



# SophyAI Platform and Deep Sphere Testing Field

A path through robotics, Neural Network Digital Twin and Agent AI

**Roberto Navoni, CEO**

IT Patent N. 102018000009442

EU Patent N. EP3867841B1

# SophyAI stood out...



- Selected by Open Italy and TERNA for a project implemented in 2023
- Winners of ENI's Call For Safety 2021
- Among the 10 Selected from Open Italy's Demo Day 2021
- Winners of the Innovation Day of RINA 2020
- Selected by California Incubator 2019 (SophyAI for Digital Twin) Plug and Play
- Innovation Award 2019 (Autonomous Tractor) Verona Agricultural Fair
- Overall Winner of Business Meets Innovation (Bosch Smart city
- Winner of Calcestruzzi Industrial Safety and Security contest ) 2018



# National and International patents

## ☐ 1. Sistema e metodo di ispezione di una galleria idonea al trasporto di acqua, liquami o liquidi in genere

| ★ | Inventore:                             | Richiedente:    | CCB:                                         | CIB: | Informazioni relative alla pubblicazione: | Data di Priorità: |
|---|----------------------------------------|-----------------|----------------------------------------------|------|-------------------------------------------|-------------------|
|   | PIANTELLI<br>LUCA<br>NAVONI<br>ROBERTO | IREN S P A [IT] | E03F7/12<br>G08C17/02<br>G08C2201/40<br>(+1) | E03F | IT201900002029 (A1)<br>2020-08-12         | 2019-02-12        |

## ☐ 2. Sistema e metodo di acquisizione dati da una pluralità di contatori intelligenti tramite volo autonomo di uno o più droni

| ★ | Inventore:                                      | Richiedente:                                         | CCB:                  | CIB: | Informazioni relative alla pubblicazione: | Data di Priorità: |
|---|-------------------------------------------------|------------------------------------------------------|-----------------------|------|-------------------------------------------|-------------------|
|   | TESSERA<br>MICHELE<br>NAVONI<br>ROBERTO<br>(+2) | CAP HOLDING SPA<br>[IT]<br>ARCHON TECH S R L<br>[IT] | G01D4/00<br>G05D1/102 | B64C | IT201800010936 (A1)<br>2020-06-10         | 2018-12-10        |

## ☐ 3. Sistema di controllo e gestione di un processo all'interno di un ambiente attraverso tecniche d'intelligenza artificiale e relativo metodo

| ★ | Inventore:        | Richiedente:                 | CCB:                                 | CIB: | Informazioni relative alla pubblicazione: | Data di Priorità: |
|---|-------------------|------------------------------|--------------------------------------|------|-------------------------------------------|-------------------|
|   | NAVONI<br>ROBERTO | LASER NAVIGATION<br>SRL [IT] | G06N3/0427<br>G06Q10/06<br>G06Q10/08 | G06K | IT201800009442 (A1)<br>2020-04-15         | 2018-10-15        |

## ☐ 4. DISPOSITIVO AUTOMATICO DI ILLUMINAZIONE ARTIFICIALE

| ★ | Inventore:                            | Richiedente:                                   | CCB:                                | CIB: | Informazioni relative alla pubblicazione: | Data di Priorità: |
|---|---------------------------------------|------------------------------------------------|-------------------------------------|------|-------------------------------------------|-------------------|
|   | NAVONI<br>ROBERTO<br>SOZZA<br>ALBERTO | CLASSIC LIGHT S R L<br>ELES LUCE S R L<br>(+2) | H05B47/11<br>H05B47/19<br>Y02B20/40 |      | ITMI20130549 (A1)<br>2014-10-10           | 2013-04-09        |

## ☐ 5. PALLA DA GIOCO CON CIRCUITERIA ELETTRONICA

| ★ | Inventore:        | Richiedente:              | CCB:                                                    | CIB: | Informazioni relative alla pubblicazione: | Data di Priorità: |
|---|-------------------|---------------------------|---------------------------------------------------------|------|-------------------------------------------|-------------------|
|   | NAVONI<br>ROBERTO | LASER NAVIGATION<br>S R L | A63B2024/0028<br>A63B2024/005<br>A63B2071/0625<br>(+16) |      | ITMI20130059 (A1)<br>2014-07-18           | 2013-01-17        |

## ☐ 6. CONTENITORE PER IL TRASPORTO DI CAMPIONI BIOLOGICI.

| ★ | Inventore:                            | Richiedente: | CCB:                                               | CIB: | Informazioni relative alla pubblicazione: | Data di Priorità: |
|---|---------------------------------------|--------------|----------------------------------------------------|------|-------------------------------------------|-------------------|
|   | FORNI<br>DANIELE<br>NAVONI<br>ROBERTO | SOL SPA      | A01N1/0273<br>B01L2200/185<br>B01L2300/023<br>(+2) |      | ITMI20120943 (A1)<br>2013-12-01           | 2012-05-31        |

**System for controlling and managing a process within an environment using artificial intelligence techniques and relative method**

**Patent number: EP3867841B1**

**Type: Grant**

**Filed: 10 15, 2019**

**Date of Patent: Sept 13, 2023**

**Assignee: Laser Navigation S.R.L.**

**Inventors: Davide Venturelli, Roberto Navoni, Paolo Velcich**

**Ground movement system plugin for VTOL UAVs**

**Patent number: 10967960**

**Type: Grant**

**Filed: April 6, 2016**

**Date of Patent: April 6, 2021**

**Assignee: Archon Technologies S.R.L.**

**Inventors: Davide Venturelli, Francesca Lorenzoni, Roberto Navoni**

**Docking and recharging station for unmanned aerial vehicles capables of ground movement**

**Publication number: 20190039752**

**Type: Application**

**Filed: February 23, 2017**

**Publication date: February 7, 2019**

**Inventors: DAVIDE VENTURELLI, ROBERTO NAVONI, PAOLO VELCICH**

# Our customers who have decided to use SophyAI and our technology

## Autonomous Robotics



## Infrastructure Managements



POLITECNICO  
MILANO 1863



## HD & AI Data Collection Advanced NLP

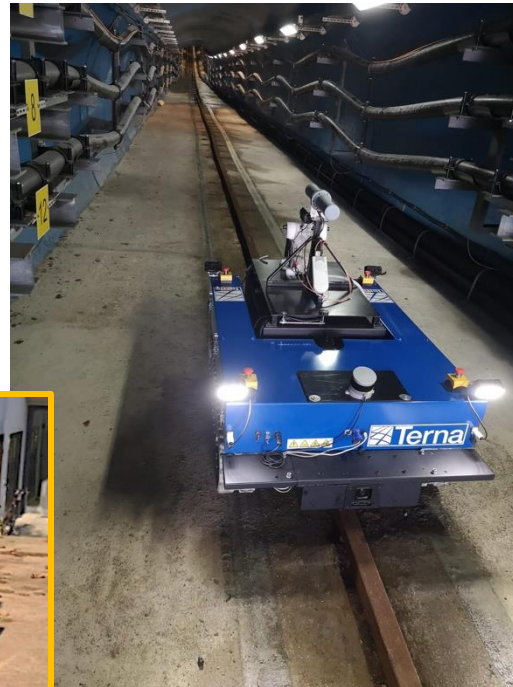
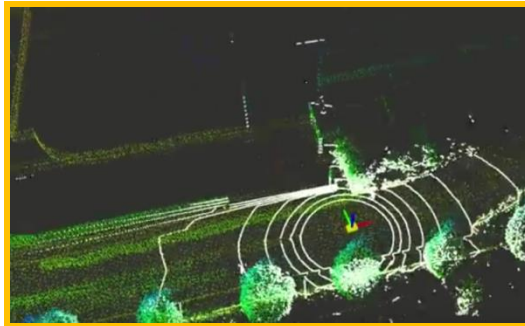


*List of clients not exhaustive*

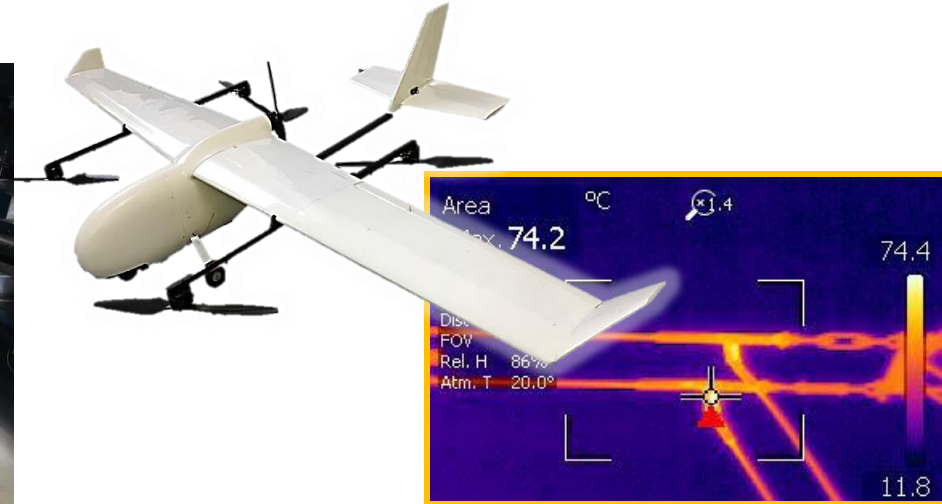
# The company background: Robotic applications in non-destructive inspection services



