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BYTE

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ROBOJELLY FISH - A CLIMATE SPY

To study coral reefs and the creatures that live there, scientists sometimes deploy underwater drones. But drones aren't perfect spies. Their propellers can rip up reefs and harm living things. Drones also can be noisy, scaring animals away.

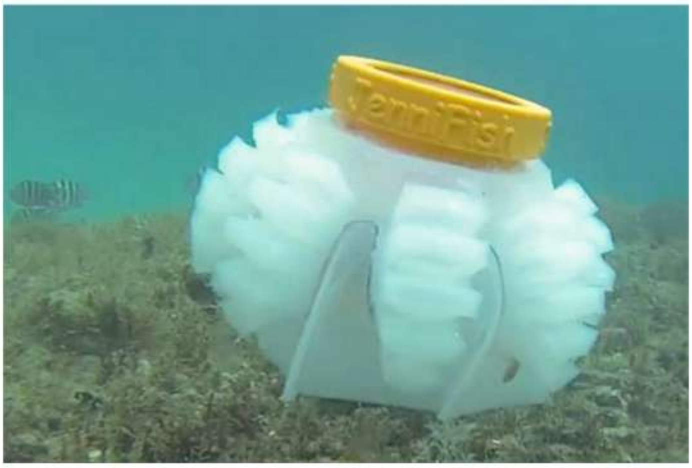
A new robo-jellyfish might be the answer. Erik Engeberg is a mechanical engineer at Florida Atlantic University in Boca Raton. His team developed the new gadget. Think of this robot as a quieter, gentler ocean spy. Soft and squishy, it glides silently through the water, so it won't harm reefs or disturb animals living around them. The robot also carries sensors to collect data. The device has eight tentacles made of soft silicone rubber. Pumps on the underside of the robot take in seawater and direct it into the tentacles. The water inflates the tentacles, making them stretch out. Then power to the pumps briefly cuts out. The tentacles now relax and water shoots back out of holes on the underside of the device. That rapidly escaping water propels the jellyfish upwards.

The robot also has a hard, cylindrical case on top. This holds the electronics that control the jellyfish and store data. One component allows wireless communication with the jellyfish. That means someone can remotely steer the robot by making different tentacles move at different times. The hard case could hold sensors, too. Engeberg's group described its robot's design September 18 in Bioinspiration & Biomimetics.

Natural inspiration :

The researchers had practical reasons for modeling their device on jellyfish. "Real jellyfish only need small amounts of power to travel from [point] A to B," Engeberg says. "We wanted to really capture that quality in our jellyfish."

Jellyfish move slowly and gently. So does the robo-jelly. That's why the researchers think it won't frighten marine animals. What's more, Engeberg says, "The soft body of our jellyfish helps it to monitor ecosystems without damaging them." For example, the robot could carry a sensor to record ocean temperatures. The data it gathered could help scientists map where and when the ocean is warming because of climate change.



"Jellyfish have been moving around our oceans for millions of years, so they are excellent swimmers," says David Gruber. He's a marine biologist at Baruch College in New York City who was not involved with the robot. "I'm always impressed when scientists get ideas from nature," Gruber says. "Especially something as simple as the jellyfish."

Fighting climate change motivates Engeberg and his team. "I have a deep desire to help endangered reefs around the world," he says. He hopes his robo-jellyfish will help researchers study the otherwise hidden impacts of climate change at sea.

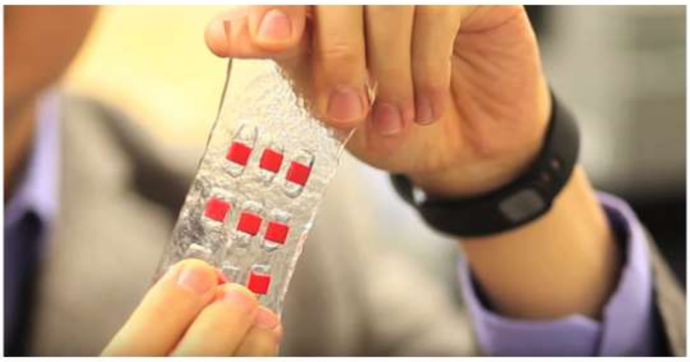
ELECTRIC BANDAGE

One day, bandages could speed healing by zapping wounds with gentle bursts of electricity. They wouldn't even need a battery pack. A patient's own body movements would power the device. And such a system may not be that far off. Researchers have already produced a working prototype. "We thought it might work, but we didn't know how good it would be," says Xudong Wang. "Then we saw the result and thought, 'Wow! That's really fascinating." Wang is a materials scientist at the University of Wisconsin–Madison. He leads the group working on this new bandage. His team has been developing a nanogenerator for many years. It uses body movements to generate electricity. These engineers were hoping to use the device to power wearable electronics. Then they realized it might be even more useful as medicine.

