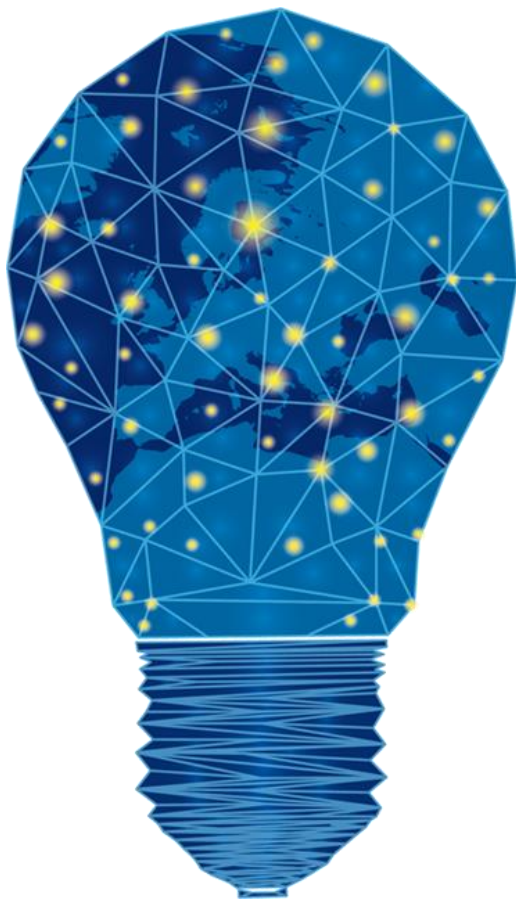




HELLAS

STEM & Educational  
Robotics Contest 2024

Open Junior High School Category



## Light Pollution

Create your own robotic solution that will study, measure and propose solutions to the problem of light pollution.

Release Version: 31/01/2024

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## Introduction

Most environmental pollution on Earth comes from humans and their inventions. Take, for example, the car or this miraculous man-made material, plastic. Today, car emissions are a major source of air pollution that contributes to climate change, and plastics fill our ocean, posing a significant risk to the health of marine animals.

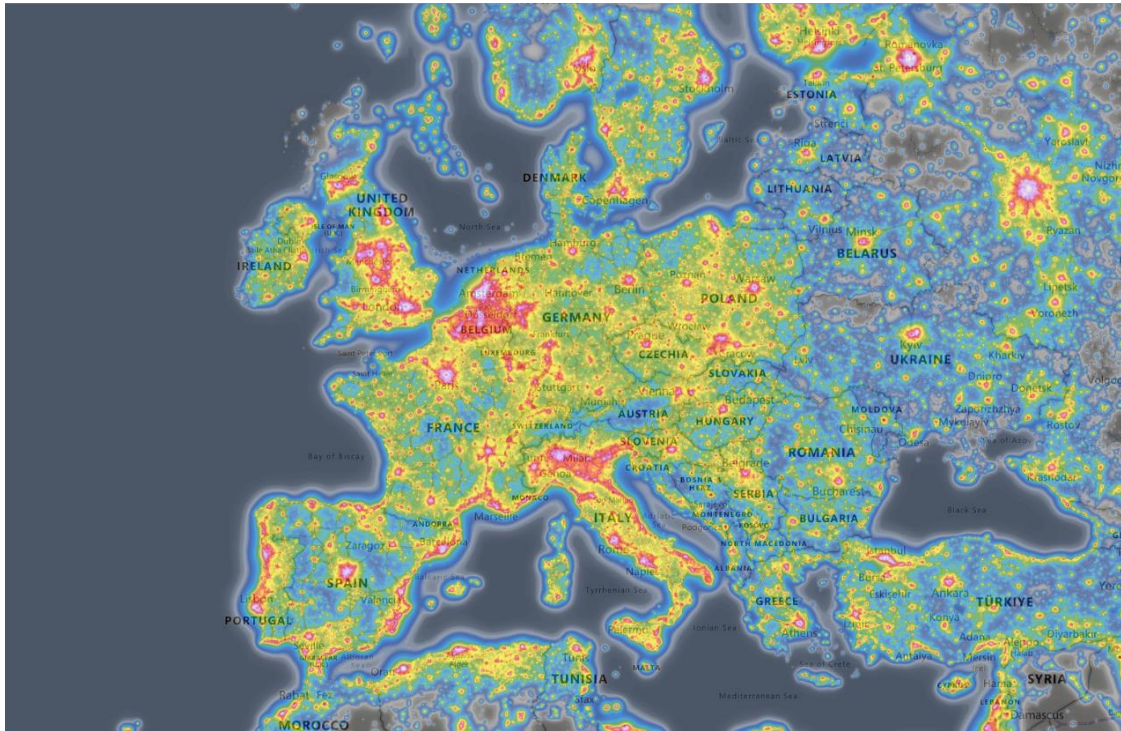
And what about the electric light bulb, believed to be one of the greatest human inventions of all time? Electric light can be a beautiful thing, lead us home when the sun goes down, keep us safe and make our homes comfortable and bright. However, like carbon dioxide emissions and plastic, this has begun to negatively affect the environment. Light pollution, the excessive or improper use of artificial outdoor light, affects human health, wildlife behavior and our ability to observe stars and other celestial objects. For more info, please refer to [Home - CliC-PoLi](#) site.

You may as well watch the “[Losing the Dark](#)” conventional flat screen video, for use in classrooms, kiosks, museum theaters, and advocate multimedia presentations.



# CliC-PoLi

## The glow of the Earthly Sky



Light pollution is a global issue. This was made abundantly clear when the World Atlas of Brightness of the Night Sky, a computer-generated map based on thousands of satellite photos, was published in 2016. Available online for viewing, the Atlas shows how and where our globe is illuminated at night. Vast areas of North America, Europe, the Middle East and Asia shine with light, while only the most remote regions on Earth (Siberia, Sahara and the Amazon) are in complete darkness. Some of the most light-polluted countries in the world are Singapore, Qatar and Kuwait.

The glow of the sky is the glow of the night sky, mainly in urban areas, due to the electric lights of cars, lamps, offices, factories, outdoor advertising and buildings, turning night into day for people who work and play long after sunset.

People living in cities with high levels of sky glow find it difficult to see more than a handful of stars at night. Astronomers are especially interested in the pollution of the sky, as it reduces their ability to see celestial objects.

More than 80 percent of the world's population, and 99 percent of Americans and Europeans, live under the glow of the sky. It sounds beautiful, but the glow of the sky caused by anthropogenic activities is one of the most diffuse forms of light pollution.





### **Is it time to act?**

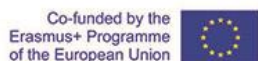
Artificial light can wreak havoc on the body's natural rhythms in both humans and animals. Night light interrupts sleep and confuses circadian rhythm - the internal, round-the-clock clock that guides day and night activities and affects physiological processes in almost all living organisms. One of these processes is the production of the hormone melatonin, which is released when it is dark and inhibited when there is light. The increased amount of light at night reduces the production of melatonin, which leads to sleep deprivation, fatigue, headaches, stress, anxiety and other health problems. Recent studies also show a link between decreased melatonin levels and cancer. In fact, new scientific discoveries about the health effects of artificial light have convinced the American Medical Association (AMA) to support efforts to control light pollution and conduct research into the potential dangers of exposure to light at night. Blue light, in particular, has been shown to reduce melatonin levels in humans. Blue light is found in mobile phones and other computer devices, as well as in light-emitting diodes (LEDs), the kinds of lamps that have become popular in the home, and in industrial and city lighting due to their low cost and energy efficiency.

### **Animals are also lost and confused!**

Studies show that light pollution also influences animal behaviors, such as migration patterns, awake sleep patterns, and habitat formation. Due to light pollution, sea turtles and birds guided by moonlight during migration get confused, lose their way and often die. Many insects, the main source of food for birds and other animals, are attracted to artificial lights and are immediately killed when they come into contact with light sources. Birds are also affected by this, and many cities have adopted a program "Lights Out" to turn off the lights of the building during the migration of birds.

A study on blackbirds (*Turdus merula*) in Germany found that traffic noise and artificial night lighting force birds in the city to be active earlier than birds in natural areas - waking up and singing up to five hours earlier than their cousins. Even animals living under the sea can be affected by underwater artificial lighting. One study looked at how marine animals responded to brightly lit panels submerged under water off the coast of Wales. Fewer pollution-fed animals, such as sea squirt and sea hair, built their homes near the illuminated panels. This could mean that light from oil rigs, passing ships and ports is changing marine ecosystems.

Even in places meant to provide protected natural habitats for wildlife, light pollution has an impact. The National Park Service (NPS) has made it a priority to maintain a dark night sky.





## The contest's theme

Create your own robotic solution that will study, measure and propose solutions to the problem of light pollution!

