

Project name:

Baltic SEA inteGrated unmanned aerial vehicle multifunctional
monitoring system for resurveying of shipping routes (SEAGLE)

Development of autonomous survey vehicles

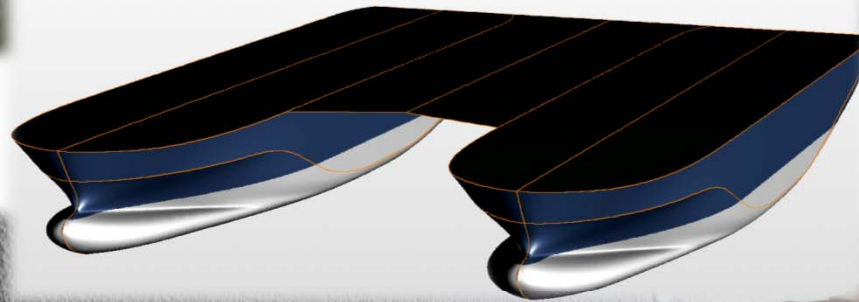
UBASUV – unmanned bathymetry survey vehicle at work



<https://www.youtube.com/watch?v=fxmMbNAVMfs>

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Task 1.3. RPAS and UMS structural and navigational requirements analysis for the integration in SEAGLE system.

- *Increased autonomy for UMS,*
- *Should have innovative construction for different payload carriage (both for RPAS and UMS);*
- *Monitoring methodology of environmental monitoring should be developed for each case (marine, wood, boarder etc.) (both for RPAS and UMS);*
- *Should include integrated command and control software through the advanced command and control options (i.e. internal navigation systems or satellite link) (both for RPAS and UMS);*
- *Should be able of carrying nominated payload for every monitoring case (photo and video equipment for maritime surveillance, LIDAR, infrared cameras, etc. two or more options will be available on payload set) (both for RPAS and UMS);*
- *Should be capable of acting in special missions (i.e. emergency on scene monitoring, water and ice prove testing) (both for RPAS and UMS);*
- *RPAS should be able to launch and take off from the Unmanned Marine System or other marine vessel carrying GPS or AIS, not even designed for special purposes;*
- *Navigation system should be compatible with AIS and other navigation systems (both for RPAS and UMS).*

In addition vessel traffic insertion for UMS should be taken into consideration.

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Task 1.3. RPAS and UMS structural and navigational requirements analysis for the integration in SEAGLE system.

General description of the UMS:

The UMS will be designed and built as multihull self-propelled unmanned floating device. Multihull composition - preliminary projected as catamaran

Description of UMS – standard/necessary devices and systems, ensuring safe navigation and exploitation:

- Energy system
- Emergency device self-rescuing system
- Propulsion system
- Navigation system
- Communication system
- Base station
- Main computer
- Survey system interface
- Mission planner and control system
- Measurement
- Data logging and data storage

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Task 1.3. RPAS and UMS structural and navigational requirements analysis for the integration in SEAGLE system.

General description of the UMS:

Description of UMS – capabilities and systems beyond state-of-art:

- Safeguarding of the device.
- Obstacle detection and reaction system
- Innovative energy system
- Intelligent energy balance system
- Landing platform for the RPAS.

Description of UMS – capabilities and systems (*including beyond state-of-art systems*) directly related to hydrographical use:

- single beam echosounders
- multibeam echosounders
- positioning devices as GPS, dGPS (with SBAS capability), RTK GPS
- Motion reference units MRU and gyrocompass
- sound velocity profilers
- hydrographic data acquisition and processing software

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Description of UMS – standard/necessary devices and systems, ensuring safe navigation and exploitation:

- **Energy system:**
 - **Power sources:**
 1. Electrical energy accumulators
 2. Solar panels
 3. Fuel cells
 4. Internal combustion power generator
 - **Refueling and charging port**
 - **Energy system sensors**
- **Emergency device self-rescuing system**
 - Emergency situation detectors Lift bags Emergency signal
 - Underwater beacon
 - EPIRB

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Description of UMS – standard/necessary devices and systems, ensuring safe navigation and exploitation:

- **Propulsion system**
 - Motor driver module
 - Electrical motor and propeller
 - Motor driver module sensors

- **Navigation system**
 - Navigation
 - GNSS and antenna
 - AIS and antenna
 - LIDAR
 - Echo sounders

