SafeShore Newsletter

Issue 2

January, 2018

Content:

www.safeshore.eu

Welcome

We are excited to start the new year with this 2. edition of our SafeShore Newsletter, bringing you new 'behind the scenes' insights into some of our recent or ongoing project activities, interviews with a selection of our partners, examples of topical technical challenges faced by our professionals, updates on the project's progress, related business trends, and information about upcoming events of interest.

This year, SafeShore's mission seems relevant more than ever. In light of ongoing problems related to terrorism, increased potential for misuse of UAVs, trafficking of people or illegal substances, and a yet-to-be-closed gap between regulation and law enforcement capacity, SafeShore's objective to increase safety around coastal border regions by improving detection of threat agents (or of victims) in maritime environment represents an important step in the right direction. By combining several recognition methods, SafeShore system will be able to detect small-scale 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 designed to be effective, efficient, affordable, and easily deployable while using green technology with minimised impact on the environment.

SafeShore team would like to thank readers of our first Newsletter (issued in August 2017) for the positive and encouraging feedback we have received. We hope that you will find Newsletter No.2 just as insightful and enjoyable. We also want to take this opportunity to wish all of you a fulfilling and bright 2018 — Stay safe!!

Your SafeShore Team

Technical Feature

Counter "Remotely Piloted Aircraft" Systems

by Marian Buric and Geert De Cubber

The need for a Counter Remotely Piloted Aircraft System (C-RPAS) is imposed by the fact that RPASs have recently joined the list of other common things which can be misused as lethal weapons, the risk of which cannot altogether be mitigated by appropriate legal action, regulation and procedures specifically for dual use technology, or through technical countermeasures alone. Malicious use of RPAs is possible due to a series of vulnerabilities such as

- low costs of recreational/commercial RPASs
- weakness of export control
- gaps in the existing regulatory framework
- lack of effective C-RPAS technology
- challenges in C-RPAS deployment
- misunderstandings between the different decision levels of the real threat dimension
- rapid technological development of the commercial RPASs
- already 'buit-in' information, surveillance, target acquisition and reconnaissance capabilities present in most recreational and commercial RPASs
- easy ways of modification of recreational and commercial RPASs to add military features and capabilities
- increasing level of difficulty regarding the detection and classification of a malicious RPAS in permitted zones/environments

From a technical point of view, an effective C-RPAS has to work in compliance with the "five steps of drone-countermeasure model", starting with the detection phase, followed by classification and prioritization, tracking, neutralization of the targets, and ending with the forensic phase. Each of these phases are briefly outlined here:

1.) During the ***detection phase***, a large number of heterogeneous sensors (ranging from active and passive optics, active and passive radars, electromagnetic emission detection, B-field and acoustic, to weather and visibility) organised into a sensors network, are collecting information from cluttered, noisy-background environment data. The sensors must be deployed in accordance with their effective range, with the aim to cover the whole zone to be protected (also labelled 'the responsibility zone of the C-RPAS').

2.) The second phase, ***classification***, is based on unique ID event and timestamp which have been assigned by sensors in the previous phase, and which provide valuable information (whether or not the object detected is an RPAS, and if yes, whether or not it represents a threat). Also, as output information, an accurate risk level is stated for each target, calculated via following parameters: type of target (there are different types of RPASs), direction of arrival, range (distance between threat and protected area), velocity, estimated time of arrival, number of targets detected and tracked, number of sensors that have con-

Figure 1: The 'Five Steps of Drone-Countermeasures'

firmed the target, altitude, interrogation results of other data bases, and target size.

3.) The logical phase to follow is ***tracking***. "Handover" procedures are the main logical processes implemented here as a result of sensors' data fusion, in order to properly track the targets crossing more than one sensor set. The alert will be then displayed on the GIS map with its tracking path and target ID. Information about the target type and its level of threat will also be given (s. previous phases).

