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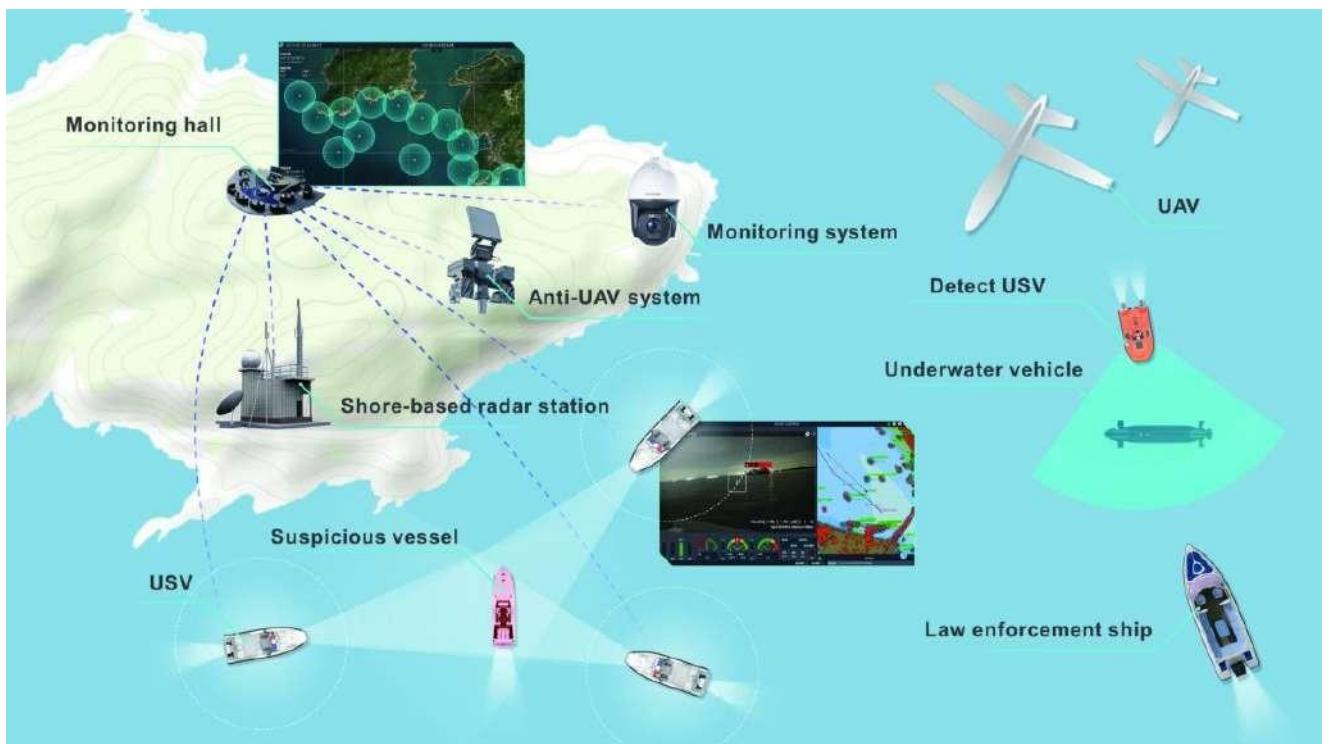


## 01 Background:

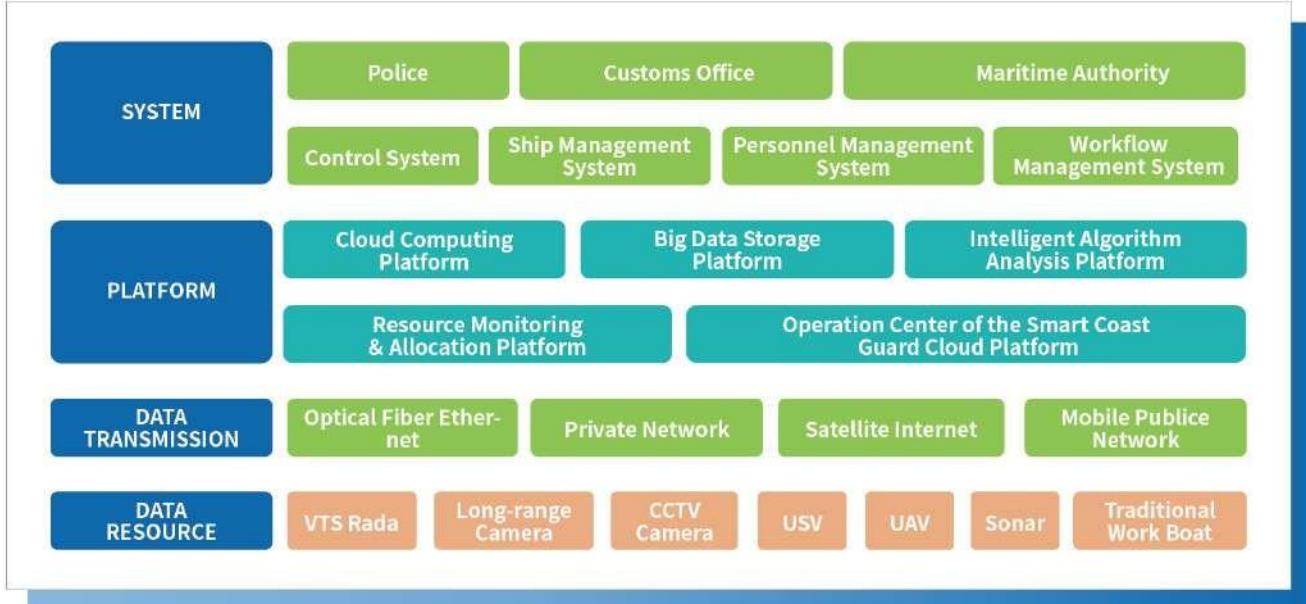
The Maritime Intelligent Security System is a platform for maritime emergencies and defense based on unmanned equipment. With the help of front-end sensing equipment such as radars, drones, and USVs, it monitors various ships and targets in real time to establish an air-space-sea-ground multi-dimensional intelligent perception system. The system aims to overcome traditional challenges such as scattered resources, no sharing of data, insufficient depth of sea defense lines, insufficient defensive initiative, high labor costs, and poor economic efficiency.

## 02 Solution:

The Maritime Intelligent Security System is to establish a platform to coordinate all different parties involved by sharing info, resources and task scheduling. Equipped with perception devices such as radar, UAV (Unmanned Aerial Vehicle) and USV (Unmanned Surface Vehicle), the system uses cloud computing and big data analysis technology integrating with massive amounts of related data resources to efficiently monitor ships and other targets passing by at sea. It is expected to cover multiple domains (air, sea, subsea) and digitalize the coastguard's workflow, including detecting, alarming, decision-making, emergency-responding, and analyzing as a comprehensive system.



## Overview of the Maritime Intelligent Security System



### Framework of the Maritime Intelligent Security System

USV is an intelligent vessel platform that can be deployed with different payloads in order to complete certain tasks according to practical needs.



Deploy with different mission loads, the USV is able to conduct a variety of missions such as patrolling and guarding, fixed-point duty, warning and deterrence, approaching reconnaissance, situational awareness, night duty, interception and strike. And it has established a data sharing network with the Maritime Intelligent Security System, accepts the unified command and deployment of the system, and cooperates with radar, drones and other systems to perform duties.



The USV is equipped with the OCEAN eye intelligent identification system. Through the establishment of a huge database, the USV has the ability to identify multiple targets, which improves the efficiency of discovering surface targets during patrol inspections.

