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www.safeshore.eu



Welcome

We are excited to present you this first edition of our SafeShore Newsletter!

In each new edition, we offer 'behind the scenes' insights into some of our past or ongoing project activities, we take a close-up snapshot of selected SafeShore partners, we talk about some of the project's technical challenges, we update on progress and latest developments, and we keep you informed on recent or upcoming events.

SafeShore's mission is to increase safety around coastal border regions by improving detection of threat agents (or of victims) in maritime environment. In contrast to traditional methods, SafeShore system is capable of locating small-scale recognition-targets such as low-altitude drones and their remote control equipment, small vessels coming to shore, humans emerging from the sea, etc. The system is combining several recognition methods aiming at effective, affordable, and easily deployable design, and using green technology with minimised impact on the environment.

One key ambition of SafeShore is also to create awareness of this important mission. This Newsletter brings us one step closer towards this goal. In this sense, we would like to extend a warm welcome to you, and hope that you will enjoy the read!

Your SafeShore Team



Above: Safeshore partners during the technical meeting in Bucharest.

Below: Key representatives of the SafeShore consortium, connecting eleven leading organisation active in the border security domain.



Partners feature



QMUL (academia), UK

Queen Mary, University of London (QMUL) is one of the UK's leading research-focused higher education institutions. Amongst the largest of the colleges of the University of London, QMUL's 3,000 staff deliver world class research across a wide range of subjects in Science and Engineering, Medicine and Dentistry, and Humanities. QMUL ranks as the top 11th of leading research Universities in the UK (source: 2008 Research Assessment Exercise) and 4th amongst University of London multi-faculty colleges. With a budget of £260 million per annum and a yearly economic impact on the UK economy of some £600 million, Queen Mary is a research-focused university, which has made a strategic commitment to the highest quality of research. QMUL hosts one of UK's leading research groups in multimedia signal processing and computer vision: the Multimedia and Vision group (MMV) which enjoys a distinguished reputation for innovation. The group has participated in and coordinated several EU funded projects. During the past 3 years only, the group has published over 100 journal papers, over 300 refereed conference papers and has secured grants from various sources.

Website: <http://mmv.eecs.qmul.ac.uk/>

Interview with Prof. Ebroul Izquierdo



SafeShore: What is your capacity in this organisation and how long have you been working there?

E. Izquierdo: I am Professor (Chair) of Multimedia Signal Processing and Head of the Multimedia and Vision Research Lab (MMV) at Queen Mary, University of London (QMUL). I have been with QMUL as a member of academic staff for the last 17 years. I funded the MMV Lab back in 2000.

SafeShore: How is QMUL's expertise relevant to SafeShore?

E. Izquierdo: The MMV group at QMUL performs leading edge R&D in several areas of Computer Vision which are relevant to SafeShore. Specifically, we specialize in real-time machine learning algorithms for automated image and object detection and recognition. This technology makes up key components of the video analytics engine in SafeShore. It will be used for detection and classification of UAVs and threat agents in a maritime border environment.

SafeShore: What, in your opinion, will be the greatest accomplishment of SafeShore project as a whole for end-users ?

E. Izquierdo: The production of a fully integrated low-cost system able to recognise

threat agents in coastal areas will have a substantial impact on the protection and security of European external borders. This represents a significant achievement of SafeShore.

SafeShore: Which is your favourite stretch of beach in Europe and why?

E. Izquierdo: The 10 meters beach stretch at Furore at the Italian Amalfi coast. Its beauty and its remarkable character make it my favourite “beach” in Europe.



TG Drives (industry), CZ

For over 20 years, since 1995, Czech company TG Drives has been demonstrating great expertise in the manufacture and supply of servo-motors, servo-drives and control systems, with a customer-centered approach focused on quality design, programming, optimization, set up, and commissioning of tailored solutions. TG Drives product range consists mainly of servo-motors, digital servo-amplifiers, high precision gearboxes, linear and rotary actuators and control systems. TG Drives motors, drives and control systems are used in key industries such as machine tools, process technology, robotics, automotive, rubber, food and glass industry, defense, etc.

Website: <http://www.tgdrives.cz/en>

Interview with Stanislav Kachyňa



SafeShore: What is your capacity at TG Drives and how long have you been working there?

S. Kachyňa: I have been working at TG Drives for 7 years as a Technical and Business Specialist. As a mechanical engineer I am responsible for technical projects and their leadership.

SafeShore: How is TGD's expertise relevant to SafeShore?

S. Kachyňa : TGD has more than 20 years of experience with manufacture of servo-drives and their implementation. Our engineers solve many special projects and customized solutions. We are experienced also in the military field.

SafeShore: What, in your opinion, will be the greatest accomplishment of SafeShore project as a whole for the wider public?

S. Kachyňa : I think the greatest success will be if all our goals (set by the consortium) will be achieved and if SafeShore system will successfully help to protect borders and decrease crime.

SafeShore: Which is your favourite stretch of beach in Europe and why?

S. Kachyňa: My favourite beach is Black Sand Beach near Vík City on Iceland - it is very unusual and I really love that view!

Romanian Border Police (end user), RO



The Romanian Border Police is part of the Ministry of Internal Affairs. Responsible for approximately 3.150 km of borders, the Romanian Border Police carries out tasks related to the surveillance and control of the state border, the prevention and fight against illegal migration and against acts specific to cross border criminality such as illegal migration, drug, gun and stolen vehicle trafficking, and smuggling. The Romanian Border Police undertakes important efforts in the field of prevention and fight against cross border criminal phenomena and in carrying out and complying with the international standards and legislation.

Website:

<https://www.politiadefrontiera.ro/en/main/pg-general-information-24.html>



Interview with Police Chief Commissioner Adrian Sbarcea

SafeShore: What is your capacity at RBP and how long have you been working there?

A. Sbarcea: I'm specialist officer directly involved in maritime surveillance. I accomplish my duties in Naval Surveillance and Control

Branch within the Directorate for Surveillance and Border Control since 2009.

SafeShore: How is RBP's expertise relevant to SafeShore?

A. Sbarcea : RBP expertise is relevant for the nominated project because we have a big expertise in Maritime Surveillance we coordinate the operational activities within our own Surveillance System - SCOMAR. We were involved in CooPp project and we are involve in EUCISE 2020, both of them directly linked with integration of maritime surveillance. At the same time, RBP has a long tradition in project development. The Schengen Evaluation was passed by RBP on Maritime Borders from the first test.

SafeShore: What, in your opinion, will be the greatest accomplishment of SafeShore project as a whole?

A. Sbarcea : The greatest accomplishment of SafeShore project is a firstly for the end-users because they test and find solutions to help them defend against the new threats in the operational fields, secondly for academia because they have to research and study innovative solutions and thirdly to industry because they have to create and build new prototypes and systems, in order to fulfil the end-users requirements. On the way to the final achievement, the public must be informed about the project's objectives and results, for a better transparency and understanding.

SafeShore: Which is your favourite stretch of beach in Europe and why?

A. Sbarcea: My favourite beach stretch in Europe is in Romania. It is named Vadu beach and is one of the wildest beaches in our country.

Technical Feature

The Video Module System – an important component in the border surveillance process

by Octavia Borcan (IOEL)

In surveillance activities related to different missions and scenarios, which can occur both, at day or night time, a video system extends not only the human vision but also improves the detection capabilities of other sensors, adding recognition possibilities. A few advantages of deploying a video system are here presented in brief:

The images and video at hand can be magnified using optical zoom, and so even a small target can be detected or recognised either by human eye, or by using intelligent video analytics software. Often, an object may be detected as 'target' because it is in a likely place or sometimes because it resembles an object of interest; but even if the level of detection varies with operational circumstances, the recognition of the object is

always a real gain for the system.

Recognition involves a process of discrimination during which an interesting object detected in field is classified into a category. For instance, for the recognition performed by SafeShore, qualifying small flying objects are classified into object categories commonly found in the skies, namely: birds, kites, balloons, and drones. For recognition of objects detected on water, these categories are: small vessels, buoys, and humans. A video system with good recognition capabilities involves a good lens with high contrast values at specific target image resolution, high luminosity, low geometric aberrations, no blur and also a video sensor (imager) with high resolution and low noise from the photo-detection process; if an automatic recognition is desired, an image size of min. 100 ppi (pixels per inch) is recommended; this demands the achievement of a good compromise between focal length (which determines the distance of recognition), field of view (if it is too small the object of interest will be lost very easily), and the relative diameter of lens (if the diameter is too large the optics will be heavy and very expensive).



Figure 1: This example shows the same objects in two different spectral ranges: VIS (left) and LWIR (right). Even if some details are better highlighted in VIS spectral range (because the imager has a higher resolution), the visual contrast between different objects is better in LWIR (thermal contrast between drone and sky, building and sky or foliage and wall are better than their reflective contrasts).

The video sensor allows to see outside the visible wavelengths and if several spectral ranges are used we say that the system is 'multispectral'. Often, the target signatures are more robust in other spectral ranges, thus, the SafeShore video system takes advantage of using three types of imagers, namely in VIS, SWIR and LWIR spectral ranges. Each of these video technologies has its own limits but if they are used in combination, the system is more robust at preventing false alarms because the visual information received is complementary. For example, the existence of an object's camouflage matching the background is a big issue for a recognition process. There are some common cases, especially encountered in border surveillance, when fugitives use thermal camouflage clothes made of ordinary thermal bags, so in these cases, other (non-thermal) video sensors (i.e. in NIR or SWIR spectral ranges) can recognize the target instead. In other instances, visible camouflage is frequently met, and many times these are unintended coincidences. A dark coloured target in front of a cluttered background (e.g., waves, mixed background, foliage) can be easily camouflaged if the visual contrast is less than 15%. In these cases, an infrared sensor (MWIR or LWIR) can identify the target if the thermal contrast is more than 1°C or if there are large emissivity differences between material types. Figure 1 shows the possible difference between object image aspects in VIS and LWIR spectral ranges.

The images can be saved and sent at distance in real time to be analysed by a Control and Command Center, thus, if a decision cannot be taken immediately using an intelligent video analytics, a decision about possible threat level of some unidentifiable object can be cast later by trained staff.

SafeShore talks Business

by Ron Shalom (DFSL)

The main objective of the SafeShore project is to cover existing gaps in coastal border surveillance, increasing internal security by preventing cross-border crime such trafficking in human beings and the smuggling of drugs.

It is designed to be integrated with existing systems and create a continuous detection line along the border.

One of the treats to the maritime coast are small Remotely Piloted Aircraft Systems (RPAS) which can carry explosives or which can be used for smuggling drugs, boats and human intruders on the sea shore.

The market potential for SafeShore system is very big and contains the following market segments:

1. Perimeter Security Market
2. Area Detection Market
3. Area Drone Market
4. Maritime Borders

Table 1: Projections for the Perimeter Security Market

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Sales	4.24	4.65	5.10	5.63	6.28	7.10	8.03	9.14	10.40	11.85	13.26	14.63
After-sale revenues	2.49	2.82	3.19	3.63	4.17	4.86	5.67	6.64	7.79	9.14	10.54	11.97
Total	6.73	7.47	8.29	9.26	10.45	11.96	13.70	15.78	18.19	20.99	23.80	26.60

As mention on previous page, the SafeShore system can replace currently used systems in those specific market and can be also integrated to current system and improve its capabilities.

Perimeter Security Market

According to the Market Research “Global Homeland Security & Public Safety Market 2014-2022”, the Video Analytics market is expected to grow from 8.03 B\$ in 2017 to 14.63 B\$ in 2020.

Taking into account that the outdoor VMD (Video Motion Detection) is about 10% of the market, the market potential for Perimeter Security of SafeShore system is therefore around 803 M\$.

SafeShore system contains 2 major modules for that market :

- DFSL LIDAR technology is a complete VMD system.
- IOEL video camera & QMUL video analytics modules.

Area Detection Market

The intrusion detection market is estimated at 22.39 B\$ in 2017. Assuming that about 5% of it will use VMS/LIDAR systems, we believe that Market potential for SafeShore system is around 1.12 B\$.

Area Drone Market

The global anti-drone market size is anticipated to reach 1.85 B\$ by 2024, according to a new report by Grand View Research Inc.

The Laser based system is about 70% of the market. SafeShore system contains the 3D LIDAR mini drone detection system.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Sales	21.70	21.81	21.93	22.04	22.16	22.27	22.39	22.50	22.62	22.73	22.85	22.96
After-sale revenues	6.30	6.47	6.63	6.81	6.98	7.16	7.34	7.52	7.70	7.89	8.08	8.28
Total	28.00	28.28	28.56	28.85	29.14	29.43	29.72	30.02	30.32	30.62	30.93	31.24

Table 2: Projections for the Area Detection Market

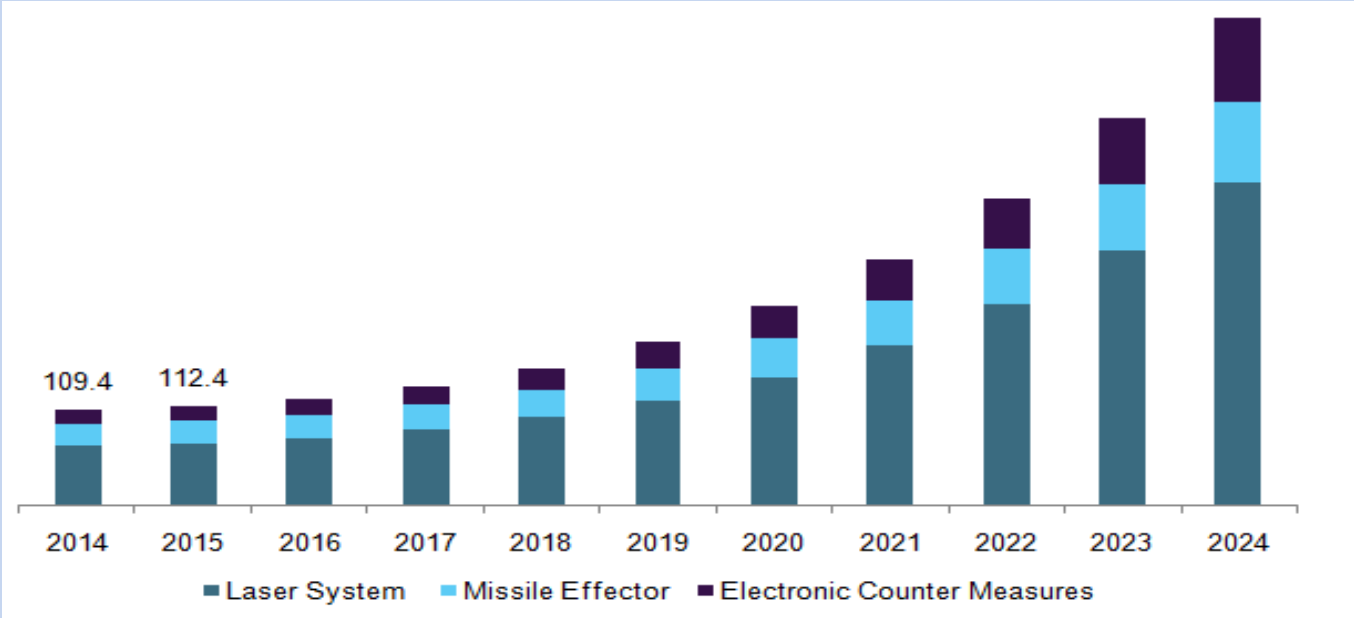


Figure 2: Projections for the Area Drone Market

Maritime Borders & Other Markets relevant to SafeShore system

Maritime Borders, Large Buildings, Temporary Assets - all together are estimated at 500 M\$. Overall market potential for the 4 segments in 2018 is around 3 B\$.

SafeShore Workshop in Romania *by Tudor Radulescu (UTI)*

Between 20 and 23 September 2016, the SafeShore consortium members met for a second workshop in Romania. The 4-day workshop sessions were hosted by the Romanian Partners of the consortium: UTI Grup, Protection and Guard Service, Institute of Optoelectronics, and were held in Bucharest and Constanta. Topics concerning R&D, legal and security aspects were approached.

The workshop was completed by a site survey carried out at various locations on the shore of the Black Sea, including Constanta and Midia Ports.

The SafeShore experts analysed the coast areas, took photos and images, and discussed implications and necessary steps required to organize the test on the Black Sea coast. The Romanian partners informed the consortium members about the legal procedures, the specific weather conditions and the schedule to submit the documents for the authorities' approval. During the site survey the specialists also discussed about the necessary set-up for the testing phase and they decided on the next steps in the project. Of help was the parallel work session conducted by the SafeShore partners with representatives of the Romanian authorities during the DronEast Conference in Constanta. This year's Workshop in London brought back into discussions the information gathered during the site survey, having pinpointed the candidate locations for the SafeShore Black Sea trial phase: Constanta Port South Pier, Midia Port and Neptun Beach. During the trial installation detail design, the final two locations will be chosen, after formal approvals are obtained.



SafeShore partners during the DronEast Airshow near Constanta

WOSDETC - a New Perspective

by Angelo Coluccia (UNILE)

Many people associate the term “drone” either with the unmanned military aircrafts seen in defense operations, or with 'cool toys' that are used for taking aerial pictures and videos, nowadays sold in every gadget store. Probably less known to the general public is the fact that small drones are also a rising threat, causing big headaches to police and other law enforcement agencies, due to their possible misuse in illegal activities such as smuggling of drugs, or in terrorism attacks involving explosives or chemical weapons.

SafeShore is addressing the ambitious goal of detecting such small targets within a general framework of border protection. To foster participation of the research community in this novel societal challenge, the SafeShore Consortium has been promoting a dedicated international workshop on small-drone surveillance, detection and counteraction techniques (WOSDETC). The rationale is that a joint research effort is needed to close the security gap as soon as possible, and as such, the initiative has been warmly welcomed by the

organisers of the 14th edition of the IEEE International Conference on Advanced Video and Signal based Surveillance (AVSS, <http://www.avss2017.org>), which offered to host the workshop as co-located event in Lecce, Italy, this August, the 29th.

As part of WOSDETC, a competition has also been launched: the “Drone-vs-bird detection challenge”. In fact, one of the most difficult aspects of the detection task is how to build intelligent algorithms able to automatically discriminate between drones and their much look-alike natural counterpart, that is, birds. This is especially challenging in maritime areas where bird populations may be particularly numerous.



14th IEEE International Conference on
Advanced Video and Signal based
Surveillance

“Carlo V” Castle, LECCE (Italy)

29 August - 1 September 2017

The challenge has attracted remarkable interest and enthusiasm, with around 20 different research groups requesting access to the dataset for participation to the competition. The participants' worldwide distribution is remarkable, too: Countries of origin include Germany, Spain, India, Turkey, Italy, Australia, Japan, UK, Iran, and USA.

Results will be discussed during WOSDETC, and it will be exciting to see how the different research groups have independently conceived diverse solutions to the same identical problem. After all, isn't ultimately the quest for 'thinking out of the box' finding different approaches the ambition of all research?

On the juicy side, the winner of this first edition of the “Drone-vs-bird challenge” will be awarded a TX2 platform for high-performance video analytics, offered by Nvidia, sponsor of WOSDETC and AVSS.

Indeed, currently the most effective solutions are all based on cutting-edge Deep Learning approaches, the same on which many Web2.0 players are 'betting the farm' in what appears to be an “artificial intelligence rush”;

Deep Learning requires tremendous computational power for training the algorithms, thus calling for more advanced computational schemes and hardware, one of the most appealing being, in fact, Nvidia's Graphical Processor Units (GPUs). taking a wider look, one might say that over the last few years, the introduction of “challenge format” has been adding a twist to academic work, motivating scholars, especially the younger ones, to put their hands on research problems, stimulated by the fun and rivalry of such competition. Could this be a way to give a renewed “cool” dress to technical studies, counteracting the shortage of STEM graduates? SafeShore is playing its two-cents part.

Visit our website **www.safeshore.eu**
or follow us on social networks for most recent updates and news:



SafeShore partners:

