ADVANCED ROBOTIC MANIPULATION FOR

NAVAL FORCES

CASE STUDIES ON MILITARY ORGANISATIONS

REACH ROBOTICS

TETHYS ROBOTICS INTEGRATES ALPHA GRABBER FOR MILITARY EOD & SEARCH AND RESCUE

Tethys Robotics is an Unmanned Underwater Vehicle (UUV) developer founded by Christian Engler and fellow pioneering ETH Zurich students in 2019. Tethys aims to push boundaries for underwater exploration in Switzerland, where large waterways including lakes and rivers are abundant and contribute to the country's hydroelectric industry. They have found great success with development of 'Proteus', an omnidirectional ROV appointed with a stereo camera, depth sensor, IMU, SBL and sonar, certified to 300m depths.

Alongside research partners 'Armasuisse', an armament procurement agency affiliated with Switzerland's Federal Department of Defence, Tethys aims to produce UUVs for local authorities including the Swiss Explosive Ordnance Disposal (EOD) team.

The vehicles applications will include rescue diver assistance through robotic interaction, 3D mapping of the seabed, ammunition recovery and search and recovery of underwater targets. Their technology will minimise risk to rescue divers operating in harsh, unsafe conditions including high currents, turbulence, long dive durations and extreme temperatures.

To assist in achieving these goals, Tethys integrated the Reach Robotics Alpha Grabber to their Proteus UUV. The Alpha Grabber is a tough, versatile and proven solution for intervention in harsh subsea environments. It features adjustable grip force, active compliance for safe lifting of heavy, unbalanced objects and quick-change end effectors for mission specificity.

In their own words, Tethys describes their success with the manipulator:

Proteus UUV with Alpha Grabber submerging for a mission

> **"With the Reach Alpha Grabber, we are now able to interact with the environment and the divers underwater. The combination of reliability and robustness of the grabber with the precision and maneuverability of the UUV pushes the frontiers of underwater operations. Furthermore, due to the depth rating of the Reach Alpha, we have no restrictions to operate in any lake or river of Switzerland."**

At Reach Robotics, we're proud to be working with innovative ROV and UUV manufacturers globally to push the limits of underwater possibility.

Alongside Tethys, we are striving to support the Special Recovery and Military EOD communities develop mission specific technology and innovative robotic solutions.

Tethys conducts testing with their successful integration

REACH ROBOTICS SECURES AUSTRALIAN GOVERNMENT DEFENCE CONTRACT TO DEVELOP ADVANCED ROBOTIC CLEARANCE DIVER TECHNOLOGY

The Australian government has announced a $19 million investment in multiple companies for technology protecting Australian Defence Force members. As part of this, Reach Robotics Pty Ltd has been awarded $1.04 million to develop remote operation systems for underwater expeditions as part of this investment. The investment will allow the company to fast-track innovation on its world-first remote intervention manipulator systems. Ultimately, these systems will protect ADF members in the field.

Minister for Defence Industry Melissa Price announced the Defence Innovation Hub grants that demonstrate the Australian government's drive to invest in advanced Australian research and development to protect and sustain ADF personnel.

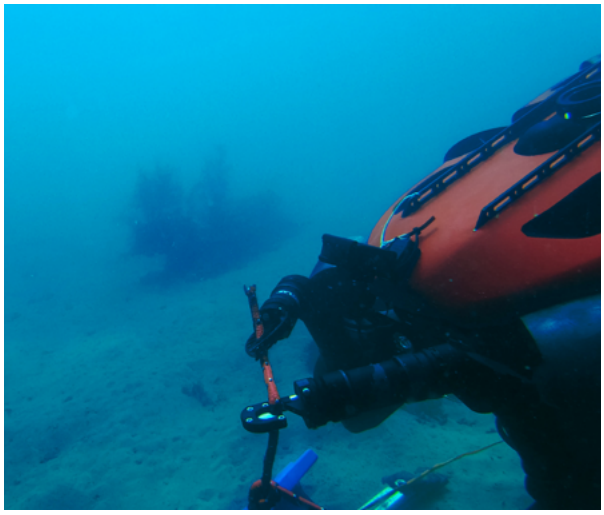
> **"I am delighted to see this investment in businesses and a research organisation to help Defence harness cutting-edge capabilities that could help protect and sustain ADF personnel in the field."**
>
> **Minister Price**

Under this defence contract, Reach Robotics will deliver novel manipulator and vision systems for a portable Remotely Operated Vehicle (ROV). Such a system will be able to complete some of the taskings currently reserved for human clearance divers, improving operational efficiency and safety for Navy operators.

> **"We are very excited to receive this investment from the Australian Government. Reach Robotics has been working with various military stakeholders in Australia, the US, and the UK for many years and it is an honour to have this official backing from Defence. This contract will enable us to fast-track our technology developments and more quickly contribute to our vision to enable remote intervention in harsh environments in the realm of the Clearance Diver remit."**
>
> **Anders Ridley-Smith,**
> Director – Business Development

Reach Robotics has its headquarters and manufacturing facility in Sydney, Australia. The company creates advanced robotic arm solutions for harsh environments which enable complex inspection and intervention in maritime infrastructure management (UWILD, NDT, CVI, Sampling), military/police operations (Special Recovery), marine science, autonomous robotics research applications, and more.

SRS Fusion vehicle with Reach Alpha 5 manipulators conducting diver-less complex remote operations



SRS Fusion vehicle with Reach Alpha 5 manipulators conducting diver-less complex remote operations

BOXFISH RESEARCH INTEGRATES REACH ALPHA GRABBER FOR SUBSEA EXPLORATION & INTERVENTION

Boxfish Research is a New Zealand-based ROV and underwater camera manufacturer established by three entrepreneurial engineers seeking to improve the capabilities of portable subsea technology. They specialise in ultra-high definition, underwater vision systems, including a 360° camera and actively stabilised ROV technology which has been verified to depths of 1000m. Boxfish technology facilitates a range of solutions for subsea industries, including Submerged Asset Inspection, Offshore Energy, Defence & Security, Marine Science, Luxury Superyachts, Aquaculture, Police/ Search & Rescue, VR/ AR and Cinematography.

Recently, Boxfish Research integrated Reach Robotics's Reach Alpha Grabber onto their portable ROV, which features a 3D vectored thruster layout allowing six degrees of freedom and independent movement in any direction. The Reach Alpha Grabber is a high-strength linear actuator with interchangeable jaws, making it a versatile and compact unit capable of grabbing, cutting and sampling.

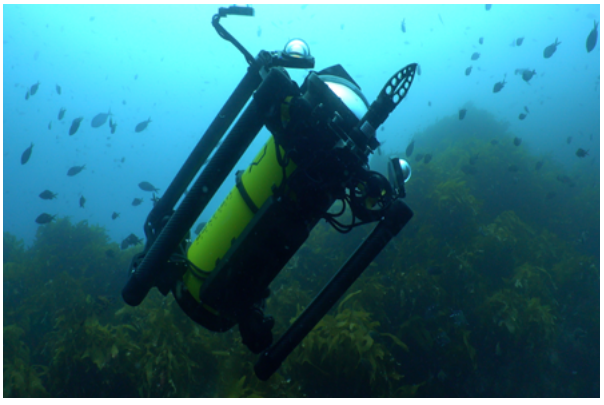
When combined, the Boxfish ROV and Alpha Grabber are a powerful offering for robust and reliable subsea manipulation and intervention tasks, capable of precise, targeted movement, delicate object retrieval and high-force applications. The Boxfish team seamlessly integrated control of the Alpha Grabber into their topside console for intuitive control of vehicles and manipulators from one operating system. After the integration, Boxfish has conducted several successful sea trials and seeks to integrate Reach Robotics's more dexterous Reach Alpha manipulators in future tests.