**Autonomous rovers** for road-work operation and gallery inspections safety and indoor SLAM



**Vertical Take Off and Landing drone** for long range inspections



**Autonomous bathymetry with sonar**



# GROUP EVOLUTION



|                                                                                                                                              |                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>2008</b><br><b>BEGIN DEVELOPMENT</b>                                                                                                      | LASER NAVIGATION, FOUNDED IN 1971, BEGINS DRONE TECHNOLOGY RESEARCH LEVERAGING ITS EXTENSIVE BACKGROUND AND INTELLECTUAL PROPERTY OF 3D MAPPING, SENSORS, WIRELESS COMMUNICATIONS AND GPS TECHNOLOGY                                                                                                       |
| <b>2009</b><br><b>ARDUCOPTER PROJECT</b>                                                                                                     | CEO, ROBERTO NAVONI, JOIN DEVELOPMENT OF OPEN SOURCE AUTOPILOT PROJECT 'ARDUCOPTER' <i>(NOW THE MOST POPULAR PLATFORM WORLDWIDE)</i>                                                                                                                                                                       |
| <b>2009</b><br><b>VIRTUAL ROBOTIX</b>                                                                                                        | LASER NAVIGATION CREATED VIRTUAL ROBOTIX BRAND TO PURSUE DRONE DEVELOPMENT AND LAUNCH <a href="http://WWW.VIRTUALROBOTIX.COM">WWW.VIRTUALROBOTIX.COM</a> A DIY COMMUNITY WITH MORE THAN 3000 ACTIVE MEMBERS TODAY                                                                                          |
| <b>2010-2013</b><br><b>VR BRAIN DEVELOPMENT AND AI ALGORITHMS.</b>                                                                           | LASER NAVIGATION DEVELOPS ITS PROPRIETARY FLIGHT TECHNOLOGY. ALL DEVELOPMENT IS FUNDED VIA 3RD PARTY PROJECTS (GOV, UNIV. & PRIVATE) . START TO IMPLEMENT AI ALGORITHM ON OUR DRONE APPLICATION                                                                                                            |
| <b>2014</b><br><b>MINIATURIZATION</b>                                                                                                        | LN INVESTS INTO MINIATURIZATION (<400GR), FLIGHT TIME ( > 1 HOUR) AND ADVANCED FEATURES (FOLLOW ME)                                                                                                                                                                                                        |
| <b>2015-2016</b><br><b>COMPANION COMPUTER NEURON II , ERA OF AUTONOMOUS DRONE BEGIN</b>                                                      | MORE THAN 2500 CURRENT BETA CUSTOMERS/ TESTERS WORLDWIDE , WORKING ON INDOOR LOCALIZATION , OBSTACLE AVOIDANCE , AUTO RECHARGING DOCKING STATION                                                                                                                                                           |
| <b>2016-2024</b><br><b>ADVANCED COMPUTER VISION TECHNOLOGY FOR NAVIGATION AND SAFETY IN COMPLEX ENVIRONMENTS. NLP ALGORITHMS DEVELOPMENT</b> | AFTER SOME PROJECTS IN ROBOTICS VISION WITH TRADITIONAL ALGORITHMS WE START TO INVEST IN ADVANCED TECHNOLOGY BASED ON GPU ACCELERATION AND ON CNN /RNN NEURAL NETWORK FOR FAST OBJECT LOCALIZATION AND CLASSIFICATION. <b>SOPHYAI</b> PLATFORM BECOME A REALITY. SOPHYAI NOW INTEGRATES NLP FUNCTIONS TOO. |

# CORE TECHNOLOGY PLATFORM



LASER NAVIGATION HAS DEVELOPED A ROBUST, COMPREHENSIVE DRONE TECHNOLOGY PLATFORM CAPABLE OF SUPPORTING ANY CONSUMER OR COMMERCIAL MULTI-COPTER, FIXED WING, WATER OR LAND BASE UAV WE ARE WORKING TO CERTIFY OUR TECHNOLOGY TO AERONAUTICAL QUALITY CERTIFICATION EUROCAE 12D

## VR BRAIN – AUTOPILOT -

- 32 Bit Micro Flight Control
- Drivers + firmware
- Supports: 8 flight modes, Waypoint, RTL and Follow



## VR VISION SYSTEM

- LASER NAVIGATION
- STEREO CAMERA.
- MONOCULAR CAMERA
- ADVANCED SONAR TECHNOLOGY
- Supports MAV link



## VR TELEMETRY

- SDR Technology
- Multi protocol and carrier
- Support telemetry c2c and video channel
- Supports MAV link



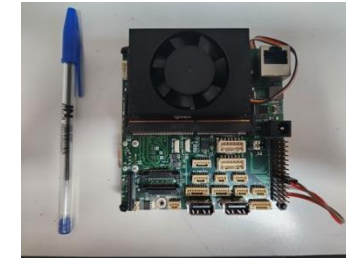
## VR GIMBAL Standard and Digit

- Movement sensor
- Stabilization software
- 3D Magnetometer, Gyroscope & Accelerometer



## VR GPS Ublox 9

- GPS, Glonass, Galileo Constellations
- TTFF < 1 Second
- Achieves 24+ Sats & < .07 HDOP



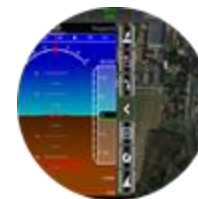
## VR SOPHYAI – ADVANCED AI ROBOTICS SYSTEM

ROS BASED COMPANION COMPUTER:

- NEURAL NETWORKS
- LOCALIZATION AND MAPPING SLAM ALGORITHMS
- REAL TIME COMMUNICATION.
- ADVANCED CLOUD INTERFACE

## VR GROUND STATION

- Virtual Flight Control
- System Configuration
- Telemetry & OSD
- Map and waypoint navigation



# VR MOBILE GROUND STATION

## VR PAD STATION



Click on video to know more



AVAILABLE ON  
GOOGLE PLAY



### Description

Already in its 10th release, VR Mobile Ground Station is a fully equipped ground station designed for professional drone operators. It's a one stop shop to operate and configure any type of drone, plane or rover based on arducopter, open pilot and aeroquad.

### Key functions

- Telemetry in Manual Flight
- Define Polygon and Plan Survey Map Atzimutal and 45°
- Integration with major application : Pix4D , Photoscan , APS Menci



Click on video to know more



16 YEARS RESEARCH  
AND DEVELOPMENT



MORE THAN 3000 BETA  
TEST CUSTOMERS

## AUTOPILOT

### Description

VR Brain is the smallest, lightest 32bit autopilot available on the market today. Highly reliable and thoroughly tested, it is in its 5th generation and comes in 2 different versions: pro and micro.

### Key Functions

#### VR Brain 5 / VR Brain X Core OEM

The best solution for professional and complex applications. Comes with a ARM 32-bit Cortex M4F CPU, 192Kb of RAM and a 64Gb flash memory slot. It supports up to 3 IMU with a 2 SPI expansion BUS, 1 sonar input and 2 serial port for GPS interface. Further more VR Brain has an integrated CAN BUS for external sensors integration used mainly for advanced industrial applications. Comes in 2 versions standard (with no external sensors) pro (with 2 certified external IMUs).

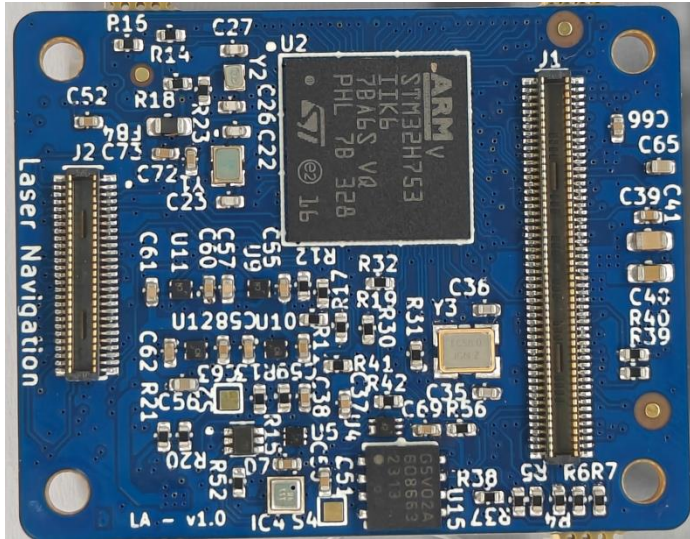


#### VR Micro

The best solution for dimension and weight sensitive applications. With its 9gr weight and 3.7cm size, it's the smallest 32Bit autopilot available on the market today. It Runs the RTos operating system and carries MEMS accelerometer, gyro and barometric pressure sensors. It can connect up to 1 external GPS and 1 external magnetometer and comes equipped with an SD card slot for telemetry logs data storage.



## ADVANCED VR BRAIN X PRO AUTOPILOT



VR Brain Autopilot :

STM32H7 Main processor

1 Heater over Sensor:

- 3 X BMI088 Acc / Gyro
- 1 X BMI1150 Magnetometer
- 1 X BMP388 Barometer
- 1 X MS561101

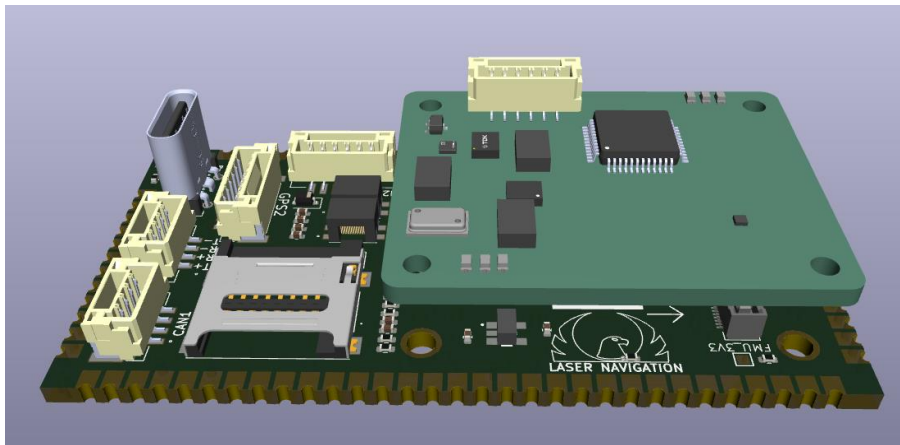
STM32F1 I/O CoProcessor.

- 7 Usart
- 16 PWM Out
- 2 CAN BUS
- 1 LAN

Firmware available :

Ardupilot , PX4 and custom firmware.

Support different kind of drone configuration : Plane ,  
Quadcopter , Boat , Rover ecc.



