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ROBOT FISH CAN CHANGE BEHAVIOR OF REAL FISH

TELECOMMUNICATIONS

Researchers from Swiss university have developed a miniature aquatic robot that can influence the behavior of a school of real fish.

From a robot snake that can crawl through pipes to a tiny robot that can build molecules, robots are becoming ever more complex. Now, a research team at the Ecole Polytechnic Federale de Lausanne's Robotic Systems Laboratory (LSRO), headed by Professor Francesco Mondada, has developed a miniature robot zebrafish (*Danio rerio*) that is convincing enough to fool real zebrafish.

The team first determined the characteristics of the zebrafish, such as shape, color and acceleration speed, that would allow the robot to successfully integrate into the zebrafish school and influence their behavior. Armed with this information, the researchers built a seven-centimeter robot fish equipped with magnets that connect to a tiny engine installed under the aquarium. This arrangement allows the robot to move through the water without any tell-tale engine noise. The robot was also able to adapt its own behavior to learn how to communicate and move like a real fish. The robot fish's swimming mechanism improved the longer it spent with the real fish.

The team tested their robot in different aquariums and with different schools of zebrafish, and determined that the robot was accepted into the school as though it were a real fish. As the robot was also able to mimic the school's behavior, it could induce the school to change direction or swim from one specified part of the aquarium to another. The LSRO team had previously designed a robot cockroach which could interact with real cockroaches, but the fish robot proved much more complicated. To integrate an insect community, a robot only needs to emit the correct pheromones, but joining a community of vertebrates required the robot to mimic many more elements, such as

appearance, movement and vibration. What other applications might there be for a robot fish that can influence the behavior of real fish?