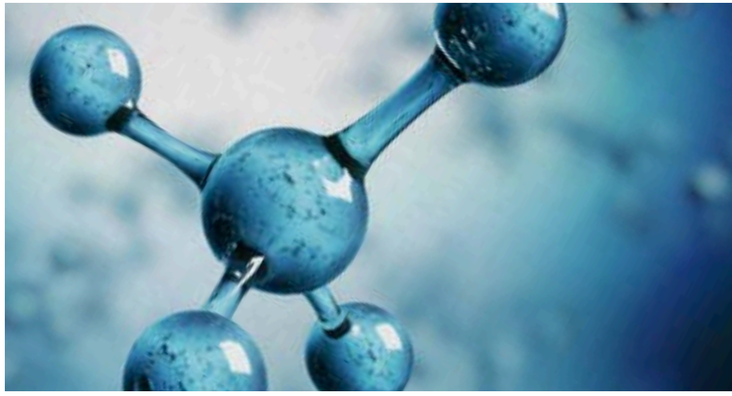
In this regard, the students chose Mondrian's painting as a symbol of this process. Throughout his artistic journey, Mondrian represented nature in a transition from figurative representation (such as in The Red Tree) to a complete abstraction of forms, culminating in the famous Tableau I, where natural forms are reduced to lines and primary colors. This process symbolizes how reality, once observed and understood, is then reinterpreted by humans in geometric and rational terms, a process parallel to the physical modification of the territory through construction techniques and urban planning.
The Ecoland project, therefore, aims to reverse this process. Instead of continuing down the path of abstraction and separation from nature, the students imagined an ecological city that returns to its roots, rediscovering and enhancing natural forms. They aimed to design an urban environment that is in harmony with the landscape while also addressing the functional and technological needs of modern life.









formal and symbolic aspect

The students drew inspiration from natural forms, analyzing them from the microscopic scale (examining cellular aggregations and the beauty of biological structures) to the cosmic scale, observing planetary orbits and the spirals of galaxies.

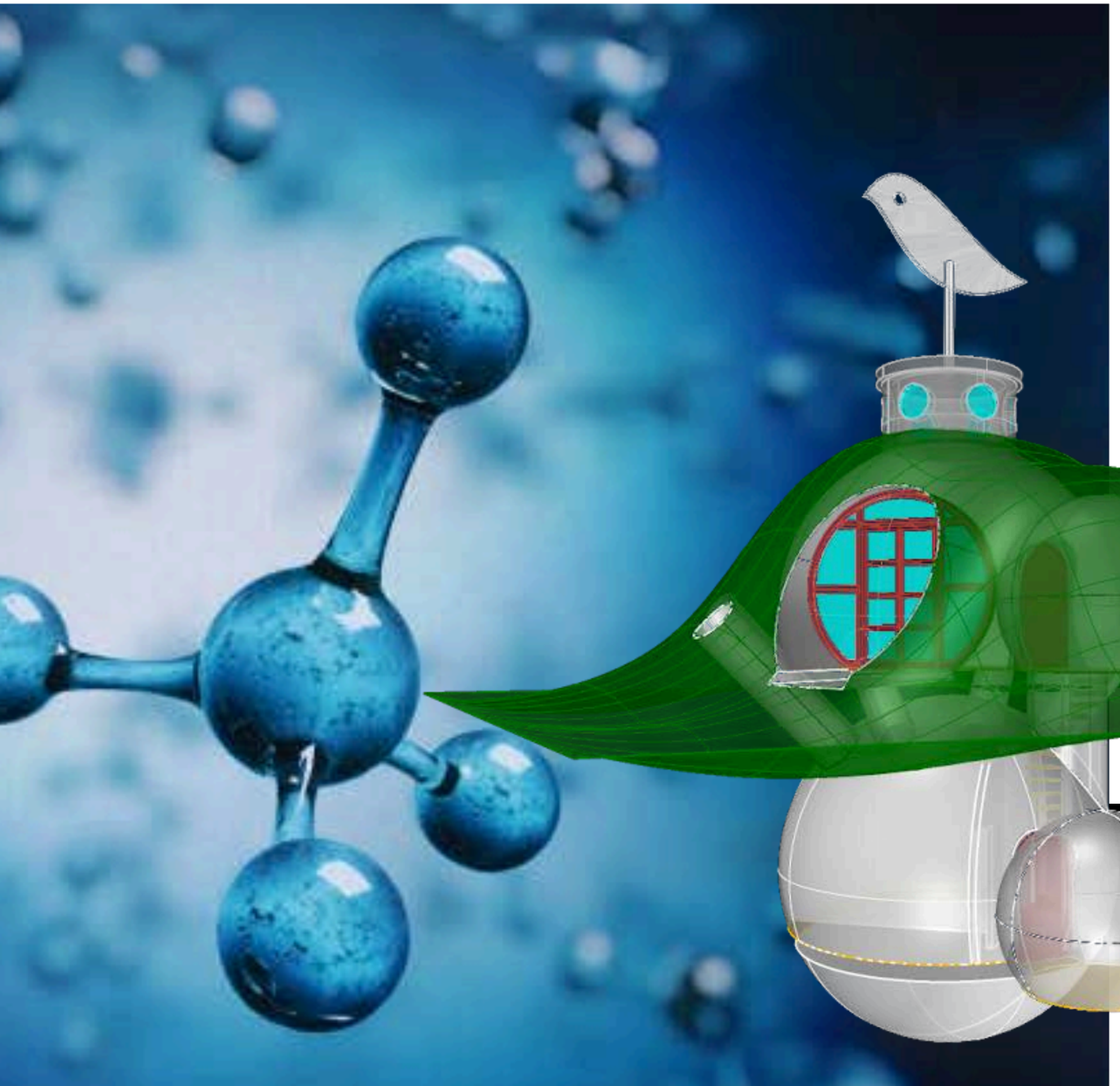
This study allowed them to design buildings that blend with the landscape, featuring organic shapes, curves, and lines reminiscent of natural elements. As a result, the city does not appear as a set of rigid and artificial structures but as a living organism in continuous dialogue with nature.

functional and energy aspect

From a functional perspective, Ecoland is designed as a self-sufficient community. The houses, also inspired by traditional Trulli of Alberobello and the Sassi di Matera (with flexible spaces, skylights that bring in natural light, and energy-saving solutions) are equipped with systems for water collection and recycling, as well as renewable energy sources such as wind turbines and solar panels. The goal is to minimize environmental impact, creating an urban ecosystem that sustainable utilities resources while also providing communal spaces for social interaction and the well-being of its inhabitants.

urban planning aspect

On an urban planning level, Ecoland is structured following an organic model inspired by the pomegranate. At the center, a symbolic square serves as a gathering point, much like the core of the pomegranate from which all roads and connections extend. This design conceives the city as an interconnected system, where each home is not isolated but part of a harmonious whole that respects both social functions and the surrounding environment.



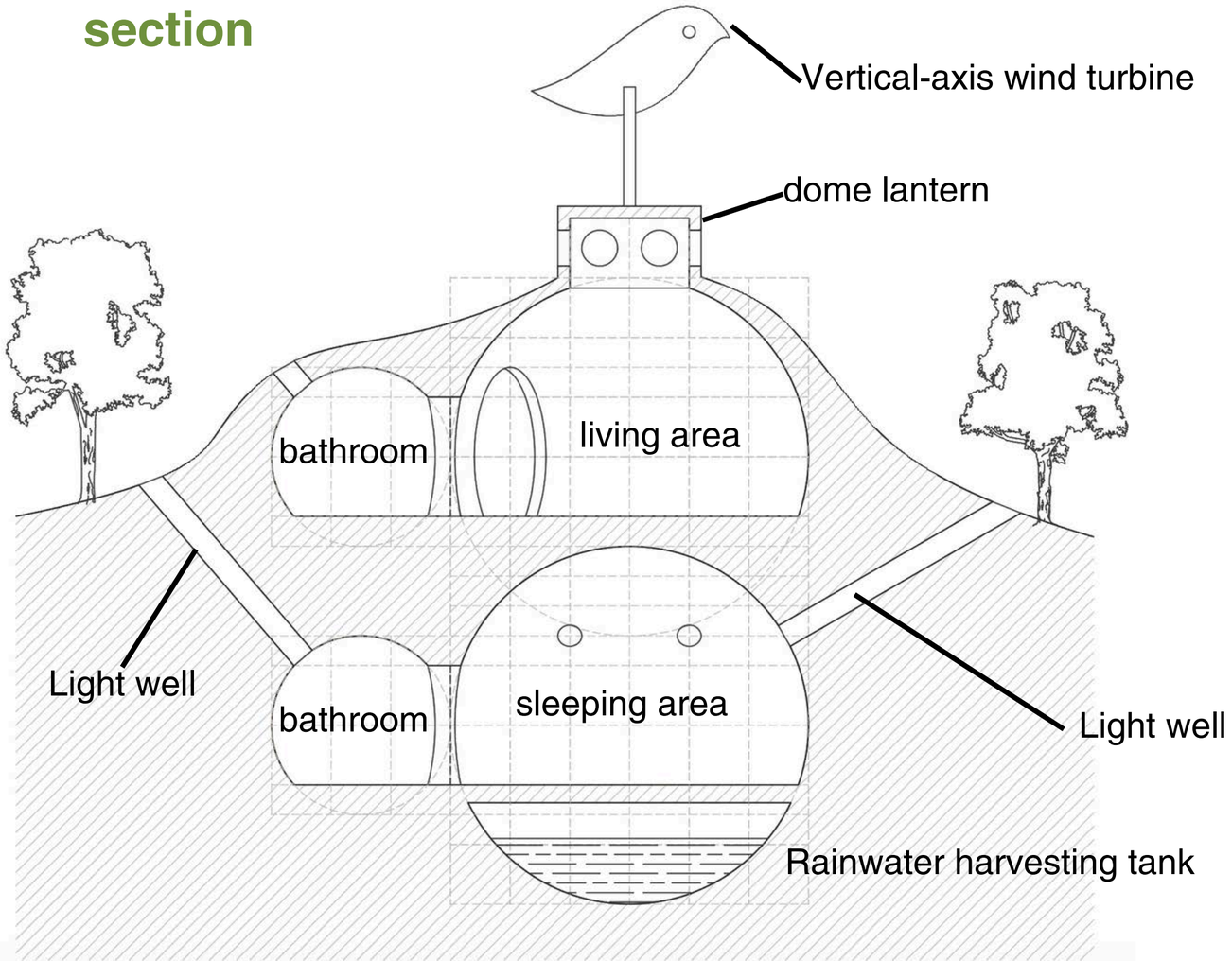
the single living cell

The students decided to make our living cell spherical and three-quarters underground. We were inspired by the Trulli of Alberobello, the Matera's stones and the molecular structure even if it looks like a hobbit house

inside the houses

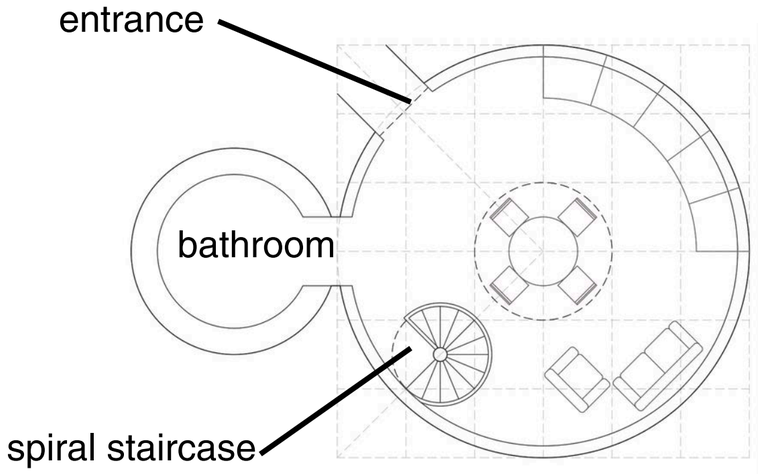
It’s a bi-local with an open space where in the middle there is a table, a place where the family members meet, typical of Italy.
The students made so that the light comes from light channels that give into the interior of the house made by only the main rooms.
The students made small and essential furnitures to not waste space.

section



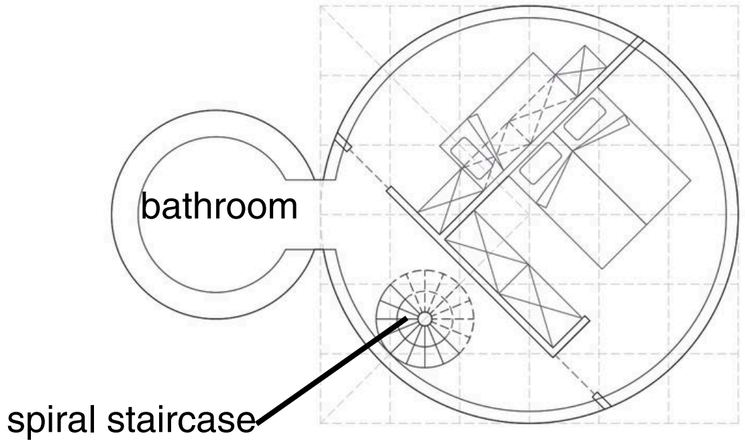
ground floor plan

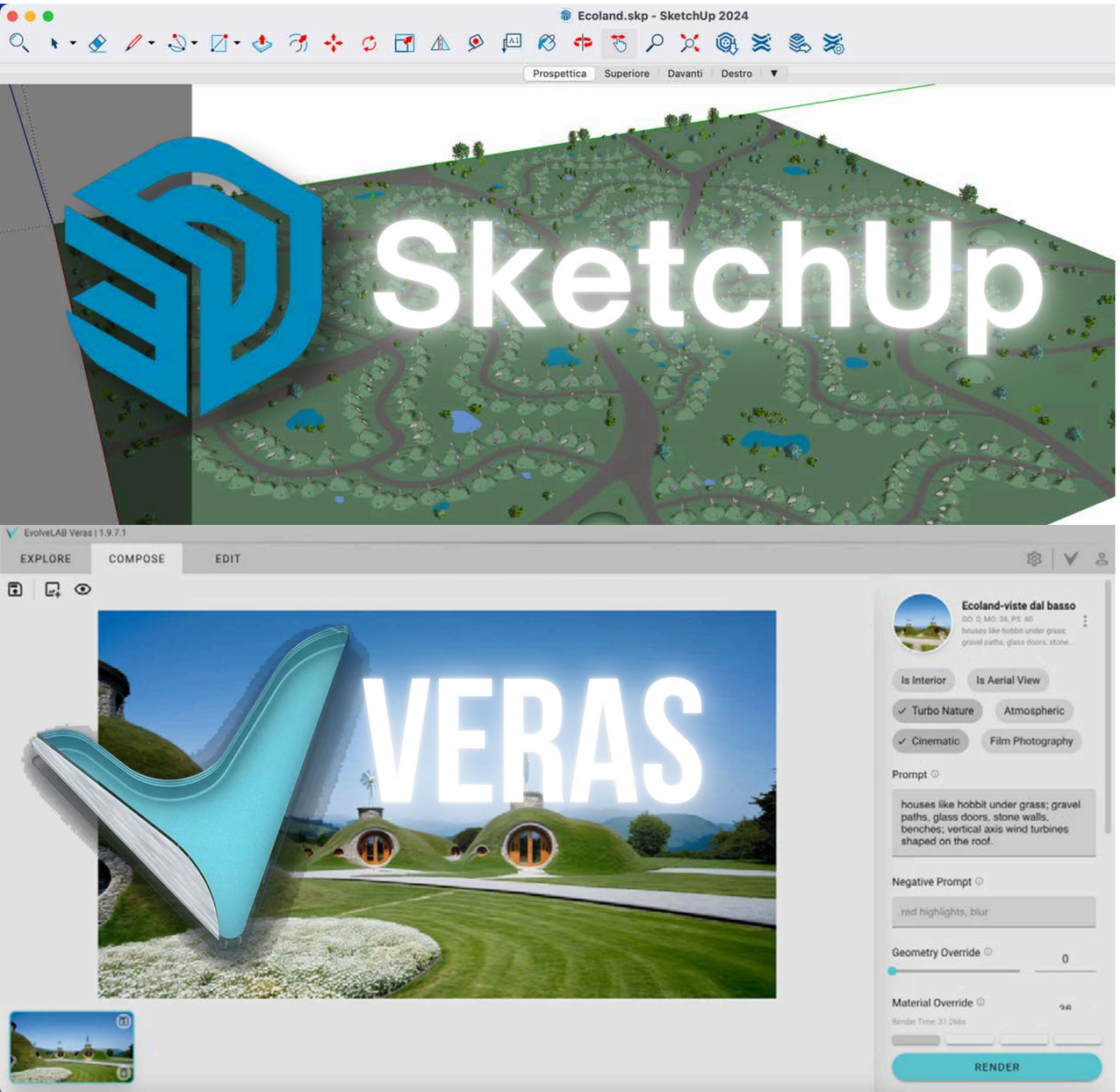
living area



underground floor plan

sleeping area





technical and representational aspect

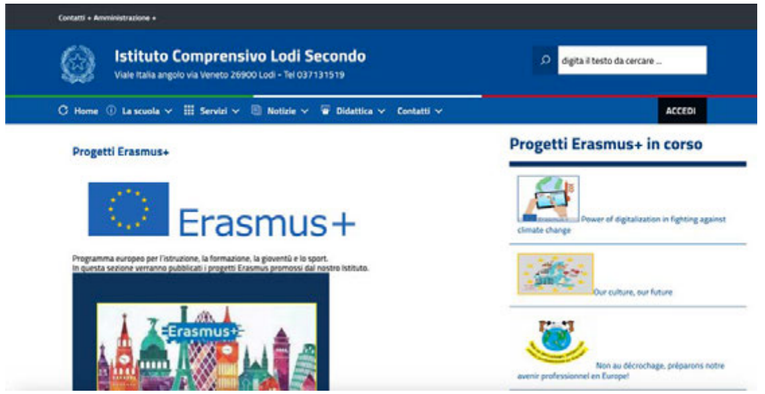
To create the three-dimensional model of the city, the students used professional digital design software SketchUp. These tools allowed them to accurately model the organic forms inspired by nature. Additionally, for the generation of renderings and photorealistic visualizations of the project, they used the rendering engine Veras, which effectively conveyed the atmosphere, materials, and spatial quality of the designed environments.

the ecoland project
conclusion

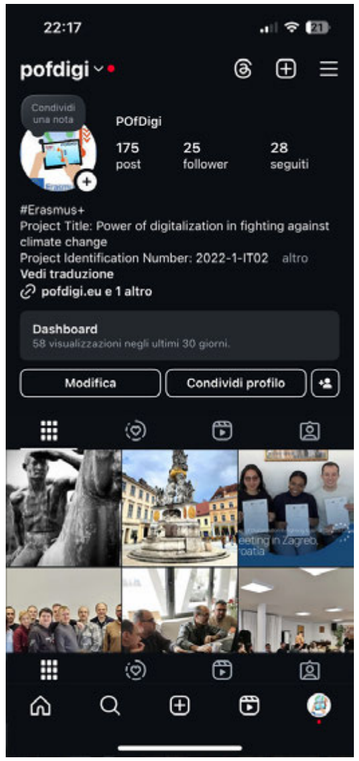
In summary, the Ecoland project is an innovative and sustainable response that invites us to reflect on our relationship with nature and technology. The students have captured the historical process symbolized by Mondrian's artistic evolution and transformed it into a model of an ecological city that reinterprets forms, materials, and functions to create an environment in perfect symbiosis with the territory.

dissemination of the project

website of the Institute
iclodidue.edu.it



website of the project
pofdigi.eu



Instagram channel of the project
pofdigi

- Conference at school
- presentation to the Town Hall and to the Major of Lodi
- Local press

Interview with Mr Iwasaki
japanese manager of an italian seed company and presentation of the project

meet our team

Carmela Maria Antonia Riganò

Anna Maria Carratta

Mariella Marini

Valeria Barbierato

Concita Mimmo

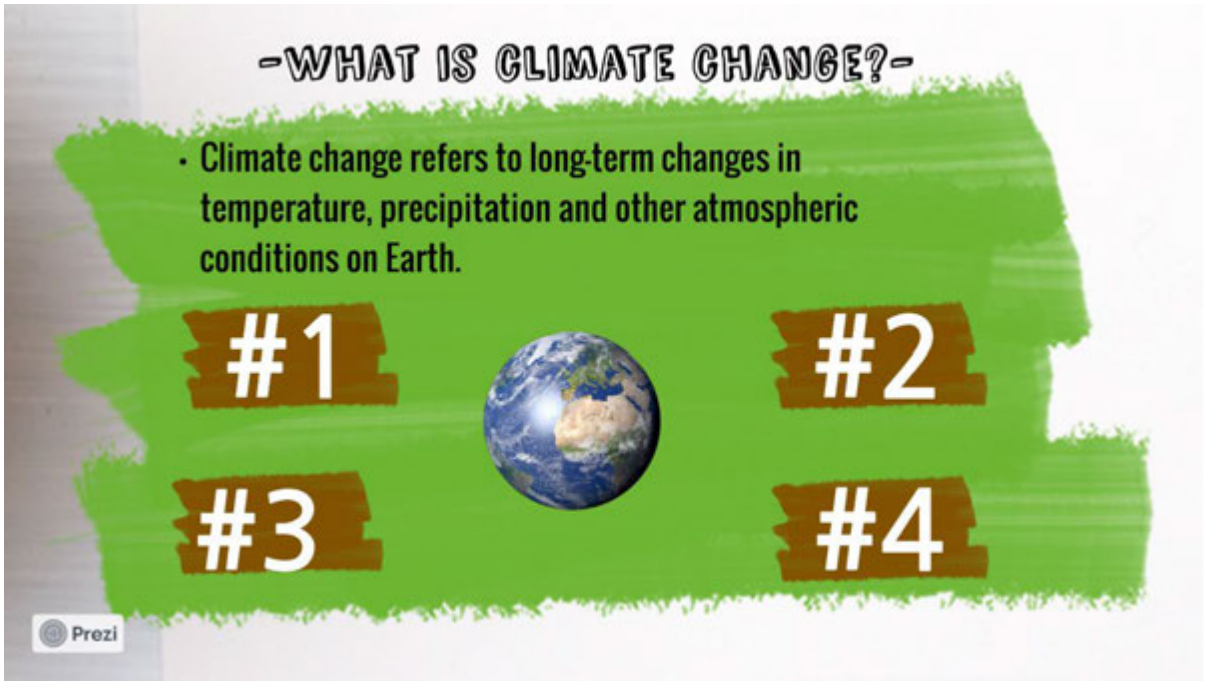
Stefano Santagata

Michelangelo Lapolla

IC2LODI
GIOVANNI SPEZZAFERRI

thank you

WP3 presentation of the Arduino design task on climate change prepared by the Turkish students



WHAT CAUSES CLIMATE CHANGE?