4.) The goal of the ***neutralization*** phase is to deter the RPAS's mission (non-destructive), or the RPAS's neutralization (destructive). Based on the results of the classification and in particular the risk assessment, an intelligent C-RPAS should dynamically choose to carry out the appropriate method to meet one of the above goals. The neutralization method needs to be selected considering the environment (e.g. urban, isolated, operational requirements, battlefield) and the effect of the method (e.g. destructive or non-destructive). There are many neutralization solutions, each with their pros and cons, depending on technical implementation, objectives, and applicability: geofencing, physical or kinetic solution, jamming, hacking, etc.

5.) The ***forensic*** is logically the last phase of a C-RPAS process which has to meet the following objectives: to establish the owner of the RPAS and the purpose of use, to retrieve the flight path and the home point, to retrieve valuable information from application databases installed in the remote controller and mobile device.

SafeShore focuses on the ***detection***, ***classification*** and ***tracking*** of threat agents like RPAS in a marine border and critical infrastructure surveillance scenario. SafeShore seeks to cover existing gaps in coastal border surveillance, increasing internal security by preventing cross-border crime such as trafficking of human beings and the smuggling of drugs and by flagging potential terrorism attacks. The SafeShore solution is designed to be integrated with existing systems to create a continuous detection line along the border. The SafeShore core solution for spotting small targets flying in low attitude uses a 3D LIDAR that scans the sky and creates a virtual dome shaped protective shield. For improve the detection, SafeShore will also integrate passive acoustic sensors, passive radio detection and video analytics. Boats and humans near shore will be detected by a 2D LIDAR equipped with video analytics. SafeShore will fill present detection gaps of other existing systems such as costal radars, and thereby provide law-enforcement authorities and protection agencies with a valid tool for their day-to-day work.

Partner Feature

Belgian Westcoast Police (end user), BE

The Local Police Westkust (LPW) is one of 192 local police forces in Belgium. Westkust zone is formed by the cities De Panne, Koksijde and Nieuwpoort, is situated on the north-west side of the province of West-Flanders, and includes a stretch of North Sea coastline where two military bases are located: the air-component base of Koksijde (search and rescue helicopters for use in international waters) and the land-component base of Lombardsijde situated in Nieuwpoort. It is also a touristic residential area, with a lot of dunes, long beaches, and 5 sailing clubs.

The 'outside Schengen' harbor Nieuwpoort is the biggest North-European pleasance harbor with more than 2,200 boats. Westkust also borders on France and the Netherlands, and has close proximity to the UK (at 30 km air distance), the international harbor of Dunkirk (France), and the Euro channel tunnel (at 60 km distance).

LPW ensures that all those who live, work or visit the region are free to exercise their fundamental rights without compromise. LPW focuses on operating friendly and problem-orientated. Tasks include providing effective victim support, conducting efficient investigations, managing safety around local events and/or traffic flows, handling of major incidents and/or disasters, fighting trafficking of people or of illegal substances between France, Belgium and the UK, etc.

LPW was the first police-force to deploy ANPR -systems (since 2003) and body-worn video camera (since 2007).

Website: http://www.lokalepolitie.be/5461/

Interview with Korpschef Nicholas Paelinck

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

N. Paelinck: As Chief Commissioner 'Korpschef', I have been Chief of Police of the Local Police West-Coast for over 20 years where I am responsible for the implementation of the local police policy, and more specifically, for the implementation of the zonal security plan; i.e. the implementation of a local oriented and locally embedded policing as reflected in the concept of Community Oriented Policing (COP). Due to the evolution of criminality in a global context and due to a greater mobilization, I recently orientated our force to Technological and Information Led Policing.

Currently I am also Chairman of the Standing Committee of Local Police (Belgium Chiefs of Police from the local police forces) which is hosted by the Ministry of Home Affairs. I have been appointed to carry responsibility for the 'Internationalization of Belgium Local Police'. I represent the Standing Committee within the International Committee of IACP (International Association of Chiefs of Police) in Washington. I represent the Belgium Local Police within the Strategic Committee between Belgium and France. I am member of the taskforce 'Keytasks Belgium Police', Minister of Home Office and Security. I am also board member of INNOS (Innovation Centre for Security - triple-helix between Police-University-Private Companies).