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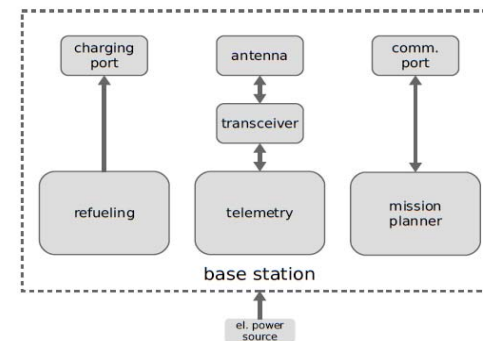
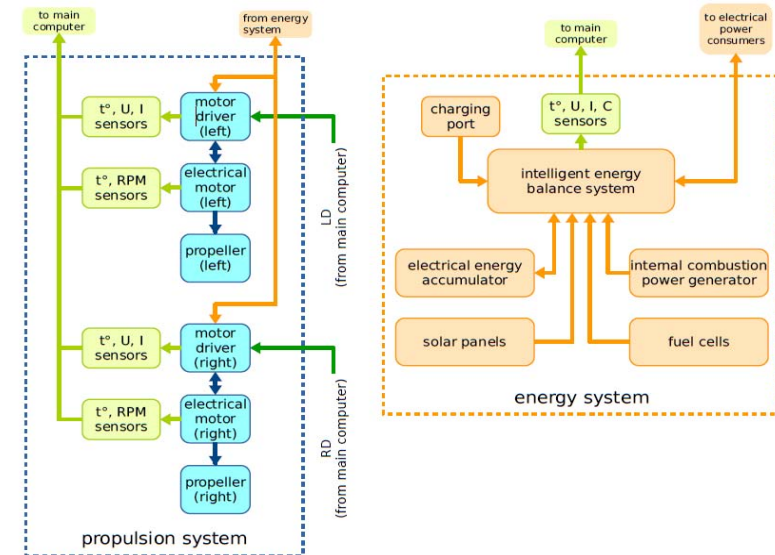
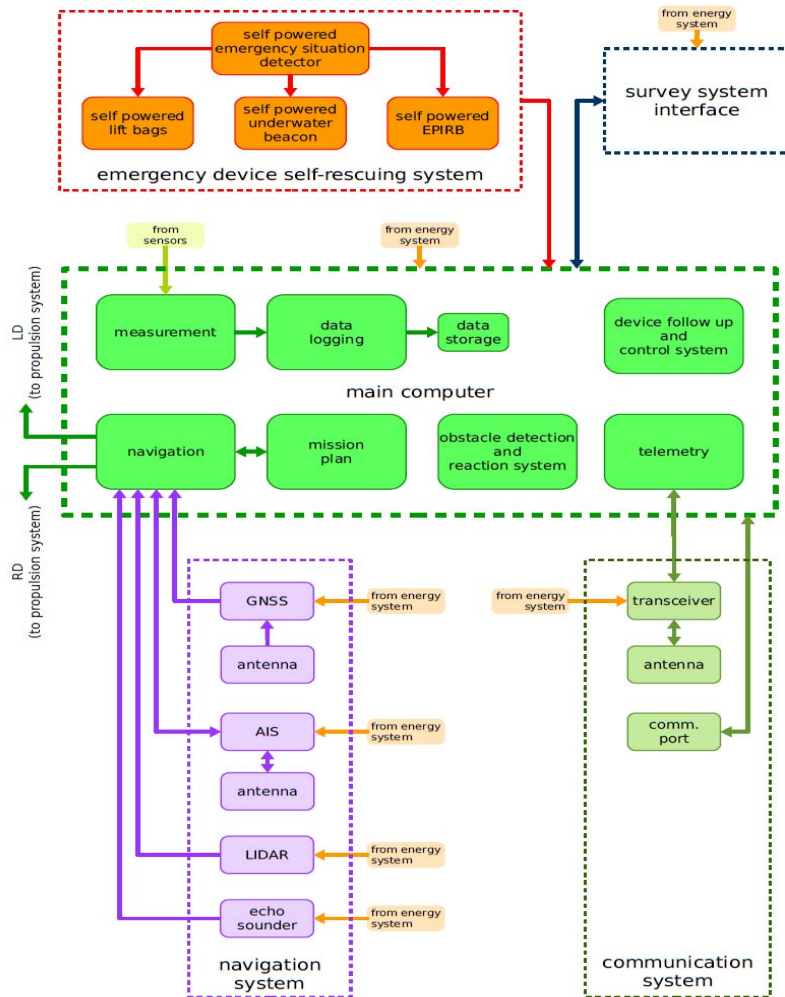
- **Communication system**
 - Transceiver and antenna
 - Communication port
- **Base station**
- **Survey system interface**
- **Main computer**
- **Mission planner and control system**
 - Mission planner
 - Control system
 - Telemetry, transceiver and antenna
- **Measurement**
- **Data logging and data storage**

