

TECHNOLOGY ► MILITARY ► NAVY

## The Navy's version of a Roomba inspects billion-dollar ships for damage

The machine from Gecko Robotics cruises along on magnetic wheels, gathering data about the hull as it goes.

BY KELSEY D. ATHERTON

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The critter is on the hull. Gecko Robotics

On March 27, Gecko Robotics announced its hull-inspecting robots will be used to assess a US Navy destroyer and an amphibious assault ship, expanding work already done to inspect Navy ships. These robots map surfaces as they climb them, creating useful and data-rich models to better help crews and maintainers find flaws and fix them. As the Navy looks to

climbers can guide present and future repairs, and help ensure more ships are seaworthy for more time.

Getting ships into the sea means making sure they're seaworthy, and it's as important to naval operations as ensuring the crew is fed and the supplies are stocked. Maintenance can be time-intensive, and the Navy already has a backlog of work that needs to be done on the over 280 ships it has. Part of getting that maintenance right, and ensuring the effort is spent where it needs to be, is identifying the specific parts of a ship worn down by time at sea.

Enter a robotic critter called Gecko.

"The Navy found that using Gecko achieved incredible time savings and improvement in data quantity and quality. Before Gecko, the Navy's inspection process produced 6,000 data points. Gecko provides significantly more coverage by collecting over 3.3 million data points for the hull and over 463,000 data points for the outboard side of the starboard rudder," Ed Bryner, director of engineering at Gecko Robotics, tells Popular Science via email

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Those data points are collected by a hull-climbing robot. Gecko makes several varieties of the Toka robot, and the Navy inspections use the Toka 4. This machine can crawl over 30 feet a minute, recording details of the hull as it goes.

"It is a versatile, multi-function robot designed initially to help hundreds of commercial customers in the power, manufacturing and oil and gas industries. It utilizes advanced sensors, cameras, and ultrasonics to detect potential defects and damages in flight decks, hulls and rudders," says Bryner.

To climb the walls, the Toka uses wheels with neodymium permanent rare earth magnets that work on the carbon steel of the ship's hull. The sensors are used to detect how thick walls are, if there is pitting or other degradation in the walls, and then to plot a map of all that damage. This is done with computers on-board the robot as it works, and then also processed in the cloud, through a service offered in Gecko's Cantilever Platform.

"The millions of data points collected by the Toka 4 are used to build a high-fidelity digital twin to detect damage, automatically build repair plans, forecast service life and ensure structural integrity," says Bryner.

A digital twin is a model and map based on the scanned information. Working on that model, maintainers can see where the ship may have deteriorated—perhaps a storm with greater force or a gritty patch of ocean that pockmarked the hull in real but hard to see ways. This model can guide repairs at port, and then it can also serve as a reference tool for maintainers when the ship returns after a deployment. Having a record of previous stress can guide repairs and work, and over time build a portrait of what kinds of degradation happen where.

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than replacing large swaths of a flight deck, for example), track their physical assets over time to identify trends and patterns, prioritize and build repair plans, deploy repair budgets efficiently, and make detailed maintenance plans for the service life of the asset," says Bryner.

The robot is a tool for guiding repairs, operated by one or two people while it inspects and maps. This map then guides maintenance to where it is most needed, and in turn shapes maintenance that comes after. It's a way of modernizing the slow but important work of keeping ships ship-shape.

So far, [reports Breaking Defense](#), Gecko's system has scanned six ships, with two more announced this week. Deck maintenance is a dull duty, but it's vital that it be done, and done well. In moments of action, everyone on a ship needs to know they can trust the vessel they are standing on to work as intended. Finding and fixing hidden flaws, or bolstering weaker areas before going back out to sea, ensures that the routine parts of ship operation can operate as expected.

Watch a video of the robot below:





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Kelsey D. Atherton is a military technology journalist who has contributed to *Popular Science* since 2013. He covers uncrewed robotics and other drones, communications systems, the nuclear enterprise, and the technologies that go into planning, waging, and mitigating war. Kelsey lives in Albuquerque, New Mexico, with his spouse, beloved pets, and ample sunshine...



