

OBJECTIVES

The main objectives of the **ROBORDER** project are:

- Autonomous border surveillance system with unmanned mobile robots.
- Exploit aerial (UAV), water surface (USV), underwater (UUV) and ground (UGV) vehicles.
- Functioning as both standalone and in swarms.
- Incorporate multimodal sensors as part of an interoperable network.
- Accurate operations in a wide range of operational and environmental settings.
- Provide a complete and detailed situational awareness picture.
- Enhanced static networked sensors (passive radars, passive RF-signal sensing devices, thermal cameras).
- Detection capabilities for early identification of criminal activities and hazardous incidents.
- Additional command and control functionalities for optimized composition and operation of hardware.
- Design and demonstrate three large scale pilot use cases.

ROBORDER



Contacts

CERTH - ITI : • **Dr. Stefanos Vrochidis (Project Coordinator)**
Email: stefanos@iti.gr
• **Prof. Elias Kosmatopoulos (Scientific Manager)**
Email: kosmatop@iti.gr

ROBORDER

Border authorities and Law Enforcement Agencies (LEAs) across Europe face important challenges in how they patrol and protect the borders. Their work becomes more problematic considering the heterogeneity of threats, the wideness of the surveyed area, the adverse weather conditions and the wide range of terrains. The vision of **ROBORDER** is to develop and demonstrate a fully-functional autonomous border surveillance system with unmanned mobile robots equipped with multimodal sensors. Our intention is to implement a heterogeneous robot system and enhance it with detection capabilities for early identification of criminal activities at border and coastal areas along with marine pollution events.



Autonomous Swarm of Heterogeneous Robots for Border Surveillance

<https://www.facebook.com/robordereu/>

<https://www.linkedin.com/in/roborder/>

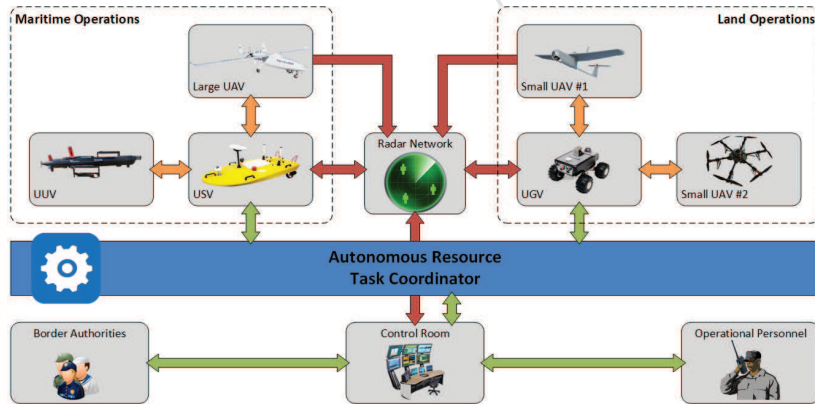
<http://www.roborder.eu/>

https://twitter.com/roborder_eu



CONTEXT

The overall framework for the **ROBORDER** project lies in the domain of border surveillance, marine pollution detection and situational awareness. The main objective is to detect and recognize illegal border activities, assess conditions and properly indicate and inform the border authorities and operational personnel about the area status.



ROBORDER Architecture

EXPECTED RESULTS

ROBORDER will generate technical outputs with significant impact to the field of border security. Main results of the final deployed system can be summarised as:

- Provide an overall border security solution.
- Enabling response to threats within minutes.
- Effective operation of heterogeneous multi-asset system by a single operator.
- Improved payloads and contributions to UxV cyber-security.
- Photonic radar network.
- Passive radar onboard UAV.
- Improved automatic threat recognition and identification of cyber physical attacks.

DEMONSTRATORS

Unauthorized sea border crossing

The use case involves the monitoring of sea passages and islets in the Greek archipelago. The role of the data mule is assigned to heterogeneous autonomous vehicles equipped with a plethora of sensors like coastal radars, optical cameras etc. The mobile devices interact with static infrastructure enabling the commander to determine whether an alarming situation is developing.



Unauthorized land border crossing

The autonomous systems will allow to patrol hardly accessible territories leading to an optimized surveillance and control situation system with a maximum coverage. The exploited surveillance units will be the source for directing the patrols and tracking illegal activities in order to mitigate personal risks and increase monitoring capabilities.



Detecting pollution accidents

The system will demonstrate the capability to track pollutants spilled at sea and to determine key environmental conditions needed for defining the response and for forecasting the fate of the pollutants. The capability will be tested using a natural phenomenon as a proxy of pollutant spill: a river plume will be tracked by vehicles and environmental conditions measured.



EXPECTED IMPACT

Societal impact describes the improvements that an innovative border surveillance system like **ROBORDER** will bring to the early detection of illegal activities and pollution incidents. Our system is expected to:

- Enhance the protection of human lives exposed at land and sea.
- Improve identification and tracking of illegal activities.
- Influence positively anti-drug and anti-smuggling operations.
- Perform improved Search and Rescue (SAR) operations.