Scientists have known for decades that electricity can stimulate wounds to heal. For instance, electricity fosters cells on the skin's surface to grow. This "electrotherapy" has relied on bulky devices that need a power source. That's why it's usually used only in hospitals for treating serious injuries.

The Wisconsin engineers have now created a bandage with small electrodes.

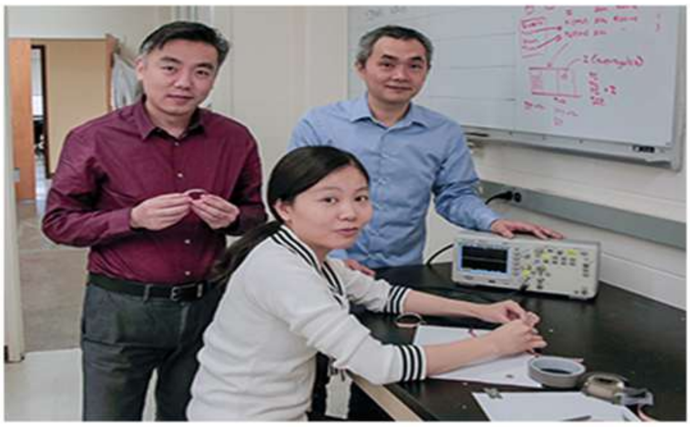
"Our device is very simple," Wang says. "It's a flexible, wearable device." Its electrodes connect to nanogenerators inside the bandage. Those nanogenerators turn movement into electricity. That power then travels through the electrodes into the skin as mild electrical pulses.
Wang's group tested the bandage on more than 10 injured rats. As these "patients" breathed in and out, their wounds received tiny electrical shocks.
Another group of injured rats served as controls. That means they received no treatment.



The wounds of rats in the control group took about two weeks to heal. Those on rats treated with the electrified bandages healed in just three days. Wang's team described its new findings online November 29, 2018 in the journal ACS Nano.

No pain, big gain

The new bandage not only is simple, flexible and wearable, but also gentle. Compared to the electrical stimulation delivered by hospital machines, these bandage gives a much smaller electrical pulse. That should help protect healthy tissue from being damaged by the zaps. In fact, Wang says: "Usually, you don't even feel it."
This is "a good first step toward an interesting and potentially promising approach to wound care," says Tyler Ray. He says you might think of it as a "smart Band-Aid." Ray is a mechanical engineer at the University of Hawaii at Manoa who had no role in creating the new system. He said he'd like to see the bandage tested on larger animals or people, and lots of them.
Wearable technology has been around for several years. Usually these are fairly stiff devices, like a Fitbit, Ray notes. Researchers across many fields are now working on building soft, flexible devices for people to wear on their skin.
Wang next wants to design a nanogenerator that's even more sensitive. His goal is to build one that can generate electricity from the tiniest movements like blood moving under your skin. That way, the bandage could be powered by something as small as someone's pulse.



PRINTERS FOR THE BLIND

Maybe you've heard the saying that "a picture is worth a thousand words." It means that some information is best conveyed visually. And that's especially true in many research fields, says electrical engineer Dan Gardner.

But what if you can't see?

John Gardner was a solid-state physicist at Oregon State University (OSU) in Corvallis. His job involved using "the properties of the nucleus [of an atom] to
learn something about the solid [state]" of materials, he explains. For many projects, he and his team added tiny bits of radioactive impurities — think of them as tags — to different solids and liquids. Then they applied a strong magnetic field to each material.
Energy from the "tags" would be released in the form of gamma rays — a type of radiation. The rays would be at right angles to each other. But there was also some wiggle, some variation in the angle of an emerging beam of energy. The wiggles came from other atoms in the material, which were all moving around.
"What we did," John explains, "was to evaluate the wiggles." That gave his team useful information about the materials they studied. Yet to do that took alot of complex math.

Although blind in one eye, John could see with the other. Or he could until too much pressure built up from fluid in the good eye. He needed surgery. This left the scientist completely blind.
John still wanted to do physics. But to do that, he had to interpret each graph precisely. "Getting it exactly right all the time was incredibly important," he explains. And that, he notes, "was not easy to do when I couldn't see." Once he became blind, he had to approach things differently.
For a while, he still supervised graduate students. They would tell him what a graph showed. But he wasn't satisfied. He wanted to more directly "see" those graphs and data that underpinned his work.
His solution: Design a system to make touchable data graphs and other "visual" aids for himself and others who couldn't see well, or at all.
John got a team together at OSU. With financial help from the National Science Foundation (NSF), they invented a new type of printer for these data and graphs. Braille is a form of printing for the blind. Raised dots take the place of printed letters. But regular braille couldn't handle a lot of advanced math. It didn't work well for scientific graphs and charts, either, John explains. People at NSF asked John if his team could invent a better way. He told them he thought so. Afterward, NSF gave his group funding to give it a try.
Together, John's team worked to apply the concept of braille to math and visual data.

Their novel printer squeezes paper between pointy tools called punches and little cups, called dies. When the punches press into the dies, they make raised dots on the paper between them. This type of printing with raised dots is called embossing.

The team showed NSF how the concept worked. "They were absolutely blown away," John recalls. NSF gave his group another grant for more work. And John moved from working on physics to working full-time on developing this technology. His new job: creating new tools for scientists with vision problems.

How to make data & 'show and tell'

John Gardner set up ViewPlus Technologies to make the new printers — and make them better. For instance, the printers had to work with common software programs such as Word and Excel. They also needed to increase how many dots per inch, or DPI, the machine could emboss. The more dots per inch, the sharper and more detailed a graph or chart could be. Users would also need to be able to tell different parts of a map or chart from each other. One bar chart might compare several groups in a study, for example. Someone might display this on a regular chart using different colors, shading or other visual patterns. John's team had to figure out ways to display such contrasts. They decided on "shading" such regions using dots with different heights.

The team also has developed interactive "talking" pictures. This system combines a tactile (TAK-tyle), or touchable, printout with a computer to make interactive graphs and charts. One printer step embosses braille and graphics.

Another adds visible ink. Meanwhile, a computer file for the graph has sound information coded for different parts of the image. Now a sighted teacher or low-vision user can work with the same document. A person puts the tactile printout over a touchscreen. That touchscreen is hooked up to a computer, and the corresponding computer file is open. As someone touches different parts of the printout, this activates the touchscreen below. And that triggers the computer to read aloud the matching audio information for the touched spot. Someone doesn't even need to know how to read braille to use this system.

John Gardner often talks at conferences about the tools his group has been developing. Assistive technology deals with tools that make life easier for people with disabilities. This past spring, John described the new audio-touch combo at the CSUN Assistive Technology Conference in San Diego, Calif.

For John, such products have made a huge difference. "My biggest joy [comes from] the great maps I can read," says John Gardner. "I enjoy reading historical novels, traveling and other activities that involve maps. Now I can have maps again."

Reversing the flow of time on a quantum computer

We all mark days with clocks and calendars, but perhaps no timepiece is more immediate than a mirror. The changes we notice over the years vividly illustrate science's "arrow of time" -- the likely progression from order to disorder. We cannot reverse this arrow any more than we can erase all our wrinkles or restore a shattered teacup to its original form.

Or can we?

An international team of scientists led by the U.S. Department of Energy's (DOE) Argonne National Laboratory explored this question in a first-of-its-kind experiment, managing to return a computer briefly to the past. The results, published March 13 in the journal Scientific Reports, suggest new paths for exploring the backward flow of time in quantum systems. They also open new possibilities for quantum computer program testing and error correction.

To achieve the time reversal, the research team developed an algorithm for IBM's public quantum computer that simulates the scattering of a particle. In classical physics, this might appear as a billiard ball struck by a cue, traveling in a line. But in the quantum world, one scattered particle takes on a fractured quality, spreading in multiple directions. To reverse its quantum evolution is like reversing the rings created when a stone is thrown into a pond.In nature, restoring this particle back to its original state -- in essence, putting the broken teacup back together -- is impossible.The main problem is that you would need a "supersystem," or external force, to manipulate the particle's quantum waves at every point. But, the researchers note, the timeline required for this supersystem to spontaneously appear and properly manipulate the quantum waves would extend longer than that of the universe itself.

Undeterred, the team set out to determine how this complexity might be overcome, at least in principle. Their algorithm simulated an electron scattering by a two-level quantum system, "impersonated" by a quantum computer qubit -- the basic unit of quantum information -- and its related evolution in time. The electron goes from a localized, or "seen," state, to a scattered one. Then the algorithm throws the process in reverse, and the particle returns to its initial state -- in other words, it moves back in time, if only by a tiny fraction of a second.