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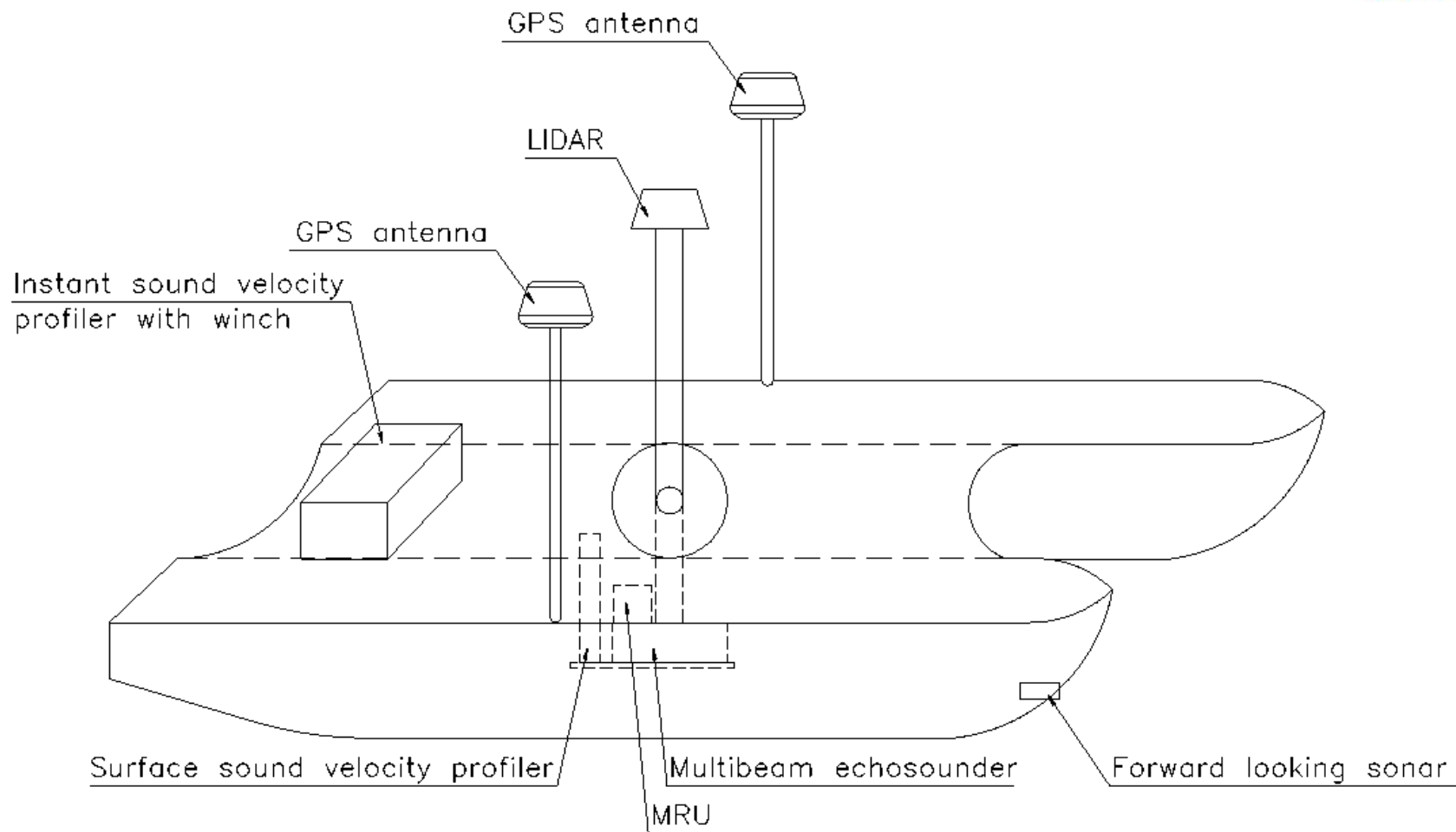
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Description of UMS – capabilities and systems beyond state-of-art:

- **Safeguarding of the device.**
- **Obstacle detection and reaction system**
- **Innovative energy system**
- **Intelligent energy balance system**
- **Landing platform for the RPAS.**



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Description of UMS – capabilities and systems beyond state-of-art:

- **Safeguarding of the device** (“runaway” maneuver)
- **Obstacle detection and reaction system**
 1. Detection of the vessels having identification signals AIS.
 2. Detection of the vessels (moving detection targets) that do not have any identification signals
 3. Detection of stationary objects that do not have any identification signals.

The algorithms for the reaction - in line with the navigation rules.

- **Innovative energy system**
 - fuel cell system sizable to the dimensions of the UMS will be developed

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Description of UMS – capabilities and systems beyond state-of-art:

- **Intelligent energy balance system**

1. Safe charging of the UMS energy sources (including emergency sources);
2. Safe discharging of the UMS energy sources;
3. Energy power source management: monitoring and switching on/off power supply sources by mission plan or by necessity (e.g. emergency situation).

- **Landing platform for the RPAS.**

- To be developed depending on RPAS construction and flying principles