Wave Glider USV3

Solar-Powered Uncrewed Surface Vehicle (USV)

Overview

The USV3 Wave Glider harnesses **wave energy and solar energy for forward propulsion**, enabling **endurance of up to several months**. The system is **man-portable** and can be **launched directly from beaches, ramps, or docks**, providing persistent maritime domain awareness for **border regions, ports, and offshore infrastructure**.

The platform is capable of **successful operation in Sea State 6 and above**, and is equipped with **redundant communication systems** to ensure **global-scale reliability**. Featuring a **modular open system architecture (MOSA)**, the USV3 supports rapid **hardware and software integration**.

Collected observation and sensing data are transmitted back to shore-based monitoring centers in the form of **processed computational results**, marking a new stage in the development of **unmanned ocean observation and sensing systems**.

Wave & Solar Energy Propulsion

Powered by a combination of **wave energy and solar energy**, the USV3 enables **long-duration autonomous navigation over tens of thousands of kilometers**. The platform is capable of executing **global open-ocean observation and sensing missions**, even under **harsh sea conditions**, while **acquiring and transmitting data in real time**.

Adaptive Power Supply System

USV3 features an **adaptive, modular power management system** with enhanced power delivery capability. It is designed to support **high-power payloads** (such as sonar systems) as well as **multiple combined payload configurations**, ensuring stable and efficient energy supply for demanding mission requirements.

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Standard Configuration

Category	Item	Specifications
General	System Configuration	Surface float, subsurface glider, armored tether (4 – 20 m)
	Dimensions	Hull: 290 cm × 67 cm; Underwater tow vehicl: 21 cm × 190 cm; Hydrofoil span: 143 cm
	Weight	Approx. 150 kg
	Speed	Auxiliary propulsion off: 1.0 – 2.0 knots (Sea State 1 – 4); Auxiliary propulsion on: 1.5 – 2.3 knots (Sea State 1 – 4)
	Pressure Resistance	Resistant to scour and short-term submersion (max depth 2 m)
	Visibility	Mast with flag and strobe light
	Transportation	Aviation case packaging; Deployment and recovery trolley
Energy	Propulsion	Wave energy converted into propulsion; Auxiliary thruster
	Battery	980 Wh rechargeable lithium-ion battery, expandable up to 3.92 kWh
	Solar Power	180 W (peak)
Payload	Architecture	Standardized mechanical, electrical, and software modular payload units for easy integration and configuration
	Basic Configuration	AIS receiver; LED warning light and flag
	Continuous Output Power	Voltage: 12 – 28 V; Current: 6 A (max)
	Payload Interfaces	Hull: 4 ports; Glider: 1 port; Miniature 5/8-pin wet-mate connectors; 12 – 28 V, 4 A (max); RS232/422/485, GPS, PPS; 10/100 Ethernet
	Power Expansion Port	Hull: 1 port; Miniature 2-pin wet-mate connector; 14.4 – 16.8 V, 10 A (max)
	Max Effective Payload (Hull)	Max payload mass: 45 kg; Max payload volume: 93 L; Peak available power: 80 W
Safety	Emergency Positioning	Redundant Iridium beacon
	Compartment Health Monitoring	Dry compartment pressure, humidity, and water ingress detection
	Battery Protection	Independent battery installation; Automatic charge/discharge switching (Over-temperature and over-voltage protection)

