INSPIRED BY NATURE

Check out four inventions modeled after animals

How do you find water in the driest deserts? Or explore the ocean's depths? Questions like these have stumped the world's smartest engineers. But they're no match for Mother Nature.

Millions of years of *evolution*—small changes in a species between generations that can lead to big changes over time—have created organisms with amazing abilities. Read on to learn about four inventions that borrowed from nature's most brilliant adaptations. —*Stephanie Warren Drimmer*

ROBOT CRAB

In photos, the deep sea often looks calm and peaceful. But tidal currents sweep over parts of the ocean floor like rushing rivers. These fast-moving waters are dangerous for divers and can be strong enough to push heavy submersibles off course.

Crabs, however, are experts at dealing with the perils of the deep sea. "They constantly adjust their bodies to endure the currents and waves," says Bong-Huan Jun, an engineer at the Korea Research Institute of Ships & Ocean Engineering. He helped create the Crabster CR200, a car-size robot designed to take on seafloor currents as easily as the real-life crabs it was modeled after.

Crabster scuttles along the bottom of the ocean, using its six legs and 30 joints to shift its body and stay stable. The robot has 11 onboard cameras, including an *acoustic* one that can create a visual map of the seafloor in murky conditions by using sound. Crabster can survey the seafloor, respond to oil spills, and assist with search operations.

This past May, it helped with the rescue effort after a ferry carrying 476 people—mostly high school students—capsized off the coast of South Korea. Nearly 300 people died. Jun and his team remotely guided Crabster through rough seas to map the wreck site. Their maps helped point rescue divers in the right direction.

GRAHAM MURDOCH (CRABSTER)

WATCH A VIDEO ABOUT THE CRABSTER

CLICK FOR 4 BONUS SKILLS SHEETS

Turn the page for more animal-inspired tech!

THIRSTY BUG: Once enough water collects on the back of a Namib Desert beetle, it will drink it.

WATER CATCHER

The Namib Desert on Africa's southwest coast is one of the driest places on Earth. Parts of it get only 2 millimeters (0.08 inches) of rain each year. Still, the Namib Desert beetle manages to get all the water it needs by catching ocean fog that rolls over the desert each morning.

The beetle's back is rough and covered in ridges. Microscopic water droplets from the fog gather on its textured back. Once the droplets grow large enough, they roll down the thirsty beetle's back and into its mouth.

Constantine Megaridis, an engineer at the University of Illinois at Chicago, is working on creating textured surfaces that mimic the beetle's back—and could revolutionize the way people gather water.

Some people already use fog nets (*pictured at left*) to collect water droplets from the air in places where water is scarce. Megaridis's textured coatings could be applied to inexpensive fabrics to create a more efficient netting. That could help the world's 780 million people who lack drinking water. Megaridis says, "We try to figure out what nature has done over millions of years, and then use that to improve technology."

DRIP, DROP: Megaridis's work could revolutionize how fog nets, below, capture water.

SOLVIN ZANKL/NATURE PICTURE LIBRARY/CORBIS (BEETLE); FOGQUEST (WATER NET, NET CONSTRUCTION)

SNAKEBOT

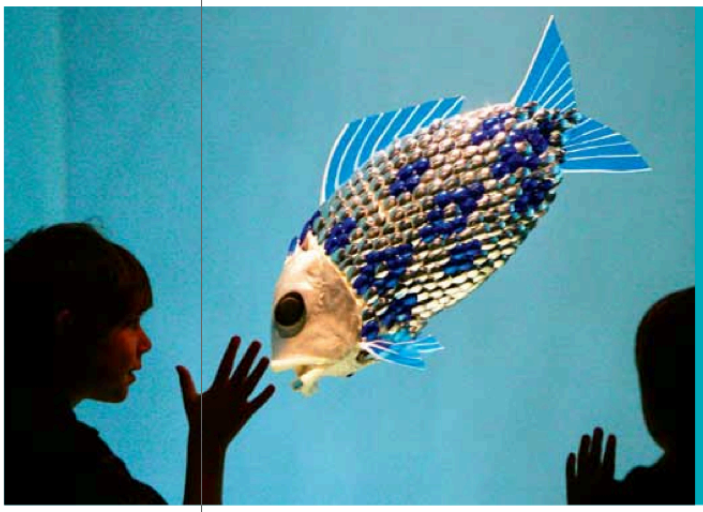
Robots with legs or wheels can get stuck in rough terrain. But a snake-shaped bot could slither through bushes, swim in rivers, climb trees, and cross deserts—just like live snakes do.

Howie Choset, a roboticist at Carnegie Mellon University in Pittsburgh, Pennsylvania, spent years working on a snake-inspired robot. But his design had a problem: It couldn't climb sandy hills.

Many real-life snakes have trouble with sandy slopes too. But not the sidewinder, a snake found in desert regions. Sidewinders scale sand dunes with ease.

To find out how sidewinders do it, Daniel Goldman, a physicist at the Georgia Institute of Technology in Atlanta, used high-speed cameras to watch the snakes climb sandy inclines. He found that on a slope, they adjust their motion to maximize how much of their body touches the ground. The extra *surface area* making contact with the sand helps the snake scale the dune without sliding.

Choset used Goldman's findings to update his robot. It now mimics the sidewinder's motion. His snakebot could someday use its improved slithering skills to squeeze inside collapsed buildings and find trapped victims, or to explore pyramids and other tombs.



ROBO-FISH

It looks like a fish and moves like a fish, but don't be fooled. The swimming machine at left was created to patrol the seas for pollution.

Luke Speller manages the European research team that created the 1.5-meter (5-foot)-long Robo-fish. "Let's say someone is dumping chemicals or there's a toxic leak," he says. "We can get to it straightaway, find out what is causing the problem, and put a stop to it."

The swimming robot uses sensors to analyze the surrounding water. If it finds pollutants, it instantly reports the information to a base station. This cuts the time it takes to locate and test for pollution "from weeks to just a few seconds," says Speller.

CORE QUESTION

How can understanding animal biology help engineers solve technological problems?

COURTESY OF HOWIE CHOSET/ROBOTICS INSTITUTE, CARNEGIE MELLON (SNAKEBOT); ADRIAN DENNIS/AFP/GETTY IMAGES (ROBOFISH)