



Project Results

APPS

Plug & play solution for interoperability

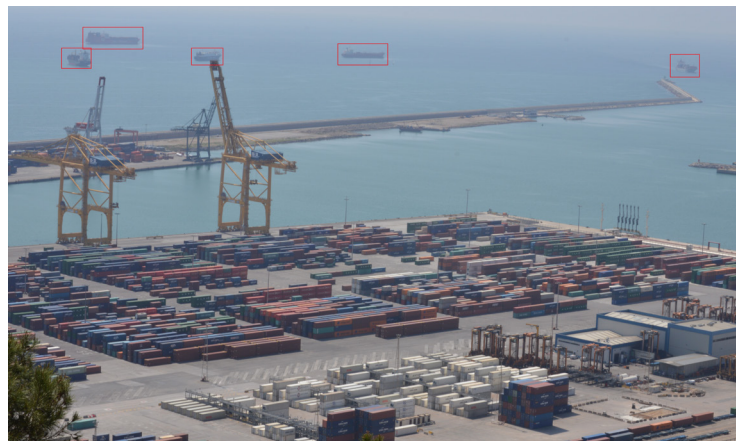
EXECUTIVE SUMMARY

By advancing the state-of-the-art in plug & play, smart surveillance and robust communication, the ITEA project APPS facilitates the transition to future surveillance systems that will feature high capacity, low-latency and low-loss communication.

PROJECT ORIGINS

The prevention of illegal maritime activities to ensure the safety, security and protection of an increasingly complex, diverse and 'smart' marine environment is not feasible with existing radar-only surveillance systems. There is a need to compensate the limitations and increase the detection horizon and performance of existing conventional radar systems, lowering the cost and power requirements while increasing the situational awareness. With system interoperability key to solving this need, a profiling-based architecture is required to address the technical, semantic and organisational levels of the interoperability stack to enable the development of plug & play solutions.

It is against this background that the APPS project went in search of a plug & play solution that could enable national authorities to increase the interoperability of surveillance activities, improve the effectiveness of the operations at sea and facilitate the implementation of relevant legislation and policies. The result of this search was a set of clear guidelines and recommendations for standardisation as well as advancement in the state-of-the-art such as adaptation of IoT to Maritime Domains, developing novel image processing algorithms, and definition of standards to ease the integration for smart surveillance. In liaison with the ITEA PS-CRIMSON project, the following approaches, ideas and methods for the common challenges were discussed: the integration platform (DDS, basis for FIWARE), object detection, tracking and classification, 3D



Enhanced Maritime Surveillance

reconstruction of the marine area, behaviour analysis, and acoustic sensors and data analysis.

TECHNOLOGY APPLIED

The technology developed during the project can be illustrated by the various deliverables produced to demonstrate the capabilities and KPIs of the APPS platform, such as data flow between an application and the APPS DDS, interoperability and mediation with other systems or interoperability components as well as algorithms and devices to boost recognition performance. At device level, the technology allows sensors to plug & play into a surveillance system whose layers are able to reconfigure themselves and operate uninterrupted. At the other end of the stack, surveillance systems operate as a system of systems, exchanging and fusing information and sharing situational awareness.

The project generated a number of innovations in areas such as image processing enhancement, audio enhancement, coaster concept and behaviour recognition. Acoustic sensors, sensor interface devices, collision detection algorithms and an automatic filter selection are just a few of the innovations that contributed to enabling a robust plug & play architecture for smart maritime surveillance. Based on simultaneous observations of events made by multi-sensor systems (radar, visual, thermal, acoustic and physicochemical), this plug & play architecture was demonstrated for maritime surveillance. In Turkey a particular case focused on detecting illegal activities at sea and protection of critical infrastructure both at sea and in harbours. This is the coaster proof of concept. It demonstrated the successful connection and data transfer between an APM (air particle monitor) device

and NANObiz software on the one hand, and the unmanned aerial vehicle of Aselsan, on the other. Another convincing set of live demos was presented in the Port of Rotterdam to show an up and running version of the future P&P smart surveillance system.

MAKING THE DIFFERENCE

In the growing market of this domain significant business potential exists for the industrial partners in the APPS consortium. The maritime authorities of the European countries, in cooperation with FRONTEX, are trying to achieve interoperability among many fragmented solutions. This offers huge opportunities (worldwide) for the plug & play capabilities built in the APPS project. It should be noted that the technologies developed in the project are also applicable to other surveillance applications.

The project results have been exploited in various ways. One is a mobile application commercialised by the Korean partner GMT for the National Federation of Fisheries Cooperatives in Korea. Sales of this application amounted to 200,000 Euros. The Turkish Undersecretary of Defence initiated a tender in March 2017 for the use of

LTA platforms at border security sites, including a demand from the Naval Forces to observe sea borders. Turkish consortium members Aselsan and Otonom acquired the order worth USD 40 million. Additionally, the Undersecretary of Defence has purchased an aerostat for the smart border security project from these two companies. The Online Water Monitoring System of NANObiz that was demonstrated to municipalities has resulted in concrete interest from one of the municipalities. It is keen to initiate a project regarding weather monitoring, so a project proposal has been drafted for EU funding.

Furthermore, NUNSYS and Prodevelop have joined forces to explore a commercial opportunity in a Ghana port in June 2017. Also, ITI is collaborating with these two companies as a technological consultant and developing some of the components integrated in their platforms. GMT, in its turn, is planning close technical cooperation with ViNotion and Prodevelop to provide port security and maritime surveillance solutions in Europe and Southeast Asia. Finally, ViNotion is working on several project proposals for commercial spin-offs with its video-based ship detection and classification system.

MAJOR PROJECT OUTCOMES

Dissemination

- More than 20 publications (e.g. IEEE Oceans, IFIP, SCIS)
- Several presentations/demos at conferences/fairs

Exploitation (so far)

Exploitations about 41 million Euros:

- IoT for Maritime Domain
- Wide Area surveillance by using LTA Aerostat
- Vessel Detection, Tracking, Classification
- Suspicious Behaviour detection
- ENC mobile application

Standardisation

- Telecommunications Technology Association(TTA) e-Navigation communication infrastructure, e-Navigation software & service, e-Navigation system
- IALA (International Association of Marine Aids to Navigation and Lighthouse Authorities), Guideline on VHF DATA EXCHANGE SYSTEM (VDES) OVERVIEW Edition 1.0
- OGC-SWE

Patents

- Automatic Detection System for Unusual Situation of the Vessel, Automatic Notification System for the State of Emergency of Ship's Engine
- One-stop automation test measurement method for radio performance of marine VDES equipment and system performing it
- "An efficient transmission method of multi-packet data in a maritime communication system and a multi-Data transmission / reception device"

ITEA is a transnational and industry-driven R&D&I programme in the domain of software innovation. ITEA is a EUREKA Cluster programme, enabling a global and knowledgeable community of large industry, SMEs, start-ups, academia and customer organisations, to collaborate in funded projects that turn innovative ideas into new businesses, jobs, economic growth and benefits for society.

Partners

Netherlands

Eindhoven University of Technology
Microflown AVISA
Microflown Maritime
Siqura
Thales
ViNotion

Spain

Instituto Tecnológico de Informatica
Nunsys
Prodevelop

Turkey

Aselsan
Nanobiz
Otonom Teknoloji
SRDC

Republic of Korea

GMT

Project start

January 2015

Project end

December 2017

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