Given that quantum mechanics is governed by probability rather than certainty, the odds for achieving this time-travel feat were pretty good: The algorithm delivered the same result 85 percent of the time in a two-qubit quantum computer. "We did what was considered impossible before," said Argonne senior scientist Valerii Vinokur, who led the research. The result deepens our understanding of how the second law of thermodynamics -- that a system will always move from order to entropy and not the other way around -- acts in the quantum world. The researchers demonstrated in previous work that, by teleporting information, a local violation of the second law was possible in a quantum system separated into remote parts that could balance each other out.

"The results also give a nod to the idea that irreversibility results from measurement, highlighting the role that the concept of "measurement" plays in the very foundation of quantum physics," said article coauthor Gordey Lesovik of the Moscow Institute of Physics and Technology.This is the same notion Austrian physicist Erwin Schrödinger captured with his famous thought experiment, in which a cat sealed in a box might remain both dead and alive until its status is monitored somehow. The researchers suspended their particle in this superposition, or form of quantum limbo, by limiting their measurements.

"This was the essential part of our algorithm," Vinokur said. "We measured the state of the system in the very beginning and at the very end, but did not interfere in the middle."

The finding may eventually enable better methods of error correction on quantum computers, where accumulated glitches generate heat and beget new ones. A quantum computer able to effectively jump back and clean up errors as it works could operate far more efficiently.

"At this moment, it's very hard to imagine all the implications this can have," Vinokur said. "I am optimistic, and I believe that it will be many."

The study also raises the question: can the researchers now figure out a way to make older folks young again? "Maybe," Vinokur jokes, "with the proper funding. " The work was done by international team including researchers from the Moscow Institute of Physics and Technology (Gordey Lesovik, Andrey Lebedev, Mikhail Suslov), ETH Zurich (Andrey Lebedev) and Argonne National Laboratory, U.S. (Valerii Vinokur, Ivan Sadovskyy). Funding for this research was provided by the DOE Office of Science and Strategic Partnership Projects (Swiss National Foundation and the Foundation for the Advancement of Theoretical Physics "BASIS").

FUSHIA

Fuchsia is a little different from Android and Chrome OS in that it's not based on Linux. Instead, it's based on a new Google- developed kernel called Magenta. According to Google, Magenta is aimed at "modern phones and modern personal computers," so it wouldn't be surprising to one day see Fuchsia appear on our smartphones. Not only that, but Google has even added Apple's programming language, Swift, to the operating system — though we don't know why just yet. Because Fuchsia is written using the Flutter SDK, which runs on Android, chunks of Fuchsia can be run on an Android device. This version of Fuchsia appears to be called Armadillo, and it completely reimagines the home screen. The screen, according to testing by Ars Technica, is basically presented as a big scrolling list, with a profile picture, the date, your city, and a battery icon all placed at the center.

Above that, you'll find "Story" cards, or a list of recent apps. Below, you'll see a list of suggestions for you, which acts kind of like Google Now.You can also drag recent apps around and drop them where you choose to organize and personalize the home screen. If you drop one app on top of another, you'll enter a split-screen mode with up to three apps. According to Hacker News, Travis Geiselbrech, who worked on NewOS, BeOS, Danger, Palm's WebOS, and iOS, and Brian Swetland, who also worked on BeOS and Android, are involved in this project.

FLUTTER: What's the hype about?

Flutter is Google's open-source mobile application development SDK for crafting high-quality native applications for Android and iOS in record time.

With Flutter, Google open ups a new way to build fast, attractive mobile apps that helps developers to break away from "cookie cutter" apps.With the announcement of Flutter Release Preview 1, everyone wants to know what makes Flutter different, or the need to push all other native tools aside and focus on only one toolchain — the Flutter Platform and SDK from Google. What is new and exciting about Flutter? Why Flutter? It's a fair question, and this article is about to answer it from a technical viewpoint — not just what is exciting, but why. Flutter is a cross-platform framework designed to address both the Android and iOS platforms. It's based on Google's own Dart programming language with a rendering engine based on the Skia Graphics Library, the same thing Chrome uses to draw pixels on a screen.

There's an IntelliJ IDE for Flutter, just like Google has with Android Studio. Google is also using Flutter in its upcoming Fuchsia OS.

Some Interesting facts:

•The first computer mouse was made with wood in 1964 by Doug Engelbart.

• 30,000 websites are hacked every day.

• The Dirty Dozen was the name of a 12 engineer's group who developed the first IBM computer.

• In 1939, the first electro mechanical computer was made/developed.

• ENIAC was the first electronic computer which was weighed around 27 tons and it's taken up space around 1800sf (square feet).

• In 1979, the first of first hard disk/drive was made to store the user's data and it could hold only data under 5MB.

• Microsoft Windows, this is not an original name, the first original name was 'Interface manager' which was changed later.

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