

Deep-sea diver hand offers freedom and feedback

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Bodyskins and goggles are hardly the solution for divers who need to reach extreme depths. The Atmospheric Dive Suit (ADS) gives them the protection they need. Recently, *The Economist* detailed a technology advance that, for ADS-clad divers, will provide improved hand functions enabling better task performance than with prehensors. This is a remotely operated robotic hand, noted *Popular Science*, which, while resembling the human hand on the outside, is a complex arrangement of [actuators](#) and robotic mechanisms adapted to the pressures of the deep.

The hand creators are Massachusetts-based Vishwa Robotics, which describes the Vishwa Extensor as an anthropomorphic robotic hand for deep-sea applications. The Extensor has two fingers and a thumb. How human-like are the Extensor's capabilities? The hand does more than open and shut. "The thumb can touch each of the fingertips, for example. Like the human hand, the Vishwa hand has four 'degrees of freedom' in each finger—it can move in the three dimensions of space, and curl up—and five in the thumb, which can also rotate from a flat to a grasping position," said The Economist.

The interface gives force feedback; objects can be grasped gently or firmly. "The operator can use a wrench or pick up a nut and attach it to a bolt, fiendishly difficult with prehensors," said Popular Science. The company's roots involve research engineers and scientists who were trained in organizations including NASA and MIT. The [hand](#), according to The Economist, was developed for the U.S.Navy.

The significance of the Vishwa Extensor is its potential as a valuable support for those wearing the ADS and assigned to tasks such as underwater welding or operating chipping hammers quicker and safer, said PopSci. Also, "In marine archaeology and biology, the delicate handling of the Vishwa Extensor is a big step forward. At the moment it is impossible to pick up fragile sea creatures from the ocean floor."

Moving forward, the Vishwa Extensor will undergo underwater tests in a test tank over the next few months before deep-water testing.

Earlier this week, meanwhile, John Markoff reported on scientific advances in deep diving suits, in *The New York Times*, writing about a lightweight suit that is "Part robot and part submarine," the Exosuit. He said that Nuytco has made similar diving suits for rescue operations for many of the world's navies. The suits are virtually weightless [underwater](#); a version developed for the United States Office of Naval Research will

allow divers to swim with flippers for long periods at great depths.

More information: vishwarobotics.com/

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