- Burning fossil fuels
- Deforestation
- Increase in greenhouse gas emissions
- Industrial processes
- Implementation of improper agricultural activities
- Using certain chemicals

Prezi

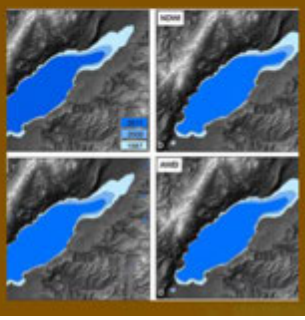
WHAT SHOULD WE DO TO FIGHT AGAINST CLIMATE CHANGE?

- We should use solar panel.
- We should use public transportation.
- We should reduce fossil fuel consumption.
- We should plant a tree and protect the green areas.
- We should use filters in places like factory chimneys.

Prezi

HOW DOES CLIMATE CHANGE AFFECT BURDUR?

Due to climatic conditions, seasons have changed in Burdur recently. That's why in Burdur sometimes there is too much rainfall and sometimes too little. This irregularity in rainfall causes Burdur Lake to dry out and natural disasters such as floods to occur.



Prezi

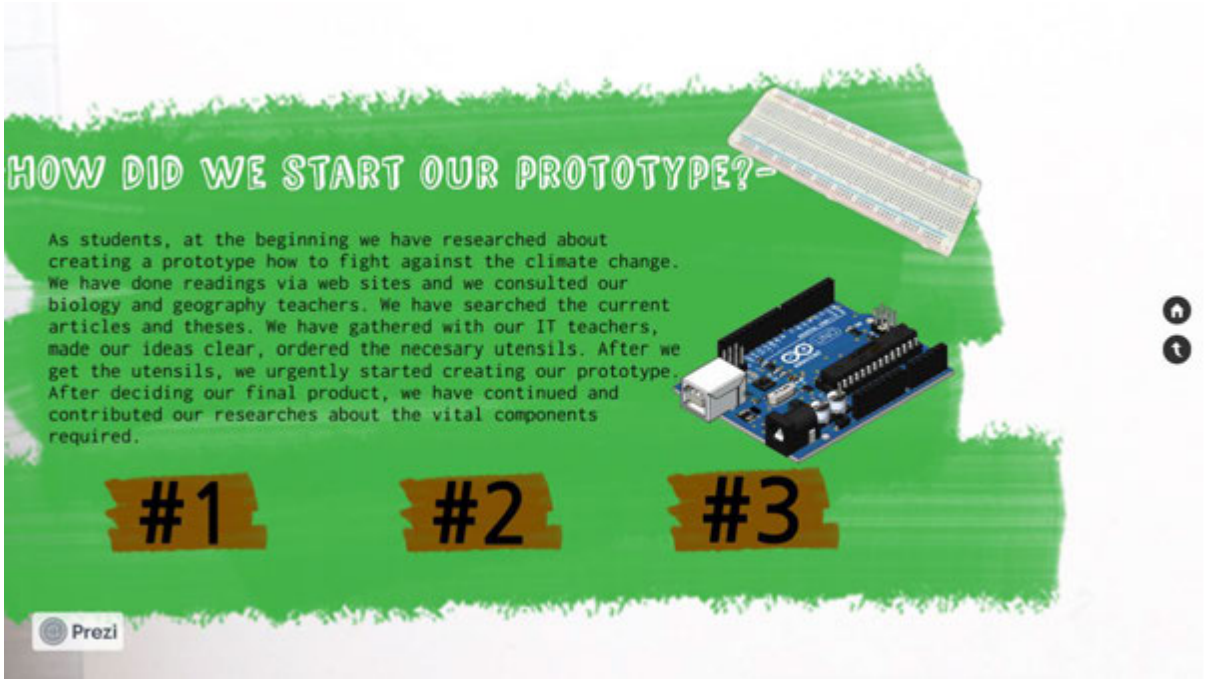
prezi.com – Tam ekrandan çıkmak için Esc tuşuna basın

OUR AIMS

Our main aim is to fight against the climate change.

- To avert the wastage of energy
- Protect green areas
- Decrease the carbon footprint
- Attenuate the emissions of greenhouse gas

Prezi

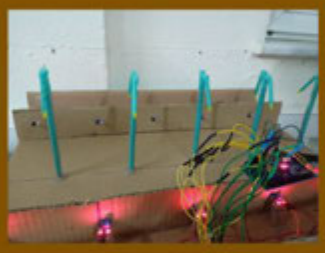


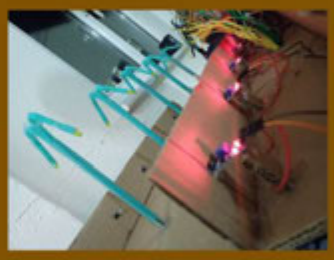
PROCESS

Since our project aims to minimize the energy waste where occurs because of lighting systems of roads at urban areas which don't have much traffic but still have to be enlightened because of few vehicles passing at intervals of several hours and causes a huge amount of energy waste and light pollution, we started to work in this direction.

Prezi

After getting the necessary utensils, we started to connect them, wrote codes on Arduino, and consulted our art teacher to beautify our prototype, too.





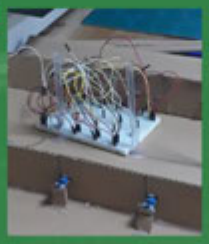
Prezi

-RUNNING OUR PROTOTYPE PROPERLY-

The most significant part of our project is that:
Our project was perfectly working and ready for presentation.

- Infrared sensors and
- LED Lights

were complete.



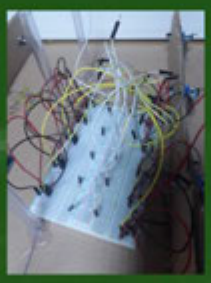
Prezi

prezi.com – Tam ekrandan çıkmak için Esc tuşuna basın

AREAS OF USAGE

Our project is usable in various places and has numerous areas of usage.

#1



#2

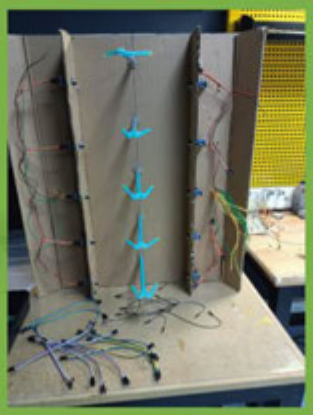
Prezi

USAGE AREAS

Our main purpose is using less energy while enlightening roads efficiently in:

- City centers and Squares
- Highways
- Sidewalks

at nights.

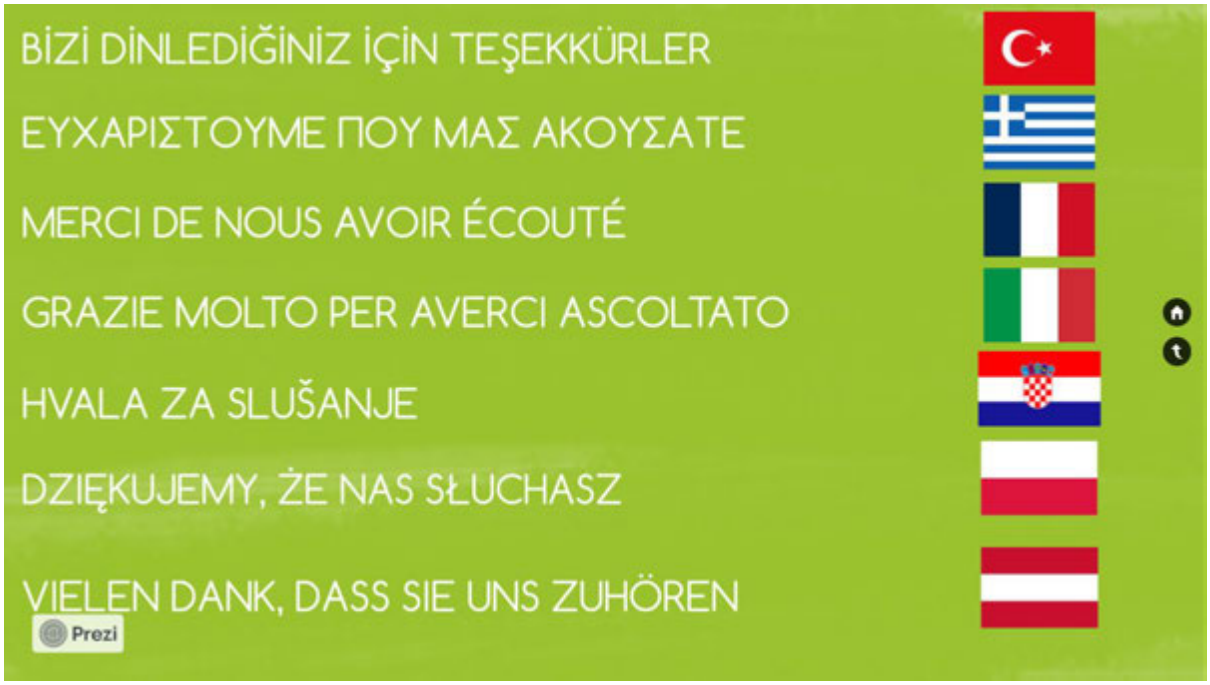


Prezi

IF DEVELOPED

- It heavily reduces the cost of electricity at: pedestrian crossings and subways where the risk is less, closed areas and metros where the common usage is high.
- Decreases the Import percentage of energy
- Since the lightening tools will be used less, it makes the usage duration of these tools long.
- It secures the Gross Domestic Product in countries where the energy import percentage is high.
- It lessens the light pollution.
- It contributes to use energy sources efficiently.

Prezi



Erasmus+

An eco-friendlier building for our school

“5th High School of Agrinio”

Power of Digitalization in
Fighting Against Climate Change
2022-1-IT02-KA220-SCH-000086101

Methodology

01
Team formation

02
Project update

03
Software training

04
Photographs with drone

05
3D-modelling of the school

06
Presentation of the work

Erasmus+

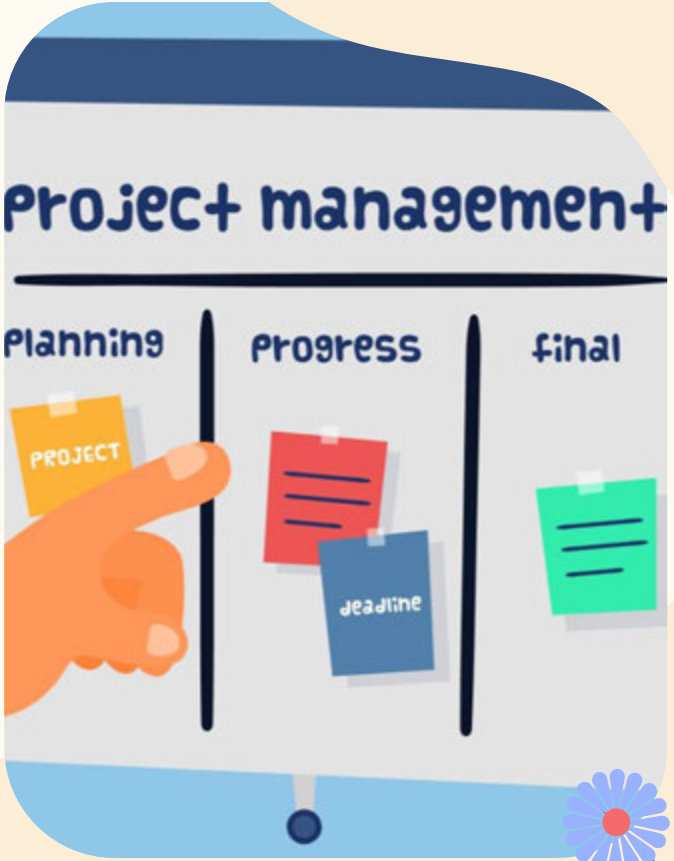
Team

The students who are members of our Robotics team and participated in the previous phases of the project

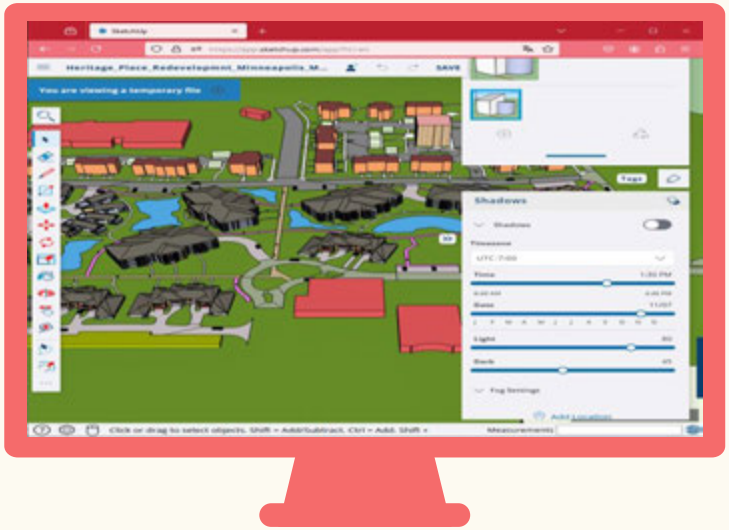
Project update

Aims of the project

Mobility Requirements



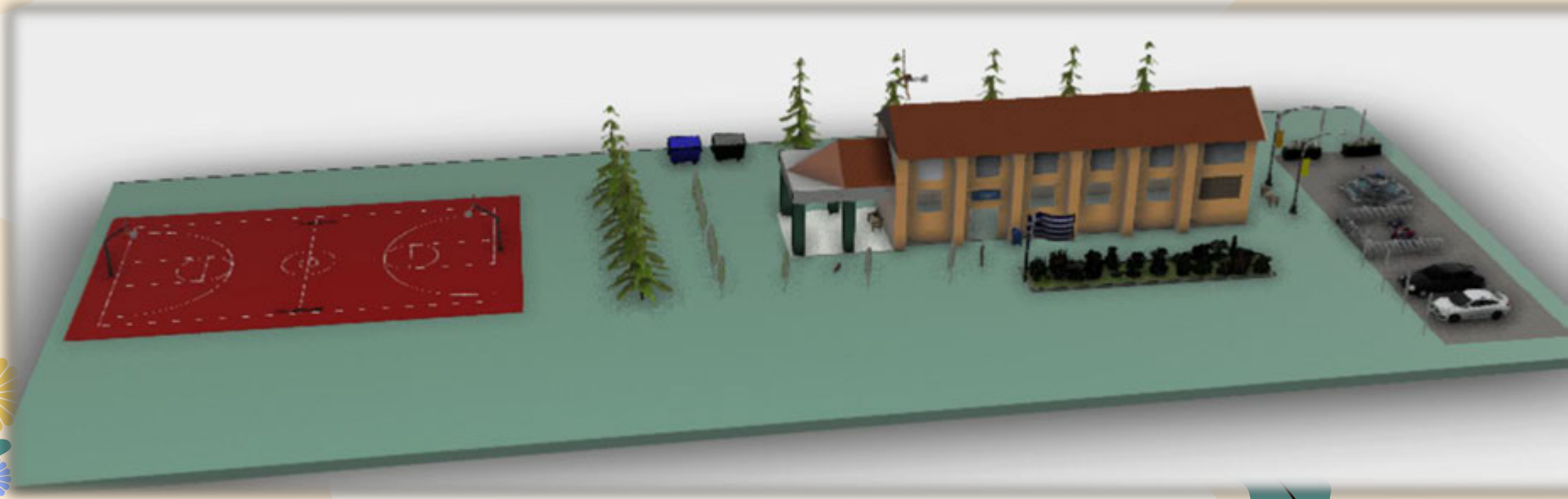
Software training



Erasmus+

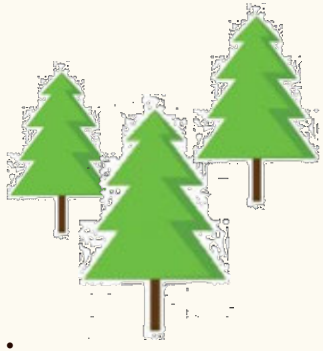
Photographs with drone

3D-modelling



Eco-friendly additions

- Solar panels
- Wind turbine
- Compost and recycling bins
- Vegetable garden
- Several trees

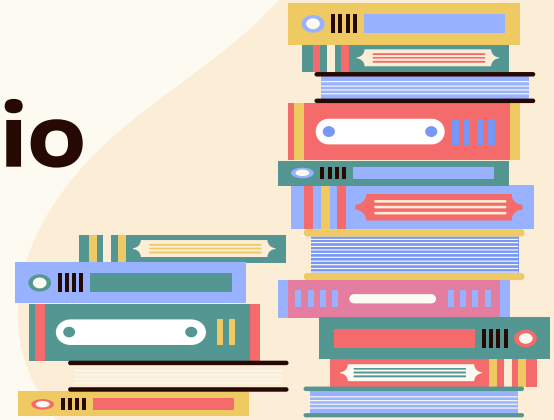


Whoa!

Click me - Our project!!!

Thank you

5th High School of Agrinio



Power of Digitalization in
Fighting Against Climate Change
2022-1-IT02-KA220-SCH-000086101

POWER OF DIGITALIZATION IN FIGHTING AGAINST CLIMATE CHANGES

ECOLAND

PRESENTATION
CROATIA

WHAT IS AN ECOLAND?

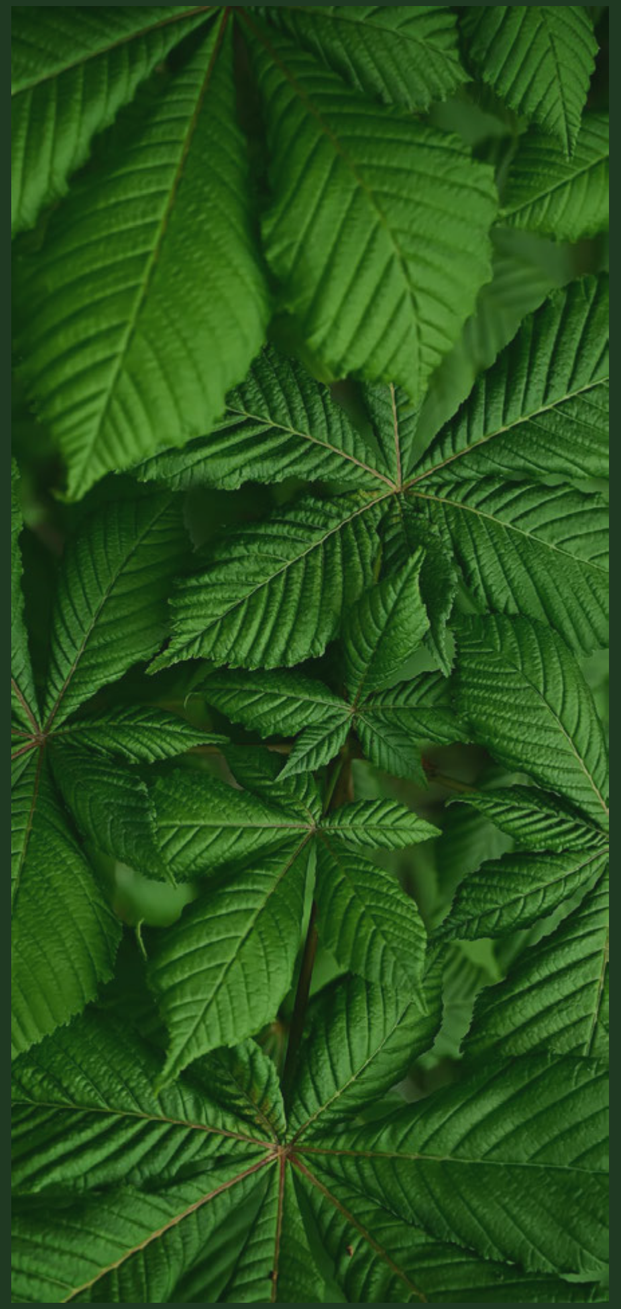
Ecoland is an eco-friendly destination or park. It is basically mix of nature and tehnology with renewable sources of energy. For example it can be a park with some modern gadgets.

WHY DID YOU MAKE IT LIKE THAT?

We made exactly this ecoland because that is how we imagine an ecoland.