I started my career in 1983 as an aspirant-officer at the age of 21 in the Brussels Police Force to become an officer by attending the Police Academy in Brussels. I followed the School for Criminology and Criminalistics in Brussel. I followed the European Police Summer Course in Holland and various other relevant courses (management and operational). I followed the management track at the Antwerp Management School. I joined the Koksijde Police in 1991 as head of the Investigation/ detective squad. In 1996 I was appointed as Chief of Police of the City of Koksijde. In 2001 I was appointed as the Chief of Police of the West-Coast police-force. was honoured with the 'Médaille de la Défense nationale à titre exeptionelle' by the French Gendarmerie for contribution to the fight of French-Belgium boarder criminality and also with the golden medal "elite of labor", given by the king of Belgium.

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

N. Paelinck: As End-User we deal with the policing of beaches and are often confronted with illegal migration and illegal drug traffic.

Our Police force mainly focuses on using innovative methods. We have been using video surveillance for many years already and in Belgium we were pioneers in using ANPR (Automatic Number Plate Recognition) technology. As Chairman of the standing Committee of the Local Police I represent the entire local police force of Belgium and serve as a liaison with our minister Of Home Affairs.

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

N. Paelinck: SafeShore System will be particularly beneficial for end-users by helping to easier protect infrastructures, facilitate border control and maintain public order.

SafeShore: Beaches and coast lines are commonly associated with warm weather and summer time, but which - in your opinion - is the best stretch of beach in Europe for a winter visit?

N. Paelinck: These are most definitely the beaches along the West Coast of Belgium. We have the widest shores of Europe and besides the amazing walks, our beaches are the perfect place for many different types of sports such as land sailing, kitesurfing and horseback riding. Also, Nieuwpoort has the biggest port of pleasance of north Europe with a marvellous promenade along the harbour channel.

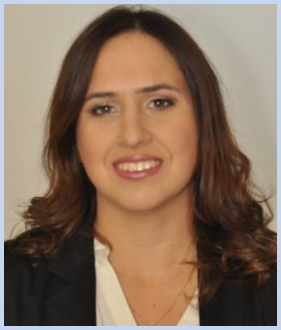
Dr Frucht Systems Ltd (industry), IL

Dr Frucht Systems Ltd (DFSL) started its operation in 2005 and has been involved in projects for Homeland Security. The company develops and produces virtual fences. The company generates high-end products with a high detection capabilities and extremely low false-alarm rate. DFSL has been adapting its technologies also to suit the Safety and Robotics market.

With its focus set on delivering high-performance Homeland Security products for Virtual Fencing, DFSL implements the Virtual Fencing by deploying Laser Radars, Seismic Systems and RF solutions, all of them developed and manufactured by the company. DFSL offers their expertise to and participates in various R&D projects given that they lead to future production and sale of the sensors.

The company's core business consists of Laser Radar based products, and distributes these currently to clients in Israel, France, Japan, China, the US and Canada. DFSL products have to date been installed in various types of sites including airports, power stations, correctional facilities and various sensitive civilian and military sites. The products have successfully passed through tests conducted by various establishments including the USAF, Sandia, Safeskies, French Navy, Israeli MOD and the French Energy Department. DFSL's main distributors are: Sorhea in France, NATURE in Japan, AGP for the US, Canada and South Korea, and Hypersee for China. DFSL's products can be integrated in various ways, in existing security suits or in new installations.

Website: http://www.smartsecsystems.com/



Interview with Malka Klein-Fucht

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

M. Klein-Frucht: We have 10 workers, I have been working at DFSL for 3 years. Our sales are valued at around 1M Euro per year.

