ALADDIN

NEWSLETTER #2

APRIL 2019

At the turning point

ALADDIN

Advanced hoListic Adverse Drone Detection, Identification & Neutralization

European Commission

Horizon 2020
European Union funding
for Research & Innovation

aladdin2020.eu

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ALADDIN AT THE TURNING POINT

Dear Reader,

ALADDIN has successfully reached its turning point (M18), marked by a full calendar of activities:

- A busy integration week at the end of January,
- Training of end users on the ALADDIN Beta version in the first week of February
- A successful DEMO day on 7th February

Further details of all of these activities are given in this second newsletter. This marks the end of the development of the Beta version of the ALADDIN platform.

This milestone achievement also triggers the preparation of the final version of the system.

A workshop to review the operational requirements and the functional specifications is envisaged before the summer. This will inform the final system design and performance targets. Currently the project team is preparing for the first Review with the European Commission Project Officer.

Enjoy your reading and keep up to date with the project through the events published on the website.

The Project Coordinator

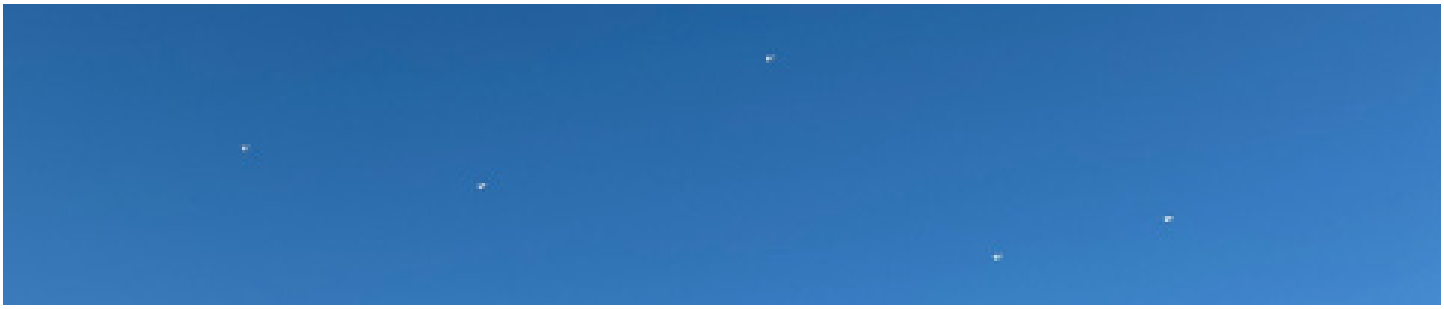
EXCITING DEMO OF ALADDIN BETA RELEASE

The **first Pilot exercises** were conducted recently to evaluate and demonstrate the Beta release of the ALADDIN platform. Representative of 'open-field' use cases, these experiments took place at the ATLAS airfield and test flight centre, near Villacarrillo, in Spain. The agenda included two weeks of intense activity:

- 21–25/01/2019: **integration tests** restricted to the technical partners of the ALADDIN Consortium;
- 04–08/02/2019: **end-users training** and **demonstration** open to external participants.

We had a **very good demo** on Thursday 7 February in the ATLAS centre of the FADA-CATEC beneficiary. Almost 80 people attended. They were very interested, judging by the questions asked relating to the anti-drone system (both formal questions and informal discussions during the day). A big screen displayed alternatively or simultaneously the ALADDIN Command and Control (C2) screen with local operational situation, infrared or camera views: this gave a very dynamic aspect to the presentation and display. In discussions the invitees seemed to be very satisfied.
The flight plans of the drones were designed according to three main cases (scenarios) and included both day and night flights:

1. Drone coming from far away.
2. Drone standing nearby (grounded), taking off and invading the protected airspace.
3. Swarm of drones flying in formation and performing a coordinated attack.



