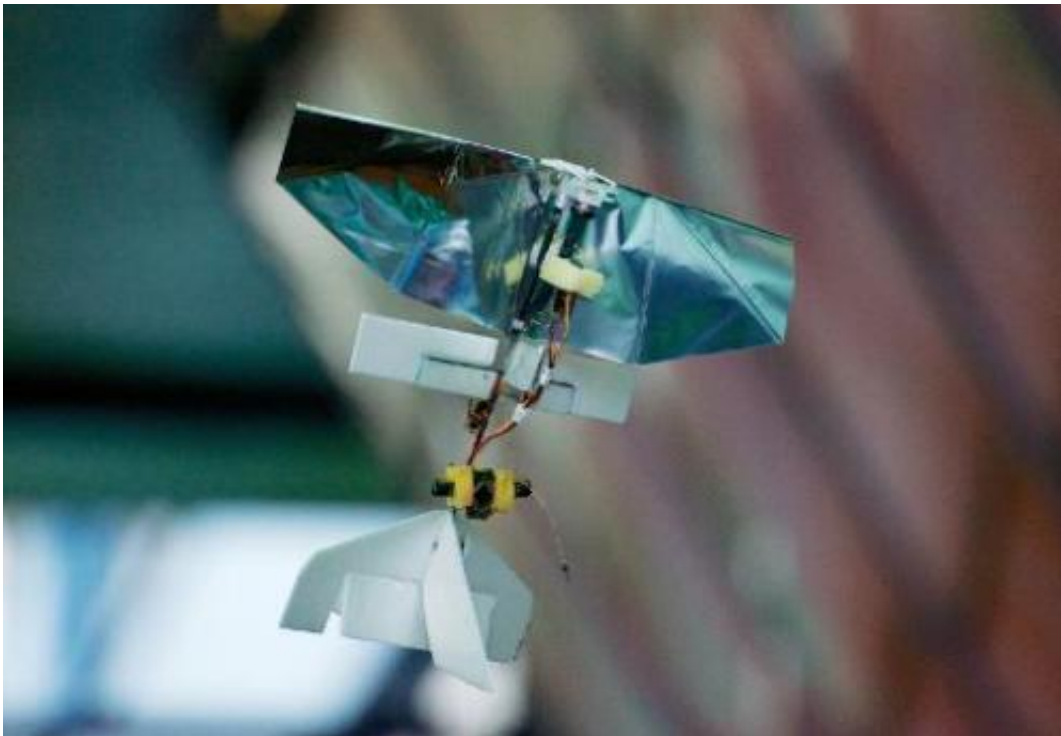


Dutch scientists flap to the future with 'insect' drone

February 23 2014, by Jan Hennop



A view of the DelFly Explorer, the world's lightest autonomous flapping drone, during a demonstration at the Delft Technical University, on January 29, 2014

Dutch scientists have developed the world's smallest autonomous flapping drone, a dragonfly-like beast with 3-D vision that could revolutionise our experience of everything from pop concerts to farming.

"This is the DelFly Explorer, the world's smallest [drone](#) with flapping wings that's able to fly around by itself and avoid obstacles," its proud developer Guido de Croon of the Delft Technical University told AFP.

Weighing just 20 grammes (less than an ounce), around the same as four sheets of printer paper, the robot dragonfly could be used in situations where much heavier quadcopters with spinning blades would be hazardous, such as flying over the audience to film a concert or sport event.

The Explorer looks like a large dragonfly or grasshopper as it flitters about the room, using two tiny low-resolution video cameras—reproducing the 3-D vision of human eyes—and an on-board computer to take in its surroundings and avoid crashing into things.

And like an insect, the drone which has a wingspan of 28 centimetres (11 inches), would feel at home flying around plants.

"It can for instance also be used to fly around and detect ripe fruit in greenhouses," De Croon said, with an eye on the Netherlands' vast indoor fruit-growing business.

"Or imagine, for the first time there could be an autonomous flying fairy in a theme park," he said.

'Real small insects'

Unlike other drones that use rotor blades and can weigh hundreds of times as much, the Explorer has two wings on each side that flap rapidly to create lift.

"We got our inspiration from real small [insects](#)," De Croon said.



Chief Developer Guido de Croon releases the Delfly Explorer, the world's lightest autonomous flapping drone, during a demonstration at the Delft Technical University, on January 29, 2014

While smaller "flapping" drones exist, such as the RoboBee developed by students at Harvard University in the United States, they are tethered for power, control and processing, and thus far from autonomous.

The Explorer has its own small lithium polymer battery that allows it to fly for around nine minutes, while it "sees" with its onboard processor and a specially-developed algorithm to make instant decisions.

It has wireless analog video, gyroscopes and a barometer to calculate its height.

Different algorithms would allow it to perform different tasks, and

because it is autonomous it could be sent into enclosed spaces such as concrete buildings or mine shafts, where radio control would be impossible, to search for casualties or hazards.

"The DelFly knows precisely where obstacles are located," said De Croon as the aircraft, built from composite materials including carbon fibre, fluttered towards a wall during a demonstration flight before veering elegantly away in search of another route.

The idea of building a flapping-winged drone began around nine years ago when a group of students at Delft Technical University's prestigious aerospace faculty first designed the DelFly I.

Over the next few years, research continued and the machine became smaller and smaller, said Sjoerd Tijmons, 28, who helped write the algorithm for the latest DelFly Explorer's "brain".

An earlier incarnation, the DelFly Micro with a wingspan of 10 centimetres, was in 2008 declared the "smallest camera equipped aircraft in the world" by the Guinness Book of Records.

But De Croon admits that humans are not quite able to produce swarms of autonomous robotic insects the size of bees or flies, mainly because of restrictions on battery life.

"Still there are some major challenges... and if I have to put a number on it, I think we are still a few decades away," he laughed.

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