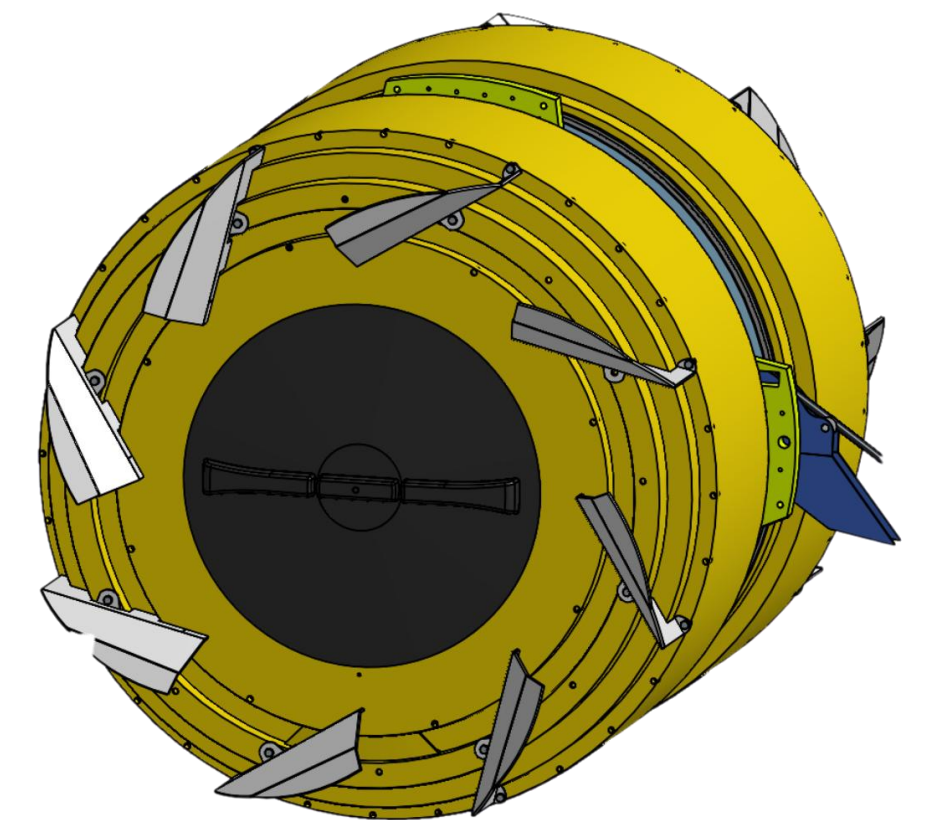




An amphibious sensors carrier for critical environments

Tap on the images to learn more



Precision Agriculture (PA)

The Rover in Precision Agriculture (PA)



MAR allows the monitoring of precision crops during the entire vegetative cycle, intervening in the irrigation phases and application of any pesticides and nutrients, optimizing their use and operating only where there is an actual need.

It can work in:

- Viticulture
- Rice culture
- Any row cultivation



Tap the video to start playback.





Precision Agriculture (PA)

Why is the use of MAR so advantageous in Precision Agriculture?

The **Rover** has a support surface of 120 cm linear transverse planes against a weight that varies between 250 and 450 kg. In comparative terms, a (light) 4-wheel drive car distributes at least 300kg per wheel on a width of about 20cm. The rover (fully loaded) is **5 times kinder** to the ground than a wheel of equal diameter.

The Rover wheel has a size of 120 cm, comparable to that of a tractor, but much larger than that of a QUAD.

Altogether it moves the ground at least **10 times less** than a tractor and/or a quad. The ground has its own intrinsic resistance and this ratio guarantees a substantially **zero impact in dry soil** conditions, but allows maneuvering even in the presence of snow or very wet ground without generating slush.

The number of **passes** is **practically unlimited** without the need to rework the land.





Aquaculture

Fish farming and mussel culture

01

MONITORING

MAR can **monitor** the state of the floating aquaculture cages even in the presence of critical waves and, opportunely equipped can intervene with **small maintenance**. Compared to a diver, the operational availability of the vehicle is always guaranteed, **reducing risks** and **human costs**.

02

NIGHT SURVEILLANCE

MAR is equipped with a series of **infrared**, **NIR** and **RGB sensors** and, for high-end applications, it can be further equipped with **multispectral sensors**.





Aquaculture



Fish farming and mussel culture

03

MUSSEL FARMING

MAR can intervene both in the seeding phase (the wheels can act as tanks) and in the crop monitoring phase. It moves easily both on **marshy soils** and in **shallow water** without damaging the crops.

■ KEY ENABLING TECHNOLOGY (KET)

- Allows accurate inspection of farming areas
- Maintenance and growth assessment of shellfish farming

■ AI FOR ENVIRONMENTAL MONITORING

- Study of biodiversity and protection from foreign organisms
- Water quality certification for production optimization

■ SUSTAINABLE

- Innovative solution with low environmental impact
- Higher efficiency in water farm management





Rescue

Rescue in complex environments

01

DESERT AREAS

- The rover can easily move on **desertic terrain**
- It can **transport** materials without overturning
- It is equipped with a series of **infrared, NIR and RGB sensors** and for high-end applications it can be equipped with multi-spectral
- It will be used for **surveillance** and **security** activities
- Antennas can be located inside the wheels that can be designed to be **transparent to RF**



02

OIL SPILLING

Monitoring at sea and **interventions** in shallow waters. In the event of environmental disasters such as oil spills, the rover, operated remotely, can be used for **safe interventions** while preserving the safety of the operators.





Rescue

Rescue in complex environments

03

FLOOD RELIEF

MAR has ease of movement in **shallow water** and **muddy terrain** and can **carry food** and first aid **medicines**.

This function is particularly useful because in many emergency conditions, factors like the depth of the water or the presence of muddy ground or underwater obstacles cannot be predicted. It is thus normally difficult to decide, beforehand whether to use vehicles or boats.



04

SNOWY TERRAIN

- **Ease of mobility** on snowy terrain
- Timely inspection for ease of movement on snowy terrain
- Possibility of transporting food and first aid medicines
- Support for **telemedicine** intervention





Surveillance

Perimeter control

01

SURVEILLANCE OF STRATEGIC STRUCTURES

MAR is equipped with infrared, NIR and RGB sensors and for high-end applications and it can be equipped with multi-spectral and biofluorescent sensors.

It is particularly useful when **perimeter structures** are close to ditches, marshes or, in general, areas with **complex terrain**.

02

LIFEGUARD (COAST CONTROL)

MAR is particularly useful in coastal control, being able to move easily and quickly, even where the waters are **very shallow**.

Furthermore, being a **zero-emission** vehicle, it can also move in protected marine environments.



 Surveillance

Perimeter control

03

AIRPORT AREAS

Mar can be useful in:

- Runway and infrastructure inspection
- Acoustic defence devices
- Monitoring and surveillance of the airport perimeter
- Anti FOD
- Fire-fighting system
- Follow-me

04

ARCHEOLOGICAL SITES

MAR can also be applied in archaeological sites for **surveillance** and **monitoring activities**. The Sites are subject to natural environmental stress and to the constant threat of professional fishing and recreational diving.



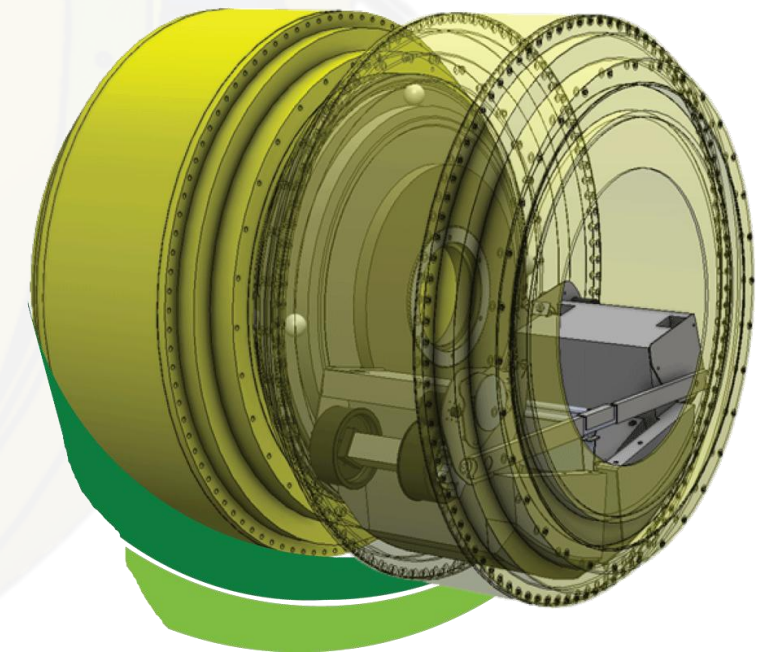


Features



Energy Efficiency

The use of only two wheels, which combines propulsion and steering, reduces friction and weight and guarantees a **greater autonomy than** tracked or **four-wheeled vehicles**. At the same time, in an amphibious environment, it allows to maintain a **stable position** being able to direct the boost.





Features



Intrinsically stable

In comparison with other electronically stabilized two-wheeled vehicles, MAR is **intrinsically stable** and therefore does not require power consumption during standby.

This allows prolonged use while waiting for events.

The MAR can also be equipped with a **small thermal engine** (thus creating a hybrid engine) that allows it to extend its operational capabilities over time, without sacrificing the advantages of the electric motor during the main operational phases.





Features



Cost/Performance ratio

MAR has a sophisticated architecture but **intentionally simple** in the mechanics. It is equipped with cheap electrical engines even if with high reliability and, above all, it transforms the defects of the lead-acid batteries (weight) in advantage (boost) keeping at the same time a low cost for the energy storage.

The MAR therefore provides an **extremely competitive price / performance ratio** in its vehicle category.





Features



Low soil compaction



The rate of the MAR and its support surface ensures **low pressure** on the **ground**, allowing it to make infinite passes **without compacting** the soil.

This makes the MAR highly sustainable, as it **does not damage** any **flora** and **fauna** present in the area, also preserving burrows and laid eggs.





Features



Amphibious

The **wheels**, equipped with blades, which can be constructed of plastic or composite material, act as **floats** and **provide propulsion**.

The wheels themselves protect the payload from water, mud and similars.



Tap the video to start playback.





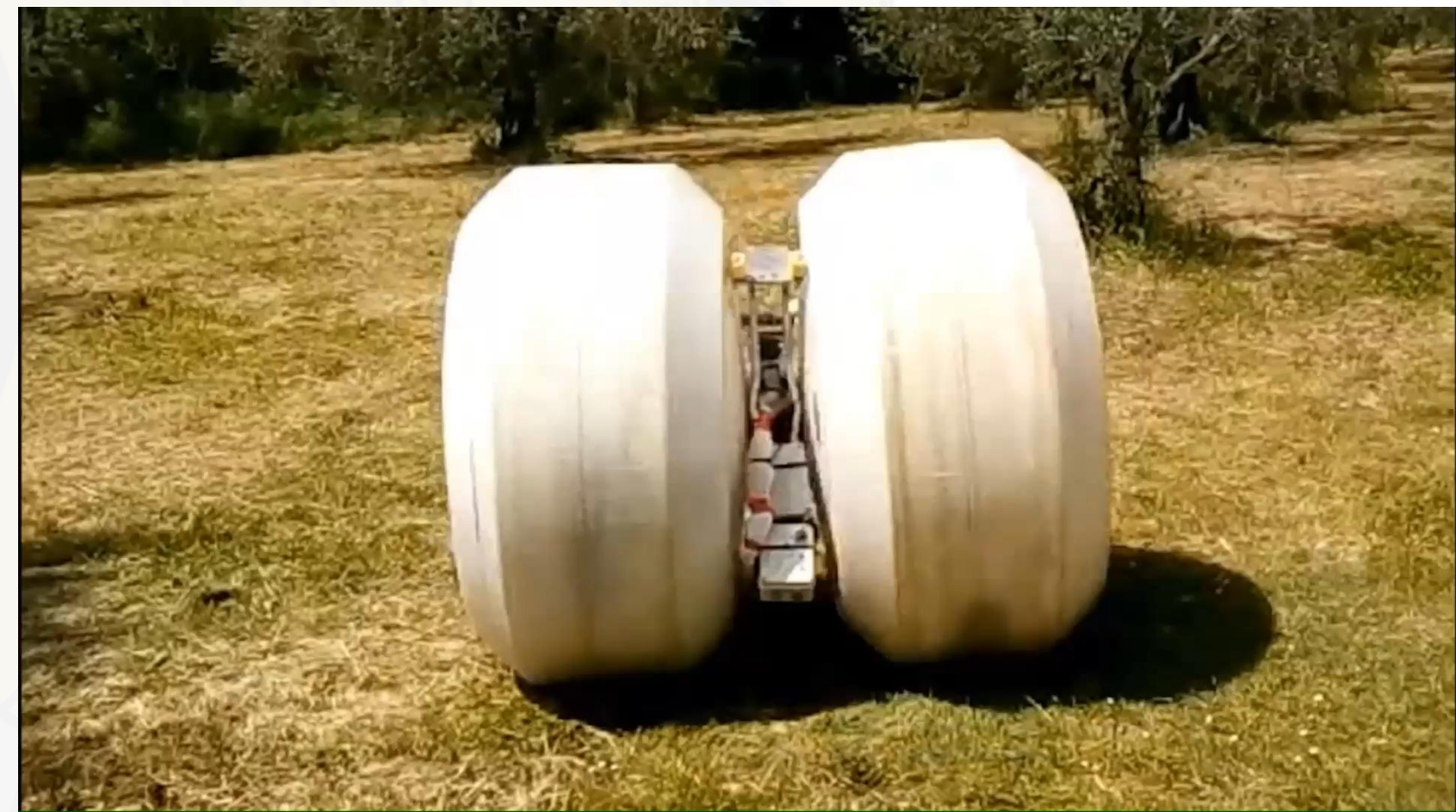
Features



High Mobility

MAR can move in **all trajectories**, including rotation on itself at high speed, either on the central axis or by rotating on a wheel.

The tests carried out on the prototype demonstrate a **strong acceleration** capacity and **good maximum speed**. The **low barycenter** ensures the possibility of turning at high speed and on significant slopes without overturning.



Tap the video to start playback.





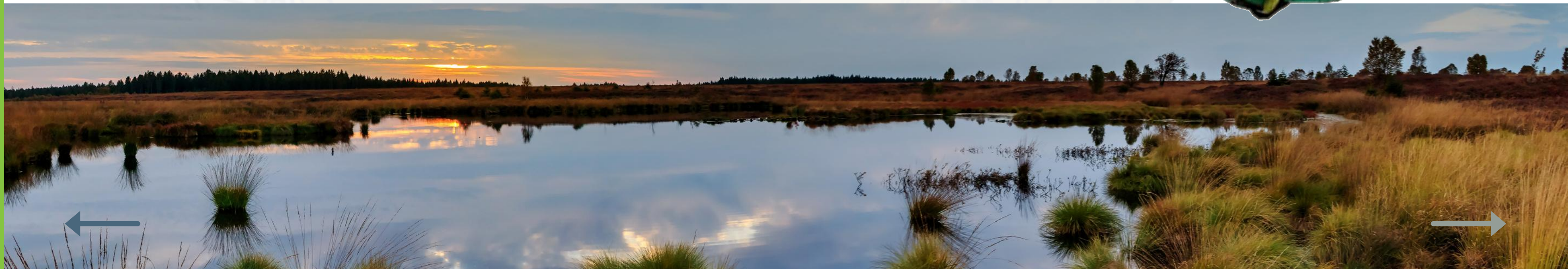
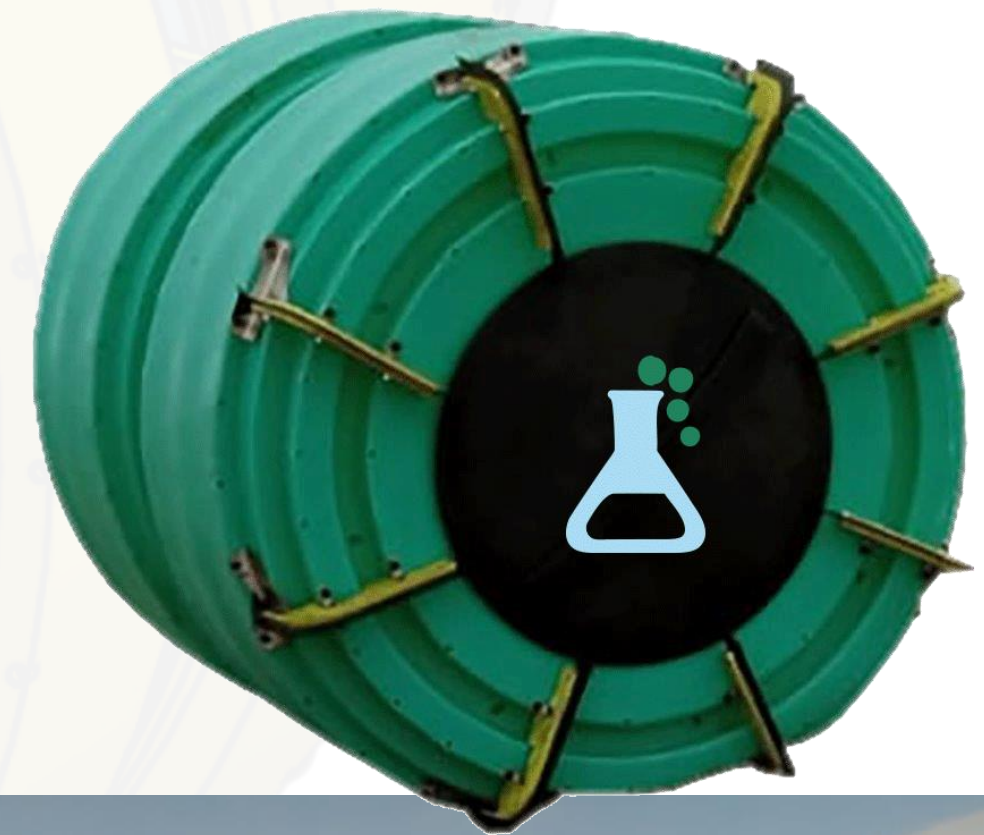
Detections in marshy environments

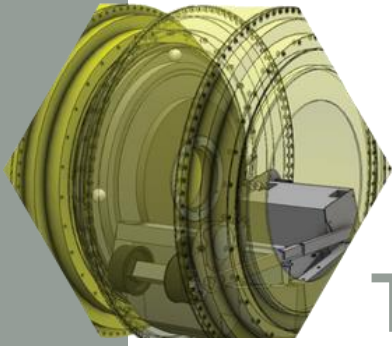


Research and monitoring in marshy environments

MAR finds application in the field of **environmental research** and **monitoring** of **wetlands** and **rivers**, for the protection of the ecosystem.

The system based on MAR carries out a quick **analysis on site** and then **takes sample** only if pre-alarm conditions exist.



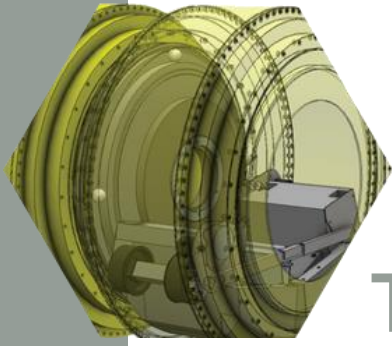


Technology

The MAR concept

The MAR system (Multipurpose Amphibious Rover), is composed by a platform, the **Rover** and a **Ground Station**.



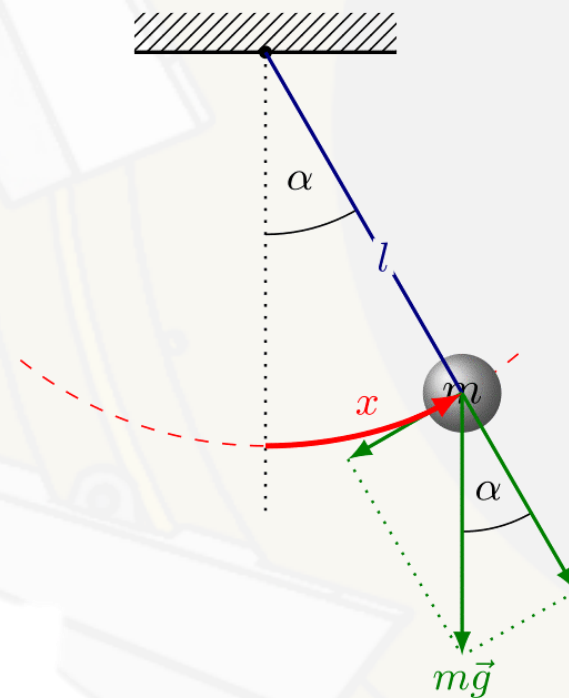


Technology

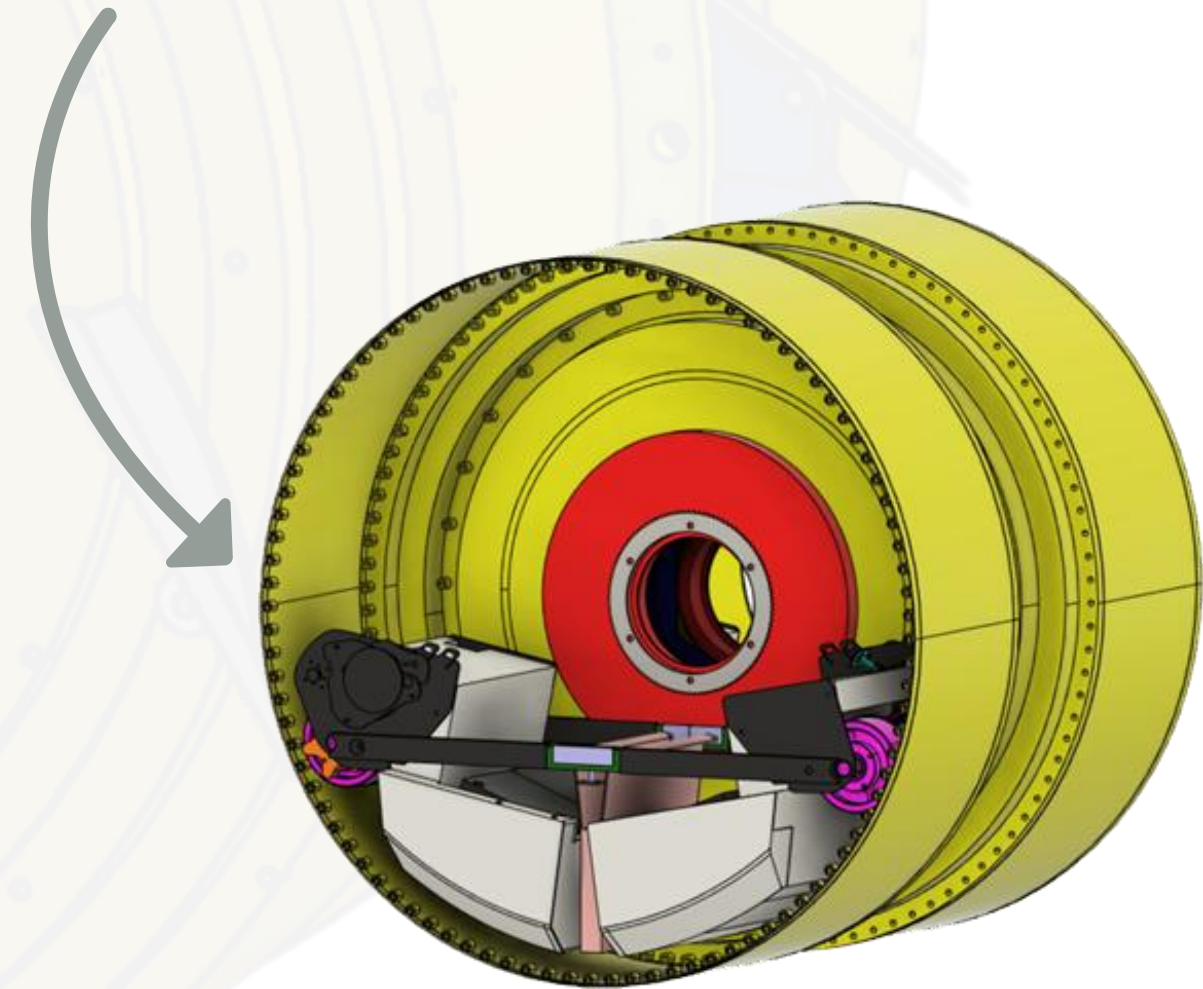
MAIN
MENU

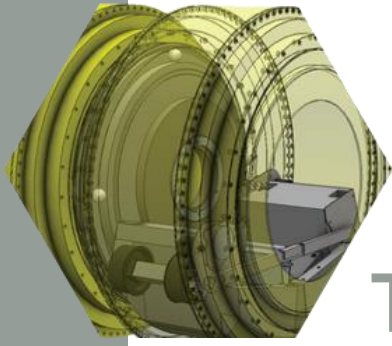
Operating principle

This vehicle exploits the physical principle of the **pendulum**.



The **cradle inside the wheel** performs exactly this movement.





Technology

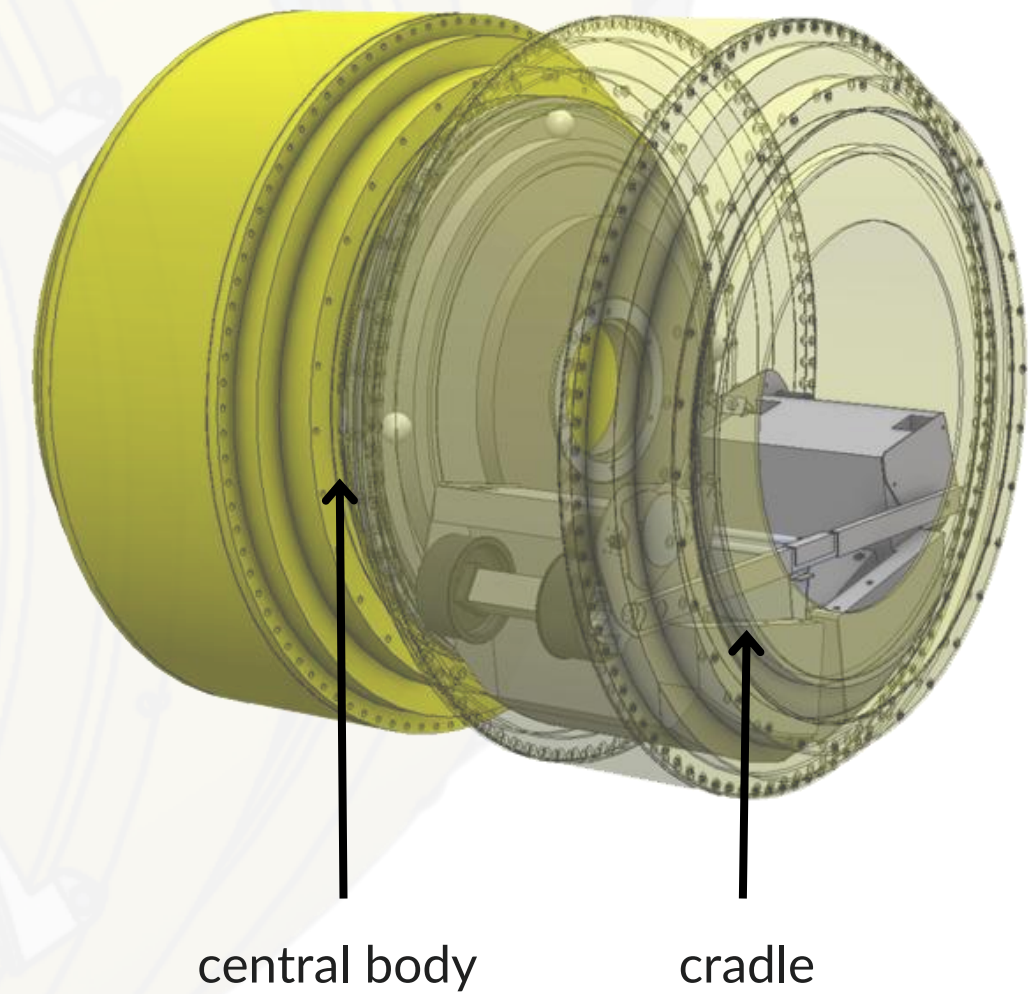
Payloads

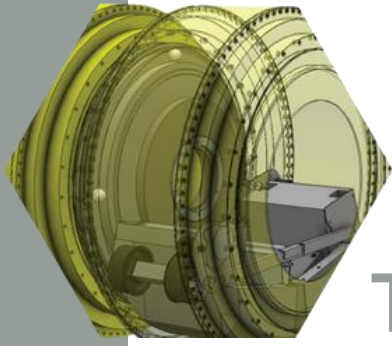
MAR can carry payloads in two areas:

- The **cradle** (payload weight contributes to propulsion)
- The **central body** to house the visual sensor (multispectral, IR) and the active arms

All metal parts can be placed below the float level, reducing the radar cross section.

Low energy consumption; consequent reduction of IR emissions.





Technology

MAR is the ideal platform for various types of sensors



01

STANDARD SENSORS

- Multispectral cameras
- Thermal camera
- Hyperspectral sensor
- ...

02

POSITIONING DEVICES

- GPS RTK
- Lidar
- IMU's
- ...

03

OTHER SENSORS

- Far and near infrared
- Bioluminescence
- Georadar
- Multilevel resistive sensors
- Temperature, humidity pressure
- Brix hydrometer
- ...

Suitable for any other sensor.

Videos

The MAR in various environments

From the first prototype to today, a series of videos showing the MAR being tested in different environments.



Tap the videos to start playback.



Videos

The MAR in various environments

From the first prototype to today, a series of videos showing the MAR being tested in different environments.



Tap the videos to start playback.



Videos

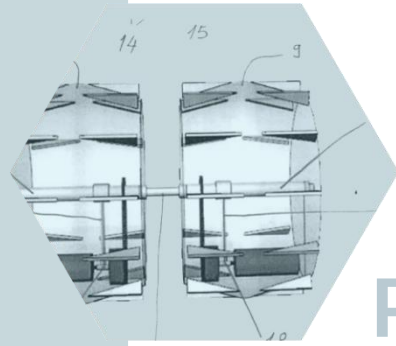
The MAR in various environments

From the first prototype to today, a series of videos showing the MAR being tested in different environments.



Tap the videos to start playback.

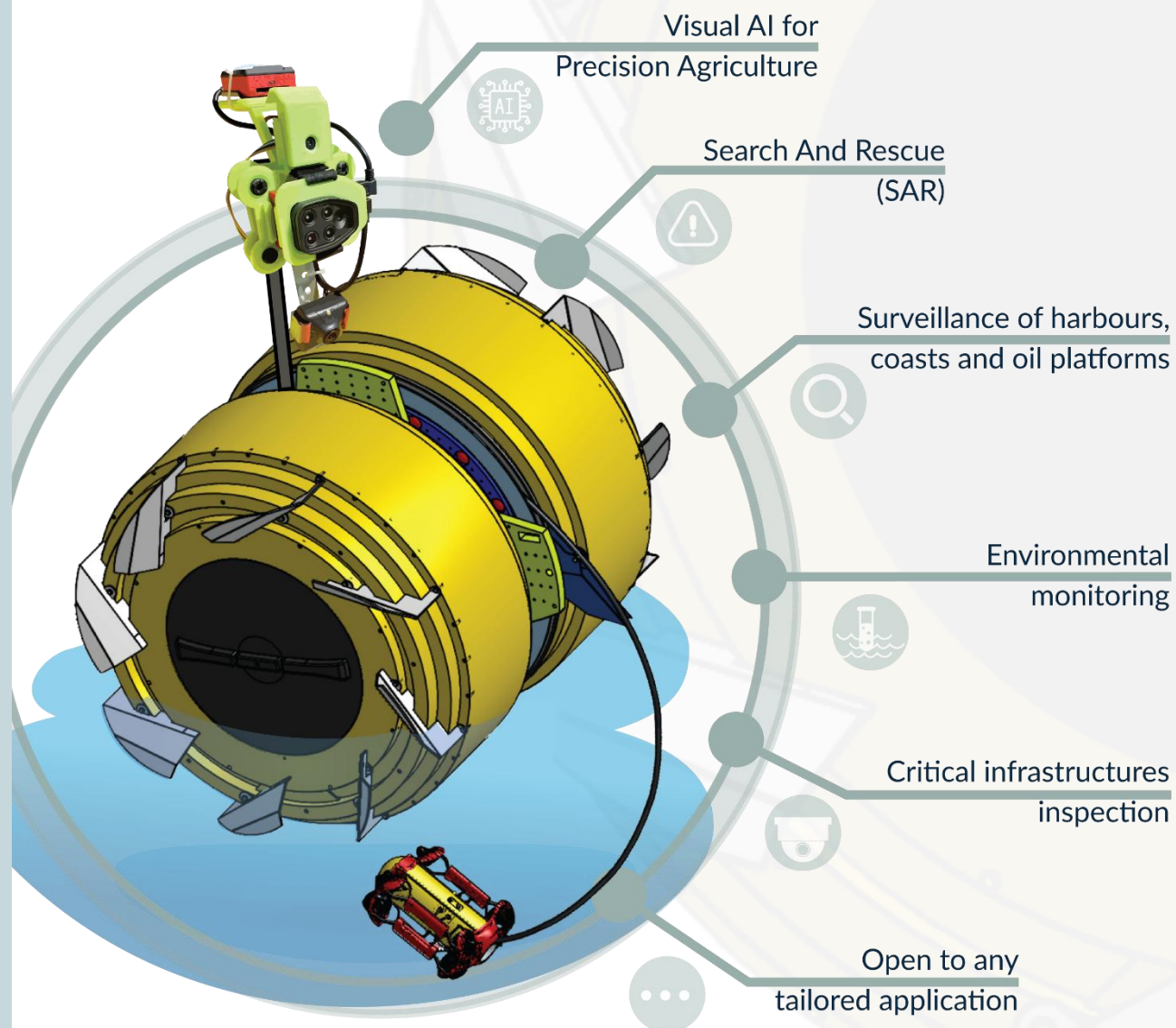




Projects

ecomar

Fast Deployment and Early Warning

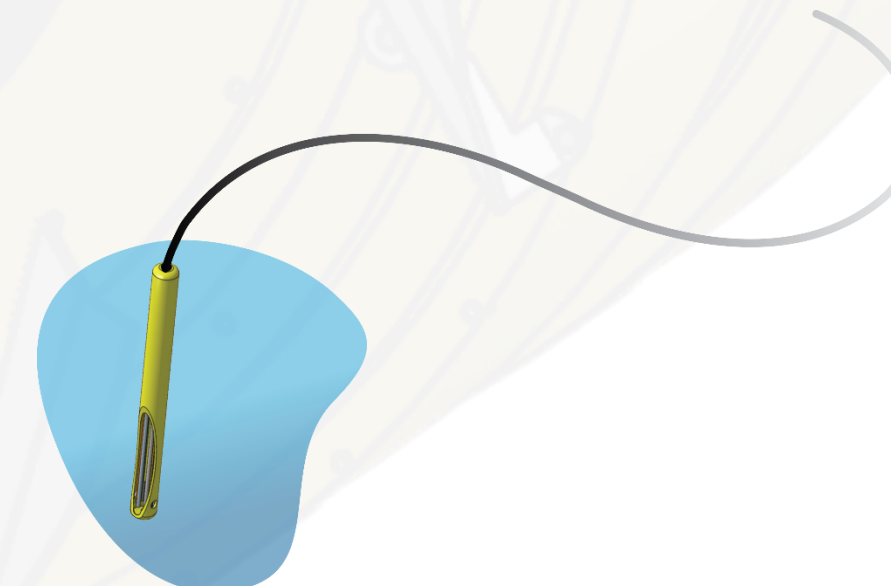


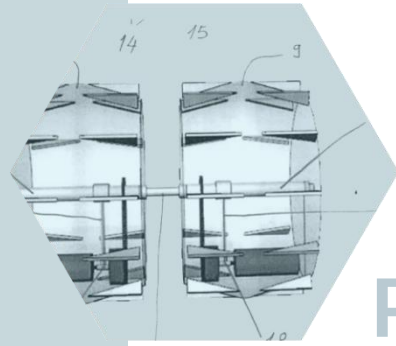
FAST DEPLOYMENT

- The vehicle can start from land and autonomously navigate up to 1 km offshore in calm waters.

EARLY WARNING

- The onboard lab measures temperature, salinity, and oxygen levels in real time.
- It collects water samples automatically when the analysis system detects an anomaly.





Projects

MAIN
MENU

Hydromar

Critical Infrastructures Robotic Safety Inspector



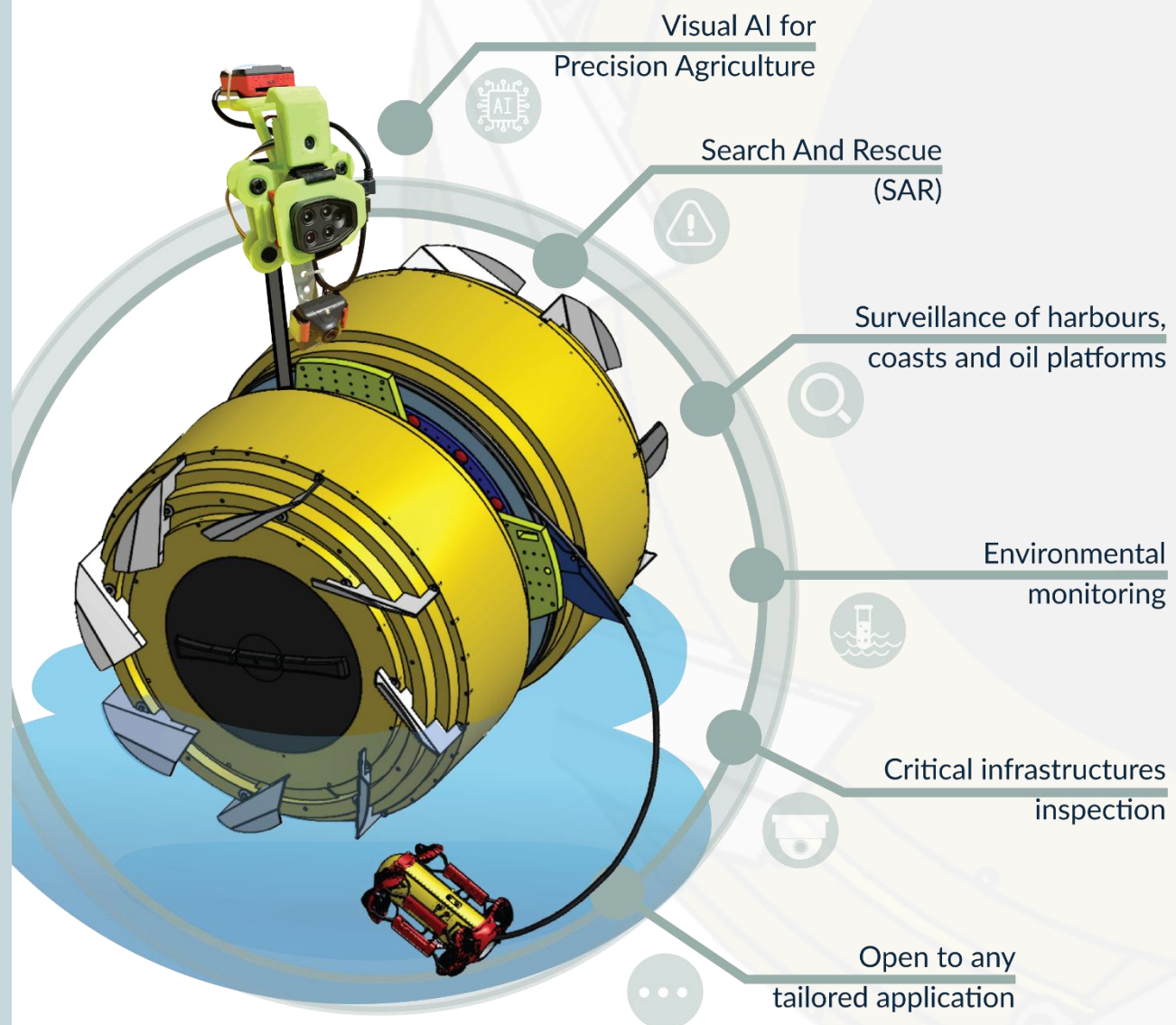
Finanziato
dall'Unione europea
NextGenerationEU



Ministero delle Imprese
e del Made in Italy



START4.0

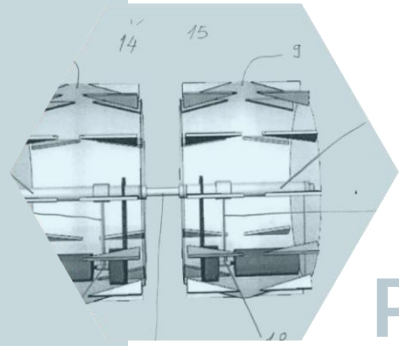


(ROV)²

Hydromar adds an underwater ROV to the Ecomar project for the inspection of critical infrastructure.

ROV² = Underwater ROV operated by a surface vehicle, which is also autonomous.

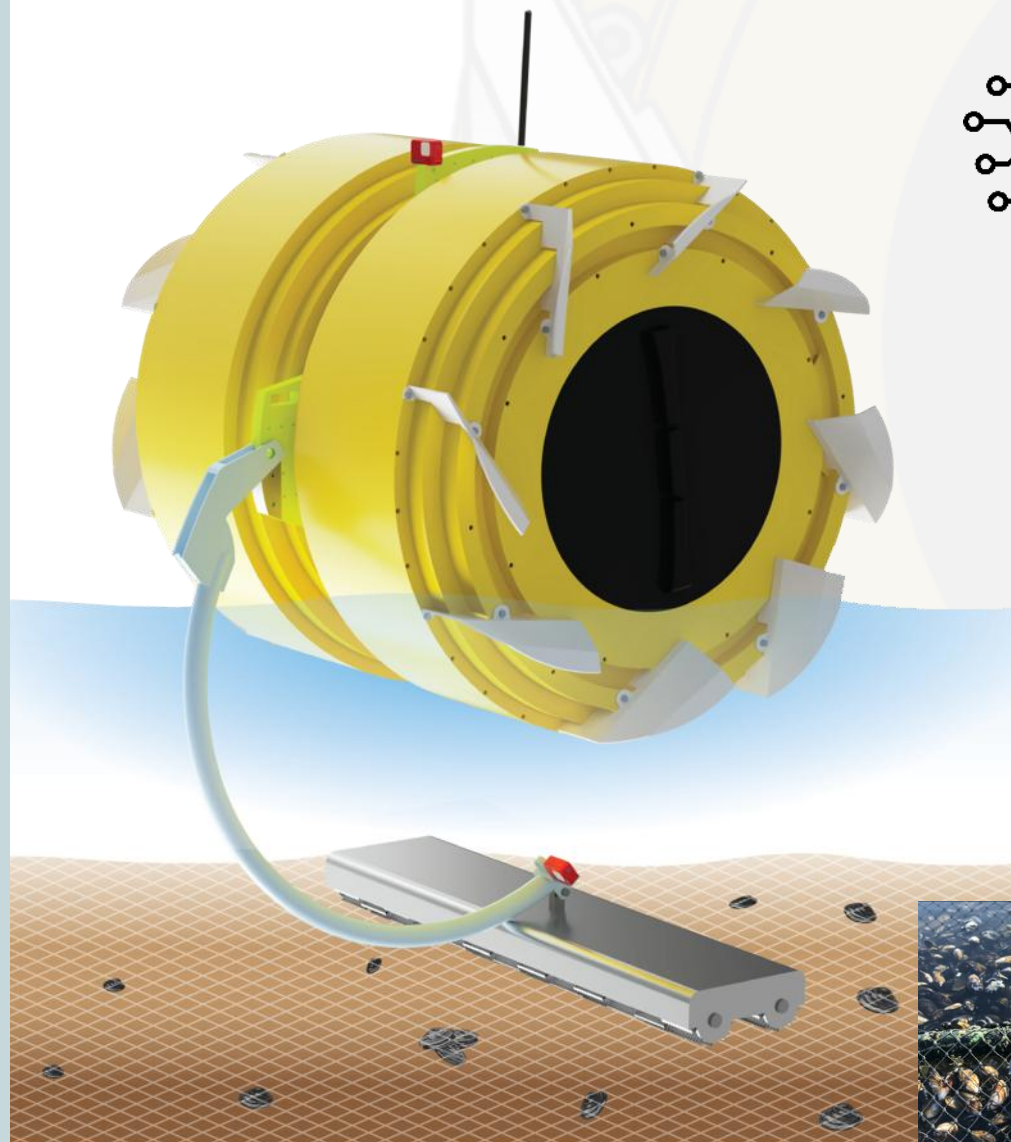
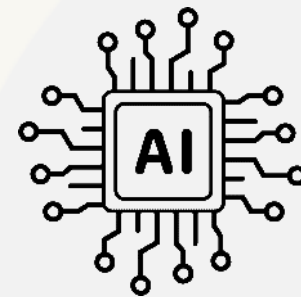




Projects

Bi@Valvia 4.0

Smart Farming and Alien Sentinel



Risorse PNRR, Missione 4, Componente 2, finanziato dall'Unione Europea – NextgenerationEU

- The project combines the enabling technology of the MAR (Multipurpose Amphibious Rover) with a tethered underwater ROV for:
 - **Monitoring**
 - **Inspection**
 - **Maintenance**
 - **Sampling activities** in the aquaculture sector, with a specific focus on shellfish farming.
- It is proposed as a Key Enabling Technology (KET) equipped with a sensing component.
- It enables the assessment of product maturity to optimize production.
- It studies the presence of **alien species** using **AI** techniques.
- It introduces an innovative, low environmental impact farming method.

The Company



SeTeL is a limited private company located in Rome operating, since 1973, in the Integrated Logistic Support Engineering field. Its main mission is to provide services, consulting, applications, and technologies that guarantee the highest level of operational availability (life cycle) of complex systems.

In this scenario SeTeL has carried out its activities on more than 200 Complex Systems, ranging from the **Aeronautics**, to **Space**, **Naval**, **Railway**, **Information & Communication Technology** sectors.

ILS technologies evolve following the concepts of Life Cycle Management and Life Cycle Thinking, thanks to a **continuous R&D effort** on fields like ILS Information technology, Training, Documentation and RAMTS.



Our heritage



Defence



Aerospace



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