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For a Greener
Europe

Greener Europe Coding and the Environment

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How to improve the problem of global warming and climate change with CODING



Image by rawpixel.com



Objectives

- * To understand the role of technology and coding in reducing the effects of global warming.
- * Learn how technology and coding can help reduce greenhouse gas emissions and adapt to the changing climate.
- * Come to appreciate the value of learning about technology and coding as a means of addressing one of the most pressing challenges of our time.

Coding and Programming



Discussion: how are coding and programming skills are essential in the development and implementation of these technologies.

A brief introduction to the basics of coding and programming.



What are various ways that technology can help address global warming?



- * Renewable energy sources (e.g., solar, wind, hydro) that can replace fossil fuels.

Wind Turbines



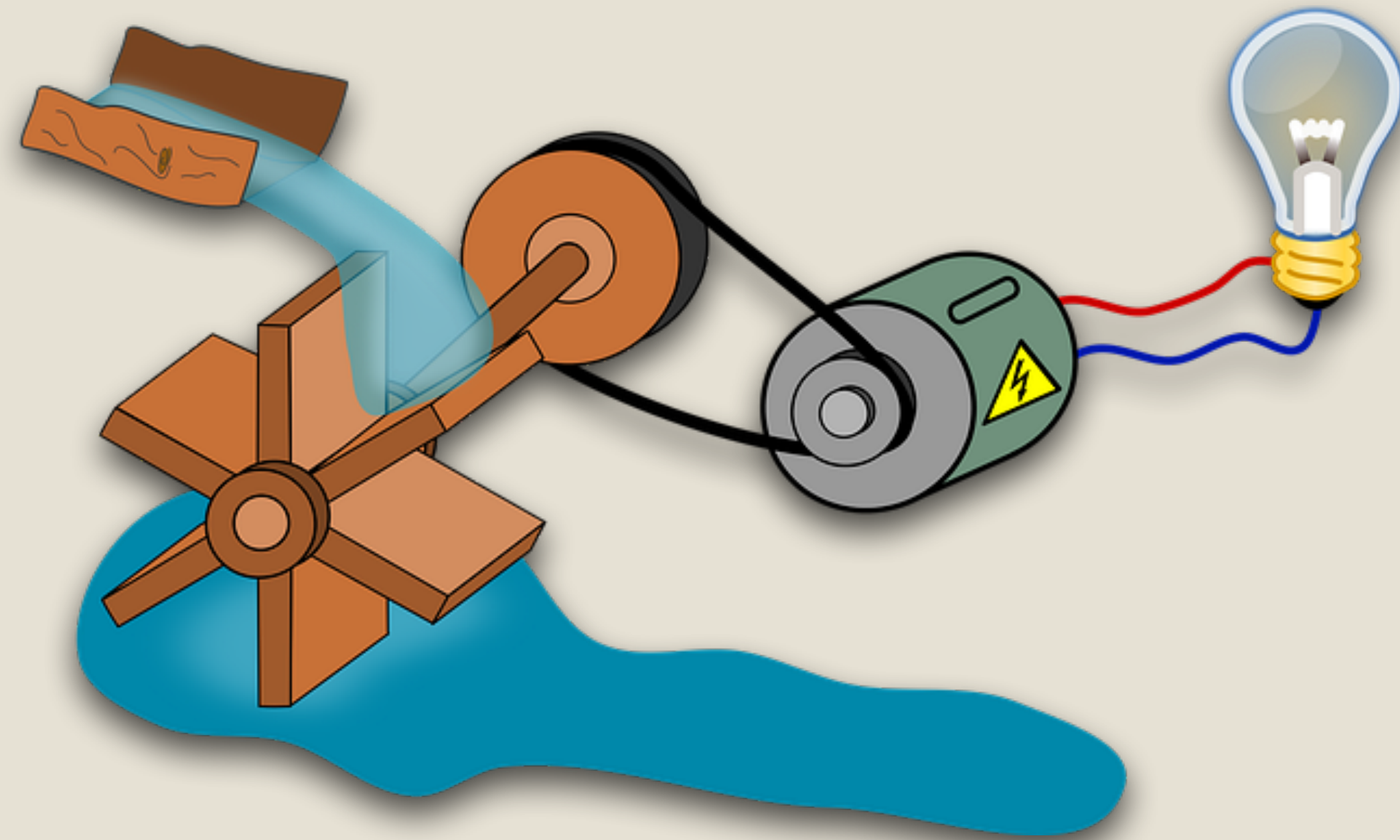
Image by rawpixel.com

Solar Panels



Image by rawpixel.com

Hydroelectric Power



- * Energy-efficient technologies reducing the energy consumption of buildings, vehicles and appliances.



- * Smart grids and energy storage systems that can better manage energy use and storage.
- * What are smart grids?
 - * They use sensors and software to manage energy use and storage and reduce the need for fossil fuels, which allows energy waste to be reduced.

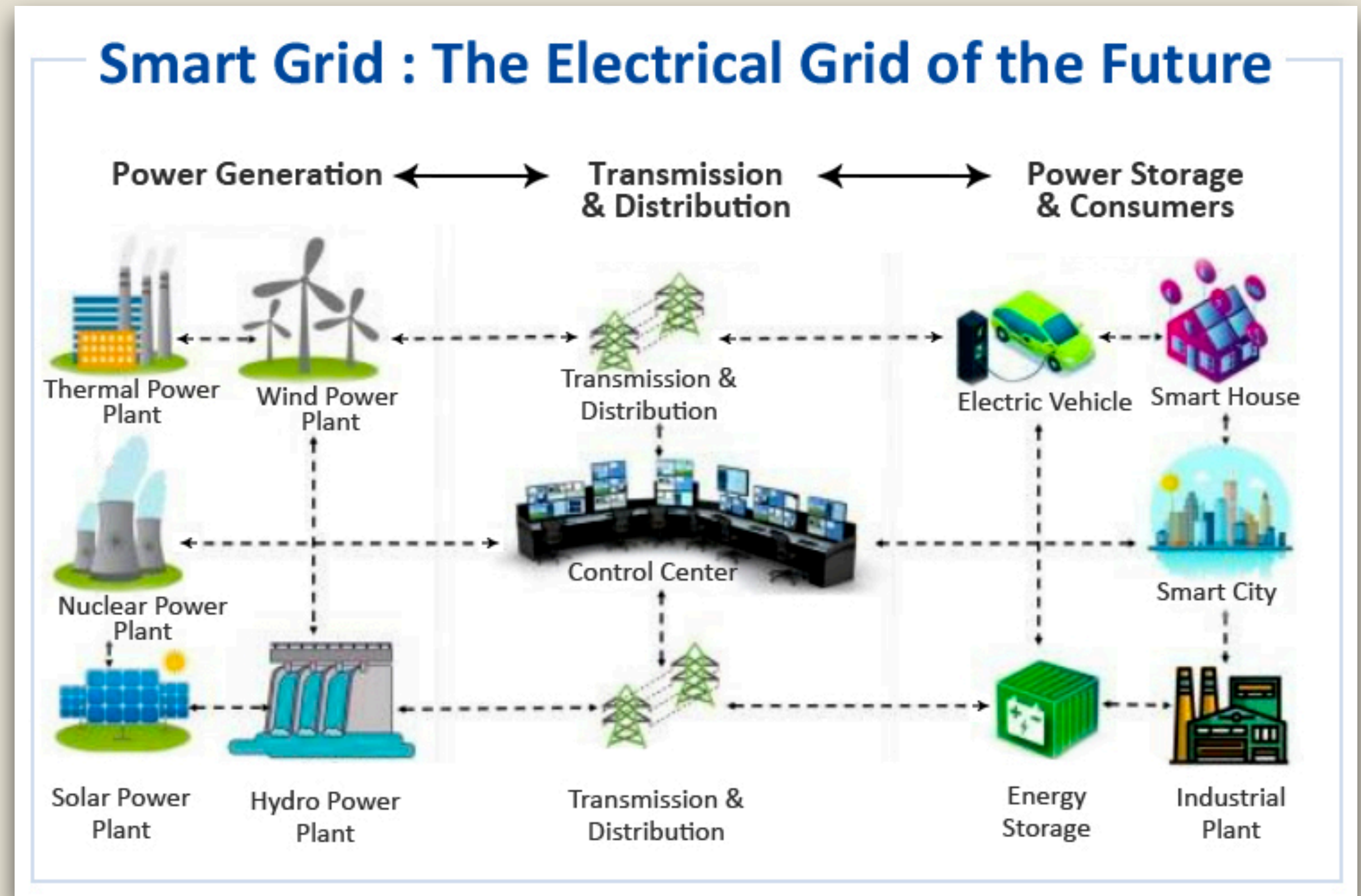
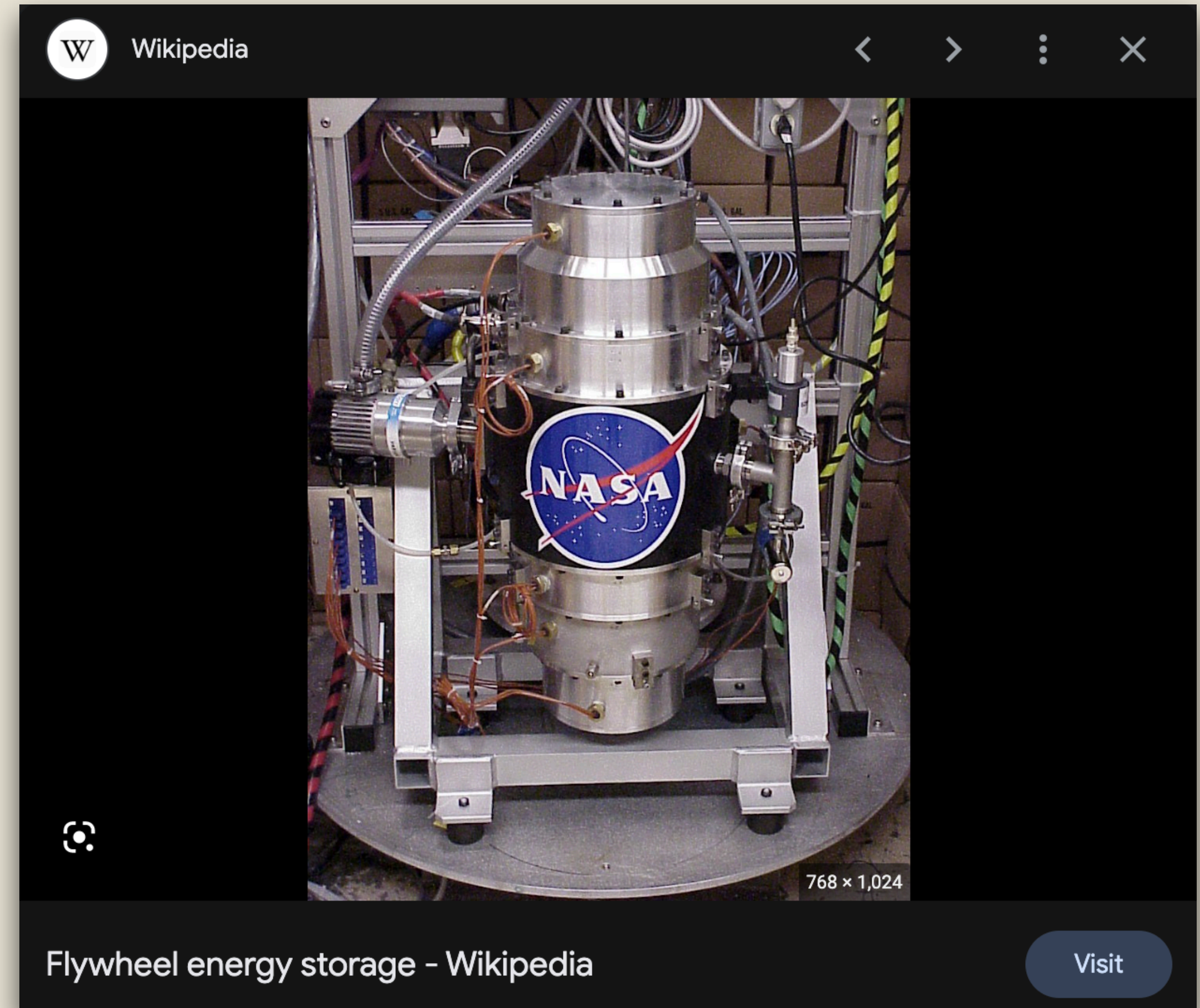


Image credit: <https://circuitdigest.com/article/smart-grid-the-electrical-grid-of-the-future>

- * What are energy storage systems?
- * Energy storage systems, such as batteries, can store energy from renewable sources for later use. They provide a more stable and reliable energy supply.



Image credit: <https://ratedpower.com/blog/battery-storage/>



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- * Climate modelling and prediction tools that can help us understand and plan for climate change impacts.
 - * Discuss how these technologies can help reduce greenhouse gas emissions and adapt to the climate change.

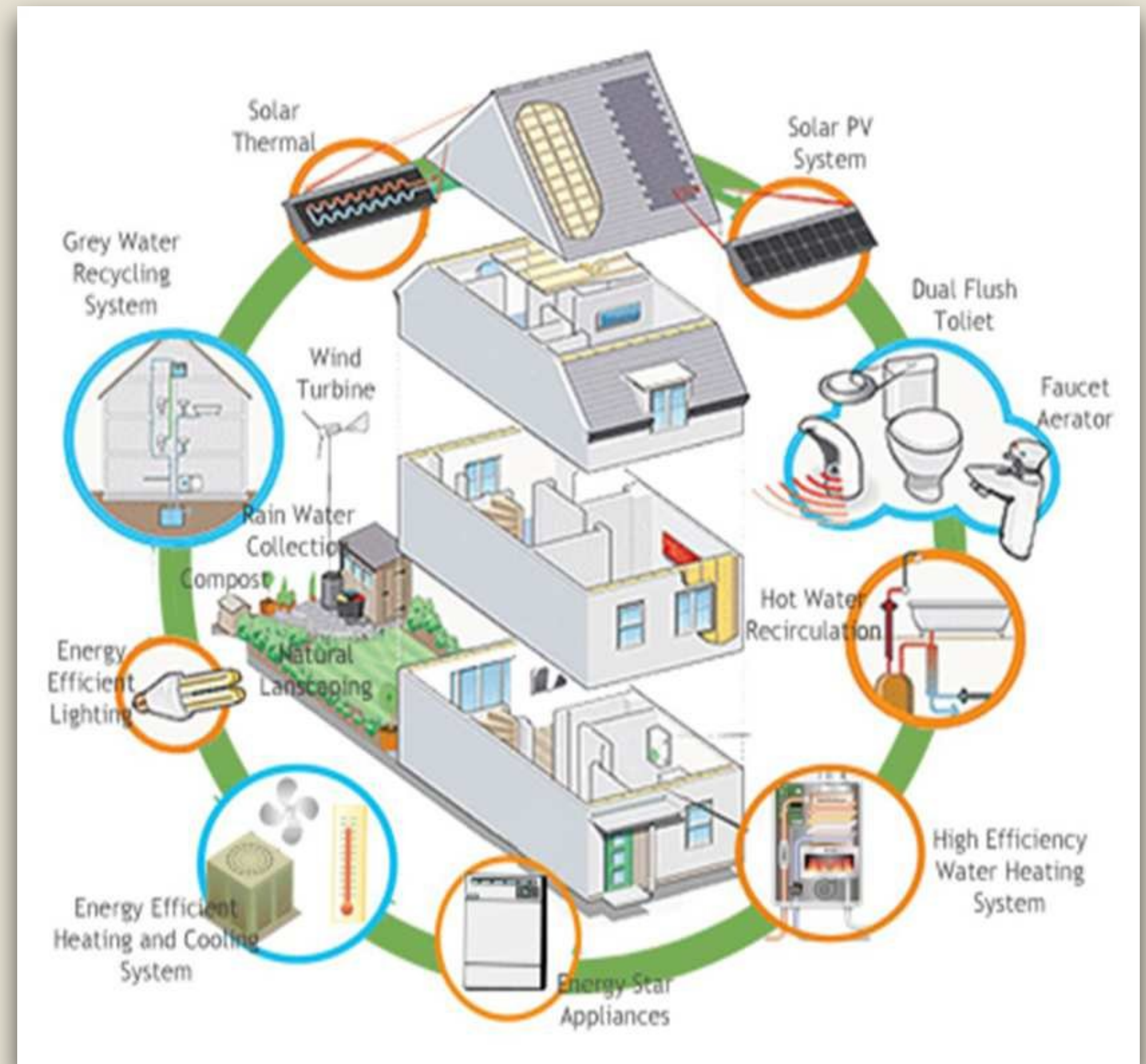


Renewable Energy Sources

- Renewable energy sources, such as **wind and solar power**, are one example of how technology is used to reduce the effects of global warming.
- Why are they useful?
 - They don't produce *greenhouse gas emissions* that *fossil fuels* do - coal and oil - which are also the primary drivers of global warming.
- Renewable energy technologies such as solar panels and wind turbines, are becoming more cost efficient and cost-effective.
 - Governments, businesses and individuals are investing in them to reduce their carbon footprint and reduce the effects of global warming.



- Technology is also used to develop energy-efficient buildings, appliances, and vehicles.
- Energy-efficient buildings use less energy for heating, cooling, and lighting, reducing carbon emissions.
- Energy-efficient appliances and vehicles consume less energy, reducing the need for fossil fuels.



Facade Insulation



- Overall, we can see that technology plays a crucial role in the fight against global warming by providing solutions that reduce greenhouse gas emissions and help us adapt to the changing climate.

Introduction about the relationship between technology, coding and saving the environment

- * What do you already know about global warming and climate change?
- * What are the causes and effects of global warming on the environment and human life?
- * Technology and coding can help reduce the effects of global warming.
- * Let's take a look at a few examples of young inventors, who are changing the world with technology.



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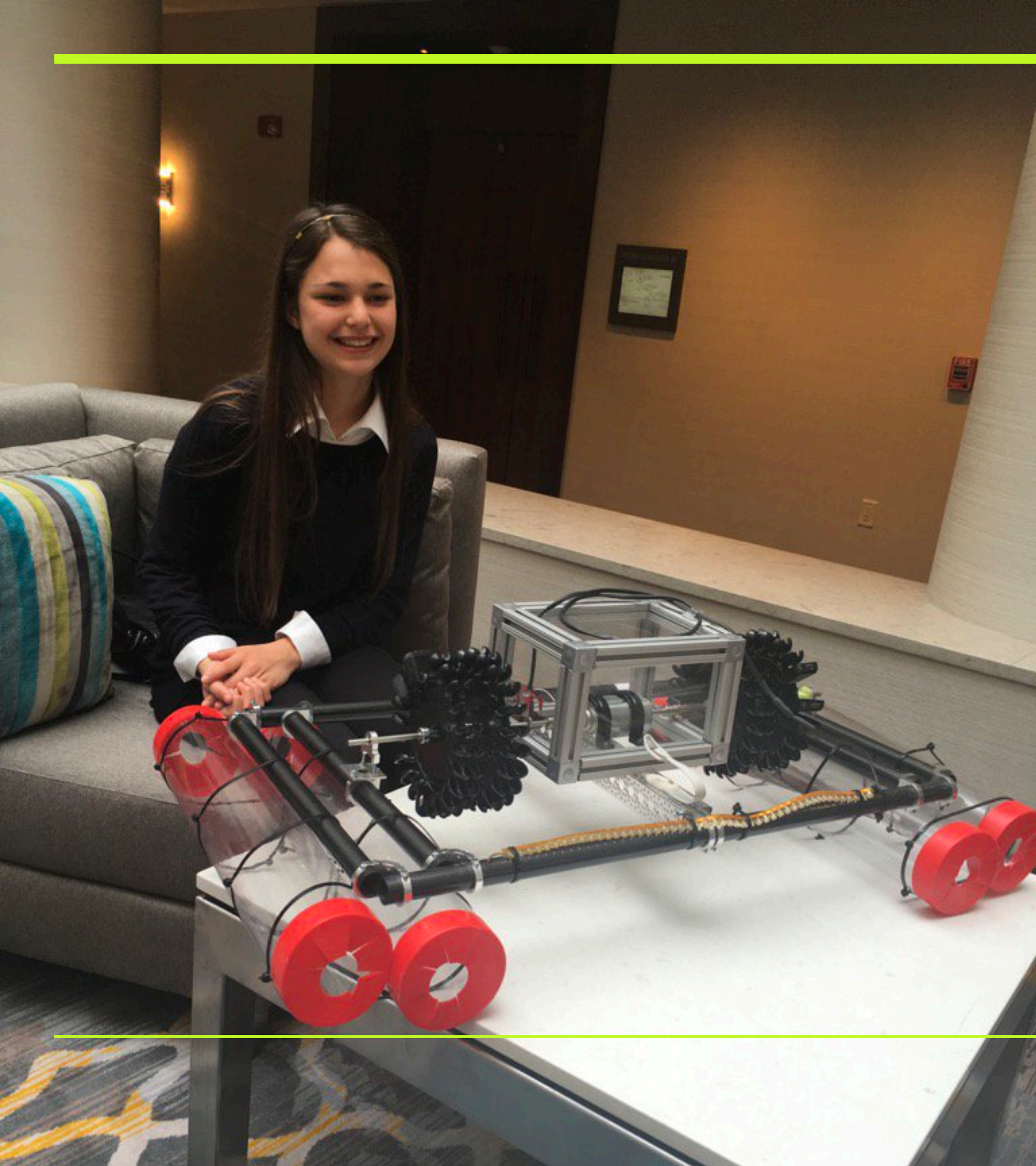
**Dutch teen designs giant
plastic trap to clean world's
oceans!**

Video from 8 years ago



Video from 5 months ago





Hannah Herbst

BEACON

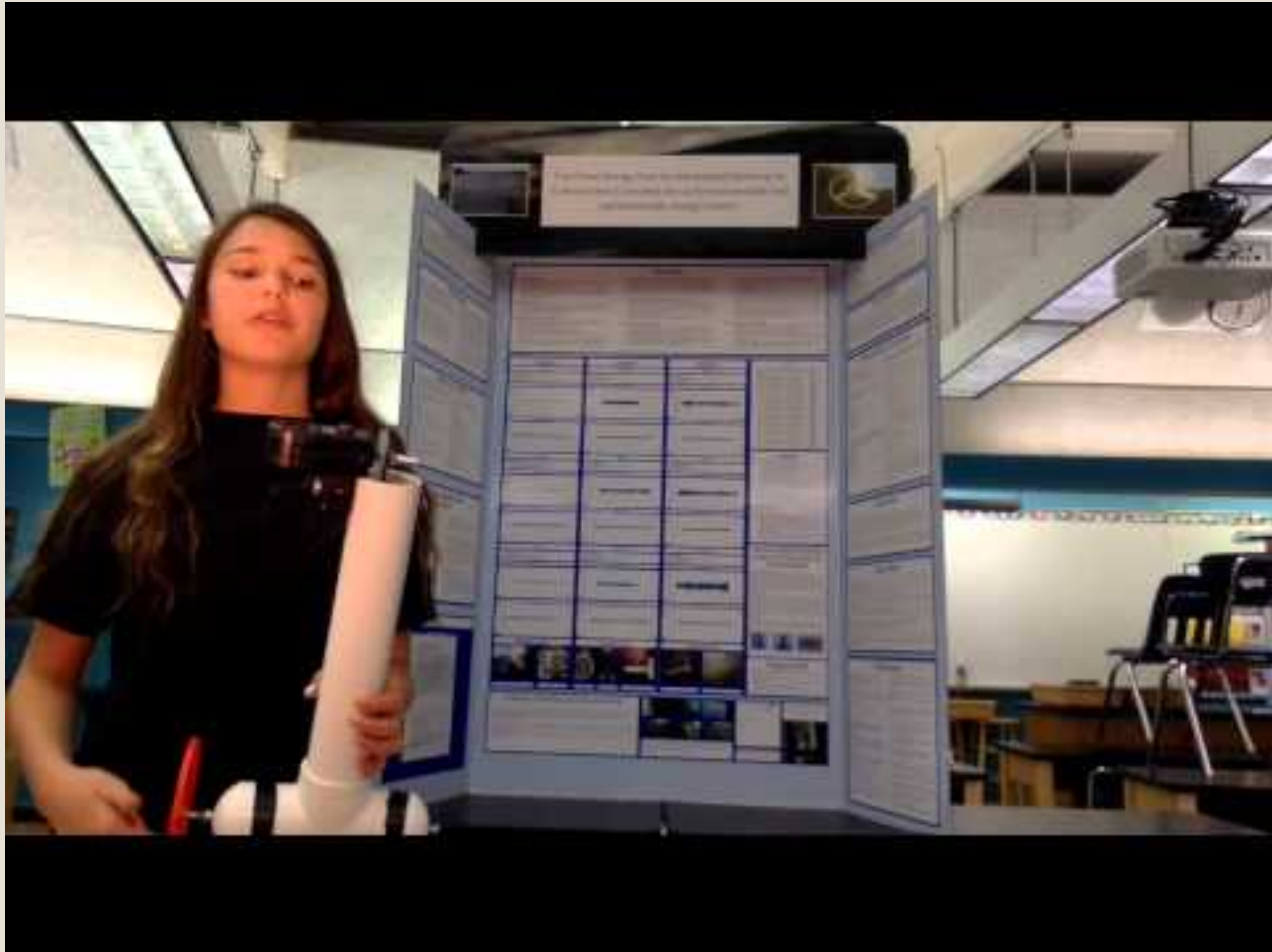
- **BEACON** stands for: Bringing Electricity Access to Countries through Ocean Energy
- What is it?
 - A portable ocean energy probe using the energy of the tides to create a power source. Designed to help developing countries with this problem.
 - *A probe is an object used to test certain conditions.*
- What does it do?
 - Turns the ocean tides into useable power!

Image credit: <https://www.hannahherbst.com/>



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- How does it work?
 - Built from a hollow plastic tube with a propellor (like a fan) on one end and a hydroelectric generator on the other.
 - The waves power the propellor at the bottom of the probe which then powers the generator at the top of the probe via a pulley system.
 - What was her inspiration?
 - Her friend in Ethiopia would write to her and explain the difficulties they face to have access to clean water and enough electricity.
 - Close to 800 million people live without proper electricity - that number varying from continent to continent.
 - She used computer-aided design software and her knowledge of engineering.
 - She would also like BEACON to be able to power water purification technologies and medical related devices at hospitals in countries who lack these basic needs.





Start at 0:31





Image credit: <https://www.wbur.org/hereandnow/2016/11/04/teen-scientists>

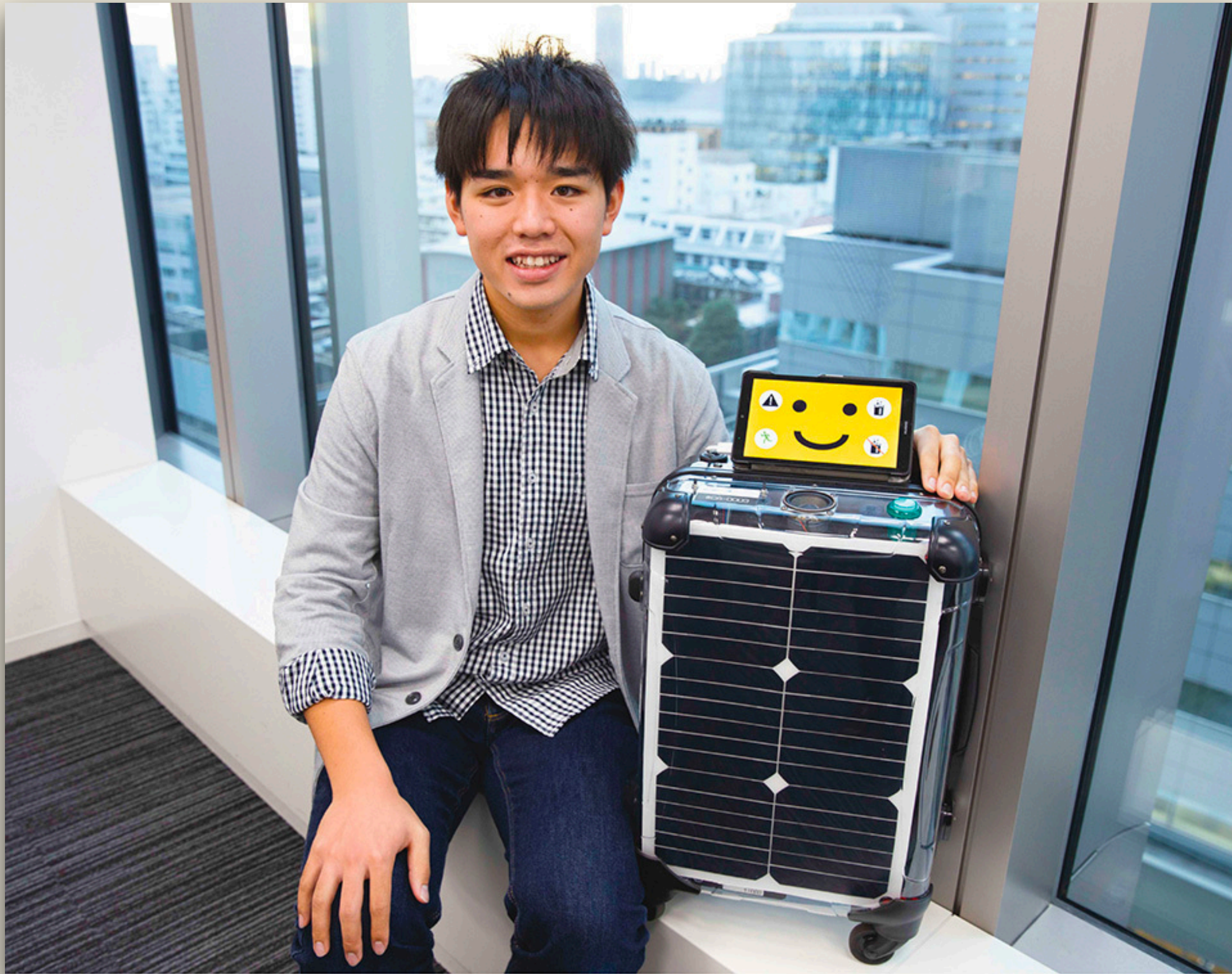


Kazumi Muraki

Hiyassy



- What is it?
 - A CO₂ (carbon dioxide) air-recovery system device.
 - It is the world's smallest carbon capturing device, looking like a small suitcase on wheels. Intended for home and office use.
- What does it do?
 - Absorbs CO₂ to reduce the effects of global warming.
 - Focuses on collecting CO₂ from the atmosphere to be used in beneficial ways, ex. as fuel for motor vehicles.



- How does it work?
 - This lightweight and portable device absorbs up to 6 litres of CO₂ in one hour, all with the push of a button!
 - It pulls in air and filters it through an alkaline solution before sending it back out.
- It comes with an AI-driven tablet which allows users to interact with the robot. When the device is turned on, you meet an animated character (the yellow smiley face) that Kazumi designed himself. Added to encourage children to think about global warming.

Image credit: Shuji Goto (https://www.wipo.int/wipo_magazine/en/ip-at-work/2022/kazumi-muraki.html)



-
- What was his inspiration?
 - He read a book by Professor Steven Hawking at the age of 10 and developed a big interest for Mars.
 - His dream is that someday, humans may be able to live there. However, he knows that before this is possible, the layer of CO2 must first be removed.

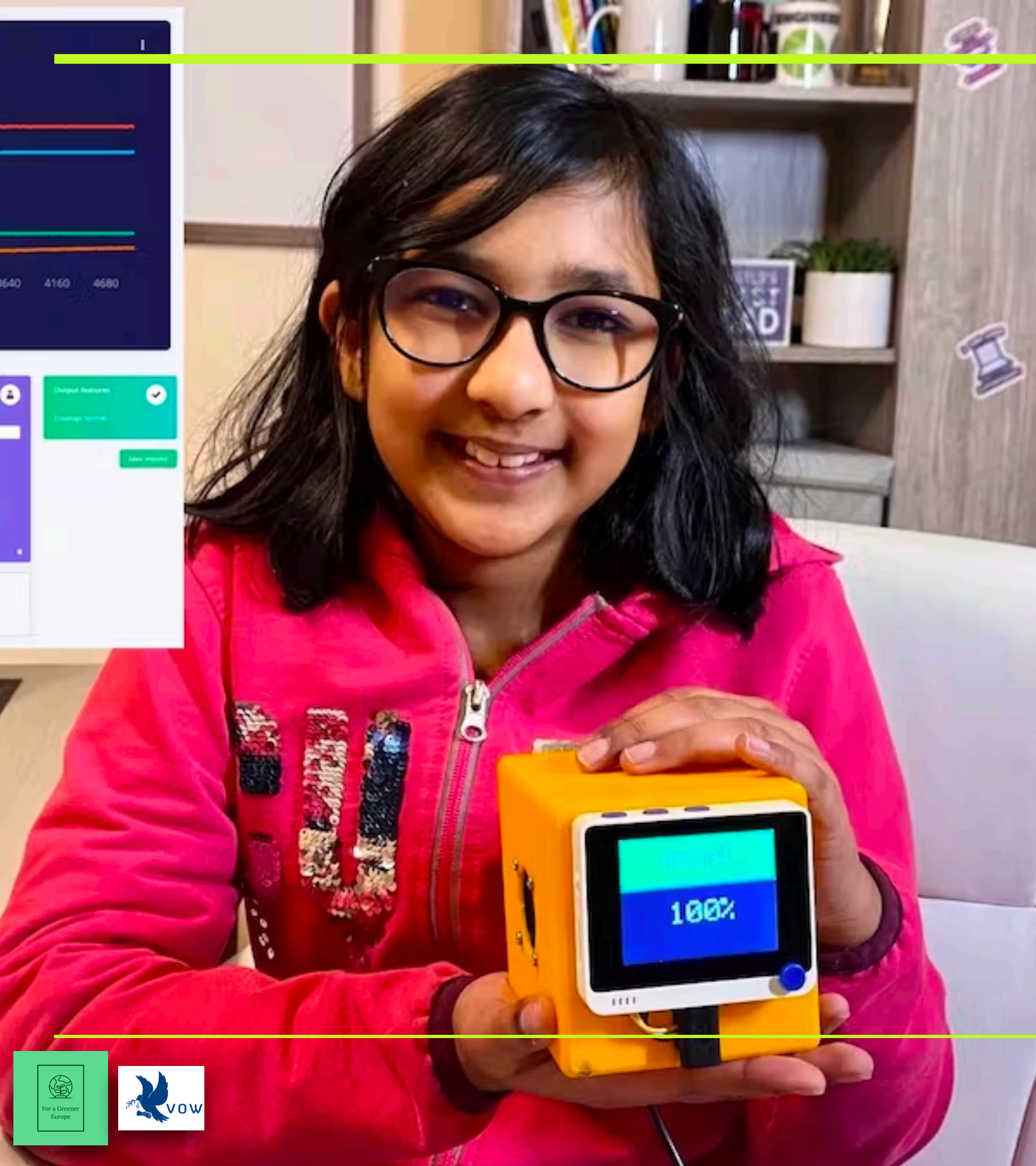
« But even if the day came when people could go to Mars, nothing could be sadder than if our planet were facing ruin at that time. I am going to do everything I can for our planet's future, and someday, I want to be in schoolbooks around the world as the 'man who stopped global warming.' »

Meet HIYASSY



#CA-0003



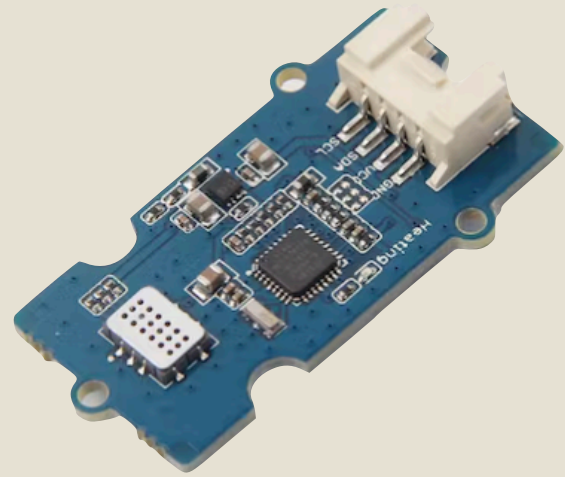


Sashrika Das

Gas Leak Detector

- What is it and what does it do?
 - A small gas detecting device which helps people who heat their homes with diesel detect when there is a gas leak.
 - When the device has detected a gas leak, it sends a notification to your phone through an application called *Blynk*.

- How does it work and what does it contain?
- Uses machine learning combined with physical computing.
- A gas leak is detected by a Multi-channel gas sensor:



- There is a fan to circulate the air and microcontroller called a Wio terminal:



- Uses a program called Edge Impulse Studio to collect the data.
- She programs the Wio terminal using Arduino IDE



- What was her inspiration?
- People living on the east coast of the USA, use diesel to heat up their homes. Many old houses have oil tanks in their basements and people don't go down there very often.

- If there is a leakage, it is very likely to go unnoticed for days. This can lead to serious damage such as fires.



Image credit: hackster.io

Victor Dewulf and Peter Hedley

Recycleye

- What is it and what does it do?
- AI-driven waste recognition and sorting system that improves the recycling process.
- It scans and identifies waste materials that have not yet been sorted.
- It can distinguish between food-grade and non-food-grade products and even sort by colours and shapes.



Image credit: recycleye.com

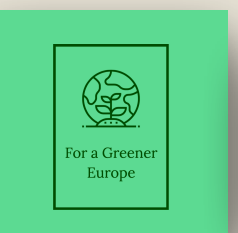




Image credit: [recycleye.com](https://www.recycleye.com)



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- How does it work?
 - Uses computer vision, machine learning and robotics which allows the waste sorting to be more accurate than compared to conventional technology.
 - A camera collects digital images of the mixed waste as it moves along the conveyor belt. Then the images are run through a machine learning algorithm which further sorts the items.
 - The data is sent to a robotic arm that picks up and separates the items for recycling.
 - The collected data also provides us with valuable information about what the waste is made of.
 - It also reduces the production and consumption of materials containing massive amounts of carbon.



Dana, Dilnaz, Lyubov, Malika

TECO

- What is it and what does it do?
 - An interactive 3D mobile game encouraging users to make sustainability behavioural changes.
 - It inspires the user to prevent and solve ecological issues as well as provides useful information.
 - It contains a tool for tracking recycling activities which is connected to devices in recycling bins.
 - Provides a map showing all the places to recycle.



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- How does it work?
 - The user gets to be an astronaut who has to take care of the planet by performing tasks based on the real-life choices of the user him/herself.
 - It tracks how much carbon they prevent from entering the atmosphere when they decide to take low-emission forms of transportation.
 - It also offers an AR recycling education program.
 - What was their inspiration?
 - They hope to inspire and educate children, especially in their country, Kazakhstan, about the environment and its many problems.
 - Want to help their own society become more ecologically friendly.
 - Instagram page: <https://www.instagram.com/teco.coco/>



Neil Deshmukh

PlantumAI

- What is it and what does it do?
 - An application that detects, diagnoses and provides treatment options for plant diseases.
 - Provides agricultural advice to farmers or even home gardeners.
 - Doesn't need internet access because it runs offline.

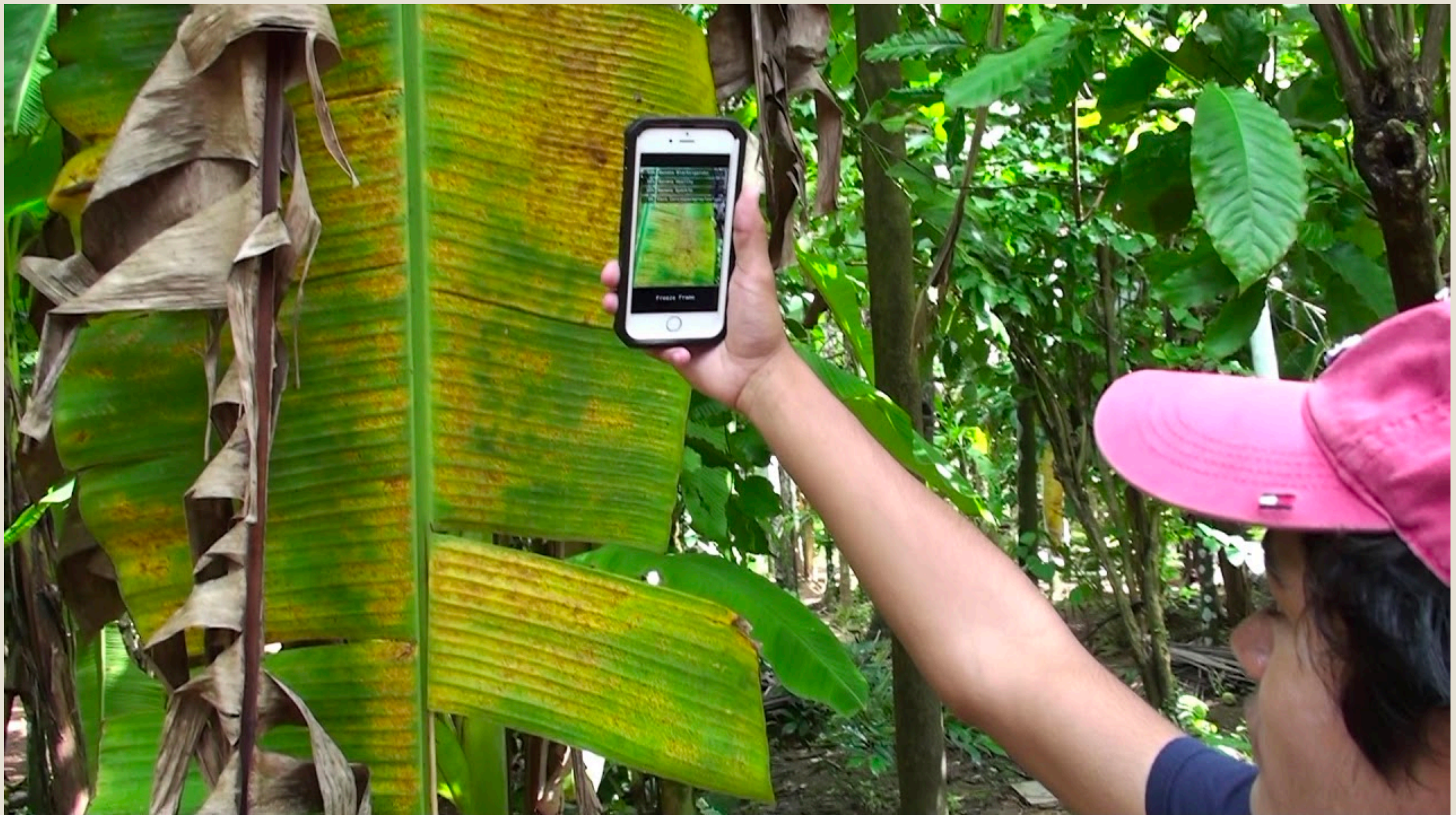


Image credit: <https://www.neildeshmukh.com/plantumai>

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- How does it work?
 - The user takes a photo and the app will process the data and provide a first analysis. Then it sends the image to the local university for a final analysis by plant pathology students.
 - Uses AI technology
 - Provides planting and harvesting advice and even alerts farms if there is a spreading of disease in the area.
 - Solves three main problems: crop disease, overpesticide use and changing climates.
 - What was his inspiration?
 - Witnessing the crop devastation of his family's farm in a village in India in 2016.
 - Then partnered with plant pathologists at Akola Agriculture University who help local farmers use the application.
 - They have analysed more than 1,000 crop disease occurrences across many villages.
- « My dream is to change the world using technology – to make it better for people everywhere, in every class of life. »*

Other Young Inventors



Inventions for Humanity

- ❖ As we have seen, very often the ideas for these inventions come from the issues present in these young people's lives. Sometimes the cause is the sickness of a loved one, other times it's a friend far away in need.
- ❖ Sometimes they feel a deep sympathy and calling to make sure that they have a bright future on our planet Earth. They want to help and they want to share their creations with others.
- ❖ Some other apps and devices that young people have invented are:
 - **Emma Yang** - an app called, *Timeless*, which aims to improve the lives of those living with Alzheimer's disease. Sends reminders to the user using AI-based facial recognition technology such as photos of family members and friends, reminds them of the date and time and even allows the user to use the phone's camera to identify the person who is standing in front of them. Inspired to help her grandmother who suffered from Alzheimer's.

