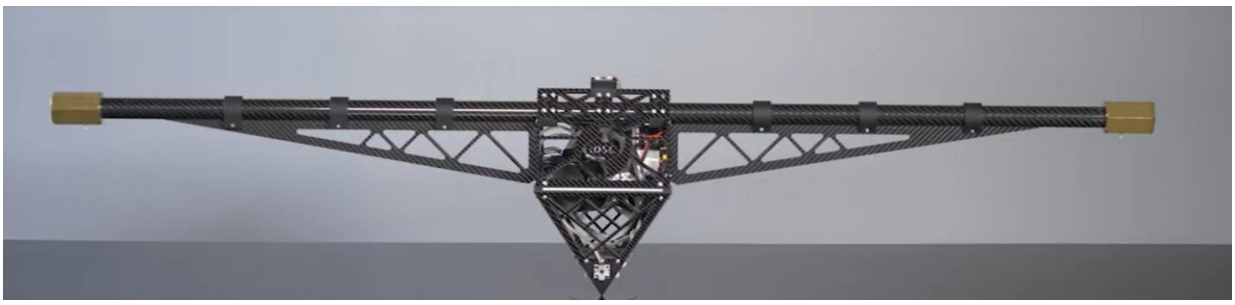
Video: New, cube-shaped robot with a single reaction wheel can compensate for external disturbances

March 3 2023, by Peter Rüegg



Credit: ETH Zurich

Robotics specialists from a group led by ETH professor Raffaello D'Andrea have created a new, cube-shaped robot that can balance on its pivot and compensate for external disturbances. What makes the One-Wheel Cubli unique? Unlike its predecessors, it only requires a single reaction wheel.

It was almost 10 years ago that researchers led by ETH robotics professor Raffaello D'Andrea made a splash with a robotic cube that was capable of balancing on its pivot. Multiple reaction wheels in the cube's interior were able to compensate for disturbances to a certain degree, making it harder to knock off balance. It was also able to jump up and move around via controlled falls.

Now it has a successor: the One-Wheel Cubli. That's the name D'Andrea's workshop gave to this new balancing artist. It only requires a single reaction wheel for its balancing act. Instead of additional wheels, it is equipped—like a tightrope walker—with a balancing pole. As a result, the inertias differ in the two directions of motion, allowing the One-Wheel Cubli to stabilize both directions simultaneously. In the latest issue of *Mechatronics*, the researchers introduce the One-Wheel Cubli.

More information: Matthias Hofer et al, The One-Wheel Cubli: A 3D inverted pendulum that can balance with a single reaction wheel, *Mechatronics* (2023). DOI: 10.1016/j.mechatronics.2023.102965

Provided by ETH Zurich