Tests with single drone (DJI Phantom 4 and Matrice 600) and with swarm of drones

THE ALADDIN CONSORTIUM

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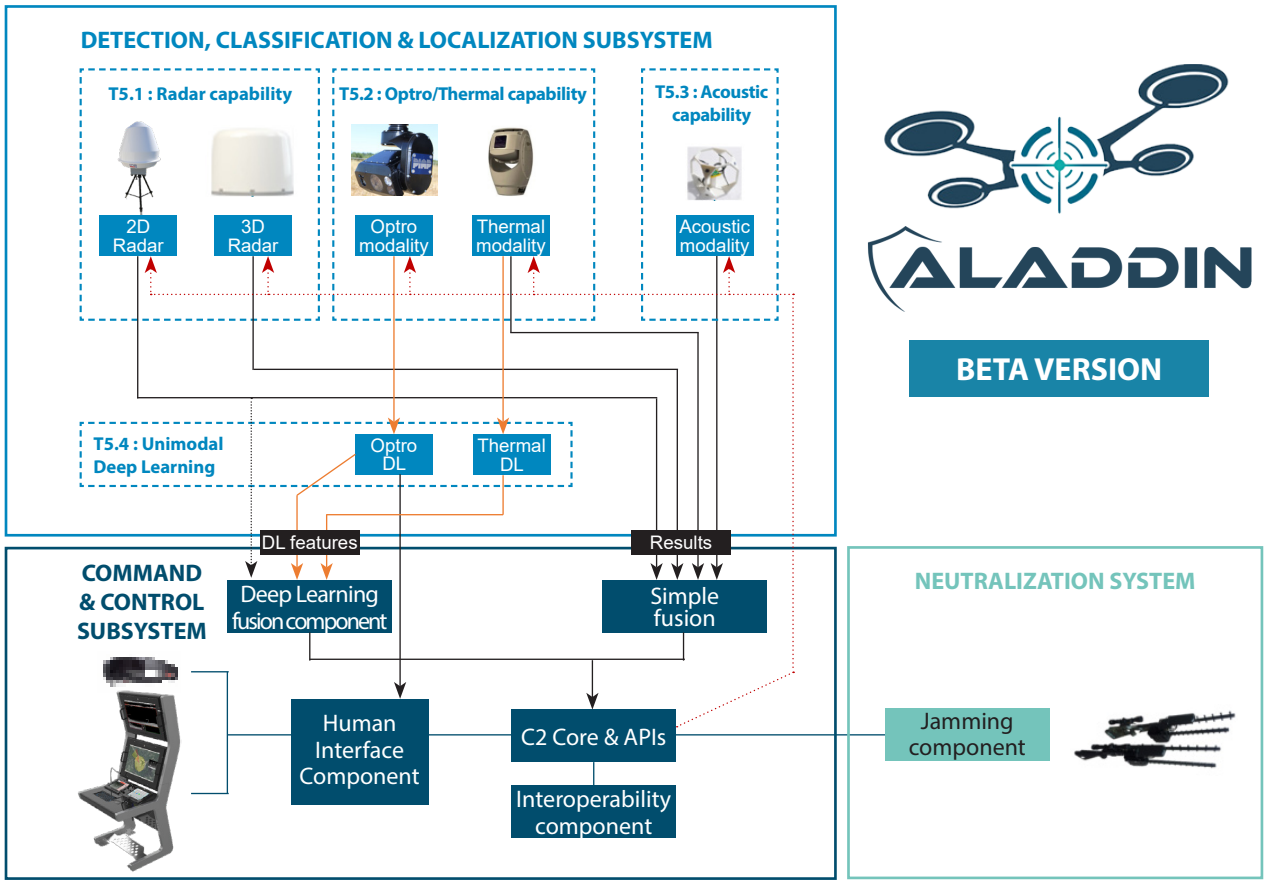
Members of the ALADDIN consortium

EVENT HIGHLIGHTS - TECHNICAL PERSPECTIVE

The two-week period of **integration and testing** enabled the ALADDIN technical team to assess their achievements for the current BETA version of the ALADDIN counter-drone system depicted in the following diagram. This technical assessment was useful to identify any issues - in terms of integration, capability/connectivity and functionality - that need to be addressed for the ALADDIN Final version.



In addition, this event included an extensive **data recording session**, useful for improving the various data processing algorithms of each sensor modality as well as for training robust multi-modal Deep Learning and data-fusion classifiers and methodologies.

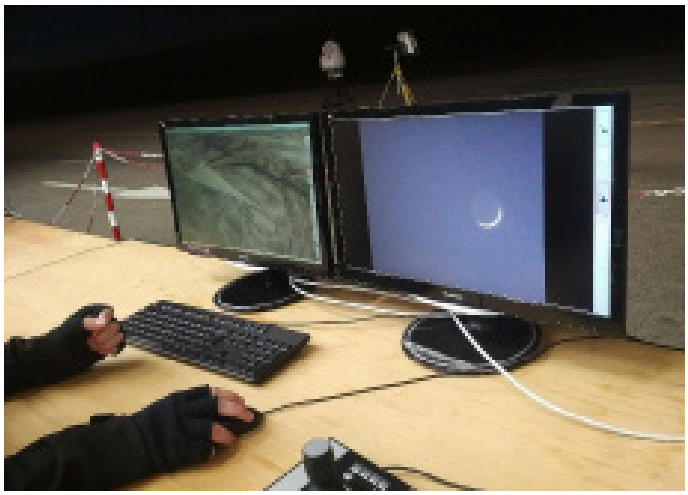
This is the first time that **data from different sensor modalities** has been captured simultaneously in field experiments with drones flying according to the 3 threat scenarios established by end users, including night flying (which required an authorisation from the Spanish authorities).

The resulting dataset includes four different sensor modalities (2D radar from IDS, 3D radar from SIRC, Infrared panoramic images by 2 cameras from HGH and PTZ video camera from PIAP), each one with its own unique characteristics and file formats. Overall, the diversity of the captured data will allow the efficient threat identification and classification by the C2 from CS. The innovative deep learning methodologies from CERTH, will be integrated for the ALADDIN Final release planned for August 2020.

The ALADDIN Technical Manager

EVENT HIGHLIGHTS – END-USERS POINT OF VIEW

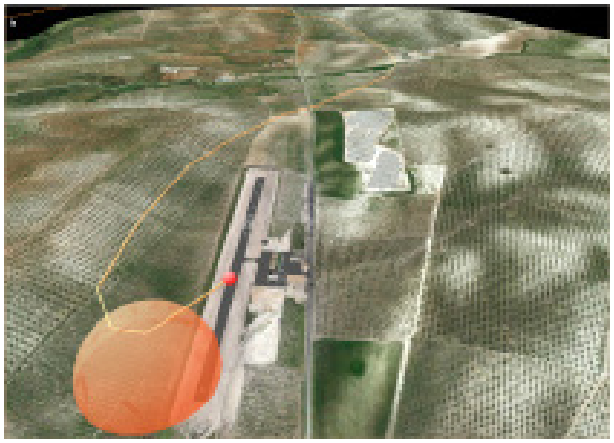
The first Pilot exercises were completed to the satisfaction of the end users. The ATLAS airfield in Spain allowed us to evaluate the Beta release of the ALADDIN platform in the 'open-field' use case, relevant to scenarios such as the protection of critical infrastructure. After an engaging theoretical training session, the practical training and demo at ATLAS allowed us to evaluate the different ALADDIN components and their potential. The 2D radar showed its effectiveness in detecting and tracking drone swarms (including at night). The possibility of distinguishing birds from drones would be invaluable for end users. The 3D radar provided the elevation of the looming threat, which is useful information that enables confirmation sensors (e.g. the pan-tilt-zoom optical camera) or directional countermeasures to be pointed at the target.



The infrared panoramic systems completed the list of sensors present, ensuring a complete appraisal of the sensing technologies presented in the training days.
A key issue for an efficient anti-drone system is the **multi-sensor capability of the C2**. By fusing multi-sensor information, the Artificial Intelligence Deep Learning algorithms are promising to improve the accuracy of detection in all conditions. The versatility for day and for night operation (see side photo) has been demonstrated during the exercise.

Among the tested systems, the mixed reality component with the HoloLens device showed us a new way to display drone activity over a protected site. Once fully integrated in the ALADDIN platform, this solution will allow the user to visualise in an augmented reality the information gathered by the different sensors deployed on the territory.

Visualization through augmented reality of a possible threat can facilitate end user activities, particularly when visibility conditions are limited by fog, light, etc. The 3D Mock-up functionality will increase situational awareness by displaying on a 3D map the current position of the threat and its path or the position and coverage area of the various sensor modalities.



Considering the high interest aroused by the mid-term test, end user expectations for the final test, scheduled for next 2020, are now very high!

The ALADDIN LEAs and End Users

END USER TRAINING

Two weeks prior to the practical training, the **e-learning** platform (https://elearning.aladdin2020.eu/) was open for trainees to visit to undertake training on the theoretical aspects of system deployment. Learners were provided with a unique username and a password, enabling access to the four course modules (General UAS Concepts, Technologies and Applications, Threat Analysis and Assessment, Standards and Regulations). Learning was completed by taking an evaluation test. The ALADDIN training material covered both the sensors used and the physical laws that underpin their operation. The positive feedback trainees provided, along with the results of the evaluation test, revealed that the e-course was effective, achieved its objectives and that learners enjoyed the experience.

In the second week a wide group of end-users (members of the **ALADDIN User Group** (AUG)), were trained on use of the ALADDIN platform. This practical training lasted two days and included five modules (Concept of operations, ALADDIN platform description, Neutralization, Command and Control, Detection/Classification/Localization). During this second part of the training, learners were first trained **in class**, then **simulation** training followed using the HoloLens device, followed by **on-field training**, where trainees saw the different components of the ALADDIN system in action and learned how each one functions. The outcome of the overall evaluation of the training indicated that the entire training procedure went very well. Training was effective and trainees seemed to be very satisfied with the learning material and the trainers. Trainees received a certificate of completion and trainers a certificate of participation.

The ALADDIN Training Officer

In-class training

Hands-on training (Virtual reality with HoloLens)

Panoramic view of ATLAS test centre: deployed sensors and control room

NEXT ALADDIN MILESTONES AND EVENTS

The project is now entering its second development cycle that will lead to the production of the final version of the system to be demonstrated in Athens, Greece in May 2020. A **workshop** to review the Requirements, Concept of Operations, and Functional Specifications will be held in spring 2019. The outcomes will inform the development of the final version of the system. A second **Data capturing session** will be organised in September in Greece to collect datasets needed to train Deep Learning modules and for the preparation of the pilot experiments. Finally, during the **integration and pilot experiments** in May 2020 the full capability of the system will be demonstrated.

RELATED EVENTS

ICUAS

ICUAS'19 - The 2019 International Conference on Unmanned Aircraft Systems, June 11 - 14, 2019, Atlanta, GA, USA.

http://www.uasconferences.com/

SIAE 53rd International Paris Air Show, 17-23 June 2019, Aéroport Paris-le Bourget, France.

https://www.siae.fr/

Contact us:

For more information, please visit the **ALADDIN website**: https://aladdin2020.eu/

Send us an email to info@aladdin2020.eu

Join the LinkedIn group: Counter-Drone group managed by Aladdin

You may get involved in ALADDIN activities by joining the **External Advisory Board (EAB)** and the LinkedIn **Counter-Drone group managed by Aladdin (CDGMBA)**, *a professional group with participants only by invitation*. Send us an email (to info@aladdin2020.eu or through the ALADDIN contact form https://aladdin2020.eu/contact-us/) if you are interested in joining the EAB or CDGMBA.

Issue 1 of the Newsletter is available in the webpage: https://aladdin2020.eu/media/

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