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A Drop in the Ocean!

Roving the Seven Seas with Sea Drones

December 2024



Baby's Day Out!!!

You may have heard about Ukraine's "Sea Baby".



In the current war between Ukraine and Russia, Ukraine's use of sea drones, charmingly called "sea baby," have wracked havoc on Russia's naval assets and infrastructure.

Such notoriety has made sea drones famous. But in reality, sea drones offer much more than their military uses.

Overview

Sea drones are unmanned vessels that operate in water bodies, such as oceans, lakes, rivers and canals. Because no humans are onboard, they can:

- operate in hazardous conditions, including in hurricanes and iceberg filled waters,
- stay underwater longer,
- go deep in ocean waters,
- are smaller in size,
- are easy to maneuver,
- cost significantly less, and
- be less conspicuous to and interfering with wildlife.

Surface Drones	Submersible Drones
<p>They operate on the surface of a water body.</p> <p>Often called drone boats, drone ships, drone sails, unmanned surface vehicles/vessels, uncrewed surface vessels (USV), etc.</p>	<p>They operate underwater and functional at various depth levels.</p> <p>Often called drone submarines, unmanned underwater vessels (UUV) or underwater autonomous vessels (UAV).</p>
<div><p>Source: NOAA</p></div>	<div><p>Source: QYSEA</p></div>

Wired Drones	Remote Controlled Drones	Autonomous Drones
<p>They are navigated by a human from a ship or from a ground station through a connected wire.</p> <p>They receive power through connected by wires.</p> <p>They are the simplest and easy to operate, but they have a limited range of operations.</p>	<p>They are navigated remotely through wireless connection by a human from a ship or from a ground station.</p> <p>Here, power is supplied by on-board batteries or by solar panels in some surface drones.</p>	<p>They navigate autonomously using advanced sensing and navigational technologies integrated with artificial intelligence.</p> <p>Power is provided by on-board batteries or solar panels in some surface drones.</p>

Given all these advantages, sea drones can help us in many areas beyond military use. For example:

- Enable us to explore the unexplored parts of our vast oceans.
- Strengthen maritime logistics and transportation.
- Help develop aquaculture and fisheries.
- More effectively monitor ocean health and endangered marine species.

In recent years, the demand for sea drones has grown rapidly, though not as explosively as for aerial drones.

- The global USV market is expected to grow at the CAGR of 13.7% to reach \$2.8 billion by 2030, according to Data Bridge Market Research
- The global UUV/UAV market is expected to grow at the CAGR of 11.9% to reach \$6.63 billion by 2030, according to Zion Market Research.

India Story

Use of sea drones is not yet widely prevalent in India. According to GlobalData, the Indian USV market to reach \$200 million by year 2033. Whereas the Indian UUV market is expected to grow relatively faster.

The initial interest in sea drones in India is from the defense department. Indian navy is actively developing sea drones as well as procuring them from the US, UK and France.



Source: India Today



Source: L&T

Indian companies like L&T are developing various types of UAVs indigenously. L&T has developed Adamya, Amogh and Maya. Indian Navy is looking to deploy such UAVs in Indian Ocean and South China Sea regions.

Garden Reach Shipbuilders and Engineers (GRSE), a government shipyard launched a UAV, Neerakshi, for mine detection, mine disposal and underwater surveys.



Source: Hindustan Times

Enabling Technologies

Key aspect in sea drones is powering them and navigating them to the intended location in the three-dimensional areas of water bodies.

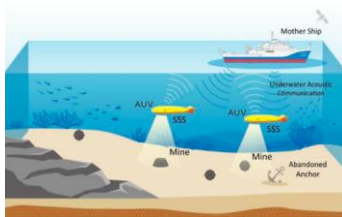
- Wire-connected. Power is supplied from, and navigation done by a human in a ship on the surface.
- Remote-controlled. Power is supplied by on-board batteries and navigated remotely by a human from a ship or a ground station.
- Fully autonomous using advanced sensing and navigational technologies and artificial intelligence.

Sensors and Cameras

They provide information about obstacles in the surroundings of the drone to the navigator or navigation system.



Source: HERE Tech



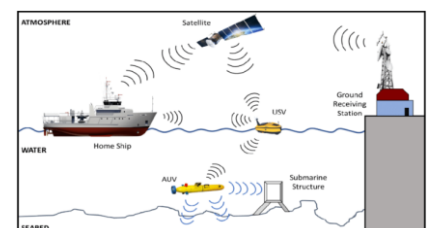
Source: JMSE

Sonar

It uses sound waves to collect info (including speed and direction if moving) about obstacles not visible from camera.

GPS

It receives information from GPS satellites to identify precise information about the drone's location.



Source: IEEE



Source: JW Fishers

Remote Control Systems

They enable the human operator to operate the drone from a ship on surface.