### Participants

- Age of students: 1st – 3rd Junior High School (12-14 years old)
- Group composition: 2-4 students

### Rules

The teams are asked to create a robotic solution related to the topic, according to the following rules:

- Your solution may consist of one or more sensors, motors and mechanisms that will be controlled by one (1) controller.
- There is no restriction on which sensor, motor, or controller you will use.
- You can use any environment and programming language you want.
- Each team on the day of the contest can present their work in a space that will be indicated to them, measuring 1.5 x 1.5m. Any decorative elements of the project (posters, banners, etc.) should be integrated in this space.
- The presentation of the work concerns both the judges and the guests, competitors and each team should be able to present their work to everyone.
- The use of dangerous materials such as fire, toxic and dangerous gases, high voltage current, etc. is prohibited.

### Before the day of the contest

Each team, up to 10 days before the contest, must have delivered a portfolio in electronic format that will include a video of a maximum duration of 3 (min) to 5 (max) minutes (brief presentation of the team, the robotic system and the solutions to the problem, snippets of the system in action, etc.), instructions for building the system and its code.





## The contest's procedure

The teams will come to the pitch on the day and time announced by WRO Hellas. They will be shown a space where they can install their equipment and robotic system. They will have time at their disposal for this process, while each team will have been notified at least 10 minutes before the arrival of the panel of judges so that they have prepared properly.

## Evaluation

Each team will have 5 (min) to 10 (max) minutes to present their work to the judges and be scored. Specifically, 3 minutes to demonstrate the robotic system and 3 minutes to answer questions from the judges. The evaluation of each team is shown in the evaluation table below:

	Criterion	Score	Maximum score
Work & Innovation	Idea, Quality and Creativity		30
	Research and Reporting		15
	Usefulness of the idea		15
	Innovation and Slogan		10
Total			70

	Criterion	Score	Maximum score
Robotics Solution	Robotic Solution		30
	Meaningful use of engineering concepts		10
	Code efficiency & software automation		10
	Presentation of Robotic Solution		15
Total			65

	Criterion	Score	Maximum score
Presentation & Team Spirit	Presentation & Presence		30
	Technical understanding and quick thinking		15
	Team Spirit		20
Total			65



**As for participant teams from the rest European countries of the project, you are more than welcome to join the event face to face in Athens on 30<sup>th</sup> and 31<sup>st</sup> of March 2024.**

However, there is a chance of an online evaluation, on 14<sup>th</sup> of May 2024 (pls register your team through <https://forms.gle/71uod9gazkuG8dJe6>). We kindly request you to submit the video of your team sharing what has been announced above. These videos will be used so that the evaluating team has a better knowledge of what your project is about.

**The deadline for video upload (plus description) is Sunday 5<sup>th</sup> of May 2024!**

Ask your team members to please follow these guidelines to ensure a high-quality video:

- Hold phone horizontally when recording.
- Set camera resolution to full HD (1920x1080)
- Use a microphone, if possible, to capture the voice clearly.

**INSTRUCTIONS** (for the coaches of the teams):

1. Wait for 3 seconds before speaking
2. Let your team introduce briefly
3. Tell us what the system is you have made and the solutions to the problem, snippets of the system in action, etc. (active time)
4. Wait for 3 seconds and then stop the video.
5. Upload video in the corresponding YouTube channel of WRO Hellas asking permission before, with a request mail to [wrohellas14@gmail.com](mailto:wrohellas14@gmail.com)

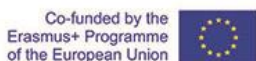
As soon as you get an invitation to join WRO Hellas account, you need to accept it before you can upload the video.

### **How to accept an invitation**

Open the invitation email. The email is sent from [wrohellas@youtube.com](mailto:wrohellas@youtube.com) and has the subject Invitation to manage content for {WRO Hellas} on YouTube.

Click the link in the body of the email.

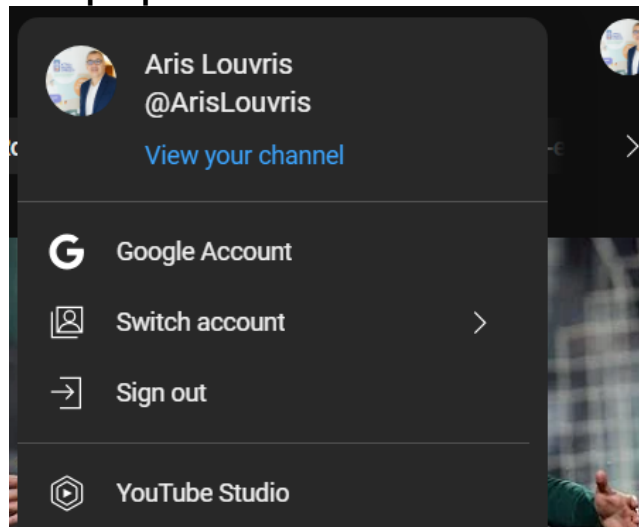
Sign into YouTube with the Google Account that you want to use for managing your content. You can use an existing Google Account or create a Google Account. Select Use existing Google Account if you have an existing Google Account that you use. Once you've signed in, you can start managing your content, subject to the permissions granted to you by WRO Hellas who invited you.



