FEATURES

How AI is Improving Onboard Operations

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As the use of Artificial Intelligence explodes exponentially across all industries, superyachts are learning how to harness its power for good.

When the topic of utilizing artificial intelligence in superyachting first rose to the forefront around five years ago, it seemed to many the stuff of dystopian science fiction: autonomous yachts, machines taking the jobs of crew, and the bridge being relocated to a windowless room on the lower deck.

But as AI makes its mark on every imaginable industry, it might actually be more friend than foe. Instead of diminishing the crew's role, it's being used with the aim of improving onboard operations and making life easier for all.

Even if AI seems to be a net positive so far, regulatory hurdles and questions over data reliability mean it's not without limitations. There are also environmental, ethical and legal matters to consider. Yet no matter how you feel about AI taking on a bigger role in yachting, it's a topic that can't be ignored. Shipyards, engine manufacturers and regulatory bodies certainly aren't. In addition to industry stalwarts, a multitude of startups are exploiting AI to streamline life on board. From energy management to route optimization and safety to hospitality, machine learning and generative AI are already transforming key aspects of yacht operation.

What if, for instance, crew could knock an hour off the time it takes to plan routes? With a weather synopsis function introduced in version two of its Compass navigation planning software, superyacht navigational management company dsnm is helping crew to do just that. Instead of having to analyze weather forecast data, crew can get a 250-word synopsis in about 10 seconds.

"Feeding weather data into open-source AI, we steer the AI through the raw data and explain who it's for so the information it sends back is useful for that yacht, highlighting each vessel and its parameters," says Stuart Denham-Harding, digital development manager at dsnm. "The synopsis is written for our reader – professional crew who have an understanding of weather but aren't meteorologists." Crew on the 600 yachts using Compass just press a button to prompt the weather synopsis, but in the future, dsnm plans to take more of a live approach, so the information will be continuously updated while underway.

Commercial shipping is ahead of the curve when it comes to harnessing AI for route optimization – and making real-time navigation decisions by itself. Marine AI, a software developer for autonomous shipping, has deployed its Guardian AI technology on a number of commercial vessels. It's yet to be used on superyachts, but Tom Rooney, the company's general manager, says that's just around the corner.

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Guardian AI takes inputs from vessel sensors and systems, such as radar, AIS, cameras and electronic charts, and uses AI to correlate all hazards and traffic in the vicinity. It then classifies them, tracks them, models their behavior and predicts their future path. “Guardian AI also has the capability of autopiloting the vessel either full time or condition-based where it could temporarily take control to avert a critical incident and pass control back when clear,” Tom says.

However, many in yachting are dubious of AI fully taking over the controls. “AI might take on a bigger role in commercial shipping as that industry is motivated by efficiency and cost cutting, but yachting is still a human-based industry, and yacht owners are more inclined to speak to a person on the bridge than a robot,” says Stuart. “And AI can’t replicate human intuition, experience and adaptability. In navigation, things can change quickly. An experienced crew member’s ability to consume information and analyze what’s outside the window is still better than what AI can do.”

Building on a decade of experience working with AI-based technologies, marine engine manufacturer Volvo Penta offers semi-automated steering tools, enabled by its Electronic Vessel Control (EVC) system. EVC uses AI algorithms to interpret operator input and environmental data, such as wind and current, to execute safe docking maneuvers. “They are aimed at simplifying tasks like maneuvering and station keeping,” says Johan Inden, president of the Marine Business Unit at Volvo Penta. “However, the captain is always in full control of the vessel.”

Volvo Penta’s tools must comply with global and regional marine regulations, including emissions, such as in IMO Tier III, and safety standards. “We are closely monitoring guidance around AI from government-regulated bodies to ensure our technologies maintain the highest levels of safety, reliability and compliance,” Johan says.

Trained by AI, SEA.AI’s machine-learing cameras can recognize obstacles, distinguish between types of hazards and assist in man overboard rescue operations. “SEA.AI systems act as an ever-vigilant lookout, providing 24/7 monitoring and detection in all visibility conditions,” says Solenn Gouerou, the company’s head of marketing. It can detect hazards such as a small boat, kayak or paddleboard with inadequate lighting, as well as people or buoys, providing early warnings that enable the crew to take preventative action. In polar or high-latitude regions, it can help detect icebergs or smaller ice floes that might otherwise go unnoticed. “This reduces the workload for yacht crew. It’s like having an additional crew member dedicated solely to watch.”

SEA.AI has launched a new offering, the SEA.AI Brain. Unlike earlier systems that relied on its proprietary cameras, the SEA.AI Brain is designed to work seamlessly with third-party cameras, updating them with smart alarms.

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“A camera is useless if no one is looking at it, and this is where the SEA.AI Brain shines,” Solenn says. “It alerts crew when it truly matters, ensuring they are notified even when busy with other tasks on board.” This technology can prove useful in enhancing security and warning of intruders by continuously monitoring for potential unauthorized approaches.

Sharing the Load

AI is also being utilized to improve onboard efficiency, whether reducing fuel consumption or cutting down on a yacht’s hotel power load. The Volvo Penta IPS professional platform features a new EcoMode that automatically starts and stops individual engines based on the power required for each situation.

“EcoMode optimizes fuel consumption and engine running hours while prolonging the operation time between required engine maintenance,” Johann says. “By automating routine tasks, such as managing engine load, we can create systems that give crew more time to focus on safety and guest comfort.”

The bespoke AI that Videoworks created for the 140-foot Rossinavi hybrid catamaran *Seawolf X* was presented at the 2024 Monaco Yacht Show. Fittingly dubbed Rossinavi AI, the system focuses on power management from the engine room to the laundry room.

“Rossinavi AI is based on an articulate set of machine learning for energy consumption forecasts, AI for energy consumption optimizations and generative AI for augmented reality and tech documentation browsing,” says Maurizio Minossi, CEO of Videoworks.

To help reduce energy demands, the system monitors everything from air conditioning to audio-video tech, all connected through a single network. Sensors monitor the energy usage of each cabin, noting whether guests are present. If the cabin is empty, the blinds can be automatically lowered so rooms stay cool and the air conditioning doesn’t overload. “By observing real guest behaviors, the AI refines the accuracy of those predictions and helps to optimize onboard energy use,” Maurizio says.

In *Seawolf X*’s laundry room, a stoplight system gives guidance on the best time to do a load to help optimize power consumption. “If there’s a green light, the crew knows they can run the washer and dryer but should refrain from doing so if the light is red. If it’s yellow, they can ask their manager for permission,” he says.

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A vital use of AI on board will be predicting problems before they arise. This can be seen in the form of engine-room maintenance, but it can also prove useful in yacht management, safety compliance and even accounting. When it comes to the former, Volvo Penta's EVC system supports predictive maintenance by monitoring a variety of functions related to engine health. "This helps us identify anomalies early and gives crew a chance to address potential issues before they escalate," Johan says. "This is one example of an improvement we've introduced that's shaped by what we've learned from the Volvo Group, where similar capabilities have shown promise in on-road applications, reducing downtime and improving reliability."

Rolls-Royce is also using AI in its engines. "As an engine designer and manufacturer, we use specific algorithms based on our product knowledge for prognostics and diagnostics," says Kevin Daffey, senior vice president of mobile automation at Rolls-Royce Power Systems. "We have an ongoing program to develop AI for further prognostics of our engines in the context of the vessel they are fitted."

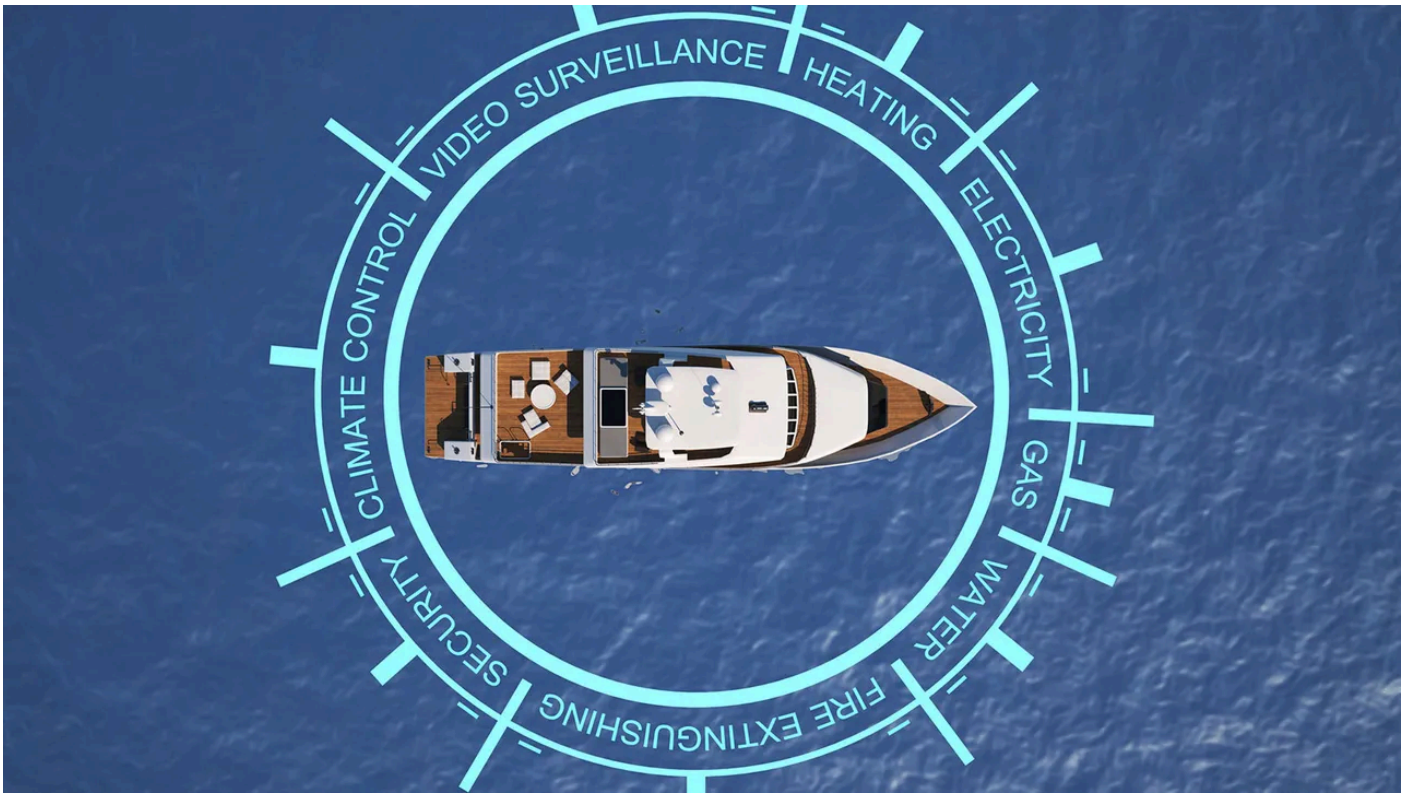
Future enhancements in predictive maintenance are an aspect of AI that shipyards are enthusiastic about. "The moment we will be able to prevent issues by using data and warn the crew to do some maintenance or change parts will be very exciting indeed," says Marc Levadou, Feadship's knowledge and innovation manager.

