

'Jellyfish aircraft' takes flight (w/ Videos)

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Inspired by nature and by the aviation pioneers of the early 20th century, scientists in the United States said Wednesday they had built the world's first jellyfish aircraft.

The tiny, ultra-light lab machine, weighing just 2.1 grammes (0.07 ounces), is the first man-made flying object to hover and move with a motion like that of the [jellyfish](#) in water, the inventors believe.

"We were interested first of all in making a robotic insect that would be

an alternative to the helicopter," said Leif Ristroph, who works alongside Stephen Childress at New York University's Applied Math Lab.

"Our interest ended up being a little bit weird—it was the jellyfish."

The jellyfish has long been admired by engineers for a simple yet efficient motion, sculpted by millions of years of evolution, that requires just a simple muscle and no brain power, just a primitive nervous system.

It has a bell-like translucent skirt that first billows out and then closes tightly, squirting water out from the small opening to provide itself with movement.

In this case, the aircraft uses four petal-shaped wings, each eight centimetres (four inches) long, that when folded together form a downward-facing "cone."

A tiny motor, attached to a crankshaft, causes the wings to push outwards and then downwards, 20 times a second, forcing out air through the bottom of the cone.

The result is an "ornithopter," or flying machine that hovers with great stability, without the need for constant, energy-draining correction.

"If it's knocked over, it stabilises by itself," Ristroph said in a phone interview with AFP.

The craft can change direction by making one of the four wings work harder than the others.

Pioneers of flight

The materials to make the machine are all over-the-counter components—light carbon-fibre ribs to hold the motor and provide the frames of the wings, which are covered by transparent Mylar film—bought at ordinary modelling stores.

Ristroph said he and Childress had been intrigued by film footage of aviation pioneers who had tried to mimick insects to build ornithopters, but lacked the knowledge or materials at the time.

"We were inspired in part by videos from the 1900s, in the early experimental days of flying. They were very creative in those days, they had lots of very good ideas, but also some bad ones," he said.

In its present state, the jellyfish aircraft is a "proof-of-concept" device aimed at testing that the idea works. New York University has already filed a patent, said Ristroph.

The next step will be to add a battery—the prototype is powered by a fine electrical wire—and remote control.

The invention is reported in the *Journal of the Royal Society Interface*, published by the Royal Society, Britain's de-facto academy of sciences.

A lot of work is needed on manoeuverability and energy efficiency, but ultimately, perhaps not too many years down the road, flapping unmanned aircraft could be a common sight, Ristroph hoped.

"There's definitely some military use for things like this, such as in surveillance, but I hope that it has a civilian outlet too," said Ristroph.

"I can imagine a cluster of a hundred of these being thrown out and fanning out across in a city to monitor air pollution."

The feather-weight craft still needs an official name.

"We usually call it our flying jellyfish," said Ristroph. "But the name AeroJelly would be cool!"

More information: Stable hovering of a jellyfish-like flying machine, *Journal of the Royal Society Interface*, [rsif.royalsocietypublishing.or...
.1098/rsif.2013.0992](https://royalsocietypublishing.org/doi/10.1098/rsif.2013.0992)

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