

# Digital Ship

June / July 2021

www.thedigitalship.com

## Singapore start-up unveils plans for ground-breaking drone technology

Singapore start-up F-drones announced earlier this year its success in raising seed capital to further develop large scale autonomous drones for maritime logistics. *Digital Ship* spoke with Mr. Yeshwanth Reddy, CTO and co-founder of F-drones to find out how the investment will help the company develop a new ground-breaking drone capable of transporting 100kg over 100km.

**F**-drones is the first company in the world to provide 24/7 commercial Beyond-Vision-Line-Of-Sight (BVLOS) drone deliveries to ships. It is currently in the middle of expanding its drone delivery services and has devised an 18-month roadmap to develop and commercialise its technology. The first step in the roadmap is to conduct test flights on the Hyperlaunch, a drone that is able to lift 5kg over 50 kilometres – significantly more than any other drone’s capabilities today. F-drones hopes to commercialise this technology in the next several months.

Once completed, F-drones will pursue development of its next-generation drone, the Hyperlaunch Heavy (HLH). This will be a fully electric and autonomous proprietary drone capable of delivering 100kg payloads over 100km. Following the completion of documentation and certification work, the HLH is expected to launch in around 18 months’ time and will mark a significant milestone in drone capabilities.

### Design and technology

Both the Hyperlaunch and the HLH are based on F-drones’ proprietary design concept. The drones will each



*F-drones is developing a new drone technology that will be capable of delivering 100kg loads across a 100km range*

have two wings and eight motors to facilitate vertical take-off. The aircraft will be capable of performing a complete 90-degree rotation to cruise like an aeroplane. “Such an innovation in the design has enabled us to develop these aircrafts to lift heavier payloads over longer distances than any other option out there,” Mr Reddy told *Digital Ship*.

“Our drones do not have any single point of failure, meaning we have redundancies in every component. In

the unlikely event of two rotors failing for example, the system can still safely complete its delivery mission.”

The current drone technology can withstand winds up to 50 kilometres per hour, giving an 80-90 per cent uptime in locations with very high winds and stormy weather. F-drones is currently planning all future drones to be fully operational in all weather conditions.

The current technology also features a traffic light system that

*continued on page 2*

## IN THIS ISSUE

### Advanced Tech

 Using AI to enhance navigational safety - 6

6 maritime start-ups to watch out for - 8

Start-up Orca AI raises \$13M in Series A funding - 15

### Cybersecurity

 Epsco-Ra unveils the next-generation of shipboard cybersecurity - 16

Managing cyber risks of ECDIS - 18

University of Plymouth recognised for work on maritime cybersecurity - 20


### Satcoms

 OneWeb completes successful launch of 36 satellites - 24

IEC Telecom becomes official Iridium GMDSS provider - 24

The role of Singapore start-ups in Singapore’s maritime digital transformation - 25

### Software

 Using AI and machine learning to optimise vessel health - 28

Crew completes remote sensor installation - 33

Danelec and ioCurrents partner to help operators make sense of data - 34

changes from red to green, alerting crew onboard the vessel when it is safe to approach. This enables crew to simply pick up or drop off their items without having to operate the drone in any way, as this is all done by experienced operators onshore. The drones also feature multiple onboard cameras to identify the surrounding environment and potential risks. According to Mr Reddy, F-drones is looking at developing a computer vision technology that is capable of identifying the safest spot for a drone to land on.

It is also possible for multiple drones to be operated by a single operator. This reduces the time needed to deliver several packages to a single vessel. "The aim with the Hyperlaunch and Hyperlaunch Heavy is to cut down delivery times by up to 80 per cent," Mr Reddy confirmed.

The drones feature rechargeable and switchable batteries, enabling quick and timely battery changes. Going forward with the HLH, Mr Reddy admitted they will have to "be a bit more creative on how to swap these batteries as they are pretty heavy."

F-drones is currently working to minimise the size of the components with the goal of producing compact drones that are able to fit into small spaces, while retaining the heavy payload needed to transport large items such as vessel spare parts.

## Funding and development

The seed capital round, which was led by ship manager Eastern Pacific Shipping (EPS), will enable F-drones to spend the next 18 months preparing HLH for operation, and following that to continuously advance the technology.

