Productivity improving technology

Unmanned Underwater Robot

Smart Water Solutions with Cutting-Edge AUV Technology

Compact yet multi-purpose! Simultaneously investigate 3D terrain and water quality using autonomous navigation

An AUV (Autonomous Underwater Vehicle) is an underwater robot equipped with a computer and various sensors. The AUV can navigate autonomously along a preset course and depth, and can acquire acoustic images of the seabed and 3D topographical data using the onboard side-scan sonar and interferometric echo sounder, as well as 3D underwater water quality data using a multi-item water quality sensor. Using this data, we provide solution services related to dam reservoir sedimentation prediction, water quality management, and underwater structure maintenance and management.

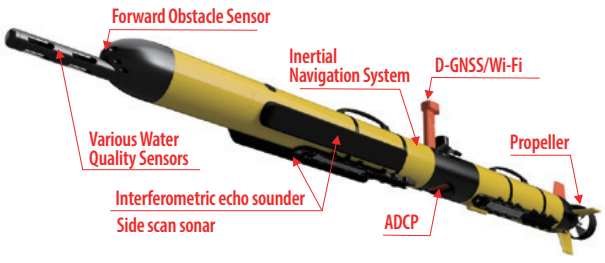
Featured Technology 1

Easy handling by two people

A typical AUV is so large that it needs to be operated by a crane attached to a ship, but our AUV is compact and can be deployed and retrieved by two people.

Specification			
Name	i3XOECOMapperAUV (YSI)		
Length	2.3m	Weight	40.0kg
Diving speed	0.5～2.5m/s	Diving Depth	0～100m
Operating hours	Continuous use for 6 hours (with sensor)		

[1] Various sensor arrangements



[2] Measurement items

(1)Multilayer flow conditions (flow direction, flow velocity, etc.)

(2)Acoustic images, bathymetry data

(3)Water quality data (water temperature, salinity, electrical conductivity, pH, CDOM colored dissolved organic matter, ORP oxidation-reduction potential, DO dissolved oxygen, chlorophyll,cyanobacteria, turbidity)

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Featured Technology 2

Navigate autonomously along a set route and acquire various data

AUVs navigate autonomously along a set course, so no operation is required once they are deployed on the water surface. Once set, they can accurately follow a route as many times as necessary, making them useful for periodic surveys.

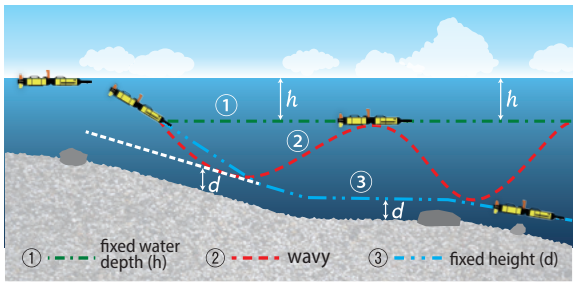
They excel at acquiring three-dimensional data, and can spatially grasp not only topography, but also water temperature, water quality, flow conditions, etc.

Major Technical Points

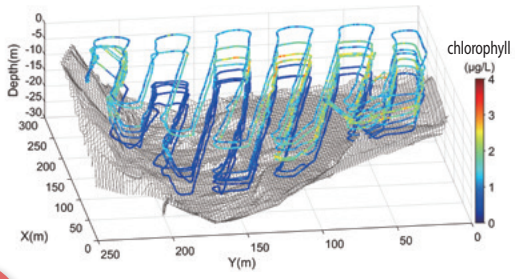
- ▶Autonomous navigation without cables
- ▶Repeat the set route as many times as you like
- ▶Complementary with UAVs (drones) and ROVs (underwater drones) for wider, deeper and more reliable coverage
- ▶One-stop solution with simultaneous acquisition of various data

The AUV inspection technology was proposed as a "new inspection technology for port facilities" in a public competition run by the Port and Harbor Bureau of the Ministry of Land, Infrastructure, Transport and Tourism. It was selected after technical verification.

[1] Preset course/depth



[2] 3D distribution of chlorophyll



Published

Ministry of Land, Infrastructure, Transport and Tourism, Port sand Harbors Bureau

"New inspection technology for port facilities"

Underwater visualization technology for outer facilities (breakwaters and revetments) using AUVs

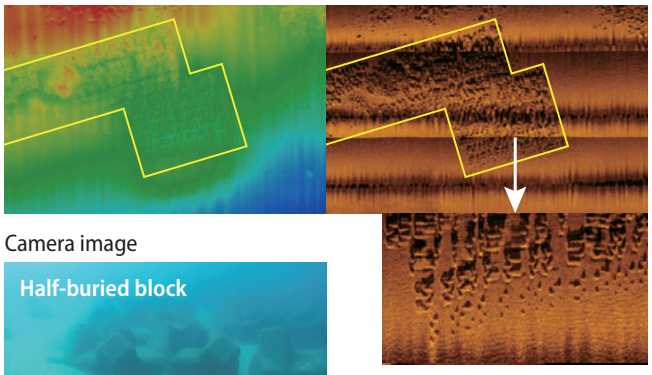
Featured Technology 3

Technical capabilities proven in the field

Improving Fisheries environment Understanding the installation range of seaweed bed reefs and check for changes

3D terrain data

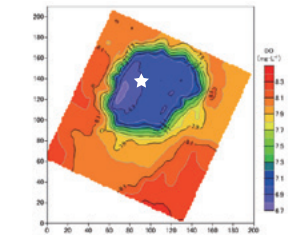
Sonar images



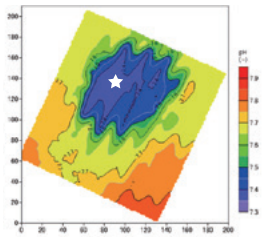
Camera image

For water quality control Confirming the effectiveness of the aeration type water circulation device (marked with ★ in the diagram below)

DO



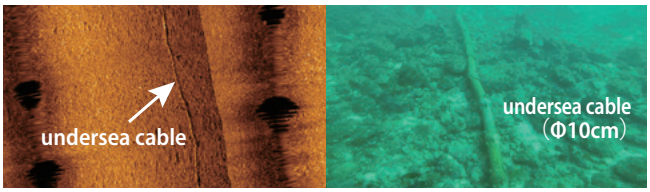
pH



Maintaining underwater structures Extension installed to wave observation point Survey a 360m submarine cable in about 6 minutes

Sonar image

Camera image



Achievements

Case Studies:

- River: Topographical surveys, flow conditions and water quality surveys, foundation deformation surveys
- Ports: Topographical survey, foundation deformation survey, environmental survey such as seaweed beds
- Dams/lakes: Topographic survey, water quality survey, sediment measurement

Our main Clients:

Ministry of Land, Infrastructure, Transport and Tourism
local governments
Water Resources Agency
Water Source Environment Center Foundation, etc.