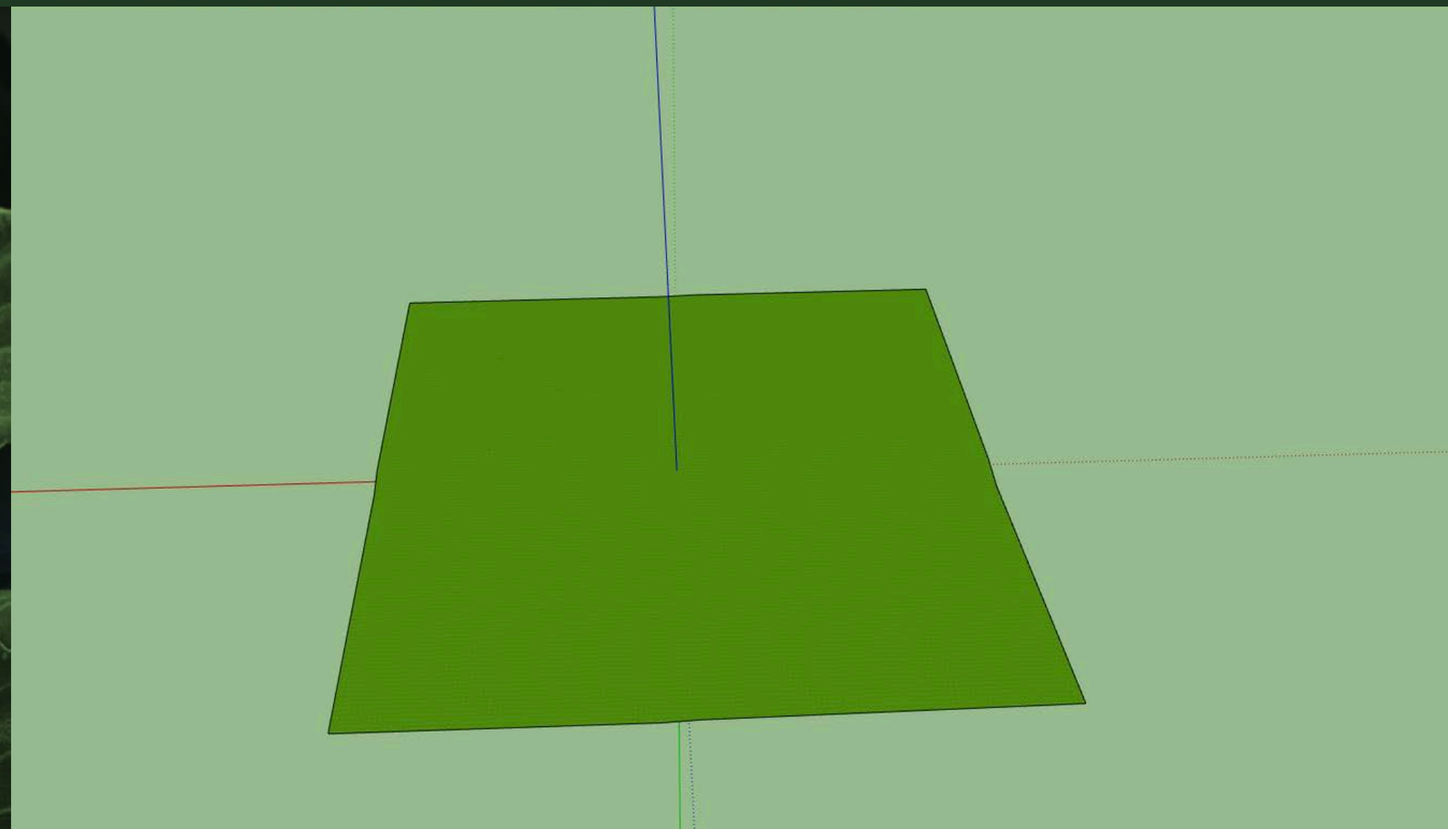
STEPS

OF MAKING THE ECOLAND



STEP 1

- we made a platform
- we made it by drawing lines
- we colored it

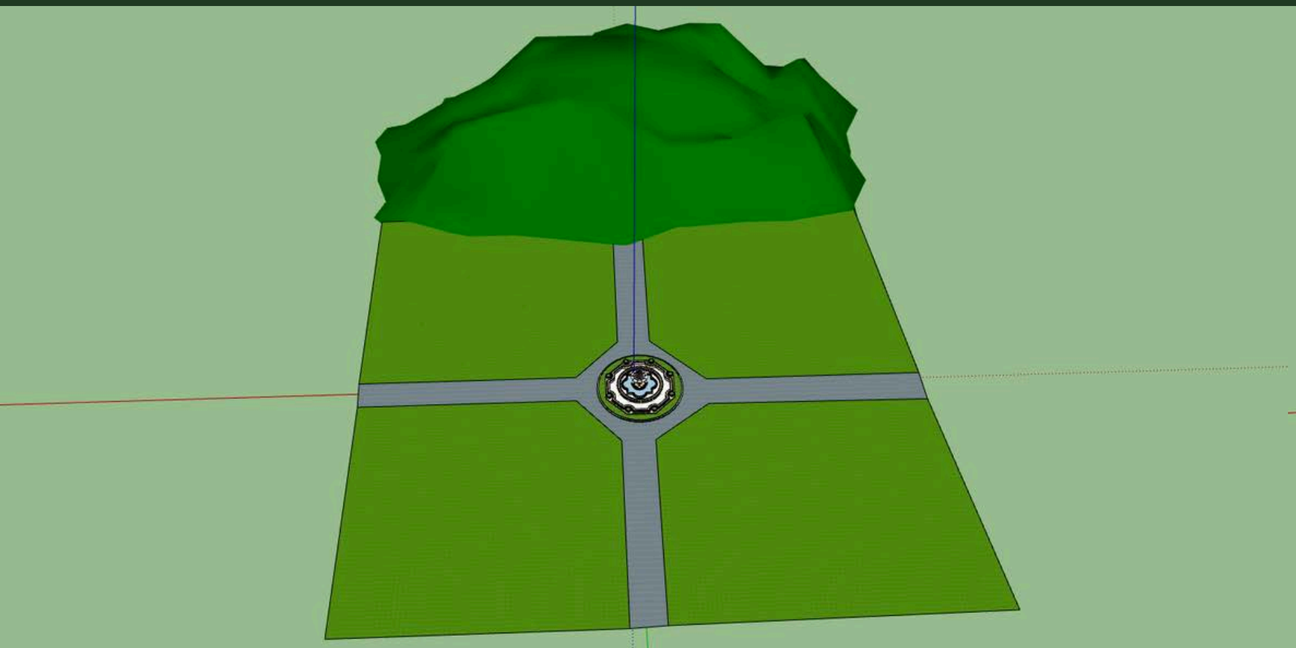


STEP 2

- we added a hill and we changed it so it could fit
- we drew the lines and colored it inside
- the pathway sepatarates park in four parts

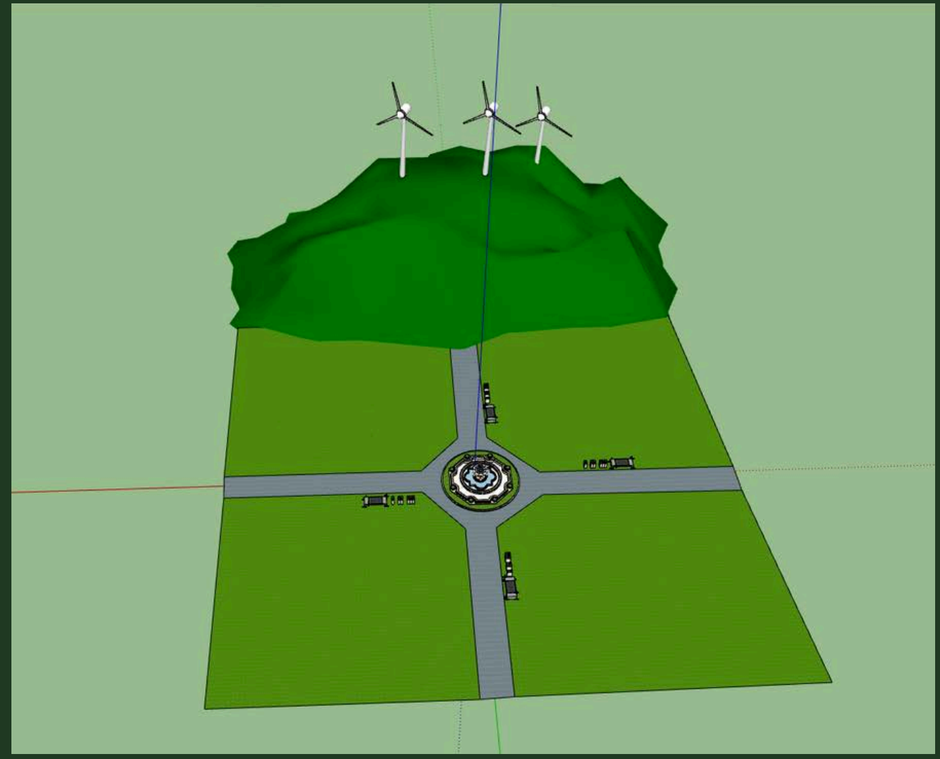
STEP 3

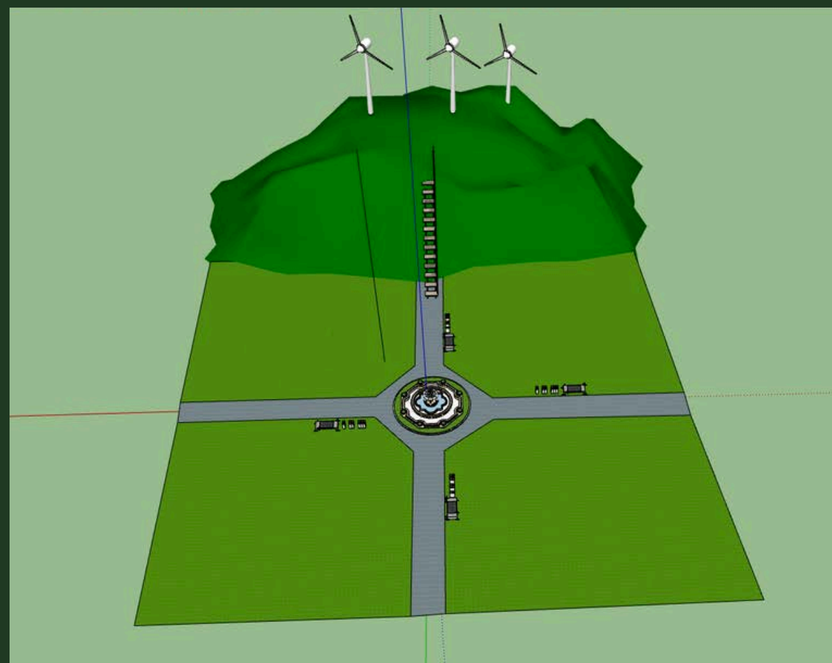
- we added a fountain and we located it at the center of the park
- we put benches with solar panels
- there are recycle bins



STEP 4

- we put wind turbines at the top of the hill
- we made a stairs that are leading you to the zipline



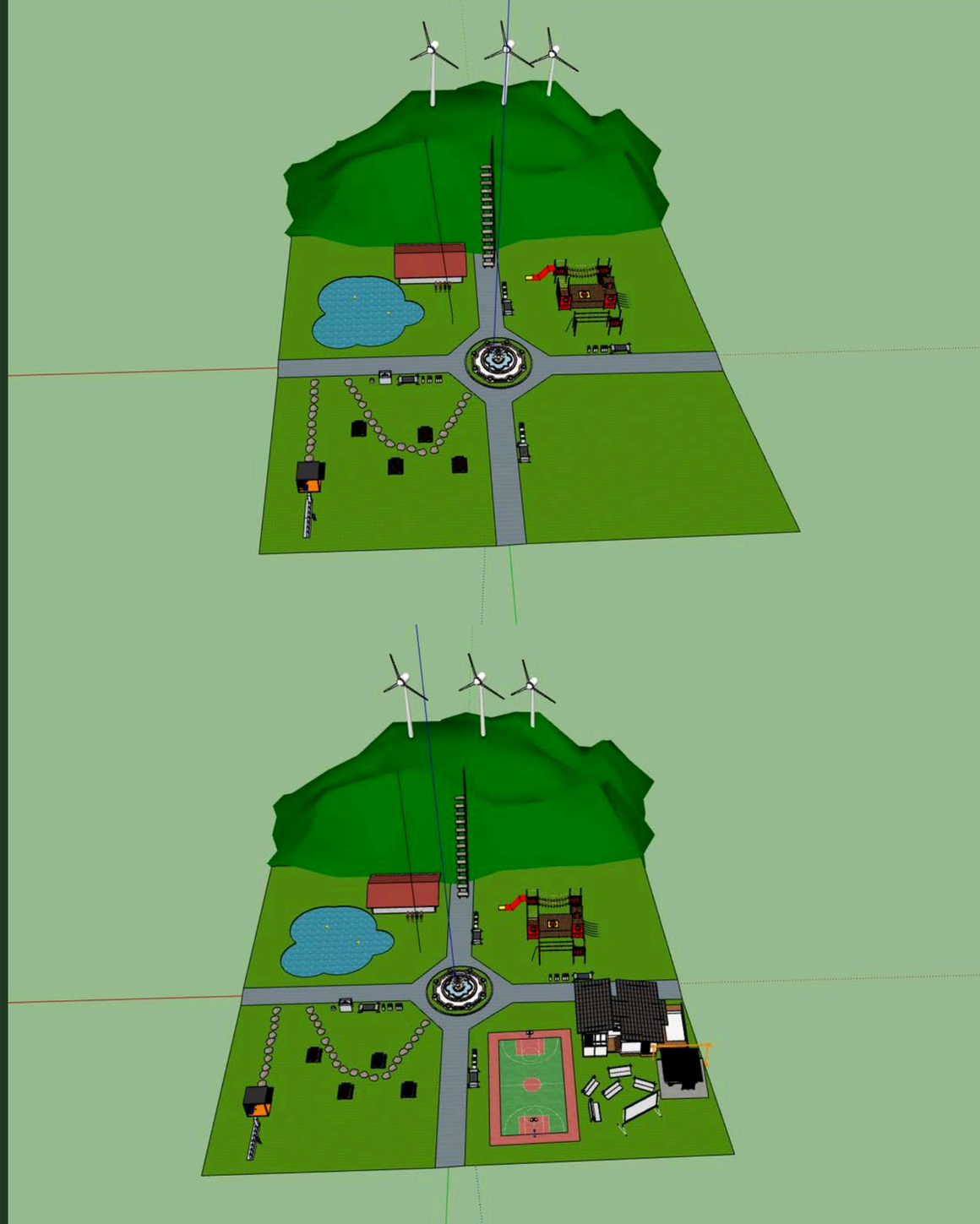


STEP 5

- at the first part of the park, we put a playground
- at the second part of the park, we made a barn with horses and a small lake with ducks

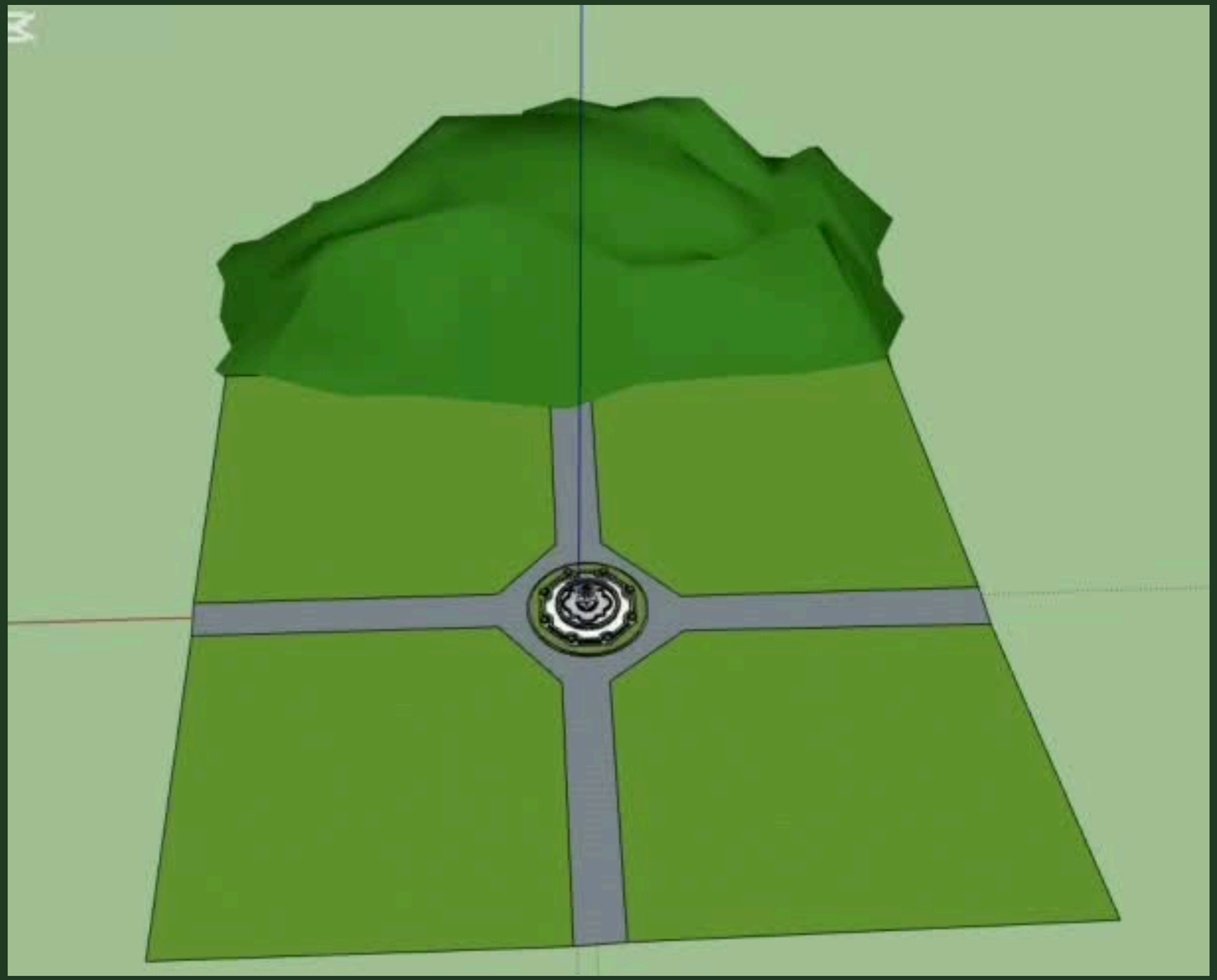
STEP 6

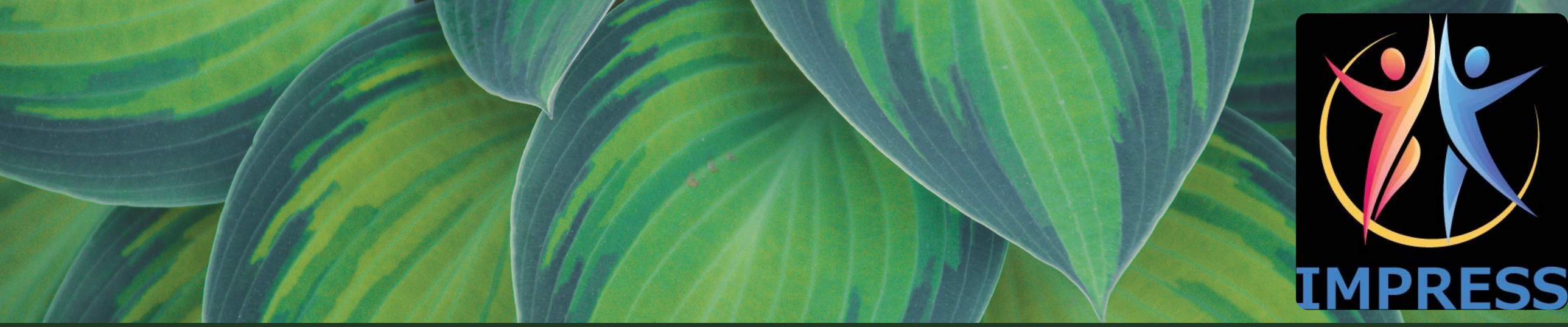
- at the third part of the park, you can find a place where you can have a picnic, bike docking station
- at the fourth part of the park, there is a basketball court, a youth center, a charging station for electric cars and an outdoor cinema



STEP 7

- we put solar panels in almost every part of the park
- we put trees because of improving air quality and because they are offering a habitat to wildlife





THANK YOU FOR YOUR ATTENTION

Power Of DIGItalization in fighting against climate change

Work Package n.4

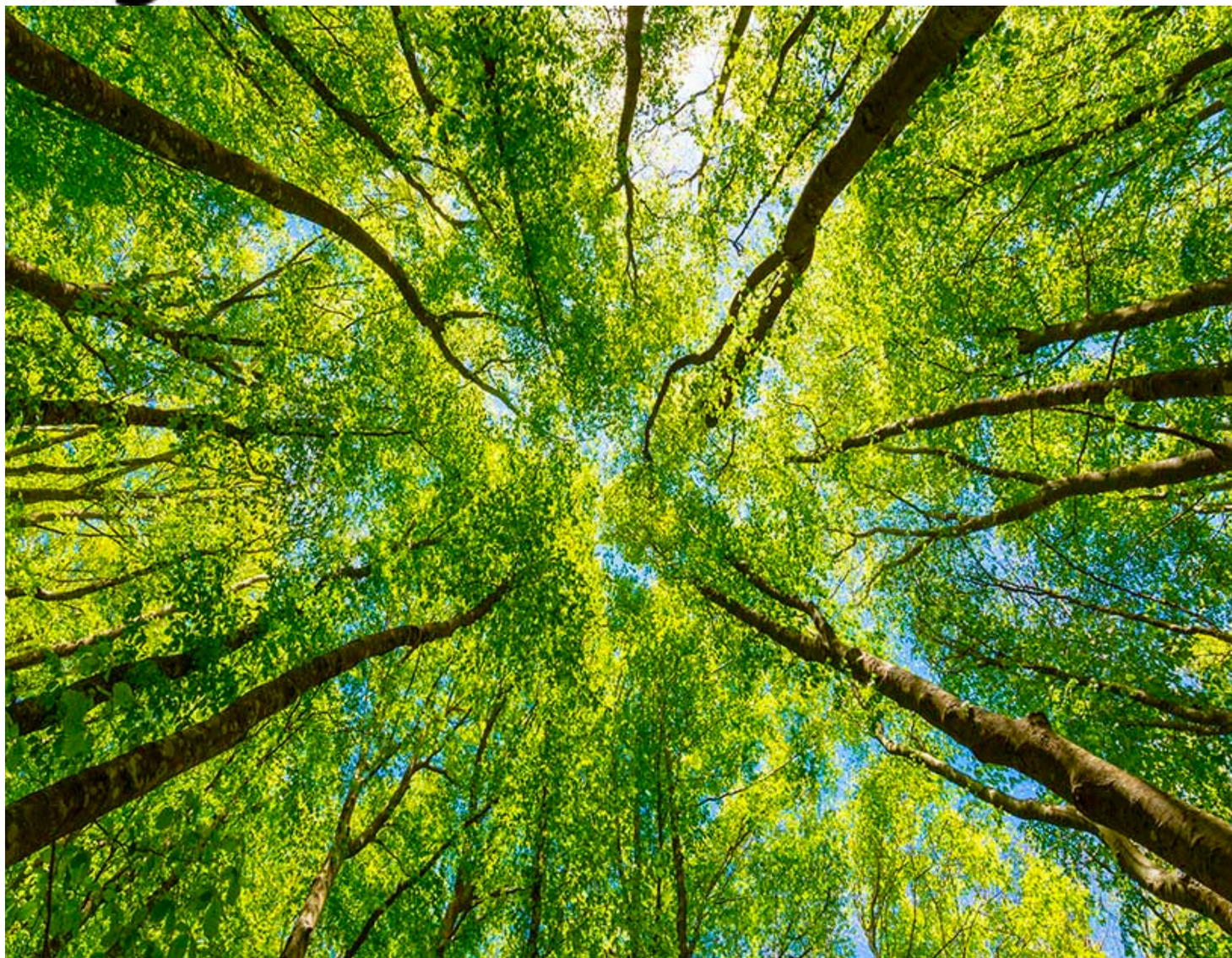
4° LTTA’s | Skale (Poland)

01/06 December 2024

Italy

Istituto Comprensivo Lodi 2°

”Giovanni Spezzaferri”



GIORGIO BANDERALI

ERIK DOKA

MATIAS ORSI

GABRIELE RUBINO

Our school

We are stutents of Istituto comprensivo Lodi 2°, this is our school, located in Basiasco, a small town near Lodi and Milan

: : ecoland

analysis

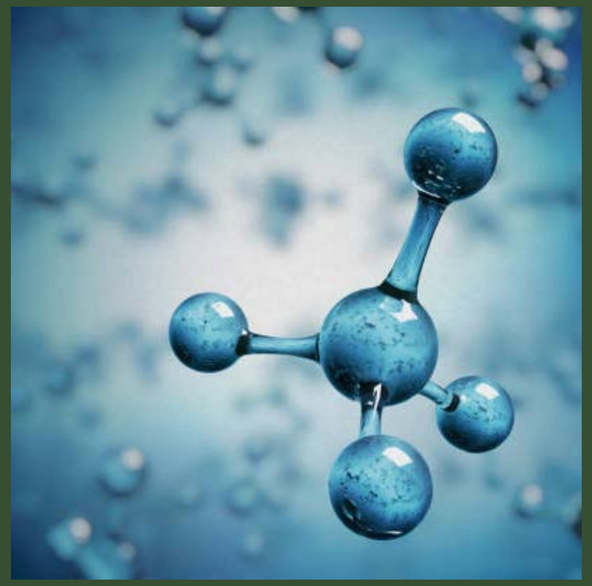
Our suggestion

Through history, man has moved away from natural forms and towards geometry. We have done the opposite

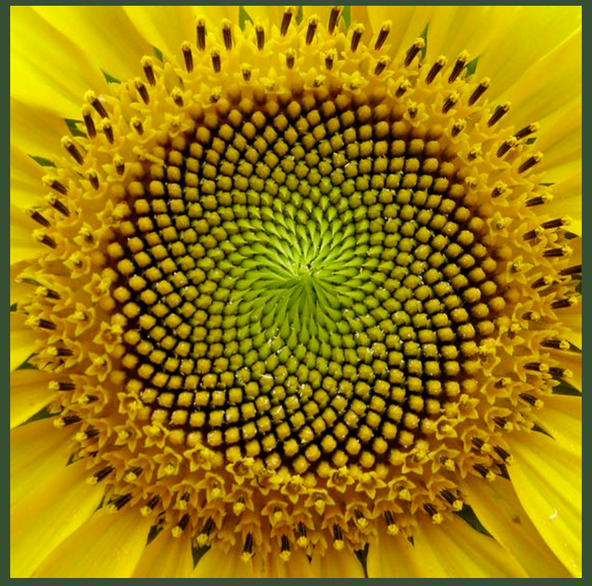
history

we

Natural forms



Our work starts from the fact that man modifies nature in order to live better in it, by destroying it. Following the logic of nature, we have introduced the natural forms into everyday life.



