

Italy team cheers robot pulling a passenger plane

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HyQReal is 1,33 m long and 90 cm tall, and its weight is 130kg considering hydraulics and batteries onboard. The robot is protected by an aluminium roll cage and a skin made of Kevlar, glass fiber and plastic. Credit: IIT-Istituto Italiano di Tecnologia

This four-legged robot has pull—3 tons of it—and its engineers were proud to show it off on May 23 as rugged and powerful as it is.

HyQReal is a quadruped developed at the Italian Institute of Technology, and its team watched proudly as the [robot](#) pulled an airplane for over 10 meters (33 feet). This was a three-ton Piaggio P180 Avanti passenger airplane.

At ITT, the action is at the Dynamic Legged Systems [lab](#) where work has been going toward hydraulic quadrupeds for some time. Specifically, a big concern is for "accurate hydraulic force/torque control at the joint level."

The lab considers its "torque-controlled hydraulic quadruped" robot HyQReal as "our flagship platform." The video was released on May 23 from the Dynamic Legged Systems lab, showing the robot with hydraulics and batteries onboard, plus

two computers, one for vision, the other for control, pulling the plane—a small-passenger Piaggio P180 [Avanti](#).

The features were [tested](#) at Genoa Airport, with the support of Piaggio Aerospace.

The plane weighs 3,300kg (7,275.255 pounds, 3.6376275 tons). Now here are the far smaller numbers on this robot.

HyQReal is 90cm (2.95 feet) tall, and its weight is 130kg (286.6 pounds). The robot has an aluminium roll cage and a skin made of Kevlar, glass fiber and plastic. The feet have special rubber for high traction on the ground.

There is a 48 Volt battery; four electric motors are connected to four hydraulic pumps.

IIT partnered with Moog on the hydraulics and Claudio Semini, project leader and coordinator of IIT's Dynamic Legged Systems lab, told *Digital Trends* that "IIT's software can optimize the robot posture, balance, and the ground-reaction forces to increase the pulling force and the [traction](#)."



HyQReal has been tested in Genova Airport, in Genoa (Italy), with the support of Piaggio Aerospace. HyQReal was able to pull a small passenger airplane (Piaggio P180 Avanti), 3300 kg weight, 14.4 m long, with a wingspan of 14 m. Credit: IIT-Istituto Italiano di

The robot would in the real world support relief efforts in disaster-hit areas without putting human lives at risk. ("Since the actuators are mostly sealed up, HyQReal is water- and dust-resistant, able to keep [moving](#) while being sprayed with water or having sand dumped all over it," said Evan Ackerman in *IEEE Spectrum*.)

"The battery (which weighs 15kg) [33 lbs] should be good for about two hours," said Ackerman, "although IIT hasn't yet done endurance testing."

In fact, the "not yet" helps to describe what's next. "The long-term goal of the project is to create the hardware, software and algorithms for robust quadruped vehicles for [rough terrain](#) that can be tailored to a variety of applications, such as disaster response, agriculture, decommissioning, and inspection," said the news release.

"It's still very much a research robot at the moment," said Ackerman. Actually, Ackerman took care to point out that this robot is to undergo further testing.

"At the ICRA workshop, we saw some brief video of the robot trotting, as well as lying down and standing up again. We're told that it should be able to autonomously recover after it falls, but IIT hasn't had time to test that either. HyQReal is very, very new, so there's a lot of stuff that the researchers simply haven't had a chance to figure out yet."

More information: dls.iit.it/robots1/hyqreal
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