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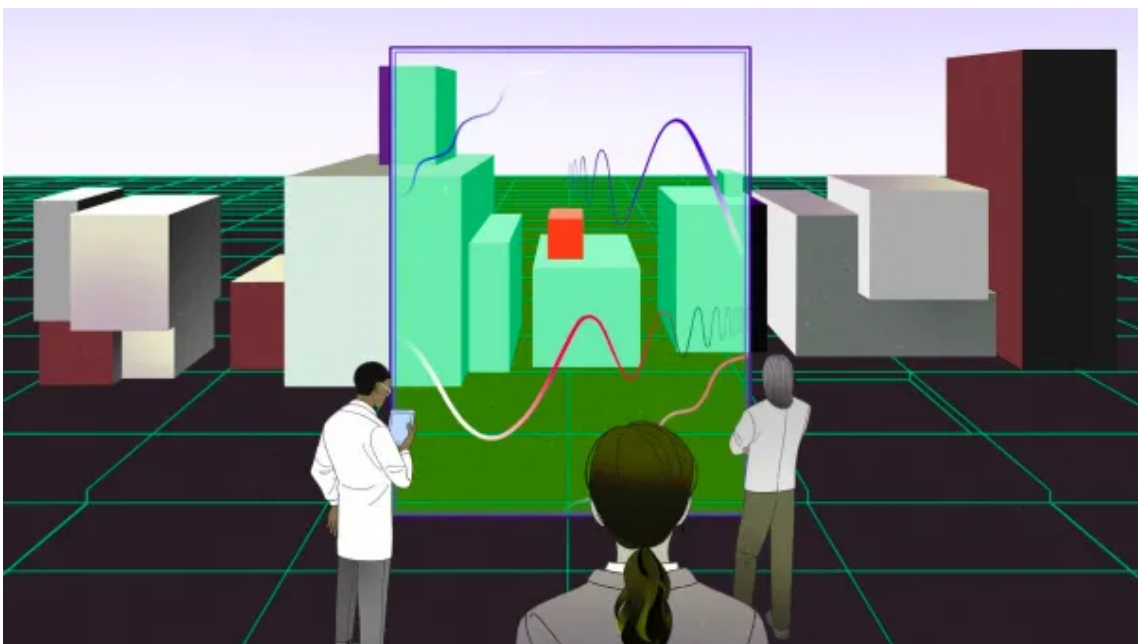


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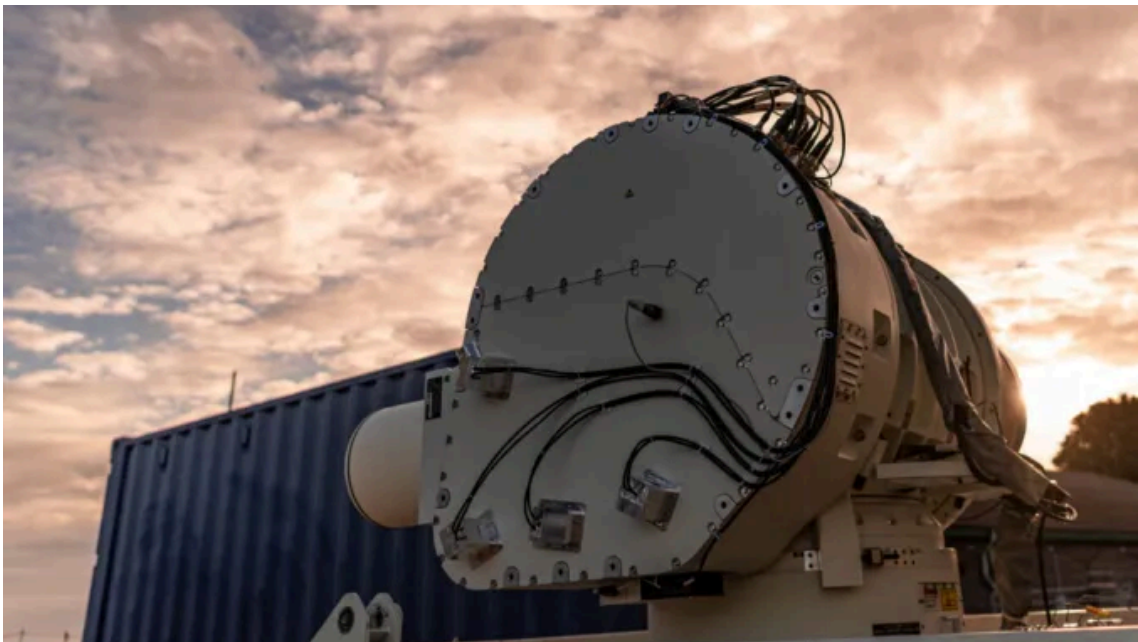
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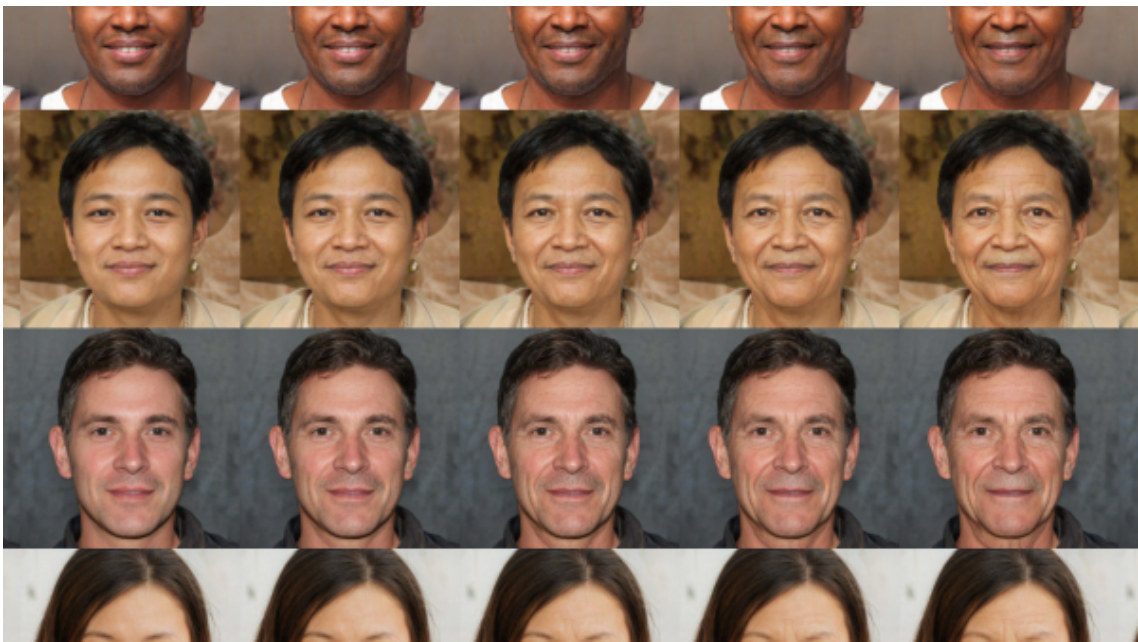


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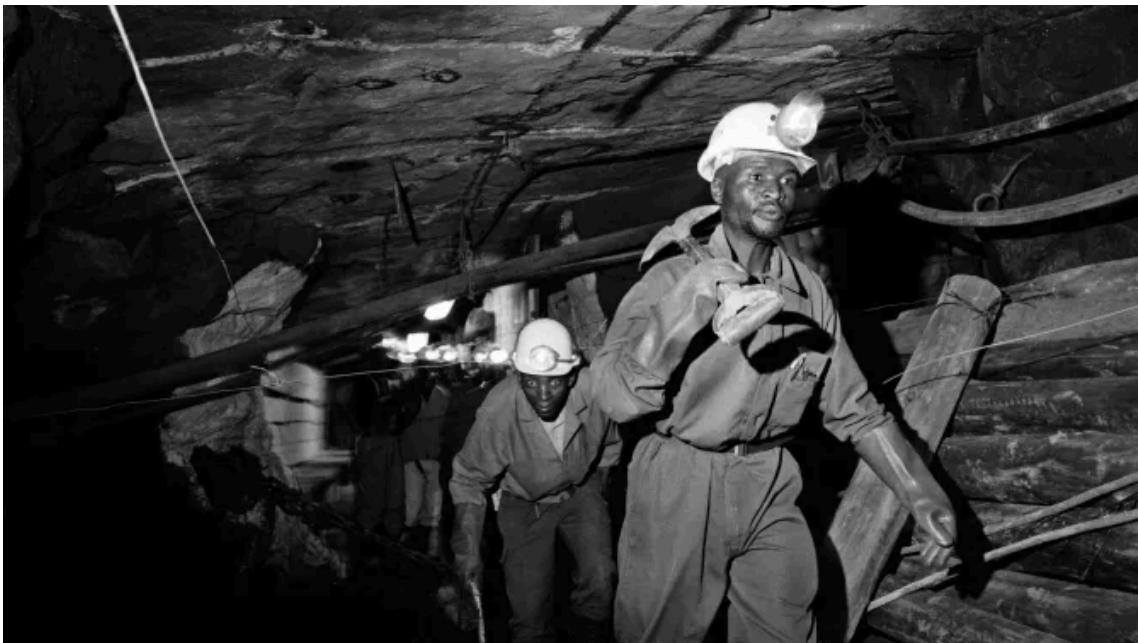
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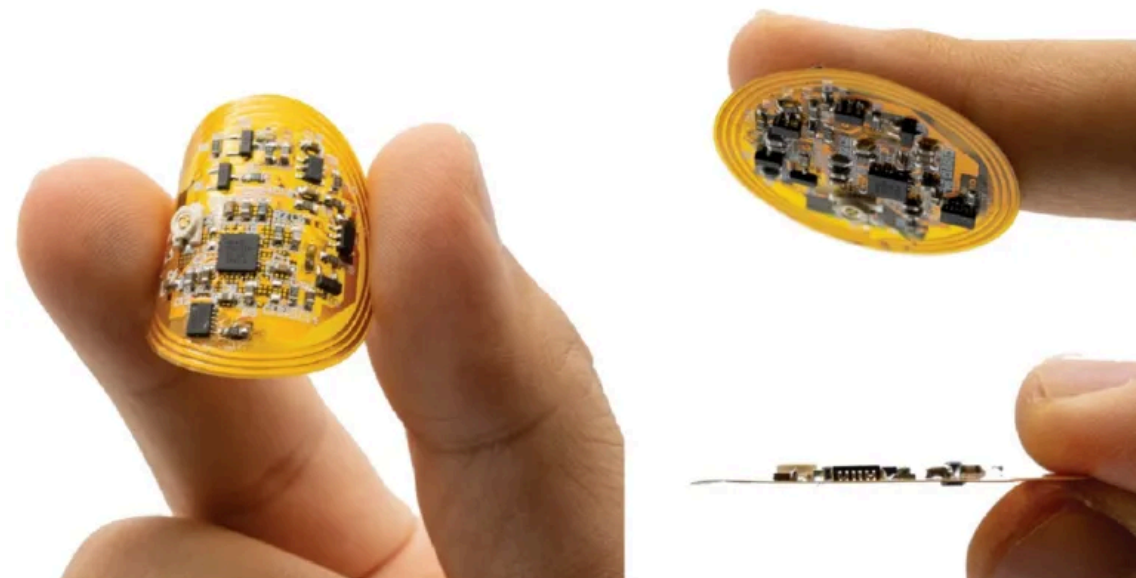


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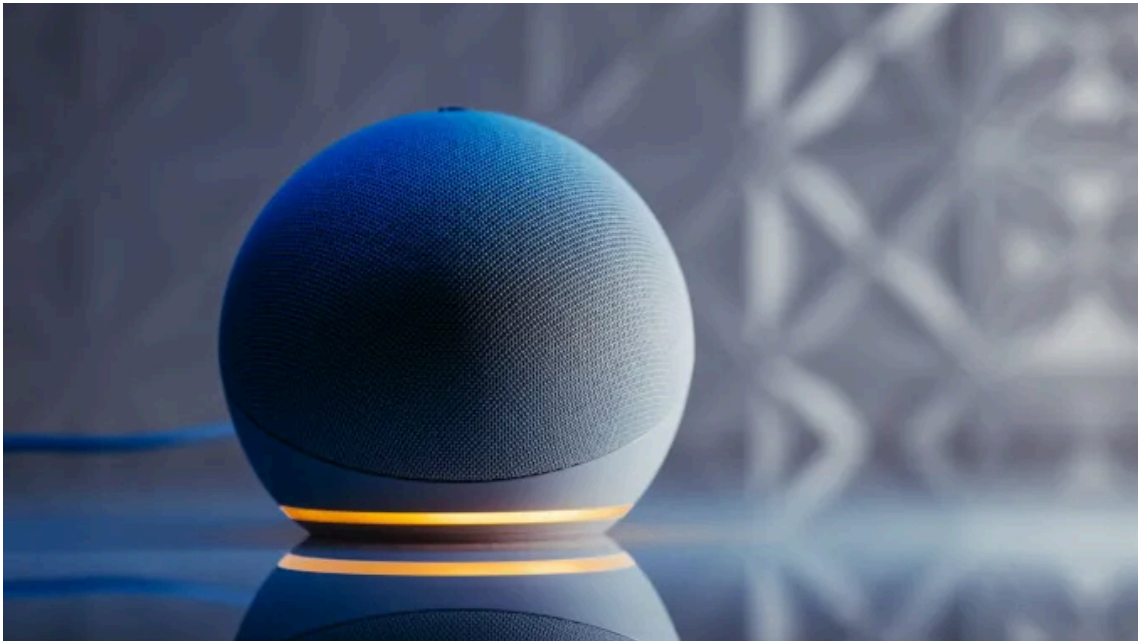
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