# VR GPS

## GPS

Click on video to know more



HIGH PRECISION IN  
ANY CONDITION

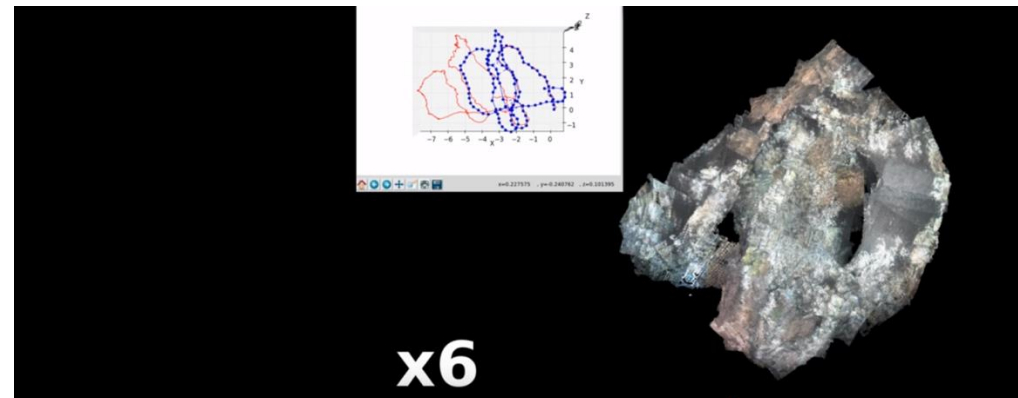
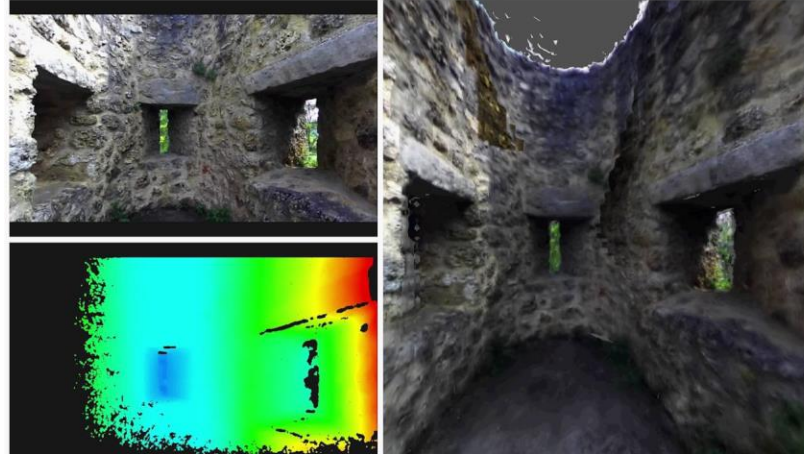
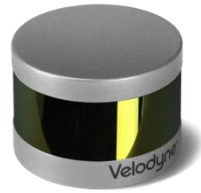
### Description

With 15+ years of experience and the production of 15.000+ devices, VR GPS is a incredibly reliable and precise machine. The latest version VR GPS Ublox 9 Multi features a multi constellation system with the highest level of accuracy available on the market today.

### Key Functions

- Ublox Muti-constellation (Gps, Glonass, Galileo, Beidu)
- High precision with up to 24 sats and  $<0.7$  HDOP and a
- Small and light only 3.7x3.7 cm for 19gr
- Fast with less than a second hot-start





2014

## + INTERNET ON BOARD 100%

The Neuron 2.0 which will enable the drone to the cloud during flight by leveraging 3G/4G connections and a Linux OS, CNN Neural Network.

## + AUTO ROUTING 100%

A software application, which is also referred to as 'passive obstacle avoidance', enables the drone to automatically re-route the drone flight path when an obstacle is encountered.

## + OBSTACLE AVOIDANCE 100%

We are actively testing and researching different solutions for an active obstacle avoidance including Lidar, 3D visual and multiple sonar mash-up. The solution is still at an early stage but we are experiencing promising results.

## + DUAL GPS & INDOOR 100%

Two EU financed research projects lead by Virtual Robotix:

- GINSEC is a dual antenna GPS technology that can define direction and stabilization without the magnetometer and inertial sensors
- EIGER a new GPS technology based on ultra wideband for indoor usage with an accuracy of 20 cm.
- SLAM : Localization and Mapping Technology

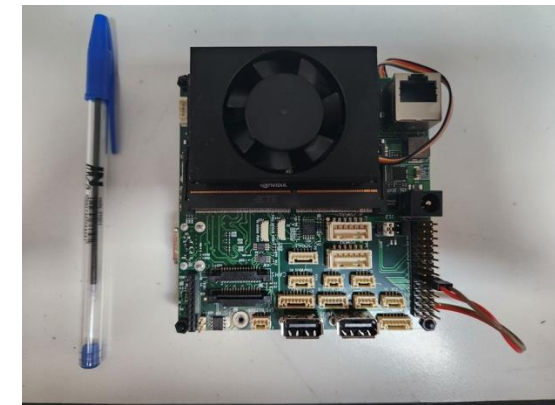
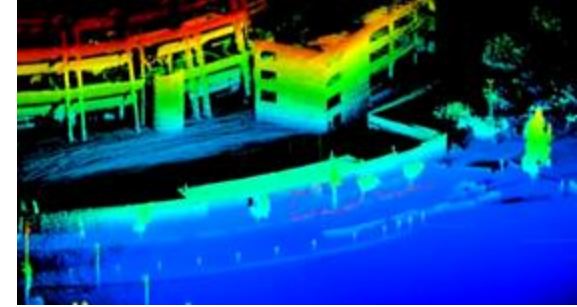
## + NEURAL NETWORK 100%

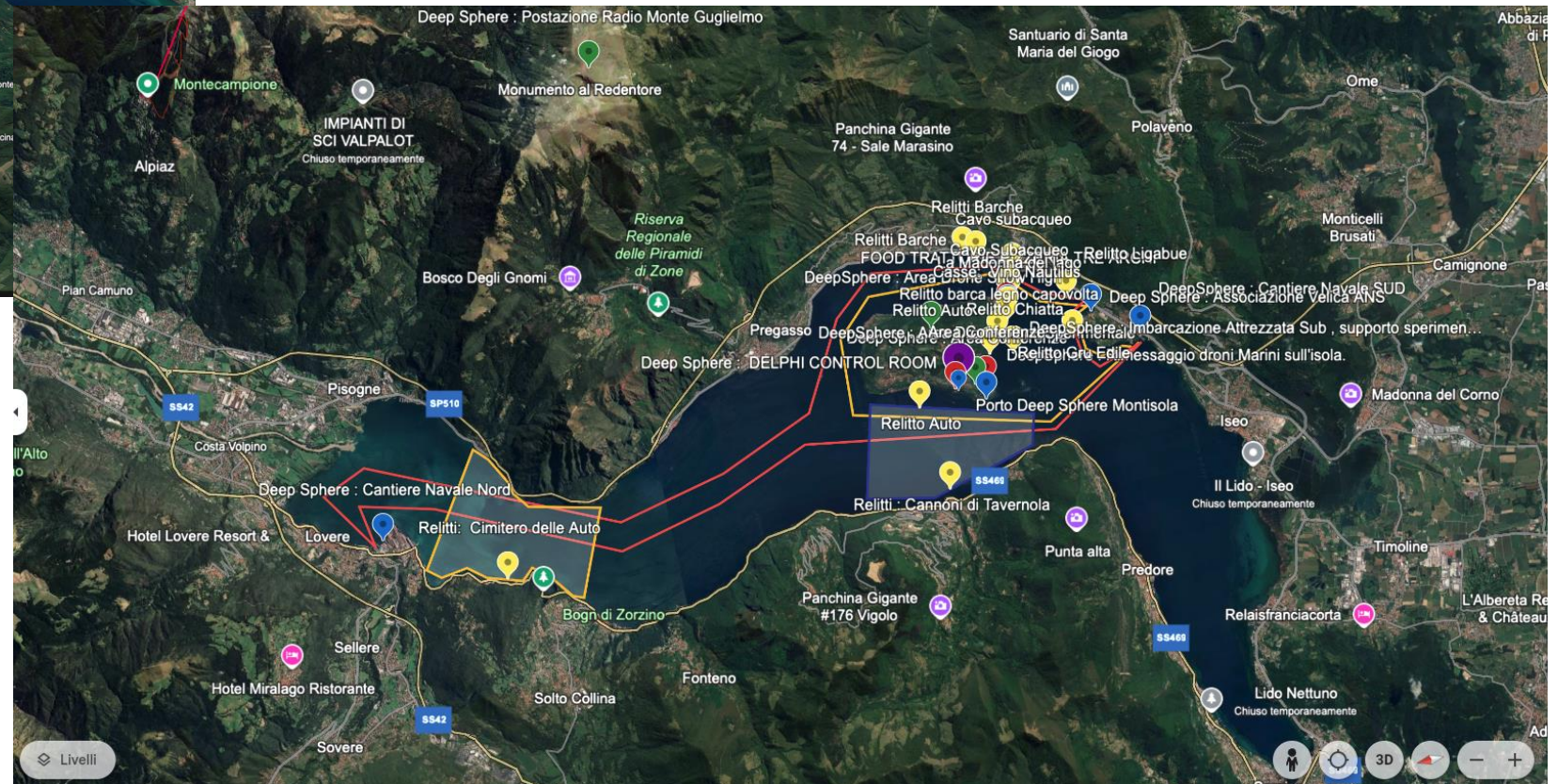
Add support of Neural Network for classification and localization algorithm The application are for autonomous navigation fast algorithm for collision detection

