Horizon Europe programme 2021

HE-CL6-2021-GOV-01 - *2nd Joint Newsletter*

Progress in Tech

CHAMELEON

Spade
physical-cyber drones ecosystem
agriculture • forestry • environment

ICAERUS

THE OBJECTIVE

The adoption of drones is expanding globally, fueled by the constant evolution of new applications and capabilities. In rural and remote regions, drones present versatile solutions for a variety of tasks, including surveillance using cameras or sensors, acting as mobile connectivity hubs, and delivering goods to inaccessible areas. While many of these uses are closely tied to agriculture and livestock management, their adaptability extends to numerous other industries and urban applications. In rural contexts, the potential for drone use is vast, encompassing sectors such as agriculture, forestry, livestock management, environmental monitoring, and water quality assessment in rivers and lakes. Additionally, drones play a crucial role in firefighting and in providing targeted support to vulnerable populations, such as elderly residents in isolated areas.

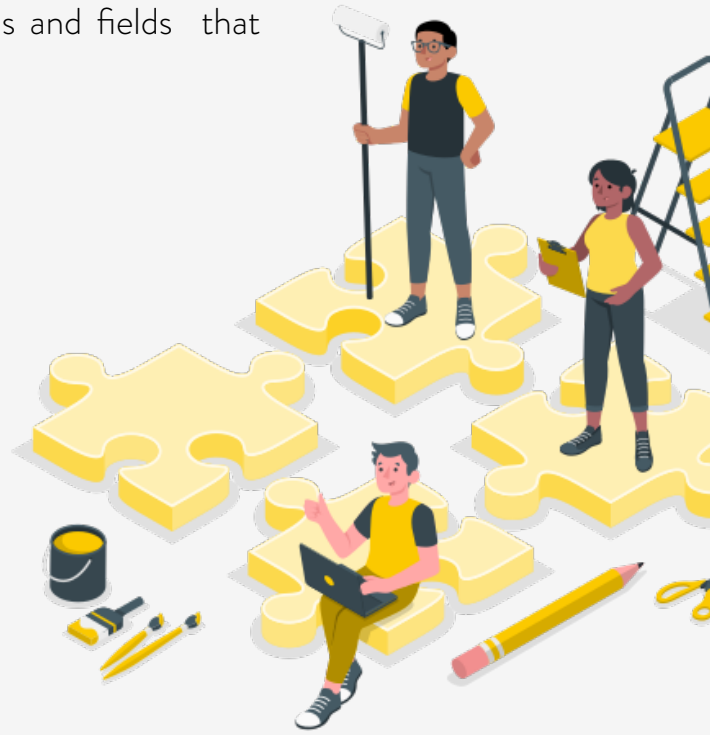
CHAMELEON, SPADE and ICAERUS are European initiatives focused on advancing drone technologies across diverse sectors. These projects support the growing global adoption of drones for applications such as agricultural monitoring, livestock management, and forestry assessment. To share their progress, they recently participated in a webinar designed to showcase the technological advancements and innovative solutions made possible by drone-based systems. In this second edition of the joint newsletter, we highlight these achievements.

Topics 2024 Webinars

Topics Webinar | Drones for Rural Development

COOPERATION

CHAMELEON, SPADE and ICAERUS are three projects that were funded under HORIZON - CL6-2021-01-21 in the category of "Potential of drones as multi-purpose vehicle". Therefore a synergy was found and carried out by the three projects that aims to help each other, find solutions to future problems, ensure efficient dissemination and worthwhile opportunities and simultaneously create knowledge that together with the developed solutions will transform the present situation in areas and fields that each of the projects is focusing and working on.



The expected results of this collaboration are:

- Sharing knowledge on using drones in rural areas
- Identifying new opportunities in the area of digital agroforestry services
- Bring awareness of the value of using drones in agriculture, forestry and livestock monitoring

PARTNERS

CHAMELEON

A Holistic Approach to Sustainable, Digital EU Agriculture, Forestry, Livestock and Rural Development based on Reconfigurable Aerial Enablers and Edge Artificial Intelligence-on-Demand Systems

Spade
physical-cyber drones ecosystem
agriculture • forestry • environment

Multi-purpose physical-cyber agri-forest drones ecosystem for governance and environmental observation

ICAERUS

Innovation and Capacity building in Agricultural Environmental and Rural UAV Services

CHAMELEON

A Holistic Approach to Sustainable, Digital EU Agriculture, Forestry, Livestock and Rural Development based on Reconfigurable Aerial Enablers and Edge Artificial Intelligence-on-Demand Systems

CHAMELEON is a Horizon Europe Project that aims to optimise production and identify potential problems in agriculture, livestock, forestry and rural areas.

