



BIOMIMICRY

Inspired Light

**COMMUNITY OF THE FUTURE
INNOVATION CHALLENGE**

**Unleash the wonders of
biomimicry and explore
how nature's genius
sparks human
innovation!**



What if...

we use biomimicry to create a prototype of something inspired by nature?

Students will create prototypes and models based on the unique adaptations of flora and fauna, such as replicating the climbing ability of ants or the structural design of sea snails.

This knowledge can be applied to solve global challenges by inspiring sustainable technologies in fields like energy, waste management, and healthcare. For example, biomimetic solutions can enhance resource efficiency, resilience, and contribute to circular economy models.

Students will ideate and brainstorm creative ways to apply these natural designs to real-world challenges by fostering innovative problem-solving solutions.

Fun fact:

Velcro Came From Burrs!

In 1941, an engineer noticed how burrs stuck to his clothes and his dog's fur. Looking closer, he saw tiny hooks on the burrs and used the idea to invent Velcro, which we now use in shoes, clothes, and even spacesuits!



UN SDG



- Contributing to the development of sustainable energy technologies
- Emulating nature's strategies, to develop more sustainable materials and processes
- Creating buildings and urban environments that are more energy-efficient, resilient, and harmonious with natural ecosystems
- Minimizing waste and using resources more efficiently, contributing to a circular economy
- Promoting healthier ocean ecosystems inspired by marine life
- Preserving biodiversity by learning from forests, deserts, and other ecosystems

SKILLS

Students will learn :

Biomimicry:

Imitating methods found in nature to help create innovative technologies and resolve human issues.

Basic electronics and circuitry:

Designing circuits and integrating LED lights.

DID YOU KNOW?

Shark Skin Inspires Speedy Swimsuits!

Shark skin has tiny tooth-like structures called denticles that reduce drag and help them swim fast. Scientists copied this design to create high-tech swimsuits, helping swimmers glide through the water more efficiently!





Topics/curriculum area

Science: Biodiversity,
Conservation

Technology: Circuit, LED

Engineering: Designing, Creating
Models (3D Art)

Arts: Reading, Drawing

Mathematics: Geometry

Competencies

This project has been designed to support the Council of Ministers of Education, Canada global competencies.

- critical thinking and problem solving
- innovation, creativity, and entrepreneurship
- learning to learn/self-awareness and self-direction
- collaboration
- communication
- global citizenship and sustainability

BADGES

- Circuits
- Design Thinking
- Problem Solving
- Engineering
- Biomaking



Levels of activity

Hello World

- design sculpture that looks like a plant or animal

Intermediate

- take inspiration from the natural characteristics of a plant or animal to create a light

Advanced

- mimic the movement of an animal or plant to position the light

Brilliant

- consider mass production in the creation of the final design
- design a new invention inspired by nature

Timeframe

2 - 3 hours

Suggested grade level

2 - 12





Materials & resources

In the Kit:

- batteries (CR3202)
- battery holders
- warm white LED lights
- cardstock
- vellum white and multi coloured

Not in the Kit:

- tape
- scissors
- glue
- pencil

Useful resources

Biomaking

Inspired by nature

Other helpful external resources

How to make a paper circuit template

The Innovators Using Nature's Design Principles to Create Green Tech

What is Biomimicry?



Possible development

Introduction

Discuss biomimicry, the practice of drawing inspiration from nature to solve human challenges. What patterns, shapes, and processes in nature have inspired our technology and designs? For example, what is Velcro, and where did we get the idea for it? How do we use it in our daily lives?

Group brainstorming session

In small groups, brainstorm shapes, patterns, and processes you observe in nature. What do we see, hear, touch, smell, or taste in nature that could inspire new designs? Have students share their ideas with the class.

Using the design thinking process, students will:

- Explore nature: Identify specific patterns or phenomena in plants, animals, or ecosystems.
- Innovate: Use those natural inspirations to create designs or technologies that address modern challenges.

Encourage students to reflect on their process and product, considering what they learned and what they would do differently.