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- **Riya Karumanchi** - a cane for visually impaired people called, *SmartCane*. It uses haptic-based GPS technology making the cane vibrate as it gives turn-by-turn directions. It also has an ultrasonic proximity sensor so that it can alert the users of potentially harmful objects that are in their way.
 - Eventually she plans on installing an AI-powered camera which would describe everyday objects and even recognise people's faces. Inspired by her friend's grandmother's struggles to get around easily and safely with her vision impairment.
 - **Shubham Banerjee** - *Braigo*, an affordable printer for Braille texts. A normal Braille printer can cost around \$2,000. With the help of his father (a software engineer), a Lego Mindstorms EV3 robotics kit and a few small electrical components, he successfully built his first prototype printing six dots of Braille. Through his company, Braigo Labs, he is further developing the printer for educational and home use.



SMART CANE

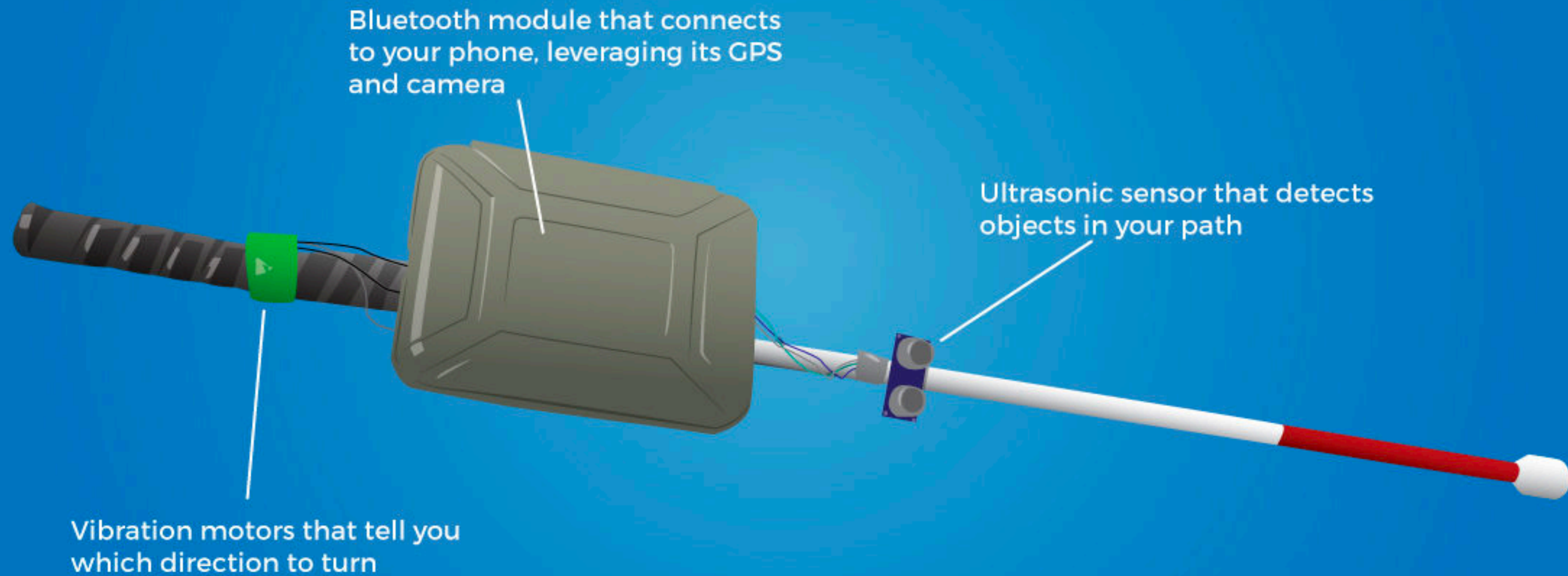


Photo credit: <https://ryersonian.ca/a-step-forward-for-the-traditional-white-cane/index.htm>



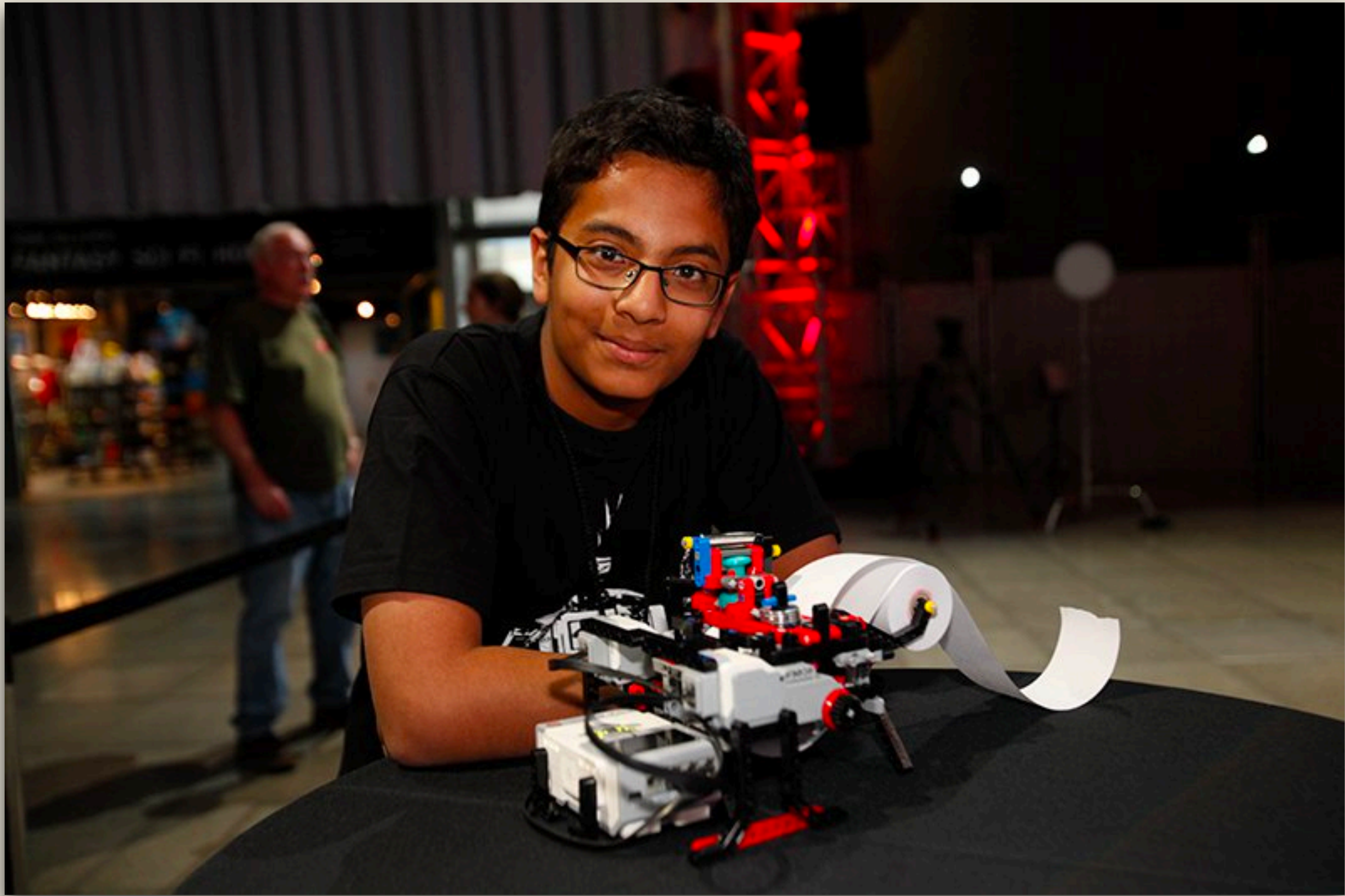


Photo credit: <https://www.smithsonianmag.com/innovation/meet-13-year-old-who-invented-low-cost-braille-printer-180956659/>



Women and girls in Technology

- To move towards creating more equality between men and women, we must provide the skills and tools to women who do not have neither such access, opportunity nor belief that they can be successful in this field.
- If this begins from a young age in a girl's life, it will benefit her greatly, *however*, it is **never** too late to learn new skills!
- **Empowerment:** « *the process of gaining freedom and power to do what you want or to control what happens to you.* »
 - One of the first steps towards creating change is the empowerment of girls and women.
 - It helps create solidarity among women - that we stick together, we support and listen to one another. This is so important and is extremely powerful in fighting against inequality, especially in a world that teaches us to be jealous of one another.



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- We often think of professions in technology as only being for young boys and men, and unfortunately, up until now, the tech world is mostly male dominated.
 - However, this is changing thanks to more and more school programs and efforts made to empower girls to get involved in science and technology so that they too can make a difference!
 - Some programs and competitions found in Europe:
 - <https://eit-girlsgocircular.eu/>
 - https://eic.ec.europa.eu/eic-prizes/eu-prize-women-innovators_en
 - <https://www.laboratoria.la/en>



Competition

- <https://teentech.com/awards/>
- <https://www.technovation.org/programs/>



Creative Activity - Part 1



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Take a moment to reflect on an element
of nature (ex. a forest, an ocean, etc.)
and think about what it would like to tell
us.



Is it experiencing an emotion?

Is it trying to send us a message?

What wisdom would it like to share?



On a sheet of paper, express your ideas
either through words, a short story or a
drawing.



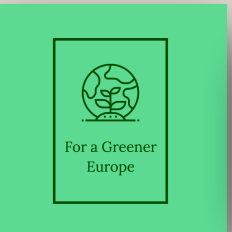


Image credit: <https://www.springernature.com/gp>

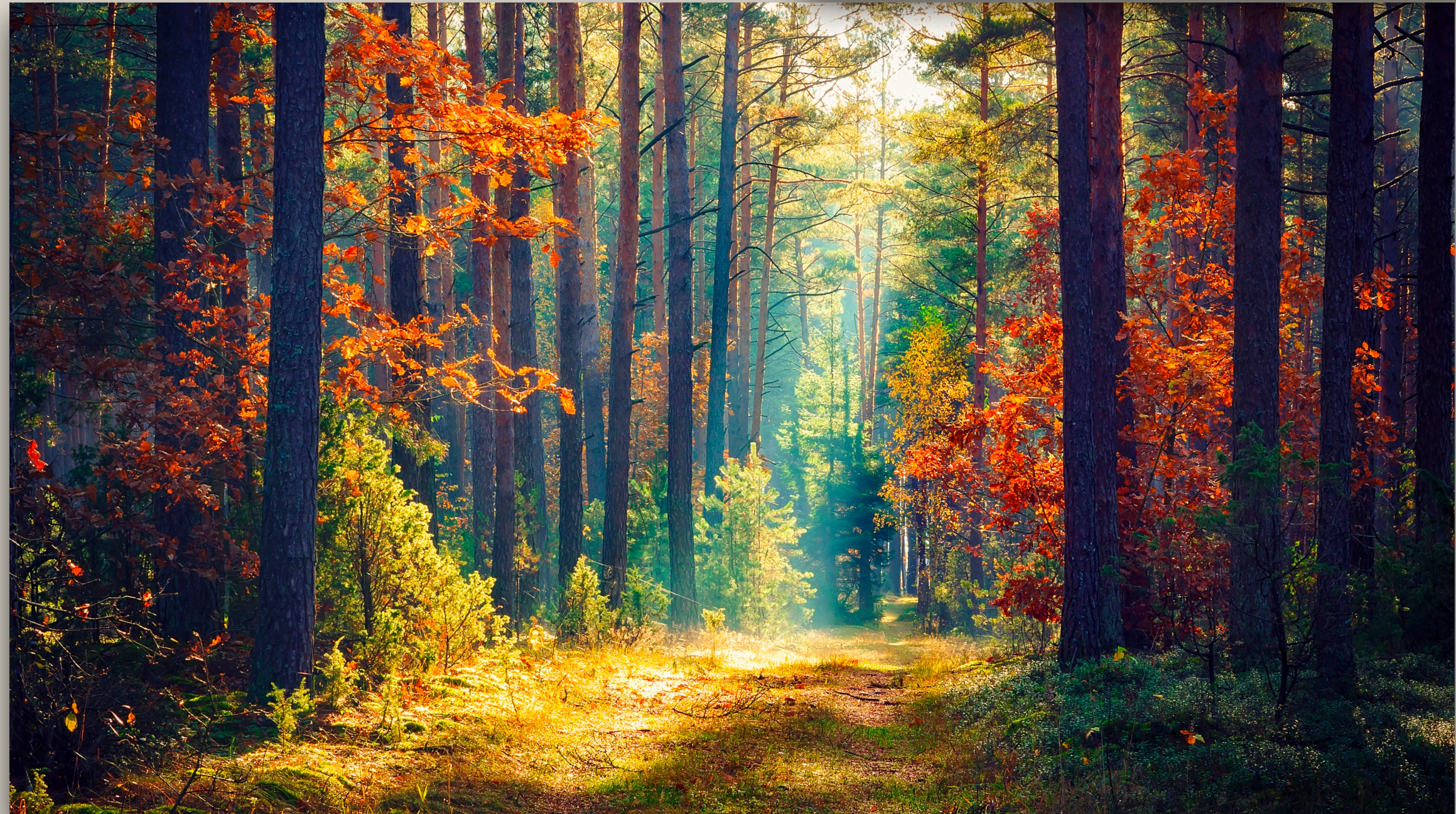


Image credit: <https://www.euractiv.com/section/climate-environment/news/half-a-billion-euros-to-flow-into-germanys-forests/>



Image credit: <https://www.nottingham.ac.uk/news/new-study-identifies-world-rivers-most-at-risk-from-climate-change>

Creative Activity - Part 2



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- Students will work in pairs or small groups to create a device or app that addresses a climate related challenge:
 - ✦ *Reducing energy consumption*
 - ✦ *Promote recycling*
 - ✦ *Encouraging use of public transportation*
 - How to use free app designers to design their app.
 - How to use online free drawing tools for the design of a device.
 - Each group will present their device or app to the class and explain how it helps fight the effects of global warming.
 - There will be a competition at the end but we will help everyone submit their project!





Conclusion



- * Recap the main points of the lesson, including the role of technology and coding concerning global warming.
- * Students reflect on how the skills they learned in this lesson could be applied in their own lives and future careers.
- * Emphasise the importance of continuing to learn about technology and coding as a means of addressing one of the most pressing challenges of our time.