A little hexacopter shows off acrobatic moves

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Watching the little machine in action is like watching some proud circus performer vie for full audience attention in making athletic moves on wires and swings. This machine though shows what is humanly possible in making drones move in more agile ways.

This is the Voliro drone, an omnidirectional hexacopter that signifies the team's mission.

"Multicopters are on the rise and redefine agility and maneuverability in the air. We want to take this further ...."

They are members of an interdisciplinary team of 11 college students from the Swiss Federal Institute of Technology (ETH Zürich) and Zurich University of the Arts (ZHdK). They focused on bringing forth this prototype for 9 months. Their fields include mechanical and electrical engineering at ETH, and they were at work with industrial design students from ZHdK.

The video notes said "Unlike standard multicopters, the position and the orientation are completely decoupled and can be steered independently. This is achieved by six additional tilting motors which allow the rotor units to turn around its axes."

Dani Deahl in *The Verge* remarked on this —with its individually tiltable axes—calling it "an acrobatic wonder drone."

It was developed to hover in any orientation. That is where it merits special attention.

Cliff Li, a mechanical engineering student who served as team leader on the project, told *Digital Trends* about the significance.

He said "multicopters are not unlimited in their flying capabilities. To hover, they have to stay horizontal, and to move they have to tilt. For the Voliro hexacopter this is not necessary. It can turn in midair, and move in any direction, no matter how it is oriented. It can fly vertically, upside down, or at any other angle, and proves that completely unrestricted flight is possible."

New Atlas remarked how "each of its six props can tilt a full 360 degrees, allowing a staggering 12 degrees of freedom in the air."

New Atlas said that its ability to hug walls "could be a huge advantage in infrastructure inspection jobs and the like."

Nonetheless, the project team so far wanted to show how this thing moves but its potential for application in real life is on their minds as they move forward.

"Li said that the project has been more about demonstrating that omnidirectional fight is feasible than focusing on use-cases, but these applications are things the team might focus on next."

Li in *Digital Trends* talked about potential use cases.

Modules attached on the underside of the hexacopter would bring on extra functionalities. Li said that "One example is a camera module. The hexacopter can act as a gimbal and therefore doesn't need one. It can also fly upside down and take footage of what is above the rotors, which is impossible for a regular multicopter with a gimbal. Another example is interaction with walls and various curved structures, as it can adapt its orientation to that of the surface."

They have items on a to-do list as they move forward. One of their ambitions is to develop intuitive user control—by that they mean to be able to control all 6 DOF's by moving your hand.

They are considering a large sphere in its center whereby it could roll omnidirectionally on the ground.

All in all, the team sees its value as expanding the potential of drones. "As it can fly vertically, it could also drive with a chassis on a wall and perform tasks like bridge inspection or creating paintings on the wall."