### USV's Highlights as part of the Smart Coast Guard System:

1. Safe: reduce the personnel's risk and vessel collision
2. Economical: cut the labor cost, fuel consumption as well as operation and maintenance costs
3. Intelligent: the system unit of the Maritime Intelligent Security System to perform maritime missions
4. Collaborative: share information and interact with various smart devices

## 03 Typical Applications:

The Maritime Intelligent Security System has developed various data models according to massive ship info in response to emergencies, such as low-speed warnings, collision warnings, wrong direction warnings, abnormal route warnings and AIS shutdown warnings. In ordinary times, the system can support the Maritime Authority in dealing with daily ship management and maritime traffic accidents. For emergent cases, it can help the police to accomplish anti-smuggling, anti-stowaway and anti-terrorism tasks to maintain public safety.

## Case 1

### - Emergency Response to Maritime Accident

In October 2022, the Maritime Intelligent Security System detected a ship collision accident in the China Sea. The OceanAlpha USV was deployed by the system to reach the scene of the accident at once for close investigation, sending back live video. It is also appointed to conduct victim searching, oil spill monitoring, and patrolling tasks in collaboration with other workboats within the control area. After receiving the accident information, the OceanAlpha USV sailed to the accident waters at high speed, alerted the area around the accident ship, and sent the scene rescue screen back to the command center in real time to provide a basis for the next rescue action.



Real-time Data Transmission



USV searches for drowning victims with photoelectric equipment

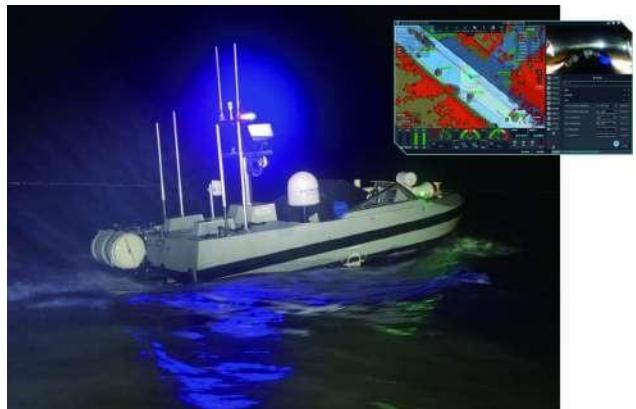
At the same time, during the square search at the accident site, the search and rescue personnel found the person who fell into the water through photoelectric equipment, remotely controlled the unmanned boat equipment to release the life raft, rescue the person and brought them back.

The application of OceanAlpha USV not only increased the efficiency of victim searching by 38%, but also doubled the time for continuous searching compared with the traditional method. This case underlined the quick response ability of OceanAlpha USV toward maritime accidents and demonstrated the OceanAlpha USV as a significant emergency search and rescue tool.

## Case 2

### - Daily Patrol for Anti-smuggling and Anti-stowaway

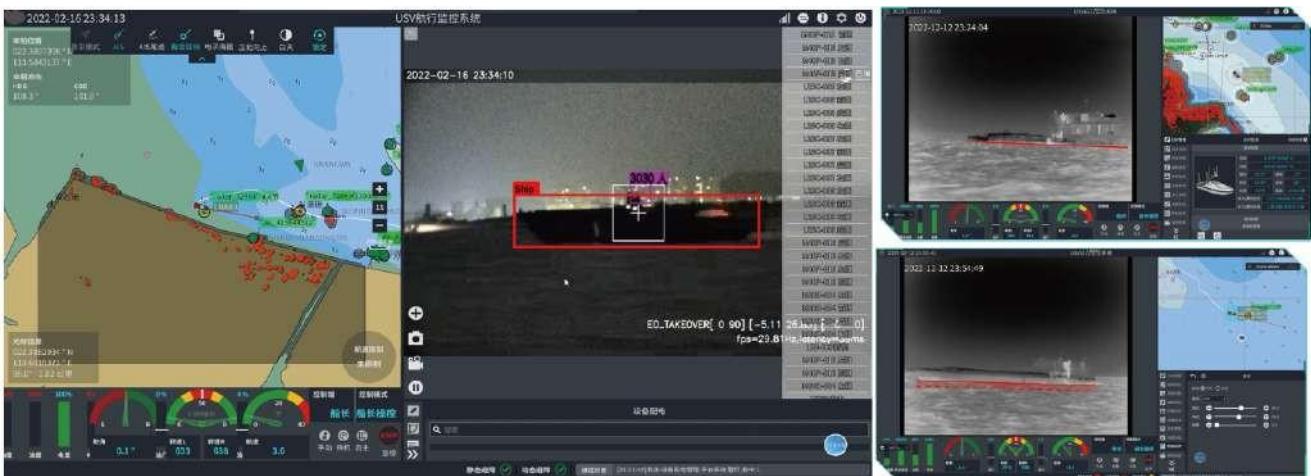
Hengqin Island is located near Macau and south of Zhuhai, a southern city of the Chinese Mainland. To crack down on crimes and illegal activities such as smuggling and stowaway at the Hengqin Bord, the Police Bureau of Zhuhai City has carried out day-and-night patrolling missions using OceanAlpha USVs combined with traditional patrol vessels.



The OceanAlpha USV is small in size, flexible in maneuvering, low in noise, and suitable for investigation work at night, and stowaway and smuggling behaviors have been found many times during the voyage around the island.

In Figure 1 below, the OceanAlpha USV tracked for nearly an hour, linked with the Maritime Intelligent Security System in real-time, and arrested the stowaways when they were about to go ashore, and successfully captured 4 stowaways and assisted 1 smuggler;

Figure 2 In and 3, at 23:00 at night, at the entry of the island, a OceanAlpha USV found a suspicious ship when it was alerting, and followed it for about half an hour. It was found that the draft of the ship had changed by nearly 1.5 meters, and there was an obvious dumping behavior. Maritime Intelligent Security System immediately notified the marine law enforcement unit to detain. The USV recorded evidence that provided strong evidence for the marine law enforcement unit



USV finds several illegal acts during a night patrol

## 04 Results:

The OceanAlpha USV is still on duty for round-the-clock patrolling around Hengqin Island today. Data comparison between the OceanAlpha USV and the traditional boat is as below:

**Service Day:** 296 Days

**Cases discovered:** 8 cases, 2 cases of smuggling, 6 cases of other illegal acts;

**Service Time:** 2808 hrs (Average Daily Time: 9.5 hours)

**Fuel cost:** 4,194 CNY per day (9.5 hours), compared with 5,441 CNY (4.5 hours) for law enforcement boats, the economy is significantly better;

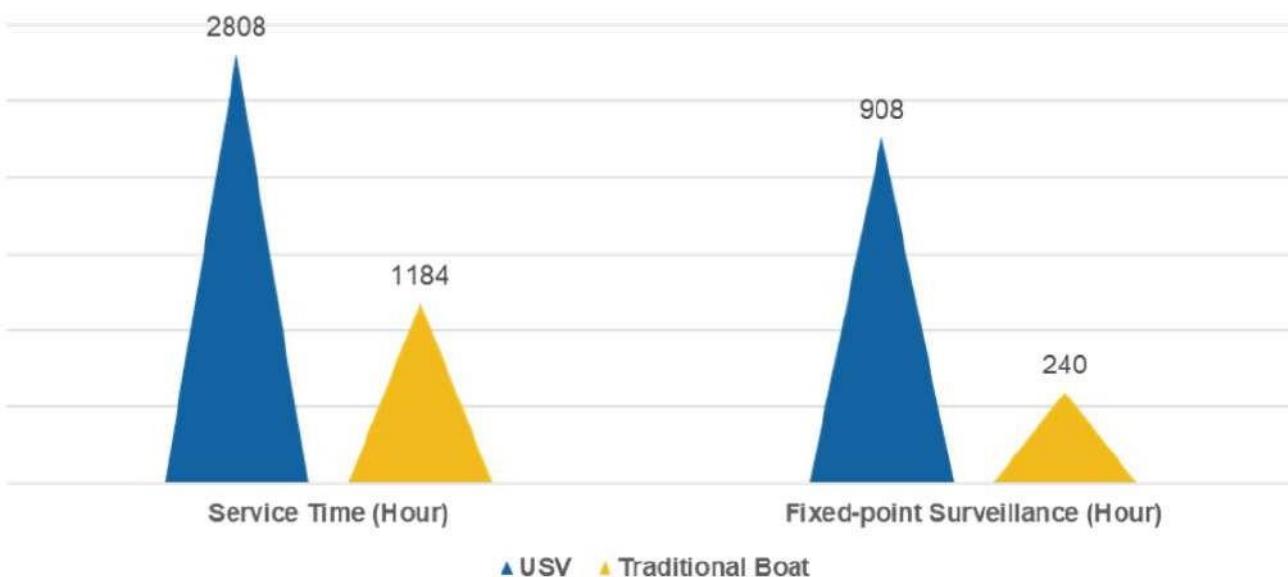
**Fix-point Surveillance Time:** 908 hours (Average Daily Time: 3.1 hours)

**Service Mileage:** 62405 km (Average Daily Distance: 210 km)

**Saving police force:** 2368 person-times; the average daily reduction of 8 person-times

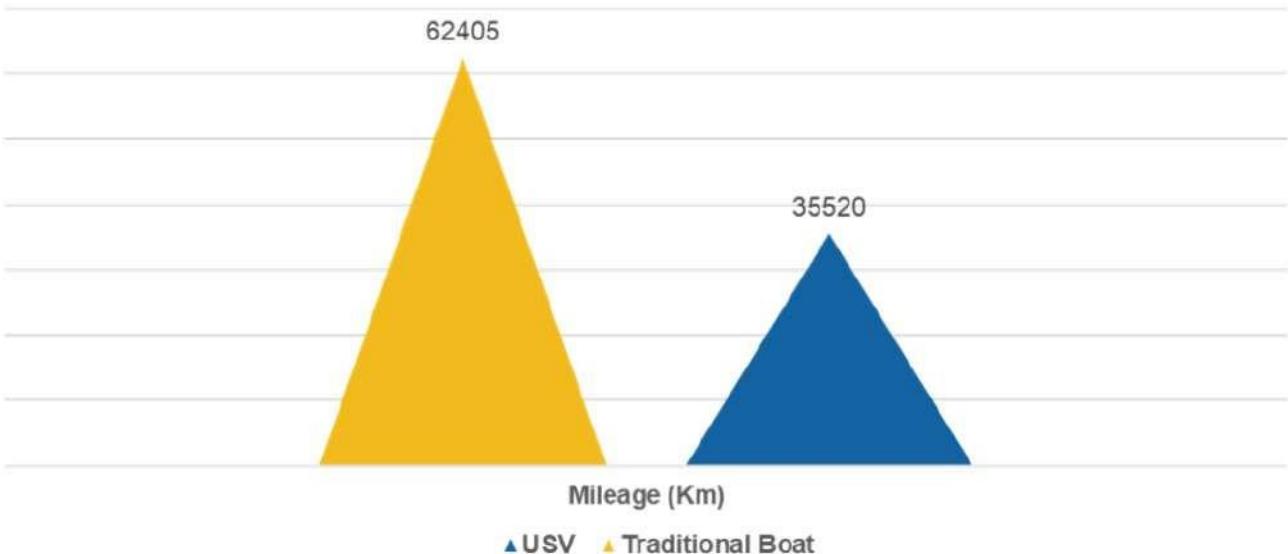
**Number of police dispatches:** 6 times per day, with an average increase of 4 times per day

