Saildrone Voyager: A Unique Solution for 24/7/365 Maritime Domain Awareness

The Saildrone Voyager, a 33-foot sailboat-like vehicle primarily powered by wind and solar energy. *SAILDRONE*

According to the U.S. Coast Guard's 2020 "Illegal, Unreported and Unregulated Fishing Strategic Outlook," IUU fishing has replaced piracy as the leading global maritime security threat. Saildrone uncrewed surface vehicles (USVs) have sailed more than 500,000 nautical miles collecting valuable data about the marine environment for fisheries research, climate science, and ocean mapping. Now, a new class of Saildrone vehicles equipped with radar, 360-degree cameras, Automatic Identification System (AIS) and proprietary machine learning algorithms makes Saildrone a unique solution for combating IUU fishing, narcotics interdiction, and other maritime domain awareness (MDA) activities, anytime and in any ocean.

The Saildrone Voyager is a 33-foot sailboat-like vehicle predominantly powered by wind for propulsion and solar energy for electronics, communications, and navigation. With an average speed of up to five knots, the Saildrone Voyager can operate continuously in the open ocean for up to 180 days while producing a minimal carbon footprint. Saildrone USVs can be deployed and retrieved from any oceanside dock and transit autonomously to and from the operating area.

Global Fishing Watch uses a combination of publicly available AIS data and satellite imagery to expose areas of illegal fishing activity. The Voyager fuses optical data and machine learning to detect targets that are otherwise not transmitting their position in real time. These detection events are then fused with other data sources – AIS and acoustics – to deliver

a fully informed picture of the surrounding maritime domain. Stationed strategically, a group of Voyagers can deliver 24/7/365 protection of marine assets.

Saildrone possesses the world's largest data set of images of the open ocean. Tens of millions of images, collected by the Saildrone fleet deployed all over the world during more than six years of operational missions, have been annotated with human analysis highlighting anything of interest – vessels, birds, icebergs, etc. With this enormous data set, Saildrone's ML model automatically recognizes objects in real time, providing unprecedented situational awareness to remote command centers.

In October 2020, Saildrone performed a successful 30-day demonstration of MDA capabilities for the U.S. Coast Guard off the coast of Hawaii. Each week highlighted a specific real-world use case for persistent MDA: general traffic monitoring, IUU fishing, search and patrol and port security. Additionally, Saildrone USVs can conduct long-duration intelligence, surveillance and reconnaissance missions enabling narcotics interdictions.

Saildrone USVs also carry a robust payload of oceanographic and meteorological sensors for continuous high-resolution environmental monitoring above and below the sea surface. Optional sensors include an Acoustic Doppler Current Profiler (ADCP), which can help to identify conditions in which a loitering vessel might drift into a protected area, and multibeam sonar for high-resolution ocean mapping, necessary for improving safety of navigation.

Data is transferred in real time via a secure satellite network. Saildrone data can be viewed in the proprietary Saildrone Mission Portal or linked directly into existing architecture, for example, Minotaur via an API interface. The Saildrone Mission Portal provides a variety of tools – overlays of satellite products, model GRIB files, and

ingestion of other assets such as ships, buoys, tagged animals, or other autonomous platforms – for on-the-fly mission analysis and fleet management.

Saildrone USVs are rugged and have a proven track record of performing long-duration missions in remote areas and extreme conditions. The Saildrone fleet has logged more than 13,000 days at sea in some of the most extreme weather conditions on the planet. They have tracked fish in the North Sea, surveyed ocean eddies off Africa, air-sea heat transfer in the Gulf Stream and discovered a shipwreck in the Gulf of Mexico. They have crossed the Atlantic Ocean in both directions, sailed up to the Arctic ice edge setting a northern latitude record for an autonomous vehicle of 75.49°N and survived Southern Ocean storms to circumnavigate Antarctica.

The robustness of the underlying core components, a wind-powered vehicle capable of long-duration missions and a machine learning-based approach to vessel detection, makes Saildrone an ideal solution for persistent maritime domain awareness in any ocean.