

Robot Zoo



Engineers look to wildlife when designing some of the latest gadgets

A world roamed by robotic animals might sound like a science-fiction movie that takes place in the distant future. But actually, things like bionic bugs and mechanical mammals are a reality right now. Scientists are using an engineering concept called **biomimicry** to make technology inspired by nature.

Biomimicry means to imitate, or copy, life. “It’s about learning something from the genius of nature’s designs,” says biologist Janine Benyus. Throughout Earth’s history, “nature has learned what works and what lasts.”

Here’s a close-up look at five of the latest devices inspired by birds, bugs, and beasts.

—Rachelle Burk

FOTOSTATION/FESTO AG & CO. KG (ELEPHANT); AERONAVIGATION INC./REX/REX USA (ROBOT); ISTOCKPHOTO.COM (HUMMINGBIRD)

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Bionic Trunk

An elephant's trunk contains about 40,000 muscles. It's so flexible that it can pick up a single grain of rice! It's no wonder that when German company Festo wanted to make a bendable robotic arm, it modeled the arm on an elephant's snout.

Many robotic arms are made of heavy, rigid metal. But Festo's robotic arm is made of a lightweight material. It has three rows of motors that use pumps to turn air pressure into movement. When one row of motors contracts, the others stretch. That causes the arm to bend.

The end of the flexible "trunk" has a three-fingered gripper. The inventors of the robotic trunk think it could help people working in factories or hospitals by holding and moving objects. It could also lend a hand to people with special needs.



Spy Birds

You think you're looking at a hummingbird in flight. But what you're seeing is actually a miniature spy craft!

Hummingbirds are known for fancy flying tricks, like hovering in place. So engineers at the U.S. Department of Defense copied their body plan when constructing a remote-controlled spy robot.

The flying bot has a 16.5 centimeter (6.5 inch) wingspan and weighs less than an AA battery.

That's about the size of an actual hummingbird. At speeds of up to 18 kilometers (11 miles) per hour, it can quietly zip into a building or over a battlefield. Then it can beam live video to its operators through a built-in camera.



Hummingbird



Bee Bot

What buzzes around flowers but doesn't sting? The Robobee—an insect-size robot that could one day help farmers.

Many farmers depend on bees to **pollinate** their crops. But over the past several years, a mysterious disease has been wiping out bee colonies. Scientists at Harvard University hope to help by creating robotic colonies that could pollinate crops instead.

They have built a mechanical bee that copies the flying pattern of a real bee. Right now, it can run only while connected to a power source. Plus, engineers must use a computer to control the bot. But lead scientist Robert Wood says the team is developing **fuel cells** and a tiny computer “brain” that would allow the Robobee to fly on its own.



Bee

words to know

biomimicry—to imitate or copy nature to develop new technologies or solve problems

pollinate—to carry pollen from one flower to another to help plants reproduce

fuel cell—a device that creates electricity through a chemical process that combines hydrogen and oxygen

sensor—an electronic device that detects, or senses, a signal



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All-Purpose Crawler

Salamanders look like lizards, but they often live both in water and on land, like frogs. Engineers at a university in Switzerland wanted a bot that does this type of double-duty. They created a robotic salamander that swims, crawls, and walks.

The robot's spine contains a network of computer chips. Scientists send commands to the network. This controls the bot's movement, speed, and direction.

Researchers hope the robot will help them learn more about how our spinal cord decodes signals from the brain for controlling muscles. The bot itself could also be used to search for missing people after disasters, like floods or mudslides.



Salamander

Robo Fish

It looks like a fish and moves like a fish, but don't be fooled. The swimming machine below 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," says Speller. "We can get to it straight away, 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.



Fish