2015

2016

2024

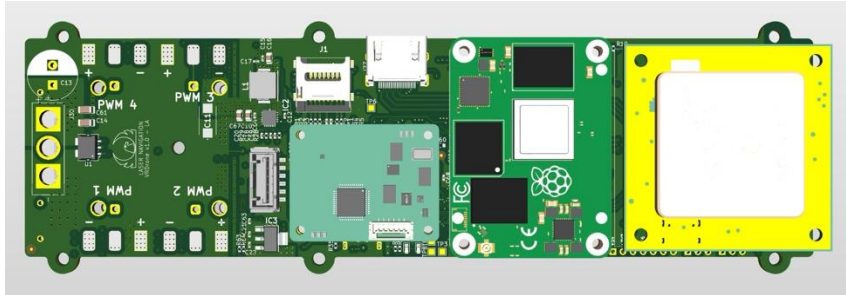








# Robotic use Cases with SophyAI on board



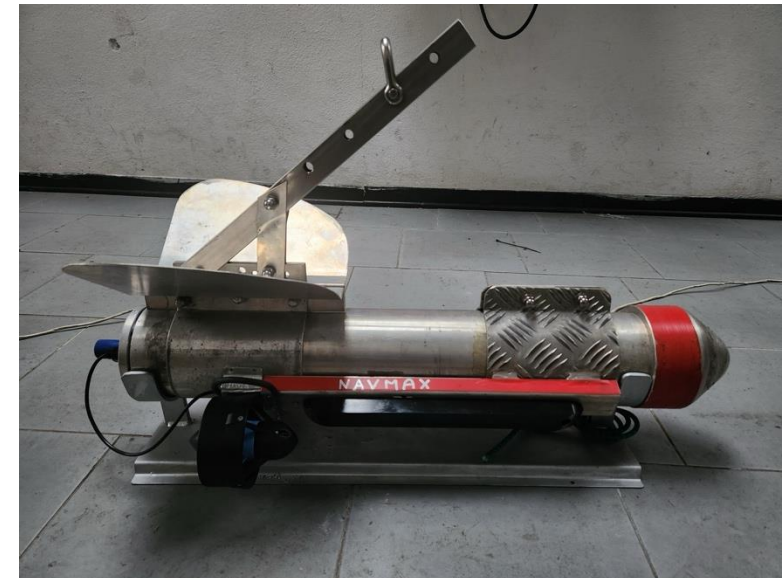
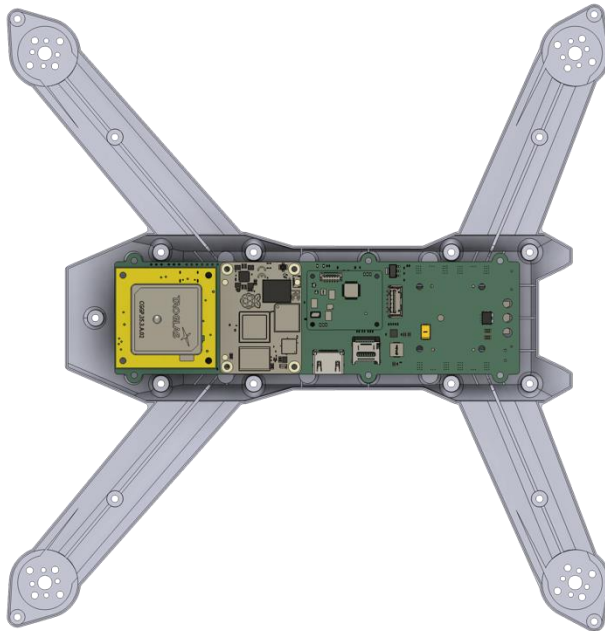
## INTEGRATE UAV TECHNOLOGY BASE MODEL

Custom integrated electronics that integrates:

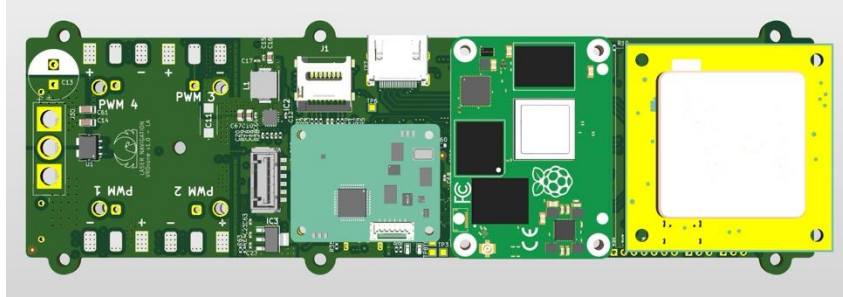
- VR Brain
- Raspberry PI CM4,
- GPS M9N.
- SDR Radio Module.
- Power Management.

The system integrates 2 cameras, 1 visible and an optional thermal one, implements an HD digital communication system, for video preview and telemetry based on SDR communication techniques.

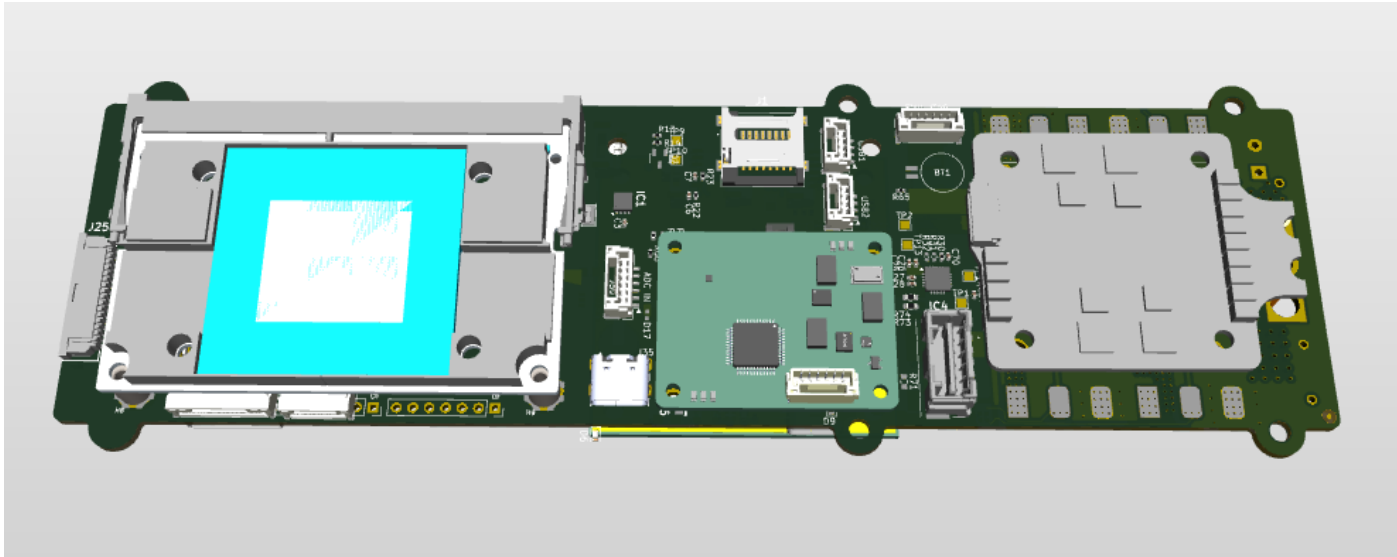
Serial or CAN communication buses are available for integration with the payload.



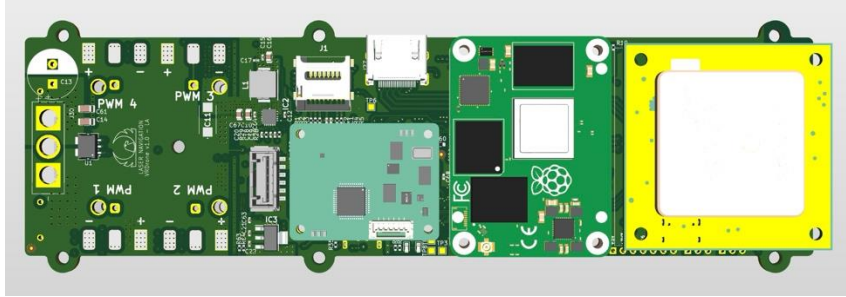
## CUSTOM INTEGRATED AUTOPILOT AI VERSION



In addition to the modules already described in the previous slide, the AI version integrates the AI VR Neuron In particular, it enables the drone to be able to add anti-collision functions, path planning, classification and autonomous localization of objects. The system is able to manage up to 8 simultaneous video sources and apply advanced vision algorithms. These integrated boards were created to be able to massively produce and maintain both flying, land and sea drones. The integration of the components allows you to not have to worry about wiring and connecting the devices to each other without having to resort to wiring, this approach makes the system more reliable. The components are chosen from European suppliers, to guarantee the availability of materials in the event of a shortage without depending on third parties, in particular Chinese or Asian furniture.



## CUSTOM INTEGRATED AUTOPILOT AI VERSION



The custom board is designed to allow the modular use of different types of drones.

Flying, Terrestrial, Marine.

This feature allows you to simplify the production, procurement, maintenance, updating and interconnection phases of the different types of drones.

The components of IMU, Localization, Navigation and AI remain unchanged, the program and the configuration of the specific configuration change, but the logic underlying drone management is exactly the same.

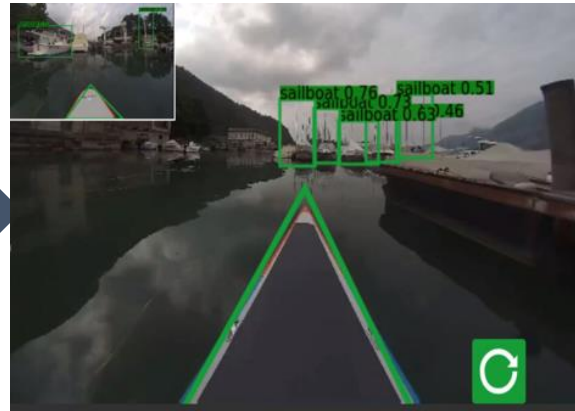


# What is SophyAI Marine Sentinel

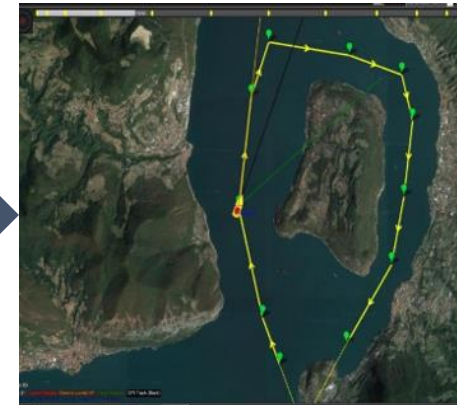
- SophyAI Marine Sentinel is a derivation of our patented A.I. platform SophyAI that can act as a careful overseer of what is happening on and around a vessel or drone in the water.
- The system is based on three integrated modules that allow, through a data fusion of different sensors to interpret the scenario intelligently, providing safety on-board and for the anti-collision of the vessel or drone with other vessels or elements of the marine environment both at the surface and at water depth.
- SophyAI Marine Sentinel can interface with the vessel/drone payload (IoT or sensors) in order to transmit collected data to the ground station or to a remote web interface.



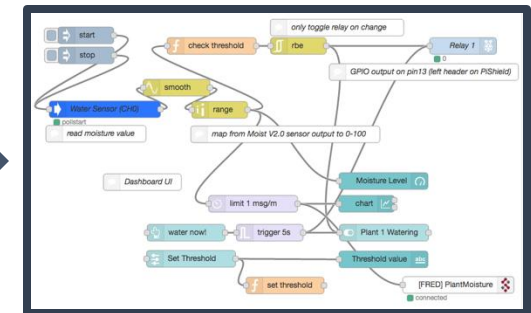
**Day Light Camera**  
**Radiometric Camera**  
**LiDAR, Side Scanner**



**Neural Network**  
**Recognition Module**



**Geolocalization and**  
**Digital Twin Module**



**Workflow Module**

## System components:

- Boat Platform : *Autonomous Sailing Drones.*
- Power Managment.
- Cameras (Optional LIDAR and Sonar)
- Dual Auto Pilot RTK GPS : *VRBrain PRO XI*
- Autonomous Sail Mangament.
- AI Anti collision System : *SophyAI Sentinel.*
- *Multi Payload Managment Systems: Side Scan , Bathymetry , Multibeam , Oilspin detection*
- *Datalink : Satellite / 4G - 5G integrated Router*

## Control modes :

- Control by Human.
- Tele Operated
- Autonomous Operation.



### System components:

- Boat Platform : *4 m Inflatable dinghy.*
- Control Unit.
- Power Managment.
- Cameras (Optional LIDAR and Sonar)
- Auto Pilot RTK GPS : *VRBrain PRO XI*
- standard interface: *ROS , MAVLINK .*
- AI Anti collision System : *SophyAI Sentinel.*
- *Datalink : Satellite / 4G - 5G integrated Router*

### Control modes :

- Control by Human.
- Tele Operated
- Autonomous Operation.



The scalable architecture heart of VR ROBO DINGHY is the **VR CAPTAIN** platform

- On-board Power Management Module.
- Control Panels, Batteries and Utilities.
- Consumption Verification Dashboard.
- Power supply disconnection system.
- Router module with 4G / 5G Hyperlan Technology + Local LAN network for boat management and on-board Payload. (Optional Starlink connection)
- Autopilot Module #1 **VR Captain X11** Electric Motor Control + Rudder.
- Autopilot module #2 **VR Captain X11** Rigid Wing Control. (Option for sail drone)
- Central weather interface module.
- Obstacle avoidance management module complete with edge module for local processing with **SophyAI Marine Sentinel** technology.
- Basic version with camera.
- Evolved version with 3D Front Lidar , RADAR , AIS .
- Navigation camera Front 180°, Rear 180°.
- Ground Station system for tele operation, programming and total sistem control
- Optional Payloads : Gimbal Inspection Camera , Sonar

# SOPHYAI MARINE SENTINEL



- SophyAI Sentinel is a derivation of our A.I. patented platform that can act as a careful overseer of what is happening on and around a ship.
- The system is based on three integrated modules that allow, through a combined vision system, to interpret the scenario intelligently, conspicuously complementing the human observation function but with the peculiarity of being able to interpret the scene h24



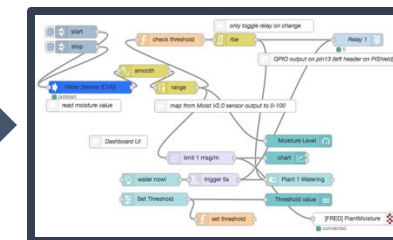
**Day Light cameras  
Radiometric Camera  
Lidar**



**Neural Network  
Recognition Module**



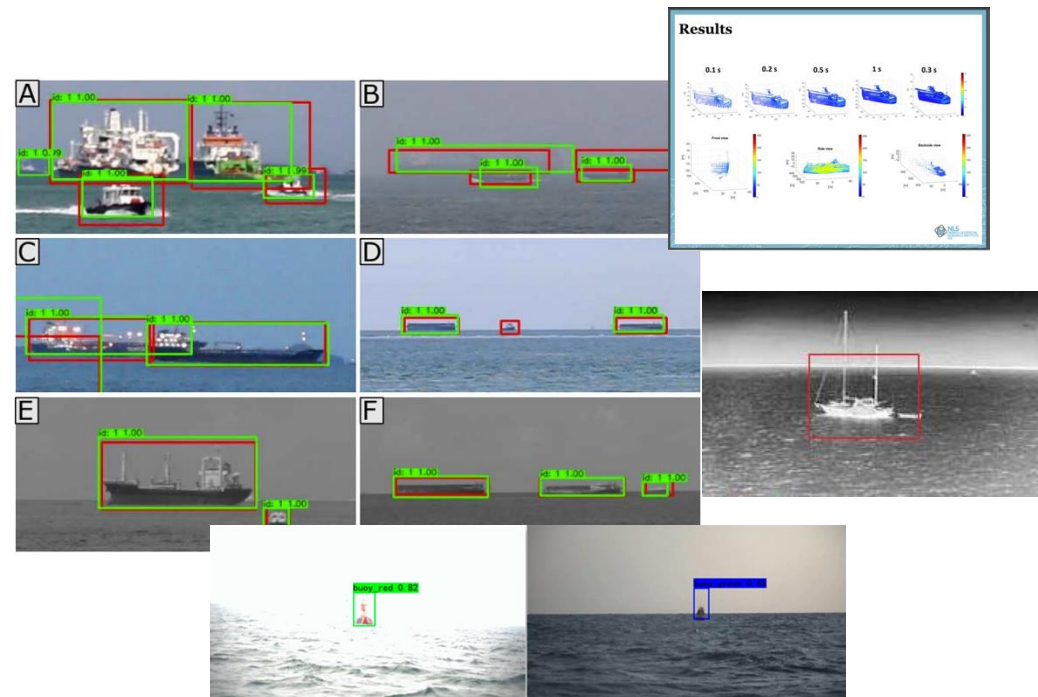
**Geolocalization and  
Digital Twin Module**



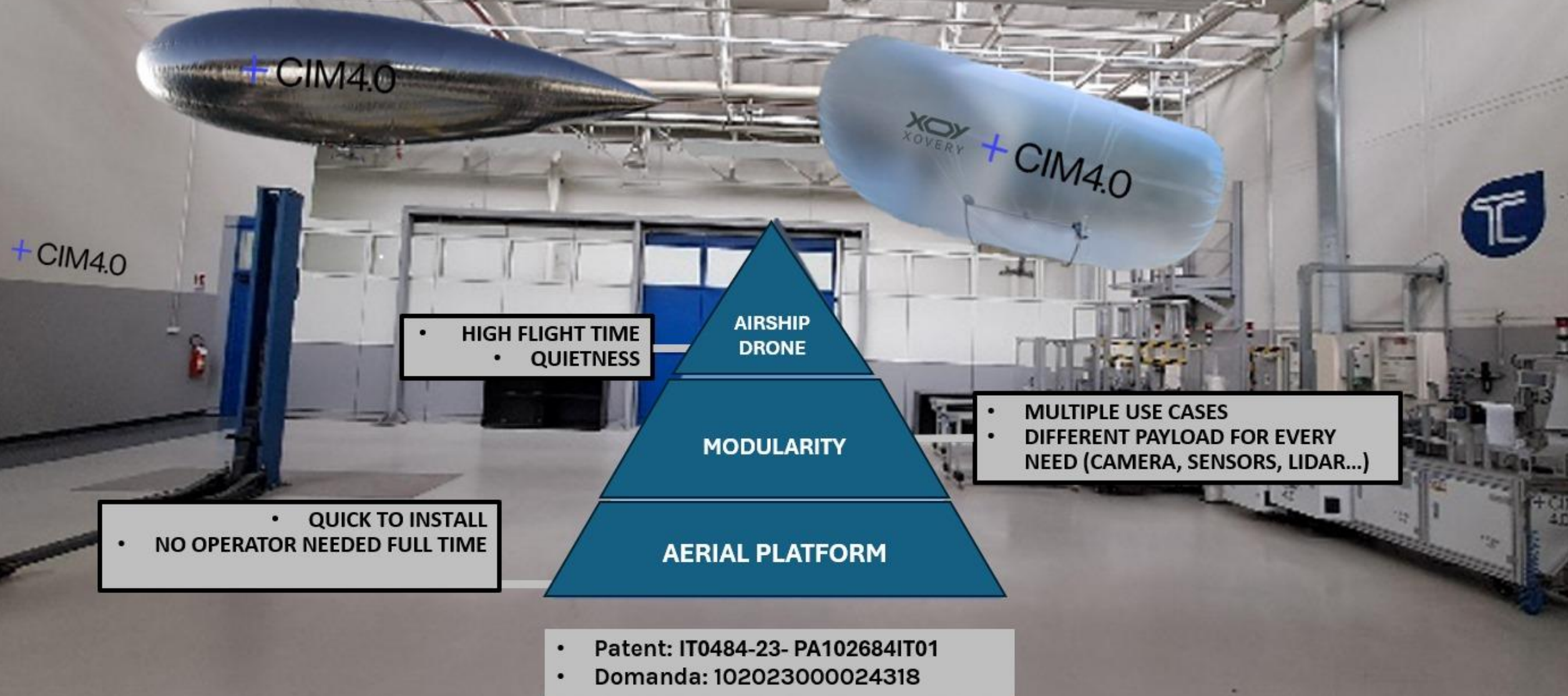
**Workflow Module**

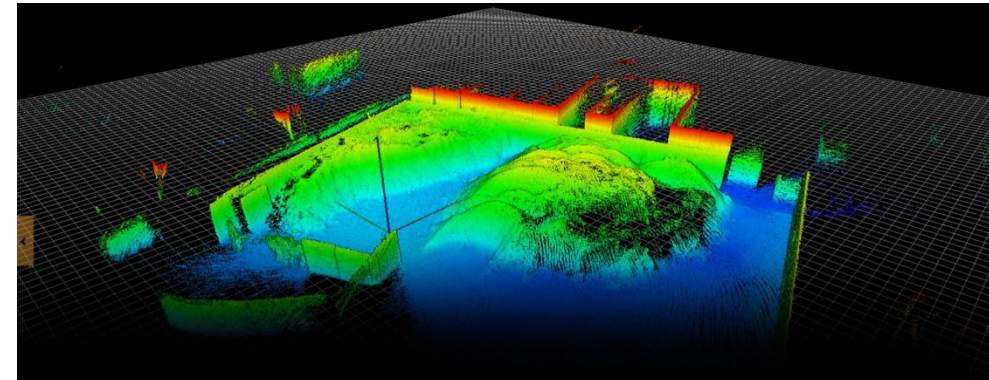
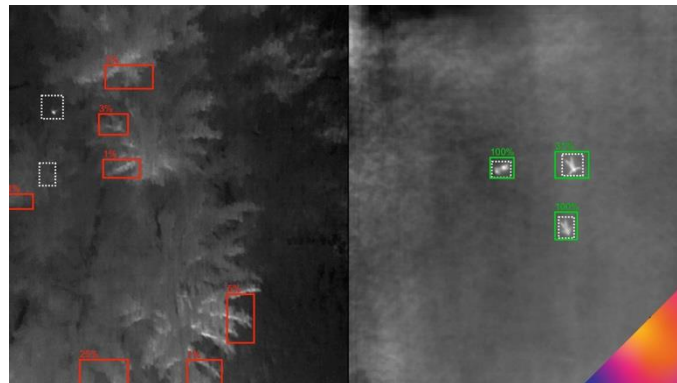
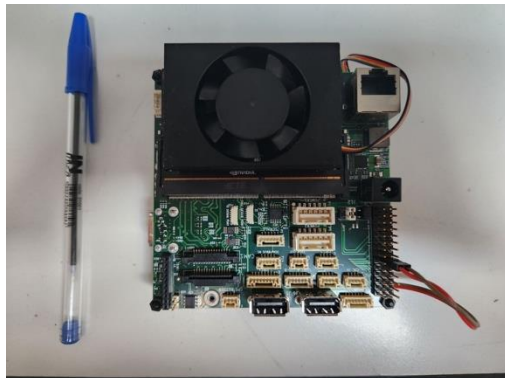
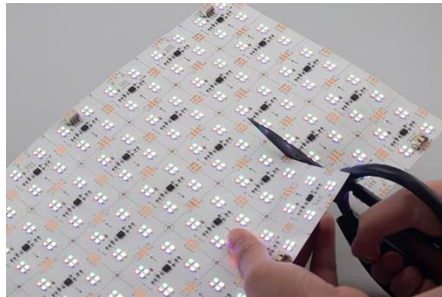
# SophyAI Sentinel for anti-collision control

- **SophyAI Sentinel**, through its sensors, is able to recognize different types of vessels both during the day and at night.
- Vessels are recognized by the neural network at sufficient distances to enable maneuvers to avoid collision.
- **SophyAI Sentinel's** flexibility to use different algorithms and recognition classes allows it to "recognize", through training, not only boats but also buoys and fixed structures.



# Drone - Dirigibile

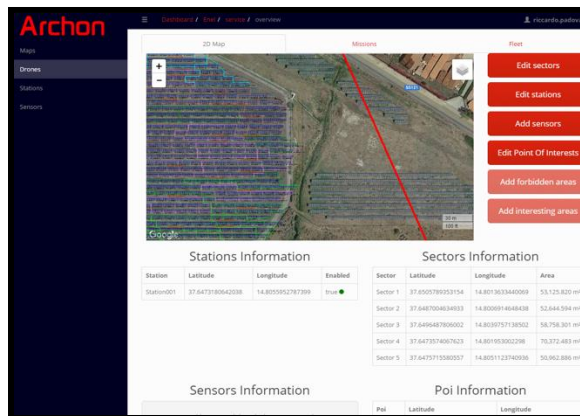




Payload aggiuntivi :

- **Micro Gimbal camera 360 nel visibile 4K** : applicazioni d'ispezione .
- **Micro Gimbal camera visibile + termico** : applicazioni di search and rescue , rilevazione d'incendi , anti bracconaggio
- **Micro Lidar 128 fasci** : mapping e ricostruzione 3D d'ambienti , ispezioni , digital twin.
- **Sistema SDR integrato** : applicazioni radio avanzate , sistema di data collection IOT , jamming , ripetizione di segnali radio
- **AI Engine on Edge**: Integrazione funzionalità di obstacle avoidance , identificazione e targetting .
- **Fogli o Strisce Led / pannelli flessibili** : Advertising , drone show.

## Archon Autonomous Drones for PV inspection developed by Laser Navigation



The services are accessible anywhere in the world through an easy-to use web interface.

- No need to pilot the drones. Flying cameras move automatically.
- A.I. switches between multiple drones to guarantee continuance of service.
- Highly secure communication and robot control (encryption/authentication).
- Future: automatic intrusion detection, Virtual control/visualization center

### Services

1. *On-demand thermal/visual inspection of any panel at high resolution.*
2. *On-demand video/thermal monitoring of the site (e.g. alarm verification).*
3. *Recurrent random patrols (video-surveillance).*

Every drone is capable of flying and hovering vertically like an helicopter and to safely land with motorized wheels, for recharging.

Two kind of drones can be used, depending on the size of the plant:

- small quadcopters (1)
- hybrid quad-planes (2)



## Vision about the pilot: drone

This prototype has to be created.

- 2m (up 2.7m\*) Wingspan
- 4kg (up 10kg\*) MTOW
- VTOL
- 24 min (up 28 min\*) endurance as copter
- 60 min endurance as plane
- Cruise speed 60 km/h (90 km/h\*)
- Radio telemetry range 70 km + LTE
- HD Video/Image Downlink range 70 km + LTE
- New recharge station to be designed
- Recharge time approximately 75min
- Prototype single-unit material cost approx. 30k USD

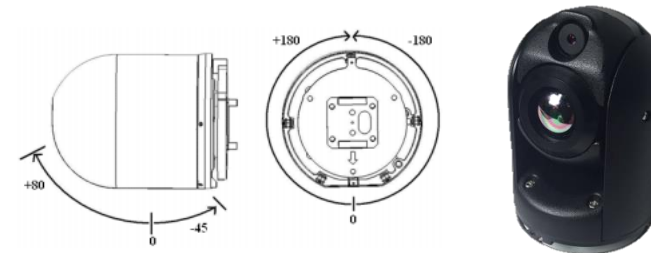
\* = larger version supporting lidar



Inspection in  
quad-rotor  
mode

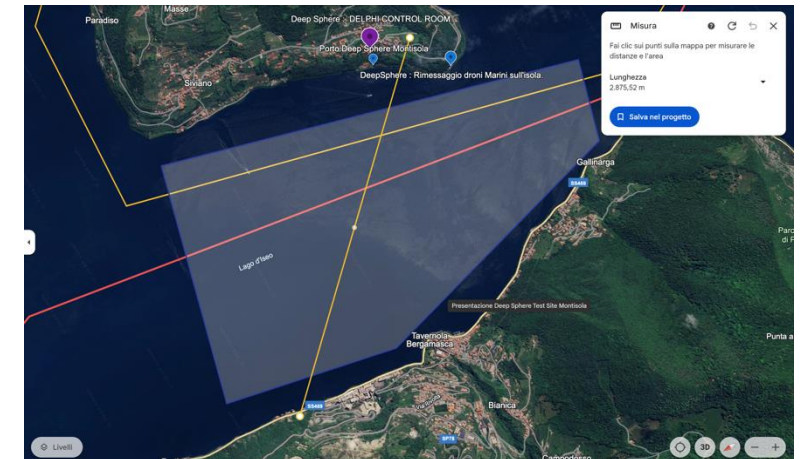
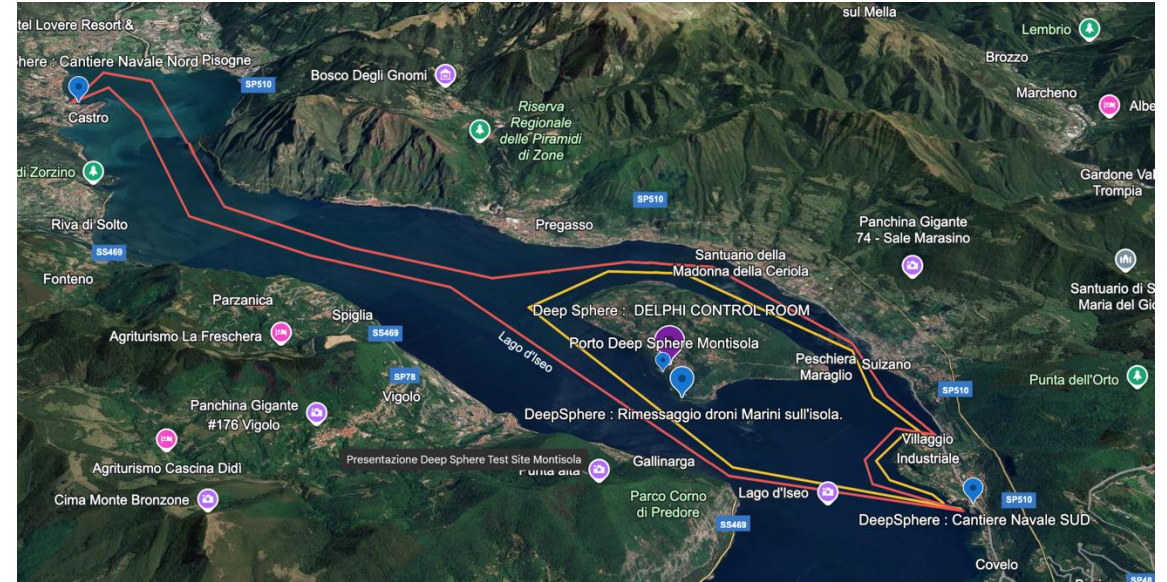
Fast automatic positioning in  
plane-mode

Fast automatic return to base in plane-  
mod (or travel to another base!)



- Identified EO/IR payload for aircraft nose.
- Possible extension to gimbal payload under the belly of the plane .
- Possible addition of Lidar and satellite link (infinite range) in the larger version \*
- Required attachment of motorized wheels

- Attraverso droni marini di superficie o subacquei è possibile mappare la posizione di target subacquei.
- VR Dinghy e Oceandrone, rispettivamente consentono la navigazione autonoma o tele operata , supervisionata da mezzi di support e controllata dalle nostre ground station remote.
- Nell'area sperimentale Deep Sphere abbiamo effettuato diverse attività sperimentali su percorsi fino a 50 km a tratta , e percorsi continui fino 300 km a tratte di 16 per verificare l'affidabilità delle componenti di Sistema.
- Nell'area tra Montisola e Tavernola Bergamasca possono essere effettuati test di Boe Robotiche vista la presenza di venti anche fino a 25 nodi e di sistemi autonomi di gestione di vele rigide
- Sono previsti nel prossimo futuro sperimentazioni fino di alcuni km di volo blob per droni autonomi VTOL e Droni dirigibili con partner CIM4.0



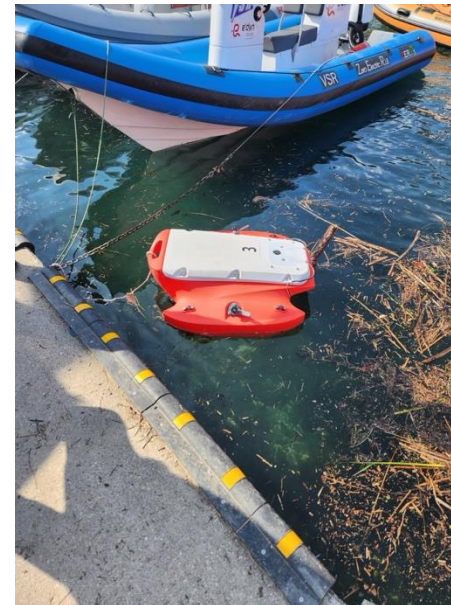
## A reliable unit with deployment features based on state-of-the-art technology.

- VR ROBO DINGHY can be fitted with a customized payload, but already in its standard version it is equipped with the SophyAI Sentinel anti-collision system.
- Thanks to our VR CAPTAIN Platform, it can be tele-operated or navigated autonomously along a route previously traced on the ground station.
- Constant connection with the ground station is guaranteed by the best LTE technology and it can now also be optionally connected to Starlink for missions where there is no LTE coverage. Satellite communication could be evaluate as advanced option.
- Optionally, in addition to the on-board cameras, it can be equipped with LIDAR to achieve extremely high accuracy of any obstacles and to operate in conditions of absolute darkness.



# VR ROBO BOAT

- **Technical Characteristics of the System.**
- Navigation processor: *VRBrain PRO XI*
  - LTE connection
  - Remote Control Unit
  - STANDARD OR RTK GPS
  - Magnetometer
- ESC (Electronic Speed Control) 2 Propeller
- **Switch with different modes :**
  - Hold (Stops Engines in transport phase)
  - Loiter (Stays where you set the loiter)
  - Guided (Goes where the on-board computer tells it to)
  - Auto Navigation ( Waypoint from Control Ground Station )
  - Tele Operated Nav .
- Connect : Battery and Motors



A signal buoy drone to be placed or sent wherever you want

- **Technical Characteristics of the System.**

- System.Control Units
- Remote Control Unit
- ESC (Electronic Speed Control) 2 Differential Motors .
- GPS
- Magnetometer
- Navigation processor.
- LTE connection

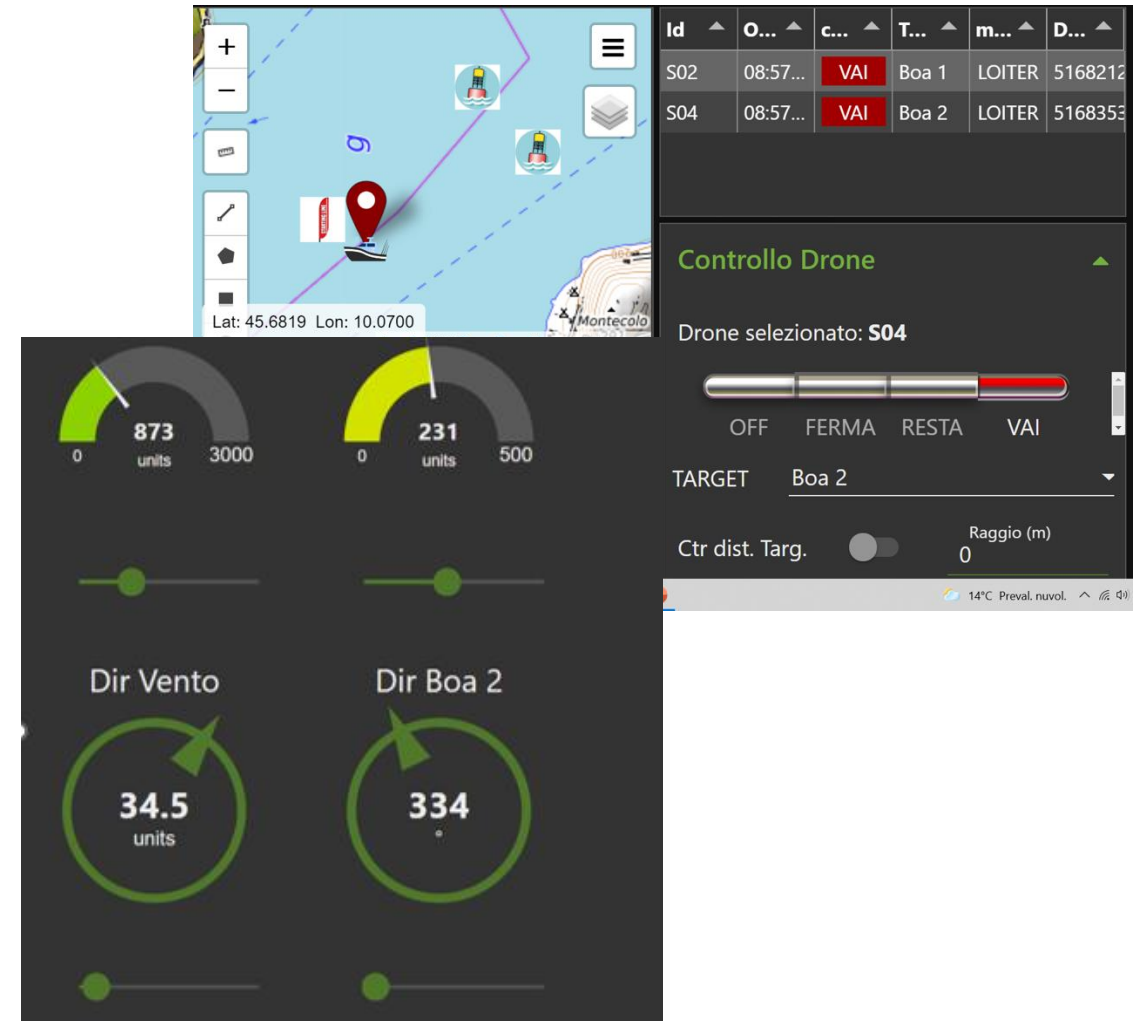
- **Switch with 3 modes :**

- Hold (Stops Engines in transport phase)
- Loiter (Stays where you set the loiter)
- Guided (Goes where the on-board computer tells it to)
- Connect : Battery 100 AH 8 hours



A signal buoy drone to be placed or sent wherever you want

- Employs GSM + SIM and Planning Cloud Software:
- You can set multiple buoy position.
- Receive buoy position data in real time .
- If desired, move buoys to a new position .
- Receive the position data of the buoys .
- Generate alarm if the buoys go out of the original or resetted position.



## System components:

- ROV Platform: *Multi Sensor Hybrid ROV* .
- Control Unit : *VRBrain PRO X* -
- Power Unit : *6/8 Thruster X , Y , Z Movment* .
- Theter : *10 Mbits for payload - boat Net – Z movment*
- Sensor : *Depth Sonar, Side Scanner , Baro Depth Sensor , robotics arm*
- Auto Pilot + RTK GPS (ON BOAT) : *VRBrain PRO X* -
- standard interface: *ROS , MAVLINK* .
- Standard version 300 m depth
- 20 Amp 4S li-ion battery 8 hours operation

## Control modes :

- Tele Operated
- Autonomous Operation.



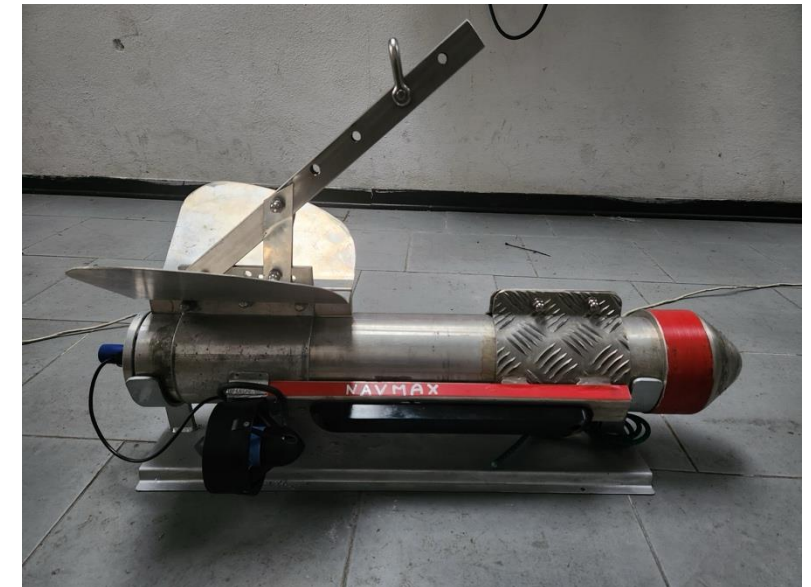
# VR NAVMAX

## System components:

- Boat Platform: *Multi Sensor Hybrid ROV / Side Scanner* .
- Control Unit : *VRBrain PRO X -*
- Power Unit : *2 Thruster X , Y Movment , Recharging bat*
- Theter : *10 Mbits for payload - boat Net – Z movment*
- Sensor : *Depth Sonar, Side Scanner , Baro Depth Sensor*
- Auto Pilot + RTK GPS (ON BOAT) : *VRBrain PRO X -*
- standard interface: *ROS , MAVLINK .*
- Standard version 300 m depth
- 20 Amp 4S li-ion battery 8 hours operation

## Control modes :

- Tele Operated
- Autonomous Operation.



# What is SophyAI Marine Deep Sentinel

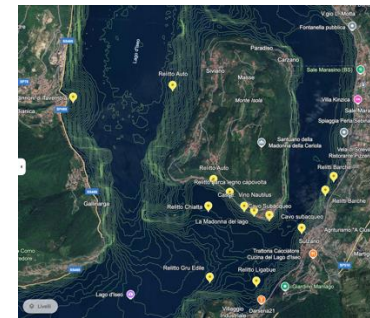
- SophyAI Marine Sentinel is a derivation of our patented A.I. platform SophyAI that can act as a careful overseer of what is happening on and around a vessel or drone in the water.
- The system is based on three integrated modules that allow, through a data fusion of different sensors to interpret the scenario intelligently, providing safety on-board and for the anti-collision of the vessel or drone with other vessels or elements of the marine environment both at the surface and at water depth.
- SophyAI Deep Sentinel can interface with the vessel/drone payload (IoT or sensors) in order to transmit collected data to the ground station or to a remote web interface.