The trulli and the Stones of Matera

They are of typical homes of our nation. We were very inspired by these for their unique way of managing small spaces

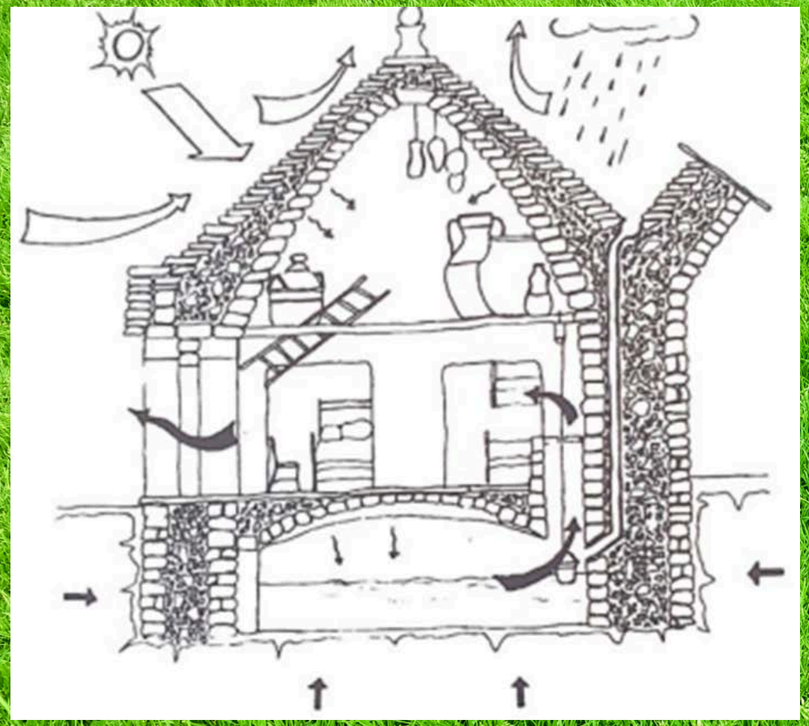
Where are they?

Both Matera and Alberobello are towns in the south of Italy. Alberobello is in Puglia and Matera in Basilicata

Alberobello

Matera

The trulli



The trullo is a house in harmony with the environment, essential but extremely functional, full of light, and it is realised with natural materials that keep the ideal temperature inside in each season

The stones of Matera

Matera is a town known for the set of the film "The Passion of Christ" by Mel Gibson, and for the typical rural houses in harmony with the nature. The house that are carved in the stone are essential and functional.

Materials

In order to return to nature we chose natural materials and easy to find like wood and stone that are excellent insulators.

The rennovable sources

The rennovable sources we used for the town are: solar panels, wind turbines, moss, lucky bamboos and water hyacinth that generate electricity.

The parks, lakes and biodiversity.

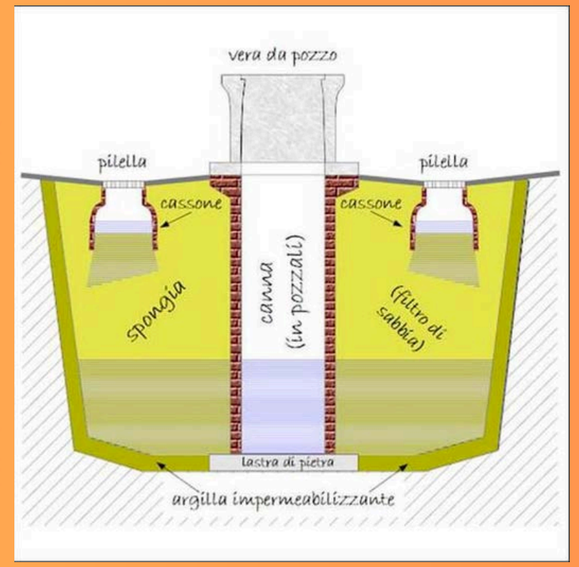
In our town we thought to give big space to green areas that, thanks to the presence of plants and of small lakes, promote the development and conservation of biodiversity, offering at the same time recreation and relaxing areas.

the transport methods

For our vehicles we used as the main one the bycycle, E-bike and a variant called the cube-bike and a little eletric bus that goes in the streets of the town.

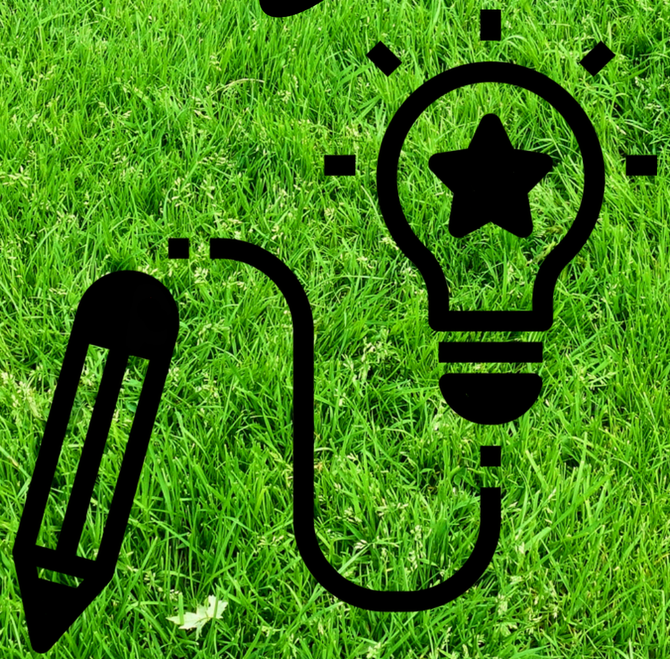
FOR THE RAINWATER

WE WERE INSPIRED BY THE HISTORICAL WELLS OF VENICE



...in the main square we placed manhole covers, with a sand filter that filters water. At the bottom of the filter there is a collection tank

project

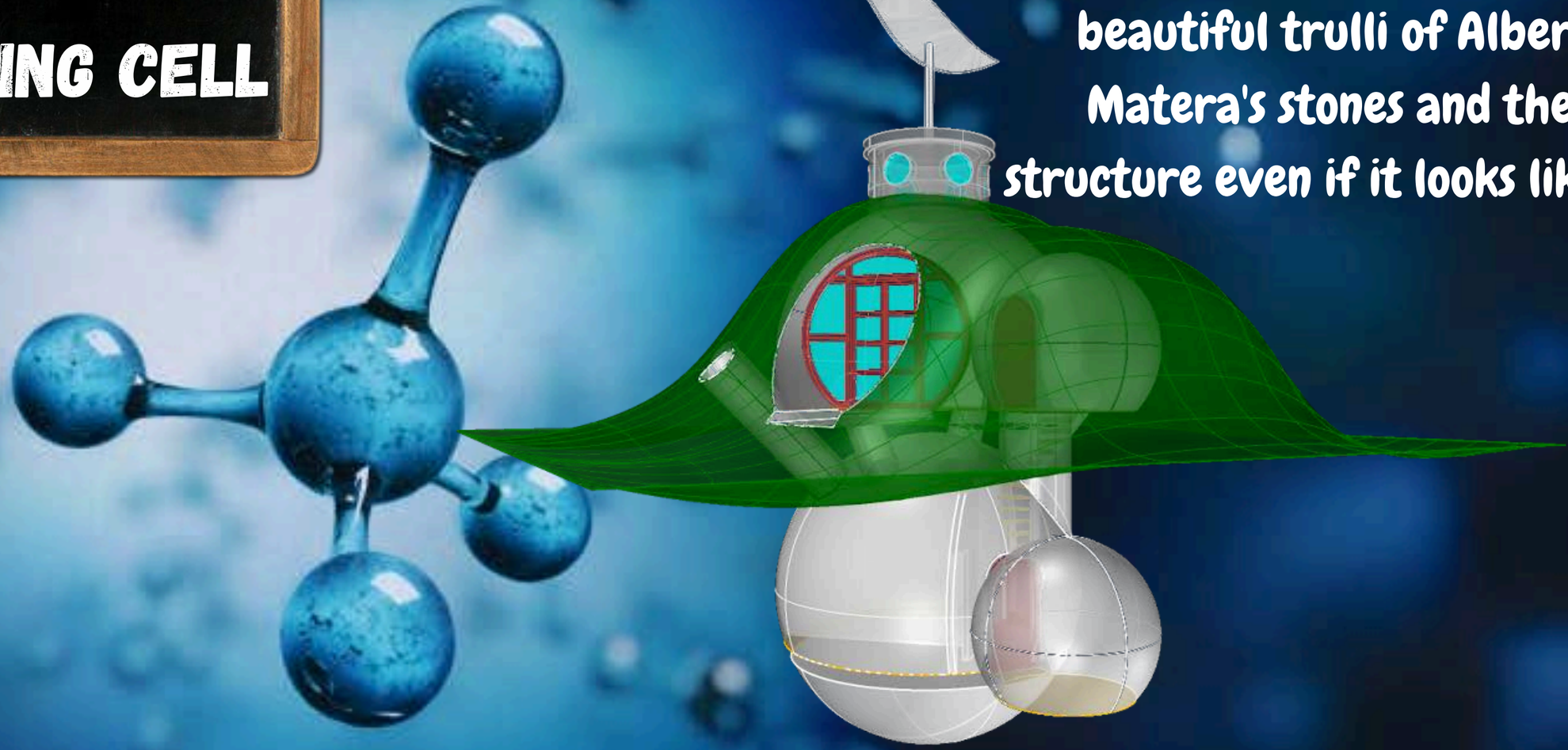


The first brain storming

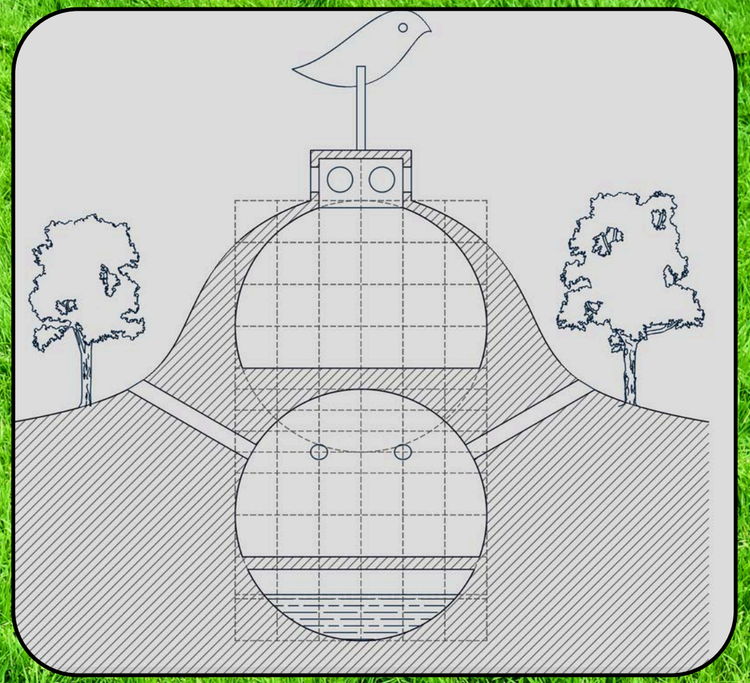
On the basis of our study we started to approach our idea of an ideal house. The first step was a free interpretation through freehand sketches.

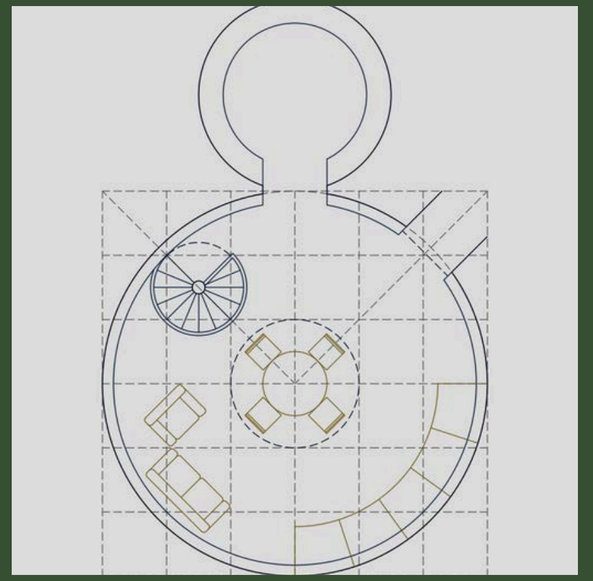
THE SINGLE LIVING CELL

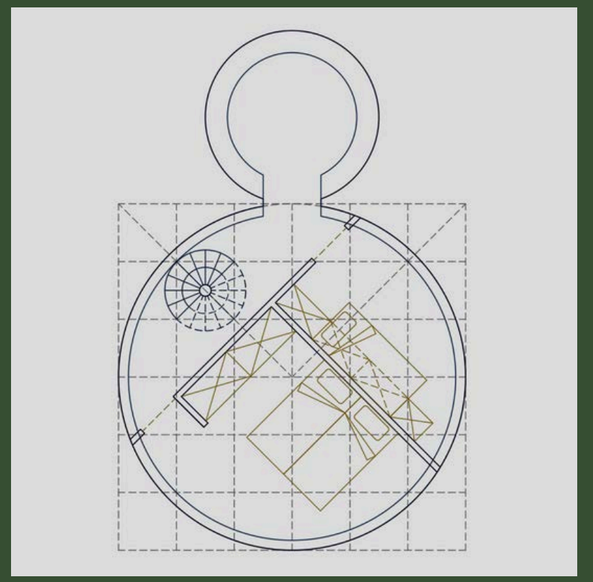
We decided to make our living cell spherical and three-quarters underground. We were inspired by the beautiful trulli of Alberobello, the Matera's stones and the molecular structure even if it looks like a hobbit house



INSIDE THE HOUSE

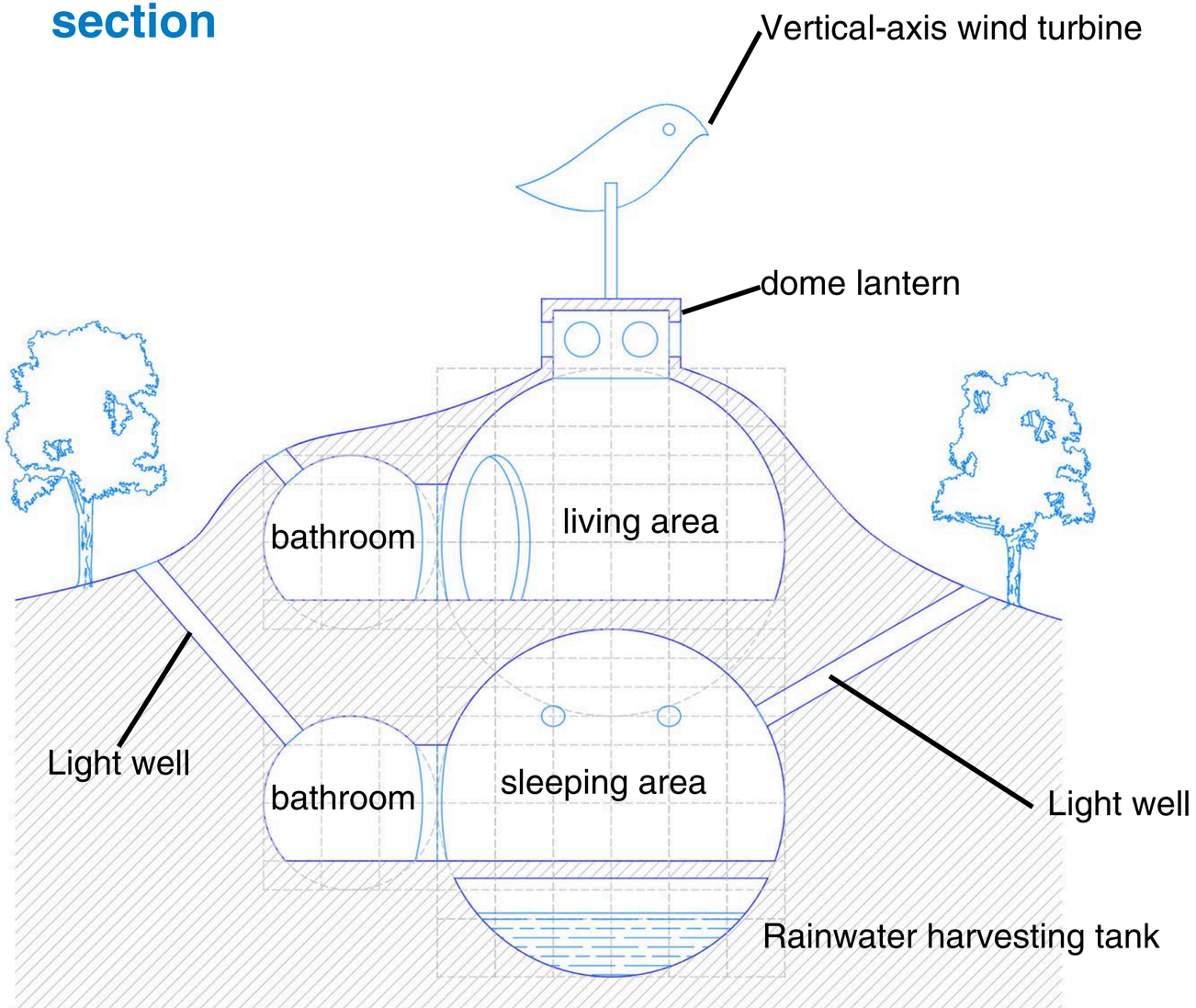




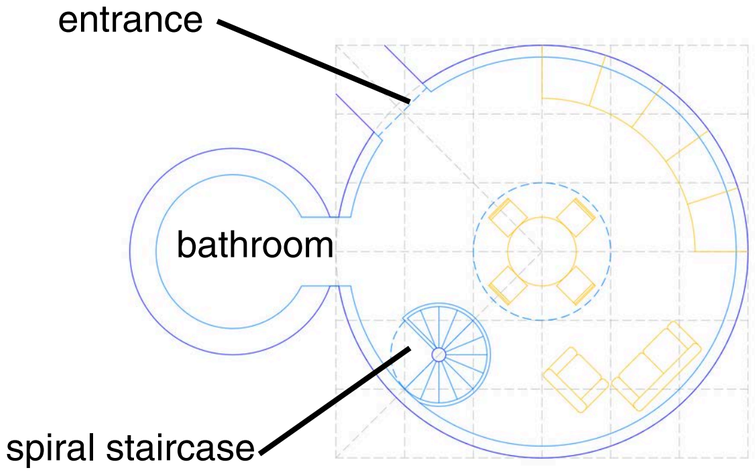


It's a bi-local with an open space where in the middle there is a table, a place where the family members meet, typical of Italy. We made so that the light comes from light channels that give into the interior of the house made by only the main rooms. We made small and essential furnitures to not waste space.

