

SMART TATTOO



Designing responsive
on-body interfaces

What if...

we could decorate our bodies with smart technology to express ourselves in new ways and monitor our health, or the environment we are in?

Students will design and create temporary smart tattoos that change color based on external influences such as body temperature, exposure to sunlight.

Students will explore the concepts of hybrid body craft and develop a deeper understanding of wearable technology, focusing on personal health monitoring and environmental responsiveness.



Did you know?

Smart tattoos can glow under UV light! These high-tech tattoos use special inks that light up, combining style with functionality.

UN SDG



- creating ways to improve personal monitoring and awareness.
- understand how non traditional approaches may lead to advancements in fields such as health and science.

FUN FACT

Smart tattoos can turn your skin into a touchpad! Using conductive ink, they can control devices with simple taps or swipes.



SKILLS

Students will learn :

Problem Solving:

Ideating, while considering how to integrate technology with health and environment monitoring

Design Thinking:

Making the smart tattoos both functional and visually appealing

Chemical Reaction:

Exploring how pigments are affected by external influences

Did you know?



Smart tattoos can monitor your health by changing color! These futuristic tattoos can detect changes in hydration, blood sugar, or UV exposure, acting as wearable health trackers.



Topics/curriculum area

Science: Human Body Systems, Chemical Changes

Technology: Tools (e.g. brushes, paints, stencils), Pigments

Engineering: Designing, Prototyping

Arts: Digital Art, Painting

Mathematics: Number Sense, Algorithms

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

- 2D
- Design Thinking
- Entrepreneurship
- Hand Tools
- Wearables



Levels of activity

Hello World

- Use stencil and pigment to create tattoos
- Use UV reactive highlighters and black light

Intermediate

- Create individual tattoos using pigments and the design thinking process

Advanced

- Identify how pigments are used to influence behaviour (e.g. change in color indicates need to apply sunscreen)

Brilliant

- Create tattoos equipped with technologies that can support awareness of medical, social or environmental issues

Timeframe

1-2 hours

Suggested grade level

3 - 12





Materials & resources

In the Kit:

- temporary tattoo paper
- design stencils
- reactive pigment
- pigment solvent/sealer
- mixing cups
- paint brushes
- permanent pens
- sponges
- flexible scrapers

Not in the Kit:

- drawing tools
- pencil paper
- scissors

Useful resources

For students

Handouts

For teachers

Teacher presentation

Pre-designed templates

- Fabric Units cut file
- Smart Tattoo stickers
- Stretch board with LED insertion



Possible development

Introduction

Discuss the choices people make when deciding what to wear and some of the issues within the fashion industry. What if fashion could be more than just clothing? How could it be used as a tool for positive change?



Introducing hybrid body craft and wearables

Use the glossary and Canva slide deck to explain how style can merge with technology to create body art that not only looks good but also serves a functional purpose, such as tracking health data.

Discuss the possibilities of fashion

- How is fashion sustainable, culturally diverse, and inclusive? How is fashion NOT sustainable, culturally diverse, and inclusive?
- What if we could use technology in fashion to express ourselves in new ways?
- Could our clothes and fashion choices monitor our health and well-being?
- Ask students: What types of devices do people already use to track their health (e.g., Fitbit, smartwatches)?
- How can fashion impact global issues?