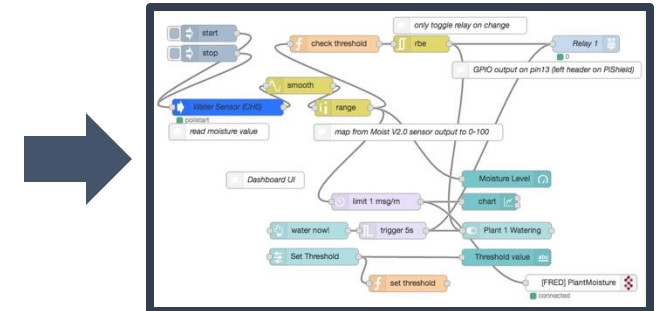
**Day Light Camera  
Radiometric Camera  
LiDAR, Side Scanner**



**Neural Network  
Recognition Module**



**Geolocalization and  
Digital Twin Module**



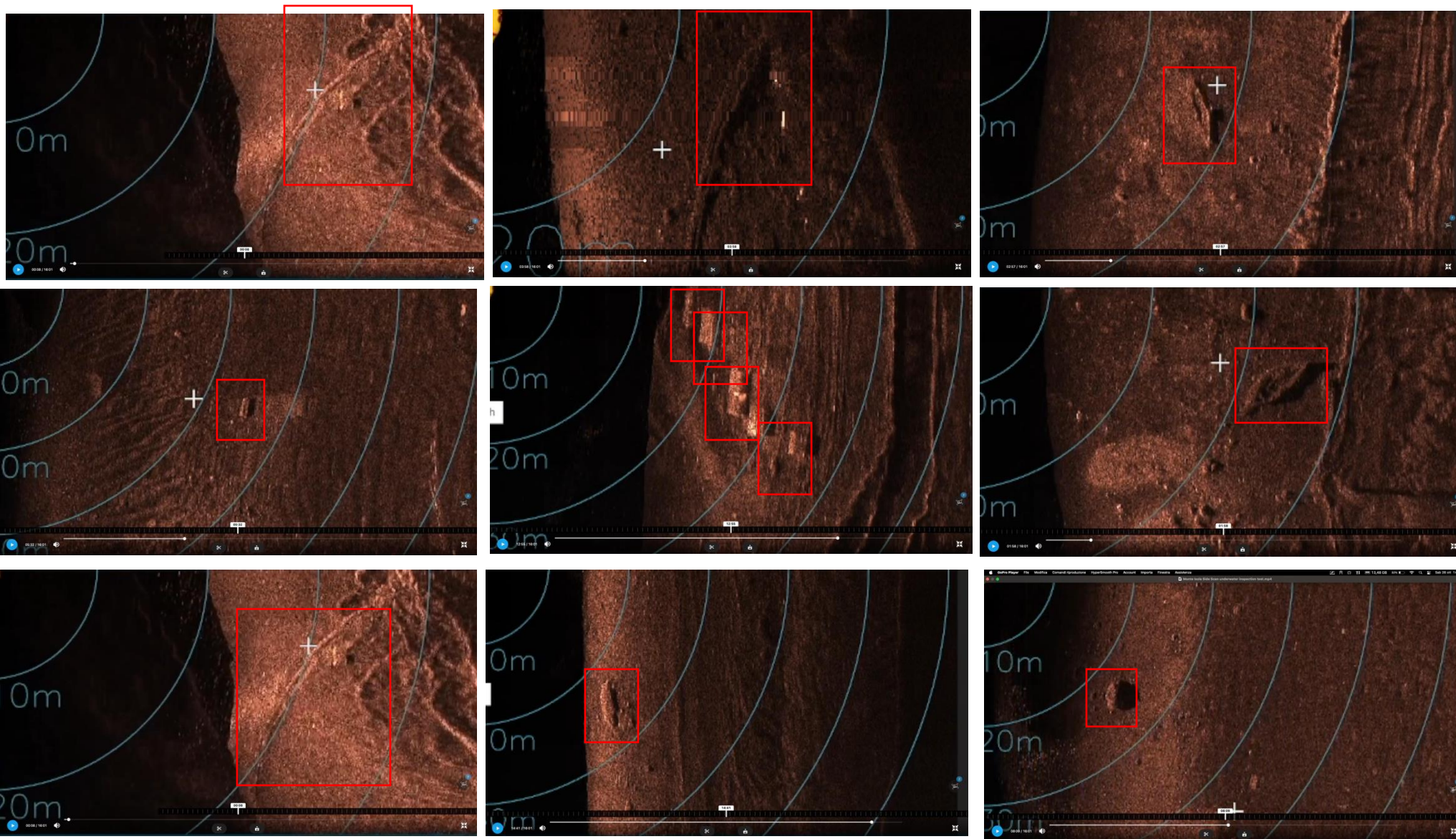
**Workflow Module**

# SIDE SCAN AUTOMATIC AI DETECTION

- Attraverso droni marini di superficie o subacquei è possibile mappare la posizione di target subacquei.
- VR Boat e VR NavMax , rispettivamente consentono la mappatura attraverso sensori batimetrici o side scan nel primo caso di target fino ad un massimo di 30 m di profondità nel secondo caso fino a 330 m di profondità.
- Nell'area sperimentale Deep Sphere abbiamo effettuato diverse attività sperimentali e formative della squadra sub di protezione civile di Montisola . Quest'approccio consente sia di formare il personale che verificare la performance e l'usabilità della strumentazione .

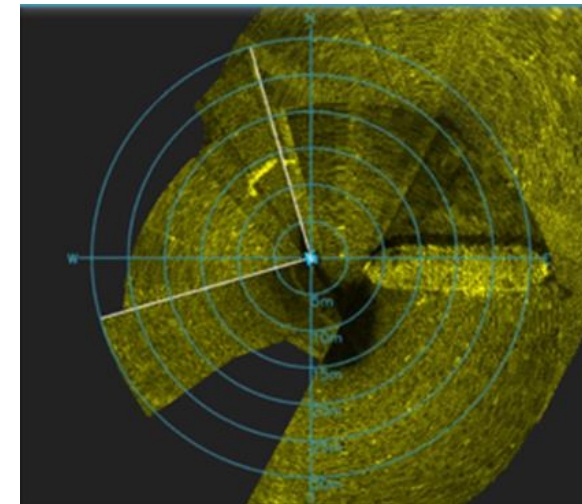
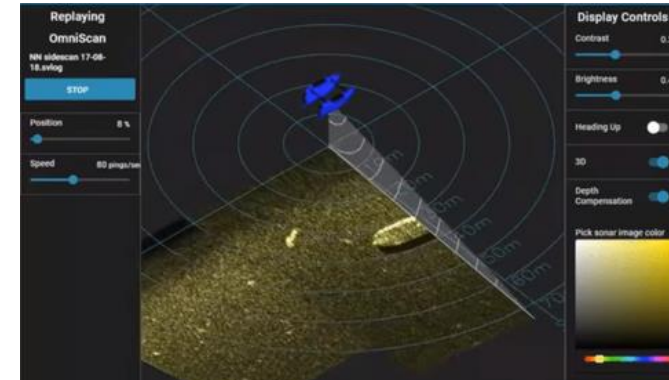


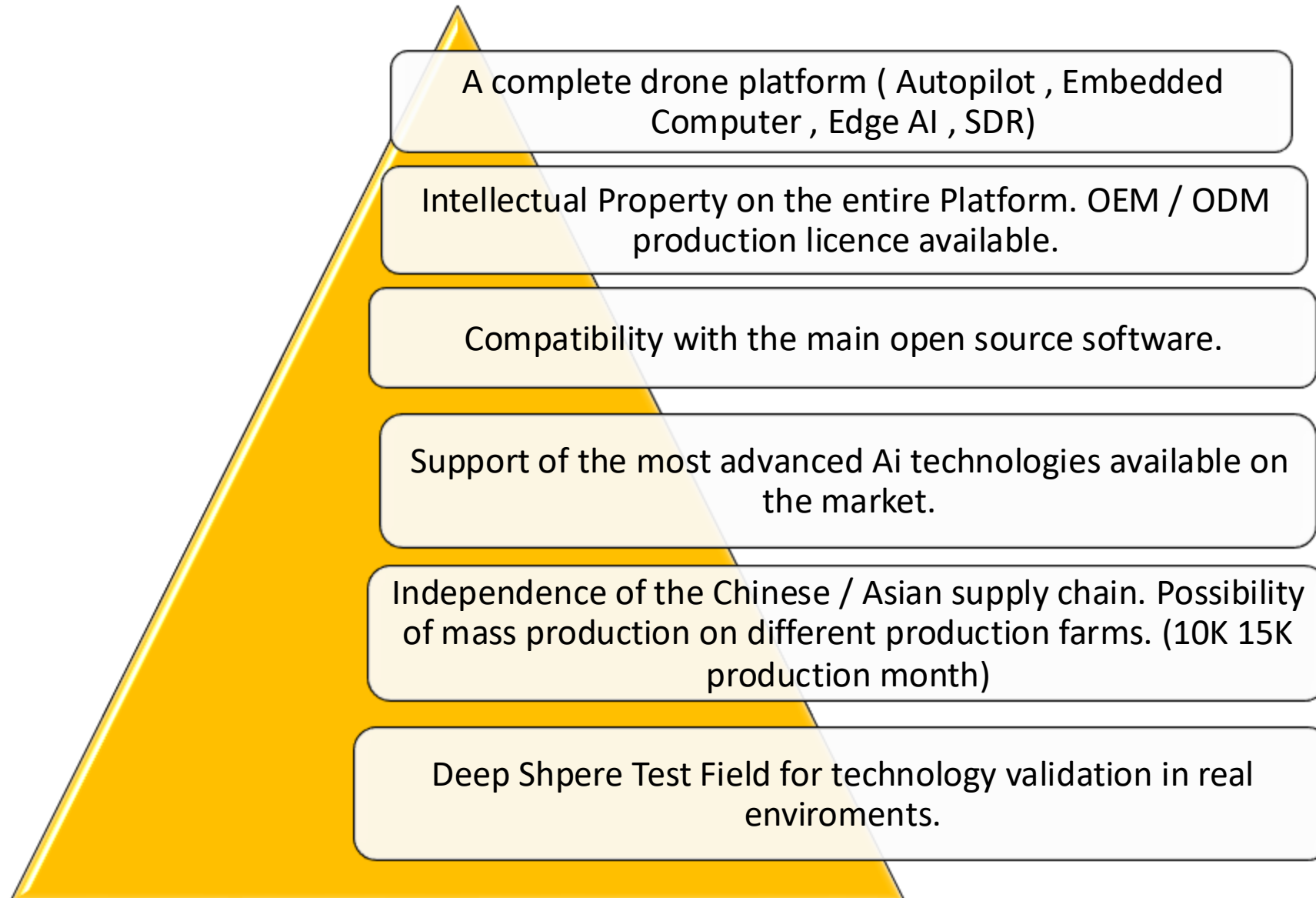
# SIDE SCAN AUTOMATIC AI DETECTION



A precise look at what lies beneath....A new payload now available:

- VR ROBO DINGHY can now be equipped with latest-generation sonar capable of mapping, in real time, what lies beneath the surface up to a distance of 150 metres.
- Typical side-scan sonars usually simply display a sequence of pings in a linear array and require post-processing with high-end software tools to obtain a correct rendering of the image.
- With the new sonar on VR ROBO DINGHY, it is possible to see the live image, geometrically corrected and in real time.
- Technological innovation has made it possible to significantly reduce the cost of this sonar to values unmatched by previous products offering equivalent performance.
- The data could be analyzed by SophyAI marine that can detect specific objects like different kinds of mines or submarine vehicles near below the dinghy.





# Thanks for your attention

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