section

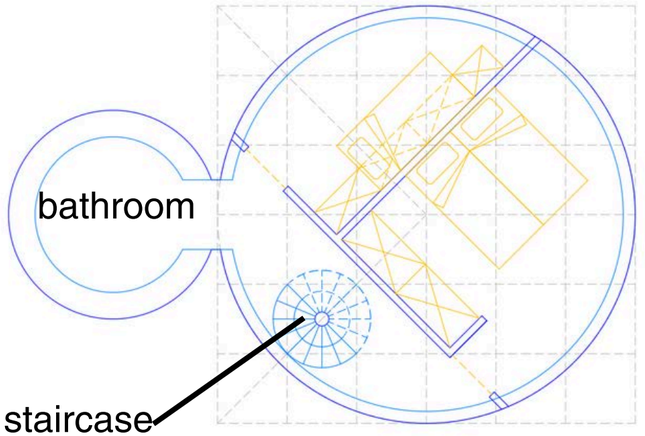


ground floor plan

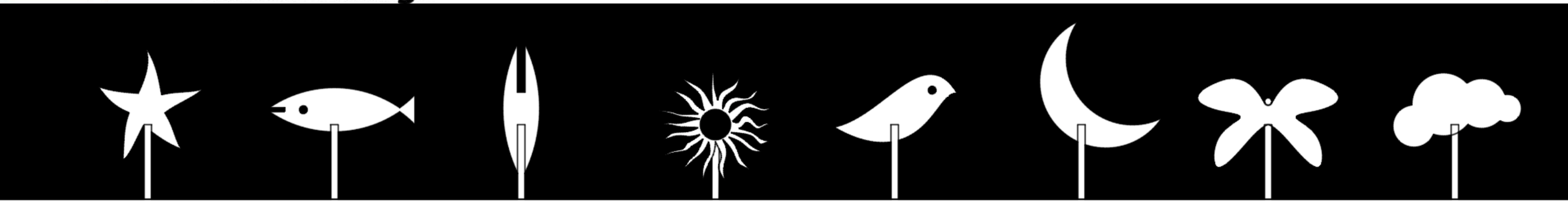


living area

underground floor plan

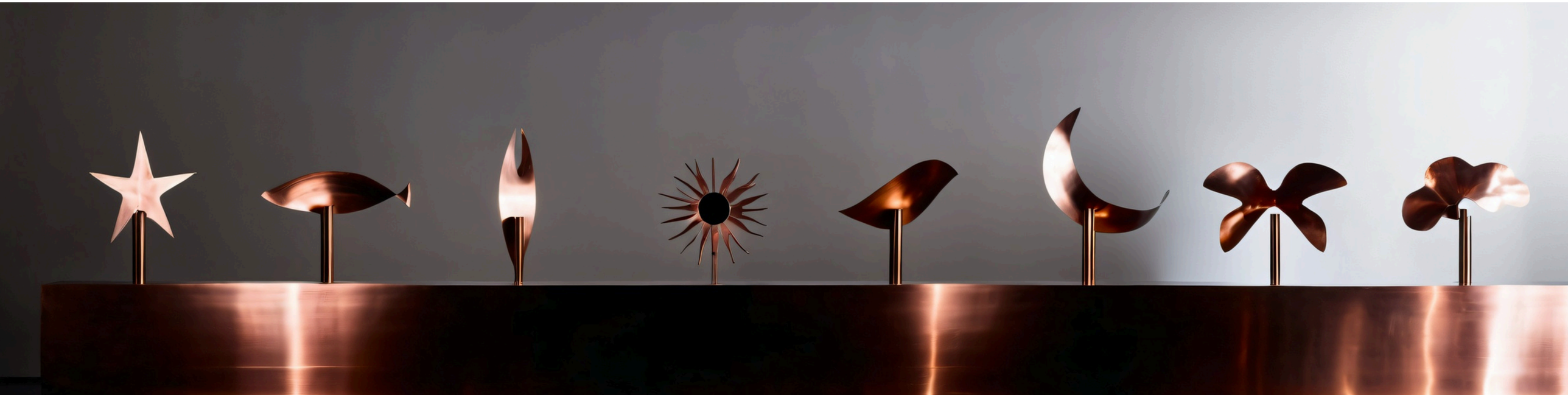


sleeping area



Wind turbines

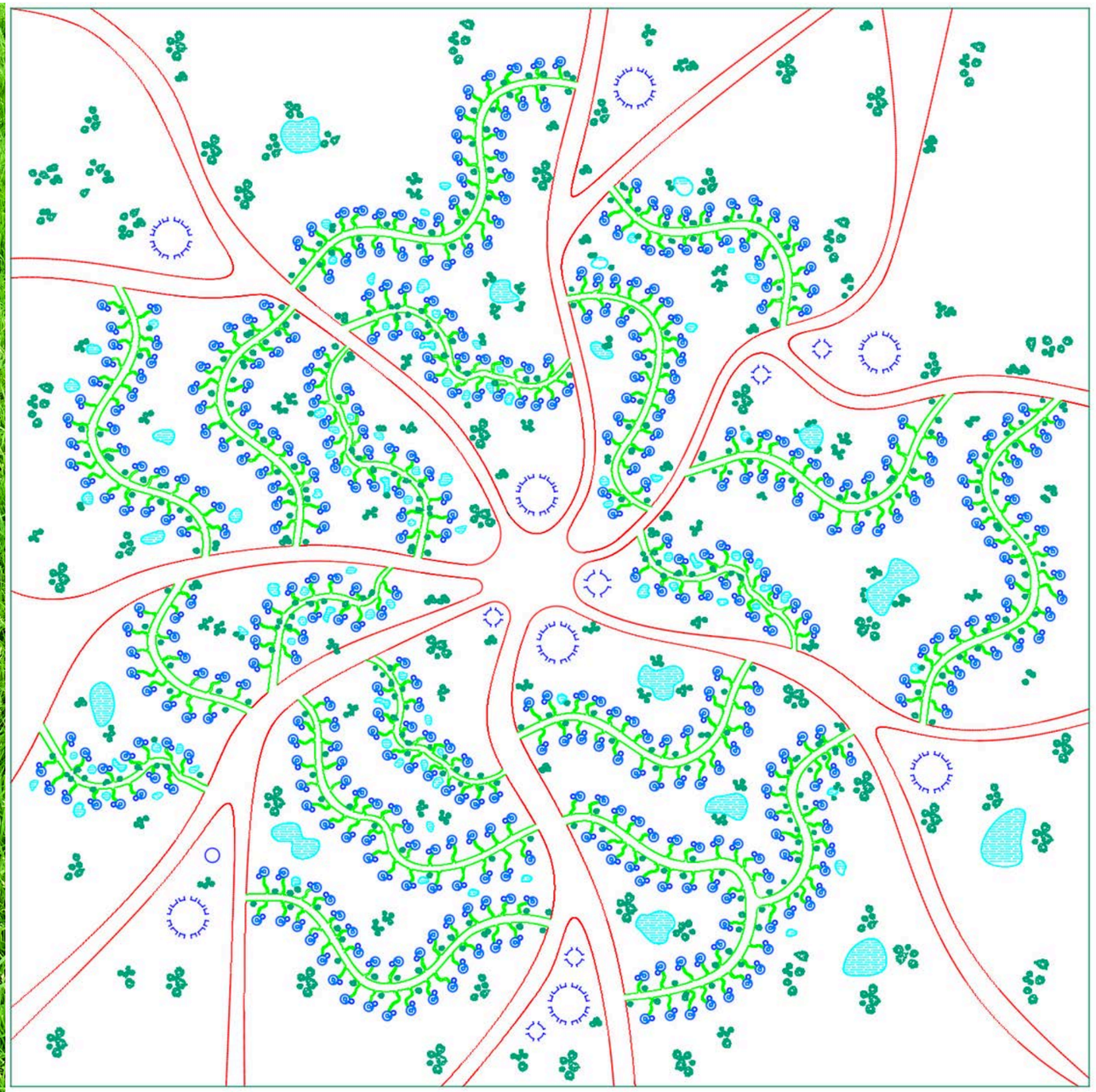
For the design of the wind turbines, we took inspiration from natural forms. Starting from handmade drawings we arrived to use Autocad and 3D model with Rhinoceros.



The town

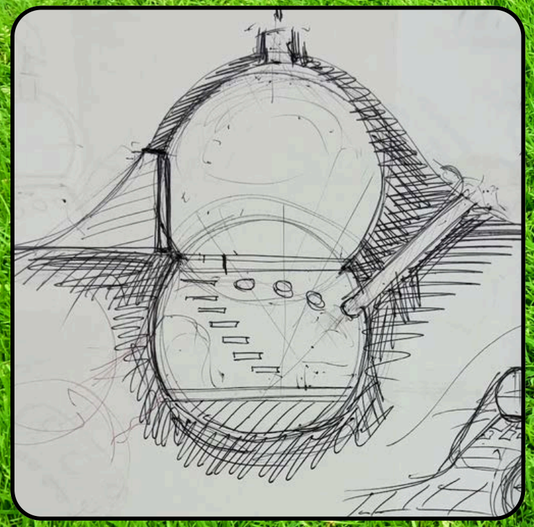
Our town is shaped like a pomegranate divided into slices containing everything a town needs like services,facilities and entertainment.

planimetry of the town



realisation

Process



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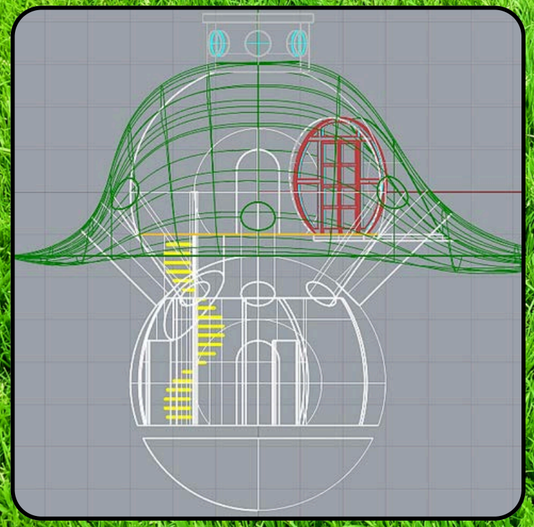

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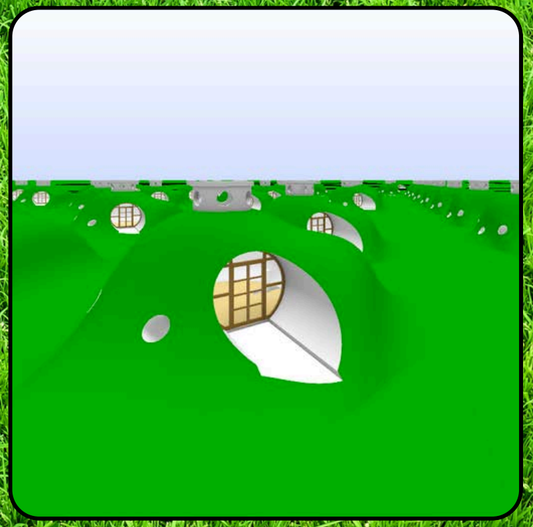
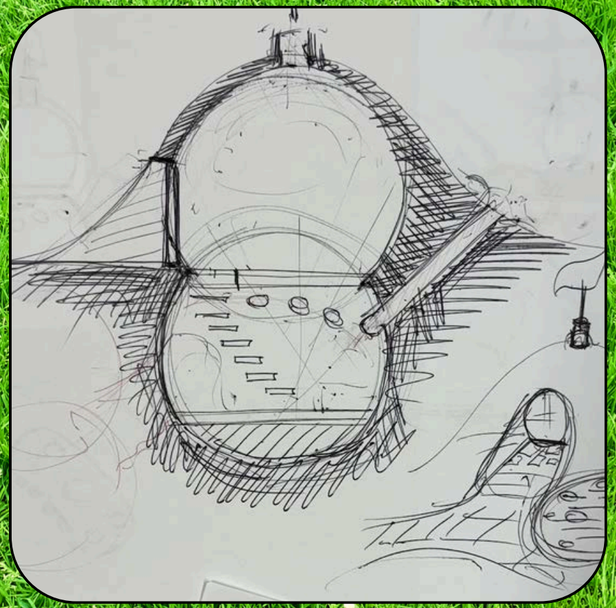


3

4

From the draft to 2D

Based on the drafts, we worked with Autocad to create the planimetry of the house and of the town.



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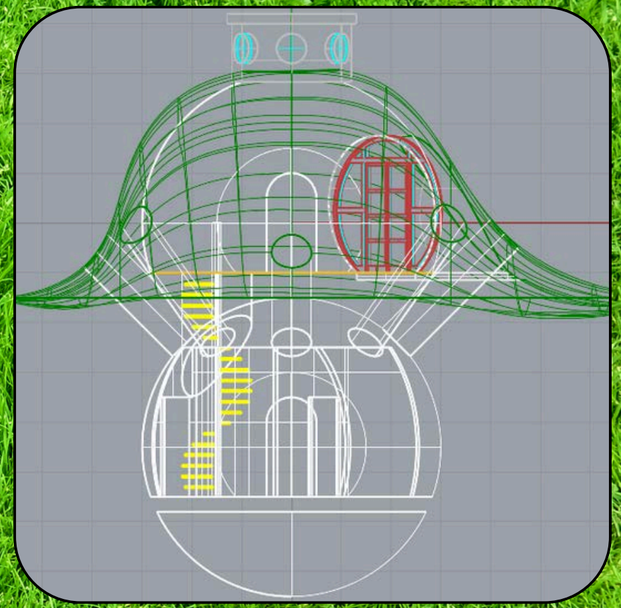
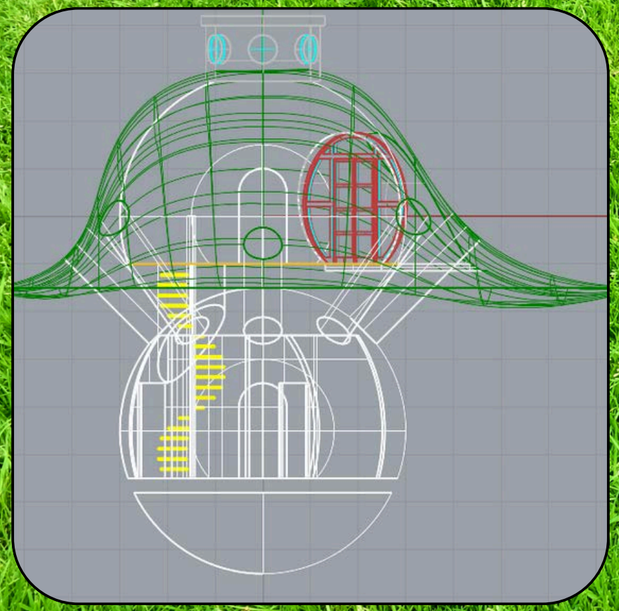


2

From 2D to 3D

To reach 3D both for the living unit and for the town we used Rhinoceros



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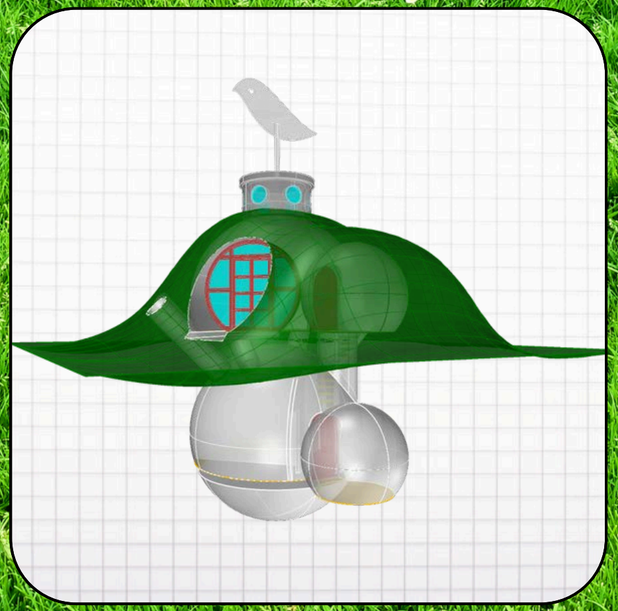

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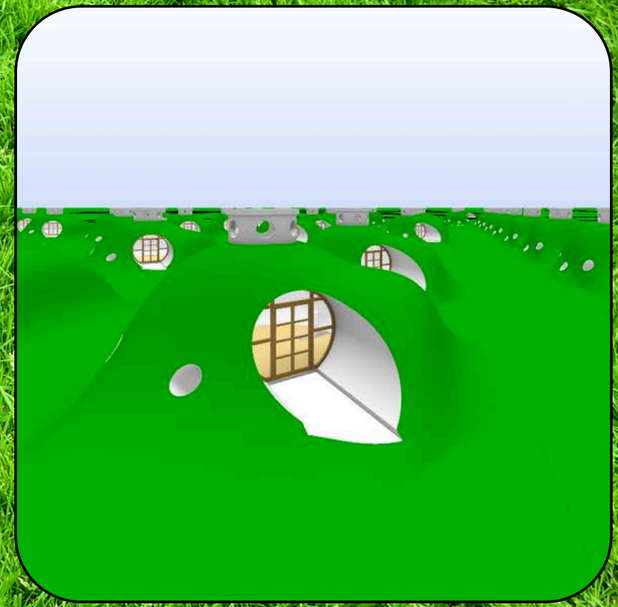
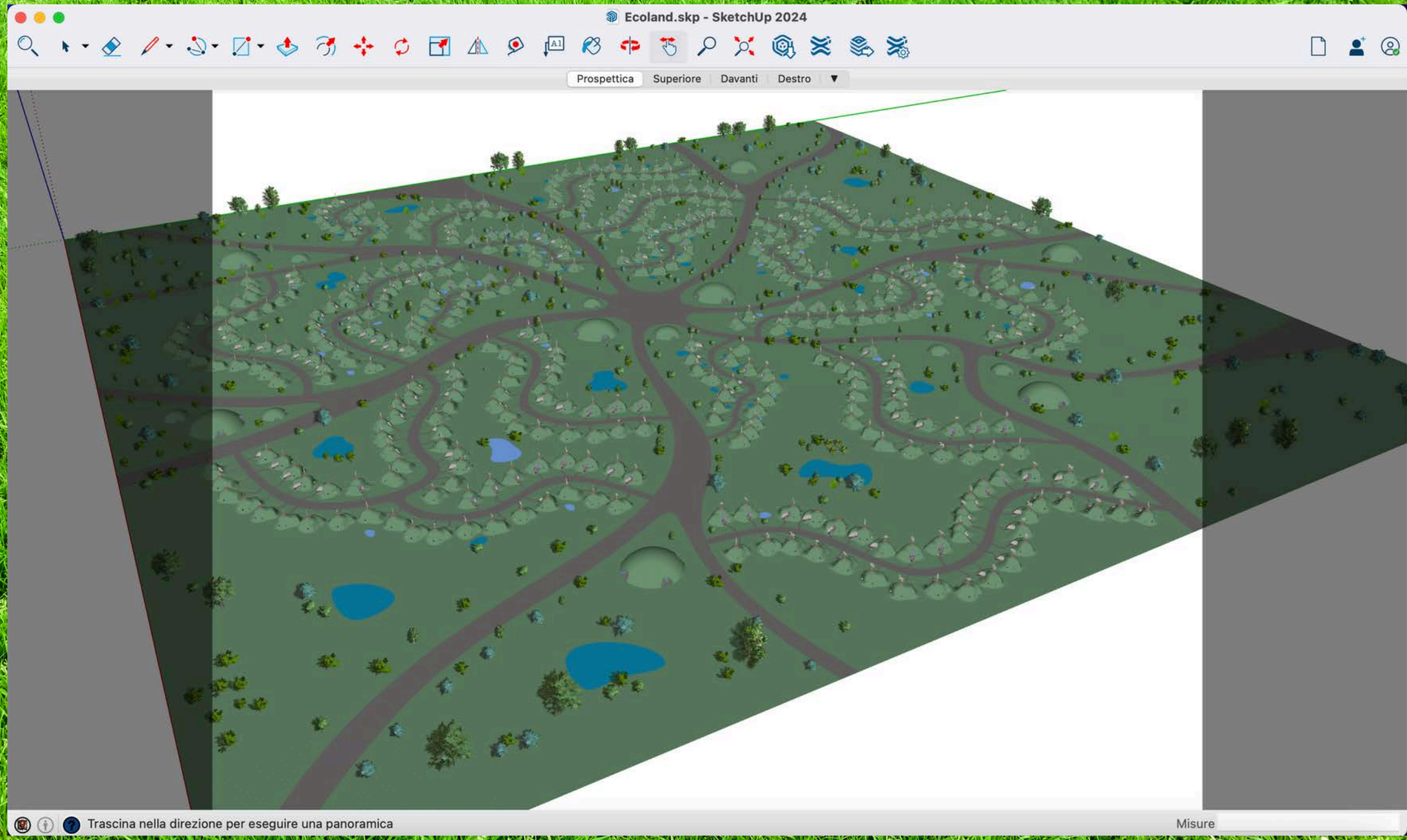


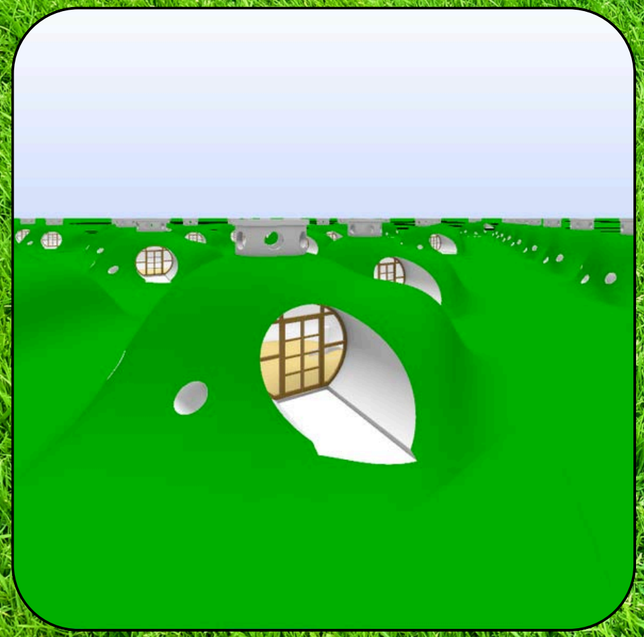
4

And here's our final result in SketchUP!



The final step

After turning 3d the town we used Veras to render the images from rhinoceros.