Within the forestry bundle, one of the challenges being addressed is the detection of woody debris in rivers. The goal is to prevent the accumulation of large woody debris, which could obstruct river flow and lead to flooding during extreme rain events. This effort employs drone-based technology integrated with advanced image recognition techniques to achieve its objectives effectively.

MEET THE EXPERT

David Sánchez Jiménez

- **Post-doc researcher at TIDOP - USAL**

Post doc researcher and coordinator of the geospatial section in the TIDOP group at University of Salamanca, Spain. His doctoral thesis applied photogrammetric and computer vision approaches to some health problems.
David has experience in European and national geospatial projects. His main research interests include medial applications of photogrammety, computer vision and object detection and authentication of paintings using ultrasonic and structures light techniques.

THE TECHNOLOGY APPLICATION

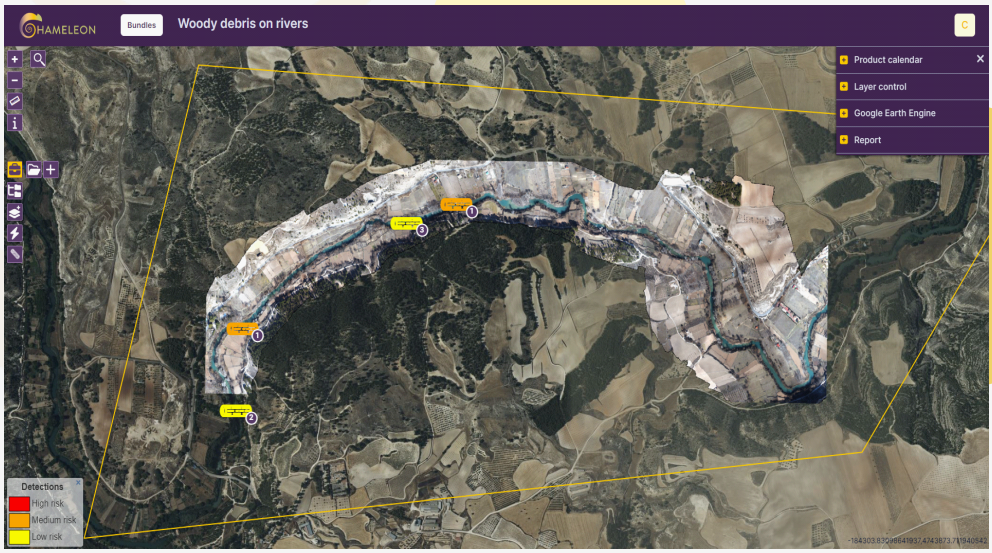
Detection of woody debris in rivers using drones

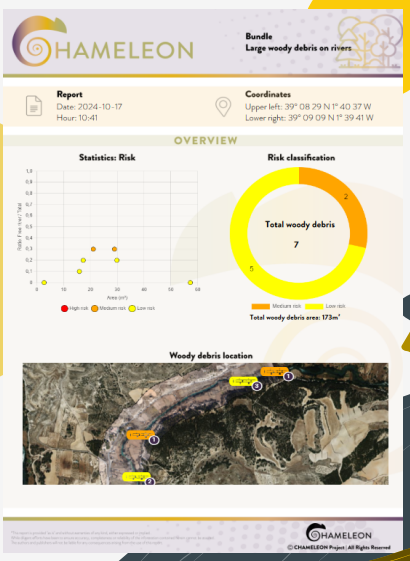
Objective

- Automatically detect large woody debris on rivers that could pose a risk of flooding, especially following extreme weather events like strong storms.
- Utilizing drone imagery, the software identifies fallen trees and other woody materiales that may disrupt the normal flow of the river
- This approach helps in preventing the flooding of nearby areas by enabling timely and effective removal of the debris