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

M. Klein-Frucht: DFSL develop the LIDAR systems (2D&3D) which are the main hardware sensors for detection of mini-drones as well as boats and swimmers coming from the sea.

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

M. Klein-Frucht: We think that industry and end-users will be the greatest beneficiaries of this project – since the SafeShore prototype

contains innovative technology, integration of several sensors types all combined in an economic low foot print mobile system. This is a new product, which will be used by coast guards and can be adjusted to other surveillance and security needs as well.

Israel National Police (end user), IL

The Israel National Police is subordinate to the Ministry of Public Security, comprised of some 30,000 sworn officers reinforced by 36,000 volunteers. It is the only national entity responsible of policing and law enforcement in Israel. The responsibilities of INP cover all police work aspects from the local through the national levels.

The Overall Objectives of the Israel National Police are to prevent crime, secure the public order and protect the public, for example, maintain law and order, traffic enforcement and border security

The Israel National Police is guided by the values and principles of the democratic government of the State of Israel.

Website:

http://www.police.gov.il/Eng_HomePage.aspx

Interview with

Chief Superintendent David Shericker,

Head of Technologies, INP Southern District

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

D. Shericker: I joined the Israel National Police over 20 years ago and since then I have served in various technological units and districts. My versatile experience with the technological and operational requirements of the different departments in the Israel National Police, such as the Operations Department, the Intelligence Department and the Border Patrol, enable me to understand the growing need for technological means to assist us in fighting crime, protecting the public and maintaining law and order.

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

D. Shericker: The Israel national Police, as many law enforcement agencies, encounter criminal and terror acts coming from the sea. The use of drones, for example, is becoming a very common scene in our lives. Companies and people are getting more involved in this field learning every day of the added value the drones can give us. Parallel to peaceful use of drones, there is a growing use of them for acts of crime and terror where the controllers are not in vicinity and yet are able to endanger the public. More traditional examples for these threats are the infiltration of divers and boats

who attempt to carry out illegal actions such as smuggling drugs, commercial goods etc.

The Israel National Police has invested extensive efforts in gaining knowledge and expertise in coping with these threats and we believe that by sharing our vast experience we can help the project in developing a better technological means.

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

D. Shericker: As an end-user, I can see the great potential of the project's outcome for operational use as an additional device which will enable us to better protect the population.

In addition, the participation in a project of Horizon 2020 was a bonus which enabled us to share our experience, learn of new approaches and be in touch with the industry and academy. Hopefully these will help all participants to improve their understanding of things and doing better in the future.

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

D. Shericker: The shores of Greece are beautiful. However, there is no place like home, my favorite beaches are the beaches of Israel and especially those of Tel-Aviv.

UTI Grup (industry), RO

UTI Grup is a Romania-based top integrator of security systems for critical infrastructures used by a variety of sectors: Government, Airports and Ports, Energy, Oil & Gas, Defense Units, Emergency Services, Chemical Industry. The success of its integrated solutions resides not only in UTI's technological excellence, sense of innovation and highly specialized teams, but also in their strong commitment to core values, including trust and responsibility, as business partners.

Established in 1990, UTI has continuously been developing capabilities and competencies to meet dynamic and competitive economic environment, focusing on areas of innovative technology in order to be able to respond to long-term strategic requirements in the context of a globalized economy. UTI is a key player on the Romanian security and surveillance market, with more than 1,500 employees and a turnover of over 120 million Euro per year.

UTI is highly experienced in sensitive security areas and develops projects based on unique proprietary equipment, software applications and signal processing technologies, which are efficiently integrated with parts provided by the

top manufacturers of security equipment. Specialised research and development infrastructure, in-house prototyping and production facilities, as well as the know-how and experienced personnel makes UTI a reliable partner in larger consortia for complex projects.

UTI looks on over 10 years of experience in R&D in the areas of video acquisition and post -processing techniques, mass video data storing, dedicated video data communication, algorithms development and implementation.