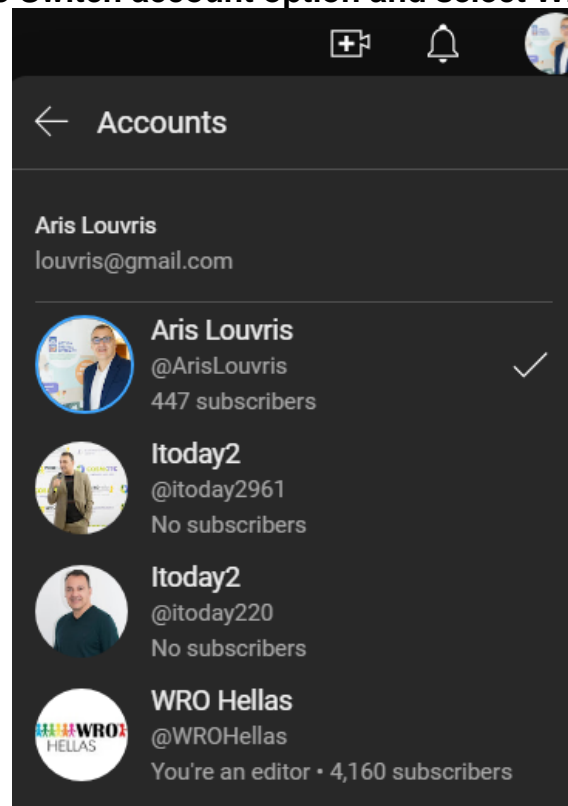
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As soon as you are ready to upload your video on WRO Hellas channel please see the following example pictures:



Make sure you go to **Switch account option** and select **WRO Hellas channel**.







On 13/5/2024 there will be a test from 10:00 to 12:00 CET. In this test, we will provide instructions regarding the day of the broadcast.

ATTENTION: A link will be sent ONLY to coaches of presenting teams! The link will be the same on the day of the broadcast, which will be on the official WRO Hellas channel.

IMPORTANT DETAIL: the platform can accept up to 10 people at the same time. On the day of the test, Monday 13/5/2024 and especially on Tuesday 14/5/2024 when you log in to the platform, the coach (teacher) must write his/her school and name in the details.

### Before the broadcast on 13/05/2024

Make sure you have the following:

- A **laptop or desktop** with a webcam and mic.
- A recent version of **Chrome, Edge, Firefox, or Opera**
- A strong internet connection. Just like Skype, you must have a strong internet connection for it to work well. If possible, connect to your router with an ethernet cable instead of using WiFi.
- We recommend wearing **earbuds or headphones** to prevent audio echoes.

### Joining the broadcast on 14/05/2024

When the time comes (10:00 CET), follow these steps to enter the broadcast studio:

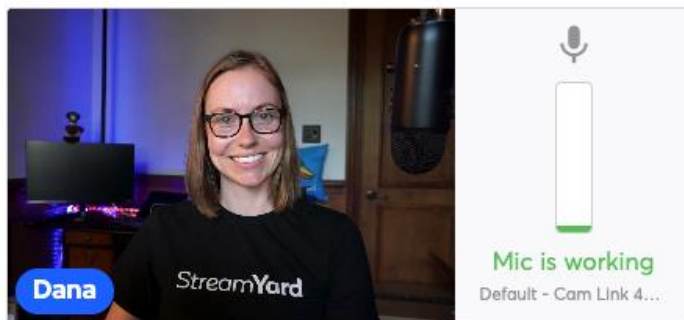
1. WRO Hellas should provide you with a link before the show. Open the link in a **supported browser** for your device and you'll be taken to their broadcast studio.
2. Allow StreamYard to access your camera and mic.
3. Make sure you have the correct camera and mic selected.





4.

Let's check your camera and mic



You will enter the studio as a guest. The host can add you to the broadcast at any time.

Display name

Dana

Enter studio

5. Enter a display name. Use your team name along with the name of your school. Then enter the studio.

We will be informed that you've arrived. You won't be part of the broadcast until we as host decide to add you in. The page will update to let you know when you've been added. Then everyone will be able to see and hear you. This is your time to shine!

If you have more questions, please feel free to let us know with an e-mail to [wrohellas14@gmail.com](mailto:wrohellas14@gmail.com)

*Kind regards,*

*WRO Hellas team.*