Suggested videos

- [What is Biomimicry?](#)
- [Biomimicry and Nature](#)



Creating the

PROJECT

Look for inspiration

1. Ask students to explore their natural surroundings. If possible, take the class on a walk in a natural setting nearby. Look for birds, trees, rocks, mushrooms, etc. If an outside walk is not possible, bring a wide variety of things that were found in nature (e.g. sticks, rocks, leaves).
2. Using different tools such as a cutter, foldoscope, magnifying glass, look for something that inspires them, pause and observe closely its shape, form and pattern. It can be a plant, insect, animal, whatever that grabs their attention.
3. Ask students to sketch what they see, hear, feel or smell.
4. Tell them to take a look at their sketches and try to imagine how it might look and work as a lamp.
5. They can break it up into its separate components to help make it easier. Example: petals, stem, leaves; legs, body, head; etc.





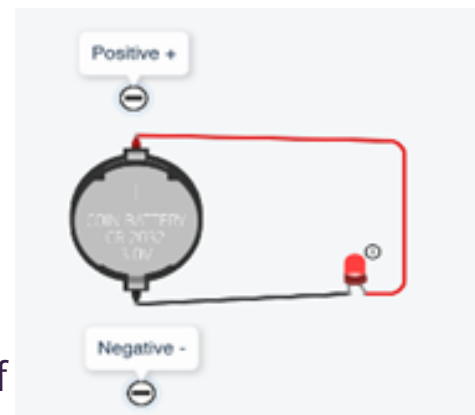
Creating the **PROJECT**

Design and build your lamp

6. Encourage sketching multiple ideas before choosing one as their final design. They now have to transform it into a 3D form product from their 2D sketch.
7. Outline the parts of their design on paper and cut out the pieces. Stick the pieces together in a 3D form.
8. Students may continue iterating and modifying their design as they work on their project.

Illuminate your design

9. choose the desired position for the light, and coin cell battery holder (if using) on the prototype.
10. Connect the positive lead of the battery holder to the positive lead of the LED (longer lead).
11. Connect the negative lead of the battery holder to the negative lead of the LED (shorter lead).



Possible Problems:



Light isn't lighting up.



- Check the battery is not dead with a different light
- Check the light is working with a different battery
- Are the positive and negative wires connected properly?
- Are the negative and positive touching, creating a short circuit?

DID YOU KNOW?

Gecko Feet Inspired Sticky Tape!

Geckos can climb walls and ceilings because their feet have millions of tiny hair-like structures that grip surfaces using microscopic forces. Scientists mimicked this design to create super-sticky, reusable tape that works like gecko feet!





Facilitator tips

If you use other materials non included in the kit:

You may need a 100-ohm resistor in case you have an LED without an internal resistor.

Provide Demonstration:

Show students which is the longer lead and shorter lead of the LED. Model how to connect the wires to the battery. Share examples of others' creations to inspire students and spark their imagination.

Safety tips

Consider what may be required for the project (e.g. gloves, lab coat, safety glasses) and ensure students have access to anything they may need or want to protect themselves.



Handle tools with care:

Be sure to use tools and resources for their intended purposes; this can help reduce accidents or injuries and preserve the life of the item. Use extra caution when handling sharp or heated tools or objects. When working with electronics, ensure devices are plugged in or unplugged as needed. Stop immediately if you sense something hot or burning, spark or shock and seek help from an adult.

Glossary

Circuit

A complete closed loop of conductive material.

Biomimicry

Imitating methods found in nature to help create innovative technologies and resolve human issues.

Adaptation

A change (physical or behavioral) made by an organism to adapt to its environment and increase its chances of survival

Conductive material

Material that facilitates the flow of electrical current.

Biomaking

Creating of products using biological processes (e.g. series of natural events)



Innovation Challenges Possible:

Community of The Future

Brilliant Blue

Circular making

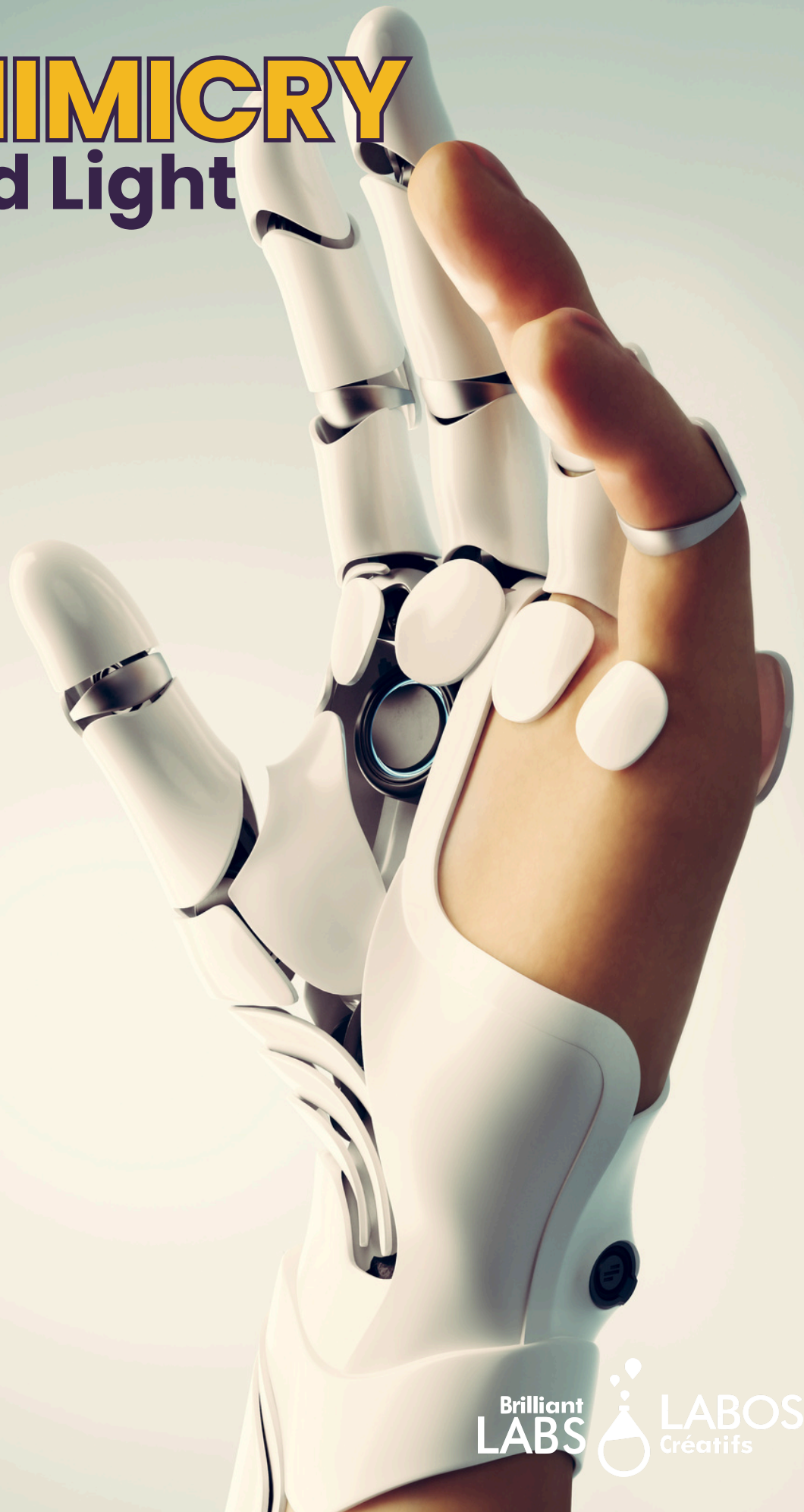
Mission: Mars

Innovative Fashion

Robotz got Brilliance

BIOMIMICRY

Inspired Light



Brilliant
LABS



LABOS
Créatifs