Possible development

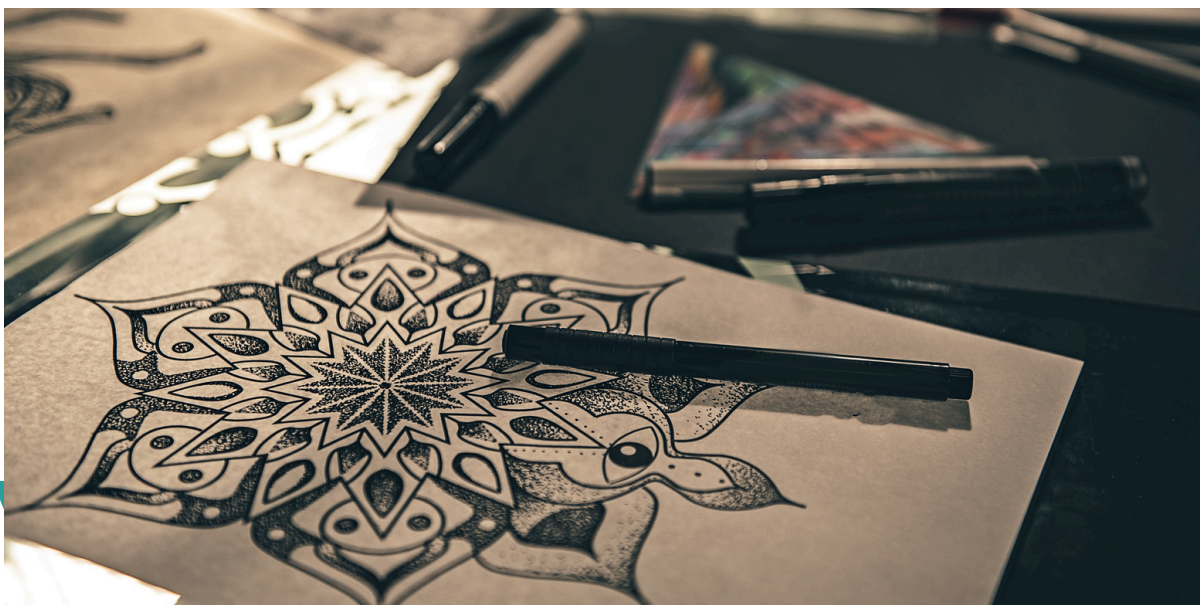
Reflection

Students will reflect on how tattoos can be reimagined to promote sustainability, inclusivity, and health. How can technology enhance the potential to improve lives and the world around us? Encourage students to reflect on their process and product, considering what they learned, what they enjoyed, what they would do differently.

Using the design thinking process

Students will design their own smart tattoo, focusing on health and well-being. They will:

- **Ideate:** Brainstorm ideas for wearables that combine personal style and health monitoring. In small groups, have students discuss creative ideas for how body art could be transformed through technology. What would they design? How could they make it sustainable, culturally relevant, and technologically innovative?
- **Prototype:** Sketch or create a basic model of their wearable design.





Creating the **PROJECT**

****Teachers may need to cut the tattoo base paper and top sheet in advance****

Assembling the system

1. Use a permanent pen to draw the outline of your design onto the smooth/shiny side of the tattoo paper.
2. Make sure to leave at least 5mm ($\frac{1}{4}$ ") from the edge undecorated
3. Mix 5 ml of pigment solvent/sealer with 1 gram of chosen pigment in a mixing cup until smooth, ensuring no lumps
4. Paint onto the design with the ink mixture.





Creating the

PROJECT

Application

1. Handle with care to avoid paint smudging.
2. Allow the paint to dry completely (about 2-3 minutes).
3. Remove the backing of the adhesive sticker sheet B (green).
4. Place the clear adhesive sheet on top of the design, smoothing out air bubbles.
5. Use a flexible scraper to press the surface of the adhesive sticker sheet down (press hard), ensuring the sticky part is transferred onto the base sheet.
6. Use scissors to trim around each tattoo design, leave about 5mm ($\frac{1}{4}$ ") from the edge of the design.
7. Peel off the plastic top.
8. Apply the tattoo to clean, dry, hair-free skin, pressing firmly.
9. Wet the tattoo with a damp sponge for 60 seconds, ensuring it's thoroughly soaked.
10. Carefully remove the paper to reveal the tattoo.

Test the tattoo's responsiveness

Possible Problems:



Pigment does not mix in properly



- Add pigment to a small amount of solvent to make mixing easier

Mixture cannot be applied to transfer



- Work swiftly as the mixture dries quickly.

Transfer does not separate from plastic cover



- rub the top layer more to ensure adhesion
- make sure pigment is completely dry before putting on top layer

Transfer does not apply properly



- Check the transfer has been put on the correct side of the paper



Facilitator tips

Start Simple:

You may wish to cut the tattoo base paper and top sheet in advance. This activity can get messy as students use paint and adhesives. Students will benefit from reviewing the steps before beginning this activity.



Provide Demonstration:

Show students the glossy side of the tattoo paper and also the adhesive sticker sheet. Demonstrate mixing the pigment and sealer, highlighting its need to be smooth. It is advisable to try making the project yourself before introducing it to the students. Share examples of other smart tattoo creations to inspire students and spark their imagination.

Safety tips

Personal Protective Equipment

It is advised to use gloves while handling materials like pigments and adhesives.



Handle materials with care:

Ensure that no one is allergic to any of the materials, especially the tattoo paper. If someone is allergic, they can watch the demonstration.

Glossary

Thermochromic Pigment

type of material that changes color in response to temperature changes.

Photochromic Pigment

material that alters its color when exposed to ultraviolet (UV) light, typically from sunlight. Upon removal from UV light sources, the pigment returns to its original color.

Hybrid Body Craft

concept that integrates cultural and social perspectives into the design of on-body interfaces.

Pigment sealer

a substance that protects the duration and color of the pigment for extended periods

Wearables

electronic devices or technology that are worn on the body as accessories or embedded in clothing. These devices typically have smart sensors to collect data.

Pigment solvent

a liquid that helps dissolve the color pigment and makes for easier mixing and application

Possible other class activities

Experiment with additional materials such as:

- Ph-sensitive pigments
- glow-in-the-dark pigments
- and conductive pigments.

Consider entrepreneurial aspects

Investigating the steps involved in the process if such a product becomes commercial.

Create your own stencils using Cricut, 3D printers, CNC, CAD, etc.