

## Lateral Lines Study May Help Develop More Sophisticated Robots

**A study of the lateral line could help develop more sophisticated robots that will maneuver in underwater caves and deep-sea volcanoes that humans cannot explore.**

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The lateral line is visible on this discus (*Symphysodon* sp.), beginning just behind the fish's eye. The physics department at Technische Universitaet Muenchen in Germany has been researching the lateral lines of fish and some amphibians to perhaps improve future robots. The use of the lateral line could help robots make their way through crowds of people or maneuver in underwater caves and deep-sea volcanoes that humans cannot explore.

A fish's lateral line, an organ on the left and right sides of the fish's body that also surrounds its eyes and mouth, helps the fish sense its surroundings. Made up of tiny gelatinous neuromasts and hair cells similar to the cells in the human inner ear, the lateral line helps the fish sense changes in currents and water disturbances, and provides backup for eyesight when water is dark or murky.

Professor Leo van Hemmen and his team at the university have been researching the lateral-line system so that it may one day be used for technology. They have been experimenting with mathematical models and electrical nerve signals. Professor van Hemmen says that "biological systems follow their own laws [that] can be described mathematically — once you find the right biophysical or biological concepts, and the right formula."

The team has discovered that when a fish uses its lateral line, it can accurately determine the location, size and shape of other fish. For example, a predator can determine whether a fish is big enough to be worth pursuing based on the information it receives from its lateral line. They have also discovered that the lateral line sensory organ is just as powerful as a fish's nervous system, proving that the lateral line is significant in a fish's perception of the world.

Professor van Hemmen says, "My dream is to endow robots with multiple sensory modalities. Instead of always building in more cameras, we should also along the way give them additional sensors for sound and touch." To accomplish this, the team is also studying infrared perception of desert snakes, vibration sensors in scorpions' feet and barn owls' hearing. ("Fishy Sixth Sense: Mathematical Keys to Fascinating Sense Organ." ScienceDaily.com.)