## Service Time



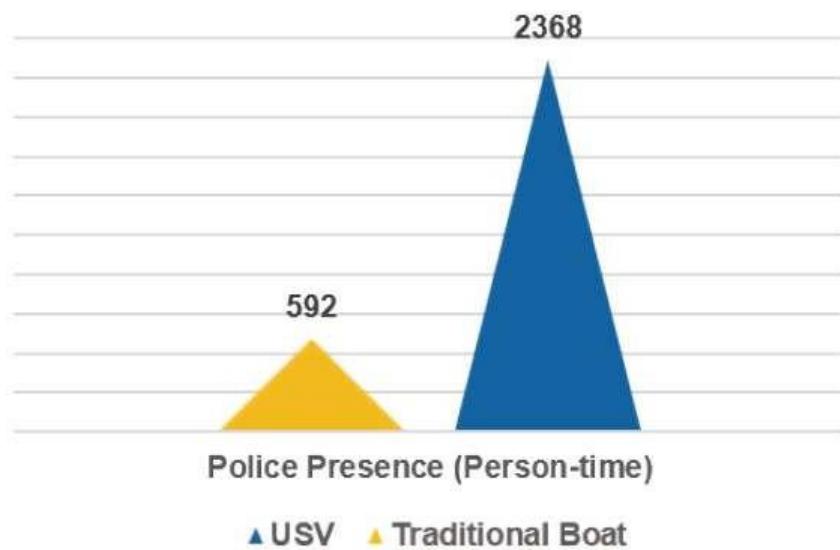
A USV patrol is 2.4 times the hours of a traditional boat and conducts fixed-point surveillance 3.8 times the hours of the traditional law enforcement boat.

## Service Mileage



The service mileage of a USV sail is 1.8 times the traditional law enforcement boat in the same period.

## The Number of the Presence of Police Officer(s)



## Fuel cost

¥ 5441  
(4.5 Hrs.)

¥ 4194  
(9.5 Hrs.)

Fuel Cost

▲ USV ▲ Traditional Boat

Economic comparison

## 05 Conclusion:

The way of OceanAlpha USV patrolling and guarding around the island is a typical application demonstration in the Maritime Intelligent Security System. It provides a practical model for public security units to use OceanAlpha USV to carry out water "anti-smuggling and anti-smuggling" operations.

## 06 Other Cases - Anti-terrorism and Emergency Assistance:

In October 2021, the Maritime Intelligent Security System issued an alarm alerting that a vessel was detected deviated from the course and ordered the OceanAlpha USV, which is patrolling around the Hong Kong-Zhuhai-Macao Bridge, to expel the suspected vessel. The maritime police remotely controlled the OceanAlpha USV to arrive at the site and recognized there are armed personnel on board through the optronics pod on the OceanAlpha USV. The OceanAlpha USV was used to block the vessel and send back real-time data to inform the police bureau for further actions.

The Maritime Intelligent Security System has deployed a channel deviation warning function module near important bridge facilities. Through track calculation, it is found that the cargo ship is heading for the bridge pier. The unmanned boat patrolling near the bridge immediately

intervenes at high speed after receiving the warning information to avoid crashing into the bridge pier.

The police officers operating backstage found an unknown organization on board, and immediately coordinated and deployed all nearby OceanAlpha USV to contain and intercept the target. It was necessary to intervene and delay the sailing of the target ship as much as possible before the maritime duty force arrived.



The Maritime Intelligent Security System detects the course deviation of a shipDeviation



The maritime police monitor the front-end police situation in real-time



Two USVs quickly surrounded and intercepted the unknown ships. The control of the two USVs was in the hands of the police. The police used the surrounding tactics to control the merchant ships. Take the initiative to launch an attack on merchant ships and assist the personnel on duty to go on board.

USV is a kind of intelligent and unmanned equipment for anti-terrorism emergency response, the USV provides strong data support for the law enforcement force backstage, USV containment and interception have become a sharp weapon in the fight against terrorism, effectively ensuring the safety of personnel when the intelligence ahead is unknown.

#### Conclusion

USV and Maritime Intelligent Security System have played an important role. It extends the depth of the border and coastal defense system and moves the overall defense line forward. It has changed to maritime defense, from passive defense to active defense, from fixed-point defense to global defense, and from manpower defense to intelligent defense, which improved the overall level of the border and coastal defense system

