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NATO SPS International Symposium
ATC.G5816 ”Monitoring and Protection of Critical Infrastructure by Unmanned Systems”

MAY 30 – JUNE 5, 2022

EVENT PROGRAMME

MOLDOVA STATE UNIVERSITY
ALEXEI MATEEVICI STR. 60, CHISINAU MD-2009

Sessions will be held in the conference room 119 of the Faculty of Law on 67 M. Kogălniceanu str.

ORGANIZING COMMITTEE

NATO Country Co-Director

Prof. Pasquale DAPONTE
Laboratory of Signal processing and Measurement Information, Department of Engineering, University of Sannio, Italy

Partner Country Co-Director

Prof. Florentin PALADI
Faculty of Physics and Engineering, Moldova State University, Republic of Moldova

Organizing Committee in addition to the co-directors

Prof. Vincenzo GATTULLI
Sapienza University of Rome, Faculty of Civil and Industrial Engineering, Italy

Dr. Lucia FIGULI
University of Zilina, Faculty of Security Engineering, Slovakia

Assoc. Prof. Luca De VITO
University of Sannio, Department of Engineering, Italy

Responsible with the communication aspect and the language section of the conference

Prof. Elena INTORCIA
Adjunct Professor of English at the Department of Law, Economics, Management and Quantitative Methods (DEMM) and at the Department of Engineering (DING), University of Sannio, Benevento, Italy

EVENT DURATION	The event will last for **7** days between 30th May – 5th June, 2022
LOCATION	It will be hosted by Moldova State University, Alexei Mateevici str. 60, Chisinau MD-2009
SESSIONS	Sessions will be held at Moldova State University conference room 119 of the Faculty of Law on 67 M. Kogălniceanu str., Chisinau MD-2009
ACCOMMODATION	Jolly Alon Hotel, Maria Cibotari str. 37, Chisinau MD-2012

Day 1 (30 May 2022)

Arrival day

Arrival of participants

Welcome greetings from the NATO director and NATO partner directors and organisers

Accommodation

17:00-18:00	**Registration of the NATO Advanced Training Course (ATC) participants**
18:00-20:00	**Dinner**

Day 2 (31 May 2022)

7:30-8:30 Breakfast and transfer

Registration of advanced training course participants and officials

9:00-9:30 Opening session and welcome greetings from the organizers of workshop, officials and delegations: *onsite*

- Prof. Pasquale Daponte & Prof. Florentin Paladi, ATC co-directors;
- Assoc.Prof. Aurelia Hanganu, vice-rector;
- Assoc.Prof. Liliana Dmitroglo, dean of the Faculty of Physics and Engineering
- Mr. Dorin Recean, Secretary of the Supreme Security Council of the Republic of Moldova;
- Mr Sergiu Plop, State Secretary, Ministry of Defense of the Republic of Moldova;
- Mr Oleg Malașevschi, Head of the Directorate-General for Prevention, General Inspectorate for Emergency Situations of the Ministry of Internal Affairs of the Republic of Moldova;
- E.S. Lorenzo Tomassoni, Ambassador of Italy in the Republic of Moldova;
- Ms. Kristina Baleisyte, head NATO Liaison Office in the Republic of Moldova;
- Ms. Elena Marzac, Executive Director Information and Documentation Center on NATO in Moldova (*online*)

Conference interpreter: Assoc.Prof. Elena Gheorghita

BLOCK 1: GENERAL ASPECTS OF PROTECTION OF CRITICAL INFRASTRUCTURE IN MOLDOVA AND NATO COUNTRIES

Symposium on Moldovan security in light of the Ukraine situation
Moderator: Dr. Andrew Fink, Estonia

9:30-10:00	Vladislav Cojuhari, Ministry of Internal Affairs of Republic of Moldova, Republic of Moldova ”Technology used for Counter-Terrorism in Moldova”	*onsite*
10:00-10:30	Jason Jay Smart, Ph.D., Political Adviser, USA, "Tactics and strategies to prevent support for breakaway regions"	*online*
10:30-11.00	H.E. Darius Jurgelevičius, Ambassador Plenipotentiary and Extraordinar, Lithuania, "The process by which Lithuania joined NATO: Looking back after 18 years"	*online*

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11:00-11:45- Coffee break with networking and discussion

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Protection of Critical infrastructure in NATO countries

11:45-12:30	Prof. Ing. Zdeněk Dvořák, Ph.D., University of Žilina, Faculty of Security Engineering, Slovak Republic ”Critical Infrastructure Protection in the area of infrastructure systems”	*online*

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12:30-13:45 – Lunch

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13:45-14:30	Octavia A. Dobre, P.Eng., FEIC, FIEEE, Professor and Research Chair, Electrical and Computer Engineering Dept., Cross appointed to Computer Science Dept., Memorial University, Canada *"Blind signal identification for intelligent radios and tactical networks: Classical approaches and new trends"*	*online*
14:30-15:15	Ing. Lucia Figuli, Ph.D., University of Žilina, Faculty of Security Engineering, Slovak Republic "Threats on the Critical Infrastructure elements"	*online*
14:30-15:15	Ágoston Restás, PhD, National University of Public Service, Budapest, Hungary *"Disaster Management with Resource Optimization Supported by Drone Applications"*	*onsite*

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15:15-16:00 - Coffee break with networking and discussion

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BLOCK 2: UNMANNED SYSTEMS AND SENSOR NETWORK TECHNOLOGY FOR THREATS MONITORING OF CRITICAL INFRASTRUCTURES

16:00-17:30	Prof. Pasquale Daponte, Laboratory of Signal Processing and Measurement Information, Department of Engineering, University of Sannio, Italy "New Trends in Unmanned Systems"	*onsite*
17:30-18:00	Discussion, conclusions, problems and ideas	

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19:00-20:00 – Dinner

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Day 3 (1 June 2022)

8:00-9:00	Breakfast and transfer	
9:00-9:45	Lt Col. Assoc. Prof. Eng. Cristian-Constantin Molder, PhD, Vice-Rector at the Military Technical Academy "Ferdinand I" in Bucharest and founder of the Center of Excellence in Robotics and Autonomous Systems (CERAS) at the Military Technical Academy "Ferdinand I" in Bucharest, Romania “Security considerations regarding the threats of swarm systems”	*online*
9:45-10:15	Prof. Diego Galar, PhD, Professor of Condition Monitoring, Division of Operation and Maintenance Engineering, Luleå University of Technology, Sweden *“Robots, Drones, UAVs and UGVs for Operation and Maintenance"*	*onsite*

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10:15-11:00 - Coffee break with networking and discussion

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11:00-11:45	Assoc. Prof. Martin Hromada, Ph.D., Tomas Bata University in Zlin, Faculty of Applied Informatics, Department of Security Engineering, Zlín, Czech Republic “New Methods and Approaches to Increasing Resilience of Critical Infrastructure”	*online*
11:45-12:30	Bartosz Brzozowski PhD, Team Leader of R&D Projects, JSW Innowacje S.A.,	*onsite*

	Poland *"AutoInvent - Automatic UAV System as an enhancement for Critical Infrastructure protection"*	

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12:30-13:30 – Lunch

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13:30-14:15	Lt. Col. Konrad Wojtowicz PhD, Faculty of Mechatronics and Aerospace, Military University of Technology, Poland *"UAV flight safety based on modern technology"*	*online*
14:15-15:00	Prof. Hugo Plácido da Silva, Professor at Instituto Superior Técnico (IST), University of Lisbon (UL), PLUX Company, Portugal *"Remote Sensing for Biometrics and Health: A Novel Opportunity for Unmanned Systems"*	*online*

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15:00-15:30 - Coffee break

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15:30-16:00	Assoc.Prof. Ioannis Templalexis, Hellenic Air Force Academy, Greece *"Principles of Propulsion Systems - Applications on UAVs"*	*online*
16:00-17:00	Prof. Janusz Mindykowski and Prof. Romuald Masnicki, Gdynia Maritime University, Poland, *"Marine Equipment and Marine Drones: Problems of Using and Positioning/Assessing of its Accuracy"*	*online*
17:00-17:30	Discussion, conclusions, problems and ideas	

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19:00-20:00 – Dinner

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Day 4 (2 June 2022)

BLOCK 3: MONITORING, DATA ANALYSIS AND STRUCTURAL MODELLING MONITORING AND FORECASTING OF NATURAL CATASTROPHES

8:00-9:30	Breakfast and transfer	
9:30-10:30	Prof. Ing. Marián Drusa, University of Žilina, Faculty of Civil Engineering, Zilina, Slovak Republic *"Introduction to new sensors technology applied in geotechnical monitoring based on MUMS sensors and TDR technology for the continues on line monitoring of underground movements, stresses, pore water pressure, for the protection and control of critical part of infrastructure"*	*online*
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	10:30-11:00 Coffee break	
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11:00-11:45	Assist. Prof. Maksims Feofilovs, Assoc. Prof . Francesco Romagnoli, Institute of Energy Systems and Environment, Riga Technical University, Latvia *"Flood risk reduction strategies: use of System Dynamics modelling to assess urban resilience"*	*onsite*
	MODELLING AND DATA ANALYSES	
11:45-12:30	Salvatore Antonio Biancardo, P.Eng., Ph.D., Department of Civil, Architectural and Environmental Engineering (DICEA) University of Naples Federico II, School of Polytechnic and Basic Sciences Naples,	*online*

Italy *"BIM for Roads and Railways: State-of-the-Art Review and Practical Aspects"*

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12:30-13:30 – Lunch

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13:30-14:15	Francesco Abbondati, P.Eng., Ph.D., Department of Civil, Construction and Environmental engineering (DICEA), University of Naples Federico II, Naples, Italy *"I-BIM for existing infrastructures"*	*online*
14:15-15:00	Prof. Vincenzo Gattulli, Ph.D., Sapienza University of Rome, Faculty of Civil and Industrial Engineering, Italy *"DEtection of Steel DEfects by Enhanced MONitoring and Automated procedure for selfinspection and maintenance - DESDEMONA"*	*online*

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15:00-15:30 - Coffee break

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15:30-16:00	Assoc.Prof. Juraj Mužík, PhD., University of Žilina, Faculty of Civil Engineering, Zilina, Slovak Republic *"Introduction of new Meshless solution for numerical modelling of hydrotechnical problems, avalanches, debris flows and similar types of geohazards"*	*online*
16:00-17:00	Eng. Eduardo De Francesco, Selelgroup, Rome, Italy "An innovative Unmanned Vehicle suitable for Monitoring of Critical	*onsite*

	Infrastructures in an amphibious environment”	
17:00-17:45	Assoc.Prof. Chiara Bedon, Ph.D., University of Trieste, Department of Engineering and Architecture, Italy *“Finite Element numerical analysis of glass structures under near-field explosions”*	*online*
17:45-18:15	Discussion, conclusions, problems and ideas	

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19:00-20:00 – Dinner

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Day 5 (3 June 2022)

Block 4: CYBERSECURITY AND PROTECTION OF IT INFRASTRUCTURE

8:00-9:30	Breakfast and transfer	
9:30-10:30	Prof. Corrado Aaron Visaggio, Ph.D., Department of Engineering, University of Sannio, Benevento, Italy *"The state of the malware: what can we defend against?"*	*online*

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10:30-11:00 - Coffee break

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11:00-11:45	Assoc. Prof. Luca De Vito, Ph.D., Department of Engineering, University of Sannio, Italy *"Spectrum monitoring and localization of Radio-frequency emitters"*	*online*
11:45-12:30	Assoc. Prof. Galya Marinova, Ph.D., Faculty of Telecommunications, Department of Technology and Management of Communication Systems, Technical University of Sofia, Bulgaria *"Hardware solutions for cybersecurity"*	*online*

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12:30-13:30 – Lunch

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13:30-14:15	Prof. Florentin Paladi, Ph.D., Department of Theoretical Physics „Prof. Iu.E.Perlin" & Principal Researcher at the	*onsite*

	L.C.Ş. Environmental Physics and Modeling Complex Systems of Moldova State University (MSU), Moldova *"Advanced physical technologies with the UVS application in environmental security"*	
14:15-15:00	Ms Tatiana Bulimaga, Head of International Relations Department, Moldova State University (MSU), Moldova *"Educational for Drone Program for continuing professional education at the Moldova State University (2018-present)"*	*onsite*

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15:00-15:30 - Coffee break

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15:30-16:00 - Discussion, conclusions, problems and ideas

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18:00-21:00 - Gala Dinner

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Day 6 (4 June 2022)

ONSITE PRACTICAL TRAINING ACTIVITIES

9:00-10:30 Dr. Veaceslav Sprincean, Ph.D.,
Head of the eDrone laboratory, Faculty of Physics and Engineering

- *Using drones for building and critical infrastructure inspection - 3D mapping in the Laboratory by using "licensed software Pix4Dmapper Professional drone-mapping*
- Presentation of the *eALERT* project state-of-the-art review and practical aspects: "Creation of the *eALERT* platform for real-time environmental monitoring and instant warning of the population of Chisinau in case of dangerous natural and anthropogenic hazards", ANCD no. 22.80015.7007.262T

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10:30-11:00 - Coffee break

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11:00-12:30 Assoc.Prof. Sergiu Vatavu, Ph.D.,
Head of Applied Physics and Informatics Department, Faculty of Physics and Engineering

Visit to the CaRISMA research center

Environmental monitoring platform Flying laboratory SOWA, model SmartCity SOWA;

air quality sensors Flying laboratory SOWA"

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12:30-13:30 – Lunch

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13:30-15:00 Building information modelling and finite element modelling of critical infrastructure elements

Day 7 (5 June 2022)

Departure of the NATO ATC participants

ABOUT THE EVENT

The Advanced Training Course (ATC) explores the issues of monitoring and protection of critical infrastructure through an interdisciplinary approach. Over the past decade, the attention of the developed democratic countries has been mainly addressed to the protection of vital objects. Science and research are increasingly focusing attention on Security and Critical Infrastructure Protection. Legal frameworks for the protection of critical infrastructure elements with a focus on energy, transport and ICT have been gradually developed in European countries, but such frameworks are still missing in some countries, mainly in non-EU countries.

Protection of infrastructure objects is solved by technical, technological and organizational measures. In the future, the protection of soft targets appears to be another key activity of modern states.

The concept of critical infrastructure was set mainly because of the occurrence of unexpected events. To identify the key elements for an efficient security management, it is necessary to define and describe the types of threats besides estimating their probability of occurrence along with their expected consequences.

When we speak about Critical Infrastructure Protection, we are considering the influence of the entire spectrum of possible threats, which are classified into three main types:

- **Natural events;**
- **Technical failure/human error;**
- **Intentional acts such as terrorism, crime or war.**

The Advanced training course will be divided into 4 blocks:

Block 1: **General aspects of Protection of Critical Infrastructure**

1.1 Protection of Critical infrastructure in Moldova;

1.2 Protection of Critical infrastructure in NATO countries.

Block 2: **Unmanned Systems and sensor network technology for threats monitoring of Critical Infrastructures;**

Block 3: **Monitoring, data analysis and structural modelling**

3.1 Monitoring and forecasting of natural catastrophes;

3.2 Modelling and data analyses Daponte/Paladi Event Application;

Block 4: **Cybersecurity and protection of IT infrastructure and one practical section "Practical training activities".**

After the theoretical interdisciplinary presentation, a practical section is planned, where the participants will obtain practical skills related to the presented areas: using drones for building and critical infrastructure inspection - 3D mapping in the Laboratory by using "licensed software Pix4Dmapper Professional drone-mapping, Environmental monitoring system in Flying laboratory SOWA, and building information modelling and finite element modelling of critical infrastructure elements.

If the critical infrastructure elements (physical and IT) have to be protected, the essential task is prevention, i.e. discovering and predicting threats. ATC aims at covering this issue through an interdisciplinary, and innovative approach, using advanced methods for monitoring and protection.

The ATC is focused on the new methodology (Unmanned Systems, sensor networks, etc.) which can help to recognise various threats (terrorism-explosion, crime – cyber-

attacks, natural events – flooding, etc.), modelling behaviour of critical infrastructure elements under such threats and consequently designing adequate means of protection from the new intentional actions, not only by Unmanned Systems.

The Unmanned Systems (USs) have been rapidly growing in popularity in recent years. Tactical USs are now used extensively by the military and various security services, while professional USs are becoming increasingly common in a variety of civilian fields. This expanding use of USs is due to advances in technology as well as to the versatility and reductions in size, risks and costs that remotely operated systems offer as a result of not having a pilot or operator on board. USs include ground control stations (GCS), data communication links, and a range of unmanned aerial (UAV), ground (UGV) and underwater (UUV) vehicles. USs are being used more and more in mainstream applications thanks to advancements in technology. This is leading to more ways of refining the way platforms are deployed and integrated into teams of workers.

Performance in autonomy mainly comes from massive use of advanced IT technology as core of the USs. Operators should consider the security of data collected via US as a critical part of their risk management program. Questions of cybersecurity in the USs domain become crucial and the potential misuse of small USs for criminal and other malicious purposes is a growing development that needs to be addressed in education and training, in order to have qualified personnel ready to engage these challenges.

One part of ATC will be dedicated to data analysis and modelling, addressing, in particular: application of computer modelling software for forecasting dangerous natural hazards, namely, the 3D mapping of the current state of risk factors, etc., as well as procedure for defect detection through data fusion of processed images and vibration measurements;

automation in defect image acquisition by UAV, automatic data storage in bridge management systems; embedding sensor systems to revalorize and transform elements and structures into self-diagnostic elements, data-driven automatic procedure for alert in monitored structures.

Practical training activities will be carried out in the Laboratory "Educational for Drone (eDrone)" at the Moldova State University, having: Environmental monitoring platform Flying laboratory SOWA, model SmartCity SOWA; air quality sensors Flying laboratory SOWA etc.

AUDIENCE

The intended trainees are researches and students specializing in the area of security of infrastructures (security studies, infrastructural engineering, electrical engineering, etc.); Local government security experts; Security officers who deal with security challenges of critical infrastructure; stake holders; Experts who deal with terrorism or other violent threat and are looking for specialized knowledge; Experts who deal with problems related to protection of critical infrastructure.

There are two most significant benefits for attendees:

- **Acquaintance and knowledge of the development of modern technologies for technical protection systems that will provide safety and security of critical infrastructure concentrated on civil engineering objects;**
- **Shared knowledge and ideas for future scientific and technical activities in the field of research and development of protection of critical infrastructure using elevated monitoring system and high performance structural materials.**

Website: https://ephysimlab.usm.md/spsatcg5816/index.html