Technology

Robot fish set to be deployed to rescue sea life

By Anthony Cuthbertson in Singapore

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Just before dawn on 28 February 2015, hundreds of dead fish washed up on Singapore's north shore. They had been killed by a harmful algal bloom that eventually caused the deaths of more than 500 tonnes of local fish. Enter the robot fish.

Scientists in Singapore have created a bio-inspired robot packed with sensors that can be used to monitor pollutants and other environmental factors in oceans so that measures can be taken to avoid such catastrophic losses in the future. While the robo-fish won't be able to replace living fish, they will be able to save them.

Various forms of sea life, such as octopuses and stingrays, were used as the inspiration for different designs by researchers at the Singapore-MIT Alliance for Research and Technology (SMART), which each have numerous advantages over traditional robots.

"Stingrays are native to Southeast Asia," Pablo Valdivia Alvarado, a research scientist at SMART, told **IBTimes UK**. "By finding interesting ideas in nature, we can take the bits we like and extend the physics to adapt them to our engineering applications."

The autonomous robots form part of an emerging class of robots referred to as soft robotics. All of the electronics used to control and power them are encapsulated in a single silicon body that is both less expensive and more manoeuvrable than their traditional counterparts.

"By virtue of being simpler they're also cheaper," Alvarado said. "They're orders of magnitude cheaper. For the cost of one robot used for the same task, we could produce 10 or even 100 of ours.

"We can move like the real thing. Now we want to see if we can behave like the real thing in terms of energy consumption and lifespan."

What is soft robotics?

Soft robotics is a new field in robotic engineering that uses materials like silicon to create soft and flexible devices capable of behaving in a manner unlike traditional robots. Potential benefits include resilience, cost effectiveness and manoeuvrability.

Another issue soft robotic devices like those developed by Alvarado overcome is the lack of air bubbles within the inner components. This allows the robotic fish to travel to deeper

depths without being adversely affected by increasing pressure.

Current methods for keeping track of ocean waters involve either gathering data by hand and analysing it back at a laboratory, or using autonomous but limited traditional robots.

Mohamad Maliki Osman, Singapore's Minister of State for National Development, said that following the fish deaths significant measures need to be taken to avoid such severe losses in the future.

"Plankton bloom occurrences are very difficult to prevent, but it is possible to reduce the impact," Osman said. "Farmers [need] to take mitigating measures early."

Beyond mapping algal blooms, the robotic fish could be used to detect industrial leaks or within an academic setting, while Alvarado and his team at SMART are working on several other bio-inspired robots, including a sensor based on seal whiskers.

Discussions are underway with collaborators and ocean trials are expected to begin in Singapore later this year using a stingray-inspired robot.