



The extra eyes on board: AI powered marine collision avoidance

The Swedish Club's analysis shows that about 80 per cent of all vessel collisions take place in water which would be defined as congested, such as approaching port, in the anchorage, in coastal waters, in canals and rivers, or in traffic separation scheme areas. The most immediate cause of a collision is lack of situational awareness – or, to put it another way, the bridge officer is not fully aware of what is happening around a vessel and is not aware of the consequences of what he does, whether action or inaction. So what are the solutions to this ongoing problem?

AI (artificial intelligence) is increasingly being used to prevent collisions and enhance fleet safety. A leader in this field is Orca AI. Founded in 2018, its team

brought together marine and technical experience to develop a system that uses AI technology and machine learning to increase situational awareness at sea.

Too much information

Philip Nielsen, General Manager Europe, explains: "Most accidents happen in congested areas such as the Straits of Malacca or the English Channel, or when vessels enter and leave ports. And it seems the technology [on the bridge] especially in these congested areas, gives the crew a somehow complex, confusing, noisy picture of the situation. Today's tools can actually lead to a low level of situational awareness.

There is naturally a good match between Orca AI and The Swedish Club in that both are working to the same goal – enhancing safety and efficiency and reducing incidents, he says.

"Interestingly, Orca AI's data confirms many of the collision hotspots identified by The Swedish Club's TELP (Trade Enabling Loss Prevention) solution.

"At Orca AI, we asked – what could we bring to the bridge that would be a real game changer?" explains Nielsen. "What kind of technology could we build that would enhance the capabilities we already had?"

Marine collision avoidance system

Orca AI's marine collision avoidance system collects data through vision sensors fitted to the bridge, which detect multiple objects in the vicinity, then fuses this visual feed with information from the other nine existing navigational sensors, such as radar and GPS.



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"We created a lookout unit which produces a computer vision via three high-definition cameras and three thermal cameras that can detect very small objects very early – such as fishing vessels - under very low visibility situations," adds Nielsen.

A machine learning algorithm then analyses and prioritises all the data and risks, helping the crew to understand clearly any difficult or dangerous situation and take the best decision.

Safety concerns

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"With so many inputs on the bridge, there are distractions, which are a particular problem among the younger and less qualified officers, causing confusion and

uncertainty," says Nielsen. "Also, we hear there is no effective onboard training tool for officers which is based on real life scenarios. From the office perspective there seems to be a lack of real time visibility regarding near misses of vessels – but also the risk patterns of the total fleet."

A lot of companies told Orca AI they were concerned as to whether their SMS (Safety Management System) was being followed and enforced correctly at all times, adds Nielsen. Also, in the event of an incident, how could a shipping company access real time voyage records in an easy-to-use way?

Orca AI has expanded its solution to a second level – creating a safety platform which maximises the value of the data gathered. "We are turning all the raw data into insight that will help mitigate risk and also safeguard the [shipping] company."

Using the system

Dor Raviv, CTO and co-founder of Orca AI, says that deep learning algorithms perform real-time marine target detection, tracking, classification and fusion, to create situational awareness in real time. "What do you do with this? You wrap it up and present it in a beautiful user interface which is very easy to understand. Aids to navigation, docked ships, navigational hazards are all labelled."

Shipping is changing and oceans are more congested than ever, says Raviv. "Younger crews have more access to technology and understand it better. AI algorithms work in the real world."

Making sense of the data

Vessels today create massive amounts of data, from sensors to visuals to action taken, he points out. Orca AI's system processes the data in the Cloud to generate meaningful insights for fleet managers, providing visibility and transparency even of near misses. "Orca AI is looking for anomalies. Vessels are expected to sail from point A to point B as fast as they can. We try to analyse, for example, why a vessel spent so much time outside port. We can benchmark

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operations and our platform allows analysis and debrief from a specific incident.”

A growing need

Orca AI is currently installed on 80 ships, including gas carriers, tankers, container ships and bulkers. Installation is designed to be simple – some clients have installed it by themselves.

Co-founder and CEO Yarden Gross told Triton that vessel numbers using the system exceed 100 by the end of 2021. Next year the number will be 300 and he expects to exceed 1,000 installations in



From left: Dor Raviv and Yarden Gross, co-founders of Orca AI.

2023. “The scale here is huge – some shipping companies started by installing the system on two or three vessels and are now looking to expand to the rest of the fleet.”

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“AI is an enabler but doesn’t necessarily create any value in itself,” says Gross. “Shipping companies want to see value, by enhancing safety and reducing cost, and that is what they are investing money in. It was important for us from the beginning to have a feedback loop and improve our offering all the time, deploying the capabilities that they are requesting.”

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The importance of connectivity

The rapid improvements in ship connectivity are the real accelerator. “Shipping has been super conservative, more than other industries. That is because ships have been isolated. But now there is a major change – connectivity is going to transform the entire industry and it will do it very quickly. When the ship is completely connected to the Cloud, you will be able to deploy technology much more easily and make the operation more efficient. These are exciting times.”

Orca AI can send data to the Cloud and in real time it can show and provide insights about specific ships, fleets, regions, etc., says Gross. “We can provide information about ships sailing in a dangerous way. Another use case is around claims management. We have ‘eyes’ on the ship; we see everything. Even a near miss is an incident, and something to be learned from.”

