



Lesson Plan:

Bioinspired Robots that Help the World

The Natural Robotics Contest is a public competition in which students can submit their ideas for nature-inspired robots that can help the world. The best idea will be turned into a real, working robot by a team of expert engineers!

This year's contest centres around the goals announced at the recent **UN Biodiversity Conference/COP15** (see next page for key goals agreed at the conference), and thinking of ideas for robots which can help the world meet those targets.

- *Maybe a woodpecker robot finding parasites in trees?*
- *Maybe a robot falcon protecting the eggs of sea turtles?*
- *Maybe a robotic plant that helps soil regenerate?*

The aim of this lesson plan is to give a starting point for discussion, and some activities to help generate ideas, before students finish by preparing a submission to the contest.

Helpful media resources:

- Why is biodiversity important? (Sir David Attenborough): <https://youtu.be/GIWNuzrqe7U>
- Can we create the "perfect" farm? (TED-Ed): <https://youtu.be/xFqecEtdGZ0>
- How trees secretly talk to each other (BBC News): <https://youtu.be/yWOqeyPIVRo>
- Five Crazy Bridges for Animals (MinuteEarth): https://youtu.be/VjCJvn_N5c
- Spying on Wildlife With Animal Robots (Great Big Story): <https://youtu.be/8xS-wB6NvYo>
- Bio-inspired Robots (BBC Science Focus): www.sciencefocus.com/future-technology/biomimicry-robots-animal-behaviour/

Key Goals from the 2022 UN Conference on Biodiversity (COP15)



Restore 30% of degraded ecosystems



Stop human-caused extinctions



Protect 30% of all land/sea area for nature



Reduce invasive species spread by 50%



Halve global food waste by 2030



Share the benefits of biodiversity fairly



Bring pollution to levels that do not harm ecosystems



Incorporate nature into agriculture/infrastructure

Read a summary of the conference here (BBC Newsround): <https://www.bbc.co.uk/newsround/64027041>

Initial Discussion Questions

Start by talking about unique abilities in animals and nature, and the threats facing our ecosystems. The sheet below may be a helpful place to write down thoughts.

What can animals do that we can't? What is the most impressive thing you have seen an animal do?	What are the biggest threats to nature? How can we stop them?	How could a robot help? What can robots do that humans can't?
<i>e.g. climb and jump between trees, see in the dark, fly into the water</i>	<i>e.g. habitat loss, pollution, fishing</i>	<i>e.g. reach dangerous places, blend into the environment, spend long periods of time at work</i>

Brainstorming Robot Ideas

Once you have discussed the challenges, start brainstorming ideas!

There are many ways to do this, and you may choose yourself, but we suggest using a brainstorming grid.

Brainstorming grid:

1. Print out the template on the next page, or simply divide paper into a 3x3 grid (bigger paper size is better - more space to draw)
2. Everyone takes a sheet and sketches 3 different ideas into the top row of the grid.
3. You should draw rather than write your idea, but do label your sketch.
4. After a short period of time, swap sheets between group members.
5. Each person now builds upon each of the three ideas they receive in the next row:
You can add a feature, change something, or sketch a new idea inspired by the first - but you should build on the idea, not swap it for a different idea you like better.
6. Everyone swaps sheets once more and builds further on the three ideas and their first set of additions.
7. You now have 10-20 ideas, each of which has been developed by three different people. Review these ideas as a group and select a shortlist of favourites. You can mix/merge ideas when you do this.

Brainstorming tips:

- Group brainstorming is about idea **quantity, not quality** - by generating lots of ideas together and discussing them, you will get further than you would by thinking about your own ideas in your head. Quality comes from refining ideas, not at the moment they are thought up.
- **Draw, draw, draw.** Sketching your ideas, no matter how roughly, helps both you and others visualise your concept. Don't worry about your 'artistic ability'.
- **Build on each other's ideas** - brainstorming is not a competition! You will be able to see things that others miss and your own ideas will benefit from the group's insight.

Brainstorming Grid Title: _____**Date:** _____

<i>Idea 1</i>	<i>Idea 2</i>	<i>Idea 3</i>
<i>Idea 1 Development</i>	<i>Idea 2 Development</i>	<i>Idea 3 Development</i>
<i>Idea 1 Further Development</i>	<i>Idea 2 Further Development</i>	<i>Idea 3 Further Development</i>

The Natural Robotics Contest: My Entry
Complete and upload to www.naturalroboticscontest.com

The name of your entry:	
What problem is your robot designed to solve?	
What inspiration has your design taken from nature?	

Draw your idea below: