

Aquatic robot audits health of seabed

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The aquatic robot was developed by University of Sydney experts.

The watery depths of Western Australia's Ningaloo coast will be audited by marine engineers and scientists this week using an aquatic robot and technology developed by University of Sydney mechatronic experts.

The innovative technology will assist scientists from the Australian Institute of Marine Science (AIMS) in detailed mapping of the seabed communities of Ningaloo Reef's <u>deeper waters</u>, which form part of Australia's Integrated Marine <u>Observing System</u> (IMOS).

An <u>Autonomous Underwater Vehicle</u> (AUV) will take up to 50,000 images in a day with its high resolution cameras and will also collect detailed multi-beam sonar and water-column measurements while



underway.

Nicknamed "Sirius", the AUV will dive to depths of 200m to conduct surveys and gather data on the complex ocean environs. Sirius is capable of creating detailed three dimensional models of the seafloor by using software systems and algorithms developed by robotics engineers at the University of Sydney's Australian Centre for Field Robotics (ACFR).

Sirius initially surveyed the world heritage listed area at Ningaloo five years ago. The data collected will provide scientists with unparalleled information on how our deep-sea communities may have been distributed, damaged or altered over time.

Associate Professor Stefan Williams, who will lead the <u>robotics team</u> from the University of Sydney, says the new images collected will be cross-referenced with those taken in 2007 and will give <u>marine biologists</u> from AIMS the first insights into changes over time on the deeper areas of seabed.

Professor Williams says that since the first visit ACFR engineers have advanced the functions of their AUV.

"We have developed Sirius to a point where it can return to the precise spot where it captured images five years ago. And unlike an underwater diver it can gather data from several kilometres of terrain in a single day.

"Also since our first survey we have developed algorithms that automate the analysis of the data we collect. The new technology groups the 3D images into categories of interest for marine scientists, for example, the machine vision algorithms can automatically identify groups of similar images representing different habitats such as coral, algae, kelp or sponge beds. This process helps our partners to identify patterns of biodiversity related to the areas being surveyed.



"Repeating the 2007 survey will help scientists assess changes in the Ningaloo underwater habitats over time, and perhaps help in predicting future changes in these areas."

The technology is now being used around the Australian coastline to gather information on changes to the underwater world.

"We have been invited by organisations across the globe to help with assessments of changes in marine habitats and to document previously unexplored environments. This has also led to opportunities to survey maritime archaeological sites, including submerged cities and ancient shipwrecks," says Professor Williams.

Dr. Andrew Heyward, Principal Research Scientist from AIMS, who is heading up research of Ningaloo Reef's deepwater communities said, "our trip will test the high spatial precision of the AUV, but based on its current performance the scientists believe this robot could become the tool of choice for revisiting areas that divers cannot easily reach."

Provided by University of Sydney

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