DoubleHelix

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ISSUE 6

WEARABLE TECHNOLOGY

SCIENCE ON THE BRAIN

IT'S NOT APPLE PIE IT'S A TASTE ILLUSION

DECEPTION DETECTION

HOW TO SPOT A LIAR

CELEBRATING 30 YEARS OF SCIENCE FOR KIDS

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CSIRO

ON THE COVER

This issue of Double Helix will get you thinking … about your brain! Find out about the psychology of lying in **Deception detection** (22) and the science of humour with **What's the joke** (24).

We also have a range of mind-blowing illusions, including a recipe to trick your tastebuds called **Not apple pie** (26), and optical illusions in our **Head spin** article (28).

Check out the beautiful and informative calendars in the story **Sustainable living on the Tiwi Islands** (16), and find out about the latest in **Wearable technology research** (10).

CSIRO

At CSIRO, Australia's national science agency, we love science and technology. We find ways to solve real problems and make new discoveries.

Our CSIRO scientists are working on future fabrics. Combined with energy harvesting, flexible batteries and electronics, wearable technology could improve our lives. Find out more in our 'Wearable technology' article (10).

FEATURES

REGULARS

ACTIVITIES

31 COMPS

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Special thanks to Mr Ben Clark and the students at Burgmann Anglican School for sharing their ideas for this magazine.

WHAT'S ON THE INSIDE?

Dr Adam Best, a Senior Research Scientist at CSIRO, says that the wearable technologies we're currently seeing are "fairly simple". They're essentially watches with extra functions, such as step counting. He's interested in taking wearables to the next level, building technologies into the type of clothes and accessories we use every day.

For example, Adam was part of a team that developed an 'energy-harvesting' backpack.

"It collects energy as you walk and can then wirelessly charge a portable device," says Adam. "It even has lights inside when you open the bag!"

This shirt contains CSIRO's flexible battery, which can power small electronic devices.

HOW TO HARVEST ENERGY

You might be used to plugging your rechargeable batteries into a power source, such as mains electricity, among a tangle of cables. But there are better ways of collecting electricity from the world around us. CSIRO is focused on two types of energy harvesting to charge flexible batteries for their wearable technologies.

Capturing energy from movement is one way of powering up. 'Piezoelectric' materials transform kinetic (moving) energy into electricity when they are put under pressure or twisted. So shoes, clothes or recreational gear could generate electricity from your movement. Joggers and cyclists could use their energy output to power a vest that shines bright at night while they run and ride.

CSIRO is also researching 'thermoelectric' harvesting. This looks at temperature differences: for example, between warm skin and cool air. This difference can generate electricity. The technology is not highly efficient yet, but it has great future potential.

If we can harvest energy on the go using these methods, our wearables will no longer need to be plugged in. That means they're easy to take anywhere, anytime!

LOOKING SMART

Combining ideas from CSIRO research and existing technologies, Adam imagines a smart jacket with a built-in artificial intelligence.

You could make phone calls, watch TV on an inbuilt flexible screen, or listen to the radio. It would tell you if you'd had the right amount of sleep, or enough water that day.

Not only would the jacket be wireless, but it also would charge as you walked around. It could even be washable. A tomato sauce stained-jacket could go straight in the washing machine, without the need to remove any cables or electronics.

You'd never have to remove your fitness tracker for charging or showering, and your phone battery would never run low!

LOOKING TO THE FUTURE

Adam is particularly excited about the future. He looks forward to a time when all our technology is a seamless part of our day-to-day life, with no cables or charging points!

For readers interested in developing this kind of technology, he says there is great opportunity to create inventions that will have a huge effect on people's lives.

"We need creativity and lots of invention," he urges.

DATA FOR DOCTORS

FUTURE WEARABLE TECHNOLOGIES MAY BE LIFE-CHANGING – OR EVEN LIFE-SAVING.

"There are a lot of possibilities in the medical field," explains Adam. "For example, a device could tell a diabetic if their blood sugar is too low or high. Or, a sensor could monitor a patient's heart rate and tell their doctor if they are ill."

"You could even have a device that uses an accelerometer, which measures movement. It could detect if you have fallen over and call for help if you can't get up."

These technologies are exciting possibilities for medical researchers as well as for the people using them, who could live more independent lives.

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