

## Science and technology

1 Work with a partner. Look at the photos and discuss the questions.

- 1 What can you see in the photos?
- 2 Why do you think athletes wear them?
- 3 How do you think a bracelet can help the environment?

2 Quickly read the text. Which statement best describes what it is about?

- a We can now wear clothes that help the environment.
- b New technology in clothes is useful and fun.
- c Scientists are helping athletes.

### Smartclothes

Technology in our clothes is already helping us today. Athletes wear devices on their wrists that can track sleep, heart rate and blood pressure. You can even buy a GPS-based cat collar that tells you the location, health and other activities of your pet.

Other technology is available, too, such as clothes and bags with flexible solar panels that charge devices while you are wearing them. You need to be in the sun for one hour to charge a smartphone to 50% power.

But now, scientists are taking clothing technology into the future, with some incredible new ideas.



### Dresses that move when someone looks at them

Designer Ying Gao uses technology in her dresses so that they respond when someone is looking at them. Eye-tracking technology activates tiny motors inside the fabric. These motors move to make the dress move and change shape. The clothes also light up and glow in the dark because the fabric is made up of photo luminescent fibres.

### Human-powered batteries

Most wearable technology items like watches and wristbands use lithium-ion batteries. But because the batteries are small, you need to charge the devices often. Some devices use ultra-thin zinc batteries that are very flexible. They can store more energy, but they are expensive.

Scientists at Massachusetts Institute of Technology (MIT) are now developing devices that use human energy to generate electricity. The device is the size of a stamp and has a similar structure to a battery with two conducting electrodes separated by a liquid electrolyte. When the device bends, the electrons move from one electrode to the other, and this movement creates energy.



### Anti-pollution bracelet

The Hand Tree is a new kind of bracelet, inspired by trees. Trees use photosynthesis to produce clean air, and the Hand Tree takes polluted air from around you and cleans it. It contains a carbon filter that processes smoke, bad smells and chemicals in the air and recycles the air back into the atmosphere. The bracelet is the first design that uses this technology, but the developer wants to make other accessories to do the same thing.

**3 Read the text again. Then read the sentences and write dress (D), bracelet (B) or human-powered battery (H).**

- 1 It contains electrons. ....
- 2 You wear it on your wrist. ....
- 3 It generates electricity. ....
- 4 You can see it in the dark. ....
- 5 It contains technology that responds to eyes. ....
- 6 It contains a carbon filter. ....

**4 Match the sentence halves.**

- 1 You can buy a bag that .....
- 2 A device for athletes .....
- 3 The Hand Tree .....
- 4 Ying Gao's dress .....
- 5 A lithium ion battery .....
- 6 The MIT battery .....
- a can move.
- b uses human energy to generate power.
- c tracks your heart rate.
- d doesn't have a lot of energy.
- e charges your phone.
- f cleans the air like a tree.

**5 Work with a partner and discuss the questions.**

- 1 Which of the inventions in the text do you think is the most useful? Why?
- 2 Do you or does a person you know have any clothes or accessories that use technology? What do the devices do?

**?? DID YOU KNOW?**

Astronauts in space wear clothes that use 'phase change material' (PCM). This material responds to a person's body temperature and can store and release large amounts of energy. When a person is hot, the PCM absorbs the heat and melts. When a person is cold, the PCM releases the heat energy. The PCM consists of tiny particles inside the fabric. The person who is wearing the clothes can't see or feel the particles

**PROJECT**

- 1 Find out about another item of clothing or accessory that uses technology, or about a new invention that you can wear or carry. Describe the key features of the item, and explain how the technology works. Present the information to the class.
- 2 Design an invention of your own that you can wear or carry, and that uses technology. Explain what the item does and how the technology works. Present the information to the class.

**VOCABULARY FOCUS**

- accessory [n]:** a small thing such as jewellery or a bag that you wear
- already [adv]:** describing a situation that started in the past and still continues
- athlete [n]:** someone who is good at sport and takes part in sports competitions
- battery [n]:** an object that fits into something and gives it electricity
- blood pressure [n]:** the pressure at which blood flows around your body
- bracelet [n]:** a piece of jewellery that you wear around your wrist
- charge [v]:** to put electricity into a piece of equipment
- collar [n]:** a thin piece of leather or plastic that a dog or cat wears around its neck
- device [n]:** a machine or piece of equipment
- electrode [n]:** a small metal or carbon object inside a battery that electricity flows through
- electrolyte [n]:** a liquid containing atoms that electricity can pass through
- fibre [n]:** a piece of thread
- filter [n]:** a piece of equipment that removes parts that aren't wanted from a liquid or gas
- flexible [adj]:** able to bend or move easily
- generate [v]:** produce power
- glow [v]:** to shine with a soft light
- GPS [n]:** global positioning system: a system for finding exactly where someone or something is anywhere in the world using satellites
- heart rate [n]:** the speed at which your heart beats
- motor [n]:** the part of a machine that makes it work or move
- photosynthesis [n]:** the process by which green plants use carbon dioxide and energy from light to produce food
- recycle [v]:** to use something again
- solar panel [n]:** a piece of equipment that uses energy from the Sun to create power
- store [v]:** to keep something in a particular place
- track [v]:** to follow or measure something
- wrist [n]:** the part of your body between your hand and your arm
- wristband [n]:** something that you wear around your wrist