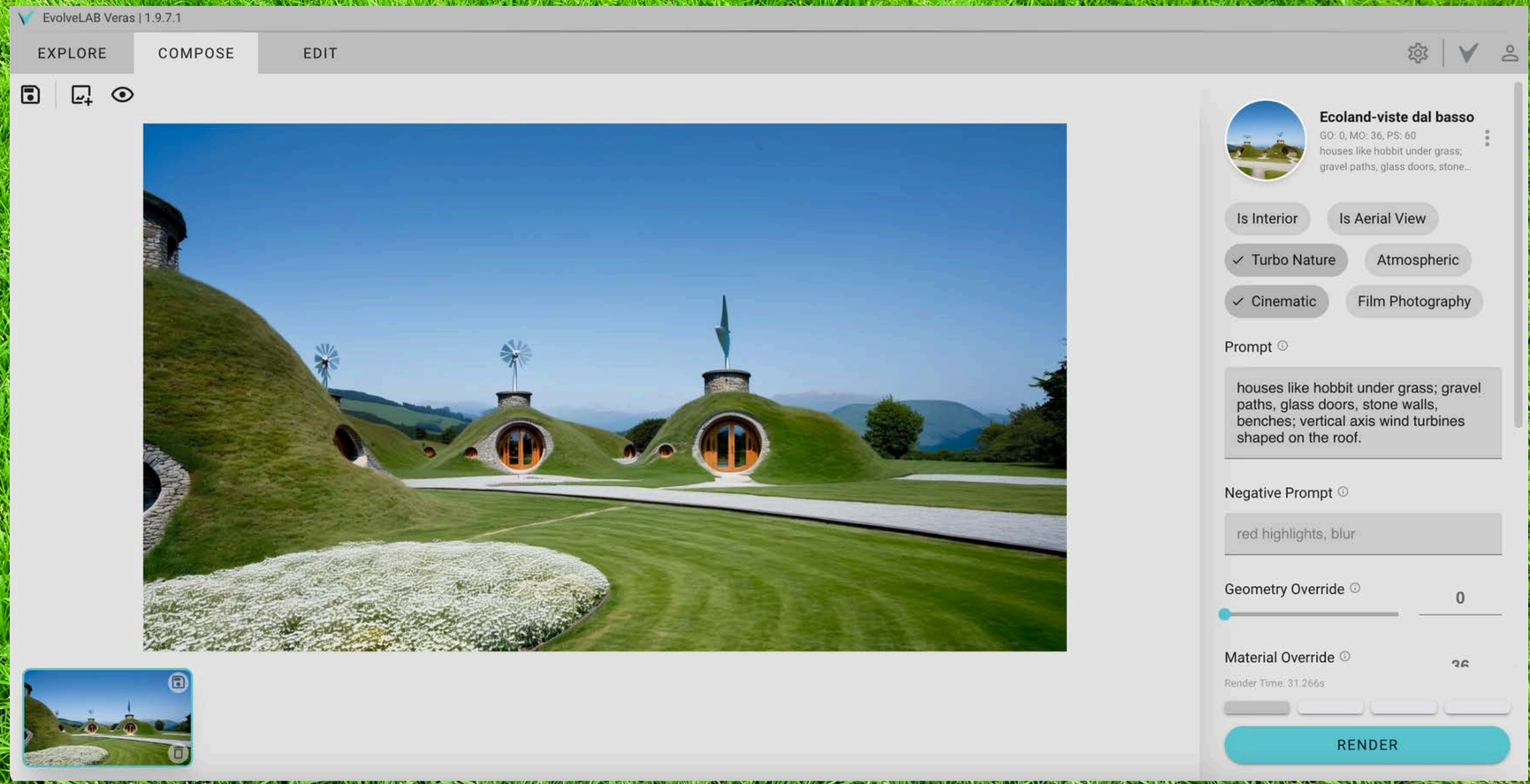


4

5

VERAS

To have some pictures of our ideal town, we used the artificial intelligence Veras.



For the images of Veras we asked for some characteristics: spring environment, trees, flowers, lakes and cobblestone streets. So it was not easy to satisfy our request because the city is not a typical.

some tree...

spring enviroment...

lots of flowers...

some small lakes...

Power Of DIGItalization in fighting against climate change

Work Package n.4 : 4° LTTA's |Skale (Poland) : 01/06 December 2024

Italy : Istituto Comprensivo Lodi 2° "Giovanni Spezzaferri"

Power Of DIGItalization in fighting against climate change

Work Package n.4 : 4° LTTA's |Skale (Poland) : 01/06 December 2024
Italy : Istituto Comprensivo Lodi 2° "Giovanni Spezzaferri"

Dedications

We dedicated to our teachers a lot of streets of our town the facilities and the worship places. The main square is dedicated to our beloved coordinator of our Erasmus project: Mrs Carratta. To Mr Santagata we dedicated the town hall , the park to Mrs Barbierato, the main roads to Mrs C. Mimmo and Mrs M. Marini. And the....

The vegan restaurant

The vegan restaurant is dedicated to our Italian History and Geography teacher, Mrs Elvira Antibo.

vegan

restaurant

da Elvira

Thank you for your attention.

Co-funded by the European Union

Power of digitalization in fighting against **climate change**

Greek Student Works

5th High School Agrinio -Greece

May 2025

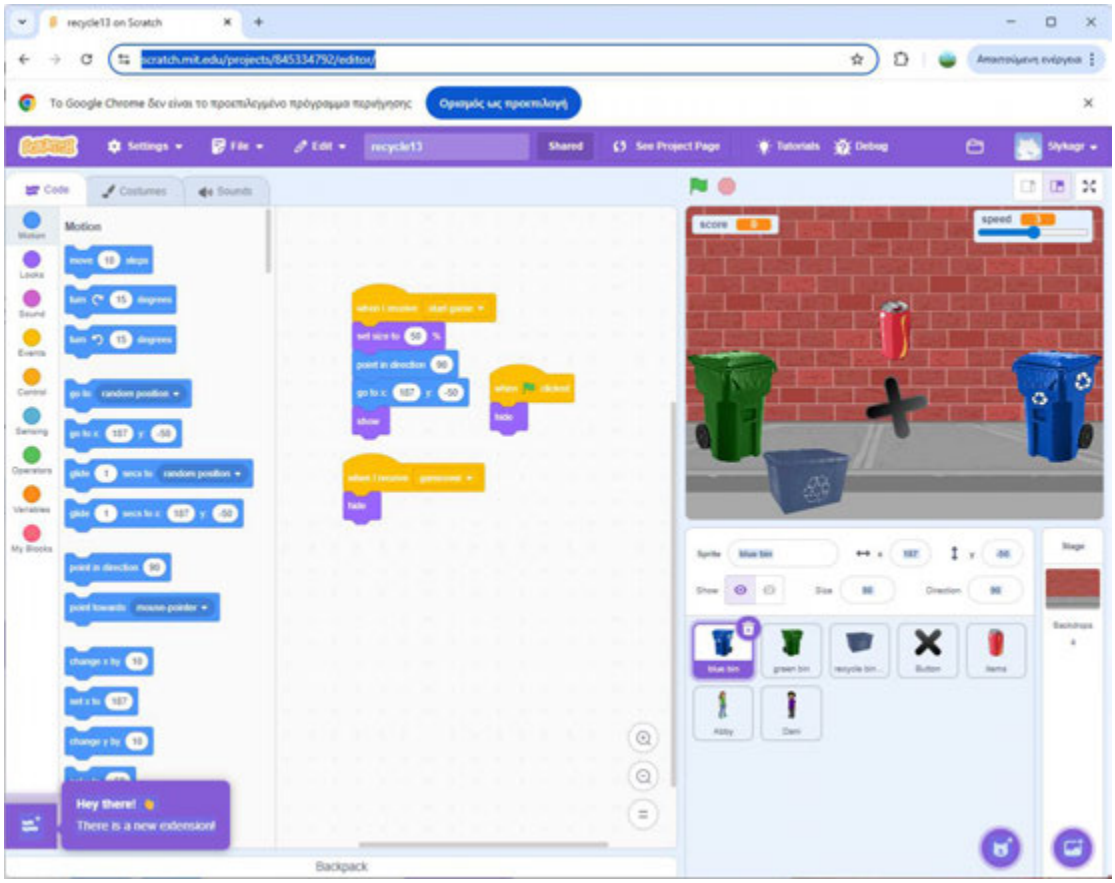
5th High School of Agrinio · Greece

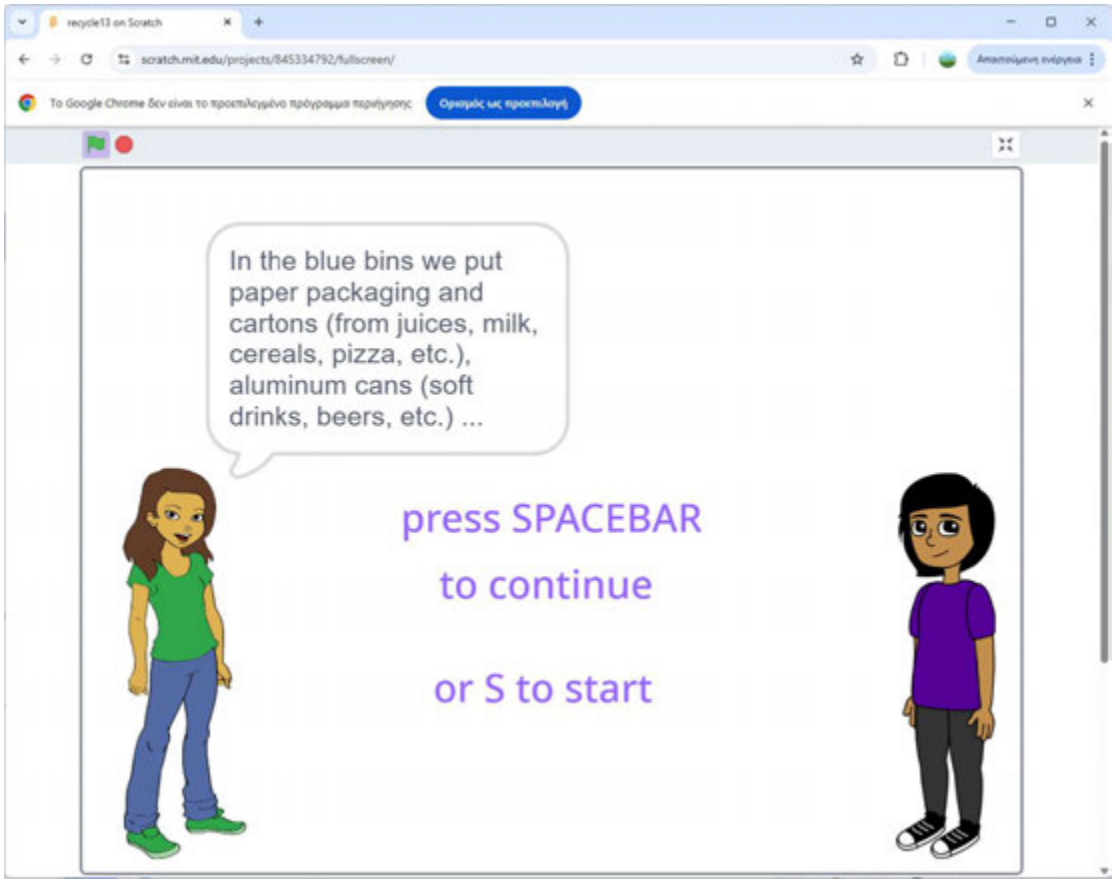
Contents

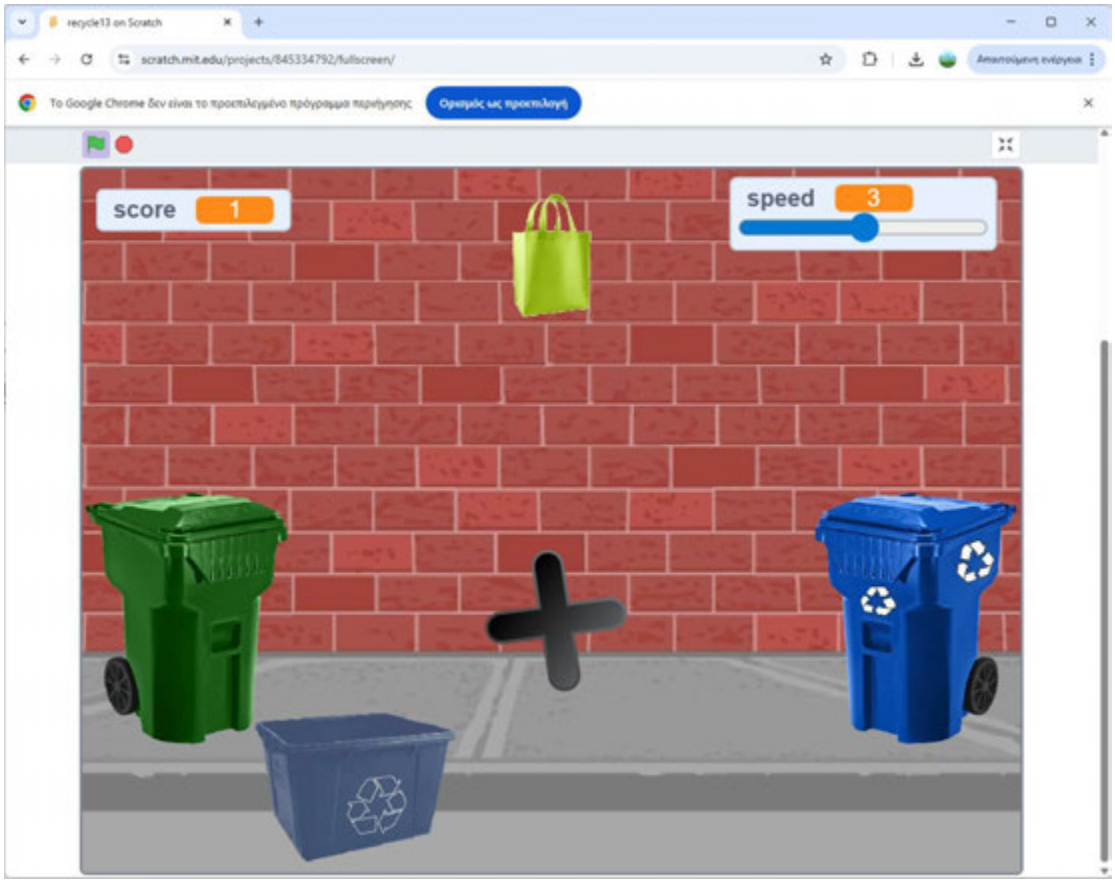
2nd WP "Increasing GREEN in education"

Scratch Project

https://scratch.mit.edu/projects/845334792/editor/





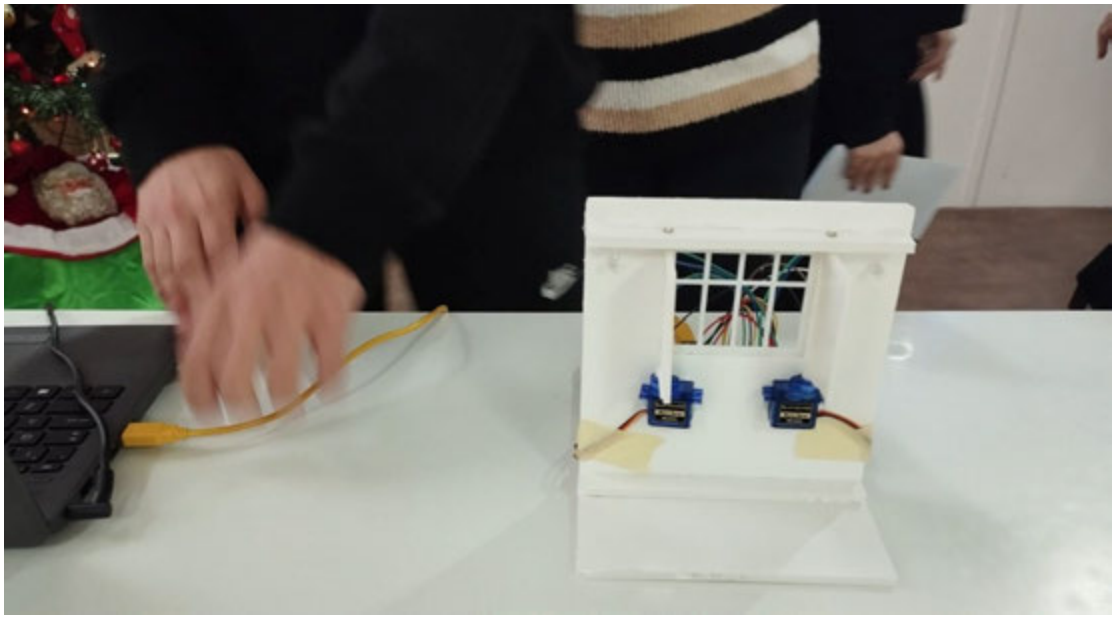


Canva Poster

https://www.canva.com/design/DAFhBhJptH8/4I4yTpwDTEktm_A6RnLanQ/edit?utm_content=DAFhBhJptH8&utm_campaign=designshare&utm_medium=link2&utm_source=sharebutton

3rd WP "Design development to prevent climate change"

Arduino project



Code in Arduino environment

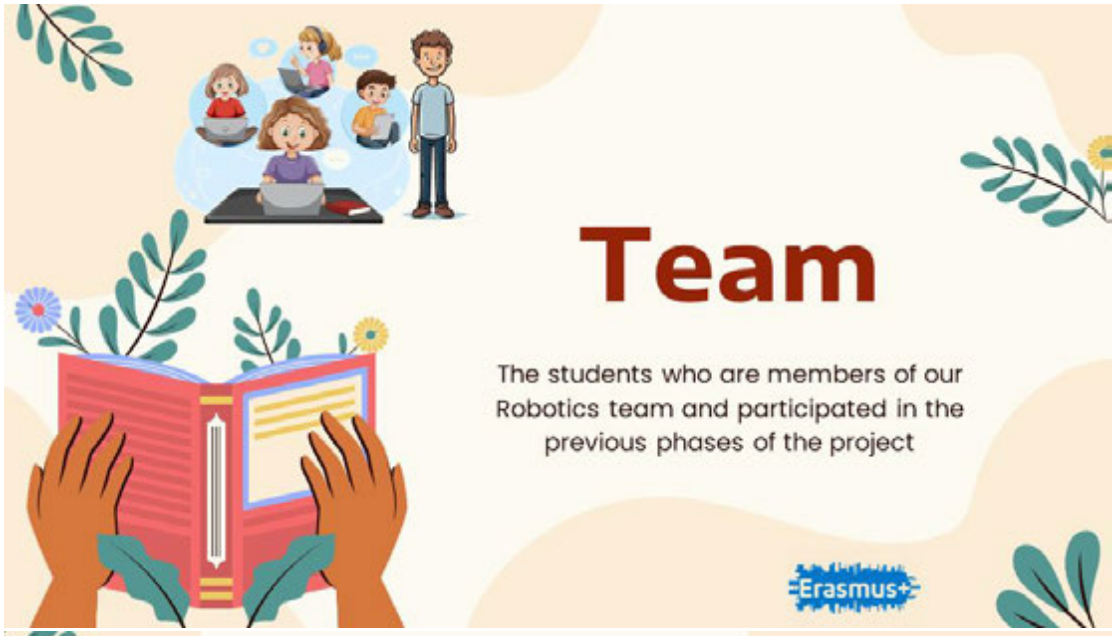
```
#include <Servo.h>

Servo windowServo;

// Pins
const int SERVO_PIN  = 9;
const int BUTTON_PIN = 2;

// Angles (tune these for your mechanical setup)
const int CLOSED_ANGLE = 0;    // window closed position
const int OPEN_ANGLE   = 90;   // window fully open position

bool isOpen = false;           // current window state
bool lastButtonState = HIGH;   // because of INPUT_PULLUP

void moveWindowTo(int targetAngle) {
```

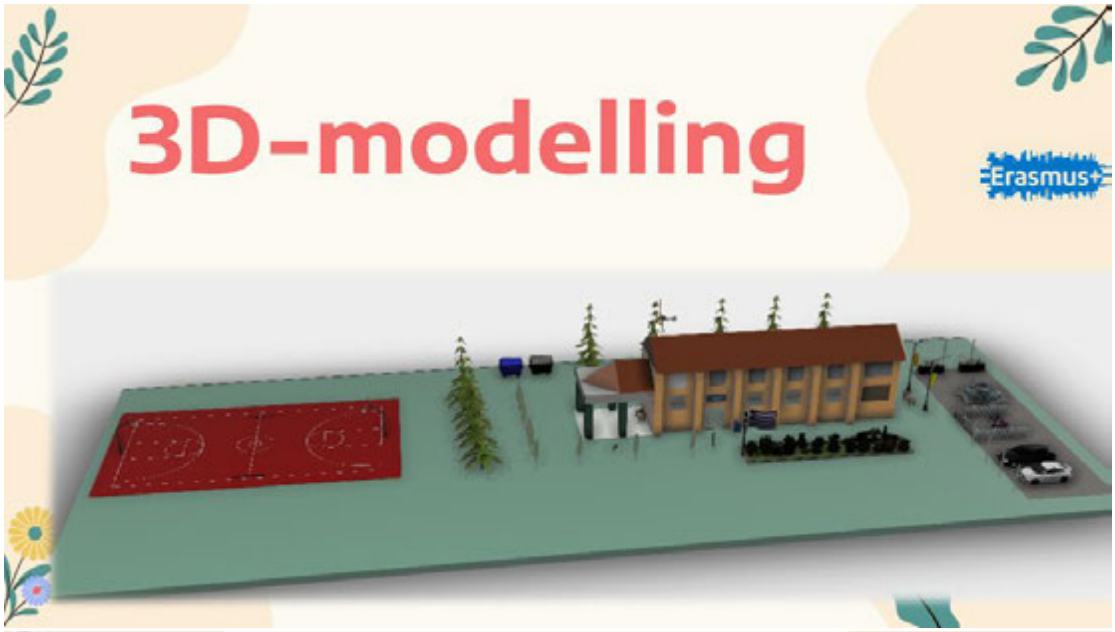
```
  int currentAngle = isOpen ? OPEN_ANGLE : CLOSED_ANGLE;

  if (targetAngle > currentAngle) {
    for (int a = currentAngle; a <= targetAngle; a++) {
      windowServo.write(a);
      delay(20); // move slowly, adjust for speed
    }
  } else {
    for (int a = currentAngle; a >= targetAngle; a--) {
      windowServo.write(a);
      delay(20);
    }
  }
}

void setup() {
  windowServo.attach(SERVO_PIN);
  pinMode(BUTTON_PIN, INPUT_PULLUP);

  // Start with window closed
  windowServo.write(CLOSED_ANGLE);
  isOpen = false;
}

void loop() {
  bool buttonState = digitalRead(BUTTON_PIN);

  // Detect button press (transition from HIGH to LOW)
  if (lastButtonState == HIGH && buttonState == LOW) {
    // Toggle state
    if (isOpen) {
      // Close window
      moveWindowTo(CLOSED_ANGLE);
```

```
      isOpen = false;
    } else {
      // Open window
      moveWindowTo(OPEN_ANGLE);
      isOpen = true;
    }

    delay(200); // simple debounce
  }

  lastButtonState = buttonState;
}
```

3D Design in ScetchUP

Ecoland presentation





THE POWER OF DIGITALIZATION IN THE FIGHT AGAINST CLIMATE CHANGE FOR AN ECOLOGICAL ENVIRONMENT

PROJECT 2025

FRANCE

Erasmus+
Enriching lives, opening minds.

ASSOCIATION HEXAGONALE
de l'Innovation Sociale et de l'Education

STUDENTS: AMNA, ASMA, BILAL, HAIDER, NISANUR
TEACHERS: MR.BUCHLER , MR.SENHADJI, MRS PONAPIN

TABLE OF CONTENTS

01 INTRODUCTION

- **Pierre Curie middle school: a place we know**

- **<u>The main objective</u> :**

Find solutions to reduce the ecological footprint

02 | DIGITAL TOOLS USED

Advantages

- Practical use of mathematics
- A realistic model

SketchUp

02 DIGITAL TOOLS USED

Advantages

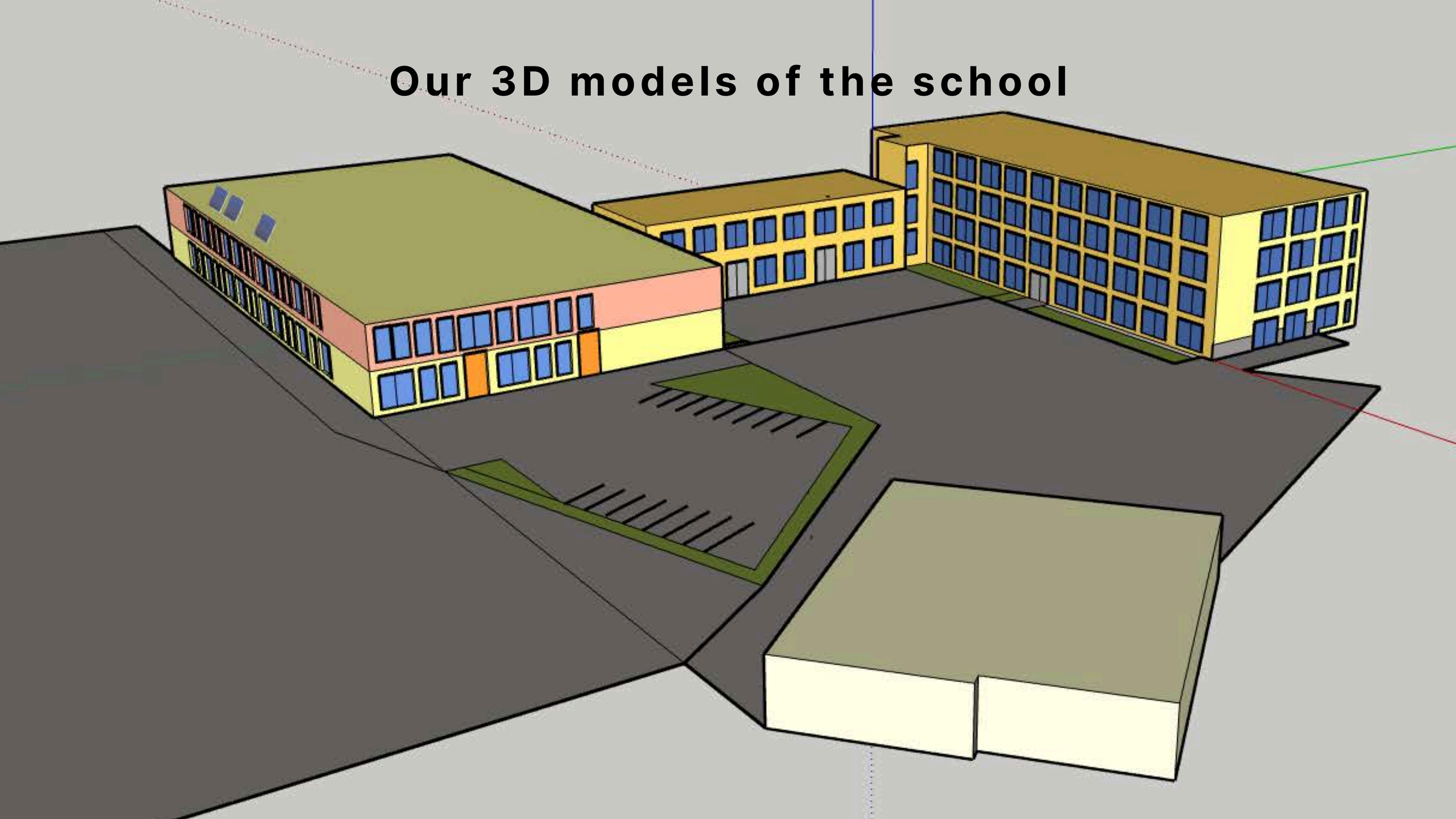
- Practical use of mathematics
- A realistic model

SketchUp

Disadvantages

- Its interface was not very intuitive
- Measurement tool limitations
- Computers unable to process large files

Our 3D models of the school



Mesuring the height of the buildings

02 | DIGITAL TOOLS USED

Advantages

- Aesthetic results
- Collaborative working made easier

Canva

Canva

02 DIGITAL TOOLS USED

Advantages

- Aesthetic results
- Collaborative working made easier

Disavantage

- Some functionalities not available

Canva

02 | DIGITAL TOOLS USED

Advantages

- Practical miniature prototype
- Attractive and innovative
- A technology that develops valued skills

3D printer

02 | DIGITAL TOOLS USED

Advantages

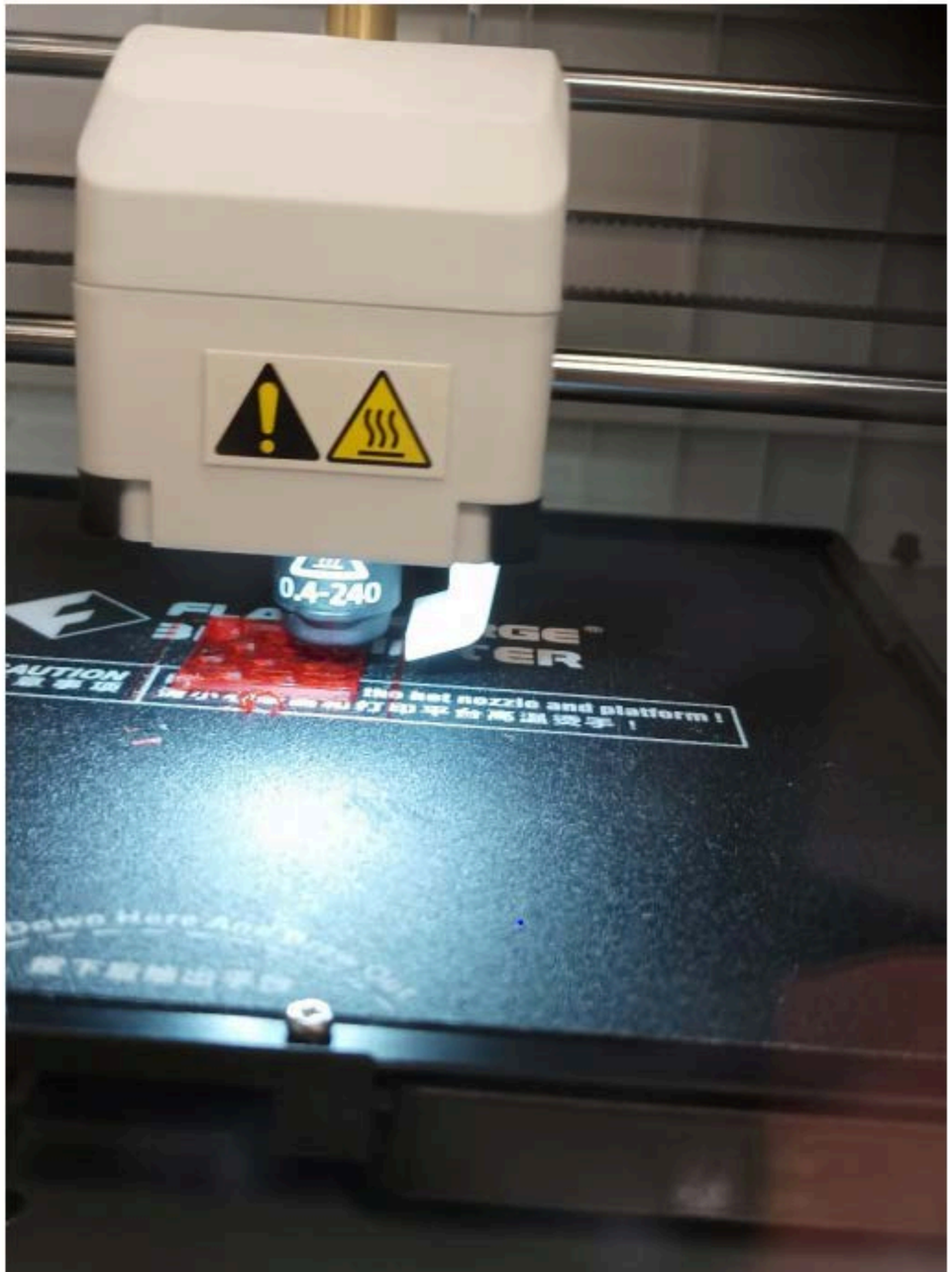
- Practical miniature prototype
- Attractive and innovative
- A technology that develops valued skills

Disadvantages

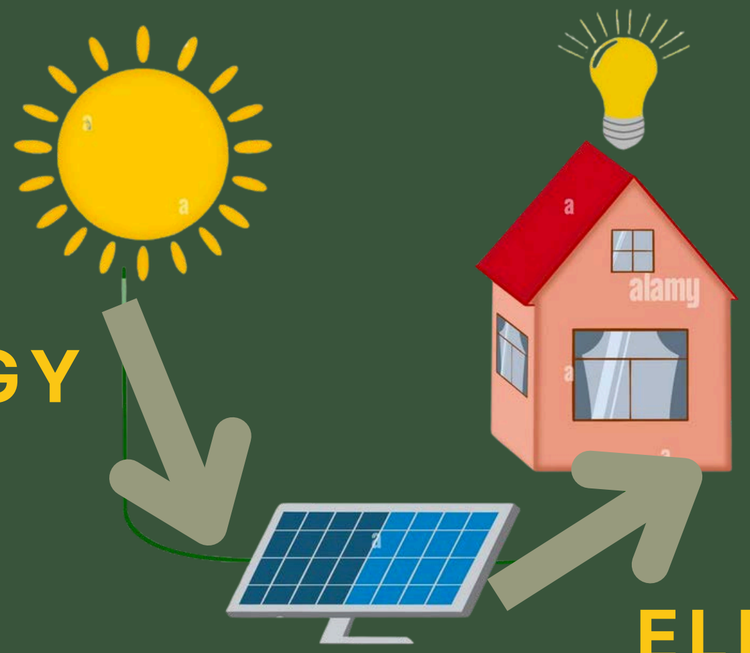
- Very long printing time
- Hard to get realistic size

3D printer

The 3D Printer in action

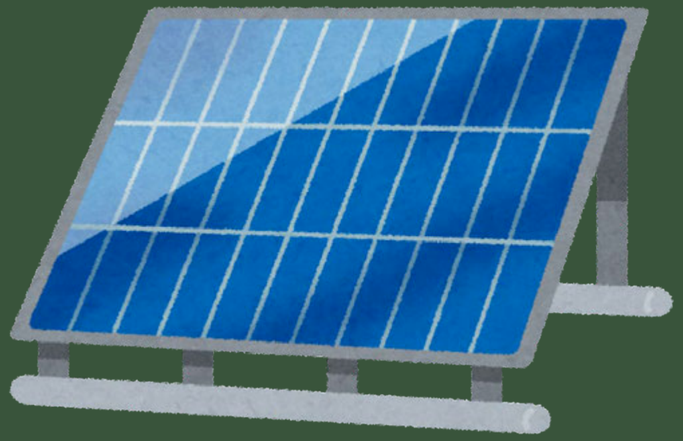


Installing solar panels



Solar panels

03 IDEAS

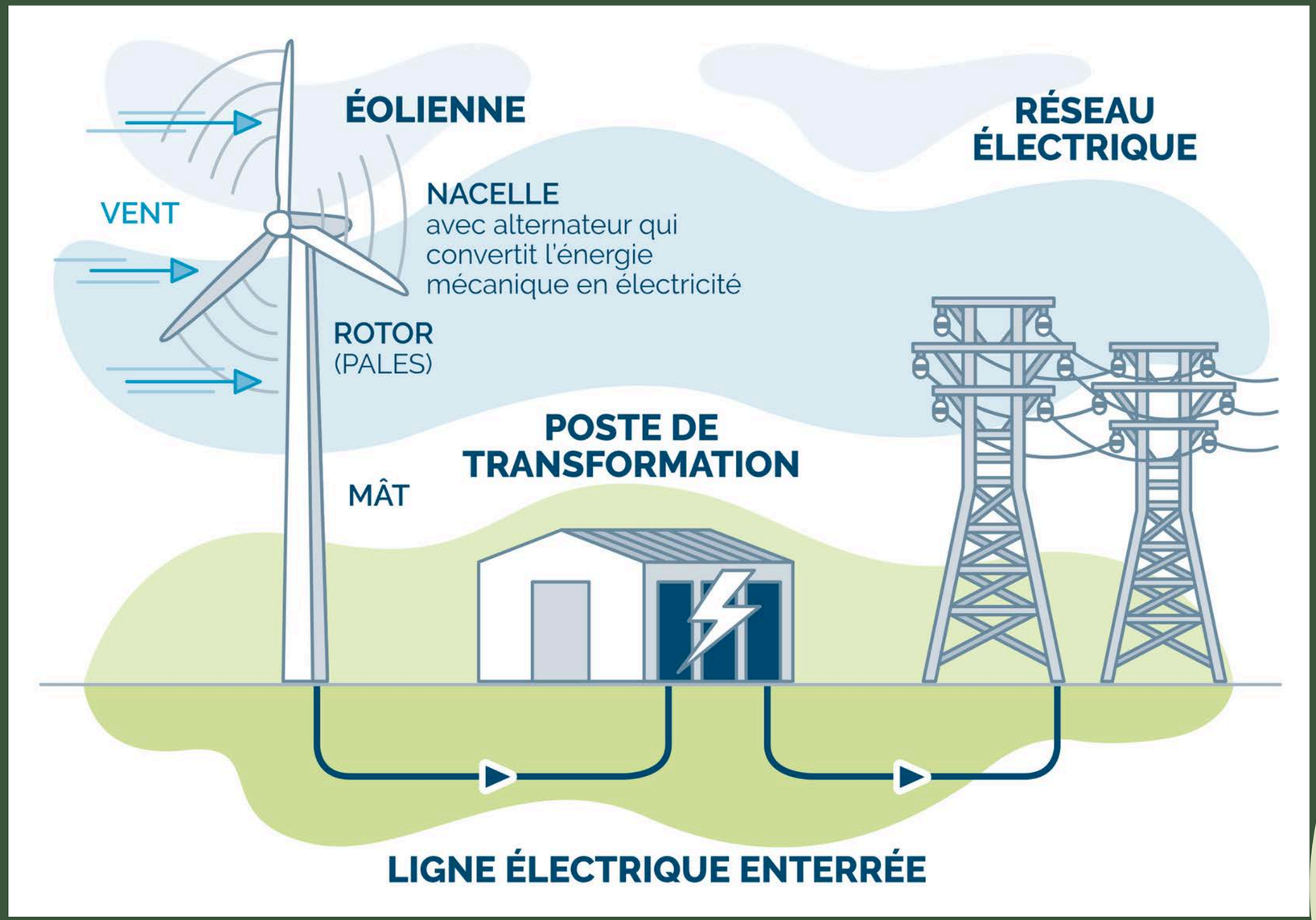


Installing solar panels

- **Produces green energy** ✓
- **Profitability** ✓
- **High costs** ⊘

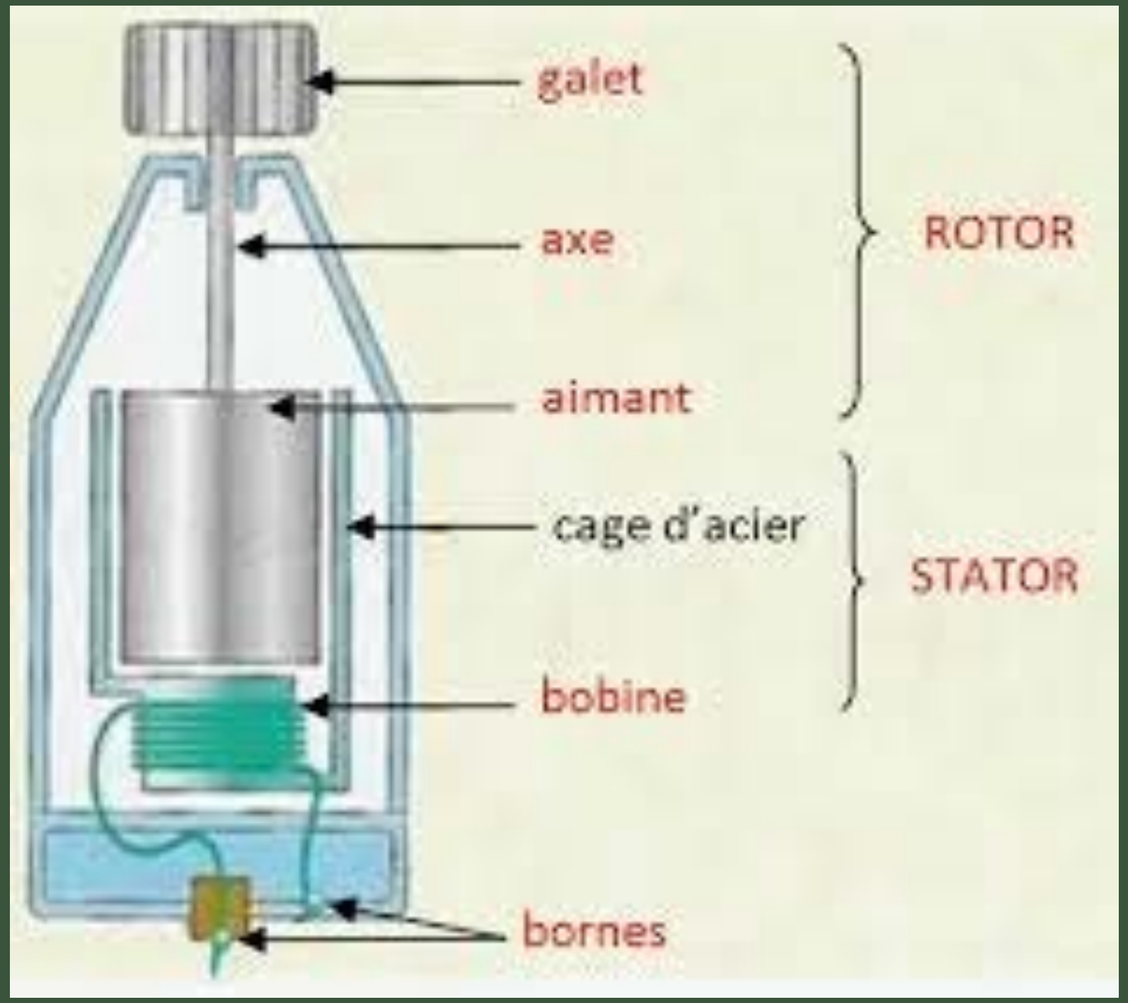
Solar panels

Installing wind turbines



Wind turbines

How it works

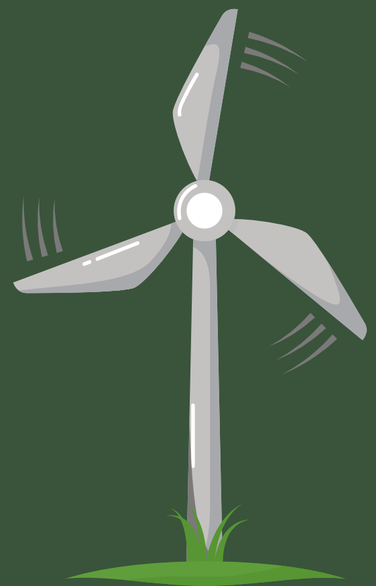


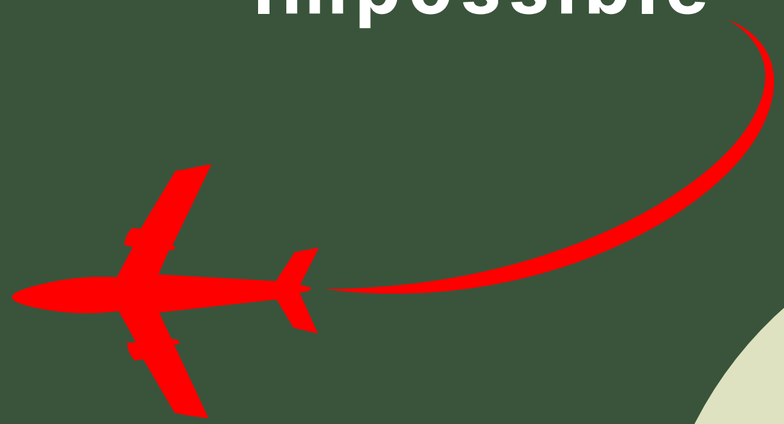
Wind turbines

03 IDEAS

Installing wind turbines

- Profitable
- Impossible





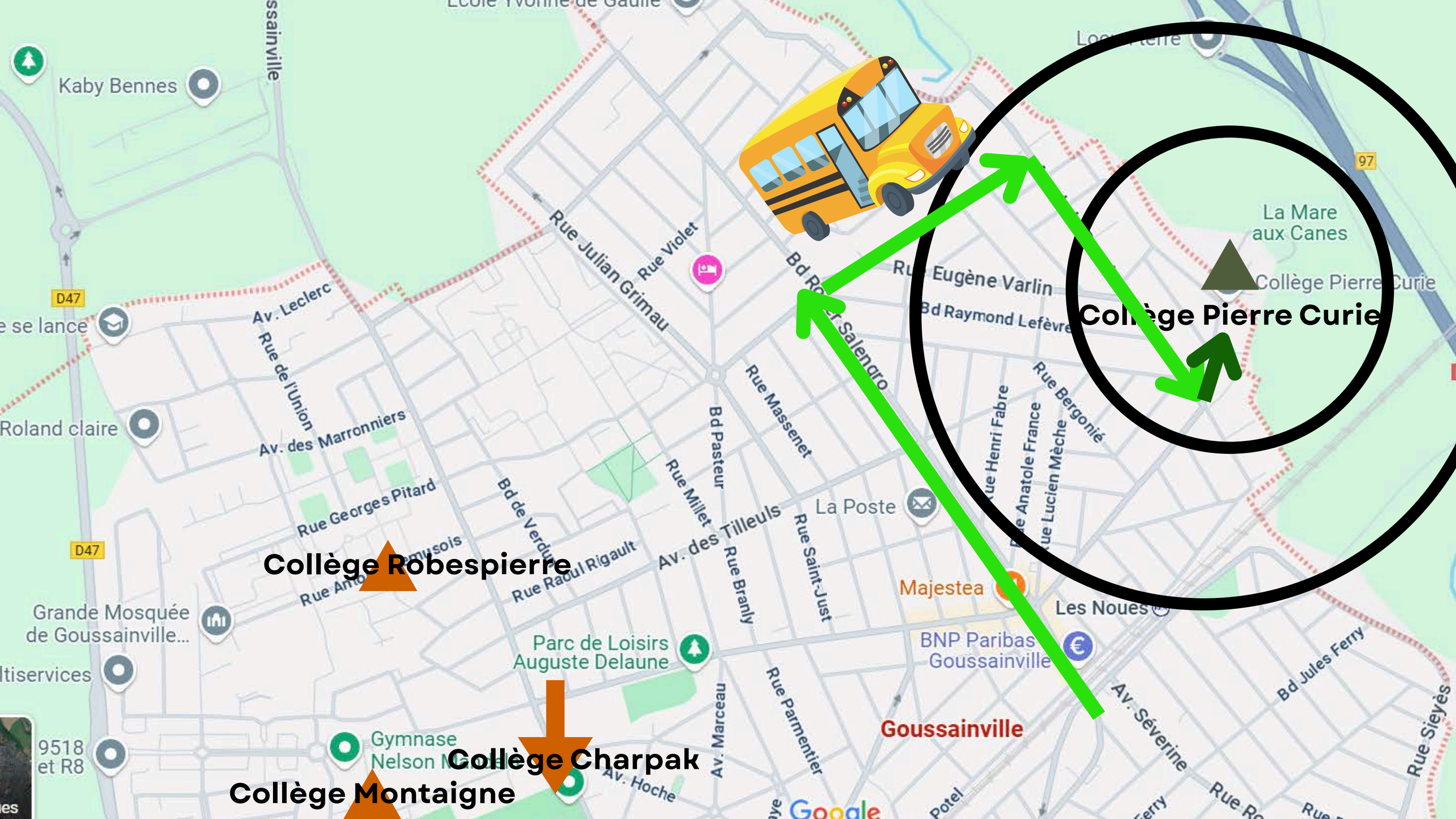
Wind turbines

03 IDEAS

Low-emission school bus

- Reduce road traffic
- Decrease CO2 emissions
- High costs

Ecological school bus


Collège Pierre Curie
Collège Robespierre
Collège Charpak
Collège Montaigne
Goussainville
Kaby Bennes
Roland claire
Grande Mosquée de Goussainville...
Parc de Loisirs Auguste Delaune
Majestea
Les Noues
BNP Paribas Goussainville
La Poste
La Mare aux Canes
Rue Julian Grimau
Rue Violet
Bd Pasteur
Rue Massenet
Av. des Tilleuls
Rue Millet
Rue Branly
Rue Saint-Just
Av. Marceau
Rue Parmentier
Av. Séverine
Bd Jules Ferry
Rue Sieyès
Av. Leclerc
Rue de l'Union
Av. des Marronniers
Rue Georges Pitard
Bd de Verdun
Rue Raoul Rigault
Av. Hoche
Rue Eugène Varlin
Bd Raymond Lefèvre
Rue Henri Fabre
Rue Anatole France
Rue Lucien Mèche
Rue Bergonié
D47
97
Google

04 GENERAL CONCLUSION

- Solar panels + circulation of an eco-friendly school bus
- An environmentally exemplary middle school.

SOURCES

CEREMA (Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement)

.

Ministère de la transition écologique

.

France renouvelables (Association for the wind turbines)

.

Service public (About laws in France)

.

INES (National Institute of Solar Energy)

.

EDF (Électricité De France)

Thank you for listening !

POWER OF DIGITALIZATION IN FIGHTING AGAINST CLIMATE CHANGE

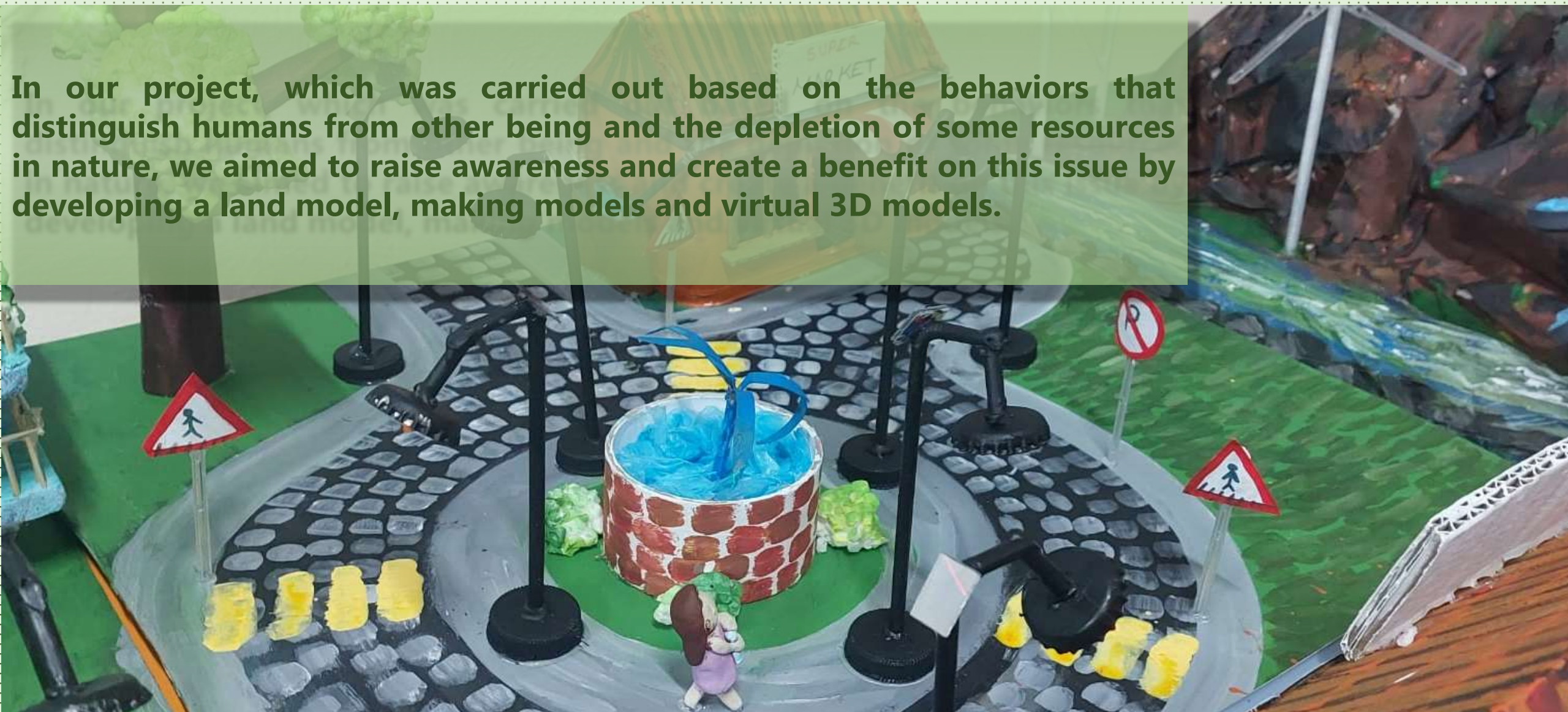
Elanur AYDIN
İzem OKTAR
Elif Su CİNOĞLU
Elif ÇEPNİ

AIM

- We are aiming to decrease the influence of climate change by using the power of digitalizition.
- To reduce the consumption of harmful resources.
- To increase the use of renewable resources instead of non-renewable resources.
- To decrease the harm towards the environment.
- To create new job opportunities based on renewable resources.
- To minimize climate change and its effects.

INTRODUCTION

In our project, which was carried out based on the behaviors that distinguish humans from other being and the depletion of some resources in nature, we aimed to raise awareness and create a benefit on this issue by developing a land model, making models and virtual 3D models.



CLİMATE CHANGE

Although cities constitute only 1% of the world's terrestrial and ice-free USB storage, they have significant impacts on the environment. The most important one among these impacts is climate change, which also has economic and social consequences. Climate change is a major problem that defines our era and is stated in the United Nations Framework Convention on Climate Change (UNFCCC) as "changes that occur over a long period of time as a result of natural changes in climate and directly or indirectly as a result of human activities and that disrupt the composition of the global atmosphere." (UNFCCC, 1992).

AGRICULTURE

It has great importance in food supply, which is one of the basic needs of humanity. The sector most affected by global warming, which we can consider as the biggest problem of our age, is agricultural activities carried out under the influence of natural conditions. Global warming is an event that increases the rate of greenhouse gases in the atmosphere as a result of human activities.

Where is Turkey in the disaster?

Turkey experienced one of its hottest summers in 2003, together with Europe, and this will continue and increase in the coming years. Sudden weather changes and extreme temperatures will increasingly become a part of our daily lives.

Temperatures in Turkey will increase by 2 degrees in winter and 2 to 3 degrees in summer.

The Mediterranean basin will see a rise of 18 cm - 12 cm in water level by 2030, 38 cm - 14 cm by 2050 and 65 - 35 cm by 2100.

The Importance of the Research and Our Difference

Although there are many projects that have been added to the literature and support the subject, there is no project that transforms a land model into something we can see and touch with our eyes and supports that model with a 3D virtual model. In this respect, our project is original.

PROBLEM

Gases such as CO2, CH4, N2O, CFC, O3, and CO in the atmosphere surrounding the Earth create a greenhouse effect and ensure that the Earth remains at its current temperature. The gradual increase in greenhouse gases in the troposphere, which is an average of 11 km above the Earth's surface, causes a chain of events that threaten the lives of all living things, which we call global warming.

Human activities, especially excessive use of fossil fuels, rapid population growth, and increasing living standards, are events that increase the effects of global warming. Natural disasters observed as a result of global warming make life difficult for plants and animals, especially human life. It is estimated that these sudden, extreme, and drastic changes in the Earth's climate system will leave no land for agriculture or a place to live in 30-40 years from now.

RESEARCH QUESTİONS

1. What is climate change?
2. What are the negative effects of living spaces in different areas?
3. How not living in enviromentally sensitive places affects on people?
4. How the use of non-renewable resources effect on human health?

DATA COLLECTİON TOOLS

- Literature review
- Consulting our school teachers on necessary issues
- Using materials such as videos, photos, etc. that will help us use the SketchUp Program

Field Work and Studies Conducted on this model and its details

First, we designed a sustainable village model. In this model, we designed 3 types of houses, 1 market and 1 school. Technologies that aim to make all designed structures sustainable were used.

Field Work and Studies Conducted on this model and its details

Pipes that collect and collect waste rainwater were used for the market, which aim to store and reuse rainwater. These pipes were placed on the slope of the building's roof, facilitating the collection of wastewater.

This collected water was then transferred to the water tank next to the building, aiming to reuse the water.

Field Work and Studies Conducted on this model and its details

As for the first of our houses, we designed an ecological tree house. We positioned this tree house next to the nature-friendly park we built. Thus, we aimed for the living creatures in the area to stay safely and for this building to be environmentally friendly and useful. In addition to the bird nests in the natural park we built, a bird nest was also placed on this building, creating a suitable living environment for birds.

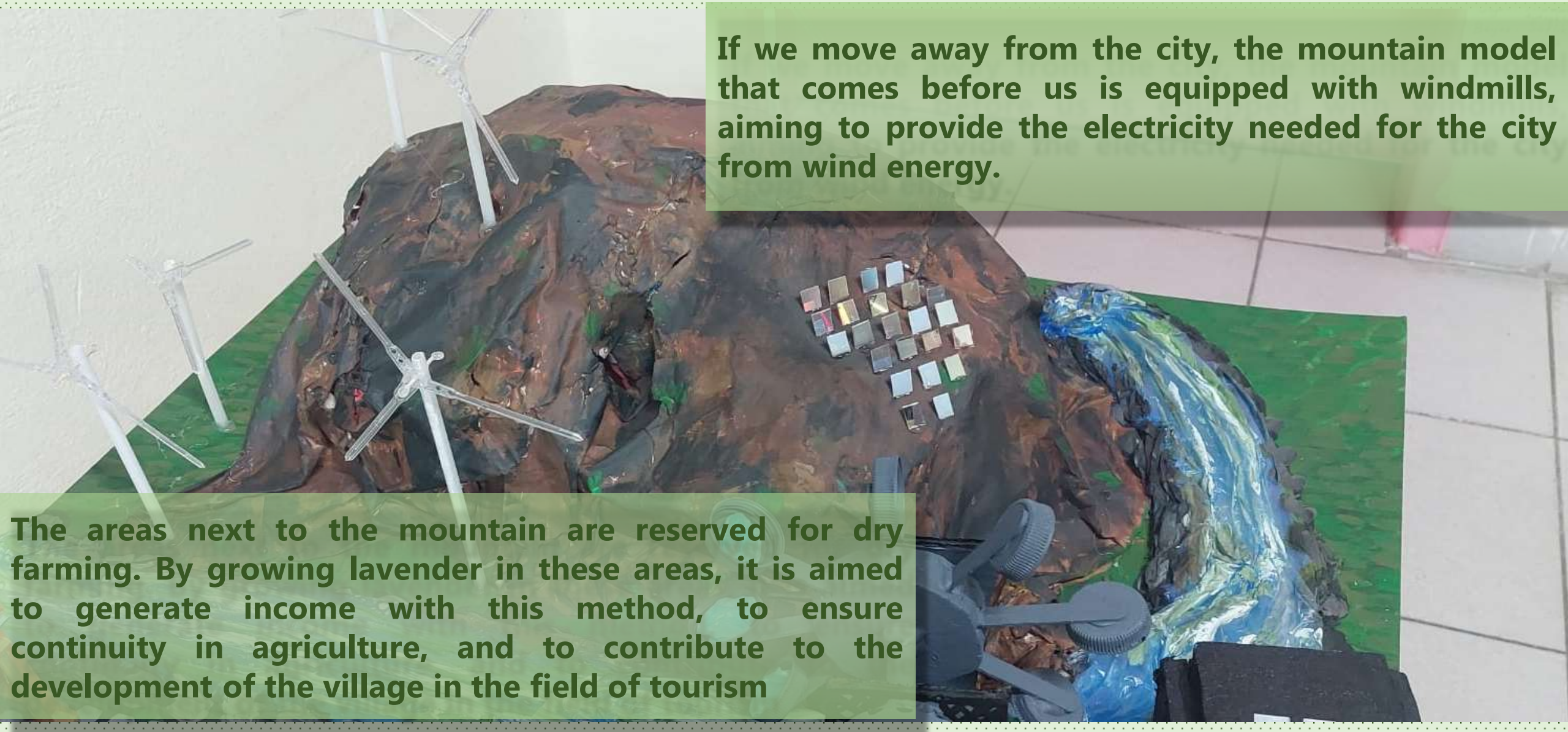
Field Work and Studies Conducted on this model and its details

In the remaining building designs, the aim was to recycle water by using waste rainwater gutters in all of them. Solar panels were placed on all buildings to meet some of the energy needs of the houses in this way. We provided fertile agricultural areas by placing large gardens in front of our houses. In this way, the homeowners obtained products that were sufficient for themselves by doing agriculture without pesticides and also ensured their health.

Field Work and Studies Conducted on this model and its details

Apart from the structural elements, the pavements were used to convert the energy released by footsteps first into kinetic energy and then into electrical energy, a renewable electricity generation method also seen in Japan. Solar panels were placed on the street lamps, aiming for the street lamps to provide their own electricity, thus saving electricity. An ornamental placed in the middle of these structures to provide an aesthetic appearance.

Field Work and Studies Conducted on this model and its details



If we move away from the city, the mountain model that comes before us is equipped with windmills, aiming to provide the electricity needed for the city from wind energy.

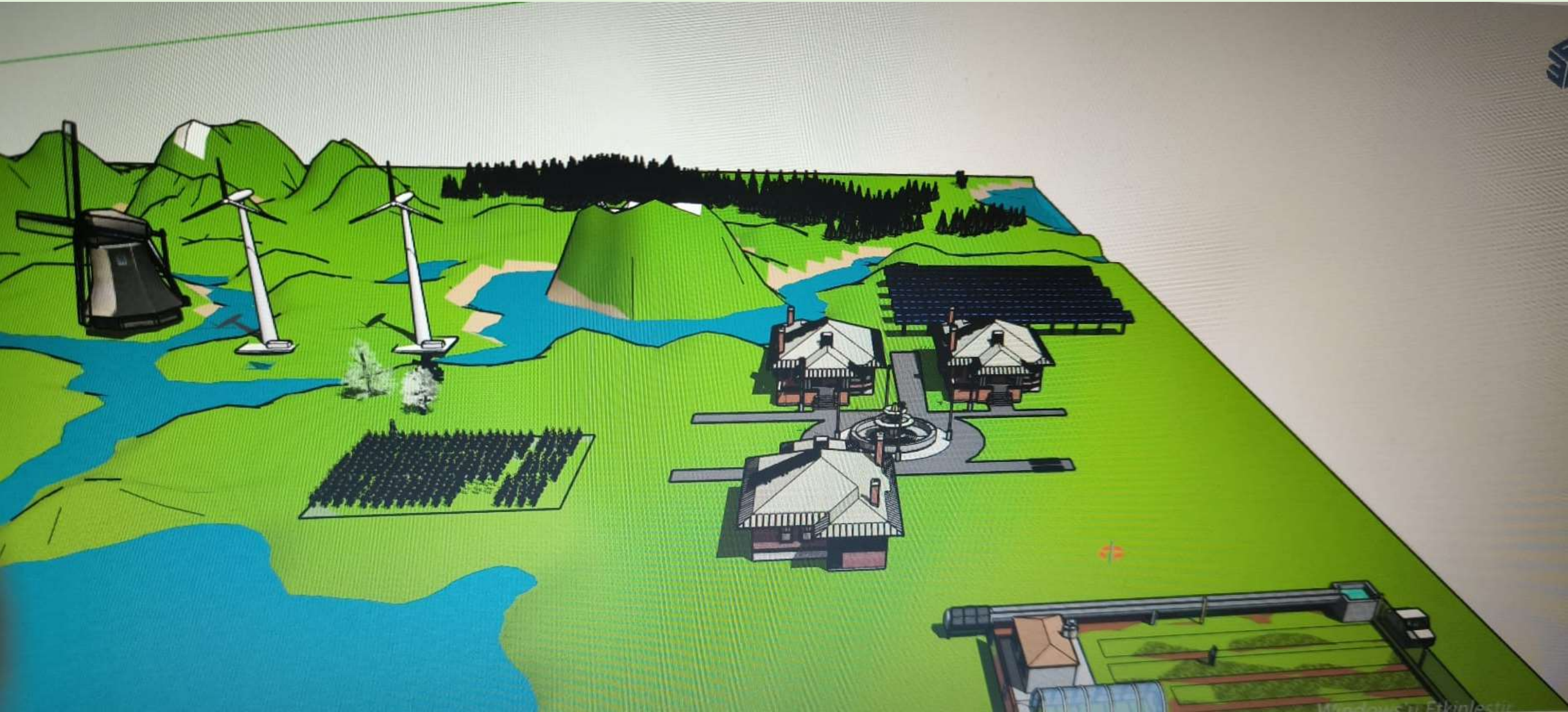
The areas next to the mountain are reserved for dry farming. By growing lavender in these areas, it is aimed to generate income with this method, to ensure continuity in agriculture, and to contribute to the development of the village in the field of tourism

Field Work and Studies Conducted on this model and its details

There is a river passing in front of the mountain. With a system built on this river, electricity is generated by using the kinetic energy of the water carried by the river.

In this way, every element placed in the village is supported by sustainable technologies and all the electrical energy the city needs is met from sustainable energy sources such as wind energy, solar energy, hydroelectricity.

Field Work and Studies Conducted on this model and its details



Field Work and Studies Conducted on this model and its details

Field Work and Studies Conducted on this model and its details

Field Work and Studies Conducted on this model and its details

Benefits of Our Project

With the construction of this land model, although it is small at first, later on, large-scale awareness can be created and research and studies can be conducted, and thus a beautiful change can be made worldwide

If this study is put into practice, a generation can aim to save other living and non-living beings besides their own lives and increase such areas. This project can even be implemented in big cities and support more people to hear and produce their own electricity.

The number of employers will also increase as it will provide new job opportunities

Most importantly, this project will provide a great benefit to nature. It can also ensure that the effects of climate change are felt less.

SUGGESTIONS

More extensive research can be done on this subject.

Efforts can be made to reduce the impact of effective resources on the world.

Efforts can be made to increase the impact of renewable resources.

There could be more suggestions about this subject, that affects the world and everything that on the planet.

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THANK YOU

Merci!

Gracias!

Danke!

Hvala!

THANK YOU!

Teşekkürler!

Dziękuję!

Grazie!

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