F-drones' relationship with EPS extends back to November 2019 when the start-up was selected to join the Eastern Pacific Accelerator Powered by Techstars, a programme that helps start-ups to develop their technology and bring it to the maritime industry. "The most important thing for us was to do some of the flight tests and to understand the operational requirements. We didn't have the technology before we joined the programme, we just had an idea and the passion, but EPS trusted us and they let us leverage their resources to do some of the initial trials. We couldn't have imagined how we would

have done our initial trials without the active involvement of EPS. The accelerator has acted as a catalyst to our development from both a solution building angle and from an industry network point of view."

Following involvement in the EPS programme, F-drones became the first company to secure a permit and complete commercial drone deliveries to vessels. From then on, the company started to gain significant traction. "We've been really excited with the closing of this half because now we have the resources to go ahead and commercialise, expand and advance the technology."

## Expanding footprint

As part of the roadmap, Mr Reddy envisions rolling out the drone technology to at least four additional ports beyond Singapore. "We have identified a few ports that we hope to be operational in including Panama, Gibraltar, UAE and Sri Lanka. We're quite advanced in terms of our discussions with the local authorities and shipping companies and so we're really hoping to be operational in these ports later this year."

Wider global expansion of the drone technology will in some part be determined by regulation, which Mr Reddy sees as a bit of a bottleneck. "Often we see the technology available and ready, but the regulation and societal aspects are still trying to catch up." For F-drones, a major advantage is that the technology operates over water, making it inherently safer than similar technology operating over land. According to Mr Reddy, this has led to promising conversations with various regulatory authorities. Moreover, as the first company in Singapore to deliver drone technology for maritime operations, F-drones has worked in close collaboration with authorities to make the technology safe and effective.

## Partnerships

F-drones is now looking for some "game-changing partnerships both on the commercial side as well as the technology side." This includes shipping companies with a strong regional presence to enable the start-up to rapidly commercialise the technology. The ultimate goal is to establish a strong range of partnerships that will

facilitate a global network of drone deliveries to improve shipping and port efficiency.

On the technology side, F-drones is on the lookout for "partners who can help us be ahead of the curve. We are already working in partnership on the computer vision side, autopilot development, propulsion systems, airframe manufacturing, and much more. We are focused on building the best drone delivery solution for maritime logistics and as is the case with most big tech start-ups or companies, we need such partnerships to be able to bring out the best in each other."

Mr Reddy noted that the funding awarded to F-drones has provided an assurance to its current and potential partners to go ahead and take this on for the long run. "It's given us a lot of confidence that people will be able to trust in us."

Mr Reddy confirmed that since establishing F-drones, feedback has been positive and there has been an overwhelming amount of excitement for the opportunities the technology will bring. "Since day one we could see the support, and this has only increased as we have progressed. More and more people are showing confidence in what we are doing. One of the testimonials to everything is that the major investors who have invested in our last round are all from the shipping industry, so they know the industry in and out and we feel this is a testimonial to what we are trying to solve."

## Moving forward post-pandemic

Despite the global pandemic, the start-up has seen "strong traction, not just in Singapore, but around the world where people are actually looking forward to us introducing this technology," Mr Reddy told us. One of the bottlenecks has been the restricted travel across borders. "We've been slightly hampered by the fact that we are unable to kind of showcase or expand our physical presence."

F-drones is determined to advance its drone technology to meet some of the major shipping and operational problems in Singapore, and worldwide. "We are quite confident that by the end of the year we will have out together a fantastic solution, just in time to expand globally when the pandemic subsides."

# 6 maritime start-ups to watch out for

In late 2019, Inmarsat published a report that estimated the value of ship technology to rise to US \$278bn by 2030, with an exponential growth for maritime start-ups predicted<sup>[1]</sup>. Many start-ups entering the maritime industry today are bringing innovative solutions to help tackle safety, security, and environmental challenges. Here are 6 start-ups to watch out for over the next few years.

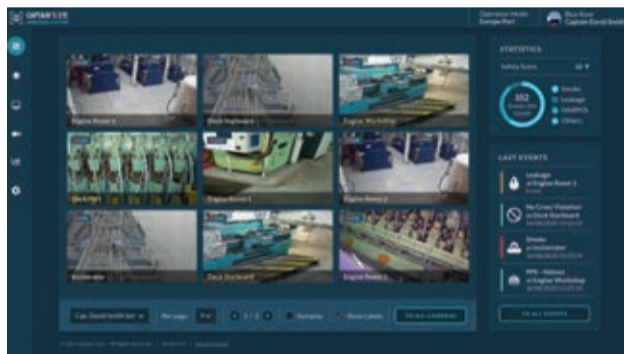
## CAPTAIN'S EYE

[www.captain-eye.com](http://www.captain-eye.com)

Captain's Eye delivers real-time video analytics based on an AI algorithm to detect and alert the captain and crew to safety, security and operational problems.

Videos can be provided on demand to support investigation and to enable real-life scenario learning to prevent future incidents.

The goal of Captain's Eye is to set a new operational standard for the maritime industry for improving the safety culture and cost-effective management.



The onboard system of Captain's Eye runs real time AI video analytics on all cameras with a control panel for the Captain and the crew

## CYDOME

[www.cydome.io](http://www.cydome.io)

Cydome provides fleet wide cyber coverage for shipowners and operators to ensure protection and enable readiness for any regulatory inspection. Through a real-time map of the assets connected to a ship's network, Cydome continuously monitors assets' behaviour and identifies any irregularities that could harm a vessel's daily routine, generating alerts on immediate risks.

The solution comprises a hardware appliance with software that connects to the vessel's network. Once installed, the solution maps all of the vessel's assets – such as its communication system, engine and generator – seeking out vulnerabilities and patching them.

The Cydome team consists of maritime and cybersecurity professionals, ex-naval officers, big data, data privacy and cybersecurity experts.



Cydome delivers a cybersecurity suite for fleets, offshore facilities and ports

## MARINSPECTOR

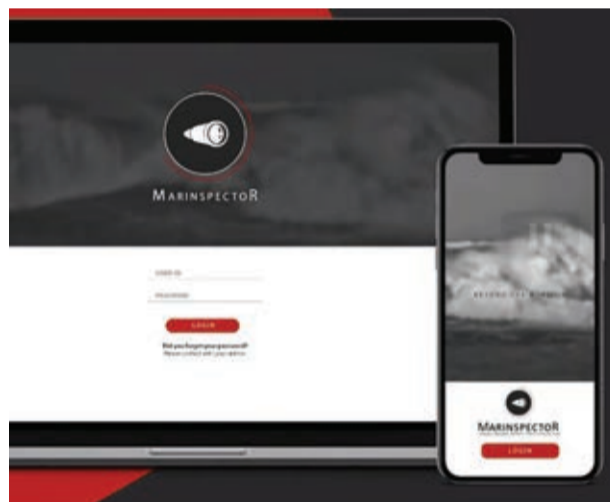
[www.marinspector.com](http://www.marinspector.com)

Marinspector is a remote ship inspection tool to help inspect ships safely and efficiency, without any restrictions. It provides real-time streaming with mobile devices and with the ability of remote camera control. The tool encourages crew to engage in the inspection process.

Drawing and annotation tools deliver detailed explanation over screenshots.

Marinspector uses smart encoding for bandwidth and latency optimisation and adapts to connection quality. This ensures there is uninterrupted recording during the session.

Recordings of inspections are stored on servers and can be accessed from anywhere. Links can also be sent to enable others to access the recording.



Marinspector live streams remote inspections onto desktop or mobile

## NIDO ROBOTICS

[www.nidorobotics.com](http://www.nidorobotics.com)

Nido Robotics manufactures underwater drones that are used to inspect, research and maintain ships without putting human lives at risk.

The user selects one of two robots and fills in a few details online before the robot is shipped to the user. Each robot comes with two hours of battery power.

The drones are provided on a subscription-based service. Nido Robotics puts its focus on becoming a technology partner rather than a retailer.



The Sibiu Nano is a small, lightweight remotely controlled "Underwater Drone" primarily intended for inspection tasks in shallow waters down to -100m

## SEA ERRA

[www.seaerra-vision.com](http://www.seaerra-vision.com)

Sea Erra has developed AI-based solutions that improve underwater vision and visibility to boost safety at sea and monitoring capabilities.

SeaErra's products and solutions are based on patented and proprietary technology in the field of image enhancement and restoration in scattering media. Methods are based on analysing the physical image formation model and developing algorithms which reverse the optical effect.

The patented algorithms are applicable in any type of water or light conditions, they have low complexity and require minimum calibration.

The technology is provided in 3 configurations:

- Standalone Software
- Proprietary Camera
- SDK for integration in other H/W systems or cameras



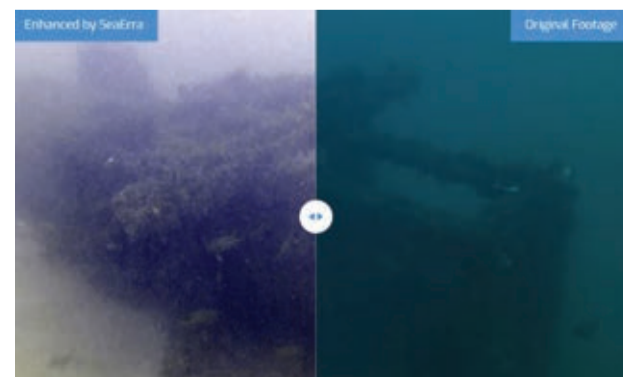
Spoolify analyser assists shipowners, ship managers and vendors in visualising key aspects of their operations

## SPOOLIFY

[www.spoolify.io](http://www.spoolify.io)

Spoolify is an AI-based platform that helps match service-related jobs in the maritime industry with the right skilled personnel, improving productivity and efficiency onboard. The goal of Spoolify is to reduce the supply chain carbon footprint by using proprietary skill mapping algorithms and enable better planning, telecommunication & coordination.

Spoolify determines the best location for carrying out a job cost effectively, based on the ship route and skill availability. Its workspace tool uses integrated features such as video calls, direct messaging, real-time technician tracking and remote assistance for job completion.



Original footage versus footage enhanced by SeaErra

[1] [www.inmarsat.com/en/insights/maritime/2019/trade-report.html](http://www.inmarsat.com/en/insights/maritime/2019/trade-report.html)

# Mitsubishi Ore Transport crew complete remote sensor installation

www.mot-tky.com  
www.nautiluslabs.com  
www.hoppe-marine.com



*Matt Heider, CEO, Nautilus Labs*

Crew onboard a Mitsubishi Ore Transport vessel have completed remote installation of sensors used to collect data and provide information on vessel performance.

Diamond Bulk Carriers, a subsidiary of Mitsubishi Ore Transport, originally partnered with Nautilus Labs and Hoppe Marine to maximise vessel and voyage profits and reduce carbon footprint by acquiring greater access to vessel performance data provided by the Nautilus platform. Hoppe Marine was originally enlisted for instrumentation, installation services, and signal aggregation for the vessel owned by Mitsubishi Ore Transport. Hoppe transmits vessel data back to shore as part of the “Data Butler” program, with which Nautilus, as an interoperable solution, integrates via an API, to access the vessel’s sensor data.

However, due to global travel restrictions, the sensor installation could not be conducted by Hoppe's team. The marine service provider guided Mitsubishi Ore Transport’s crew through a remote crew-led installation, allowing them to access a stream of high frequency sensor data used to inform Nautilus’s optimal operating recommendations powered by vessel-specific machine-learning based models.

Shusuke Miyazaki, general manager at Diamond Bulk Carriers, said: “Having a crew install sensors was the first time in our and Mitsubishi Ore Transport’s history. We’re excited to collect and receive our vessel’s data to optimise our vessel operations. Nautilus’s interoperability and the ability to integrate with any third-party provider or OEM made the deployment into Hoppe’s Data Butler easy and seamless, allowing our teams to access a single source of truth, fostering cross-departmen-

tal collaboration. Deploying Nautilus Platform is an important step for our business in achieving meaningful savings and reduced emissions.”

“We’re proud of our crew, installing the sensors in addition to their daily schedule. We’ve experienced a great partnership with Diamond Bulk Carriers, Nautilus, and Hoppe based on detailed and transparent communication. By using Nautilus Platform, we empower all stakeholders to access the same information to drive collaboration, transparency, and accountability while promoting greater sustainability,” said Fumiyuki Yasuda, marine management group technical team leader at Mitsubishi Ore Transport.

“Especially during these unprecedented times, we’ve seen that data and the insights it brings are key to success,” commented Matt Heider, CEO at Nautilus Labs. “By being an interoperable software and working with our partners to create creative solutions to overcome obstacles, such as travel restrictions when installing sensors, we enable shipowners and operators to access a predictive decision support tool that combines all different data sources and unifies all stakeholders. The crew-led install by Mitsubishi Ore Transport is a great example. We’re looking forward to working on meaningful voyage profit uplifts and increased sustainability with Diamond Bulk Carriers.”