At Reach Robotics, we love collaborating with companies pushing the boundaries in subsea innovation and are proud of our partnership with Boxfish Research. Here's what they had to say about our collaboration:

> **"Blueprint lab offers a great range of grabbers and end effectors to solve various tasks. We have only positive experience working with the Reach Robotics team, starting from technical support through to the grabber's integration and operation, and we are looking forward to integrating and offering more advanced manipulators in the nearest future!"**

The combined force of Boxfish's subsea vision systems and agile ROV with Reach Robotics's tough, dexterous manipulator technology offers a highly capable solution for underwater exploration and operation in harsh environments.

The intuitive topside control interface



Reach Alpha Grabber integrated on Boxfish ROV during sea trials

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TOPAZ SUBSEA USES REACH SUBSEA LIGHT TO RELIABLY ILLUMINATE SUBSEA WORK

Topaz Subsea is based in Perth, Western Australia and works extensively with the science community on many projects, including sampling corals and seabed surveys. They've also worked helping fisheries, oil & gas inspection and with the water police. They provide sales, hire, service, and support for a range of ROV systems and equipment, including Reach Robotics's Reach Subsea Lights and Reach Alpha 5 manipulators.

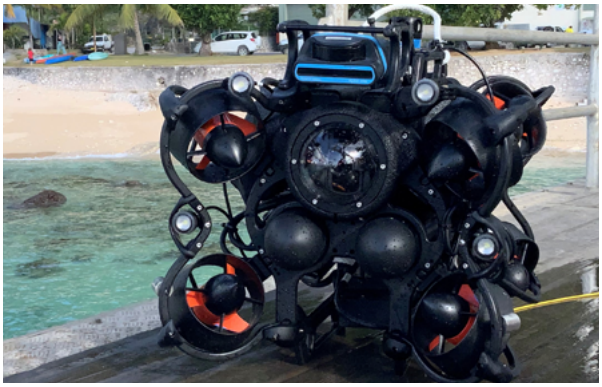
> **"Reach Robotics has always offered great support and are always keen to help with innovations and improvements to their products."**
>
> **David Whillas,** Topaz Subsea

David's latest project integrates our Subsea lights on the new RJE Oceanbotics SRV8 X ROV (pictured). Their subsea lights needed to be small, lightweight, and, most importantly, reliable and they found that in their Reach Subsea Light which has completed nearly 2000hrs dive time in a minimum 100-350m depth without any failures or decrease in performance.

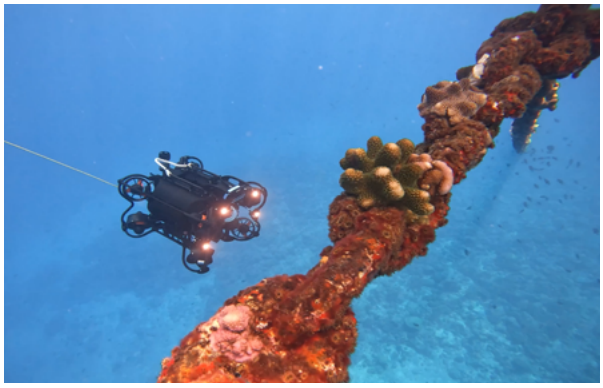
The Reach Subsea Light was developed after we kept hearing about issues with available underwater LED lights, particularly concerning leaks and interface. Our main priority was reliability over time. Specifically, this meant avoiding strain relief on the cable/light interface, improved pressure tolerant housings, over-temperature protection, and accommodating for serial (RS485) or PWM signal sources. Primarily aimed at vehicle manufacturers, we also provide to vehicle operators who need to upgrade their current illumination status.

Topaz Subsea also needed a manipulator with a small overall size, dexterity, intuitive operation and which works efficiently with the master arm topside controller. The Alpha 5 manipulator has helped Topaz Subsea to achieve its objectives;

> **"The Reach Alpha 5 manipulator has proved extremely helpful in achieving objectives with dexterity to reach difficult places which were otherwise unreachable."**
>
> **David Whillas,** Topaz Subsea



Reach Robotics Reach Subsea Lights on the Oceanbotics srv-8 ROV. Courtesy of Topaz Subsea



Reach Robotics Reach Subsea Lights on the Oceanbotics srv-8 ROV. Courtesy of Topaz Subsea