Processing steps

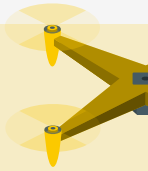
Results



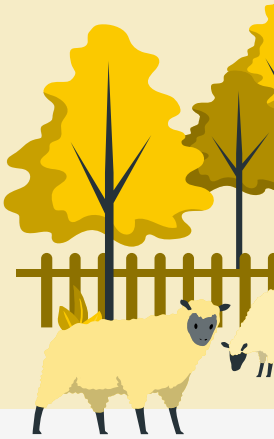


Multi-purpose physical-cyber agri-forest drones ecosystem for governance and environmental observation

SPADE aims to create a smart drone ecosystem for agriculture, forestry and livestock farming focusing on sustainability, cost-effective drones, open data ecosystem, pilot deployment and knowledge sharing.



For this purpose, SPADE is investigating the potential benefits of UAVs contributing to multiple field operations and processes and promote sustainable digital services in the sectors of agriculture, forestry and livestock. Part of the developments within the SPADE ecosystem involves the deployment of UAV formations equipped with edge computing devices for direct applications in livestock management such as detecting focused risks.
This developments involve: using multi-purpose UAVs, Direct Sensing Telemetry and Edge Computing for Cloud Based Digital Twinning.



MEET THE EXPERT

Costas T. Davarakis

- **Managing Director in Nydor System Technologies**

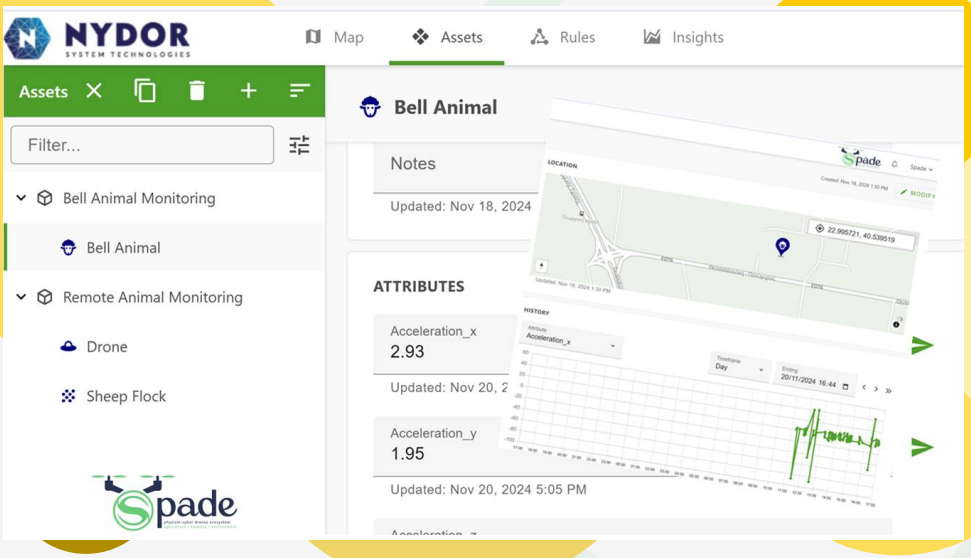
Costas has been a researcher for nearly forty years. Being a technology expert with extensive experience in managing research activities, he has coordinated several EU RTD projects . He holds an M.Sc. from Brunel University of London, and a Ph.D. from the University of Patras. Dr. Davarakis has also been an external consultant and reviewer for the European Commission. He has been involved at all EU research frameworks since 1985.

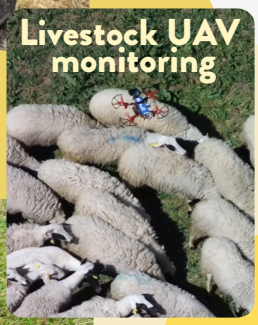
THE TECHNOLOGY APPLICATION

Monitoring Open Field Grazing

Use Cases

- Detection & counting — Use of wearable transceivers on bell animals to assist drones in tracking the herd whereabouts in open fields
- Real-time tracking of herds — Thresholding targeted area for virtual fencing in addition to the wearable transceivers
- Grazing land search — Landscape conditions detection and identification of grazing areas
- Health & behaviour monitoring — Thermal imaging





Livestock prototype

The SPADE Livestock Prototype is designed to deliver fully integrable open modules, facilitating seamless interaction with both SPADE and proprietary UAV systems, as well as proprietary wearable sensing devices.

Thus SPADE addresses:

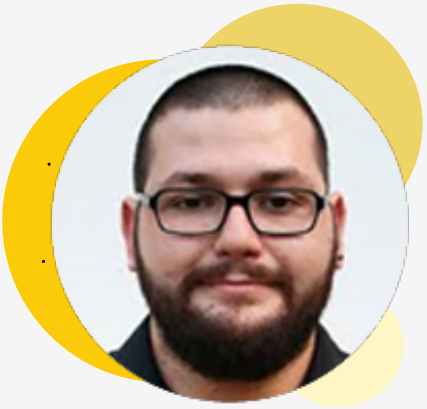
- SPADE UAVs & SPADE sensing devices
- Commercial UAVs & commercial sensing devices

ICAERUS

Innovation and Capacity building in Agricultural Environmental and Rural UAV Services

ICAERUS aims to address challenges such as costs, knowledge gaps, and regulatory and safety restrictions by supporting and demonstrating the effective, efficient, and safe deployment of drones in applicable settings. This will be achieved through five specific drone applications in Use Cases representing key sectoral and societal purposes for drone usage in Europe. Additionally, ICAERUS will produce the ICAERUS platform, which will deliver extensive positive impacts and provide insights into the risks and added value associated with drone integration.

MEET THE EXPERTS



Vasilis Psiroukis

- **Agricultural Engineer**

Vasilis Psiroukis is an Agricultural Engineer and Scientific Associate at the Agricultural University of Athens. He earned his MSc in Geoinformatics from the National Technical University of Athens. His expertise encompasses precision agriculture, spraying applications, and machine learning/image analysis in agriculture. Vasilis has participated in various research projects, including those utilizing UAV data for crop monitoring and yield estimation. He leads the Drone Spraying Use Case.

Esther Vera Moreno

- **Robotics & Computer Vision Engineer**

Esther earned a Robotics Engineering degree from the University of Alicante and a Master's in Computer Vision from Rey Juan Carlos University, Madrid. During an Erasmus exchange in Sweden, she collaborated with the Stockholm Gastro Center on advanced simulations. She has experience in developing deep learning algorithms and integrating computer vision into robotics through various internships. At Noumena, Esther leads the Drone Data Analytics Library and Crop Monitoring Use Case development.

Crop monitoring and drone spraying

Scope

- Explore oportunities and provide a more complete and interconnected account of the potencial and impact of drones as multi-purpose whicles in EU agriculture, forestry and rural areas.
- Showcase and support, through application, the effective, efficient and safe deployment of drones as well as, identify the risks and added values associated with their use.

Use Cases

Drone spraying

3 full datasets of iterations on vineyards
6 different efficacy trials in other crops of interest
Trials for ground depositions and droplets

Significant variations have been observed across different application strategies and parameter configurations, with environmental factors playing a particularly strong role, even under conditions deemed optimal for safe spraying. Additionally, operational parameters such as pump pressure, canopy altitude, and UAV positioning exhibit distinct impacts on coverage and droplet characteristics, underscoring the importance of precise calibration.

Crop monitoring

Data gathering
Global reconstruction and visualization
Plant-level analysis algorithms

Leaves color gradient analysis
Drone simulation
Platform development

Global visualization is achieved through an orthomosaic image of the vineyard from drone-captured data, offering a comprehensive view of plant health and precise localization. A 3D reconstruction enhances spatial understanding. At the plant level, growth patterns and diseases are analyzed using manual labeling, custom training, and deep learning. Additional manual studies, including leaf collection and weather station data, track color patterns and disease progression. All data integrate into a user-friendly platform for historical visualization and informed decision-making.


HAMELEON


pade
physical-cyber drones ecosystem
agriculture • forestry • environment


ICAERUS