AI/ML

Artificial intelligence and machine learning algorithms operate autonomous drone in real-time.

Who Would be Interested?

Military

- Transport weapons using Extra Large Uncrewed Underwater Vehicles (XLUUVs)
- Anti-sabotage inspections
- Locating naval mines
- Attacking enemy ships and other navel installations in a war
- Autonomous Coast Guard patrols
- Protecting exclusive economic zones and reporting violations

Maritime

- Monitoring ship movements
- Underwater inspection of the condition of ship's hull, rudder and propellers
- Certain types of underwater repairs of ship parts

Meteorology

- Monitoring oceanic jet streams
- Sea surface temperature measurements
- Storm monitoring

Research and Exploration

- Oceanographic surveys
- Monitor and study endangered marine life
- Recovery of lost objects

Energy Sector

- Monitoring and repairing underwater structures and pipelines of offshore drilling platforms
- Inspection of hydroelectric plant inlets and dams

Telecom

- Installation, monitoring and maintenance of submarine cables

Other

- Aquaculture and fisheries
- Underwater construction

Strategic Legal Considerations

Water Navigational Laws

Many countries have developed regulations for the management of aerial drones, but little has been done about sea drones. Laws developed to regulate large and crewed watercrafts do not fit well to actualities of USVs/UUVs/UAVs, especially with respect to their production and registration.

For example, navigation on inland water bodies in India is regulated by the Inland Vessels Act, 2021. Despite being relatively a new law, there is no explicit reference to USV or UUVs. Applying this law would prohibit construction of a USV/UUV without prior approval. Even a small craft designed for pleasure, videography or monitoring wildlife habitat would require mandatory registration and certification.

Data regulations - Privacy and geospatial data

Typically, sea drones in use cases like recreation, videography or monitoring assets may operate around human beings and record their movements and behavior.

In such situations, care must be taken that personal data is not captured, otherwise it could lead to extensive compliances under data privacy and protection laws.

Moreover, if drones are capturing or using any location data, existing guidelines on collection and use of geospatial data would need to be evaluated. India issued the National Geospatial Policy in December 2022 in addition to the Guidelines for Acquiring and Producing Geospatial Data issued in February 2021.

Safety and Liabilities

Sea drones can cause accidents or collisions with other vessels, structures, or marine life. Owners, manufacturers, and operators may be held accountable for any resulting damage or injuries. Adequate insurance coverage and risk management practices may be mandated by the law.

Sovereignty

Sea drones may accompany cruise ships and private yachts for various purposes. When sailing in international waters but near a nation, sea drones may inadvertently enter the territorial waters of the nation. Sea drones are often too small to register on radars and sonar systems. Hence, governments would be concerned.

How do we reconcile the right of innocent passages in territorial waters as applied with ships to sea drones?

Environmental concerns

USV/UUVs may be equipped with mechanical capabilities which enable them to interact with their surroundings. In interactions, such as maintaining any underwater infrastructure or conducting any research, they should not harm any aquatic plants or wildlife, especially those covered under endangered species.

Moreover, USV/UUV operations may cause chemical pollution during their production or in operation due to a malfunction or a collision. In addition, their propulsion systems may cause noise pollution which can affect communication, navigation, and social behavior of marine life, especially of those dependent on sonar and bioacoustics. Such effects can trigger liability under pollution control laws.

Defense and security concerns

As illustrated by the devastating effects of the military use of sea drones by Ukraine and Houthi rebels, many nations are rethinking their defense of naval assets and installations against sea drones. Their first course of action is to ban sea drones or significantly curtail the area and range of operations they can perform.

Concerns are not just for the offensive use for assault, but also about reconnaissance by sea drones. Sea drones are often too small to register on their radars and sonar system. Operators must be aware of any restrictions or prohibitions on the use of sea drones in certain areas to avoid repercussions.

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About US

We are an India-centric, research-based global law firm (www.nishithdesai.com) with five offices in India (Mumbai, Bangalore, New Delhi, Mumbai BKC, and GIFT City) and with license to practice Indian law from our international offices in Silicon Valley, New York, Singapore and Dubai. Over 70% of our clients are foreign multinationals and institutional investors and over 84.5% are repeat clients.

We are a firm of specialists and the go-to firm for companies that want to conduct business in India, navigate its complex business regulations, and grow. We are known for handling complex, high-value transactions and cross-border dispute resolution (see [Annexure A](#)). And that prestige extends to our engagement with and mentoring the start-up community that bring about industry-changing innovations.

Dedicated to shaping the future of law & society, we have set up a first-of-its kind IOT-driven Blue Sky Thinking & Research Campus named *Imaginarium AliGunjan* (see [Annexure B](#)) near Mumbai. Our ability to anticipate and address challenges from a strategic, legal and tax perspective in an integrated way (see [Annexure C](#)) have won recognitions globally from not just our clients but also government ministries.

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