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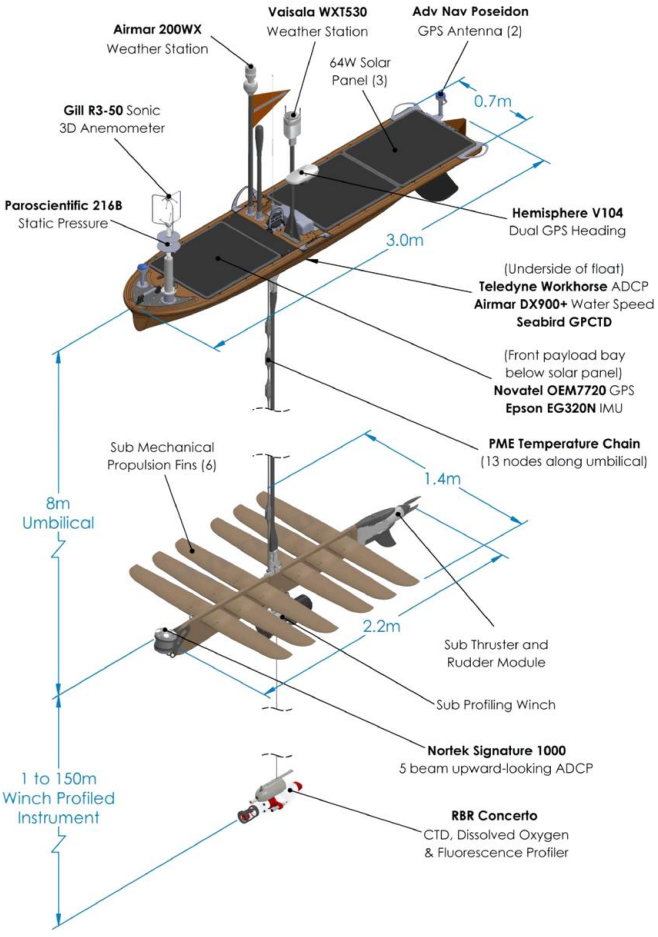
Control	Mission Control	Multi-platform display based on electronic nautical charts; Automatic waypoint and route generation
	Status Monitoring	Textual and visual status display; SMS and email alerts; Programmable geofencing
	Autonomous Navigation	Straight-line path following; Circular trajectory tracking; Virtual anchoring; Target heading keeping
Navigation	Path Tracking Accuracy	40 m (CEP90) (Sea State 3, current < 0.5 knots)
	Station-Keeping Accuracy	Radius 40 m (CEP80) (Sea State 3, current < 0.5 knots)
	Heading	Electronic compass
	Positioning	GPS; BeiDou (optional)
Communicat-ions	Communications	Iridium 9602; BeiDou short message (optional); Tiantong dial-up (optional); Iridium dial-up (optional); ZigBee wireless; Bluetooth

Product Schematic



Scientific Payloads

The **Wave Glider** can be equipped with a wide range of **scientific payloads**, including **meteorological stations**, **laser Doppler wind lidar**, **atmospheric duct sensors**, **wave sensors**, **CTD (Conductivity–Temperature–Depth) sensors**, **temperature and salinity winches**, **ADCP (Acoustic Doppler Current Profilers)**, **multi-parameter water quality sensors**, **hydrophones**, **magnetometers**, **vision-based recognition systems**, and **AIS receivers**.

These payloads enable missions such as **marine meteorological observation**, **tsunami and earthquake monitoring**, **marine mammal and biological monitoring**, and **offshore energy exploration**. In addition, the Wave Glider can carry **underwater acoustic communication modems** to perform **surface-to-underwater data relay** and **communication gateway** missions.

Unique Capabilities

The **Wave Glider** features **self-sustaining energy supply**, **global positioning**, **satellite communications**, and **autonomous navigation**. It is capable of **autonomous navigation along predefined routes** or **virtual anchoring around designated locations**, enabling **long-duration, wide-area unmanned continuous survey operations** (up to **10,000 km per year**).

In addition, the platform supports **virtual station-keeping at fixed sea-surface locations**, providing **data relay and communication gateway services** for **underwater and surface-based systems**, as well as **long-range real-time data transmission** to shore-based control centers.

Applications

- **Marine Meteorological Observation**
  Continuous measurement of wind speed, wind direction, air temperature, atmospheric pressure, and humidity, supporting offshore weather monitoring, forecasting, and climate research.
- **Sea Surface and Upper-Ocean Hydrological Observation**
  Real-time observation of wave height, wave direction, current speed, current direction, sea surface temperature, and salinity, enabling long-term monitoring of ocean surface dynamics and air–sea interactions.
- **Coastal Security and Maritime Patrol**
  Persistent coastal and nearshore surveillance using video, optical imagery, and radar data, supporting maritime domain awareness and coastal security operations.
- **Underwater Acoustic Measurement**

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Measurement of ambient underwater noise and direction finding and localization of underwater targets, supporting ocean acoustic research and maritime safety applications.

- **Ocean Dynamics and Profiling Observation**
  Acquisition of vertical profiles of current velocity and direction, as well as water temperature and salinity profiles, enabling studies of ocean circulation and water column structure.
- **Marine Water Quality and Ecosystem Monitoring**
  Long-term monitoring of pH, dissolved oxygen, turbidity, chlorophyll, partial pressure of carbon dioxide (pCO_2), radioactivity, and other key indicators, supporting marine environmental protection and ecosystem assessment.

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