Yacht brokerage firm IYC is researching the expansion of its use of AI with NMEA 2000 signals, which will greatly assist in preventative maintenance. In the meantime, it's using predictive AI to streamline yacht management. IYC developed a proprietary software system, BLUE, for its yacht and fleet management that's designed to proactively identify issues before they escalate. "It simplifies life for crew members by offering real-time monitoring, automated scheduling of tasks and streamlined compliance tracking, ensuring the yacht operates at peak efficiency," says Cassandra Bruno, IYC's global yacht management director. "BLUE works as a virtual yacht manager that removes the risk of human error." The system is not intended to replace human expertise, she says, but to handle organizational tasks, allowing shoreside yacht managers to focus on vessel operations and provide personalized support to the captain.

New applications – many created by crew to solve a problem they experienced firsthand – are being rolled out in hospitality. Fabrizio Ottoni Limena, CEO of YachtMind, created an AI-powered assistant for chefs to help with designing menus and handling dietary preferences. However, YachtMind is currently in the midst of developments that will broaden its market reach, teases Fabrizio, who is keeping things under wraps.

At Your Service

Meanwhile, stews are utilizing the Claude AI assistant to edit emails and information for guests. Claude can also be used to recall guest preference sheets. By uploading preferences into Claude, crew can prompt it to answer questions about each guest – for instance, their morning coffee order.



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AI can also be used to help in inventories. Roy Chan, a luxury asset counsel in Asia with a focus in yachts, demonstrated how easy this could be in a LinkedIn post. Simply using the camera on his phone, he scanned a bar filled with different types of liquor bottles, uploaded the video into Google's Gemini AI and gave it a prompt to create an inventory list.

But before we go casting AI as some sort of yachting cure-all, it's important to note that it has its limitations. "Implementing AI systems presents many challenges for yachting companies, including the lack of good-quality training data, unreliable connectivity at sea, high implementation costs and resistance to change in quite a traditional industry," Cassandra says. As she notes, connectivity is key – an AI application that requires a high-speed connection won't function if the internet is down.

AI is only as powerful as the data it relies on. "Garb fers to the idea that if an AI model is trained on bad data, it will produce bad results. When it come inguishing between good and bad data but also having enough of the right data. "The value is in us life on board," Marc says, noting that Feadship prefers to use the term "data science" when speaki s a lot of data. Data from one yacht is not enough – it needs to be collected from different systems to ems need class approval to use the data."

Many of the regulatory bodies in yachting aren't y AI Register, a directory of certified AI providers and solutions, is focused on commercial offerings dy to manage AI – current regulations will have to go through a modification journey in order to mar stian Paolini, head of yacht competence center at Rolls-Royce Power Systems.

"Despite these obstacles, AI offers transformative opportunities," Cassandra says. "It can optimize crew and operations management, and

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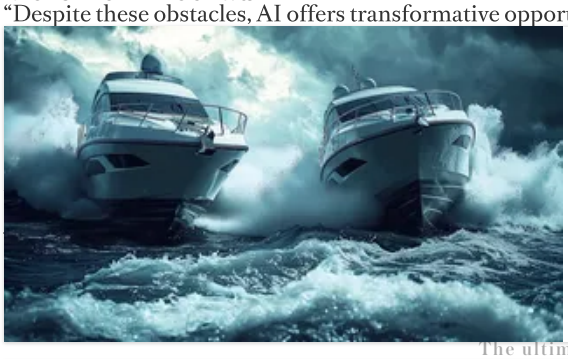

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