UTI GRUP continuously collaborates with national and European universities, R&D institutes and entities, working together on the latest cutting edge technologies in order to provide innovative solutions that address the market challenges. Creating technology to make the world safer has always been the motto that brought UTI Grup up the recognition as an important security solutions developer and integrator. UTI is organised into the following subdivisions:

- Engineering for Defense & Security Business Line
- Information Technology and Communications Business Line
- Intelligent Transportation and Ticketing Solutions Business Line
- Cyber Security Business Line
- Software & Technologies Development Business Line
- Installations and General Contracting Business Line
- Facility and Property Management Business Line

Website: http://uti.eu.com/index.php?lang=en

Interview with Mihai Gradinaru, UTI Vice-President

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

M. Gradinaru: I am the Vice-president for international development in UTI Grup. I have started at UTI during the early days of the company, in 1990, when there were less than 5 colleagues. Now UTI has more than 1,800 employees.

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

M. Gradinaru: Since 1990, we have grown in terms of areas of expertise, projects size and complexity. Starting in 1991 with our first security systems, we have become a supplier of the nuclear industry in 1993 for fire safety and in 1995 for security systems. We have developed in the areas of defense and homeland security systems, cyber security, ITS and complex IT systems.

Our focus on R&D has lead us to establish both hardware and software R&D business units since 1997, where we have developed security systems hardware and integration software, respectively. We started being active in national and European funded R&D projects

since 2004, among them being projects such as SIMAC (Master Model for National Awareness and Crisis Management System and Mobile Command Center Prototype) and the FP7 COPE (Common Operational Picture Information and DissEmination for First Responders).

UTI has a strong capability in software and products development, and the participation in projects like SafeShore helps us further our development roadmap, to create new products and expand the features of the existing ones.

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

M. Gradinaru: The SafeShore solution requirements have been specified by the end-users. However, the biggest accomplishment of our project is that the end-user partners have also been closely involved in all the stages of development, helping the consortium to develop a product which is 100% relevant for the real operational needs of the border security and government officials protection services. It is not to be overlooked that SafeShore responds to an emerging and very relevant technology-related threat to border and critical infrastructures alike.

SafeShore: Beaches and coast lines are commonly associated with warm weather and summer time, but which - in your opinion - is the best stretch of beach in Europe for a winter visit?

M. Gradinaru: With the risk of sounding to patriotic, I would definitely invite you to see the esplanade at the Casino in Constanta when the waves cover it in ice, which happens every few years.

WOSDTEC Retrospective

Researchers in Pursuit of Innovation

by Angelo Coluccia (UNLE)

The SafeShore project is addressing the ambitious goal of detecting small flying objects using “green” technology, namely with zero impact from an electromagnetic perspective. This major constraint requires to address a number of technological challenges. In order to foster the participation of the research community in this effort, the SafeShore Consortium promoted an international workshop called “WOSDETC” (http://wosdetc.wordpress.com) within the 14th IEEE International Conference on Advanced Video and Signal based Surveillance (AVSS, http://www.avss2017.org), which was held in Lecce, Italy, , 29/08-01/09/2017.

Within this initiative, a competition has been launched by the SafeShore Consortium to award the most effective algorithm able to automatically discriminate between RPAS and their much look-alike natural counterpart, that is, birds, under change of light conditions, moving camera, weak contrast, and other unfavourable factors found in real environments. About twenty different groups from all over the world joined this “Drone-vs-Bird Detection Challenge”, whose results have been present-

ed at WOSDETC, triggering an exciting discussion among the attendees about the pros and cons of the diverse solutions to address the same problem.

The WOSDETC experience has confirmed that the most effective state-of-the-art solutions are all based on cutting-edge Deep Learning approaches, thus requiring tremendous computational power. It is not a coincidence that the winner, a research group from Fraunhofer Institute (Karlsruhe, Germany) has been awarded a high-performance platform for video analytics offered by Nvidia, sponsor of WOSDETC and AVSS. The quest for ever more efficient and sophisticated algorithms always continues, of course. So, a second, improved edition of WOSDETC and its associated "Drone-vs-Bird Detection Challenge" is very likely to happen this year!

An audience of researchers gathered at the WOSDETC workshop which was co-organised by SafeShore and held at the University of Salento (Lecce, Italy,) in parallel to the 14th IEEE AVSS

Business Trends

Overview of latest relevant Business Developments

by Octavia Borcan (IOEL)

As a general trend, there are some discrepancies in public opinion regarding the usefulness and dangers of drones in civil airspace, the existence of adequate means of detecting and classifying potential hazards in the air seems to be welcomed. As a conclusion, SafeShore project seems to be well anchored in the context of everyday realities.

The Global border security market is in a period of unprecedented boom due to an escalating cycle which had formed and which is expected to lead to increased costs for security for a long time.

Global market in homeland security equipment

The demand for homeland security equipment is anticipated to be driven by internal security threats such as terrorism, illegal border infiltration, piracy, drug trafficking, cyber espionage and critical infrastructure security among several others.

Cumulatively, the global market is expected to be valued at US$2595 billion during the forecast period. During 2012 and 2022, the market is expected to be dominated by Asia Pacific, followed by North America and Europe. The Asia Pacific region is projected to be accountable for the highest expenditure in the home-

land security sector as emerging economies such as India and China execute extensive modernization programs for their respective police forces and other security infrastructure which were neglected in the past few decades. Currently, the major driver of the global homeland security market is the potential rise in terrorist activities across the world. Moreover, recent years have witnessed advancement in technologies used by terrorists and this has fuelled research and development activities by various countries in an endeavour to develop effective and advanced counter-measures.

European market in homeland security equipment

At European level, the policy response to refugees, which has focused on targeting traffickers and strengthening its external borders (including in countries outside the European Union) has led to big budget increases which benefit the industry.

Total EU funding for member state border security measures through its main funding programmes amount to €4.5 billion between 2004 and 2020.

The EU's main border control agency FRONTEX's budget increased 3,688% between 2005 and 2016 (from €6.3 to €238.7 million). Most of FRONTEX's budget is spent on grants to reimburse and support member states.

As a conclusion, even if the largest selling market is in North America, the European Market is still important, very close to Asia-Pacific market, on a third place.

Following the market analysis and the financial aspects, the general conclusion is that the tools developed under SafeShore project are in line with the increasing and challenging market demands.

Project Insights

Overview of Schedule

by Stanislav Kachyňa (TGD)

Over the last months of 2017, SafeShore was finishing the hardware integration, where all devices are mechanically integrated into the platform. Components' behaviour during operation on the platform was tested, completing finishing touches such as finalising electrical connection, position of connectors, cable length, pinout, etc. In the last step of hardware integration, all devices installed on the platform will be running together, and checks will b e performed in view of many important parameters such as shadowing, vibration, noise, etc.

The second step of integration is software integration, when communication and control between individual devices and the control system will be tested. It will be important to check the communication protocols, data transfer and controlling of each device. In the last step of software integration will be tested proper functionality of the Data Fusion and Video Analytics by easy drone detection.

The official prototype testing is planned to take place during January / February 2018 (depending on status of software integration

and on local weather conditions) in Brno, Czech Republic. TGD offered testing in two locations - on Sport Airport Brno-Medlánky and on Brno Dam, where we could partly simulate similar conditions as on the shore.

HW integration

- mechanical integration of individual devices with the platform
- solving of electrical connection

UTI - acoustic system
IOEL - video module, weather station
RMA - passive radio
DFSL - 2D LIDAR, 3D LIDAR
current status: completed

SW integration

- software part of integration (control system, Data Fusion, Video Analytic)
- checking compatibility and operation with individual devices

current status: finishing (January 2018)

Prototype Testing

- testing of prototype functionality, detection of drones

current status: ongoing (January / February 2018)

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

SafeShore partners: