

ROMANIAN NAVAL ACADEMY “Mircea cel Batran”

**THE 48<sup>th</sup> SCIENTIFIC  
CONFERENCE FOR STUDENTS  
CADET-NAV 2026  
PROGRAMME**



*23<sup>rd</sup> - 25<sup>th</sup> of April 2026  
CONSTANTA*



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*Ana Mădălin-George*

*Petcu George*

*Ion Ionuț-Cătălin*

*Mihăila Bianca-Elena*

*Neagu Alexandru-Nicușor*

*Chițoiu Daria-Ștefana*

*Vulpe Lavinia-Elena*

*Ermalai Alessia-Elena*

*Buzea Rareș-Cristian*

*Nițu David Adrian*

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*Apostu Livia Nicoleta*



<b>CONFERENCE AGENDA</b>	
<b>THE 48<sup>th</sup> EDITION OF CADET-NAV 2026</b>	
<b>INTERNATIONAL STUDENTS' CONFERENCE</b>	
<b>23 - 25.04.2026</b>	
<b>Thursday, 23.04.2026</b>	
08.00 - 12.00	Arrival of Participants, Admin Matters
12.00 - 14.00	Visit on campus
14.00 - 15.00	Lunch
15.00 - 20.30	Constanta Sightseeing City Tour
<b>Friday, 24.04.2026</b>	
08.00 - 09.00	Registration of participants; Distribution of conference maps - "Vice-Admiral Ion Coandă" Auditorium
<b>CADET-NAV 2026 Official Opening Ceremony</b>	
09.00 - 09.30	Raising the Flag Ceremony
	Welcome Address of the Rector of Romanian Naval Academy "Mircea cel Batran"
09.30 - 10.30	Paper Presentations in Plenary: - stud. Alexandru HURMUZ - <b>An Analysis of SSD Radar Systems</b> , Scientific Advisor: Lecturer Dumitru CORDUNEANU, Romanian Naval Academy - stud. Traian-Marian IONEL, stud. Liviu-Constantin CĂPĂTÂNĂ - <b>Cognitive Processes in Joint Military Cooperation</b> , Scientific Advisor: Lecturer Mihaela GURANDĂ," Henri Coandă" Air Force Academy - stud. Mircea-Georgian APOSTOL, stud. Robert BOCA, stud. Lucian-Cosmin CHIȚU - <b>Development of a Computational Model for Pressure Loss Estimation in Hydraulic Systems</b> , Scientific Advisor: Lecturer Doru COȘOFREȚ, Romanian Naval Academy
10.30 - 11.00	Group Photo; Coffee Break
11.00 - 14.30	Paper Presentations on Sections (Navigation and Transport – Room L121, Engineering and Management – Room L120, Military Sciences and Information – Room LI 126, Electrical Engineering – Room LI 356, Weapons and Communications – Room LI 125, Mechanical Engineering – Room E122, Fundamental Sciences – Room Lp-A5, Foreign Languages – Room CI S3, Students' experiences in international exchanges – "Vice-admiral Ion Coanda" Auditorium)
15.00	Recreational activities at the Palazu-Mare Maritime Training and Water Sports Department
<b>Saturday, 25.04.2026</b>	
10.00 - 12.00	Awards Ceremony
12.00	Departure of Participants



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## I. SECTION: NAVIGATION AND TRANSPORT

### Section Committee:

Chairman: Lecturer Dumitru CORDUNEANU, PhD

Members: Lecturer Lucian DUMITRACHE, PhD

Prof. assist. Livia RAUCA, PhD

Room: L1A4

### 1. (ID 2) Design and Implementation of an Autonomous Surface Vehicle using Custom Edge-Computing Architecture and Deep Learning

**Authors:** stud. Tolga Yarkın USTA, stud. Mehmet Barış HACIM

**Scientific Advisors:** Eng. Lt. Musa Cenk ÖZEKINCI, Assoc. Prof. Capt. Doğuş ÖZKAN, PhD

**Institution:** Turkish Naval Academy

***Abstract:** This paper presents the development and validation of an Autonomous Surface Vehicle (ASV) designed for operation in dynamic maritime environments. To address the "simulation-to-reality" gap often encountered in marine robotics, an Evolutionary Prototyping methodology was employed, utilizing a proxy platform for high-frequency in-situ validation. The mechanical design features an optimized trimaran hull, where hydrodynamic stability and minimized roll motion were verified through Computational Fluid Dynamics (CFD) analysis to ensure sensor fidelity. A key contribution of this study is the implementation of a custom, lightweight software architecture on the NVIDIA Jetson AGX Orin platform. Diverging from standard middleware frameworks like ROS, this research utilizes a native Python multiprocessing approach to eliminate serialization overhead and ensure a deterministic, low-latency control loop. The perception system integrates sensor fusion of stereo depth cameras, LiDAR, and GPS, while real-time object detection is achieved using a custom-trained YOLO26 model. This model is optimized via TensorRT for FP16 precision, delivering a 5x inference speedup compared to standard execution. The result is a*

*robust ASV capable of precise autonomous navigation and obstacle avoidance in complex real-world conditions.*

**Keywords:** *Autonomous Surface Vehicle, Computer Vision, Sensor Fusion, Edge Computing, TensorRT, Evolutionary Prototyping, Marine Robotics*

## **2. (ID 13) Basic Principles of Marine Navigation**

**Authors:** stud. Bogdan GRIGORE

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy “Mircea cel Bătrân”

**Abstract:** *Basic Principles of Marine Navigation form the foundation of safe and efficient travel on the seas. Mariners use latitude and longitude to pinpoint their position on a chart. A compass helps determine the ship's direction, and nautical charts guide the voyage, marking key landmarks, depths, and hazards. Early methods like dead reckoning rely on estimated course and speed, while modern technologies such as GPS offer real-time location data. Celestial navigation, which uses the stars and the sun, is still taught as a backup for electronic systems. Successful navigation also involves understanding tides, currents, and the role of navigational aids (like buoys and lighthouses) to ensure safe passage across different water routes. Mastery of these basic principles is crucial for all mariners to navigate safely and efficiently.*

**Keywords:** *Marine Navigation, Latitude and Longitude, Compass Bearings, Nautical Charts, Dead Reckoning, GPS (Global Positioning System), Celestial Navigation, Course and Heading, Bearings and Routes, Navigational Aids, Tides and Currents.*

## **3. (ID 40) Prisoner Transport: Balancing Security and Efficiency**

**Authors:** stud. Alessandra-Antonia NEAGOE

**Scientific Advisor:** Senior Police Commissioner, Lecturer Constantin Victor DRĂGHICI, PhD

**Institution:** “Alexandru Ioan Cuza” Police Academy

**Abstract:** *Penitentiary transport is a fundamental component of the justice system, ensuring the safe movement of individuals deprived of liberty between prisons, courts, or medical facilities. The security of this process prevents escapes, protects escort personnel and the public, and maintains order within the penitentiary system. Careful*

*planning, the selection of specialized vehicles, and professional training of officers help reduce risks. Security measures include searches, restraint methods, prisoner segregation, and technological monitoring through GPS and video cameras. Given the multiple risks involved, a well-organized and technologically supported prison transport system ensures the safety of inmates and the community while efficiently supporting penitentiary administration operations.*

**Keywords:** *Penitentiary transport, Security measures, Penitentiary administration*

#### **4. (ID 56) Navigation on the Danube - Black Sea Canal. Advantages and constraints**

**Authors:** stud. Theodor-Ionuț SARCU

**Scientific Advisor:** Prof. Assist. Eng. Cristina ALECSE, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The Danube–Black Sea Canal plays a key role in a strategic segment of the European inland waterway network, providing a direct and efficient connection between the Danube River and the Black Sea. This paper investigates the operational, technical, and economic aspects of navigation on this artificial waterway, with a focus on identifying its principal advantages and constraints in the context of modern inland shipping.*

**Keywords:** *Danube–Black Sea Canal; inland navigation; maritime transport; logistics efficiency, navigation safety.*

#### **5. (ID 59) Particularities of Life and Work Environment Onboard Merchant Vessels**

**Author:** stud. Lorena-Andreea OATU

**Scientific Advisor:** Prof. Assist. Eng. Cristina ALECSE, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the complex organizational dynamics and living conditions onboard merchant vessels, highlighting the critical role of the human element in maritime safety. The research is based on a qualitative analysis of specialized literature and relevant international regulations. The study focuses on the hierarchical structure of the crew and the specific distribution of tasks between*

*the deck and engine departments, emphasizing how clear the authority lines prevent operational errors. Furthermore, it examines how international regulations, specifically the Maritime Labour Convention (MLC 2006), govern the working environment, ensure decent living standards, and protect seafarers' rights. By exploring environmental factors such as social isolation, noise, vibration, and extreme weather conditions, the research identifies key elements that influence the physical and mental quality of life at sea. Finally, the analysis provides a comprehensive foundation for understanding how these living conditions and organizational pressures impact overall operational efficiency, stress levels, and modern risk management strategies in the shipping industry.*

**Keywords:** crew hierarchy, onboard living conditions, maritime environment, human factors, MLC 2006.

## **6. (ID 61) The History of Piracy**

**Authors:** stud. Robert-Andrei DAMIAN, stud. Sebastian-Mihai CIUPITU

**Scientific Advisor:** Prof. Assist. Eng. Cristina ALECSE, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This project explores the history of maritime piracy, from its origins in Antiquity to the modern era. It examines how pirates have influenced trade, politics, and maritime security throughout history. Key periods discussed include pirate activity in Ancient Greece and Rome, Viking raids in the Middle Ages, and the Golden Age of Piracy in the Caribbean, Atlantic, and Indian Oceans. The project also highlights famous pirates such as Edward Teach (Blackbeard), William Kidd, Bartholomew Roberts, Anne Bonny, and Mary Read, as well as the organization, codes, and daily life aboard pirate ships. The decline of piracy in the 18th century and its resurgence in modern times, particularly off Somalia's coast, are also analyzed. Overall, the study illustrates how piracy shaped maritime law, defense systems, and international trade.*

**Keywords:** maritime piracy, Golden Age of Piracy, pirates, trade, piracy codes, modern piracy, naval defense

## **7. (ID 63) Analysis of the Wind Assisted Propulsion System (WAPS) on a Bulk Carrier Ship**

**Author:** stud. Andrei DUMBRAVA

**Scientific Advisor:** Prof. Assist. Livia RAUCA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* This paper explores the use of WAPS on bulk carrier vessels in light of increasingly strict environmental requirements in maritime transport. It begins with an overview of the regulatory framework set by the International Maritime Organization (IMO) and the European Union, underlining the growing pressure to reduce emissions and improve energy efficiency. The paper describes the main operating principles of WAPS, with particular attention given to rotor sail technology and its practical benefits.

**Keywords:** WAPS, IMO, bulk carrier, emissions

## **8. (ID 76) Peculiarities of the pilotage system for commercial vessels in the port of Bremen**

**Authors:** stud. Ștefan BOUREANU

**Scientific Advisor:** Lecturer Eng. Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* The starting point for this research was an actual trip to Bremen. Seeing giant commercial ships trying to navigate the narrow Weser River highlights just how complex port operations really are. This study breaks down the pilotage system in the Bremen-Bremerhaven complex to see exactly how professionals manage to keep maritime traffic both safe and efficient. First, the paper looks at international rules like SOLAS and the IMO framework to understand the pilot's legal responsibilities. From there, the focus shifts to practical risks. A single handling mistake with an Ultra Large Container Vessel (ULCV) can cause massive environmental damage or block European supply chains entirely. The German pilotage model is quite unique in this regard. The research reviews their coordination methods, stress management, and the intense simulator training required for tidal waters. The conclusion is straightforward: without Weser pilots, the regional logistics flow would simply stall. Finally, the paper offers a few ideas on what

*comes next, mainly discussing how digital tools and new tech might change the profession.*

**Keywords:** *pilotage system, Weser, maritime traffic, SOLAS, IMO, ULCV, simulator training.*

## **9. (ID 79) The role of Air Force and Air Traffic Control in Search and Rescue missions in the Black Sea**

**Author:** stud. Petruț Gabriel VĂSI

**Scientific Advisor:** Captain Commander Marius TUTUNEA

**Institution:** "Henri Coandă" Air Force Academy of Brașov

**Abstract:** *In a complex and unpredictable maritime environment like the Black Sea, where second counts the absolute synergy between Air Force, Air Traffic Control and Naval Forces represents the thin barrier between a successful rescue mission and a lost life. Currently, the Black Sea basin faces intense commercial traffic, overlapping with geopolitical challenges and shifting weather conditions. Although SAR protocols exist, real time coordination and communications between search structures: Air Force, Air Traffic Control and Naval Forces and searching ships still present challenges due to jurisdictions and outdated procedures. The main categories impacted by the efficiency of these missions are civilian maritime crews, military personnel operating in the area, workers on offshore energy platforms, and military aviation, civil aviation passengers, alongside the SAR teams and ATC operators actively managing the crisis. This project aims to analyze the current cooperations between Air Forces, ATC and Naval Forces, identify vulnerabilities, highlight the opportunities and develop a theoretical and practical framework for efficient communication and streamline joint interventions, increasing the success rate of the missions. The research aims a mixed methodology, including analysis of national and international standard operating procedures (SOPs), case studies on recent SAR missions in the Black Sea and internationally, evaluating radar and communications technologies used in air space coordination and methods of strengthening air-naval interoperability. The study intends to conclude a detailed mapping of current operational gaps and the elaborations of specific recommendations and opportunities with the focus on implementing real time data sharing platforms, enhanced communications and*

*procedures and civil-military training scenarios. The finding will provide solutions for the current problems and will reduce emergency response time, improve coordination and increase success rate of saving human lives along with strengthening regional security and resilience.*

**Keywords:** *Search and Reascue, interoperability, coorodation, safety*

### **10. (ID 108) Identification and Classification of Shipwrecks in the Western Black Sea: Implications for Navigational Safety and Military Operations**

**Authors:** stud. Alexandru-Nicușor MIHALACHE, stud. Andrei LUCA

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The Western Black Sea basin is a strategic maritime region characterized by intense traffic and a dense concentration of historical shipwrecks. This paper analyzes the impact of these submerged structures on navigational safety and modern military operations. The study begins by examining the hydrographic characteristics of the area and the environmental factors affecting wreck integrity. Using updated nautical charts and hydrographic databases, the research focuses on the precise localization and systematic classification of major shipwrecks based on depth, dimensions, and structural state. The findings highlight how these obstacles pose physical risks to commercial vessels and act as tactical variables for naval forces, potentially interfering with sonar detection and littoral maneuvers. The study concludes that maintaining an updated inventory of submerged hazards is critical for minimizing maritime risks and ensuring operational efficiency in the volatile Black Sea environment.*

**Keywords:** *Identification and Classification of Shipwrecks in the Western Black Sea: Implications for Navigational Safety and Military Operations*

### **11. (ID 120) A Hybrid Threat: Dark Web Communication and Physical Transport Routes in Modern Drug Trafficking**

**Author:** stud. Alessia BULGARESCU

**Scientific Advisor:** Col. Dragoș-Andrei IGNAT

**Institution:** “Alexandru Ioan Cuza” Police Academy

**Abstract:** *This project examines the evolution of drug trafficking through the lens of two interconnected dimensions: digital communication on the dark web and physical transportation routes. The first part analyzes how cryptomarkets, encrypted messaging applications (such as Sky ECC and Signal), and cryptocurrencies (Bitcoin, Monero) have transformed drug distribution into a global, anonymous enterprise, allowing traffickers to operate beyond traditional law enforcement reach. The second part focuses on the logistical aspects, detailing the major trafficking routes, with particular emphasis on the Balkan Route and the strategic role of the Black Sea (Constanța Port) as entry points into the European Union. Additionally, it explores modern concealment methods, ranging from drone technology to sophisticated camouflaj techniques within legitimate cargo shipments. By synthesizing information from official sources such as DIICOT, Europol, and UNODC, this project highlights the hybrid nature of contemporary drug trafficking and the challenges authorities face in disrupting these complex networks.*

**Keywords:** *Drug, dark web, transport, trafficking*

## **12. (ID 125) The Implementation of Hydrographic and Oceanographic Data within the AML Structure**

**Authors:** stud. Andrei LUCA, stud. Alexandru Nicușor MIHALACHE

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy ”Mircea cel Bătrân”

**Abstract:** *This paper examines the implementation of hydrographic and oceanographic data within the structure of Additional Military Layers (AML), with particular emphasis on the Large Bottom Objects (LBO) layer. In the context of modern naval operations, AML products play an important role in enhancing maritime situational awareness by providing standardized geospatial information designed for military use. Among these layers, LBO is especially significant because it represents large seabed objects that may directly influence mission planning, route assessment, underwater operations, and the safe deployment of naval capabilities. The LBO layer includes features such as wrecks, large artificial structures,*

*submerged obstacles, and other prominent bottom objects whose dimensions and position are operationally relevant. The integration of such data into AML allows raw hydrographic surveys and oceanographic observations to be transformed into structured digital information that can be displayed and interpreted within military navigation and command systems, including WECDIS. This improves the understanding of the underwater environment and supports decision-making in complex maritime scenarios. The study highlights that accurate identification and representation of large bottom objects are essential not only for operational safety, but also for increasing the effectiveness of surveillance, mine countermeasure activities, submarine operations, and maritime security missions. Therefore, the LBO layer represents a valuable component of AML, contributing to a more detailed and operationally useful picture of the maritime battlespace.*

**Keywords:** *AML, chart, navigation, lbo, geospatial data*

### **13. (ID 142) Man Overboard Maneuver, The Stages of Its Execution, and the Importance of Immediate Response**

**Authors:** stud. Amalia Gabriela VASILE, stud. Ciprian Valentin BRATU

**Scientific Advisor:** Prof. Assist. Eng. Cristina ALECSE, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The presentation addresses the "Man Overboard" (MOB) maneuver as a major emergency in ship operations, analyzing the operational stages and the critical factors influencing the success of the intervention. Standard procedures in accordance with international regulations (SOLAS) are presented, including incident detection, alarm activation, position marking, execution of turning maneuvers (Williamson, Anderson), and recovery of the person from the water. The importance of reaction time, bridge watch vigilance, and crew coordination under varying environmental conditions (reduced visibility, sea state) is highlighted. The study concludes that the prompt and rigorous application of standard procedures represents a decisive factor in saving human life at sea.*

**Keywords:** *Man overboard maneuver*

#### **14. (ID 144) Modern Maritime Navigation Systems**

**Author:** stud. Andrew ZACHARY

**Scientific Advisor:** Prof. assist. Eng. Livia RAUCA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Modern maritime navigation systems integrate advanced technologies to enhance the safety, efficiency, and precision of sea transportation. These systems combine satellite-based positioning, digital mapping, and automated monitoring tools to support real-time decision-making for vessels operating in complex maritime environments. Key components include the GNSS systems, Electronic Chart Display and Information Systems (ECDIS), E-Navigation, Automatic Identification Systems (AIS), and radar technologies. Together, these tools allow mariners to determine accurate vessel positions, detect nearby traffic, and monitor environmental conditions such as weather and sea state. Modern navigation systems also support route optimization, helping ships reduce fuel consumption and minimize environmental impact. Additionally, the integration of artificial intelligence and data analytics is improving predictive capabilities, enabling early identification of potential hazards and more efficient voyage planning. As maritime trade continues to grow globally, the development and adoption of modern navigation technologies remain essential for ensuring operational safety, regulatory compliance, and sustainable maritime transport.*

**Keywords:** *GNSS Systems, ECDIS, E-Navigation, AIS, radar technologies*

#### **15. (ID 152) Improving Maritime Safety and Surveillance Through the Integration of AIS and Intelligent Monitoring Systems**

**Authors:** stud. Emmyly PAVEL, stud. Ariteea Maria ALBU, stud. Raul-George FLOSTOIU

**Scientific Advisor:** Professor Assist. Alina-Elena ONEȚ, PhD

**Institution:** „Nicolae Bălcescu” Land Forces Academy, Sibiu

**Abstract:** *In this context, the paper addresses a fundamental question: How reliable is AIS in the absence of independent validation? The proposed solution does not rely on a single system, but rather on an integrated approach. AIS data, including information from satellite systems, are correlated with observations*

*obtained by UAVs and analyzed using anomaly detection algorithms. The methodology follows three principal directions. First, it identifies discrepancies between declared characteristics and those observed visually. Second, it analyzes ship trajectories to highlight deviations that lack operational justification. Third, it investigates identity inconsistencies, such as the simultaneous appearance of the same signal in different locations or the presence of physically impossible discontinuities. Rather than transmitting large volumes of data, the system processes information directly on the autonomous platforms, transmitting only relevant alerts. In a simulated scenario, this approach enables the detection of a vessel that interrupts its AIS signal and continues to operate illegally, an event subsequently confirmed visually by a UAV. The outcome is not only an improvement in accuracy, but also a significant expansion of surveillance capabilities beyond the limitations of land-based AIS. Overall, the proposed solution offers a more flexible and realistic approach to maritime safety under current conditions.*

**Keywords:** *maritime safety, AIS, S-AIS, anomaly detection, data fusion, UAV, maritime surveillance.*

## **16. (ID 155) Risk Management in Transportation: The Role of Public Order Structures in Preventing Incidents**

**Author:** stud. Anet-Cristina HALIP

**Scientific Advisor:** Prof. Bogdan Nicolae ȚONEA, PhD

**Institution:** “Alexandru Ioan Cuza” Police Academy

**Abstract:** *Transportation represents one of the most dynamic and vulnerable sectors of modern society, being continuously exposed to risks generated by human error, technical failures, adverse environmental conditions, and intentional threats. In this context, risk management plays a fundamental role in identifying, assessing, and preventing incidents that may affect public safety, economic stability, and the continuity of transport operations. This paper analyses the importance of risk management in transportation, with a particular focus on the role of public order structures in accident prevention. The research highlights the contribution of police forces and other public safety institutions in monitoring transport systems, enforcing regulations, coordinating interventions, and supporting interinstitutional cooperation in both routine prevention and crisis*

*situations. Special attention is given to the transport environment as a complex operational field where risk prevention requires a multidimensional approach involving technology, professional training, situational awareness, and rapid decision-making. The paper also addresses the human factor, underlining how fatigue, stress, and errors in judgment remain among the main causes of transport-related incidents. Through theoretical analysis and case-based references, the study demonstrates that effective cooperation between public order institutions, emergency services, and transport authorities is essential for building a resilient and secure transportation system. The paper concludes that modern risk management, supported by advanced technologies and well-trained personnel, is a key element in reducing accidents and enhancing public safety.*

**Keywords:** *Risk, transportation, accidents, management*

### **17. (ID 162) Beyond Bars: Risk Management and Technological Innovation in the Escort of Persons Deprived of Liberty**

**Author:** stud. Maria-Alexandra IORDACHE

**Scientific Advisor:** Assoc. Prof. Andreea CÎRCIUMARU, PhD.

**Institution:** “Alexandru Ioan Cuza” Police Academy

**Abstract:** *This paper analyzes the transport of persons deprived of liberty not merely as a logistical process, but as a critical national security operation. The study is structured around four essential pillars: strategic route planning, tactical analysis of crisis situations based on real-world case studies (notorious escapes), management of high-risk transfers (Interpol/Europol extraditions), and the integration of cutting-edge technologies. By examining vulnerabilities at transfer points (courts, hospitals), the research proposes a modern escort model designed to eliminate human error through biometric monitoring, jamming systems, and real-time GPS tracking. The central objective is to streamline Ministry of Internal Affairs (MAI) procedures to guarantee public safety and the integrity of special transport missions.*

**Keywords:** *Police Escort, Operational Tactics, Escape Prevention, High-Risk Transport, Technological Modernization*

**18. (ID 165) Navigation System Interference and GNSS Disruptions: Implications for Navigational Practices**

**Author:** stud. Andreea MARIN

**Scientific Advisor:** Prof. Assist. Eng. Livia RAUCA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* Modern maritime navigation relies heavily on Global Navigation Satellite Systems (GNSS) and Electronic Chart Display and Information Systems (ECDIS). However, these systems are increasingly affected by signal disruptions such as jamming and spoofing, particularly in high-risk maritime areas. Such interference can lead to loss or degradation of positioning data, increasing the risk of navigational incidents. The presentation analyses the impact of GNSS disruptions on navigational practices and highlights the associated operational challenges. It emphasizes the importance of maintaining situational awareness and preparedness when electronic systems become unreliable. A practical example is presented, demonstrating manual position fixing on ECDIS using visual bearings to coastal objects in the event of GNSS failure. The study underlines the continued relevance of traditional navigation techniques as a critical backup for ensuring safe navigation.

**Keywords:** GNSS, jamming, spoofing, interference

**19. (ID 168) The Opening of Maritime Routes in the Arctic Circle as a Result of Global Warming and their Geostrategic Impact**

**Authors:** stud. David-Florin RADU, stud. Rareș-Ștefan ONOFREI

**Scientific Advisor:** Maj. Adv. Instr., Ana-Maria MERLUȘCĂ, PhD student

**Institution:** "Carol I" National Defense University

*Abstract:* As rising temperatures progressively open the Northern Sea Route, the Northwest Passage, and the Transpolar Sea Route, major powers including the United States, Russia, China, and some NATO member states are intensifying competition for strategic positioning in the High North. This article examines the emerging geostrategic significance of Arctic maritime routes made accessible through accelerating global warming and polar ice retreat. The study analyzes the navigational, economic, and military implications of these newly accessible corridors, exploring how reduced transit times between major global markets reshape international trade

*dynamics and naval posture. By investigating territorial claims, international legal frameworks such as UNCLOS, and the infrastructure investments of Arctic nations, this research highlights the profound economic opportunities and security challenges generated by the transformation of the Arctic into a contested geopolitical arena.*

**Keywords:** *Arctic maritime routes; global warming; Northern Sea Route; geostrategic competition; polar geopolitics;*

## **20. (ID 181) The Role of Modern Navigation Systems in Reducing Human Errors**

**Author:** stud. Alex George CIREAȘA

**Scientific Advisor:** Prof. Assist. Eng. Cristina ALECSE, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Modern navigation systems significantly enhance safety and efficiency in fields such as maritime, aviation, and road transport. This project examines how technologies like GPS positioning, real-time monitoring, and automated route planning help reduce human errors. It focuses on common mistakes such as incorrect decisions, reduced situational awareness, and delayed reactions. The study highlights how navigation systems support users by providing accurate data, continuous feedback, and warning alerts that improve decision-making. It also emphasizes that these technologies are designed to assist, not replace, human operators. The findings show that the proper use of modern navigation systems leads to increased accuracy, faster responses, and a reduced risk of accidents, ultimately contributing to safer operations.*

## **21. (ID 182) Loading and Discharge Operation on Liquefied Gas Carriers (Gas Tankers)**

**Author:** stud. Emir MOLOGEAN

**Scientific Advisor:** Lecturer Raluca-Aurora APOSTOL-MATEȘ, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Loading and Discharge Operation on liquefied gas carriers (gas tankers) The maritime transportation of liquefied gases represents an essential component of the international energy trade.*

*Liquefied natural gas (LNG) and liquefied petroleum gas (LPG) carriers are specifically designed to transport these products under particular temperature and pressure conditions, requiring advanced cargo handling technologies and strict operational procedures. This study focuses on the main systems and operational stages involved in the loading and unloading of liquefied gas cargoes on board LNG and LPG vessels. It analyzes the configuration and operation of cargo handling equipment such as loading arms, cargo pumps, compressors, pipelines, and vapor return systems. The paper also highlights the main differences between LNG and LPG cargo systems, especially regarding storage conditions, containment technologies, and cargo transfer procedures. In addition, attention is given to the sequence of operations during cargo transfer, including preparation of cargo tanks, cooling-down procedures, monitoring during transfer, and final disconnection. Safety remains a central aspect of these operations, considering the risks associated with cryogenic temperatures, flammable vapors, and high pressures. Compliance with international maritime regulations and the use of modern monitoring and control systems are essential for ensuring safe and efficient cargo handling on liquefied gas carriers.*

**Keywords:** *Transportation, LNG/LPG, Loading, Discharge, ESD, Pump*

## **22. (ID 185) Procedures and good practices for transiting the Danube-Black Sea Canal**

**Author:** stud. Alexandra Andreea MINA

**Scientific Advisor:** Prof. Assist. Eng. Cristina ALECSE, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This thesis presents a technical, legislative, and operational analysis of the navigation regime on the Danube-Black Sea Canal (DBSC) and the Poarta Albă-Midia-Năvodari Canal (PAMNC). The primary objective is to optimize transit procedures to ensure maximum safety and economic efficiency. The research evaluates hydro-technical infrastructure, lock systems, and clearance restrictions, integrated with the regulatory framework regarding convoy dimensions and communication protocols. A key focus is placed on operational practices in narrow waterways, specifically*

*hydrodynamic phenomena such as the squat effect and ship-to-bank interaction and emergency risk management. Practical validation is achieved through the analysis of the 2013 "Mercur" naval incident, highlighting the critical consequences of procedural non-compliance. Based on technical operational documentation and hydrological data, the study establishes a comprehensive set of best practices for the safe transit of these inland waterways.*

**Keywords:** Danube-Black Sea Canal (DBSC), inland navigation, navigation safety, hydro-technical infrastructure, locks, squat effect, ship-to-bank interaction, operational best practices, risk management, "Mercur" naval incident.

### **23. (ID 192) Optimization of container ship maneuvering when entering and exiting the port**

**Author:** stud. Ionuț-Ronaldo TUSA

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Modern container ships (especially those in the ULCV class) present unique challenges due to the ratio of size to engine power. • Relevant dimensions and technical parameters: • Sail area: Due to the high stacks of containers, the ship acts like a giant sail. In the Singapore Strait, monsoon winds can create considerable lateral force, requiring constant course corrections (drift angle). • Draft and "Squat" effect: Given the limited depths in some areas of the strait, the phenomenon of squat (reduction of sub-keel clearance with increasing speed) is critical. • Inertia and response to commands: • Container ships have fine hydrodynamic shapes for speed, which means that inertia is very high. It can take several kilometers for a 400m long ship to come to a complete stop. • Limitations in confined spaces: • The turning radius is large, and visibility from the ship's helm (over the container stacks) must comply with the SOLAS convention, being often limited in the bow.*

**Keywords:** Dimensions, draft, inertia, turning radius

### **24. (ID 202) Loading. Unloading of goods on bulk ship**

**Author:** stud. Nabil HIJAZI

**Scientific Advisor:** Prof. Assist. Eng. Livia RAUCA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Loading and Unloading on Bulk Type Vessels Loading and unloading operations on bulk type vessels are critical processes in maritime transport, directly influencing efficiency, safety, and cargo integrity. Bulk carriers transport large quantities of unpackaged goods such as coal, grain, and ores, requiring specialized handling methods. During loading, proper distribution of cargo is essential to maintain vessel stability and prevent structural stress. Equipment such as conveyor belts, grabs, and loaders are commonly used, while continuous monitoring ensures compliance with safety and environmental regulations. Unloading involves similar care, often using cranes or suction systems depending on the cargo type. Effective communication between ship and terminal personnel is vital throughout both processes. Additionally, factors such as weather conditions, cargo properties, and port infrastructure play significant roles. Proper planning and adherence to international maritime standards help minimize risks such as cargo damage, pollution, or accidents, ensuring smooth and efficient port operations.*

**Keywords:** *Bulk carriers, Cargo Handling, Loading Operations, Vessel Stability*

## **25. (ID 204) Maritime Leadership in Extreme Situations**

**Authors:** stud. Luca-Nicolae PIȚIGOI, stud. Flavius-Andrei LUPU

**Scientific Advisor:** Lecturer Mariana BOERU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Leadership is the ability to guide, influence, and support others, especially in challenging and uncertain conditions. In extreme situations, leadership becomes essential, as decisions must be made quickly, often with limited information and under intense pressure. This presentation explores how effective leaders respond to crisis through real historical examples, such as Edward John Smith, Ernest Shackleton, and the crew of the Maersk Alabama. These cases show that leadership is not only about authority, but also about taking responsibility and caring for others. Key qualities such as responsibility, resilience, communication, teamwork, and decision-making are essential in maintaining order, building trust, and ensuring survival. By analyzing these situations, we can better understand how strong leadership helps people overcome fear, uncertainty, and extreme danger.*

**Keywords:** *Leadership, Crisis Management, Decision-Making, Teamwork, Resilience*

## **26. (ID 209) Polar Navigation and Technical-Operational Challenges of Navigation Systems in the Arctic and Antarctic Regions**

**Author:** stud. Ailin BAUBEC

**Scientific Advisor:** Prof. Assist. Eng. Cristina ALECSE, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This theme addresses the main technical and operational challenges of polar navigation, with emphasis on risk factors, equipment limitations, and crew-related aspects. Polar environments are highly demanding due to extreme weather, dynamic ice conditions, and limited infrastructure. Sea ice represents a primary risk, affecting ship maneuverability and route safety, especially in the case of multi-year ice. Ice pressure, accumulation, and icebergs further increase the likelihood of structural damage and operational delays. At the same time, reduced visibility caused by polar night, fog, or white-out conditions complicates navigation. The performance of navigation systems is also affected. GNSS accuracy may decrease due to ionospheric disturbances, radar interpretation becomes more difficult in ice-covered waters, and ECDIS may rely on incomplete data. Compass systems and satellite communications are less reliable at high latitudes, requiring redundancy and cross-checking. In addition, harsh conditions impact crew performance and resource management. Safe operations therefore depend on proper training, careful planning, and the integration of technical and procedural safety measures.*

**Keywords:** *Polar navigation; Sea ice hazards; Navigation systems reliability; Arctic maritime operations;*

## **27. (ID 212) Operational Efficiency and Safety Analysis of Ro-Ro Passenger Ships in International Maritime Transport**

**Authors:** stud. Ștefan Paul CURCA, stud. Iustin Gabriel HODOROG

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This thesis examines the efficiency of maritime transport performed by Ro-Ro vessels in international trade, with emphasis on their operational advantages and limitations in comparison with cruise ships. The study highlights the rapid loading and unloading of wheeled cargo, reduced port turnaround time, and the flexibility of Ro-Ro passenger vessels in combined freight and passenger operations. At the same time, it analyzes the particular features of onboard operations and safety management, focusing on cargo securing, passenger embarkation, and the prevention of incidents during loading and discharging procedures. A case study is included to assess real operational practices and the implementation of preventive safety measures. The paper concludes that Ro-Ro passenger vessels play a significant role in efficient maritime transport, provided that strict safety procedures are consistently applied.*

**Keywords:** *Ro-Ro vessels, maritime transport, international trade, passenger Ro-Ro ships, operational*

## **28. (ID 217) Anchoring installation**

**Author:** stud. Maria-Cătălina CIUCĂ

**Scientific Advisor:** Prof. Assist. Eng. Cristina ALECSE, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *It is vital to have a reliable anchoring system in place to ensure that the vessel can be safely moored under a variety of navigational conditions. This paper presents the main components of the anchoring system, such as the anchor, chain, windlass, and auxiliary devices, with the aim of highlighting the role and operation of each. A substantial part of the study is dedicated to anchoring maneuvers, covering the various stages of preparation, execution, and supervision, as well as the process of weighing anchor. Factors influencing the anchoring process, such as weather conditions and water depth, are also discussed. Finally, the paper emphasizes the importance of adhering to safety regulations and effective crew coordination in order to prevent incidents and ensure efficient vessel operation.*

**Keywords:** *anchoring system, moored, vessel, safety*

## **29. (ID 240) Port of Colombo: The Strategic Hub of South Asia**

**Authors:** stud. Mario-Ianis BACIU, stud. Andrei STÎLPEANU

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This project investigates the multidimensional role of the Port of Colombo as a central pillar of maritime trade in the Indian Ocean region. Strategically located on the main East-West route, Colombo is not merely a transit point but a vital transshipment hub, handling over 80% of regional traffic. The central objective of this analysis is to evaluate the symbiotic efficiency between fixed port infrastructure and dynamic naval operations. The analysis begins with a presentation of the geographical and logistical configuration, highlighting the capacities of the four major terminals: JCT, SAGT, CICT, and ECT. Particular attention is given to the CICT deep-water terminal, the only facility capable of operating the latest generation of Ultra Large Container Vessels (ULCV) with drafts of up to 18m. The research methodology integrates direct observation and original photographic documentation, emphasizing the critical component of towage services and berthing maneuvers. The study details how the tugboat fleet (ASD type) ensures navigational safety and maneuver efficiency within the often-congested port basins. Key Performance Indicators (KPIs), such as Vessel Turnaround Time, are examined alongside the impact of environmental factors, specifically the influence of monsoons on berthing safety. Finally, the project proposes solutions for process optimization through digitalization and the modernization of assistance equipment, concluding that the adaptability of naval operations to infrastructural limitations is the key to the Port of Colombo's success in the current maritime landscape.*

**Keywords:** *Port of Colombo, port infrastructure, towage, berthing, operational efficiency, transshipment.*

## **30. (ID 242) Analysis of Risk Factors and Safety Measures in Port Entry Maneuvers**

**Author:** stud. Ștefan TALPEȘ

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This project focuses on one of the most delicate stages of navigation: port entry. This topic was chosen because approach and docking maneuvers involve a series of major risks, where even a minor error can lead to accidents with severe impact on the vessel or the environment. The primary objective is to identify the factors that can disrupt a seemingly routine maneuver, ranging from unfavorable weather conditions and unpredictable currents to technical failures or, most frequently, human error. Throughout the analysis, emphasis is placed on the importance of collaboration between the master, the pilot, and tugboat services, as well as on the way modern technology such as AIS or VTS systems assists in incident prevention. The conclusions highlight that, despite having latest-generation sensors and equipment, safety ultimately depends on the officer's training and strict adherence to operational procedures. This study aims to provide a clear perspective on how maritime ports can be made safer for today's intense maritime traffic.*

**Keywords:** *Port Entry; Maritime Safety; Risk Factors; Human Element*

### **31. (ID 245) The Role of Border Police in Combating Migrant Smuggling along Maritime and Land Routes**

**Author:** stud. Crina Maria Elena ANDRECA

**Scientific Advisor:** Police Commissioner, Lecturer Andrada Elena ADAM, PhD

**Institution:** "Alexandru Ioan Cuza" Police Academy

**Abstract:** *The paper analyzes the importance of border police in preventing and combating the illegal trafficking of migrants along maritime and land route, emphasize the complexity of this transnational phenomenon. The study starts from the premise of increasing migration flows and the adaptability of organized crime networks, which exploit geographical and legislative vulnerabilities. The target is to identify the most vulnerable smuggling areas and to maintain the stability in border security. It examines the responsibilities of border police, including border surveillance and control, inter-agency cooperation and international information exchange. The methodology combines document analysis with the evaluation of operational practices, focusing on modern detection tools such as monitoring technologies and risk analysis. The paper*

*also emphasizes the importance of continuous professional training for personnel and the need to adapt strategies according to the typology of routes used by traffickers. The results show that the effectiveness of interventions depends on coordination between national agencies and international organizations, as well as on the use of advanced technologies. In conclusion, border police represent a fundamental support in ensuring national security and protecting migrants' rights, contributing to the reduction of illegal trafficking through preventive measures and well-targeted operational actions.*

**Keywords:** *migrants, smuggling areas, traffickers, organized crime networks*

### **32. (ID 246) Heavy Lift Vessels (HLAVs) - The powerhouses of maritime logistics**

**Authors:** stud. Andrei STÎLPEANU, stud. Mario BACIU

**Scientific Advisor:** Prof. Eng. Florin NICOLAE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This research paper presents one of the categories of specialized maritime vessels extensively utilized in maritime logistics projects for renewable energy infrastructure development, as well as in the offshore oil and gas industry. The study provides a synthesis of primary operations: the transport, loading, and unloading of heavy-lift, voluminous, or oversized cargo. Furthermore, this work contributes to opening new research directions within the maritime sector by proposing a relatively new subject for the academic curriculum of the 'Mircea cel Bătrân' Naval Academy.*

**Keywords:** *Heavy Lift Vessels, Semi-Submersible Vessels, Dock Ships, Open Deck Cargo Ships, Project Cargo Carriers*

### **33. (ID 248) Procedures regarding ship manoeuvres for approach/departure in Port Cape Town**

**Authors:** stud. Alexandru-Florin CARAPCEA, stud. Eduard-Marius CARAPCEA

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This presentation is specifically focused on the approach and departure manoeuvre in the port of Cape Town. It includes the port's infrastructure, procedures, IMO/SOLAS standards, port*

*limitations and operational difficulties, recommendations for future optimizations within the port area.*

**Keywords:** *port, container ship, ship, manoeuvring, Cape Town, standards*

#### **34. (ID 249) Analysis of Challenges in the Process of Boarding a Vessel**

**Author:** stud. Robert-Marian HAGIU

**Scientific Advisor:** Lecturer Raluca APOSTOL-MATEȘ, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Maritime transport underpins roughly 80% of global trade, yet its effectiveness depends on the condition of the seafarers who sustain the operations. This study examines the onboarding phase, focusing on the transition from home to vessel and its effects on individual well-being. Although administrative procedures, including documentation and visa processing, are generally manageable, the cumulative burden of travel remains substantial. Using the Snowball Sampling Method and statistical analysis conducted with IBM SPSS Statistics, the research identifies a consistent pattern of pre-embarkation strain. Most respondents report significant physical fatigue alongside elevated psychological stress before arrival on board. Contributing factors extend beyond logistics and include prolonged separation from family, exposure to unfamiliar cultural environments, and the mental demands associated with international transit. The findings indicate that current onboarding practices insufficiently address the human dimension of maritime labor. While operational efficiency is maintained, the well-being of crew members is often compromised at an early stage. This imbalance may affect performance, safety, and long-term retention. A more integrated approach is required, one that incorporates both logistical coordination and targeted support measures for physical and mental health. By mitigating pre-boarding stressors, ship operators can enhance workforce stability and resilience, contributing to safer and more sustainable maritime operations.*

**Keywords:** *Maritime transport, boarding, human factors, Snowball Sampling Method*

### **35. (ID 251) Design and operation of the Cargo Loading and Unloading System for A 23,000 DWT Oil Tanker**

**Author:** stud. Darius PANICAN

**Scientific Advisor:** Lecturer, Eng. George NOVAC, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** This project is about how to design and use the cargo system on a 23,000 DWT oil tanker. Moving liquid cargo safely is very important for ships, so this paper looks at the technical details and how things work in practice. In the first part, I explain the design of the system. This includes choosing the right cargo pumps, pipes, valves, and safety equipment like the Inert Gas System (IGS). The second part is about the actual operation. It shows the normal steps for loading and discharging the oil. I also talk about how to calculate the ship's stability, check the trim, and make sure the hull doesn't take too much stress. Finally, the paper explains how all these operations must follow international rules like MARPOL and SOLAS to protect the environment and the crew. Overall, this thesis helps to understand how a tanker cargo system works safely and efficiently.*

***Keywords:** loading, discharge transportation, pumps, stability, ship design*

### **36. (ID 253) ECDIS Safety Contour Settings Based on UKC and Squat in Open, Coastal, and Confined Waters**

**Authors:** stud. Rareș-Cristian BUZEA, stud. Andreea ZAHARIA

**Scientific Advisor:** Prof. Assist. Eng. Livia RAUCA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** The integration of ECDIS in modern maritime navigation has transformed passage planning and situational awareness. Its effectiveness depends on correct configuration of depth parameters, particularly the safety contour, directly influenced by Under Keel Clearance (UKC) and squat effect. This paper examines the relationship between these factors and optimal ECDIS depth parameter settings across different navigational environments. It analyzes UKC requirements for open, coastal, and confined waters, where minimum clearance thresholds vary between 10% and 20% of vessel draft, and evaluates squat using the block coefficient formula. Through a case study of a vessel with a 10.30 m aft draft, the research shows that squat can reach 5.43 m in confined waters at full*

*speed. Applying Safety Contour  $\approx$  Draft + UKC + Squat, the study proposes environment-specific parameter settings and highlights how incorrect configurations may create a false sense of safety. The findings emphasize dynamic parameter adjustment as essential for safe navigation across varying water conditions.*

**Keywords:** *ECDIS, safety contour, under keel clearance, squat effect*

### **37. (ID 255) Carbon Capture and Storage**

**Author:** stud. Robert DORNEANU

**Scientific Advisor:** Prof. Assist. Eng. Livia RAUCA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This section outlines the emerging value chain for onboard carbon capture and storage (CCS) in shipping as a complementary pathway to low-carbon fuels. CO<sub>2</sub> can be captured onboard, liquefied, temporarily stored, and offloaded at ports for transport by ship or pipeline to permanent geological storage or utilization. While demonstration projects and regulatory efforts are advancing, commercial viability depends on factors such as fuel penalties, cargo space trade-offs, port infrastructure, and regulatory clarity. Shipping offers flexible CO<sub>2</sub> transport, especially for dispersed or smaller sources where pipelines are uneconomical. However, infrastructure for receiving and storing captured CO<sub>2</sub> remains limited. Current and planned CCS projects are concentrated near industrial clusters, with only a fraction reaching final investment decisions. Despite this, global storage capacity is expected to grow significantly by 2030, potentially supporting shipping decarbonization if integrated infrastructure and value chains develop in parallel.*

**Keywords:** *Carbon, Capture, Storage*

### **38. (ID 258) Study on the Operational Characteristics of 8,160 HP Tugboats in Towing and Search and Rescue Missions**

**Author:** stud. Nicolae-Cristian STAN

**Scientific Advisor:** Lecturer Eng. Dumitru CORDUNEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This study analyzes the operational particularities of 8,160 HP tugboats used in towing and search and rescue (SAR) missions. These vessels are essential for port operations, offshore assistance, emergency response, and support for ships in distress, due to their*

*high propulsion power, strong bollard pull, and advanced maneuverability. The paper highlights the influence of propulsion systems, towing equipment, navigation technology, and onboard safety arrangements on mission effectiveness. Special attention is given to operational planning, crew coordination, and decision making in difficult weather, restricted waters, and time critical situations. In SAR missions, 8,160 HP tugboats can provide rapid intervention, maintain safe positioning, assist disabled vessels, and contribute to the recovery of survivors. The study concludes that this class of tugboats offers a reliable and versatile operational platform, provided that performance is supported by proper maintenance, qualified crews, and clearly established response procedures across diverse maritime environments and other demanding operational scenarios.*

**Keywords:** tugboats, search and rescue, missions

**39. (ID 259) Risk Analysis and Fire Prevention Measures Onboard LNG Carriers with a Capacity of 266,000 m<sup>3</sup>**

**Author:** stud. David-Andrei MOLOAGĂ

**Scientific Advisor:** Lecturer Eng. Dumitru CORDUNEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract: The presentation I intend on submitting focuses on the fire risk of a 266,000 m<sup>3</sup> LNG carrier. It will showcase almost every aspect of fire safety onboard this type of vessel; from technicalities about the type of LNG carrier ship and its systems and distinctive tanks to legislation and international conventions and their specific codes that provide regulations for fire safety. In addition, it features in-depth details about the equipments and systems used for both detecting and fighting fire.*

**Keywords:** LNG Carrier Fire Prevention Measures 266,000 m<sup>3</sup> IGC Code

**40. (ID 261) Transport and Transit in the Port of Constanța: An Analysis of Institutional Control Deficiencies over Goods**

**Author:** stud. Vlăduț-Florian MIHAI

**Scientific Advisor:** Assoc. Prof. Andreea CÎRCIUMARU, PhD.

**Institution:** "Alexandru Ioan Cuza" Police Academy

**Abstract:** *The Port of Constanța represents Romania's most vital maritime hub and an essential geostrategic gateway for the European Union and NATO's eastern flank. However, the exponential growth in cargo traffic volume in recent years has highlighted severe systemic vulnerabilities in institutional control. This paper analyzes how state verification institutions (customs authorities, border police, sanitary-veterinary, and phyto-sanitary agencies) often fail to implement efficient, transparent, and rigorous risk management. Through an analytical approach, the study examines the primary factors contributing to this operational negligence: outdated or non-existent technological infrastructure (such as the chronic malfunction of customs scanners), severe personnel shortages, redundant bureaucratic procedures, and a lack of inter-institutional coordination. The paper argues that this control vacuum not only facilitates major criminal phenomena such as smuggling, tax evasion, and illicit trafficking but also undermines the port's economic competitiveness. In conclusion, the work raises an alarm regarding national and European security risks and proposes a set of recommendations focused on digitalization, the implementation of non-intrusive scanning technologies, and the accountability of the control process.*

**Keywords:** *institutional control, maritime logistics, customs surveillance, systemic corruption, digitalization, geostrategic security, EU Eastern Flank.*

#### **41. (ID 262) Impact of Hydrological Extremes on Port Infrastructure and Naval Operations in the Brăila-Tulcea**

**Authors:** stud. Tudoran-Badea DAMIAN, stud. Vichentie ALPETRI

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper investigates the impact of climate change-driven hydrological extremes on port infrastructure within the Brăila-Tulcea sector of the maritime Danube. As contemporary climatic shifts induce prolonged droughts and unpredictable flash floods, the physical stability and operational capacity of both civilian and military hydrotechnical structures are increasingly compromised. The study analyzes the accelerated degradation of quays, the critical reduction of navigational depths during extreme*

*low-water periods, and the heightened hydrodynamic stress exerted during sudden flood events. Furthermore, the research highlights how rapid sedimentation necessitates frequent dredging to maintain functional navigable channels. By evaluating these physical vulnerabilities, the paper identifies direct consequences for the logistical support and strategic mobility of Naval Forces operating in the region. The findings advocate for a paradigm shift from reactive maintenance to proactive, adaptive engineering solutions, ensuring the long-term resilience of critical naval facilities in an increasingly volatile environment.*

**Keywords:** *Climate change, port infrastructure, hydrological variations, maritime Danube, naval operations, infrastructural resilience.*

#### **42. (ID 263) The Cruise Industry After COVID-19**

**Author:** stud. Xandra Andreea BESLIU

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This project analyzes the impact of the COVID-19 pandemic on the cruise industry, with a focus on the main economic and operational changes. It presents how cruise activities were affected and the measures taken by companies to adapt to the new conditions. To provide an even clearer picture of the situation, the study includes a case study that incorporates both industry data and personal experience on board the ship during the pandemic. The paper also examines the recovery process of the industry, including digitalization, sustainability, and health safety measures. Finally, it highlights possible future directions for the development of the cruise industry.*

**Keywords:** *Cruise industry, COVID-19 impact, sustainability.*

#### **43. (ID 266) Combating pollution in port waters by optimizing waste management: strategies and good practices**

**Author:** stud. Isabela-Gabriela BĂDILĂ

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This analysis begins with the environmental reality of the Port of Constanța, the most important maritime hub on the Black*

*Sea, and seeks concrete solutions to protect the marine environment more effectively. As cargo traffic increases, it becomes clear that traditional methods of pollution cleanup are no longer sufficient in light of new European sustainability standards (Green Deal). Thus, the thesis emphasizes the shift toward proactive management, which aims to prevent environmental incidents before they affect the ecosystem, by adapting port operations to modern monitoring and intervention technologies. The research evaluates the integration of Internet of Things (IoT) sensor networks and autonomous surface vehicles (ASVs) to create a real-time 'Digital Twin' of the port's water quality. By moving beyond manual sampling, this system allows for the immediate detection of hydrocarbon leaks or chemical imbalances. Furthermore, the study explores the feasibility of Onshore Power Supply (Cold Ironing) as a key measure to eliminate auxiliary engine emissions during docking, alongside a circular economy model for ship-generated waste.*

**Keywords:** *Port of Constanța, Marine pollution, Black Sea, Green Deal, Proactive management, Maritime sustainability*

#### **44. (ID 268) The Technical and Operational Characteristics of High-Capacity Container Ships**

**Author:** stud. Ștefan MATVEI

**Scientific Advisor:** Lecturer Eng. Dumitru CORDUNEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This study investigates the structural and operational evolution of the global container fleet, focusing on the transition from the Panamax standard to the current generation of Ultra-Large Container Vessels (ULCV) exceeding 20,000 TEU.*

**Keywords:** *ULCV, Naval Architecture, Safety, Hydrodynamics*

#### **45. (ID 271) The Impact of the S-101 Standard on Preventing Navigational Incidents and on Maritime Management**

**Authors:** stud. Alexandru-Cosmin CRUȚESCU, stud. Adrian-Marius VÎLCEA

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The transition from the traditional S-57 format to the new S-101 standard for Electronic Navigational Charts (ENC), developed*

by the International Hydrographic Organization (IHO), represents a major inflection point in the development of digital navigation. This paper analyzes the impact that the implementation of the S-101 standard has on enhancing safety at sea and optimizing operational management on board ships and within shipping companies. Through an analytical approach, the paper highlights the superior technical capabilities of S-101, particularly its architecture based on the S-100 framework, which enables dynamic integration and complex data overlay (detailed information on tides, currents, high-resolution bathymetry, and meteorological alerts). These technological innovations significantly improve the situational awareness of the officer of the watch and reduce uncertainty in the decision-making process, thereby decreasing the risk of human error the primary cause of most navigational incidents, such as groundings and collisions. From a maritime management perspective, the study emphasizes how the transition to S-101 streamlines Voyage Planning, Bridge Resource Management (BRM), and ship-to-shore information exchange.

**Keywords:** S-101 Standard, Electronic Navigational Charts (ENC), ECDIS, safety of navigation, maritime management, incident prevention

#### **46. (ID 275) Study on the Preparation of a Tanker Ship for the Transport of Hydrocarbons**

**Author:** stud. Costin-Alexandru ȘTEFAN

**Scientific Advisor:** Sup. Instr. Eng. Andrei POCORA

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** Chapter I – The Role and Operational Characteristics of Tanker Ships in Hydrocarbon Transport Chapter II – The Preparation Process of a Tanker Ship for Loading and Transport Chapter III – Improper Loading of Hydrocarbons. Real Situations. Accidents This paper analyzes the preparation of oil tanker ships for the safe transport of hydrocarbons, a critical sector of the maritime industry. It highlights the technical procedures involved, such as tank cleaning, degassing, inerting, and system verification prior to loading. Special attention is given to safety measures aimed at preventing fire, explosion, and marine pollution. The study also emphasizes the importance of proper cargo distribution and

*adherence to international regulations. Real accident cases demonstrate the severe consequences of improper loading and inadequate preparation. Overall, the research underlines the complexity and responsibility involved in tanker operations.*

**Keywords:** *Hydrocarbons, risks, accidents, shipping, loading, discharging, maritime, tank, pollution, safety*

#### **47. (ID 277) Procedures and Best Practices for the Embarkation and Disembarkation of Vehicles and Passengers on Ro-Ro Pax Vessels**

**Authors:** stud. Cristian-Gabriel ELFIAN, stud. Alexandru-Cristian ENACHE

**Scientific Advisor:** Prof. Assist. Eng. Cristina ALECSE, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Chapter 1. Technical characteristics of Ro-Ro Pax ships Chapter 2. Regulatory framework and safety requirements Chapter 3. Operational procedures for embarkation/disembarkation Chapter 4. Case study This theme examines the operational complexities and safety protocols in the management of Ro-Ro Pax (Roll-on/Roll-off Passenger) vessels, which serve as a critical link in modern maritime and fluvial transport. Combining the high-volume transport of wheeled cargo with the stringent safety requirements of passenger carriage the study begins by analyzing the technical architecture of Ro-Ro Pax ships, focusing on specialized infrastructure such as prow and stern ramps, internal hostable decks, and advanced lashing systems. A significant portion of the research is dedicated to the engineering constraints specific to these vessels, particularly the impact of free surface effects on stability, weight distribution, and the management of dynamic loads during transit. Furthermore, the paper explores the regulatory framework established by the International Maritime Organization (IMO), including the SOLAS convention and the ISM Code, which dictate the safety standards for car decks and passenger zones. Central to the discussion are the operational procedures for embarkation and disembarkation, highlighting the importance of traffic flow management, passenger-vehicle segregation, and the prevention of cargo shifting. Integrated digital platforms play a key role in streamlining port operations of ro-ro pax*

*ships, by automating logistics processes, synchronizing passenger and vehicle flows, and facilitating rapid data exchange. These solutions contribute to reducing operating times, optimizing resources, increasing safety, and improving the overall performance of maritime transport.*

**Keywords:** *Ro-Ro pax , passengers , embark , disembark , transport , navigation*

#### **48. (ID 279) The Impact of Global Economic and Geopolitical Transformations on the Constanța Passenger Terminal**

**Author:** stud. Andrei Mircea CĂPĂTĂNĂ

**Scientific Advisor:** Assoc. Prof. Eng Sergiu LUPU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Cadet Nav Inaugurated in 2005, the Constanța Port Passenger Terminal (Maritime Station) is a strategic pillar for Romanian maritime tourism. Its modern infrastructure, compliant with Schengen standards, allows for the operation of large-scale vessels; however, its evolution has been marked by three major crises: The Economic Crisis (2008): Generated a moderate decrease in tourist flow. The COVID-19 Pandemic: Led to the total suspension of activity in 2020. The War in Ukraine (2022): Reoriented the port toward grain logistics, affecting cruises due to security risks. To remain competitive, the terminal must adopt flexible management focused on digitalization and service diversification. Although vulnerable to the geopolitical context, it remains essential for the maritime economy. The capacity for rapid adaptation to changes will be decisive for relaunching Constanța into the international cruise circuit. Author: Capatana Andrei Mircea*

**Keywords:** *Maritime Tourism, Crisis Management, Port Infrastructure*

#### **49. (ID 281) The Impact of Oceanographic Conditions on the Maneuvering Capabilities of Naval Vessels**

**Authors:** stud. Iulian SICORSCHI, stud. Ionuț-Răzvan CURBĂȚ

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper examines the multifaceted influence of oceanographic conditions on the maneuvering capabilities of vessels*

*within the Naval Forces. In the contemporary maritime security environment, the ability to execute precise maneuvers is not merely a matter of navigational proficiency but a critical factor in operational success and vessel safety. The research investigates how environmental variables such as wave height and period, tidal currents, water density gradients, and bathymetry interact with a ship's hull and propulsion systems. The study focuses on the hydrodynamic changes caused by adverse sea states, which can significantly alter a vessel's turning radius, stopping distance, and course-keeping stability. Furthermore, the paper analyzes the impact of the "shallow water effect" and "squat" in restricted coastal areas, which are primary zones for naval operations. By synthesizing theoretical hydrodynamic models with empirical observations from naval exercises, the research highlights the necessity of integrating real-time oceanographic forecasting into tactical decision-making. Ultimately, the paper argues that a comprehensive understanding of the marine environment allows for optimized fuel efficiency, reduced structural stress on the hull, and a superior strategic advantage during complex naval maneuvers, such as replenishment at sea or amphibious operations in challenging weather conditions.*

**Keywords:** *Oceanographic conditions, Ship maneuverability, Hydrodynamics, Naval Forces, Navigational safety, Tactical decision-making*

**50. (ID 282) Security challenges in commercial ports. Analysis of the impact of illegal maritime trafficking on global trade.**

**Author:** stud. Andreea Diana CROITOR

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The study entitled "Security Challenges in Commercial Ports. Analysis of the Impact of Illegal Maritime Trafficking on Global Trade" examines the role of port security in the context of the growth of international maritime trade and illegal activities. In the context of globalization and the expansion of logistics chains, commercial ports represent essential nodes of the global economy, but also vulnerable points that can be exploited by organized crime networks to carry out activities such as drug trafficking, smuggling, human trafficking, or the illegal transportation of weapons.*

**Keywords:** *Maritime security, Port vulnerability, Illegal maritime trafficking, Trade security risks International maritime regulations*

**51. (ID 283) Study on hypothermia and its effects on survivors of a naval disaster. Methods and equipment for combating them.**

**Author:** stud. Alexandra CHIVULESCU

**Scientific Advisor:** Lecturer Eng. Dumitru CORDUNEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This article discusses the critical importance of rapid response and proper knowledge for surviving immersion in cold water, particularly for seafarers. Studies show that a person who falls overboard in cold conditions may become unresponsive in less than 11 minutes, making immediate rescue essential. The text explains how the human body reacts to sudden exposure to cold water, beginning with cold shock, panic, and uncontrolled breathing, followed by cold incapacitation and eventually hypothermia. Hypothermia progresses through mild, moderate, and severe stages as body temperature drops, significantly reducing physical and mental capabilities. Survival time varies depending on factors such as body composition, clothing, weather conditions, flotation aids, and individual behaviour. The article highlights the importance of training, preparedness, and knowledge of survival equipment. It also provides practical recommendations, including wearing life jackets, minimizing heat loss, conserving energy in the water, and maintaining a strong psychological will to survive until rescue arrives.*

**Keywords:** *immediate rescue, hypothermia*

**52. (ID 290) Operational Regulations and Equipment of Oil and Chemical Tankers**

**Author:** stud. George Daniel JERCAN

**Scientific Advisor:** Prof. Eng. Florin NICOLAE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The study analyzes the regulation of operational activities on oil and chemical tanker vessels, highlighting the role of international standards such as IMO, OCIMF, and the guidelines of ISGOTT in ensuring operational safety, pollution prevention, and crew protection. It presents the requirements related to the handling*

*of petroleum and chemical cargoes, control of tank atmospheres, prevention of fires and explosions, as well as compliance with terminal operating procedures. Furthermore, the study describes the main systems and equipment specific to these vessels, such as the inert gas system, cargo pumping installations, ventilation and level measurement systems, as well as monitoring and protection equipment. These systems contribute to the safe and efficient performance of loading, transportation, and discharge operations involving hazardous cargoes.*

**Keywords:** *oil tanker, chemical tanker, cargo operations, pollution prevention, tanker safety management*

### **53. (ID 291) The design of the water fire extinguishing system for a container ship**

**Author:** stud. Alba-Smaranda CHIRIAC

**Scientific Advisor:** Lecturer Eng. George NOVAC, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The design of the water fire extinguishing system on board a container ship represents a critical component of maritime safety, aimed at ensuring rapid response in case of fire. The system is based on a network of fire pumps, pipelines, hydrants, and hoses, designed to provide sufficient pressure and flow rate for effective intervention in all compartments of the vessel. Water is discharged in the form of solid or spray jets, contributing to fire suppression through cooling and temperature reduction. The installation must be fully autonomous, reliable, and capable of operating under emergency conditions without external support. Its design follows international maritime regulations, ensuring redundancy, proper distribution, and continuous operation even in critical scenarios. Additionally, the system requires regular inspection and maintenance during operation to guarantee its efficiency, thus protecting the ship, cargo, and crew from the risks associated with onboard fires.*

**Keywords:** *container, pipelines, hoses, cargo*

### **54. (ID 294) Optimization of Oceanographic Research under Changing Marine Environmental Conditions using the Slocum Glider G3 AUV**

**Authors:** stud. Rareș-Casian DROB, stud. David MANOLESCU

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The marine environment is highly dynamic, influenced by natural processes and human activity, which makes oceanographic research increasingly complex. Given the essential role of the ocean in climate regulation and ecological balance, continuous and accurate monitoring is required. However, traditional methods are limited by operational constraints, costs, and risks, creating the need for more efficient and autonomous solutions. This paper addresses the optimization of oceanographic research under changing environmental conditions using Autonomous Underwater Vehicles (AUVs), with a focus on the Slocum Glider G3. Unlike conventional systems, this glider uses buoyancy-driven propulsion and hydrodynamic lift, enabling long-duration missions with minimal energy consumption. These characteristics make it suitable for large-scale monitoring of variable marine environments. The study highlights how sensor integration and adaptive mission strategies improve data accuracy and efficiency. By monitoring parameters such as temperature, salinity, and currents, the vehicle can adjust its trajectory in response to environmental changes. The results demonstrate that the Slocum Glider G3 provides a reliable, cost-effective, and sustainable solution for modern oceanographic research.*

**Keywords:** *Oceanographic research optimization, Autonomous Underwater Vehicles (AUV), Slocum Glider G3, Dynamic marine environments, Adaptive mission planning, Environmental data acquisition*

## **55. (ID 295) Cargo Handling Operations on Ro-Ro vessels. Case Study: \*Ciudad de Valencia\*.**

**Authors:** stud Fabrizio-Gabriel BĂLAN, stud. Iustin Gabriel HODOROG

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This study examines cargo handling operations on Ro-Ro vessels, focusing on the case of the Ciudad de Valencia. Ro-Ro ships are designed for efficient loading and unloading of wheeled cargo, such as cars, trucks, and trailers, using ramps instead of cranes. The*

*paper analyzes the operational procedures, safety measures, and logistical coordination required to ensure smooth cargo flow. Special attention is given to port infrastructure, crew responsibilities, and time management, all of which directly impact turnaround efficiency. The Ciudad de Valencia serves as a practical example to highlight real-world challenges, including space optimization and risk management. The study also explores how modern technologies and standardized procedures improve performance, reduce delays, and enhance safety during cargo handling operations on Ro-Ro vessels.*

**Keywords:** *Ro-Ro vessels, cargo handling, port operations, logistics efficiency*

## **56. (ID 296) Efficiency of Maritime Transport Using Ro-Ro Vessels in International Trade: A Comparative Analysis with Cruise Ships**

**Authors:** stud. Iustin Gabriel HODOROG, stud. Fabrizio-Gabriel BALAN

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the efficiency of maritime transport using Roll-on/Roll-off (Ro-Ro) vessels in international trade, emphasizing their main advantages and limitations. Ro-Ro ships enable fast loading and unloading operations, reduced turnaround time in ports, and efficient handling of wheeled cargo, which contributes to improved logistics performance and lower operational costs. The study also includes a comparative analysis with cruise ships, outlining key differences in functionality, economic role, and design. While cruise vessels are primarily focused on passenger transport and tourism, Ro-Ro ships are optimized for freight mobility and trade efficiency. Additionally, the research considers factors such as port infrastructure, route planning, and environmental impact. The findings highlight that, despite certain constraints, Ro-Ro transport remains a highly effective and essential component of global maritime trade systems.*

**Keywords:** *Ro-Ro vessels, Maritime transport efficiency, International trade*

**57. (ID 299) Human Factor Analysis in Maritime Incidents: Case Study of the MV Dali Container Ship Collision**

**Author:** stud. Mihaela JIANU

**Scientific Advisor:** Prof. Eng. Florin NICOLAE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** This study examines how human performance and systemic reliability interact within the high-pressure context of maritime operations. While the field of Human Factors has evolved significantly since its military origins in World War II, human error remains a persistent variable in maritime safety, particularly within the compressed decision-making windows of port operations. By analyzing the March 26, 2024, collision of the MV Dali with the Francis Scott Key Bridge, it explores how technical failures, specifically the loss of propulsion and electrical power, exponentially increase the cognitive load on bridge teams. The goal of this analysis is to demonstrate that maritime safety is not merely a product of robust engineering, but a result of how effectively systems are designed to accommodate human limitations during a crisis. As modern vessels grow in scale and complexity, understanding these behavioral and operational vulnerabilities becomes essential for mitigating catastrophic risks to global infrastructure.*

**Keywords:** Human error, maritime safety, human limitations

**58. (ID 302) Advanced Solutions in Ballast Water Management for Sustainable Marine Ecosystems**

**Author:** stud. Cristian-Marian SAMOILĂ

**Scientific Advisor:** LCDR Eng. Simion DRAGOȘ, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** Ballast water management remains a critical challenge in preventing the spread of invasive aquatic species across marine ecosystems. This research paper outlines emerging and conventional treatment methods applied onboard maritime vessels, including mechanical filtration, ultraviolet irradiation, chemical biocides, and advanced oxidation processes. Emphasis is placed on system integration, operational efficiency, and compliance with international regulatory frameworks. Hybrid technologies combining physical and chemical treatments are highlighted for their improved effectiveness and reduced environmental impact. Additionally, recent*

*developments in real-time monitoring and automation are discussed as key enablers of reliable ballast water treatment. The study underscores the importance of selecting adaptable and energy-efficient systems tailored to vessel type and operational conditions.*

**Keywords:** *ballast water management, hybrid technologies, marine ecosystem*

### **59. (ID 304) Development of a Digital MATLAB Simulator for the Optimization of "Man Overboard" (MOB) Recovery Maneuvers**

**Author:** stud. Paula DRĂGHICI

**Scientific Advisor:** Prof. Eng. Ion CHIORCEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents the development and implementation of a digital simulator created in the MATLAB environment, dedicated to optimizing "Man Overboard" (MOB) search and rescue interventions. The software application is designed as an advanced decision-support tool for the Officer of the Watch (OOW), functioning to rapidly calculate the optimal interception course and minimize the victim's recovery time under real navigation conditions. The core of the system is an automatic maneuver orientation algorithm applied to standard recovery turns (Anderson, Williamson, and Scharnow). This algorithm processes the ship's kinematic data and dynamically calculates the victim's drift based on environmental factors (wind and sea currents), automatically establishing the precise interception point. The digital tool is equipped with an interactive Graphical User Interface (GUI) for monitoring and controlling the simulation. The simulator's performance was tested across various hydrometeorological scenarios.*

**Keywords:** *Digital Simulation, MATLAB, Interception Algorithm, Man Overboard (MOB), Drift Compensation.*

### **60. (ID 305) Hydrodynamic Influence on the Precision of Naval Mine Detection and Neutralization Systems**

**Authors:** stud. Ionuț-Răzvan CURBĂȚ, stud. Iulian SICORSCHI

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** Marine currents significantly influence the detection and neutralization of naval mines. Flow velocity affects the immersion depth of moored mines through drag forces. These forces displace the sensor platforms from their intended coordinates. Moving water generates acoustic noise. This noise interferes with sonar signal processing. High current speeds increase the lateral drift of autonomous underwater vehicles. Drift reduces the accuracy of scanning patterns by fifteen percent. The study analyzes environmental data from the Black Sea region. Mathematical models predict the behavior of mine casings under hydrodynamic pressure. Neutralization robots require higher power to maintain stability in flow exceeding one knot. Real time current mapping improves mission success rates. Naval operations must integrate hydrological forecasts. Compensation algorithms stabilize the equipment during disposal tasks. Technical adjustments ensure the safety of maritime traffic. Strategic planning depends on accurate water mass dynamics. These findings support the modernization of mine warfare tactics.

**Keywords:** Naval mines, Marine currents, Sonar detection, Underwater neutralization, Hydrodynamics, Autonomous underwater vehicles, Black Sea, Maritime safety, Hydrodynamic drift, Acoustic sensors

## **61. (ID 309) Inland Waterway Traffic Management Through RIS (River Information Services)**

**Author:** stud. Ioan-Bogdan COMAN

**Scientific Advisor:** Prof. Assist. Eng. Cristina ALECSE, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** This study focuses on the analysis of River Information Services (RIS) and their role in modern inland waterway transport, especially in the context of increasing traffic on navigable waterways. It presents the definition and evolution of these systems at the European level, under the coordination of the European Union, as well as their main components, such as AIS and Inland ECDIS, which are essential for real-time information exchange. The study also highlights the standards and regulations that ensure system interoperability and cooperation between countries. Finally, the main functions of RIS are analyzed, with a focus on traffic

*monitoring and navigation support, contributing to improved safety and efficiency in inland waterway transport.*

**Keywords:** *RIS, AIS, ECDIS, Inland, Traffic, Safety, Functions, Waterways*

## **62. (ID 311) Hydrodynamic Interaction Between Ships During Encounters on the Danube–Black Sea Canal**

**Author:** stud. Ștefan-Cristian BĂRBULESCU

**Scientific Advisor:** Prof. Assist. Eng. Cristina ALECSE, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This research analyzes the importance, functionality, and operational constraints of navigable canals within maritime and inland waterway transport systems. Canals are essential infrastructures that enhance logistical efficiency by reducing transport distances, costs, and environmental impact, while supporting sustainable development. Their operation depends on strict technical parameters such as depth, width, and traffic conditions, which influence vessel behavior and safety. The study highlights hydrodynamic interactions specific to confined waterways, emphasizing risks during vessel encounters. Regulatory frameworks governing navigation ensure safe and efficient traffic flow through speed control, priority rules, and monitoring systems. The Danube–Black Sea Canal is presented as a strategic European waterway, with detailed technical characteristics, structural design, and operational modes. Its role in connecting major transport corridors underlines its economic and geopolitical significance. Overall, navigable canals represent complex, highly controlled systems vital to modern transport infrastructure.*

**Keywords:** *Navigable canals, Danube–Black Sea Canal, Transport infrastructure, Inland waterway transport, Vessel safety*

## **63. (ID 313) Navigation in Narrow Channels**

**Author:** stud. Robert-Gabriel STOIAN

**Scientific Advisor:** Prof. Assist. Eng. Livia RAUCA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the operational challenges and safety protocols required for navigation in narrow channels and confined*

waters. It examines the critical role of the bridge team in maintaining high situational awareness under conditions of restricted maneuverability and high traffic density. The research focuses on the application of international regulations, specifically COLREG Rule 9, and the integration of Bridge Team Management (BTM) to mitigate the risks of grounding and collision. Furthermore, the study explores the impact of hydrodynamic factors, such as squat and bank suction, which significantly affect vessel controllability in shallow or narrow areas. By evaluating the importance of meticulous passage planning and the effective use of navigational aids like ECDIS and AIS, this analysis provides a comprehensive framework for safe transit. The findings underscore that successful navigation in narrow zones depends on the synergy between technical expertise, pilotage, and strict adherence to safety procedures.

**Keywords:** narrow channels, maritime safety, COLREG, hydrodynamic effects, bridge team management

#### **64. (ID 316) The Evolution of Shipboard Communication Systems and Technological Processes Contributing to the Improvement of Navigation Safety**

**Author:** stud. Ayan Levent FAIC

**Scientific Advisor:** Prof. Assist. Eng. Cristina ALECSE, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** The evolution of shipboard communication systems and technological processes has really changed how maritime operations happen, moving from the old flag waving and light flashing to the more complex digital and satellite ways now used. These transformations, though sometimes confusing to trace, show how technology keeps reinventing itself and how ships must talk, really talk, to ports and maritime offices for safety and order even when signals fail or get lost in static. Maritime signal flags, which were made official by the International Code of Signals, once let ships share important messages without any electronics. These colorful pavillions built a kind of language at sea that still stands as a backup when modern systems go silent or confused. Modern systems like radio, satellite networks and the Global Maritime Distress and Safety System (GMDSS) now make it possible to share information instantly

*and keep awareness of what's happening around though sometimes the signals overlap or drift. This presentation will show how the evolution of shipboard communication systems and technological processes contributes to navigation safety by integrating traditional and modern methods.*

**Keywords:** *maritime communications, signal flags, digital navigation, GMDSS*

**65. (ID 317) Petroleum Terminals and Port Infrastructure – Case Study: Port of Hamburg**

**Author:** stud. Edin CHEMAL

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract: Petroleum terminals represent essential components of modern port infrastructure, enabling the safe storage, transfer and distribution of crude oil and refined petroleum products. Due to the increasing global demand for energy, maritime transport plays a key role in ensuring the continuity of the energy supply chain. This paper analyzes the structure and operational role of petroleum terminals, focusing on their infrastructure, safety requirements and importance within global logistics systems. The Port of Hamburg is used as a case study to illustrate how modern port infrastructure supports energy-related activities. The study also highlights the importance of maritime access routes such as the Kiel Canal, which contributes to the efficiency of navigation in Northern Europe. Practical observations from maritime operations provide additional insight into the organization of port infrastructure.*

**Keywords:**

**66. (ID 318) Digitalization of Maritime Transport and Port Infrastructure for the Real Time Operation at the Rugged Conditions**

**Author:** stud. Dmytro SHEVCHENKO

**Scientific Advisor:** professor Vladlen SHAPO, PhD

**Institution:** Naval Institute, Ukraine

*Abstract: Digitalization of maritime transport and infrastructure enhances efficiency and safety. Using IIoT technologies for vibration, temperature, humidity, proximity, pressure etc. measuring in real*

*time mode is extremely actual. Such an approach is extremely necessary for the rugged outdoor conditions. Implementation of the LoRaWAN wireless technology allows obtaining the reduction of downtime thanks to early wear detection, decreasing fuel consumption and CO<sub>2</sub> emissions through optimized operations, minimizing the consequences of human errors. Sensors' implementation allows overcoming specific port conditions, gathering data for further analysis. It's reasonable to monitor the overheating, to track the humidity in the warehouses, to control proximity to ensure cargo and people safety, to check pressure in the equipment' hydraulic subsystems, to analyze magnetic fields between vessels and port equipment. Experience, obtained by Ukraine, shows the impossibility to overcome the variety of difficulties at defending and developing country without complex digitalization in the different fields of human activity.*

**Keywords:** *real-time, LoRaWAN, IIoT, maritime and port infrastructure*

## **67. (ID 320) Safety and Environmental Protection in Petroleum Terminals**

**Author:** stud. Anefi-Edin CHEMAL

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Petroleum terminals are critical components of port infrastructure, enabling the safe storage, transfer and distribution of crude oil and petroleum products. Due to the hazardous nature of these materials, terminal operations involve significant risks that require strict safety and environmental protection measures. This paper analyzes the main safety procedures and international regulations applied in petroleum terminals, focusing on accident prevention, risk management and environmental protection. Conventions such as SOLAS and MARPOL establish the regulatory framework for safe maritime operations and pollution prevention. The study highlights the importance of modern safety systems, continuous monitoring and well-trained personnel in minimizing operational risks. Effective implementation of safety standards is essential for ensuring the protection of both human life and the marine environment.*

## **68. (ID 328) Considerations Regarding the Hydrostatic Curves of Ships with Different Breadths**

**Authors:** stud. Cristian-Ștefan COCEA, stud. David Ștefan BĂLAN

**Scientific Advisor:** Lecturer Eng. Elisabeta BUZILĂ, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** This paper presents a comparative analysis of the hydrostatic curves corresponding to two series ships for which the overall dimensions were modified only in the transverse direction, while the main longitudinal characteristics and the general hull form were maintained. The study is based on the practical calculation of straight hydrostatic curves, with the purpose of highlighting the influence of ship breadth on the main hydrostatic parameters and on their variation with draft. The analysis focuses on the comparative evolution of displacement, waterplane area, longitudinal centre of flotation, transverse metacentric radius, tons per centimetre immersion, and moment to change trim, as well as other parameters derived from the hydrostatic calculation. By keeping the same general design conditions and altering only the transverse dimension, the study allows a clearer assessment of the extent to which ship breadth affects buoyancy distribution, initial stability characteristics, and the shape of the hydrostatic curves. The results emphasize the sensitivity of hydrostatic behaviour to transverse dimensional changes and provide useful observations for preliminary ship design and for the evaluation of design alternatives within a series of vessels. The paper underlines the practical role of hydrostatic curve analysis in understanding the relationship between hull geometry and ship performance in the early design stage.*

**Keywords:** hull geometry, breath, displacement, hydrostatic curves, ship design

## **69. (ID 329) Enhancing Operational Efficiency in Ro-Ro Shipping Through Software-Assisted Stowage Planning**

**Author:** stud. Mario-Alexandru NEAGU

**Scientific Advisor:** Prof. Assist. Eng. Livia RAUCA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** The efficiency of loading and unloading operations on car carrier (Ro-Ro) vessels plays a crucial role in maritime logistics, directly influencing turnaround time, operational costs, and safety.*

*This paper explores the application of software-based solutions for optimizing vehicle stowage, focusing on the complex constraints imposed by vessel geometry, stability requirements, and cargo sequencing. By integrating algorithmic optimization techniques with real-time operational data, such systems enable improved space utilization and streamlined cargo flows. The study highlights how digital tools can reduce human error, enhance planning accuracy, and support decision-making under dynamic port conditions. Furthermore, it addresses current challenges, including computational complexity and adaptability to varying ship configurations. The results demonstrate that advanced stowage planning software significantly contributes to increasing operational efficiency and reliability in car carrier transport.*

**Keywords:** *Car carrier vessels, Ro-Ro shipping, stowage planning, maritime logistics, optimization algorithms, software-based optimization, operational efficiency*

## **70. (ID 330) Advanced Navigation Technologies and Their Impact on Military Mobility**

**Author:** stud. Valentina-Maria FODOR

**Scientific Advisor:** Col. Adrian MIREA

**Institution:** "Carol I" National Defence University

**Abstract:** *This article examines the role of advanced navigation technologies in enhancing military mobility and operational effectiveness in modern warfare. As contemporary military operations increasingly rely on precision, speed, and coordination across multiple domains, navigation systems such as Global Navigation Satellite Systems (GNSS), inertial navigation systems (INS), and advanced digital mapping technologies have become essential components of military capability. The study analyzes how these technologies improve situational awareness, enable accurate troop and equipment movement, and support decision-making in complex operational environments. Furthermore, the paper explores the challenges associated with reliance on satellite-based navigation, including signal disruption, cyber threats, and electronic warfare. By evaluating current technological developments and their integration into military platforms, this research highlights the strategic importance of advanced navigation technologies for maintaining*

*mobility, operational superiority, and mission success in modern armed forces.*

**Keywords:** *advanced navigation technologies; military mobility; GNSS systems; inertial navigation systems; battlefield mobility; operational effectiveness;*

### **71. (ID 331) An Analysis of SSD Radar Systems**

**Author:** stud. Alexandru HURMUZ

**Scientific Advisor:** Lecturer Eng. Dumitru CORDUNEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents a comprehensive study of Solid-State Drive (SSD) based radar systems, focusing on their architecture, signal processing efficiency, and integration within modern sensing frameworks. By examining the transition from traditional vacuum-tube transmitters to solid-state semiconductors, the research highlights significant improvements in reliability, thermal management, and power consumption.*

**Keywords:** *Radar*

### **72. (ID 337) Strait of Hormuz Crisis**

**Author:** stud. Ayan-Arun IDRIŞ

**Scientific Advisor:** Prof. Assist. Eng. Cristina ALECSE, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Since Antiquity, humans societies have been inside of an ongoing cycle of competing against each other for a myriad of reasons, all falling under the sign of domination. Phenomena such as territorial control, the manipulation of public perception and the unfolding of conflict are all methods through which states deliver strong messages, ones that deem them as powerful, a force not to be reckoned with, generating assertion on a multinational scale. This article aims to shed light upon the current critical situation in the Strait of Hormuz, a significant passage in between the Persian Gulf and the Gulf of Oman through which approximately one fifth of the world's oil and liquefied gas commute. Due to the eruption of the Iran war, oil tankers have halted their transit, at risk of suffering losses of the liquid cargo, making prices skyrocket all over the world as the cost of fuel rises. Furthermore, this research paper will act as*

*a gateway to understanding the navigation safety and maritime challenges of operating in a high-risk environment.*

**Keywords:** *conflict, navigation safety, maritime challenges*

### **73. (ID 355) Impact of Ship Emissions on Air Quality in Port Areas: A Comparative Study of Constanța and Rotterdam**

**Author:** stud. Bogdan-Ionuț MANU

**Scientific Advisor:** Assoc. Prof. Eng. Sergiu LUPU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This study investigates the effects of ship-generated emissions on air quality in port environments, with a comparative analysis of Constanța and Rotterdam. Maritime activities produce a range of pollutants, including sulfur oxides (SO<sub>x</sub>), nitrogen oxides (NO<sub>x</sub>), carbon dioxide (CO<sub>2</sub>), particulate matter, and volatile organic compounds (VOC), primarily resulting from fuel combustion in marine engines. These emissions significantly contribute to atmospheric pollution, posing risks to human health and ecosystems, especially in port cities. The paper examines emission sources during different operational phases, as well as the mechanisms of pollutant formation. It also reviews international and European regulatory frameworks and evaluates mitigation strategies such as alternative fuels, emission control technologies, and operational optimization. The comparison highlights differences in environmental management approaches and emphasizes the need for sustainable solutions in maritime transport.*

**Keywords:** *ship emissions air pollution port areas SO<sub>x</sub> and NO<sub>x</sub> particulate matter*

### **74. (ID 362) Virtual Reality (VR) Technologies and Applicable Scenarios**

**Author:** stud. Remzi AGI-ALI

**Scientific Advisor:** Assoc. Prof. Eng. Sergiu LUPU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Virtual Reality (VR) technologies are increasingly integrated into maritime navigation and training systems, offering immersive, safe, and cost-effective environments for skill development. This paper explores the role of VR in maritime navigation, focusing on applicable scenarios such as bridge*

*operations, emergency response, and engine room simulations. VR enables the replication of complex and hazardous situations without real-world risks, significantly improving decision-making and operational competence. Compared to traditional simulators, VR systems provide enhanced immersion, accessibility, and flexibility in training processes. Furthermore, recent studies highlight their effectiveness in improving learning outcomes and engagement among maritime students. However, challenges such as simulator sickness, technological limitations, and user acceptance remain relevant. The study concludes that VR represents a transformative tool in maritime education and operational training, with strong potential for future integration into standard navigation practices and competency-based training frameworks.*

## **75. (ID 363) Study on Crude Oil Transfer Operations Between VLCCs and FPSO Units**

**Author:** stud. George-Mihai MĂTUȘA

**Scientific Advisor:** LCDR Eng. Andrei POCORA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The transfer of crude oil between Very Large Crude Carriers (VLCCs) and Floating Production Storage and Offloading (FPSO) units represents a critical operation in offshore oil transport systems. This study aims to analyze the technical, operational, and safety aspects specific to VLCC–FPSO transfer processes. The paper examines key elements such as mooring arrangements, cargo handling procedures, and the impact of environmental conditions, including wind, waves, and currents, on operational safety and efficiency. Particular attention is given to the coordination between the two units and the role of standardized procedures in minimizing operational risks. Furthermore, the research addresses the regulatory framework and industry guidelines governing these operations, emphasizing compliance with international safety and environmental protection standards. Potential risks, including equipment failure and human error, are also considered. The study is based on the analysis of specialized literature and technical documentation, aiming to highlight best practices and support the improvement of offshore crude oil transfer operations.*

**Keywords:** *Crude oil, VLCC, FPSO, offshore transfer, safety, operations*

## **76. (ID 364) Navigation on the Suez Canal: Advantages and Constraints**

**Author:** stud. Minodor-Marius BUTNARU

**Scientific Advisor:** Prof. Assist. Eng. Cristina ALECSE, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper explores the operational dynamics of the Suez Canal, analyzing its pivotal role in global maritime trade. As a critical link between Europe and Asia, the canal offers significant advantages, primarily the substantial reduction in transit time and fuel consumption by bypassing the Cape of Good Hope. However, navigation through this waterway is subject to various constraints, including technical limitations related to vessel size (Suezmax standards), environmental factors, and high transit fees. Furthermore, recent events have highlighted the canal's vulnerability to blockages and geopolitical tensions in the Red Sea region. By examining both the economic benefits and the logistical risks, this study provides an overview of the current challenges faced by maritime operators and the strategic importance of maintaining the canal's efficiency in an increasingly volatile global supply chain.*

**Keywords:** *Suez Canal, maritime navigation, transit constraints, economic advantages.*

## **77. (ID 366) The Role of Integrated Digital Platforms in Improving the Efficiency of Port Operations Carried Out by Maritime Vessels**

**Authors:** stud. Alexandru-Cristian ENACHE, stud. Cristian-Gabriel ELFIAN

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the role of integrated digital platforms in improving the efficiency of port operations, in the context of increasing maritime traffic and the growing complexity of activities in modern ports. Digitalization plays an important role in improving communication, coordination, and decision-making between port*

authorities, terminal operators, and ship crews. The study presents the main types of digital systems used in ports, such as Port Community Systems (PCS) and Terminal Operating Systems (TOS), highlighting their contribution to better planning, real-time monitoring, and more efficient management of port operations. These platforms help reduce waiting times, improve traffic flow, and increase operational safety. The paper also briefly addresses the use of digital solutions in passenger and vehicle operations on Ro-Ro Pax vessels. The embarkation and disembarkation processes require good coordination, and digital systems can improve their organization and efficiency. Overall, the study shows that digital platforms play an important role in modern port operations, contributing to higher efficiency, better safety, and improved performance in maritime transport.

**Keywords:** digital platforms, port operations, efficiency, maritime transport, smart ports, Ro-Ro Pax

#### **78. (ID 367) Study of the particularities of the voyage of a passenger ship on routes in the Indian Ocean**

**Author:** stud. Cosmin Mihai CRĂCIUN

**Scientific Advisor:** Assoc. Prof. Eng. Romeo BOȘNEAGU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The chosen theme aims to analyze the meteorological conditions specific to the Indian Ocean and how they influence the voyage of passenger ships. The interest in this topic stems from the fact that this region is distinguished by a particular atmospheric and maritime dynamics, in which monsoons, seasonal winds, strong waves, heavy rainfall and, in certain periods, cyclonic phenomena can have a direct impact on navigation. The paper highlights the fact that weather is not only an element of the context of the voyage, but a factor that can really influence the choice of route, the duration of the voyage, fuel consumption, the safety of the ship and the comfort of passengers. In the case of passenger ships, these aspects become even more important, since any change in navigation conditions is reflected not only on the technical performance of the ship, but also on the experience on board and on the safety measures adopted by the crew. By analyzing the climatic and meteorological peculiarities of the Indian Ocean, the study aims to highlight the need for careful*

*voyage planning and constant adaptation to environmental conditions. In this sense, understanding the influence of meteorological factors becomes essential for the smooth operation of passenger transport in a complex and often unpredictable maritime region.*

**Keywords:** *Indian Ocean, weather conditions, passenger ships, sea travel, monsoons, maritime safety, navigation, maritime transport.*

**79. (ID 370) Study on digitalization and automation in transport. Impact on crew and professional training.**

**Author:** stud. Ana Elisabeta ANTON

**Scientific Advisor:** Prof. Assist. Eng. Cristina ALECSE, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper examines digital transformation in maritime transport, focusing on the impact of digitalisation and automation on crew activities, navigation safety, and training requirements. It outlines the evolution from traditional navigation to integrated digital systems within the Maritime 4.0 framework, including cyber-physical systems, decision-support tools, and Maritime Autonomous Surface Ships (MASS). Key onboard technologies such as ECDIS, AIS, and integrated bridge systems are analysed. The study highlights the transformation of navigators' roles, shifting towards supervision and management of automated processes. It also explores human technology interaction, addressing trust in automation, interface design, and operational limitations. While digitalisation improves efficiency and safety, it also introduces risks such as information overload and reduced vigilance. A case study reflects maritime professionals' perspectives, showing a positive attitude towards digital technologies alongside the need for continuous skills development. The human factor remains essential, requiring a balance between technology and human control.*

**Keywords:** *digitalisation, automation, maritime transport, Maritime 4.0, navigation safety, human machine interaction, ship crew, decision-support systems, MASS (Maritime Autonomous Surface Ships), professional training*

## **80. (ID 374) Ships Fire Detection and Alarm Systems**

**Author:** stud. Andrei MILEA

**Scientific Advisor:** Lecturer Eng. Elisabeta BUZILĂ, PhD.

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Ship fire detection and alarm systems are essential safety technologies designed to identify fires at an early stage and alert the crew immediately. These systems use sensors such as smoke, heat, and flame detectors to monitor different areas of a vessel. Their main purpose is to prevent the spread of fire, protect lives, and minimize damage to the ship.*

**Keywords:** *Ship Safety Alarms*

## **81. (ID 375) Methodology for Determining the Baseline: Nautical Charts, Archives and DHM Publications**

**Authors:** stud. David MANOLESCU, stud. Rareș Casian DROB

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The methodology for determining the baseline represents the essential technical and legal process of translating geographical reality into stable jurisdictional coordinates. According to the United Nations Convention on the Law of the Sea (UNCLOS), the baseline is the fundamental line from which the breadth of the territorial sea, the contiguous zone, the exclusive economic zone, and the continental shelf are measured. This process is not merely a descriptive exercise but a rigorous scientific operation that relies on the convergence of hydrographic data, historical records, and legal interpretations. The primary instruments used in this methodology are official nautical charts, historical archives, and the specialized publications issued by the Maritime Hydrographic Directorate (DHM). In accordance with Article 5 of UNCLOS, the normal baseline is the low-water line along the coast as marked on large-scale charts officially recognized by the coastal State. The methodology involves a meticulous selection of base points, which are the most prominent seaward points of the low-water line. These points serve as the "turning points" for the construction of maritime limits.*

**Keywords:** *Nautical Charts, Archives, DHM Publications*

## **82. (ID 381) Suezmax Oil Tanker Stability Across Different Loading Conditions**

**Author:** stud. George CRÎNGAȘU

**Scientific Advisor:** Lecturer Eng. George NOVAC, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract: This study takes a closer look at the stability of a Suezmax oil tanker and why it is so important to calculate it correctly during every voyage. Given their massive dimensions and the volatile nature of their cargo, these vessels require precise cargo distribution to ensure they remain safe under various weather conditions. The analysis demonstrates how different loading conditions, such as ballast or fully loaded states, directly affect Shear Force (SF) and Bending Moment (BM), which are critical for the ship's safety. When the cargo isn't distributed correctly, the hull can suffer from hogging or sagging, putting a lot of stress on the steel structure. By analyzing these internal forces, we can better understand how to keep the vessel balanced and prevent structural failure at sea, which can be extremely dangerous for the crew onboard and very expensive for the company. In the end, a good distribution of the cargo is the only way to ensure both the stability and the safety of the crew, while also protecting the long-term interests of the company.*

**Keywords:** Stability, Shear Force - SF, Bending Moment - BM, Hogging, Sagging, Loading Conditions

## **83. (ID 383) Design of an Automated Sail Handling System for Sailing Navigation Optimization**

**Authors:** stud. Vichentie ALPETRI, stud. Damian TUDORAN-BADEA

**Scientific Advisor:** Prof. Eng. Ion CHIORCEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract: This paper focuses on the development and implementation of a software solution for automated sail trimming, utilizing the Arduino hardware platform. The primary objective is to optimize aerodynamic thrust by automatically adjusting the sails' angle of attack relative to the apparent wind direction and intensity. The software component is structured around a closed-loop control algorithm that processes data from an anemometer and an electronic compass. The program, implemented in C++, manages data*

*acquisition, signal noise filtering, and the generation of PWM (Pulse Width Modulation) signals for the precise control of high-torque servo motors. A core aspect of the project is the decision logic designed to prevent excessive vessel heeling; the software is capable of executing emergency sheet release maneuvers. Prototype testing results demonstrate increased system stability and rapid response to wind gusts, confirming the feasibility of using microcontrollers to enhance sailing efficiency for short-handed crews.*

**Keywords:** *Arduino, Embedded Systems, Marine Automation, PWM Control, Sail Optimization.*

#### **84. (ID 385) Optimization of Navigation in the Strait of Gibraltar through Digitalization and Automated Traffic Management Systems**

**Author:** stud. Răzvan Gabriel LUNGU

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This study examines modern measures for optimizing and developing navigation in the Strait of Gibraltar, with a focus on the digitalization and automation of maritime traffic management. Given the high traffic density and the strategic importance of the area, the implementation of advanced systems such as digitalized Vessel Traffic Services (VTS), artificial intelligence for route prediction, and integrated real-time monitoring platforms becomes essential. The paper highlights how these technologies contribute to enhancing navigational safety, reducing the risk of collisions, and improving traffic flow efficiency. Furthermore, the benefits of interoperability between coastal states and the role of rapid data exchange are analyzed. This abstract establishes a direct link between academic research and practical applications in the maritime field, emphasizing the continuous need for adaptation to emerging global technological requirements and the increasing complexity of modern maritime operations.*

**Keywords:** *Strait of Gibraltar, Maritime Traffic Management, Digitalization, Automation, Maritime Transport, Vessel Traffic Services (VTS)*

**85. (ID 389) Study of the particularities of the voyage of a passenger ship on routes in the Antarctic Ocean**

**Author:** stud. Bianca Maria BRĂTULESCU

**Scientific Advisor:** Assoc. Prof. Romeo BOȘNEAGU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* Planning a passenger ship's voyage in the Antarctic Ocean is a complex process, influenced by the difficult conditions of the polar environment and the high safety requirements. This paper analyzes the essential elements that underlie the organization of such a voyage, such as the choice of route, weather conditions and the presence of sea ice. The route is determined based on ice areas, ocean currents and difficult sectors, such as the Drake Passage, and the use of weather forecasts helps to avoid dangerous situations. It also highlights the importance of complying with the regulations imposed by the International Maritime Organization, as well as practical aspects related to fuel consumption, voyage duration and general safety. Through these elements, the paper provides a clear picture of how to prepare for a voyage in the Antarctic Ocean.

**Keywords:** Antarctic Ocean, voyage planning, passenger ship, weather conditions, navigation safety

**86. (ID 390) How Container Coding Works: Ensuring Efficiency and Safety in Maritime Transport**

**Author:** stud. Valentin-Fernando NICOLAE

**Scientific Advisor:** Prof. Eng. Florin NICOLAE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* This paper examines the critical role of the ISO 6346 standard in the global maritime supply chain, focusing on the systematic identification and codification of freight containers. By analyzing the structural components of the identification system—comprising the owner code, equipment category identifier, serial number, and check digit—the study evaluates how precise codification mitigates operational risks and enhances logistical transparency. Furthermore, the research explores the transition from traditional alphanumeric marking to digital integration via RFID and IoT-enabled tracking. As maritime transport faces increasing pressure for automation, the paper assesses how standardized coding facilitates seamless data exchange between port terminals, shipping

lines, and customs authorities. The findings highlight that while the current system remains the backbone of global trade, its integration with blockchain and automated recognition systems is essential for the future of "smart" shipping, ensuring improved security, reduced human error, and optimized fleet management.

**Keywords:** ISO 6346 global maritime supply chain RFID

### **87. (ID 391) Search and Rescue Methods and Procedures for Ditched Aircrafts**

**Authors:** stud. Eduard-Marius CARAPCEA, stud. Alexandru-Florin CARAPCEA

**Scientific Advisor:** Lecturer Eng. Dumitru CORDUNEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *In this presentation will be presented all the different search and rescue procedures for aircrafts which have emergency landed on water, along with the complex operations which take place on water, involving the communication, coordination and interoperability of both civil and military structures. It will cover the five critical phases of a SAR mission: the alerting, planning phase, execution, on-scene coordination and the formal closing of the whole operation. More than that, it will include the implementation of combined aero-naval tactics, emphasizing the importance of quick decisions, proper communication, structural coordination and the strategic prioritization of the limited resources.*

**Keywords:** search, rescue, aircraft, procedure, operation, mission, tactics, coordination

### **88. (ID 392) Design and Implementation of an Autonomous Collision Avoidance System for a Scale Model Ship Based on COLREG**

**Author:** stud. Cristian KIȘCĂNEANU

**Scientific Advisor:** Lecturer Eng. Dumitru CORDUNEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This project presents the design and implementation of an autonomous scale-model ship capable of avoiding collisions in accordance with the International Regulations for Preventing Collisions at Sea (COLREG). Because human error remains the leading cause of maritime accidents, automating navigation*

*decisions is a critical step for the future of the maritime industry. The practical component consists of a vessel prototype equipped with an embedded decision-making control system. Obstacle detection is achieved using distance-measuring sensors strategically positioned to monitor the surrounding environment. Propulsion and steering are managed through a dual-motor differential thrust mechanism, allowing for agile course alterations without the need for complex mechanical rudders. The core algorithm translates fundamental COLREGs specifically Rule 13 (Overtaking), Rule 14 (Head-on Situation), and Rule 15 (Crossing Situation) into automated navigational logic. Upon detecting an approaching obstacle, the system evaluates the relative distance and autonomously adjusts engine speeds to safely alter the ship's course and avoid a collision. Ultimately, this prototype demonstrates the feasibility of using integrated hardware systems to simulate and test autonomous maritime navigation algorithms.*

**Keywords:** *Autonomous Navigation, COLREG, Collision Avoidance, Scale-Model Vessel, Differential Thrust, Maritime Safety, Sensor-Based Detection*

### **89. (ID 393) Firefighting Systems on Oil and Chemical Tankers**

**Authors:** stud. Adrian-Alexandru DUNERAȘ, stud. Robert-Leonardo TUDOR

**Scientific Advisors:** Lecturer Eng. George NOVAC, PhD., Lecturer Eng. Elisabeta BUZILĂ, PhD.

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The transportation of highly volatile oil and chemical cargoes presents one of the most severe fire and explosion risks in the global maritime industry. Because a vessel at sea cannot rely on immediate external emergency services, the internal infrastructure and crew readiness must be entirely self-sufficient. This project provides a critical examination of the preventative and active firefighting systems deployed on modern oil and chemical tankers, operating under the strict regulatory frameworks of the SOLAS convention and the FSS Code. It systematically breaks down the ship's primary defenses, starting with preventative measures like the Inert Gas System (IGS) used to control the tank atmosphere. Ultimately, this project establishes that while advanced marine*

*firefighting technology is essential for vessel survivability, the human element specifically rigorous equipment maintenance and high-pressure crew drill protocols remains the most critical factor in preventing a localized emergency from escalating into a catastrophic total loss.*

**Keywords:** *Marine Firefighting Systems, Oil and Chemical Tankers, Inert Gas System*

## **90. (ID 397) Loading Operations and Software Utilization on Product Carrier Vessels**

**Author:** stud. Robert-Marian PIRLEA

**Scientific Advisor:** Prof. Assist. Eng. Livia RAUCA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Loading Operations and Software Utilization on Product Carrier Vessels This paper analyzes the operational processes and technological systems involved in cargo handling onboard PRODUCT CARRIER vessels, emphasizing the role of digital solutions in enhancing efficiency and safety. The research is based on a qualitative analysis of specialized maritime literature and current international regulations governing liquid cargo transport. The study focuses on the structural configuration of product carriers and the integration of essential systems used in cargo management, including pumps, tanks, and auxiliary installations. Furthermore, it examines the implementation of LOADING SOFTWARE PRODUCT CARRIER systems, highlighting their contribution to real-time monitoring, stability calculations, and operational control from the Cargo Control Room. The paper also explores the sequential stages of LOADING CARGO PRODUCT CARRIER operations, identifying critical risks such as contamination, equipment malfunction, and alarm management. By addressing both the technical and operational aspects, the research underlines the importance of simulation-based training in improving crew performance and decision-making. Finally, the analysis provides a comprehensive perspective on how modern software solutions contribute to safer cargo operations and outlines future trends such as automation, digital twin technology, and artificial intelligence in maritime transport.*

**Keywords:** *product carrier, loading cargo product carrier, loading software product carrier.*

**91. (ID 399) Technical Analysis of Lashing and Securing Systems for Non-Conventional Cargoes on Board Commercial Vessels**

**Author:** stud. Cosmin MÎRZA

**Scientific Advisor:** Prof. Eng. Florin NICOLAE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Transporting heavy cargo units with small footprint areas requires carefully designed support arrangements to distribute loads safely across the ship's structure and avoid overstressing critical elements. To ensure the safety of the vessel, cargo, and crew, appropriate stowage, bedding, and securing systems must be planned so that the shipment remains stable throughout the voyage. Although project cargo operations have expanded significantly in recent years, industry practice often relies automatically on existing International Maritime Organization (IMO) guidelines. This paper highlights several cargo types whose characteristics suggest that current IMO recommendations may require future updates. The study examines a shipment considered innovative due to its particular dimensions and constraints, which posed unique challenges on board. Because the IMO CSS Code presents limitations in calculating accelerations and resulting forces, the analysis incorporates internationally recognized standards from one of the strictest classification societies to ensure accurate assessment and safe securing solutions.*

**92. (ID 400) Military Naval Navigation in GPS-Denied Environments: Techniques and Solutions**

**Author:** stud. Maria-Miruna CODREANU

**Scientific Advisor:** Ionuț CIORARU

**Institution:** "Carol I" National Defense University

**Abstract:** *Modern naval operations rely extensively on satellite navigation systems, particularly the Global Positioning System (GPS), to provide accurate positioning, navigation, and timing information. These capabilities are essential for a wide range of naval activities, including ship maneuvering, fleet coordination, maritime surveillance, and the deployment of precision-guided weapons. However, in modern conflict environments, GPS signals*

*can be disrupted or manipulated through electronic warfare techniques such as jamming and spoofing. As a result, naval forces may find themselves operating in what are known as GPS-denied environments, where satellite-based navigation becomes unreliable or completely unavailable. This presentation focuses on the challenges that GPS-denied environments pose to military naval navigation and analyzes the techniques and technological solutions that allow naval ships to maintain accurate navigation under such conditions. In particular, it examines several alternative navigation methods that can be used when GPS signals are unavailable. These include Inertial Navigation Systems (INS), which determine position using internal sensors such as gyroscopes and accelerometers; radar navigation, which helps ships identify their position relative to coastlines and other ships; celestial navigation, which relies on observations of celestial bodies such as stars and the sun; and dead reckoning, which estimates position based on speed, direction, and time. Additionally, modern electronic chart systems and maritime sensor technologies play an important role in supporting navigation in complex operational environments. The study also highlights the importance of integrating multiple navigation systems in order to increase operational reliability. By combining traditional maritime navigation techniques with modern technological solutions, naval forces can significantly enhance their resilience and maintain effective operations even in contested electronic environments. Ultimately, the development and implementation of multi-layered navigation strategies are essential for ensuring safe and effective naval operations in the increasingly complex conditions of modern maritime warfare.*

**Keywords:** *GPS-denied environments; Inertial Navigation Systems (INS); celestial navigation; dead reckoning; GPS jamming and spoofing; multi-system navigation.*

### **93. (ID 404) Military Naval Transport and Its Logistical Importance**

**Author:** stud. Larisa-Maria STAN

**Scientific Advisor:** Ionuț CIORARU

**Institution:** "Carol I" National Defense University

**Abstract:** *Military naval transport constitutes a cornerstone of contemporary defence logistics, enabling the rapid and sustained movement of personnel, equipment, and essential supplies across maritime theatres. Beyond simple transportation, it functions as a strategic instrument for projecting military power, ensuring operational readiness, and maintaining uninterrupted supply chains under challenging environmental and operational conditions. The efficiency of naval logistics directly influences the speed, reach, and effectiveness of military operations, making it indispensable in both combat and humanitarian contexts. A range of specialised vessels supports these operations, each designed for specific logistical functions. Troopships provide rapid deployment of personnel, landing ships and roll-on/roll-off vessels facilitate the transport of heavy vehicles and equipment directly to operational zones, and auxiliary support ships deliver fuel, ammunition, and vital provisions to sustain prolonged missions. Coordinating these assets requires meticulous planning, particularly when operating over long distances or in areas exposed to hostile activity. Technological advancements have further enhanced naval logistics, including automated supply chain management, integrated fleet communication networks, and unmanned support vessels. These innovations improve operational efficiency, reduce response times, and mitigate risks; however, the complexity of maritime transport continues to demand expert management and strategic oversight. Historical examples, such as rapid deployments during Operation Desert Storm and humanitarian interventions like the 2010 Haiti earthquake relief, highlight the critical role of naval transport in diverse operational scenarios. Military naval transport remains a vital enabler of global military operations, combining strategic mobility with logistical resilience. Its ongoing development through technological innovation and strategic planning ensures effective force projection, operational sustainability, and readiness in an increasingly complex maritime security environment.*

**Keywords:** *military logistics, naval transport, maritime operations, troop deployment, strategic mobility, supply chain, auxiliary vessels, operational readiness*

**94. (ID 422) Autonomous Sail Orientation System with Retractable Keel for Performance Sailing**

**Author:** stud. Adelin-Ionuț LĂCĂTUȘ

**Scientific Advisor:** Assoc. Prof. Eng. Sergiu LUPU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* This project introduces an advanced electromechatronic system for sailing vessel automation, centered on a dynamic, retractable keel. By integrating 3D-printed components with an Arduino-based architecture, the vessel achieves high hydrodynamic stability through real-time GPS and wind sensor data. A key innovation is the autonomous boom, which automatically adjusts its orientation according to wind direction for optimal propulsion. While the sails are automated, a dedicated radio-frequency (RF) system provides precise manual control over both the rudder and the auxiliary motor. This hybrid approach ensures high performance in deep waters while preventing grounding in shallow areas through rapid keel adjustment. Ultimately, the prototype demonstrates a reliable, scalable foundation for the next generation of autonomous and energy-efficient marine vessels.

**Keywords:** retractable keel, autonomous boom orientation, arduino, sailing vessel, hybrid approach, radio frequency system, 3D printed

**95. (ID 439) Methods and Equipment Used to Combat Marine Oil Pollution in The Event of a Major Spill of Over 700 Tons of Polluting Hydrocarbons Caused by A Collision Between Two Ships in The Territorial Sea**

**Author:** stud. Maria-Bianca SCURTU

**Scientific Advisor:** Lecturer Eng. Dumitru CORDUNEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* This paper addresses the issue of combating marine oil pollution in the context of a major spill of over 700 tons, resulting from a collision between two ships in the territorial sea. Oil pollution is one of the most severe forms of marine environmental degradation, causing significant impacts on marine ecosystems, coastal areas, and economic activities dependent on the sea. The study analyzes the types of hydrocarbons transported by sea, their behavior in the marine environment, and the factors influencing the evolution of accidental spills. The stages of the response process in major

*pollution incidents are also presented, from the detection and assessment of the incident to the implementation of measures for containment, recovery, and neutralization of the pollutant. Particular emphasis is placed on methods for combating marine pollution, namely mechanical, chemical, and biological methods, as well as the equipment used in response operations, such as containment booms, oil recovery systems (skimmers), specialized vessels, and absorbent materials. The paper also highlights the essential role of institutional cooperation and compliance with national and international legal frameworks in the effective management of emergency situations caused by oil pollution. In conclusion, the study underlines the necessity of a rapid, well-coordinated response supported by appropriate technical means to reduce the ecological and socio-economic impact of major oil spills in the territorial sea.*

**Keywords:** *Marine oil pollution, oil spill, hydrocarbons.*

#### **96. (ID 443) SAR Operations in the North Atlantic Ocean**

**Author:** stud. Ioan-Alexandru GAVRIL

**Scientific Advisor:** Lecturer Eng. Dumitru CORDUNEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Search and Rescue (SAR) operations in the North Atlantic require rapid coordination of air and naval resources to save lives in extreme conditions. Harsh weather, vast distances, and icy waters demand advanced technology, rigorous training, and international cooperation, ensuring an effective response to maritime and aviation emergencies while protecting crews and passengers in danger.*

#### **97. (ID 447) Ways to Improve Safety on Tanker Ships During Terminal Operations**

**Author:** stud. Sebastian-Marian SARANDI

**Scientific Advisor:** LCDR Eng. Dragoş SIMION, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Ways to improve safety on tanker ships during terminal operations Terminal operations with tanker ships(oil/chemical) represent one of the most dangerous phases in the maritime industry, involving the transfer of hazardous cargo under complex logistical and environmental conditions. In this presentation I will underline key strategies to improve not only safety onboard tanker vessels*

during terminal operations, but also safety on shore, with a focus on procedural compliance, crew danger awareness, and improved communication between ship and shore. This study emphasises the most important risks factors that exists during ship/shore cargo transfer, including hydrocarbon vapour poison during loading/discharging, static electricity, multiple possibilities of equipment failure, and also human error. I will present the critical role of the Ship/Shore Safety Checklist as a fundamental safety tool, alongside the importance of pretransfer meetings, permit-to-work systems, and continuous monitoring of inert gas systems. In the end, the presentation will highlight the importanece of reading, understanding, and use ISGOTT guidelines, STCW competency standards, and company SMS procedures. By integrating these measures, tanker operations between ship/shore can substantially reduce the likelihood of incidents, safeguarding personnel, the vessel, and the marine environment.

**Keywords:** ship, tanker, terminal, ISGOTT, STCW

## **98. (ID 448) Comparative Study of Berthing Maneuver Performance for Ships with Conventional vs. Azimuth Propulsion**

**Author:** stud. Cosmina BĂDĂRĂU

**Scientific Advisor:** Lecturer Eng. Sergiu ȘERBAN, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** This paper presents an analysis of naval propulsion systems, highlighting their role in ensuring a ship's propulsion and maneuverability. It describes the general principles of operation, as well as the structure of the classic propulsion system, consisting of the main engine, transmission, and propeller. It analyzes the methods of transmitting power to the propeller, including mechanical, electrical, and hydraulic transmission types. The paper also addresses propeller types, particularly the propeller, classified by the number of blades, pitch, direction of rotation, and material, emphasizing their influence on ship performance. Furthermore, the azimuth propulsion system is presented, highlighting its advantages in terms of maneuverability and operational flexibility.

**Keywords:** marine propulsion, azimuth propulsion, propeller, azipod

**99. (ID 451) Analysis of Piracy Attacks in High-Risk Areas: Prevention and Response Measures**

**Author:** stud. Alexandru George BADIN

**Scientific Advisor:** Prof. Assist. Eng. Cristina ALECSE, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* This paper analyzes the phenomenon of maritime piracy in High Risk Areas (e.g., the Gulf of Guinea, the Horn of Africa, the Strait of Malacca), highlighting the causes, operational tactics, and global economic impact. The study critically evaluates the effectiveness of current prevention and response measures adopted by the international community and the maritime industry. The implementation of Best Management Practices (BMP), the presence of naval forces, and the use of privately contracted armed security personnel (PCASP) are analyzed. Furthermore, the paper proposes integrated strategies for enhancing naval security, focusing on regional cooperation, early detection technologies, and rapid crisis response protocols. The research emphasizes the need for a multidimensional approach to protect crews and global supply chains, providing practical recommendations for shipping companies.

**Keywords:** Maritime piracy, High Risk Areas (HRA), Naval security, Best Management Practices (BMP), Protection measures, International cooperation

**100. (ID 454) Design and 3D printing of components for oceanography and hydrography equipment**

**Author:** stud. Dan-Andrei GHEORGHE

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* This thesis investigates the application of additive manufacturing (3D printing) technologies in the design and fabrication of components destined for oceanographic and hydrographic equipment, with a particular focus on the Model 106 Current Meter. The work is motivated by the limitations of conventional manufacturing methods high costs, extended production times, and geometric constraints which can be effectively addressed through modern additive fabrication techniques. The study begins

*with a theoretical foundation covering the primary 3D printing technologies relevant to marine applications, including FDM, SLA, SLS, and DMLS, alongside an analysis of suitable materials such as PETG, nylon, and carbon fiber composites, evaluated for their resistance to corrosion, hydrostatic pressure, and mechanical fatigue in harsh underwater environments. The design process integrates parametric CAD modeling using software such as SolidWorks and Autodesk Fusion 360, supported by structural simulations via the Finite Element Method (FEM) and hydrodynamic analysis through Computational Fluid Dynamics (CFD). These tools enable the optimization of component geometry, weight reduction through topological analysis, and validation of structural performance prior to fabrication. Key components examined include sensor housings, structural supports, and fastening elements for the Model 106 Current Meter. Design parameters including print orientation, layer thickness, extrusion temperature, and infill density are systematically analyzed to maximize mechanical performance and minimize production time. The thesis demonstrates that, when properly designed and manufactured, 3D-printed components can achieve performance comparable to traditionally manufactured counterparts, offering significant advantages in terms of cost efficiency, customization, and design flexibility for marine instrumentation.*

**Keywords:** *additive manufacturing, 3D printing, oceanography, hydrography, marine components, Model 106 Current Meter, FEM, CFD, topology optimization*

### **101. (ID 455) Military Mobility in Romania: Logistical Challenges and Solutions**

**Authors:** stud. Paula-Ancuța CADAR, stud. Andreea-Suzana BOTGROS

**Scientific Advisor:** Col. Adrian MIREA, PhD

**Institution:** "Carol I" National Defense University

**Abstract:** *This paper examines the strategic importance of military mobility in Romania, viewing it not merely as a technical indicator, but as a vital condition for collective defense on NATO's Eastern Flank. Within an increasingly unpredictable security environment, the speed at which troops and heavy equipment can be deployed depends directly on the "health" of the national infrastructure. The*

article begins by analyzing a major obstacle: the technological gap between state-of-the-art tanks, which often exceed 60 tons, and the limited load-bearing capacity of many domestic bridges and roads. The analysis continues in the railway sector, where field realities such as low transit speeds and the lack of rapid unloading ramps act as a bottleneck during critical moments. However, mobility encompasses more than just asphalt and rails; it also involves bureaucracy. Therefore, the paper advocates for the urgent need for digitalization through the "Military Schengen" concept, aimed at transforming borders from administrative barriers into seamless transit points for Allies. To anchor these ideas in reality, the Saber Guardian exercise is utilized as a case study. It functioned as a genuine "stress test" that exposed the exact locations where logistics stall under pressure. In conclusion, the findings are clear: investing in dual-use projects is not only a military necessity but also a smart solution for modernizing Romania, serving both the armed forces and the civilian economy equally.

**Keywords:** Military mobility, Saber Guardian, Dual-use infrastructure, NATO, Logistics, Load-bearing capacity

## **102. (ID 459) Development of a Navigational Dashboard for Weather-Aware USV Trajectory Optimization**

**Author:** stud. Andrei-Dorian GHEORGHE

**Scientific Advisor:** Assoc. Prof. Eng. Paul BURLACU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** This paper presents an integrated mission control dashboard designed to optimize Uncrewed Surface Vehicle (USV) operations through real-time environmental data synthesis. The primary objective is to develop a Decision Support System (DSS) that mitigates navigational drift by proposing optimized trajectories based on dynamic metocean conditions. Developed utilizing a modular Python-based framework, the interface features automated programmatic retrieval of high-resolution NetCDF datasets from the Copernicus Marine (CMEMS) and Climate Change (ERA5) services. These datasets provide critical Eulerian surface currents and 10-meter wind vectors necessary for deterministic modeling

**Keywords:** GUI, metocean, data analysis, trajectory

### **103. (ID 460) A productivity study of medium container terminal.**

**Author:** stud. Bianca-Elena APOSTOL

**Scientific Advisor:** Prof. Eng. Florin NICOLAE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The paper analyzes the productivity of a medium-sized container terminal, with a focus on the performance of quay crane (QC) operators. Productivity is defined as the ratio between output and input, reflecting the efficiency of resource utilization in the container handling process. The study highlights its importance in increasing port competitiveness and attracting shipping lines. The research uses real operational data from loading and unloading activities, analyzing indicators such as moves per hour and vessel turnaround time. The results show that QC operator experience significantly influences productivity levels, with values ranging between 20 and 30 moves per hour, in line with international standards. Furthermore, the study identifies both internal and external factors affecting terminal performance, including technology, operational organization, and market conditions. It concludes that, although medium-sized terminals face infrastructure limitations, resource optimization and staff training can lead to improved productivity and increased operational efficiency.*

**Keywords:** *Port productivity, container terminal, quay cranes (QC), turnaround time, operational efficiency, container handling, throughput (TEU), port logistics, supply chain, port performance.*

### **104. (ID 461) The Role of Containerized Maritime Transport in International Trade**

**Authors:** stud. Bianca-Elena APOSTOL, stud. Costică-Ștefan PARDOS

**Scientific Advisor:** Assoc. Prof. Eng. Filip NISTOR, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the evolution of containerized transport, highlighting its essential role in international trade and global logistics chains. It presents the main types of container ships, classified according to their carrying capacity, as well as the types of containers used, with a focus on the most common and cost-efficient ones. The paper also includes an analysis of the evolution of containerized transport during the period 2019–2025, emphasizing*

*the impact of major factors such as the COVID-19 pandemic, global logistics crises, and geopolitical changes. It highlights the industry's adaptation trends through digitalization, automation, and a shift toward sustainable solutions. A central element of the study is the analysis of a relevant case the 2021 Suez Canal blockage which underlines the vulnerabilities of the containerized transport system and the importance of risk management in global infrastructure. In conclusion, containerized transport represents a fundamental pillar of the global economy, undergoing a continuous process of transformation driven by economic, technological, and environmental factors.*

**Keywords:** *Containerized transport, global logistics, container ships, ISO containers, TEU, international trade, intermodality, sustainability.*

### **105. (ID 463) Strategic Military Transport and Mobility in Modern Warfare**

**Author:** stud. Karina-Ilinka UȚĂ-PREDA

**Scientific Advisor:** Prof. Maj. Adv. Instr. Ana-Maria MERLUȘCĂ

**Institution:** "Carol I" National Defense University

**Abstract:** *Strategic military transport and mobility have become fundamental components of modern warfare, shaping how states deploy, sustain, and reposition their forces in rapidly evolving security environments. Rather than being limited to traditional logistics, military mobility today represents a complex system that integrates multiple domains, including land, air, and maritime transport, supported by digital networks and advanced coordination mechanisms. The subject of strategic transport and mobility is relevant because the speed and efficiency with which military forces can be projected have become decisive factors in both deterrence and operational success, especially in an increasingly unpredictable and technologically contested security environment.*

**Keywords:** *Strategic military transport, Military mobility, Force projection, Strategic airlift and sealift, NATO cooperation, Infrastructure readiness, Artificial intelligence in logistics*

**106. (ID 465) Design and Operation of Hatch Cover Handling Systems on General Cargo Ships**

**Author:** stud. Denis SEITCEA

**Scientific Advisor:** Lecturer Eng. George NOVAC, PhD.

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* This paper presents the operation and safety aspects of hatch cover handling systems on general cargo ships. The study focuses on the role of these systems in cargo operations and their impact on ship safety. The analysis highlights the importance of proper handling procedures and maintenance in preventing accidents and ensuring efficient operations.

**Keywords:** hatch covers, cargo operations, ship safety

**107. (ID 466) Operation and Maintenance of Hatch Cover Systems on Bulk Carriers**

**Author:** stud. Maria Gabriela TEOFAN (VODĂ)

**Scientific Advisor:** Lecturer Eng. George NOVAC, PhD.

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* This paper presents the operation and maintenance of hatch cover systems on bulk carrier ships. The study focuses on system components, operating procedures, and maintenance practices. The results emphasize the importance of proper maintenance in ensuring reliability and safe cargo handling.

**Keywords:** hatch covers maintenance bulk carrier

**108. (ID 467) Operation and Safety of Anchoring Systems on Bulk Carrier Ships**

**Author:** stud. Ionuț Robert GAVRILĂ

**Scientific Advisor:** Lecturer Eng. George NOVAC, PhD.

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* This paper presents the operation and safety aspects of anchoring systems on bulk carrier ships. The study focuses on anchoring procedures, equipment components, and potential risks during operations. The results highlight the importance of proper handling and maintenance in ensuring safe anchoring.

**Keywords:** anchoring system bulk carrier ship safety

**109. (ID 468) The Impact of Temperature Changes on the Performance of Navigation Equipment on Board Ships**

**Author:** stud. Mădălina Antonela COSTAN

**Scientific Advisor:** Lt. Lecturer Eng. Andra NEDELCU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* This paper focuses on how temperature changes can influence the performance of navigation equipment installed on board maritime vessels, especially in cold regions. Modern navigation systems such as GPS, radar, ECDIS, AIS and communication equipment play an essential role in ensuring safe navigation, but their performance can be affected by environmental conditions. Temperature variations can lead to several issues, including changes in electrical properties, material expansion, condensation, and freezing–thawing effects. These factors may reduce accuracy, cause instability, or even lead to temporary malfunction of certain systems. The paper also considers the specific challenges of operating in polar environments, where low temperatures, ice formation and humidity are common. A case study is included in order to better understand these effects in real conditions. The study highlights the importance of proper equipment adaptation and maintenance in order to ensure safe and reliable navigation.

**Keywords:** temperature variations, navigation equipment, maritime safety, onboard systems, cold environments, performance, reliability

**110. (ID 469) Aspects Regarding the Safety of Navigation on Intercontinental Maritime Routes: Case Study of the Voyage Between the Port of Gothenburg and the Port of Busan**

**Author:** stud. Vlad ALEXANDROV

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* This presentation examines key aspects of navigational safety along intercontinental maritime routes, focusing on a case study of the voyage between the Port of Gothenburg and the Port of Busan. It analyzes environmental, technical, and human factors influencing safe navigation, including weather conditions, traffic density, regulatory frameworks, and bridge resource management. The study highlights critical risks encountered along this route, such

*as congested straits, variable meteorological conditions, and long-distance voyage planning challenges. Emphasis is placed on modern navigational tools, international regulations, and best practices aimed at minimizing risks. The findings contribute to improving decision making processes and increasing overall maritime safety for deck officers operating on long-haul voyages.*

**111. (ID 470) Study on the Influence of Wind Speed on Wave Height in the Black Sea**

**Author:** stud. Tiberiu-Ştefan SERBU

**Scientific Advisor:** Lt. Lecturer Eng. Andra NEDELCU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper looks at the connection between wind speed and wave height in the Black Sea and how these factors influence navigation safety. The conditions in this area can change quite quickly, especially during the cold season, which makes navigation more challenging. Wind is the main factor that generates waves, and when its speed increases, the sea state becomes more difficult. Higher waves can affect the stability of the vessel and make it harder to maintain the planned route. In this study, several data sources and applications used in navigation, such as SPOS, PassageWeather and NAVTEX, are taken into account. A short case study based on a 7-day voyage is also included to better understand how these parameters vary in real situations. Overall, the paper shows the importance of paying attention to weather conditions in order to ensure safe navigation.*

**Keywords:** *wind speed, wave height, Black Sea, maritime navigation, navigation safety, hydro-meteorological conditions, route planning*

**112. (ID 471) River ports in Romania – strategic hubs of transport on the Danube**

**Author:** stud. Bogdana MOISE

**Scientific Advisor:** Lecturer Eng. Ionel POPA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *River ports in Romania – strategic hubs of transport on the Danube the study on Romanian river ports highlights their strategic role in freight transport along the Danube and in connecting the national economy to the European transport network. Among the*

most important river ports are Galați, Brăila, Giurgiu, Cernavodă, and Drobeta-Turnu Severin, which account for the majority of port activities and freight traffic. The Port of Galați is the largest river port in Romania in terms of area and operational capacity, featuring complex infrastructure for handling raw materials and industrial goods. The ports of Brăila and Giurgiu play significant roles in transporting cereals, petroleum products, and other bulk goods, acting as key logistical hubs for regional trade. At the same time, the port of Cernavodă is important due to its connection with the Danube–Black Sea Canal, facilitating the link to the Port of Constanța.

**Keywords:** Danube river ports, Freight transport, Logistics hubs

### **113. (ID 472) Study on Ship Maneuvering in the Antarctic Region**

**Author:** stud. Elvin-Erol FEIZULA

**Scientific Advisor:** LCDR Eng. Andrei POCORA, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper examines the challenges and operational considerations of ship maneuvering in the Antarctic region, an environment characterized by extreme weather, ice-covered waters, and limited navigational infrastructure. The study analyzes the impact of sea ice conditions, low temperatures, and strong winds on vessel performance and handling. It also highlights the importance of advanced navigation systems, ice-strengthened hulls, and crew training for safe operations. Particular attention is given to risk management strategies and compliance with international regulations governing polar navigation. The findings emphasize that effective maneuvering in Antarctic waters requires a combination of technological support, environmental awareness, and adherence to best practices, contributing to improved safety and efficiency in polar maritime operations.*

**Keywords:** *Antarctic navigation, ship maneuvering, sea ice conditions, polar maritime safety, extreme weather operations*

### **114. (ID 474) Design and Operation of Fire Detection and Firefighting Systems on Board Cargo Ships**

**Author:** stud. Marian Emanuel VASILE

**Scientific Advisor:** Lecturer Eng. George NOVAC, PhD.

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents the design and operation of fire detection and firefighting systems on board cargo ships. The study focuses on the main components, operating principles, and safety requirements of these systems. The analysis highlights the importance of proper maintenance and operation in preventing fire incidents and ensuring crew safety.*

**Keywords:** *fire safety • firefighting systems • cargo ship*

### **115. (ID 475) Innovative Methods for Reducing Emissions in Maritime Transport**

**Authors:** stud. Paul Cristian ACATRINEI, stud. Gabriela-Maria COCOR

**Scientific Advisors:** Lecturer Eng. George NOVAC, PhD., Lecturer Eng. Elisabeta BUZILĂ, PhD.

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Innovative Methods for Reducing Emissions in Maritime Transport explores modern strategies to minimize the environmental impact of shipping, including alternative fuels (such as LNG, hydrogen, and ammonia), energy-efficient ship design, and advanced propulsion technologies. It also highlights the role of international regulations from the IMO and digital solutions in improving fuel efficiency and reducing greenhouse gas emissions.*

**Keywords:** *emission reduction, LNG, energy efficiency, sustainable shipping.*

### **116. (ID 477) Cyber Risk Management in Maritime Transport**

**Author:** stud. Robert Gabriel SANDU

**Scientific Advisor:** Prof. Eng. Florin Marius NICOLAE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper examines cybersecurity risk management in the maritime industry in the context of the exponential acceleration of digitalization in shipping, ports, and logistics networks. As ships and port facilities become increasingly dependent on current and interconnected operational technology, cyber risk is evolving from a limited technical issue to a broad operational, security, and governance challenge. Current studies examine how this*

*transformation has expanded the attack surface and increased exposure to ransomware, system intrusions, data manipulation, spoofing, and the compromise of the global flow of goods.*

**Keywords:** *maritime cybersecurity, cyber risk, shipping, ports, cyber resilience, maritime operations*

### **117. (ID 478) The impact of IMO and EU Environmental Regulations on Maritime Transport**

**Author:** stud. George PAȘA

**Scientific Advisor:** Prof. Assist. Eng. Livia RAUCA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Environmental regulations imposed by the International Maritime Organization (IMO) and the European Union (EU) have had a significant impact on the maritime transport industry, driving the adoption of cleaner technologies and sustainable operational practices. Measures such as the limitation of sulfur content in marine fuels (IMO 2020), the implementation of emission monitoring systems, and the promotion of alternative fuels contribute to reducing both air and marine pollution. For naval cadets, understanding these regulations is essential, as they directly influence daily ship operations, compliance procedures, and onboard technical requirements. At the same time, these policies create economic and operational challenges, including increased costs and the need for rapid adaptation to new standards. In conclusion, IMO and EU environmental regulations play a key role in the transition toward a more environmentally responsible and sustainable maritime transport sector.*

**Keywords:** *Maritime transport, Environmental regulations, IMO, EU, Sustainable shipping*

### **118. (ID 479) Particularities of the Cold Ironing System and Its Benefits for Reducing Emissions in Ports**

**Author:** stud. Williams MUSTEAȚĂ

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *\*\*Particularities of the Cold Ironing System and Its Benefits for Reducing Emissions in Ports\*\* The Cold Ironing system, also known as shore power, is a technological solution used in ports to reduce emissions generated by ships while docked. Its principle*

*involves shutting down the vessel's auxiliary engines and connecting it to the onshore electrical grid, thereby supplying the energy needed for onboard equipment. Key features of the system include the requirement for specialized port infrastructure, technical compatibility between the ship and the power source, and relatively high initial investment costs. However, the benefits are substantial: significant reductions in carbon dioxide, nitrogen oxides, and sulfur oxide emissions, as well as lower noise pollution and improved air quality in port areas. The implementation of Cold Ironing supports sustainability goals and helps comply with international environmental regulations, making it an essential component of modern green ports.*

### **119. (ID 496) Methods and Algorithms for Responding to Maritime Incidents on Tugboats to Ensure Vessel Survivability, in Cooperation with ARSVOM**

**Authors:** stud. Carmen Laura BONDEA

**Scientific Advisor:** Lecturer Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the intervention methods and algorithms applicable in the event of a maritime incident on board a tugboat, using the tugboat "HERCULES" as a case study. The topic is particularly important because maritime incidents can escalate rapidly and simultaneously affect the crew, the vessel, and the surrounding environment. In this context, maintaining the ship's survivability becomes essential by ensuring buoyancy, stability, and the continuity of critical onboard functions. The paper aims to define a coherent intervention procedure for the scenario of collision, hull breach, flooding, and subsequent secondary fire. The main stages of emergency response are examined, including alarm activation, isolation of affected areas, limitation of water ingress, initiation of pumping operations, and fire control. Special emphasis is placed on assessing the vessel's stability, managing free-surface effects, and preventing progressive flooding through vulnerable openings. The paper also highlights the importance of effective cooperation between the vessel and the specialized ARSVOM rescue structures through the rapid and standardized transmission of operational information. Its main practical contribution consists in the design of*

*a damage-control management software application intended to support onboard decision-making. The application integrates data regarding compartments, sensors, stability parameters, and incident severity, generating real-time operational recommendations. The practical importance of the paper lies in reducing reaction time, increasing decision-making coherence, and improving ship-to-shore cooperation in critical situations. Through the proposed solutions, the project contributes to enhancing navigational safety and limiting the technical, human, and environmental consequences of maritime incidents.*

**120. (ID 497) Black Holes in the Universe: Implications for Deep Space Navigation and Relativistic Transport**

**Author:** stud. Alexia Cristiana SIMESCU

**Scientific Advisor:** Assoc. Prof. Loredana PÎRVU, PhD

**Institution:** "Al. I. Cuza" Police Academy București

**Abstract:** *As humanity transitions toward the era of deep space exploration, the theoretical and practical challenges of navigating near high-gravity environments become paramount. This paper investigates the role of black holes not only as celestial hazards but as critical variables in the future of interstellar transport and autonomous navigation systems. Central to this study is the analysis of gravitational lensing and time dilation effects, which fundamentally disrupt conventional positioning protocols based on Euclidean geometry. The research explores how extreme gravitational fields necessitate the integration of General Relativity into navigational algorithms to maintain temporal and spatial synchronization. Furthermore, the paper discusses the theoretical potential of utilizing black hole gravity assists for high-velocity transport, while addressing the "information paradox" as a barrier to reliable data transmission in their vicinity. By synthesizing current astrophysical data with transport engineering principles, this study provides a framework for "relativistic piloting." The conclusion emphasizes that mastering navigation in a universe shaped by black holes is the final frontier for the evolution of maritime-inspired spatial transit, transitioning from traditional celestial navigation to complex, four-dimensional spacetime maneuvering.*

## **121. (ID 495) Seakeeping Prediction of a 1656 TEU Container Ship**

**Author:** stud. Iulia Gabriela IVAN

**Scientific Advisor:** Prof. Eng. Leornard DOMNIȘORU, PhD

**Institution:** “Dunărea de Jos” University of Galati

***Abstract:** This study concerns the seakeeping prediction of a 1656 TEU container ship initial design concept, considering the full-load operational condition. Regarding the environmental conditions, the study considers a representative range of wave parameters, including variations in wave height and wave–ship heading angle, specific to the vessel’s maritime operations. The ship speed is considered within a characteristic range, according to the ITTC recommendations.*

*The numerical analysis employs a seakeeping code (DYN), based on the linear strip theory method (ST) and the short-term irregular waves formulation. The results provide the prediction of the ship’s dynamic behavior and the operational capabilities in regular-irregular waves.*

## **122. (ID 514) Automated Ship Mooring System: A Conceptual Study**

**Authors:** stud. Andrei Constantin TUDOSE, stud. Ștefania Claudia OSANU.

**Scientific Advisor:** Lecturer Eng. Costel UNGUREANU, PhD

**Institution:** “Dunărea de Jos” University of Galati

***Abstract:** This project proposes an automated ship fixing system designed as a modern alternative to traditional mooring line maneuvers. Coupling a vessel to various structures is often a dangerous and time-consuming operation, often requiring high fuel consumption to maintain the ship's position. The proposed solution involves a ship-borne device that enables a quick connection to various external contact points, whether it is a pier, another vessel, or offshore structures such as wind turbines.*

*The study focuses on the operation of this fixing mechanism and the advantages of a direct mechanical connection. The primary goal is to improve deck safety and reduce operational costs through fuel savings.*

## II. SECTION: ENGINEERING AND MANAGEMENT

### Section Committee:

Chairman: Assoc. prof. Gheorghe GRECU, PhD

Members: Assoc. prof. Elena Rita AVRAM, PhD  
LCDR Dragoș SIMION, PhD

Room: L120

### 1. (ID 4) Risk Management Approaches for the Internet of Things

**Author:** stud. Nicoleta DĂNĂILĂ

**Scientific Advisor:** Prof. Andreea PORANCEA-RĂULEA PhD

**Institution:** "Nicolae Bălcescu" Land Forces Academy, Sibiu

**Abstract:** *The widespread adoption of Internet of Things (IoT) technologies across critical sectors such as healthcare, industry, and smart cities has introduced cybersecurity risks that differ significantly from those of traditional information systems. The inherent heterogeneity, dynamic architectures, and resource constraints of IoT devices challenge the applicability of conventional risk management frameworks, including NIST, ISO/IEC, OCTAVE, and TARA. This paper examines the current state of research in IoT risk management, focusing on the identification, classification, and evaluation of key cyber risks and risk vectors. Using a comparative analytical approach, the study highlights the limitations of existing models and emphasizes the need for a holistic, multi-level risk management framework tailored to IoT ecosystems. The results underline the importance of adaptive assessment methods to enhance security, resilience, and effective risk prioritization in interconnected environments.*

**Keywords:** *Internet of Things (IoT), Risk Management, Cybersecurity, Risk Assessment Frameworks, Critical Infrastructure Security*

## **2. (ID 5) Study on the Evolution of the Use of Graph Theory Models in Managerial Decision-Making**

**Author:** stud. Cosmin-Mihai BÎGU

**Scientific Advisor:** Lecturer Alexandru HAMPU, PhD

**Institution:** "Nicolae Bălcescu" Land Forces Academy, Sibiu

*Abstract: This study investigates the evolution of the use of graph theory models in managerial decision-making, with a particular emphasis on applications in the military context. In an increasingly complex and interconnected environment, effective decision-making has become essential for organizational success. Graph theory, as a mathematical framework for modeling networks and relationships, provides powerful tools for analyzing and optimizing complex managerial processes. The study explores both the theoretical foundations and the practical applicability of graph theory models in operations research. Fundamental graph concepts and key algorithms are examined, including the shortest path and critical path methods, which are widely used in solving optimization problems related to routing, scheduling, and resource allocation. The research also highlights the practical implementation of these models through the WINQSB software, particularly via the NET and PERT-CPM modules. By comparing software-generated solutions with classical algorithmic methods, the paper demonstrates the efficiency, accuracy, and time-saving advantages offered by specialized decision-support tools. The conclusions emphasize the strategic importance of integrating graph theory and simulation software into managerial and military decision-making processes. Ultimately, the study underlines the continued relevance of graph theory in improving operational performance and supporting data-driven decisions in complex organizational environments.*

**Keywords:** Graph Theory, Managerial Decision-Making, Operation Research, Military Management, Network Optimization, WINQSB Software

## **3. (ID 6) Study on the Use of Himars Systems in Current Military Operations**

**Author:** stud. Oana PASCU

**Scientific Advisor:** Col. Assoc. Prof. George BUCĂȚA, PhD

**Institution:** "Nicolae Bălcescu" Land Forces Academy, Sibiu

**Abstract:** *The evolution of contemporary armed conflicts has emphasized the growing importance of advanced artillery systems capable of delivering precise and long-range fire support. Among these systems, the High Mobility Artillery Rocket System (HIMARS) has emerged as a critical asset in modern military operations due to its mobility, accuracy, and operational flexibility. This article analyzes the role and importance of HIMARS within current armed conflicts, focusing on its technical capabilities, tactical employment, and contribution to operational success. Particular attention is given to the system's use in recent conflicts, especially the war in Ukraine, where HIMARS has significantly influenced the battlefield by targeting logistics nodes, command and control elements, and force concentrations. The study also examines the main advantages and limitations of the system, including its reliance on precision-guided munitions and advanced targeting infrastructure. The findings highlight the necessity of integrating HIMARS into joint and multinational operations to maximize its effectiveness in contemporary warfare.*

**Keywords:** *HIMARS, modern armed conflicts, precision-guided munitions, artillery systems, military operations*

#### **4. (ID 15) Advances in Robotics and Automation**

**Author:** stud. Bogdan GRIGORE

**Scientific Advisor:** Assoc. Prof. Eng. Ionuț SCURTU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The future of robotics and automation holds immense potential across diverse industries, including manufacturing, healthcare, and space exploration. In manufacturing, robots are revolutionizing production lines by improving efficiency, reducing human error, and enhancing precision in tasks like assembly and quality control. In healthcare, robotic technologies are transforming surgery, rehabilitation, and patient care, enabling minimally invasive procedures and improving patient outcomes. Moreover, space exploration is benefiting from advancements in robotics, with autonomous robots assisting in tasks ranging from exploration of distant planets to maintaining satellites. The rapid growth of AI, machine learning, and advanced sensors is driving these innovations, creating new opportunities for industries to evolve. However,*

*challenges such as ethical concerns, job displacement, and the high cost of robotic systems remain. This paper explores the advancements in robotics, their applications, and the future impact on society.*

**Keywords:** *Robotics, Automation, Manufacturing, Healthcare, Space Exploration, Artificial Intelligence, Machine Learning, Autonomous Systems, Future Technologies, Job Displacement.*

## **5. (ID 19) Applications of deterministic and stochastic game theory methods in decision-making problems.**

**Author:** stud. Bogdan BORA

**Scientific Advisor:**

**Institution:** "Nicolae Bălcescu" Land Forces Academy, Sibiu

**Abstract:** *The paper presents the role of game theory and operations research methods in optimizing decision-making processes in competitive situations and under conditions of uncertainty. The basic theoretical concepts related to decision analysis, strategic interaction and mathematical modeling are presented. The emphasis is on deterministic and stochastic games, as well as the use of linear programming and Markov chains for the analysis of complex decision-making situations. The examples presented highlight how these mathematical models can contribute to the choice of optimal strategies. The paper also emphasizes the growing importance of these methods, which are also present in modern technological fields, such as artificial intelligence and blockchain-based systems, where decision-making processes and strategic behavior play an essential role.*

**Keywords:** *Game Theory; Operations Research; Decision Making; Linear Programming*

## **6. (ID 27) Management of Human Resources in Law Enforcement Institutions: Challenges and Modern Approaches**

**Author:** stud. Dragoş PĂTRAŞCU

**Scientific Advisor:** Lecturer Emil Răzvan GATEJ, PhD

**Institution:** „Alexandru Ioan Cuza" Police Academy, Bucharest

**Abstract:** *Human resource management in law enforcement institutions presents a distinct set of challenges that differentiate it from conventional organizational management. Police and security*

*organizations operate under conditions of high operational pressure, strict hierarchical structures, and continuous public scrutiny, factors which collectively shape recruitment, retention, training, and performance evaluation in ways that demand specialized managerial approaches. This paper examines the principal challenges facing HR management in contemporary law enforcement institutions, including workforce burnout, difficulties in talent retention, gaps between formal training and operational requirements, and the increasing demand for psychological resilience among personnel. Drawing on comparative analysis of European law enforcement HR frameworks, the paper identifies modern approaches - including competency-based recruitment, continuous professional development programs, and wellbeing-centred retention strategies — that have demonstrated measurable effectiveness in improving institutional performance and personnel satisfaction. The findings carry direct implications for Romanian law enforcement institutions undergoing reform in alignment with European standards.*

**Keywords:** *human resource management, law enforcement, police, recruitment, institutional performance, personnel development*

## **7. (ID 35) Operational stress management**

**Author:** stud. Bogdan GRIGORE

**Scientific Advisor:** Assoc. Prof. Carmen-Luminita COJOCARU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Operational stress management focuses on identifying, understanding, and controlling the psychological and physiological stress experienced by personnel during demanding activities and high-pressure situations. This topic is particularly relevant in operational environments where rapid decision-making, responsibility, and unpredictable conditions can significantly affect performance and well-being. The project analyzes the main sources of operational stress, its impact on efficiency and decision-making, and methods for prevention and control. It also highlights strategies such as stress awareness, effective leadership, time management, and psychological resilience that help individuals and teams maintain performance and adaptability in challenging operational contexts.*

**Keywords:** *operational stress, stress management, decision-making, resilience, operational performance, leadership, human factors.*

### **8. (ID 39) Influence of Discounts on Consumer Behavior**

**Authors:** stud. Diana Ioana POPESCU, stud. Giulia SAVA

**Scientific Advisor:** Daniela Simona NENCIU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Price discounts are a widely used sales promotion technique in the market designed to stimulate demand and influence consumers' purchasing decisions. This paper presents an analysis of the impact that price discounts have on consumer behavior, focusing on perceived value, purchase intention, and impulse purchases. Promotional price reductions can enhance product appeal by creating a sense of urgency and an economic advantage, encouraging consumers to make faster purchasing decisions. At the same time, frequent discounts can shape long-term perceptions of brand value and customer expectations regarding price. The findings from the research highlight those consumers often respond positively to time-limited offers, percentage discounts, and combined promotions, particularly in competitive markets. Understanding how consumers interpret and react to discounts helps companies design more effective promotional campaigns and improve sales performance, while maintaining the brand's market positioning.*

**Keywords:** *marketing strategies, price discounts, consumer behavior, sales promotion*

### **9. (ID 43) Interoperability of Civilian and Military Supply Chains in National Crisis Situations**

**Author:** stud. Anamaria MIHOC

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper examines the interoperability of civilian and military supply chains in the context of national crisis situations. The research is based on a conceptual and theoretical analysis of supply chain systems, focusing on the evolution of the supply chain concept, its structural components, and the main flows of resources and information within these systems. Particular attention is given to the specific characteristics of civilian and military supply chains, highlighting their organizational structures, operational principles,*

*and functional differences. Furthermore, the study addresses the concept of interoperability, emphasizing its main dimensions, levels of interaction, and its relevance for coordination between different institutional and logistical structures. In this context, the research outlines the role of interoperability in facilitating cooperation between civilian and military actors involved in supply and logistics processes. The paper also discusses mechanisms and models that can support civil–military interoperability, together with relevant aspects of the national legislative framework and the main challenges that may affect effective coordination. The objective of this research is to provide a clearer understanding of the theoretical foundations and organizational aspects related to civil–military supply chain interoperability in national crisis contexts.*

## **10. (ID 44) Technical and Economic Analysis of Emission Reduction Technologies for Commercial Ships**

**Author:** stud. Ștefania DAMACHE

**Scientific Advisor:** Assoc. Prof. Eng. Alexandru COTORCEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the technical and economic aspects of emission reduction technologies in the maritime transport sector. It starts by examining the main sources of ship emissions, including CO<sub>2</sub>, NO<sub>x</sub>, and SO<sub>x</sub>, and highlights their impact on air quality, climate change, and public health. Data shows that maritime transport contributes around 2.9% of global greenhouse gas emissions, with increasing trends driven by global trade growth. The study reviews international regulations, especially MARPOL Annex VI and IMO strategies, which impose stricter limits on emissions and promote energy efficiency. It then evaluates key emission reduction technologies, such as alternative fuels, including LNG, hydrogen, and ammonia, energy-efficient ship designs, operational measures like slow steaming, and exhaust gas treatment systems. A comparative analysis focuses on costs, efficiency, and environmental impact. Results show that alternative fuels require high initial investments but offer long-term emission reductions, while operational measures provide immediate and cost-effective results. The paper concludes that combining technological innovation, regulatory compliance, and efficient operations is essential for*

achieving sustainable maritime transport and reducing environmental impact.

**Keywords:** Shipping emissions, maritime transport, CO<sub>2</sub> reduction, NO<sub>x</sub> and SO<sub>x</sub>, alternative fuels, energy efficiency, IMO regulations, MARPOL Annex VI, slow steaming, exhaust gas treatment, sustainable shipping, operational measures, decarbonization, greenhouse gas mitigation.

### **11. (ID 46) Performance Analysis of LTE Systems with Artificial Intelligence-Assisted Interpretation**

**Author:** stud. Anisia-Teodora FUGARU

**Scientific Advisor:** Maj Assoc. Prof. Anamaria SÂRBU, PhD

**Institution:** "Nicolae Bălcescu" Land Forces Academy, Sibiu

**Abstract:** *This paper presents an interactive software platform for link-level performance analysis of Long-Term Evolution (LTE) systems, integrating a parametric simulation engine with an artificial intelligence-driven interpretation module. By transforming simulation outputs into structured numerical metrics, the performance evaluation of LTE physical layer configurations is treated as an automated analytical task powered by a large language model. The proposed system evaluates key parameters such as adaptive modulation schemes, MIMO spatial configurations, and standardized 3GPP radio channel models, generating structured academic reports without manual intervention. Experimental results compare Block Error Rate and spectral efficiency across multiple configurations, with MIMO 2×2 achieving a 4 dB SNR gain over SISO and operating at 60.08% of the theoretical Shannon capacity limit. The AI interpretation engine achieves 87.5% metric accuracy against independently computed IEEE-standard values, producing 1,000-word technical reports in under 40 seconds and significantly reducing the expertise barrier for LTE performance engineering.*

**Keywords:** LTE, throughput, adaptive modulation, 3GPP channel models, large language model

### **12. (ID 69) The Role of Thermotechnics in Major Port Jobs**

**Authors:** stud. Elena Florentina ION (IORDACHE), stud. Bianca-Maria ISAIA

**Scientific Advisor:** Lecturer Eng. Ionel POPA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This project explores the role of thermotechnics in port operations, highlighting key jobs that rely on thermal systems, such as energy engineers, naval mechanics, HVAC technicians, and refrigeration operators. The study focuses on the responsibilities, required training, and competencies for each role, emphasizing efficient energy management, safety, and operational performance. The project adopts a managerial perspective, demonstrating how strategic recruitment and staff training contribute to a high-performing port.*

**Keywords:** *thermotechnics, port operations, energy management, HVAC, refrigeration, naval engineering, workforce management*

### **13. (ID 73) Logistics processes in Romanian ports**

**Author:** stud. Briana-Ioana REGEP

**Scientific Advisor:** Assoc. Prof. Andrei BĂUTU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The paper analyzes the logistics processes carried out in Romanian commercial ports, highlighting their role in ensuring an efficient flow of goods. The main port activities are presented, such as loading/unloading, storage, customs formalities, transshipment and monitoring of goods, emphasizing the importance of coordination and efficient organization. It also identifies current problems of Romanian ports, such as the lack of digitalization, long waiting times, poor coordination and inefficient use of equipment. The paper emphasizes the need for digitalization as an essential factor for increasing competitiveness, presenting international examples and benefits such as cost reduction and optimization of operations. Finally, smart solutions based on modern technologies (IoT, automation, digital platforms) are proposed, aimed at improving the efficiency, transparency and security of port activities.*

**Keywords:** *Port logistics, digitalization, logistics processes, operational efficiency, maritime transport, smart technologies*

### **14. (ID 86) Utilization of Renewable Energy in Maritime Transport**

**Authors:** stud. Elena Florentina ION (IORDACHE), stud. Bianca-Maria ISAIA

**Scientific Advisor:** Prof. Eng. Gheorghe SAMOILESCU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Modern maritime transport faces major challenges related to reducing pollutant emissions and improving energy efficiency, in accordance with regulations imposed by the International Maritime Organization. This paper analyzes the use of renewable energy in the naval field, focusing on solar panels, hybrid diesel-electric systems, and fully electric ships. Solar energy represents an accessible solution for powering onboard equipment, contributing to reduced fuel consumption. Hybrid systems optimize engine operation by combining conventional and electric energy sources, increasing overall efficiency. Fully electric vessels, such as Ampere, demonstrate the feasibility of zero-emission maritime transport using battery storage and renewable energy sources. The paper also highlights the role of electrical measurements in monitoring and optimizing onboard energy consumption. The results show that integrating these technologies significantly reduces environmental impact and operational costs. In conclusion, the transition to "green ships" represents a key direction for the future of sustainable maritime transport.*

**Keywords:** *renewable energy, maritime transport, solar panels, hybrid systems, electric ships, energy efficiency, CO<sub>2</sub> emissions, electrical measurements, electric propulsion, sustainability*

## **15. (ID 89) Marine pollution and contamination factors**

**Author:** stud. Mario Mihai ȚĂPURIN

**Scientific Advisor:** Lecturer Eng. Cristina-Andreea TUDOR, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Marine pollution is a major global problem, mainly generated by human activities such as industry, agriculture and maritime transport. The paper analyses the main types of pollutants affecting the marine environment, including microplastics, heavy metals, petroleum hydrocarbons, persistent organic pollutants and excess nutrients. The mechanisms by which these contaminants spread and accumulate in food chains are highlighted, as well as the negative effects on biodiversity and the health of marine organisms. Phenomena such as eutrophication and thermal pollution, which contribute to significant ecological imbalances, are also discussed.*

*The paper highlights the economic impact of pollution, especially on fisheries and port activities. Finally, the main international and European regulations aimed at preventing and controlling marine pollution are presented, highlighting the importance of an integrated approach based on monitoring, regulation and international cooperation to protect marine ecosystems.*

**Keywords:** *Marine pollution, microplastics, heavy metals, ecosystems, organic pollutants, marine environment.*

#### **16. (ID 91) Methods for Increasing the Competitiveness of a Logistics Center through the Implementation of Artificial Intelligence**

**Author:** stud. Georgiana Roxana VRABIE

**Scientific Advisor:** Assoc. Prof. Eng. Alexandru COTORCEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the disruptive impact of Artificial Intelligence (AI) on the competitiveness of logistics centers, marking a fundamental transition from reactive operational models to the predictive paradigm of Industry 4.0. The research investigates how the orchestration of massive data flows through Terminal Operating Systems (TOS) and Control Towers enables the optimization of decision-making processes and ensures end-to-end visibility. By exploring cutting-edge solutions, such as robotic micro-fulfillment and Digital Twins utilized in port hubs, the study demonstrates the scalability and versatility of machine learning algorithms in eliminating operational inefficiencies. A central dimension of the work focuses on 'Green Logistics,' highlighting the role of AI in harmonizing economic performance with sustainability imperatives and carbon footprint reduction. The integrated case study validates the practical applicability of the proposed solutions, providing a methodological framework for diagnosing dysfunctions and maximizing asset yield.*

**Keywords:** *Artificial Intelligence, Machine Learning, Digital Twin, Supply Chain, Green Logistics*

#### **17. (ID 112) Renewable Energy Systems for Maritime Vessels Technologies and Integration in Ship Electrical Systems**

**Author:** stud. Ionuț-Ovidiu LUPU

**Scientific Advisor:** Lt. Jg. Eng. Emanuil-Petru OVADIUC, PhD student

**Institution:** "Alexandru Ioan Cuza", Police Academy

***Abstract:** Maritime transport is the backbone of global trade, but at the same time, it contributes significantly to environmental pollution. According to reports published by the International Maritime Organization (IMO), shipping is responsible for approximately 3% of global CO<sub>2</sub> emissions. As a result, reducing emissions and increasing energy efficiency have become the maritime industry's top priorities, given concerns about environmental protection as well as the regulations and restrictions imposed by the IMO on new ships. One solution for reducing the environmental impact caused by traditional fuel is the use of renewable energy sources, such as solar energy, wind energy, hybrid systems, and others. This paper studies and examines the main renewable energy technologies that can be implemented on ships, as well as the methods for integrating these systems into the ship's electrical systems. At the same time, the paper details the installation methods and operating principles of these technologies, analyzing their advantages and disadvantages in terms of their effectiveness in reducing fuel consumption and pollutant emissions. Acknowledging the dangers of these systems is essential, especially when electrical installations are located near water or in environments characterized by high humidity. These specific placements amplify the potential for short circuits, overheating, and overloads, consequently elevating the probability of onboard fires. These dangers underscore the necessity of integrating and enforcing safety and fire prevention protocols within electrical installations that utilize renewable energy sources. Consequently, this study underscores the significance of implementing robust technical solutions to safeguard equipment and ensure the well-being of the crew.*

**Keywords:** Renewable Energy Integration, Ship Electrical Systems, Maritime Fire Safety

## **18. (ID 113) Analysis of the Bunkering Infrastructure and the Logistics Chain for LNG, Methanol and Ammonia**

**Author:** stud. Andreea-Georgiana TURCU

**Scientific Advisor:** Assoc. Prof. Eng. Alexandru COTORCEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The present work examines the major transformations of the maritime industry in response to new environmental standards, with a focus on technical and logistical solutions designed to ensure emission reduction and long-term sustainability. It starts from the decarbonization targets set by the International Maritime Organization (IMO) for 2030 and 2050, which require a gradual shift away from traditional hydrocarbon-based fuels. The evolution of bunkering is highlighted, from simple coal refueling to today's complex operations involving liquefied gases and toxic substances. A key concept addressed is Well-to-Wake, which evaluates the full environmental impact of fuels across their entire lifecycle. Alternative energy sources such as LNG, green methanol, and ammonia are analyzed in terms of technological readiness and economic feasibility. The study also outlines practical challenges, including high costs, storage limitations, and infrastructure gaps. Dual-fuel engine technology and advanced port safety systems are presented as essential elements supporting the transition toward sustainable maritime transport.*

**Keywords:** *maritime decarbonization, alternative fuels, emission reduction, bunkering evolution, sustainable maritime transport*

## **19. (ID 114) The Influence of Climate Change on Port Operations**

**Authors:** stud. Ioana Alexandra PATRICHE, stud. Bianca-Elena RÎȘITARIU, stud. Andreea-Ștefana SMÎNTÎNĂ

**Scientific Advisor:** Assoc. Prof. Eng. Alexandru COTORCEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Climate change represents one of the most significant global challenges, with substantial impacts on maritime transport and port operations. Due to their location in coastal areas, ports are particularly vulnerable to rising sea levels and extreme weather events, which directly affect infrastructure, operational efficiency, and safety. This paper analyzes the influence of climate change on port activities, focusing on key factors such as sea level rise, storms, strong winds, and heavy precipitation. These phenomena can disrupt cargo handling processes, delay vessel operations, and increase logistical costs, ultimately affecting the performance of global supply chains. The study also highlights the indirect economic consequences*

*of such disruptions, emphasizing the need for improved resilience and risk management. A case study of the Port of Constanța illustrates the practical implications of climate-related challenges in a real operational context. Furthermore, the paper explores adaptation strategies, including infrastructure modernization, digital monitoring systems, and sustainable port development. The findings underline the importance of proactive planning and investment to ensure long-term operational stability and competitiveness in a changing climate.*

**Keywords:** *climate change; port operations; sea level rise; extreme weather events; maritime transport; port infrastructure*

## **20. (ID 130) Simulation in COMSOL Multiphysics of Laminar Flow Through a Cylindrical Pipe and Determination of Velocity and Pressure Profiles**

**Authors:** stud. Elisa Ștefania MOLDOVEANU, stud. Alina CLANTON

**Scientific Advisor:** Assoc. Prof. Eng. Elena Rita AVRAM, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper aims to numerically simulate laminar flow through a cylindrical pipe using COMSOL Multiphysics software. The study focuses on determining the velocity profile and evaluating pressure losses for a Newtonian fluid under laminar flow conditions. The model was implemented using the Laminar Flow interface, assuming constant fluid properties and steady-state flow conditions. The analysis focused on highlighting the velocity distribution across the pipe cross-section, as well as determining the pressure variation along its length. The numerical results confirm the occurrence of a parabolic velocity profile, characteristic of fully developed laminar flow, as well as a uniform pressure drop along the flow direction. This study highlights the importance of numerical simulation in investigating fluid mechanics phenomena, providing a clear understanding of velocity and pressure behavior in pipes. The results can be applied in the design and optimization of fluid transport systems in various engineering fields.*

**Keywords:** *Simulation, Fluid Flow, Velocity Field, Pressure Field, Newtonian fluid*

## **21. (ID 131) Opportunities for Implementing Artificial Intelligence in Customer Relationship Management within a Freight Forwarding Company**

**Author:** stud. Maria-Adelina ȘERBAN

**Scientific Advisor:** Assoc. Prof. Eng. Alexandru COTORCEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* This research investigates the optimization of Customer Relationship Management (CRM) practices within the highly competitive maritime transport and logistics industry. In the context of globalized markets, shipping enterprises—ranging from Third-Party Logistics (3PL) to Fourth-Party Logistics (4PL)—face the dual challenge of maintaining high customer satisfaction while ensuring maximum operational efficiency. The core solution explored in this study is the strategic integration of Artificial Intelligence (AI) into CRM processes to fundamentally transform client engagement. The primary objective is to systematically identify and advocate for specific opportunities where AI technologies can be effectively incorporated into a freight forwarder's management systems. Ultimately, the paper outlines an actionable path for digital transformation, enabling organizations to adapt to evolving market demands.

**Keywords:** CRM, Maritime Logistics, Artificial Intelligence, Digital Transformation, 3PL/4PL

## **22. (ID 132) Logistics Analysis for the Mediterranean Deployment of a Type 22 Frigate.**

**Author:** stud. Lavinia-Irina BLĂJUȚ

**Scientific Advisor:** Assoc. Prof. Eng. Alexandru COTORCEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* In the current security environment, marked by asymmetric threats and the risk of disrupted communication lines, naval logistics support has become an essential condition for maintaining combat capability. A military vessel operates as an isolated unit, whose survival depends on a robust supply network capable of functioning even when transport routes are jeopardized. This paper analyzes the architecture and support principles of the North Atlantic Alliance, highlighting the mandatory transition from a traditional, reactive model to an integrated one, capable of anticipating needs and

*guaranteeing operational safety through well-calculated reserve stocks. Beyond the theoretical framework, the research demonstrates the utility of modern digital tools in military planning. In this regard, the paper proposes a practical model for optimizing the supply of a T22 class ship using the AnyLogistix simulation platform. By creating a virtual replica of the logistics network, the study illustrates how testing hypothetical crisis situations allows for the rapid recalculation of routes and the adaptation of material reserves. The ultimate goal is to provide commanders with data-driven solutions for the efficient use of resources and the assurance of autonomy at sea.*

**Keywords:** *naval logistics, supply network, AnyLogistix, operational safety*

### **23. (ID 133) The Impact of Automation and Artificial Intelligence in Port Management**

**Author:** stud. Ștefania MIHAI

**Scientific Advisor:** Assoc. Prof. Eng. Filip NISTOR, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Artificial intelligence, robotics, and automation are transforming the transport and shipping industries by increasing efficiency, safety, and sustainability. In ports, AI optimizes logistics operations through real-time data analysis, supports predictive maintenance, and enables automation using autonomous vehicles and cranes. Intelligent monitoring enhances security, while traffic optimization reduces fuel consumption and carbon emissions, contributing to "green ports." Examples such as the Port of Rotterdam and Jeddah Islamic Port show increased capacity and reduced operational costs. In transport, AI improves route optimization and demand management. However, challenges such as cybersecurity risks and workforce adaptation remain. In Romania, "digital twin" initiatives for Black Sea ports represent important steps toward digitalization. This study aims to examine the impact of artificial intelligence and automation on port management, focusing on their implementation, benefits, and challenges.*

**Keywords:** *artificial intelligence, robotics, automation, smart ports, logistics, shipping, digital twin*

#### **24. (ID 134) The Past and Future of Giurgiulești Port**

**Authors:** stud. Andreea NICOARA, stud. Aylin Ege VUAP

**Scientific Advisor:** Lecturer Eng. Ionel POPA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The Port of Giurgiulești represents a key strategic point for the Republic of Moldova, being its only direct access to the Danube River and, implicitly, to international maritime routes. Developed in stages and continuously modernized, the port has become an important logistics hub, facilitating multimodal transport: road, rail, and river. The completion of its infrastructure enabled integration into European transport corridors, enhancing the region's economic competitiveness. An innovative aspect is the development of new transport connection routes, making it the first port on this sector of the Danube to provide extended access to international markets. Its benefits include export diversification, reduced logistics costs, and increased foreign investment. In the future, the port has the potential to become a major regional hub, supporting sustainable development and strengthening Moldova's position within global trade and transport networks.*

**Keywords:** *Port of Giurgiulești Multimodal transport European corridors Connectivity Economic development*

#### **25. (ID 135) Port Occupation Classification Management**

**Authors:** stud. Mihaela SIMIONESCU, stud. Maria RUSU

**Scientific Advisor:** Lecturer Eng. Ionel POPA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This project aims to analyze in detail the diversity of professions and occupations within a port, highlighting their importance in carrying out economic and commercial activities at both local and global levels. The study presents the main categories of workers, such as dockworkers responsible for handling goods, crane operators, security personnel, logistics and transport specialists, as well as administrative staff. It examines the responsibilities of each profession, the required skills, and the specific working conditions, which are often demanding and dynamic. The project also emphasizes how modern technology contributes to improving the efficiency of port activities and increasing safety. Through this approach, the project seeks to*

*provide a clear managerial perspective on the essential role these occupations play in economic development and the efficient functioning of international trade.*

**Keywords:** *port professions occupations logistics transport*

## **26. (ID 137) The Role of the Logistics Department in the Maintenance of Military Equipment**

**Author:** stud. Robert Gabriel CÎȚU

**Scientific Advisor:** Assoc. Prof. Eng. Alexandru COTORCEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *In the context of the current dynamics of the security environment, the operational availability of naval equipment fundamentally depends on the fluidity and adaptability of logistics support structures. This paper analyzes the architecture of maintenance systems and the mechanisms through which the logistics department guarantees the functionality of combat equipment, treating the vessel as an isolated entity whose survival is conditioned by resource autonomy. The study explores the necessary transition toward a proactive support model, capable of anticipating technical needs and ensuring mission continuity under conditions of prolonged isolation. The core of the research proposes an innovative paradigm in logistics management by integrating 3D printing technology aboard naval platforms. This technical solution radically transforms the traditional supply concept, allowing the manufacturing of critical components and spare parts required for maintenance. Through the digitalization of processes and the use of additive manufacturing, the logistics department becomes a pillar of strategic independence, reducing downtime and vulnerability to external transport lines. The paper demonstrates how this approach not only optimizes resource utilization but also provides concrete solutions for maintaining rapid intervention capability in theaters of operation.*

**Keywords:** *naval logistics, technical maintenance, 3D printing, operational autonomy, supply flow.*

## **27. (ID 141) The Evolution of Economic Sector Dynamics in Romania (2024–2026): Economic Transformation and Security Priorities**

**Author:** stud. Elisa Petronela PINOSANU

**Institution:** "Nicolae Bălcescu" Land Forces Academy, Sibiu

**Abstract:** *This article analyzes the evolution of Romania's economic structure during the 2024–2026 period, highlighting the strategic transition from a growth model driven by private consumption toward one sustained by massive investments in infrastructure and defense. By comparing statistical data across key segments—construction, IT&C, industry, agriculture, and the military sector—the study demonstrates how the regional geopolitical context and the absorption of European funds have reshaped national priorities. The analysis underscores the resilience of the construction sector and the defense industry in the face of inflationary pressures and the fiscal volatility of 2025. The results suggest that, while consumption remains under pressure, the consolidation of the industrial base and the technological advancement of the military segment provide Romania with a new vector for macroeconomic stability in 2026. The conclusions emphasize the necessity of continued capital investments to ensure sustainable convergence within the European Union.*

**Keywords:** *Economic resilience, GDP, Strategic investments, National security, Sectoral analysis.*

## **28. (ID 143) Occupational risk assessment in port activity**

**Author:** stud. Simona-Maria CHIRESCU

**Scientific Advisor:** Prof. Eng. Florin NICOLAE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *At present, rapid technological development leads to increasingly complex port activities, which involve significant occupational risks for workers. The paper entitled "Occupational Risk Assessment in Port Activity" aims to identify and analyze the main hazards associated with the operation of port equipment, especially in the case of quay crane operators. The study uses methods such as job safety analysis and risk assessment to highlight dangerous situations occurring at different stages of the activity, such as pre-operation checks, the loading and unloading process, and material handling. The results show that the major risks are related to limited working spaces, contact with equipment, cable breakage, and falling cargo, some of which have a high priority level. Based on these findings, preventive and control measures are*

*proposed in order to reduce accidents and improve safety in the port working environment.*

**Keywords:** *occupational risks, port activity, quay crane operators, risk assessment, job safety analysis, workplace safety*

## **29. (ID 147) The Impact of Electronic Commerce on Consumer Behavior**

**Author:** stud. Teodora-Carina DAVIDOV

**Scientific Advisor:** Assoc. Prof. Eng. Gheorghe GRECU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Electronic commerce has become an important part of modern consumer behavior, changing the way people search for products, compare options, and make purchasing decisions. This paper examines both the positive and negative effects of online shopping on consumers. On the positive side, e-commerce offers convenience, time savings, easy access to information, and personalized recommendations that help individuals manage their daily activities more efficiently. For example, a teenager who previously spent many hours shopping in physical stores can now use online platforms to save time and focus more on education, hobbies, and personal well-being. However, the study also highlights potential drawbacks, such as impulsive buying, reduced physical activity, and the risk of overspending due to constant exposure to online promotions. In addition to analyzing these contrasting aspects, the paper also considers possible approaches that could help reduce the negative effects of online shopping, which will be further discussed in the presentation. Overall, the study shows how e-commerce influences consumer habits and emphasizes the importance of developing balanced and responsible shopping behaviors in the digital age*

**Keywords:** *Electronic Commerce (E-commerce) Consumer Behavior Online Shopping Customer Trust User Experience Customer Reviews Personalization Digital Marketing*

## **30. (ID 153) The Activity of Freight Forwarding Companies**

**Author:** stud. Elena-Roxana DEACONU

**Scientific Advisor:** Assoc. Prof. Eng. Alexandru COTORCEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyses the activity of freight forwarders and their essential role in the modern logistics chain. Their main functions as intermediaries between shippers and carriers are presented, highlighting their contribution to the planning, organization and optimization of the transport of goods at national and international levels. The paper also addresses the diversity of services offered, such as the organization of multimodal transport, documentation management, customs formalities, warehousing, consolidation of goods and their insurance. An important focus is placed on the legislative framework that regulates the activity of freight forwarders, including European regulations and international conventions relevant to the transport of goods. In addition, current trends in the field are highlighted, such as digitalization and the use of modern technologies to increase the efficiency and transparency of logistics operations. In conclusion, the paper underlines the strategic importance of freight forwarders in facilitating international trade and ensuring efficient, flexible and competitive supply chains.*

**Keywords:** *Forwarding companies Supply chain Multimodal transport Customs formalities Logistics digitalization International trade*

### **31. (ID 164) Engine Physics: Principles and Applications in Machine Operation**

**Authors:** stud. Alexandra ANGHEL, stud. Ștefan-Ricardo ROMAN, stud. Emirhan CADAR

**Scientific Advisor:** Assoc. Prof. Eng. Rita AVRAM, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Internal combustion engines are some of the most widely used energy conversion systems in transportation and industrial applications. The performance of these engines can be analyzed through ideal thermodynamic cycles. The paper presents the modeling and comparative analysis of the Otto cycle and the Diesel cycle using the CyclePad software. The influences of the compression ratio and thermodynamic parameters on the cycle efficiency were analyzed. The obtained results highlight the fundamental differences between the two cycles and reveal the advantages of using simulation for the study of energy systems.*

**Keywords:** Engines, thermodynamic, simulation, transportation, cycles

### **32. (ID 167) The Indoor Environment and Air Quality**

**Authors:** stud. Alexia-Maria ZAHARIEA, stud. Bianca-Elena MIHĂILĂ

**Scientific Advisor:** Assoc. Prof. Eng. Rita AVRAM, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** Indoor air quality (IAQ) influences the health and comfort of occupants in educational and residential spaces. Monitoring parameters such as carbon dioxide (CO<sub>2</sub>) concentration, air temperature, and relative humidity allows for the assessment of ventilation conditions and indoor comfort. The paper presents the results of a monitoring campaign carried out in classrooms and dormitories, using portable sensors for continuous measurement of these parameters. Data analysis highlights variations in CO<sub>2</sub> concentration correlated with space occupancy, as well as fluctuations in temperature and relative humidity determined by ventilation conditions. The results allow the identification of periods with insufficient ventilation and the assessment of indoor environmental conditions.

**Keywords:** Indoor air quality, carbon dioxide concentration, temperature and relative humidity, classroom environment, indoor environmental monitoring

### **33. (ID 171) Risk Analysis in Port Logistics of Dangerous Goods**

**Author:** stud. Stela Mihaela ȘERBĂNESCU

**Scientific Advisor:** Prof. Eng. Florin NICOLAE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** This paper examines risk analysis in port logistics of dangerous goods, focusing on the identification and evaluation of hazards associated with port operations. The handling and storage of hazardous materials involve complex processes that generate significant safety, environmental, and operational risks. The study analyzes key risk factors, including human error, technical failures, and environmental conditions, and highlights their impact on port activities. A structured approach to risk assessment is presented, integrating risk identification, evaluation, and prioritization. In

*addition, effective risk management is important to reduce accidents and limit their effects. The results show that improving safety measures is necessary to ensure safe and efficient port operations.*

**Keywords:** *risk analysis, port logistics, dangerous goods, risk management, safety assessment*

#### **34. (ID 174) Beyond Decision Fatigue: How Neuro-Management Redefines the Limits of Executive Performance**

**Author:** stud. Luca STANCU

**Scientific Advisor:** Bogdan ȚONEA

**Institution:** "Alexandru Ioan Cuza" Police Academy

**Abstract:** *Modern leadership is often measured by the sheer volume of choices made under pressure, yet the biological reality of the human brain suggests a finite limit to high-quality cognition. This paper explores the intersection of neuroscience and executive efficiency, moving beyond traditional time management toward a model of energy and cognitive resource optimization. At the heart of our inquiry lies "decision fatigue" the documented phenomenon where the quality of a leader's choices deteriorates after a long session of decision-making. By analyzing the metabolic demands of the Prefrontal Cortex, we demonstrate how fluctuating glucose levels and neurotransmitter depletion directly correlate with erratic or overly conservative strategic shifts. We shift the focus from "working harder" to "working with the brain," proposing specific neuro-hacking interventions such as cognitive automation, rhythmic task-batching, and the strategic use of the Default Mode Network. The research integrates biological data with practical managerial workflows to provide a blueprint for the "Neuro-Efficient Agenda." Ultimately, this study argues that the next frontier of competitive advantage isn't found in a leader's schedule, but in their ability to safeguard their brain's executive stamina.*

**Keywords:** *Leadership Efficiency, Neuro-management, Cognitive Optimization*

#### **35. (ID 179) Business Plan Ono Cafe**

**Author:** stud. Iustin ONOFREI

**Scientific Advisor:** Assoc. Prof. Eng. Gheorghe GRECU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Executive Summary: ONO CAFE S.R.L. ONO CAFE S.R.L. is a specialized "experience coffee shop" seeking a bank loan of 300,000 RON to supplement a total investment of 380,000 RON. Operating on a unique hybrid model, the business leverages a strategic partnership with the Romanian brand Fortuna to ensure cost efficiency while providing a premium, thematic ritual for consumers. Located in a high-traffic area in Galați, the cafe distinguishes itself through "Moka Lab" tasting flights and a unique chromatic service where cups match the specific coffee variety used. The business targets two main segments: high-volume daily consumers and experience-seeking coffee enthusiasts. Financial projections indicate robust viability, with a projected first-year turnover of 2,016,000 RON and a healthy net profit margin exceeding 40%. The total investment is expected to be fully recovered from net profits by the end of the third year. To secure the requested financing, the company offers movable mortgages on high-performance equipment and inventory.*

**Keywords:** *Artisanal Experience Hybrid Model Chromatic Service Fortuna Partnership Financial Viability*

### **36. (ID 183) Logistic Support Operations for Critical Infrastructure in the Dobrogea Area**

**Author:** stud. Liviu-Andrei GIRLEA

**Scientific Advisor:** Assoc. Prof. Eng. Alexandru COTORCEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the complexity of logistic support operations for critical infrastructure in the Dobrogea region, a territory of fundamental strategic importance for both national security and the North Atlantic Alliance. The primary objective is to evaluate how military logistics integrate within the current security framework of the Eastern Flank. The study initially examines the national legislative pillars and NATO standards governing the management of resources and logistical flows. Special attention is given to the concept of integrated logistics and Civil-Military Cooperation (CIMIC) mechanisms, which are essential for the resilience of critical infrastructure in Dobrogea. In light of regional dynamics, the paper explores the core components of military mobility, identifying the bureaucratic and infrastructural barriers*

*that may affect the speed of the Allied response. The conclusions highlight the necessity of modernizing transport nodes and harmonizing operational procedures to ensure efficient logistical support. The research findings provide an updated perspective on opportunities to enhance military mobility, underscoring the strategic importance of Dobrogea as a vital logistical platform for the stability of NATO's Eastern Flank.*

**Keywords:** *Logistic support; Critical infrastructure; Civil-Military Cooperation (CIMIC)*

### **37. (ID 184) Golden Station S.R.L-Business plan**

**Author:** stud. Liviu-Andrei GIRLEA

**Scientific Advisor:** Assoc. Prof. Eng. Gheorghe GRECU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This document details the strategic business plan for Golden Station, an entity that will operate in the municipality of Constanța, in the Garia area, integrating pawn lending services with retail services specialized in jewelry. The central objective of the project is to obtain bank financing to support the working capital necessary to start operations and to arrange the space according to legal security standards. The analysis highlights a robust business model, based on the synergy between the constant commissions generated by the IFN activity and the maximization of the value of unredeemed goods through the jewelry store. With a total investment estimated at RON 950,000, the financial projections indicate high viability, reflected by an Internal Rate of Return (IRR) of 65.06% and a sustainable growth in turnover over five years. The project rigorously substantiates cash flow management and operational risk control, highlighting Golden Station's ability to generate immediate liquidity and maintain high financial stability in a dynamic economic environment. The forecasted results confirm the profitability potential and the solidity of the proposed capital structure.*

### **38. (ID 186) Energy Management in Ports: A Systematic Literature Review of Key Performance Indicators for Decarbonization**

**Authors:** stud. Andreea CIOBANU, stud. Melyssa MANTA, stud. Maria Andreea PIOARA

**Scientific Advisor:** Prof. Eng. Florin NICOLAE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper addresses the urgent need to decarbonize port logistics facilities, considering the maritime industry's significant contribution to greenhouse gas emissions. The primary research objective is to identify and classify a coherent set of Key Performance Indicators (KPIs) capable of evaluating energy management efficiency within the port environment. Given the early stage of the research, the methodology used consists of a Systematic Literature Review (SLR) based on the PRISMA 2020 algorithm. The research targeted articles from the 2020–2024 period present in databases such as Scopus and Web of Science. The results highlight a transition from traditional metrics (fuel consumption) toward modern indicators, such as the energy efficiency of port microgrids and the use of energy from renewable sources. The study provides an essential reference framework for harmonizing monitoring practices, supporting the alignment of ports with global sustainability goals.*

**Keywords:** *Energy efficiency, energy management, port indicators, decarbonization, PRISMA 2020.*

### **39. (ID 189) Business Plan: SC "CONTABIL PERFECT" SRL Accounting Services and Tax Consulting**

**Author:** stud. Cătălin-Nicolae UDREA

**Scientific Advisor:** Assoc. Prof. Eng. Gheorghe GRECU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the sustainability and efficiency of implementing a digitalized business model within the professional services sector through the business plan of SC "Contabil Perfect" SRL. In a dynamic legislative context characterized by the digitalization of tax authorities (e-Factura, Virtual Private Space), the study proposes the "Accounting 4.0" concept. This model integrates automation solutions, such as API connections with billing systems like FGO or SmartBill, and secure cloud platforms to transform traditional accounting from a mere legal obligation into a real-time decision-support tool. The methodology involves a detailed SWOT analysis, target market segmentation focusing on IT and E-commerce start-ups, and rigorous financial projections over a 3-year horizon. Projected results indicate high economic viability, with a net*

*profit margin of 41.8% and a payback period for the 45,000 RON initial investment of less than 9 months. The research demonstrates that adopting advanced technologies and proactive tax consultancy allows small accounting firms to compete effectively in a mature market by offering clients total compliance and financial performance optimization.*

**Keywords:** *Digitalization, Accounting 4.0, Business Plan, Financial Management, SME, Automation*

#### **40. (ID 190) Organization of financial and accounting management in a military unit**

**Author:** stud. Cătălin-Nicolae UDREA

**Scientific Advisor:** LCDR Dragoș SIMION, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This thesis analyzes the financial-accounting management within a military unit, focusing on optimizing budgetary execution and administrative processes. It examines the legal framework of public military finances, detailing the A.L.O.P. mechanism and the importance of the segregation of duties. A practical case study at the Naval Academy "Mircea cel Bătrân" illustrates these concepts through the public procurement process for repairing the training ship "Mircea"'s main engine. The research demonstrates how rigorous financial discipline and strict preventive control (C.F.P.P.) generate significant budget savings, ultimately ensuring operational readiness and navigational safety.*

**Keywords:** *Military finance, Budgetary execution (A.L.O.P.), Public procurement, financial control (C.F.P.P.), Naval logistics.*

#### **41. (ID 191) Accident Scenarios in Defense Logistics Systems Associated with Natural Hazards**

**Authors:** stud. Andrei BULGARU, stud. Leonard DOBRINCU

**Scientific Advisor:** Prof. Florin NICOLAE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This study analyses the technological risks posed by natural hazards to defence logistics systems in the context of TAc←NaH type accidents. Using a probabilistic methodology and numerical modelling, the study examines a fictional military infrastructure, including a fuel tank farm and an explosives depot.*

*Three scenarios are developed: a primary accident triggered by an earthquake, a multi-hazard scenario (earthquake-tsunami), and a domino type scenario. The results highlight the high vulnerability of critical infrastructure and the amplification of consequences under conditions of combined hazards and chain propagation, underscoring the need for effective risk reduction measures and optimized planning.*

**Keywords:** TAc←NaH, probabilistic analysis, critical infrastructure, seismic hazard, multi-hazard, domino effect, fire, risk management

## **42. (ID 193) From Idea to Revenue: Building a Successful Business in The Horeca Industry**

**Author:** stud. Andrei BULGARU

**Scientific Advisor:** Assoc. prof. Gheorghe GRECU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This article analyzes a business plan developed for the establishment of "Gustul Bunicii," a restaurant specializing in traditional Romanian cuisine, located in the Tomis 1 area of Constanța. The project targets the casual dining segment, proposing a concept based on three central pillars: authentic recipes, the exclusive use of local ingredients, and the creation of a family-friendly atmosphere. From an economic perspective, the total investment is estimated at 150,000 EUR, requiring mixed financing consisting of equity and a bank loan. The financial projections demonstrate the project's viability and high profitability, estimating an internal rate of return (IRR) of 58.00% and full recovery of the investment from net profit by the end of the third year of operation. Furthermore, the study details market segmentation strategies, prioritizing the 35-64 age group and business professionals, and outlines future development directions through the integration of delivery services, catering, and in-house bakery and pastry production.*

**Keywords:** *business plan, traditional restaurant, entrepreneurship, casual dining, HoReCa market, financial projections, local ingredients*

#### **43. (ID 214) Exploring the Effects of Automation on the Workforce in Ports**

**Author:** stud. Bianca-Alexandra IACOB

**Scientific Advisor:** Assoc. Prof. Eng. Filip NISTOR, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* Automation represents one of the most profound transformations facing the global port industry in the 21st century. The adoption of smart port technologies: Automated Guided Vehicles (AGV), automated cranes, IoT (Internet of Things) systems, and artificial intelligence is fundamentally reshaping the operational models of port terminals, while simultaneously generating significant challenges in the field of human resources management. This paper aims to analyze the impact of the automation process on the port workforce, both from the perspective of the reduction of certain job categories, and from the perspective of the emergence of new skills and professional roles. The theoretical approach is complemented by a case study applied to Constanța Port, the largest port on the Black Sea and the main hub of Romanian maritime transport, examining the current degree of digitalization and automation, as well as the gaps compared to reference European ports. The research uses statistical data published by international organizations such as IMO (International Maritime Organization), UNCTAD (United Nations Conference on Trade and Development), and ESPO (European Sea Ports Organisation), complemented by information regarding the current state of infrastructure and workforce at Constanța Port. The results highlight the need for a coherent professional retraining strategy and institutional adaptation, in the context where automation cannot be dissociated from a sustainable human resources management policy.

**Keywords:** smart ports, port automation, naval and port management, human resources, Constanța Port

#### **44. (ID 216) Optimizing Military Food Logistics: Strategic Adaptation, Mobility, and NATO Interoperability**

**Author:** stud. Iustin ONOFREI

**Scientific Advisor:** LCDR Dragoș SIMION, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The provision of adequate food for military personnel is a fundamental component of military logistics, essential for maintaining health and operational capacity. This paper investigates the optimization of the military feeding process by harmonizing existing military structures with modern civilian food safety standards and addressing contemporary economic challenges. By analyzing the current legislative framework, the research emphasizes the critical necessity of integrating the HACCP system within military facilities to ensure food safety and prevent foodborne illnesses. Furthermore, the study addresses the severe impact of food inflation and regional geopolitical instability, advocating for agile budgetary planning and robust strategic stockpiling mechanisms. A significant focus is placed on operational mobility, evaluating the Romanian Army's Camping System (SCAR) and its containerized field kitchens. These systems guarantee high hygiene standards during deployments, ensuring strict interoperability with NATO standards such as STANAG 2182. Finally, the research explores alternative supply methods, highlighting the strategic importance of Host Nation Support (HNS) and local procurement via short food supply chains to optimize operations. The formulated solutions aim to modernize military logistics and enhance overall service quality.*

**Keywords:** *Military logistics, Food safety, HACCP, NATO interoperability, Host Nation Support, SCAR.*

#### **45. (ID 223) Case Study on Management of Cohesion and Morale in Military Units**

**Authors:** stud. Ioana-Mădălina SCÎRTOCEA, stud. Ianyș-Cătălin POPESCU

**Scientific Advisor:** Assist. Prof. Alina Elena ONEȚ, PhD

**Institution:** "Nicolae Bălcescu" Land Forces Academy, Sibiu

**Abstract:** *This study examines the importance of cohesion and morale management in military units, highlighting the essential role of the human factor in mission accomplishment. The research aims to identify key barriers in communication and leadership, as well as their impact on relationships among military personnel. The methodology is based on a 27-item anonymous questionnaire administered to students from various military academies, addressing aspects such as horizontal and vertical cohesion, organizational*

communication, and stress management. The findings indicate that collective effectiveness depends on leaders' ability to build trust, motivate subordinates, and transform groups into unified entities. Our examination emphasizes the need for leadership grounded in clear communication and mutual support to ensure both performance and organizational stability.

**Keywords:** cohesion, leadership, communication, morale, trust

#### **46. (ID 224) Flow Analysis Around an Obstacle in a Pipe Using Comsol Multiphysics**

**Authors:** stud. Iulian-Florin STOIAN, stud. Andreea-Claudia SCARLAT

**Scientific Advisor:** Assoc. Prof. Eng. Rita AVRAM, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Flow past obstacles in pipes is a fundamental topic in fluid mechanics, with applications in engineering, aerodynamics, and industrial processes. This study investigates the behavior of laminar flow in a pipe containing a cylindrical obstacle using the COMSOL Multiphysics platform. The numerical model is based on the Navier–Stokes equations for laminar flow, and simulations are carried out for different Reynolds numbers. Velocity and pressure distributions are analyzed, along with streamline patterns and the formation of recirculation zones downstream of the obstacle. The obtained results are compared with theoretical correlations and data from the literature, highlighting the accuracy of the numerical approach. The study demonstrates the effectiveness of COMSOL in visualizing flow phenomena and in understanding the influence of geometry and obstacle presence on fluid behavior.*

**Keywords:** COMSOL Multiphysics; Laminar flow; Fluid dynamics; Velocity distribution

#### **47. (ID 227) Optimization of Operational Flows in a Port Terminal for Handling Offshore Wind Turbine Components Using FlexSim Modeling**

**Author:** stud. Ioana Alexia PUIU

**Scientific Advisor:** Assoc. Prof. Eng. Alexandru COTORCEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the operational flows within a port terminal dedicated to handling offshore wind turbine components and explores ways to improve their efficiency through modeling and simulation. The study focuses on the specific challenges generated by the large size and weight of these components, which require special handling, storage, and transport conditions within the terminal. In order to better understand the functioning of the system, a simulation model was developed using the FlexSim application. This model reproduces the main operational processes and includes essential resources such as cranes, transport vehicles, and storage areas. By running different simulation scenarios, it was possible to observe how the system behaves under various conditions and to identify the main factors that influence performance. The results highlight several operational constraints and bottlenecks that can affect efficiency, while also showing how alternative solutions can improve the overall flow of operations. The study demonstrates that simulation is a useful tool for supporting decision-making and optimizing port activities, especially in the context of offshore wind energy logistics.*

**Keywords:** *transport, port, energy logistics, offshore*

#### **48. (ID 228) The Port of Constanta and the Opportunities of the Blue Economy**

**Authors:** stud. Lavinia UNGUREANU, stud. Larisa UNGUREANU

**Scientific Advisor:** Assoc. Prof. Eng. Rita AVRAM, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The Port of Constanța stands out as a key player in advancing the blue economy in the Black Sea region. Its strategic location and logistical capacity position it as an essential hub for maritime transport and innovation. The port invests in digitalization and clean energy solutions to modernize its operations. However, increasing activity places pressure on the marine environment. In this context, Constanța seeks to balance economic growth with sustainability.*

**Keywords:** *Blue Economy, Port of Constanța, green energy, sustainable*

**49. (ID 229) Estimation of Emissions Generated by Ships During Maneuvers in the Port of Constanta**

**Authors:** stud. Eden ZEIADIN, stud. Dan-Andrei PĂTRAȘCU

**Scientific Advisor:** Assoc. Prof. Eng. Rita AVRAM, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* Estimating emissions generated by ships during port maneuvers is essential for assessing the impact of maritime transport on air quality in coastal areas. This paper uses an activity-based methodology to quantify emissions resulting from the operation of main and auxiliary engines during maneuvering and berthing in port. The method is based on defining specific operational profiles, including activity duration, engine load, and installed power, depending on the type of vessel. Fuel consumption is estimated for each activity category, and emissions of pollutants such as NO<sub>x</sub>, SO<sub>2</sub>, CO<sub>2</sub>, and particulate matter are calculated using appropriate emission factors. The results show that ship maneuvers in port contribute to air pollution in the area. The method used is particularly useful when detailed data on ship activity are not available. In addition, the study provides a practical way to analyze the situation at a local level and can help identify effective solutions for reducing emissions.

**Keywords:** ship emissions, port maneuvers, activity-based methodology, air pollution, fuel consumption

**50. (ID 241) Performance assessment from an infrastructure perspective in ports and container terminals**

**Author:** stud. Cosmina-Ioana TOMA

**Scientific Advisor:** Prof. Florin NICOLAE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* The increase in global demand for maritime transport and the significant increase in ship sizes represent an urgent challenge for port infrastructure. The emergence of larger ships, driven by the search for efficiency and cost reduction, highlights the urgent need to adapt and modernize ports to accommodate these new classes of ships. This scenario represents a challenge for port managers and government authorities, who need to rethink and adapt their operational strategies, considering not only the physical capacity of

*terminals, but also the efficiency and flexibility needed to cope with increasing logistical complexity.*

**Keywords:** *Port infrastructure. Containerized cargo. Performance evaluation. Logistics efficiency, Maritime adaptation. Port infrastructure variables.*

### **51. (ID 260) Numerical Simulation of Structures and Processes in Ports**

**Authors:** stud. Bianca-Maria ISAIA, stud. Elena Florentina ION (IORDACHE), stud. Bogdan Andrei COȘUG

**Scientific Advisor:** Assoc. Prof. Eleonora RĂPEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents the role of numerical methods in solving engineering problems that cannot be addressed analytically. Key approaches such as the Finite Element Method (FEM), Computational Fluid Dynamics (CFD), and Finite Difference Method (FDM) are used for modeling and simulation. FEM is applied to analyze stress distribution in port equipment, such as cranes, highlighting critical structural areas through heatmap visualizations. CFD is used to simulate fluid flow in pipelines and port channels, illustrating velocity and direction. Numerical optimization methods are also employed to minimize cost functions and improve efficiency. These techniques are applied to port infrastructure, including docks, cranes, and terminals, contributing to improved safety, optimized performance, and efficient energy use.*

**Keywords:** *Numerical Methods, FEM, CFD, FDM, Structural Analysis, Fluid Flow, Optimization, Port Engineering, Cost Function Minimization, Port Infrastructure, Port Engineering, Dock Analysis, Crane Mechanics, Terminal Systems, Hydrodynamics, Energy Efficiency, Safety Analysis, Load Distribution, Computational Modeling*

### **52. (ID 265) Business Plan for a Multi-functional Leisure Center – ROC PUB**

**Author:** stud. Robert Gabriel CÎȚU

**Scientific Advisor:** Assoc. Prof. Gheorghe GRECU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *In the current local economic environment, marked by a*

*limited entertainment offer and the risk of capital migration to neighboring urban centers, support for multi-functional leisure initiatives has become an essential condition for maintaining community vitality. A modern entertainment center operates as an isolated social unit, whose survival depends on a robust network of integrated services, capable of functioning efficiently even under conditions of aggressive indirect competition. This paper analyzes the architecture and support principles of a business in the service sector, highlighting the mandatory transition from a traditional, reactive model to an integrated one, capable of anticipating consumer needs and guaranteeing operational safety through well-calculated resource stocks. Beyond the theoretical framework, the research demonstrates the utility of modern financial planning tools in entrepreneurship. In this regard, the paper proposes a practical model for optimizing the launch of the ROC PUB center using an optimized investment strategy (CAPEX) and rigorous management of revenue per visitor. By creating a virtual replica of cash flows and occupancy scenarios, the study illustrates how testing hypothetical market situations allows for the rapid recalculation of margins and the adaptation of capital reserves. The ultimate goal is to provide administrators with data-driven solutions for the efficient use of resources and the assurance of long-term financial autonomy.*

**Keywords:** *ulti-functional leisure, business plan, ROC PUB, financial sustainability*

### **53. (ID 278) Ballast Water: Environmental Impact**

**Author:** stud. Davide CIORTESCU

**Scientific Advisor:** Prof. Assist. Eng. Livia RAUCA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Ballast water plays a crucial role in the safe and efficient operation of commercial vessels, ensuring proper stability and maneuverability under varying loading conditions. Despite its importance, it poses significant environmental risks, as it can transport aquatic organisms and pathogens across different ecosystems. This transfer often leads to the introduction of invasive species, which can disrupt biodiversity and negatively impact marine-related economic activities. To address these challenges, the International Convention for the Control and Management of Ballast*

*Water was established, setting strict regulations to minimize biological pollution. This paper examines the relevant legal framework and explores the main ballast water treatment technologies implemented on ships. Particular focus is placed on electrolysis-based systems, which are widely regarded as effective in meeting the IMO D-2 standard. The functionality and performance of such a system, highlight its efficiency and its vital role in ensuring environmental protection and regulatory compliance.*

**Keywords:** *Ballast water, treatment, electrolysis*

#### **54. (ID 285) Analysis of the Economic Viability and Operational Strategies for a Start-up in the Premium Floral Services Sector**

**Author:** stud. Lavinia-Irina BLĂJUȚ

**Scientific Advisor:** Assoc. Prof. Gheorghe GRECU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper explores the decisional, operational, and financial foundations necessary for launching and effectively managing a business in the field of floral retail and event design. The context of the analysis is placed in an urban environment with high tourist and commercial traffic, the main objective being to demonstrate the viability of a business model focused on value-added services, personalization, and strategic positioning. From a methodological perspective, the study proposes an evaluation of the initial investment structure, highlighting the need for an optimal balance between equity and attracting external or bank financing. The mixed financing is strategically directed towards space arrangement, securing working capital, and acquiring specific technological equipment. Based on multi-year financial forecasts, the paper analyzes essential performance indicators such as the internal rate of return, net present value, and the investment payback period to validate the project's feasibility in the medium term. The research results emphasize that financial sustainability and rapidly reaching the break-even point are directly influenced by the diversification of the service portfolio. Integrating direct sales with corporate subscription systems, private event design, and fast delivery services represents a major competitive advantage. The paper's conclusions show that success in such an entrepreneurial niche depends on the rigorous management of highly perishable inventory, the use of*

*modern quality preservation technologies, and the direct involvement of management in adapting the offer to market dynamics.*

**Keywords:** *entrepreneurship, business model, floral design, financial indicators*

### **55. (ID 293) Residual Stress Engineering: The Role of Shrink-Fitting in Structural Integrity**

**Authors:** stud. Iulian-Adrian BEZNEA, stud. Daniel BICIUȘCĂ

**Scientific Advisor:** Assoc. Prof. Eng. Mihai BEJAN, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Thick-walled pipes and cylinders are critical components in numerous engineering applications, including naval systems, oil and gas transportation, high-pressure hydraulic installations, nuclear reactors, and high-pressure hydrogen storage. These elements operate under extreme internal pressures (often exceeding 100–400 MPa) and cyclic loading, which can lead to material fatigue, cracking, and structural failure. To enhance mechanical strength and service life, advanced pre-stressing techniques are employed: shrink-fitting and pressure-induced pre-stressing. Shrink-fitting involves the assembly of multiple concentric tubes with interference fit, achieved through thermal expansion or contraction, resulting in beneficial compressive residual stresses in the inner layer. Pressure-induced pre-stressing, on the other hand, is applied to a single thick-walled tube by subjecting it to an internal pressure significantly higher than the working pressure (typically 1.5–2.5 times).*

**Keywords:** *shrink-fitting, pressure pre-stressing, thick-walled cylinders, residual stresses, plastic deformation, high-pressure vessels, fatigue life*

### **56. (ID 301) Sipet Deluxe Winery: A Premium Viticulture Investment and Business Development Plan**

**Author:** stud. Leonard DOBRINCU

**Scientific Advisor:** Assoc. Prof. Gheorghe GRECU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This business plan outlines the establishment and development of Sipet Deluxe S.R.L., a premium wine production company located in the Dobrogea region near Constanța, Romania.*

*The project aims to develop a fully integrated viticultural business, covering all stages from grape cultivation on a 20-hectare vineyard to wine production, maturation, bottling, and commercialization under a proprietary brand.*

**Keywords:** *Premium wine production, viticulture, winery business plan, vertical integration, enotourism, investment project, financial projections, HORECA market*

### **57. (ID 306) The Integration of Artificial Intelligence in the Strategic Decision-Making Process**

**Authors:** stud. Dora-Aida MIHU, stud. Roxana-Maria DACU

**Scientific Advisor:** Assoc. Prof. Gheorghe GRECU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper demonstrates how artificial intelligence is integrated into the strategic decision-making process of today's companies, in the context of the rapid changes brought about by digitalization. In an economic environment fraught with complexity and uncertainty, the ability to make quick and well-founded decisions becomes crucial to remaining competitive. The objective of this paper is to demonstrate how artificial intelligence improves the strategic decision-making process by utilizing predictive analytics, automating processes, and leveraging large amounts of data.*

**Keywords:** *Artificial Intelligence (AI), Strategic Decision-Making, Digital Transformation, Data Analysis, Predictive Analytics, Automation, Competitive Advantage, Risk Management, Business Strategy, Organizational Efficiency*

### **58. (ID 324) Thermal Pulse: Engineering and Management of Heat Transfer in Port Grain Terminals**

**Authors:** stud. Bianca Maria SCARLAT, Ana Maria ONOFREI

**Scientific Advisor:** Lecturer Eng. Ionel POPA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper explores the critical intersection of applied thermodynamics and naval management within the context of large-scale grain storage at port terminals. Focusing on the Port of Constanta, specifically the modern infrastructure at Pier 38, the study analyzes the "Thermal Pulse" the internal heat generation and moisture migration within metal silos. From an engineering*

*perspective, the research examines the challenges posed by high thermal conductivity in steel structures under solar radiation and the resulting convective currents that lead to interstitial condensation. From a management standpoint, the paper evaluates how optimizing aeration through psychrometric analysis can significantly reduce operational costs and prevent cargo degradation.*

**Keywords:** Naval Management, Heat Transfer, Port of Constanta, Grain Storage, Thermal Dynamics

### **59. (ID 327) The Use of Drones in Support of Military Logistics Operations**

**Author:** stud. Nicolas BUTNARU

**Scientific Advisor:** Assoc. Prof. Eng. Alexandru COTORCEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The paper explores the paradigm of transforming logistical support through the integration of autonomous systems in the naval environment. In the current context of the maritime theater of operations, characterized by volatility and the need for rapid supply chains, the research analyzes the efficiency of unmanned systems in optimizing the military logistics chain.*

**Keywords:** Naval drone, logistics, supply chain

### **60. (ID 332) Naval Rudders and their Functional Development**

**Author:** stud. Eduard BLAJ

**Scientific Advisor:** Assoc. Prof. Eng. Mihaela-Greti MANEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents an overview of the main rudder systems used on maritime vessels, focusing on their classification, structural characteristics, and modern optimization concepts. Rudders are essential for ensuring both course stability and maneuverability, as "the ship must maintain a given direction for long periods of time, while also performing rapid course changes with the steering gear."*

**Keywords:** Naval Rudders and Their Functional Development

### **61. (ID 335) Trade Blockades in the Strait of Hormuz and their Economic Consequences**

**Author:** stud. Alexandra-Daniela CHENAC

**Scientific Advisor:** Assoc. Prof. Gheorghe GRECU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *"Trade Blockades in the Strait of Hormuz and their Economic Consequences" examines the strategic impact of a potential blockage in the Strait of Hormuz, the global energy "lung" through which over 20% of the world's oil transits.*

**Keywords:** *Choke point, Bunkering costs, War risk insurance premiums, Operational continuity, military conflict, marine fuel prices, substitution effect*

## **62. (ID 336) The Interaction of Electrostatic and Electromagnetic Fields with The Human Body**

**Authors:** stud. Lavinia UNGUREANU, stud. Larisa UNGUREANU

**Scientific Advisor:** Prof. Eng. Gheorghe SAMOILESCU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This project highlights the interaction of electrostatic and electromagnetic fields with the human body, combining a scientific perspective with the observation of natural phenomena. The paper presents the characteristics of these fields and their sources, emphasizing the repercussions on the body, ranging from superficial reactions to complex physiological responses. Both natural and artificial sources are analyzed, alongside the relevant safety limits. The objective of this project is to provide a clear and reality-grounded perspective on how these fields interact with the human body.*

**Keywords:** *electromagnetic fields, physiological repercussions, the human body, natural phenomena*

## **63. (ID 338) The use of risk analysis methods in port systems maintenance**

**Author:** stud. Ștefania-Luiza GUTOI

**Scientific Advisor:** LCDR Dragoș-Ionuț SIMION, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *In today's maritime world, a port is only as good as its equipment. This paper looks at why keeping machines running isn't just a technical job, but a strategic move to cut down on risks and costs. I have focused on Chapter II to show how maintenance has evolved from just fixing things when they break the corrective*

*approach to smarter methods like preventive, predictive, and proactive maintenance. A big part of my research covers how the harsh sea environment especially salt corrosion and high humidity wears out cranes and conveyor belts much faster than in other industries. I also examined how we can measure success using indicators like MTBF (reliability) and MTTR (repair speed) to track equipment availability in a real terminal. My main point is that choosing the right mix of maintenance types doesn't just cost money; it actually creates value by keeping everything safe and moving.*  
**Keywords:** port maintenance, risk analysis, reliability, STS cranes, availability.

#### **64. (ID 339) Circular economy in port activity – current status and development prospects**

**Author:** stud. Sebastian-Iulian ȘERBAN

**Scientific Advisor:** Prof. Florin NICOLAE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The paper analyzes the current state of the circular economy in port activity, emphasizing the importance of the transition to a sustainable model of resource use. The circular economy promotes waste reduction, material reuse and energy efficiency, contributing to environmental protection and economic development. Ports play an essential role in international trade, but also generate significant environmental impacts, such as air and water pollution. In this context, the integration of circular economy principles becomes necessary to reduce these effects. The main current trends, such as digitalization and the use of renewable energy, as well as the conclusions of specialized studies are highlighted. The implementation of the circular economy in ports contributes to increasing the sustainability and competitiveness of this sector.*

**Keywords:** *Circular economy, sustainable development, ports, environmental impact, sustainability.*

#### **65. (ID 346) Management of Military Organizations in the Era of Globalization**

**Author:** stud. Florentina ILIN

**Scientific Advisor:** Assoc. Prof. Eng. Gabriel MĂNESCU, PhD

**Institution:** "Nicolae Bălcescu" Land Forces Academy, Sibiu

**Abstract:** *This paper examines the management of military organizations in the era of globalization, highlighting the profound transformations generated by an increasingly interconnected international environment. Globalization has reshaped security dynamics, introducing complex and hybrid threats such as transnational terrorism, cyber warfare, and organized crime, which require integrated and adaptive responses from military structures.*

**Keywords:** *globalization, military organizations, military management, international cooperation, cybersecurity, human resource management, technological integration, defense strategies,*

## **66. (ID 349) Optimization of Load-Bearing Structures**

**Authors:** stud. Larisa UNGUREANU, stud. Lavinia UNGUREANU

**Scientific Advisor:** Assoc. Prof. Eng. Mihai BEJAN, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Structural optimization is a field that has been studied for more than 100 years. However, only in recent decades has it been developed as a significant tool in large-scale engineering applications. It consists of the effective combination of Finite Element Analysis with mathematical optimization. Finite Element Analysis, a numerical technique, provides the structural response, while optimization techniques guide the exploration of the multidimensional design space, using well-defined algorithms to identify the best possible solution, or at least an improved one. This solution satisfies all requirements while using the minimum possible resources. Structural optimization offers numerous advantages, most notably improved performance and reduced costs. For this reason, the field continues to develop rapidly even today. The present paper presents several aspects of this fascinating scientific domain.*

**Keywords:** *structural analysis, structural optimization, finite element analysis, mathematical optimization, engineering applications*

## **67. (ID 378) Analysis of an Improved Rankine Cycle using Cycle Pad**

**Author:** stud. Ioan AȘTEFĂNOAE

**Scientific Advisor:** Assoc. Prof. Eng. Rita AVRAM, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The aim of this paper is to showcase the grounded application, bounded by a set of technical constrictions, of the Rankine cycle with the aid of an educational software. Considering the ideal parameters, we have the following thermodynamical process; Isentropic Compression, where the pressure inside the pump rises, Isobaric Heat Addition where the water is heated to a vapor state, Isentropic Expansion, where the steam expands in a turbine producing work as a result, and Isobaric Heat Rejection, where at a constant pressure steam converts back into water. We can increase the efficiency of this model further by heating the vapor past its saturation temperature before it enters the turbine, this will result in a significant increase in the output of work produced by the system. The analysis and comparison of these models will be made using Cycle Pad, an educational software specialized in thermodynamical cycles.*

**Keywords:** *Analysis of an Improved Rankine Cycle using Cycle Pad*

## **68. (ID 386) Software solutions for technical and economic management**

**Author:** stud. Gabriel CRĂCIUN

**Scientific Advisor:** Prof. Eng. Beazit ALI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the critical role of integrated information systems in optimizing fleet management and port operations. In a maritime climate defined by strict regulations (IMO, MARPOL) and the need for cost efficiency, the transition from analog processes to Enterprise Resource Planning (ERP) and Planned Maintenance Systems (PMS) solutions becomes indispensable. The article explores the architecture of software solutions that interconnect predictive maintenance, fuel consumption monitoring and crew management with economic and logistical performance indicators. By centralizing technical and financial data, these platforms allow an overview of the Total Cost of Ownership (TCO) for each ship, facilitating data-driven decisions. The conclusions highlight that digitalization is not just a reduction in bureaucracy, but an essential strategy for the sustainability and competitiveness of shipping companies in the context of the global blue economy.*

**Keywords:** *naval digitalization, fleet management, predictive maintenance, operational efficiency, ERP integration, cost optimization*

**69. (ID 387) Performance Evaluation from the Infrastructure Perspective in Ports and Container Terminals**

**Author:** stud. Cosmina-Ioana TOMA

**Scientific Advisor:** Prof. Florin NICOLAE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The increasing global demand for maritime transportation and the significant rise in vessel sizes present an urgent challenge for port infrastructure. The emergence of larger vessels, driven by the pursuit of efficiency and cost reduction, underscores the pressing need for adaptation and modernization of ports to accommodate these new classes of ships. This scenario poses a challenge to port managers and government authorities to rethink and adjust their operational strategies, considering not only the physical capacity of terminals but also the efficiency and flexibility required to address the growing logistical complexity. In this context, it is identified the need to fill an existing gap, the understanding of the impact of infrastructure-related variables on the performance evaluation of ports and containerized cargo terminals. The focus is on immediate adaptation and preparing ports for future challenges in containerized cargo movement. The guiding research question is: "How do infrastructure-related variables influence the performance of these facilities?" The overarching objective is to analyse and identify critical variables in the infrastructure dimension affecting performance, with the aim of highlighting opportunities for improvement in efficiency and competitiveness in containerized cargo movement.*

**Keywords:** *Port Infrastructure, Containerized Cargo, Performance Evaluation, Logistics Efficiency, Maritime Adaptation, Port Infrastructure Variables.*

**70. (ID 388) Methods and Technologies for Reducing the Carbon Footprint in Freight Transport in Romania**

**Author:** stud. Mario-Petru GEAMALINGA

**Scientific Advisor:** Assoc. Prof. Eng. Alexandru COTORCEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *With a focus on Romania and the Port of Constanța, this research examines the many obstacles and tactical possibilities for lowering the carbon footprint in the freight transport industry. The study examines the present shift from a logistics paradigm that depends on fossil fuels to a sustainable, multimodal system within the framework of the European Green Deal. The analysis reveals a notable "modal imbalance" in Romania, where more than 70% of freight volumes are transported by road, resulting in a disproportionate amount of greenhouse gas emissions.*

**Keywords:** *carbon footprint, freight transport industry, Port of Constanța, modal imbalance, rail electrification rates, multimodal system*

## **71. (ID 395) Analysis of the efficient use of cargo handling equipment in container terminals**

**Author:** stud. Bogdan-Constantin ȚICU

**Scientific Advisor:** Prof. Eng. Beazit ALI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The presentation analyzes the efficient use of container handling equipment in port terminals, highlighting their role in optimizing logistics operations. The main types of equipment used are presented, such as quay cranes, gantry cranes, forklifts and auxiliary equipment, emphasizing the importance of each in carrying out activities. The paper also addresses the organization of operational flow in container terminals, emphasizing the need for efficient coordination of resources and activities. Methods for optimizing the use of equipment are highlighted, such as operations planning and preventive maintenance, which contribute to increasing productivity. Finally, operational costs and the impact of digitalization and automation on efficiency are analyzed. The implementation of modern technologies leads to cost reduction, improved performance and increased competitiveness of port operators on the global market.*

**Keywords:** *Container handling, port equipment, operational efficiency, process optimization, digitalization and automation*

## **72. (ID 406) Industrial Risk Assessment at the Petromidia Refinery through Aloha Modeling in the Context of Maritime Impact**

**Authors:** stud. Andrei-Cătălin CARAGEA, stud. Mihaela POPA

**Scientific Advisor:** Assoc. Prof. Eng. Ion ANGHEL, PhD

**Institution:** “Transilvania” University of Braşov

***Abstract:** This paper evaluates the major industrial risks associated with the mild hydrocracking unit at the Petromidia refinery, emphasizing the impact on the ecosystem and maritime operations in Midia Port. Given the refinery's classification as an upper-tier Seveso establishment, the presence of significant quantities of hazardous substances on-site requires a rigorous spatial analysis of major accident scenarios. For this purpose, the study uses an advanced atmospheric dispersion modeling program and geographic mapping tools to mathematically simulate the thermal and toxic hazards resulting from accidental chemical releases.*

***Keywords:** simulation, industry, risks, explosion, toxic.*

## **73. (ID 411) The Naval Transport Development Strategy**

**Authors:** stud. Ştefan STĂNOIU-CIOVICĂ, stud. Teo-Mario PALAS, stud. Sebastian Gabriel IANCU

**Scientific Advisor:** Lecturer Eng. Ionel POPA, PhD

**Institution:** Romanian Naval Academy “Mircea cel Bătrân”

***Abstract:** The Naval Transport Development Strategy (NTDS) of Romania, developed within the framework of the National Recovery and Resilience Plan (NRRP) and the EU Sustainable and Smart Mobility Strategy, aims to modernize and integrate maritime, inland waterway, and port transport. The document analyzes the current situation, proposing legislative and institutional changes for efficient management and a 15% increase in freight transport on the Danube by 2026. Key objectives include fleet greening, climate change adaptation, intermodal connectivity development, and digitalization. Through these measures, the NTDS contributes to reducing fossil fuel dependency and emissions by 90% by 2050, supporting the sustainable economic development of Romania and the Danube region, while positively impacting job creation.*

***Keywords:** Naval Transport, Sustainability, Digitalization, Intermodality, Decarbonization*

#### **74. (ID 417) GAP Analysis**

**Authors:** stud. Alexandra PĂUNESCU, stud. Georgiana BUZOIANU

**Scientific Advisor:** Lecturer Eng. Ionel POPA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The project is based on a GAP analysis conducted at the "Victor Babeş" National Institute of Pathology within the HRS4R framework, aiming to align institutional practices with the European Charter for Researchers. The analysis indicates strong compliance in research ethics and performance evaluation, while identifying gaps in open, transparent, and merit-based recruitment (OTM-R) and administrative support for research management and intellectual property. The project proposes integrated mechanisms to optimize human resource processes, including standardized recruitment procedures, strengthened administrative and legal infrastructure, and improved institutional communication. It also aims to enhance research visibility, foster international collaboration, and promote researcher mobility. The approach is transferable to other sectors, such as maritime and port industries, supporting innovation, sustainability, and the development of a competitive research environment.*

**Keywords:** *HRS4R alignment, OTM-R recruitment, Research management, Institutional capacity, Knowledge transfer*

#### **75. (ID 444) Analysis and Improvement of Multimodal Transport through the Port of Constanta**

**Author:** stud. Alexandra Ștefania LUCA

**Scientific Advisor:** Assoc. Prof. Eng. Alexandru COTORCEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The paper investigates the strategic role of Romania's primary maritime gateway within the Trans-European Transport Network (TEN-T) as geopolitical shifts and global trade volatility redefine logistics routes in the Black Sea region. The research evaluates the port's technical-economic characteristics by focusing on the synergy between deep-sea berths, the extensive internal rail network, and the Danube-Black Sea Canal to maintain its competitive edge as a trimodal hub. By analyzing current operational*

*handling rates and the legislative impact of the 2024 TEN-T regulations, the study identifies critical bottlenecks in cargo throughput and hinterland connectivity that affect the overall efficiency of the maritime-terrestrial interface. The findings suggest that the implementation of a digitalized Port Community System (PCS) and the modernization of railway infrastructure to accommodate 740-meter trains are essential for reducing dwell time and enhancing multimodal performance. Ultimately, the thesis proposes strategic improvements aimed at transforming the Port of Constanta into a resilient, high-tech, and sustainable logistics hub capable of supporting the Middle Corridor and European decarbonization targets through advanced multimodal integration.*

**Keywords:** *Port of Constanta, TEN-T, trimodal, logistics, railway infrastructure, hinterland connectivity*

#### **76. (ID 446) Marketing Strategies Adopted by Coca-Cola**

**Authors:** stud. Ștefan STĂNOIU-CIOVICĂ, stud. Georgiana BUZOIANU, stud. Alexandra PĂUNESCU

**Scientific Advisor:** Daniela-Simona NENCIU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the marketing strategies adopted by Coca-Cola, one of the most influential companies worldwide. The study highlights how the company has successfully built a strong brand through emotional branding, product diversification, and an extensive distribution network. It also examines promotional strategies based on creative campaigns and the effective use of digital media. Product personalization and corporate social responsibility play an important role in strengthening the relationship with consumers. The SWOT analysis outlines both the company's strengths and the challenges it faces in a dynamic economic environment. The conclusions show that Coca-Cola's success is due to its ability to continuously adapt and innovate, making it a relevant model in modern marketing.*

**Keywords:** *marketing, branding, strategy, consumers, promotion*

#### **77. (ID 453) Challenges in the Logistics of Perishable Goods: Ensuring Cold Chain Integrity in Storage and Transportation**

**Author:** stud. Alexandru Andrei VASILE

**Scientific Advisor:** Assoc. Prof. Eng. Alexandru COTORCEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper thesis explores the complexity and dynamics of perishable goods logistics; a critical field where operational efficiency directly intersects with consumer safety. The primary objective is to identify and analyze the major challenges encountered in storage and transport processes, with a particular focus on maintaining the cold chain and reducing waste. The first part examines the technical requirements of storage infrastructure, where constant monitoring of temperature and humidity is vital. Subsequently, the research addresses the difficulties of multimodal transport, analyzing risks associated with transit times and vulnerabilities at transshipment points. The methodology combines a theoretical analysis of international regulations with case studies on the implementation of modern technologies, such as IoT (Internet of Things) and real-time monitoring sensors. The results demonstrate that digitalization and route optimization are not merely competitive advantages but imperative necessities for supply chain sustainability. The conclusions highlight the importance of integrating high-performance management systems to minimize economic losses and environmental impact, offering practical solutions for streamlining perishable logistic flows.*

**Keywords:** *Perishable Goods Logistics, Cold Chain Management, Real-time IoT Monitoring, Supply Chain Sustainability*

## **76. (ID 456) The Danube–Bucharest Canal: A Sustainable Inland Waterway Project**

**Author:** stud. Diana Elena CHIȚU

**Scientific Advisor:** Prof. Florin NICOLAE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the role of inland waterway transport in Europe within the context of sustainable development, with a focus on the Danube–Bucharest Canal project. The study examines European best practices and highlights key principles for integrating sustainability into transport infrastructure, including environmental, economic, and social dimensions. Furthermore, it evaluates the strategic importance of the canal in enhancing connectivity within the Trans-European Transport Network (TEN-T) and supporting the*

*transition toward low-emission transport systems. Beyond its transport function, the project is assessed as a multifunctional system with potential benefits for agriculture, renewable energy production, tourism development, and biodiversity conservation. The findings emphasize that the completion of the Danube–Bucharest Canal could significantly contribute to regional development and Romania’s alignment with European sustainability objectives.*

**Keywords:** *inland waterway transport, TEN-T network, sustainability, renewable energy, development*

### **77. (ID 418) Buckling Optimization**

**Authors:** stud. Denisa DUMITRU, stud. Andreea Claudia SCARLAT

**Scientific Advisor:** Assoc. Prof. Eng. Mihai BEJAN, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Buckling is the phenomenon in which a compressed structure loses its stability. Usually buckling is considered the global one which does not cover the entire phenomenon. Local buckling is also an important phenomenon who deserves to be considered. On the other hand, optimization leads us to a solution which satisfied the requirements using the minimum amount of resources. The object of this study is the optimization of a compressed column, with a ring shape cross - section, from both point of view of global and local buckling. These two criteria are opposite and this is why the problem has a sense. The analytical equations of the phenomenon were used. Writing the equation of the optimization, mathematical problem was the most demanding part of the process. As conclusions we must note that the optimization offered us a better solution than the initial one. The chart reveals us about design space and solution.*

**Keywords:** *buckling, optimization*

### III. SECTION: MILITARY SCIENCES AND INFORMATION

**Section Committee:**

**Chairman:** Prof. Ion CHIORCEA, PhD

**Members:** Assoc. prof. Ionuț-Cristian SCURTU, PhD

Assoc. prof. Florin NISTOR, PhD

Room: LI126

#### 1. (ID 8) Global Security Challenges in the 21st Century

**Author:** stud. Bogdan GRIGORE

**Scientific Advisor:** Captain Cătălin CLINCI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The 21st century has introduced an increasingly complex landscape of global security challenges, marked by the convergence of traditional and non-traditional threats. While interstate conflicts and nuclear proliferation remain critical concerns, emerging threats such as cyberattacks, terrorism, pandemics, and climate-induced crises are reshaping the security paradigm. Hybrid warfare and transnational organized crime further blur the lines between military and civilian domains, complicating traditional defense strategies. The rapid pace of technological innovation, coupled with global interdependence, demands adaptive approaches to risk assessment and response. International cooperation, multilateral frameworks, and resilient national policies have become indispensable in mitigating these threats. Understanding and addressing these multidimensional security challenges is crucial for sustaining global stability, protecting human life, and fostering long-term geopolitical and economic resilience.*

**Keywords:** *Global security, cyber threats, terrorism, nuclear proliferation, climate security, pandemics, geopolitical conflicts, transnational crime, international cooperation, cybersecurity, hybrid warfare.*

## **2. (ID 12) The Art of War and Strategic Planning**

**Author:** stud. Bogdan GRIGORE

**Scientific Advisor:** Captain Cătălin CLINCI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The Art of War, written by Sun Tzu, is one of the most influential works on military strategy and strategic planning. The text emphasizes careful preparation, intelligence gathering, adaptability, and the importance of understanding both the enemy and oneself. Rather than promoting direct confrontation, it advocates winning through superior planning, deception, and efficient resource management. Its principles extend beyond the battlefield and are widely applied in business, leadership, and competitive environments. Strategic planning, as presented in the work, involves long-term vision, risk assessment, flexibility, and calculated decision-making under uncertainty. By prioritizing discipline, timing, and situational awareness, The Art of War remains a foundational guide for effective strategy in military, organizational, and personal contexts.*

**Keywords:** *military strategy, strategic planning, warfare theory, leadership, tactics, decision-making, competitive advantage, conflict management, intelligence, risk assessment, indirect strategy, adaptability, long-term planning, resource allocation*

## **3. (ID 14) SONAR Sound Propagation**

**Author:** stud. David MANOLESCU

**Scientific Advisor:** Lecturer Eng. Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents the fundamental principles of underwater sound propagation and their relevance to SONAR operations. It explains how sea stratification comprising the surface (seasonal) layer, the main thermocline, and the deep isothermal layer affects sound speed and transmission paths. Variations in temperature and pressure create sound velocity gradients that cause refraction and ray bending, phenomena illustrated through ray tracing. The study describes key propagation modes, including negative and positive refraction, surface ducts, deep shadow zones, the deep sound channel (SOFAR), and convergence zones. Each mode significantly influences detection ranges and acoustic*

*performance. Special attention is given to operational implications, such as submarine concealment in shadow zones and long-range transmission within the deep sound channel. Understanding these mechanisms is essential for effective naval acoustic strategy and underwater surveillance.*

**Keywords:** SONAR, Sound propagation, Thermocline, Sound refraction, Deep sound channel (SOFAR)

#### **4. (ID 18) Artificial Intelligence in Contemporary Warfare – Aspects of Morality and Leadership**

**Author:** stud. Daria-Maria BOCOCI

**Scientific Advisor:** Col. Andrei IGNAT

**Institution:** "Alexandru Ioan Cuza" Police Academy, Bucharest

*Abstract: Throughout history, humanity has experienced numerous conflicts that have profoundly shaped the evolution of international relations and legal norms. Particularly during the last two centuries, the global order has been significantly influenced by the two World Wars, as well as by a multitude of civil wars, insurgencies, acts of terrorism, and persistent geopolitical instability. Consequently, a distinct body of norms commonly referred to as the "law of war" has emerged, emphasizing ethical considerations and the protection of fundamental human rights, most notably the right to life. In the contemporary geopolitical landscape of 2024, the international community continues to confront a climate marked by conflict, uncertainty, and security threats. The military aggression initiated by Russia against Ukraine in February 2022, alongside the escalation of hostilities in the Middle East beginning in October 2023, has intensified global tensions and prompted major powers to engage in a renewed arms competition reminiscent of the dynamics of the Cold War. Unlike previous historical periods, however, this competition is characterized not only by advancements in conventional and nuclear military capabilities but also by the rapid integration of artificial intelligence (AI) into military systems and strategic planning. In this context, the prospect of artificial intelligence evolving from a mere technological instrument into a strategic actor capable of influencing or even directing military operations is no longer purely speculative. This research article seeks to examine the ethical implications of allowing AI systems to assess war-related scenarios, to participate in*

*or assume leadership roles in military decision-making, and potentially to exercise command functions traditionally reserved for human military leaders.*

**Keywords:** *ethics; leadership; warfare; military; intelligence*

## **5. (ID 24) Interpersonal Tact**

**Author:** stud. Sebastian-Nikolas ALISTARH

**Scientific Advisor:** Assoc. Prof. Carmen COJOCARU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This presentation examines the concept of interpersonal tact and its importance in relationships and leadership within the military environment. Interpersonal tact refers to the ability to communicate respectfully, empathetically, and with balance, helping to maintain harmonious relationships and reduce conflicts. The presentation highlights the main components of interpersonal tact, including empathy, diplomacy, active listening, emotional self-control, and respect. In the military context, these qualities are essential for strengthening discipline, increasing team cohesion, and creating a climate of trust. The presentation also explains the difference between interpersonal tact and leadership, emphasizing that an effective leader does not rely only on authority but also on the way they communicate and treat their subordinates. Practical examples illustrate the positive impact of a commander who demonstrates interpersonal tact compared to the negative consequences of a leadership style that lacks these qualities.*

**Keywords:** *military, leadership, effective communication, empathy*

## **6. (ID 25) Psychological Foundations and Development of Character**

**Author:** stud. Gilda Elizabeth FAIFER

**Scientific Advisor:** Assoc. Prof. Carmen COJOCARU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Character represents the fundamental pillar of a military officer's personality, functioning as both a "social garment" and a protective shield that dictates ethical decision-making and leadership effectiveness. This paper explores the multidimensional nature of character within the military context, defining it as a stable set of psychological and moral traits manifested through behaviors and*

attitudes. By utilizing the "Six Thinking Hats" method, the study provides a balanced analysis of character formation, identifying key operational values such as loyalty, integrity, and courage, while addressing vulnerabilities like operational stress and peer pressure. The presentation incorporates a practical dimension through a personal case study of leadership in a student-officer environment, emphasizing the transition from impulsive punishment to empathetic correction. To foster character development, the author proposes an integrated training program involving ethical decision-making simulations, "Character Logbooks" for self-reflection, and intergenerational mentorship. The research concludes that character is a dynamic core that requires continuous learning and moral practice to ensure organizational trust and operational cohesion within the Naval Forces.

**Keywords:** Military Psychology, Character Development, Ethical Leadership, Operational Stress

## **7. (ID 28) Disinformation and Information Manipulation as Security Threats in Democratic Societies**

**Author:** stud. Dragoş PĂTRAŞCU

**Scientific Advisor:** Assoc. prof. Cătălin ENUŢĂ, PhD

**Institution: „Alexandru Ioan Cuza" Police Academy, Bucharest**

**Abstract:** Disinformation and deliberate information manipulation have emerged as defining security threats of the 21st century, capable of destabilizing democratic institutions, eroding public trust, and undermining the decision-making capacity of both governments and citizens. Unlike conventional threats, disinformation campaigns operate below the threshold of armed conflict, exploiting the openness of democratic societies and the architecture of digital communication platforms to achieve strategic objectives at minimal cost. This paper examines the mechanisms through which state and non-state actors deploy disinformation as a tool of hybrid warfare, analyzes documented campaigns targeting European democratic societies, and evaluates the institutional and legislative responses developed at national and EU level to counter this threat. Findings indicate that effective counter-disinformation strategies require coordinated action across law enforcement, intelligence, media literacy, and digital regulation domains. The implications for

*Romanian security institutions are considered in light of the country's exposure as a NATO Eastern Flank member state.*

**Keywords:** *disinformation, information warfare, hybrid threats, democratic security, media literacy, NATO*

### **8. (ID 33) The Mathematics Behind Passwords**

**Authors:** stud. Bianca-Elena MIHĂILĂ, stud. Alexia-Maria ZAHARIEA

**Scientific Advisor:** Assoc. Prof. Eleonora RĂPEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The paper analyzes the role of mathematics in the process of securing and analyzing passwords used in the digital environment. With the help with matematics, it is possible to calculate the probability of guessing a password and the time required to test all possible combinations using Brute-force attacks. The results highlight the fact that mathematics is the theoretical foundation of modern cybersecurity, contributing both to the development of protection algorithms and to the analysis of vulnerabilities in online authentication systems.*

**Keywords:** *Cryptography, Password security, Combinatorics, Probability theory, SHA-256, Cryptosystem*

### **9. (ID 48) Psychological Preparation for Combat**

**Authors:** stud. Carmen-Laura BONDEA, stud. Luiza-Gabriela BOUROȘ

**Scientific Advisor:** Assoc. Prof. Carmen COJOCARU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the importance of psychological preparation for combat within modern military structures, highlighting the essential role of psychological factors in maintaining operational performance and decision-making under stress. The study is based on the concept of operational stress, defined as the set of emotional, cognitive, physical, and behavioral reactions experienced by military personnel exposed to combat situations, and examines both adaptive and maladaptive responses. The paper presents a phased model of psychological preparation structured into four main stages: pre-mission preparation, stress-based training, in-mission adaptation, and post-mission reintegration. Each stage*

*includes specific methods aimed at developing resilience, maintaining group cohesion, and preventing mental health disorders such as post-traumatic stress disorder (PTSD), anxiety, and burnout. Modern training techniques are also highlighted, including stress inoculation training, realistic simulations, and the use of emerging technologies such as virtual reality and military-oriented mindfulness. In addition, the role of leadership and family support is emphasized as a key factor in maintaining psychological balance among military personnel. Furthermore, the study underlines that psychological training programs are scientifically validated and institutionally implemented at NATO level and within the Romanian Armed Forces, contributing significantly to reducing the incidence of mental health issues and enhancing operational effectiveness. In conclusion, psychological preparation for combat represents a fundamental component of modern military training, playing a decisive role in mission success and in protecting the mental health of military personnel.*

**Keywords:** *psychological preparation operational stress resilience PTSD (post-traumatic stress disorder) military performance group cohesion stress training operational adaptation post-mission reintegration military mental health*

## **10. (ID 49) When Survival Learned to Think: The Evolution of Intelligence from Antiquity to the Modern Era**

**Authors:** stud. A N., stud. B. S.

**Scientific Advisor:** Prof. Assist. A. S., PhD

**Institution:** "Mihai Viteazul" National Intelligence Academy

**Abstract:** *This article traces the evolution of intelligence and security services from the earliest informal uses of strategic information to the highly organized, technologically advanced systems of the present day. Intelligence in its rudimentary form — gathering information covertly or through informal networks — has existed for millennia, but only gradually became institutionalized as formal statecraft practice. By the mid-19th and early 20th centuries, emerging nation-states began to professionalize intelligence work, developing dedicated bureaus and analytic methodologies that anticipated modern practices. Technological advances such as signals interception, satellites, and later digital surveillance*

*reshaped intelligence collection and analysis, while ethical and legal debates about oversight intensified. In the 21st century, intelligence services are confronted with new challenges from non-state actors, cyber threats, and pervasive data environments. Thus, the trajectory of intelligence services reveals an ongoing adaptation to shifting political, military, and technological landscapes, illustrating both the enduring importance and the complex evolution of clandestine information work in global affairs.*

**Keywords:** *Evolution of Intelligence, History of Espionage, Counterintelligence, Technological Innovation, National Security, Non-state Actors*

## **11. (ID 51) Leadership and Courage**

**Authors:** stud. Abdul-Nasser KOURDOUGHLI, stud. Andrei-Valentin SEMCO

**Scientific Advisor:** Assoc. Prof. Carmen COJOCARU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This project examines the relationship between leadership and courage, with a focus on the military and naval environment. Leadership is defined as the ability to influence and motivate individuals to accomplish missions effectively. In military contexts, leadership involves significant responsibility, as decisions directly impact operational success and personnel safety. Courage is highlighted as a key leadership quality, expressed both physically, through facing danger, and morally, through defending values and making difficult decisions under pressure. Effective leaders must demonstrate discipline, adaptability, and strong decision-making skills, especially in crisis situations. The project also explores leadership theories and psychological factors such as emotional intelligence, confidence, and the ability to inspire trust. It emphasizes that leadership and courage can be developed through training, education, and experience within military institutions. These aspects contribute to building effective teams and improving overall organizational performance in complex and high-risk operational environments where resilience and responsibility are essential qualities.*

**Keywords:** *Leadership, Courage, Military Leadership, Naval Leadership*

## **12. (ID 57) Government Responses to Terrorist Attack**

**Author:** stud. Maciej Kamil WYSZYŃSKI

**Scientific Advisor:** Katarzyna KURKIEWICZ

**Institution:** Military University of Technology - MBA alumn

*Abstract:* Terrorist attacks pose significant challenges to national security systems and require rapid, coordinated, and effective responses from governments. This paper examines the nature and effectiveness of governmental responses to terrorist incidents, focusing on decision-making processes, crisis management strategies, and inter-agency coordination. The study analyzes key components of state reaction, including immediate operational response, public communication, legal measures, and long-term policy adjustments. Particular attention is given to how governments balance security needs with the protection of civil liberties, as well as how emerging threats influence the evolution of response frameworks. The paper also explores the role of intelligence, information flow, and institutional preparedness in shaping the outcomes of crisis situations. Selected case studies are used to illustrate differences in national approaches and to identify best practices and common challenges. The findings highlight that effective responses to terrorism depend not only on operational capabilities but also on adaptive governance structures, efficient information management, and public trust. The paper contributes to a better understanding of how modern states can enhance resilience and improve their strategic responses to terrorist threats.

**Keywords:** #crisis governance #extremism #radicalization #international security #threat prevention

## **13. (ID 71) Designing Leadership Competencies for Air Defense Officers in the Context of New Informational Challenges**

**Author:** stud. Marian-Constantin MAREȘ

**Scientific Advisor:** Col. Prof. Adrian LESENCIUC, PhD

**Institution:** "Henri Coandă" Air Force Academy, Brașov

*Abstract:* The contemporary military operational environment is characterized by unprecedented information density, particularly within air defense structures, where split-second decision-making is critical. Consequently, the traditional archetype of the military

*leader must evolve to meet these new cognitive and communicative demands. This paper aims to design and define the core leadership competencies required for future air defense officers in the context of emerging informational challenges. Drawing upon the theoretical framework of the leader archetype, the study explores how these foundational traits can be integrated into modern curricular projections. The research focuses on the intersection of effective military communication, rapid information processing, and tactical decision-making under extreme stress. By analyzing the specific operational requirements of the air defense branch, the paper proposes a curricular adaptation strategy aimed at developing cadets into officers who are not merely technical specialists, but resilient leaders capable of managing information overload. The findings suggest that integrating targeted communication and information-management training into the educational curriculum is essential for transforming the archetypal leader into a highly competent decision-maker, fully equipped for the complexities of the modern tactical information environment.*

**Keywords:** *leadership archetype, air defense, informational challenges, curricular design, military communication, tactical decision-making.*

#### **14. (ID 75) Strategic Cyber Resilience: A Comprehensive Analysis of Ransomware & NotPetya**

**Authors:** stud. Andra-Georgiana BADIU, stud. Teodor Petruț ILIE

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract: This research analyzes the evolution of cyber threats, focusing on the 2017 NotPetya attack as a pivotal moment where state-sponsored warfare was disguised as ransomware. Unlike standard financial extortion, NotPetya functioned as a destructive "wiper" targeting the M.E. Doc supply chain, exploiting the EternalBlue vulnerability to cause global failures, including \$300 million in losses for Maersk. By 2025, cybercrime has industrialized into a Ransomware-as-a-Service (RaaS) ecosystem. Modern tactics have escalated to triple extortion and BYOVD techniques that disable security defenses. European trends show high-precision targeting of public administration, manufacturing, and healthcare sectors. The*

*report concludes that traditional perimeter defenses are insufficient. Organizations must shift toward Zero Trust Architecture (ZTA), utilizing micro-segmentation and continuous verification to limit the "blast radius" of intrusions. Critical resilience is achieved through the 3-2-1-1-0 backup standard, which mandates immutable and offline data copies to ensure recovery without negotiating with attackers. Ultimately, cybersecurity in 2025 must prioritize resilience and recoverability over absolute prevention*

**Keywords:** *Cybersecurity, Attack, Ransomware*

### **15. (ID 77) Analysis Regarding the Role of Critical Infrastructure in Hybrid Warfare**

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**Scientific Advisor:** Cpt. Cosmina NECULCEA

**Institution:** "Henri Coandă" Air Force Academy, Braşov

**Abstract:** *This paper examines the strategic role of critical infrastructure as a central target in contemporary hybrid warfare. In an increasingly interconnected security environment, disruption of the energy, transportation and digital sectors is not just a technical attack, but a tool of political pressure and social destabilization. The study explores how hybrid actors exploit systemic vulnerabilities to achieve strategic goals without triggering open conventional conflict. The findings highlight the need for an integrated approach to resilience, combining cyber security with physical protection, to guarantee the continuity of vital state functions in the face of modern asymmetric threats.*

### **16. (ID 81) The Role of “Captain Aviator Constantin Cantacuzino”, 57th Air Base Mihail Kogălniceanu, in Air Security in The Black Sea Region**

**Authors:** stud. Zsolt-Daniel NEMETHI, stud. Denis-Cristian ŞIMONCA

**Scientific Advisor:** Col. Assoc. Prof. Cosmina-Oana ROMAN, PhD

**Institution:** "Henri Coandă" Air Force Academy, Braşov

**Abstract:** *Over the past few years, The Black Sea region has gained significant importance in both national and NATO security. Due to its location, “Captain Aviator Constantin Cantacuzino” 57th Air Base, in the south-east of Romania, has the role of maintaining the*

*security of the eastern NATO border, being used as a strategic and logistic hub. It is used by the Romanian Air Force, the USA and NATO allies, apart from keeping the national and alliance integrity, for international exercises and training to enhance the chemistry between foreign personnel, as well as air police and transit for both Romanian and foreign nationals in the theater of operation. The strategic positioning, the fact that many NATO states deploy personnel at this base and the facilities function as a deterrent against the potential enemies of the alliance and hostile activities. The present paper aims at highlighting the importance of the airbase in defending the European eastern flank, dealing with the threats coming from Ukrainian – Russian war. The enhanced air policing together with the multinational involvement of forces contributes to the collective defense.*

**Keywords:** *collective defense, enhanced air policing, integrity, logistic hub*

### **17. (ID 84) Information Superiority as a Decisive Factor in Modern Military Sciences**

**Author:** stud. Mihai-Robert CRIVINEANU

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**Institution:** “Henri Coandă” Air Force Academy, Braşov

**Abstract:** *Information superiority has become a critical element in modern military operations. The ability to collect, process, and distribute information faster and more accurately than the adversary provides a significant strategic advantage. This paper analyzes the role of information superiority in contemporary military sciences, highlighting its impact on decision-making, operational effectiveness, and battlefield awareness. By integrating advanced technologies such as intelligence systems, cyber capabilities, and surveillance networks, modern armed forces can enhance situational awareness and reduce uncertainty. Ultimately, information superiority plays a decisive role in achieving success in modern military conflicts*

**Keywords:** *Superiority Highlighting Technologies Modern*

### **18. (ID 87) The Evolution of Fighter Jets From 4th To 5th Generation**

**Authors:** stud. Vlad OGĂŞAN, stud. Patrick PÎRVĂNESCU

**Scientific Advisor:** Cpt. Adrian GEORGE

**Institution:** "Henri Coandă" Air Forces Academy, Braşov

**Abstract:** *The evolution of fighter aircraft from fourth-generation platforms to fifth-generation systems reflects significant technological and operational changes in modern military aviation. Fourth-generation fighters were designed to emphasize speed, maneuverability, and aerodynamic performance in traditional air combat. In contrast, fifth-generation aircraft incorporate advanced technologies such as stealth design, sensor fusion, advanced avionics, and network-centric communication systems. These new capabilities enhance not only situational awareness but also allow aircraft to operate effectively within an integrated combat environment. As a result, air superiority increasingly depends not only on the physical performance of aircraft but also on the ability to collect, process, and share information in real time, marking an important shift in the principles of contemporary air warfare.*

**Keywords:** *Stealth technology, Network-centric warfare, Air superiority, Sensor fusion*

## **19. (ID 92) Cyber Warfare as a Strategic Tool in Modern Military Operations**

**Author:** stud. Alexandru Cosmin POPESCU

**Scientific Advisor:** Cpt. Lecturer Cosmina-Andreea NECULCEA, PhD

**Institution:** "Henri Coandă" Air Force Academy, Braşov

**Abstract:** *Cyber warfare has become an essential component of modern military strategy, significantly influencing the way conflicts are conducted in the digital age. As military operations increasingly rely on information systems, communication networks, and digital infrastructure, cyberspace has emerged as a critical domain of warfare alongside land, sea, air, and space. This paper examines the role of cyber warfare as a strategic tool in modern military operations, focusing on its capabilities, objectives, and impact on national security. The study analyzes how cyber operations can be used to disrupt enemy communications, compromise military infrastructure, gather intelligence, and influence decision-making processes. Furthermore, it explores the strategic advantages offered by cyber capabilities, including asymmetry, anonymity, and the*

*ability to conduct operations without direct physical confrontation. The paper also highlights the challenges associated with cyber warfare, such as attribution difficulties, legal and ethical considerations, and the vulnerability of critical infrastructure. By examining recent developments and examples of cyber operations in contemporary conflicts, this research emphasizes the growing importance of cyber capabilities in shaping modern warfare. The findings suggest that cyber warfare will continue to play a crucial role in future military strategies, requiring states to strengthen their cyber defense and develop comprehensive policies to address emerging threats in the digital domain.*

**Keywords:** *Cyber Warfare, Information Warfare, Military Strategy, Cyber Security, Digital Infrastructure, National Security*

## **20. (ID 93) Managing Information Flow in Multi-Domain Military Operations**

**Author:** stud. Robert-Florin LOMER

**Scientific Advisor:** Cpt. Lecturer Cosmina NECULCEA, PhD

**Institution:** "Henri Coandă" Air Force Academy, Braşov

**Abstract:** *The contemporary security environment is increasingly shaped by technological advancements, complex threat dynamics, and the growing importance of the information domain in military operations. In this context, information superiority has emerged as a critical factor influencing operational effectiveness and strategic success. Information superiority refers to the capability to collect, process, analyze, and disseminate relevant information while simultaneously denying adversaries the ability to exploit similar capabilities. This paper examines the role of information superiority as a key enabler in modern military operations, emphasizing its impact on decision-making processes, situational awareness, and operational coordination. The study explores how the integration of intelligence, surveillance and reconnaissance systems, advanced communication networks, cyber capabilities, and command and control structures contributes to the effective management of information within the operational environment. Furthermore, the research highlights the challenges associated with maintaining information superiority, including cyber threats, information overload, and the increasing complexity of modern information*

systems. The paper argues that achieving and sustaining information superiority requires not only technological superiority but also effective information management, interoperability among military systems, and personnel capable of operating within complex digital battlespaces.

**Keywords:** information superiority, military operations, situational awareness, command and control, cyber domain

## **21. (ID 97) The psychology of form**

**Author:** stud. David MANOLESCU

**Scientific Advisor:** Assoc. Prof. Carmen COJOCARU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** Gestalt psychology is an important direction in psychology that studies how people perceive reality as organized wholes, not as simple sums of elements. This orientation emerged at the beginning of the 20th century, as a reaction against structuralism and associationism. The central idea is that "the whole is more than the sum of its parts". The founder of Gestalt psychology, Max Wertheimer, studied human perception and thinking, discovering the phi phenomenon, which demonstrates the perception of movement where there is none in reality. He introduced the concept of learning by insight, that is, the sudden understanding of the solution to a problem. Kurt Koffka, co-founder of this school, contributed to the international spread of Gestalt ideas. He emphasized that perception is a unitary process, and the meaning of the parts is determined by the whole. His contributions have particularly influenced educational psychology. Wolfgang Köhler studied intelligence in primates and demonstrated that problem solving is achieved through insight, not through repeated attempts. He advocated the importance of understanding in the learning process. Kurt Lewin extended Gestalt principles to social psychology. He formulated the field theory, according to which behavior is the result of the interaction between the person and the environment. He introduced the concept of "life space" and contributed to the study of group dynamics. Friedrich Schumann analyzed the perception of movement and highlighted the connection between perception and memory. He demonstrated that the mind automatically organizes information into coherent structures, facilitating learning. Heinz Werner applied Gestalt

*principles to developmental psychology, arguing that child development is a holistic process. He highlighted the importance of experience and the organization of information in the learning process. In conclusion, Gestalt psychology has had a major impact on modern psychology, especially cognitive, educational and social psychology. It emphasizes understanding, organization and perceiving reality as a coherent whole.*

**Keywords:** *psychology, law of proximity, law of continuity, law of similarity*

## **22. (ID 98) The Efficiency of Innovative Conjugation of UAV-USV Binomial Demonstrated in the Activity in the Black Sea**

**Author:** stud. Rareș-Valentin SABO

**Scientific Advisor:** Col. (Ret.) Assoc. Prof. Ionică CÎRCIU, PhD

**Institution:** "Henri Coandă" Air Force Academy, Brașov

**Abstract:** *The emergence of the UAV-USV binomial in the Black Sea represents a revolution in naval warfare, replacing traditional crewed platforms with integrated unmanned swarms. This study examines how the innovative conjugation of these assets decouples maritime 'eyes' and 'teeth.' High-altitude Unmanned Aerial Vehicles (UAVs) serve as persistent scouting and relay nodes, while low-profile Unmanned Surface Vehicles (USVs) act as stealthy kinetic effectors. This 'Scout-Striker' architecture leverages an asymmetric cost-to-effect ratio to achieve sea denial against a blue-water navy without the use of conventional cruisers. Over the last four years, this doctrine has evolved from experimental raids in 2022 to a formalized naval strategy by 2026. Data indicates that this binomial approach has neutralized over 20% of the Russian Black Sea Fleet, forcing a strategic retreat from Crimea. The synergy between these platforms does not merely add to their individual capabilities but multiplies them, creating a 'wolf pack' tactical model that is difficult to intercept and economically disastrous for traditional naval forces. This shift signifies a permanent transition toward distributed, autonomous maritime power.*

**Keywords:** *naval forces, Scout-Striker, UAV-USV binomial, maritime power*

### **23. (ID 109) Biomimicry in Military Tech**

**Author:** stud. Desislava MUSINSKA

**Scientific Advisor:** Associate Professor Veselka RADEVA

**Institution:** "Nikola Vaptsarov" Naval Academy, Bulgaria

**Abstract:** *This paper explores how biomimicry - the practice of drawing technological inspiration from biological systems - provides innovative solutions to modern military challenges. Building on the foundational ideas popularized by Janine M. Benyus, the study argues that nature offers optimized models of efficiency, stealth, adaptability, and resilience developed through millions of years of evolution. Case studies demonstrate how shark dermal denticles inform antifouling naval coatings that reduce drag and fuel consumption, while the fusiform body shapes of marine animals influenced the revolutionary hydrodynamic design of the USS Albacore. Gecko adhesion systems inspire silent vertical mobility technologies, and the coordinated hunting behavior of orcas and swarm organization of ants provide conceptual frameworks for decentralized military strategy. The acoustic stealth of owl flight further illustrates how microstructural biological adaptations can inform quieter vehicles and surveillance platforms. Together, these examples show that biomimicry is not merely aesthetic imitation, but a rigorous engineering philosophy that integrates biological intelligence into defense innovation. The paper concludes that future military advancement will increasingly depend on interdisciplinary collaboration between biology and engineering, positioning nature as a strategic blueprint for next-generation technology.*

**Keywords:** *biomimicry; military innovation; naval engineering; bio-inspired design; stealth technology; swarm strategy; hydrodynamics; adaptive systems; nature-inspired technology*

### **24. (ID 116) The Digitalization of Military Logistics and Its Impact on Sustainability and Operational Efficiency**

**Authors:** stud. Gabriel-Alexandru MARIN, stud. Răzvan Iulian PATRICHE

**Scientific Advisor:** Col. Assoc. Prof. Ștefan-Antonio DAN-ȘUTEU, PhD

**Institution:** „Carol I” National Defence University, Bucharest

**Abstract:** *The digitalization of military logistics represents a fundamental transformation in the way armed forces plan, coordinate, and execute support operations. This technological evolution not only enhances operational efficiency in combat theaters, but also becomes a strategic pillar in achieving sustainability goals. The study explores the integration of emerging technologies such as Artificial Intelligence (AI), Big Data analytics, the Internet of Military Things (IoMT), blockchain, and digital twins, emphasizing how these innovations optimize resource consumption, reduce carbon emissions, and improve traceability and operational security. The paper highlights the logistical benefits of digitalization, including automated resupply, predictive maintenance, the use of drones and autonomous vehicles for deliveries in hostile environments, and scenario modeling through risk-free simulations. At the same time, it addresses associated challenges: cybersecurity vulnerabilities, implementation difficulties in austere environments, the need for interoperability between systems, and personnel resistance to change. The conclusion underlines that the digitalization of military logistics is not just a competitive advantage, but a strategic necessity. Sustainability is becoming the driving force behind logistical innovation, prompting the transition to autonomous, interconnected, and adaptable digital systems. Thus, the future of military logistics is shaped as efficient, resilient, and deeply environmentally responsible.*

**Keywords:** *Digitalization, Military logistics, Sustainability, Artificial Intelligence (AI), Internet of Military Things (IoMT), Predictive maintenance, Cybersecurity, Autonomous Systems.*

## **25. (ID 119) From Dream to Flight – The Historical Evolution of Romanian Aviation**

**Authors:** stud. Tudor-Florin HADA, stud. Ștefan PRIPON

**Scientific Advisor:** Air Flotilla General (r.) Lect. Jănel TĂNASE

**Institution:** “Henri Coanda” Air Force Academy

**Abstract:** *The paper examines the remarkable development of aeronautics in Romania, highlighting the transition from the first imaginative projections and rudimentary experiments to the international recognition of Romanian engineering genius. Romanian aviation was not only a military or civil necessity, but also*

*an expression of a nation's desire for self-improvement, situated at the intersection of tradition and modernity. Personalities such as Traian Vuia, Aurel Vlaicu, and Henri Coandă demonstrated that Romania was not merely a spectator, but a protagonist in the aerospace revolution. Particular emphasis is placed on the transition from flight as an experiment to flight as a controlled technology. During the interwar period, when Romania was among the world's elite aircraft manufacturers, the major development of the IAR Braşov factories took place. Special attention is given to the legendary IAR-80, a Romanian-designed fighter aircraft that symbolized the national industry's capacity to equip the armed forces with advanced technology. At the same time, it is important to note the creation of the Romanian Air Corps and its crucial role in the Balkan Wars and the First World War. Military doctrine quickly adapted to the new weapon of the air, where pilots and observers began writing important pages in the history of military honor. The final part of the paper addresses the integration of Soviet-origin technology during the Cold War, the development of training aircraft (the IAR-93 and IAR-99 series), and, finally, the transition to NATO standards through the acquisition of F-16 aircraft. The essential message of the topic addressed is that the evolution of Romanian aviation also reflects the broader process of modernization of the Romanian state.*

**Keywords:** *aviation, Aeronautics, Innovation, Industry, Modernization*

## **26. (ID 121) Psychological Effects of Information Overload in Aeronautical Activities**

**Authors:** stud. Andra POPA, stud. Iulia-Bianca PAPP

**Scientific Advisor:** Lecturer Mihaela GURANDA, PhD

**Institution:** "Henri Coandă" Air Force Academy, Braşov

**Abstract:** *This paper explores the impact of information overload on aeronautical operators, focusing on two critical roles: the Air Traffic Controller and the Electronic Warfare operator. Drawing upon Cognitive Load Theory and the Shannon-Weaver Model, the study demonstrates how massive data volumes and intentional noise (jamming, deception) degrade executive decision-making processes. While the Air Traffic Controller faces the "loss of the picture" phenomenon and cognitive tunneling, the Electronic Warfare*

*operator experiences “psychological whiplash” and a depletion of neural resources due to hypervigilance and the constant need for semantic filtering in hostile environments. The paper correlates neurophysiological indicators with human error rates, providing a mathematical-psychological model for understanding human limitations within the modern information space. The conclusions propose mitigation strategies through the adaptive design of human-machine interfaces, essential for navigational safety and mission success under conditions of induced uncertainty.*

**Keywords:** *cognitive load, Air Traffic Control, Electronic Warfare, information overload, human limitations, massive data volume*

## **27. (ID 123) Cybersecurity in the Digital Age**

**Authors:** stud. Elena Alexandra GRUMAZESCU, stud. Ioana Luciana TOADER, stud. Ioana Victoria BUSU

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy ”Mircea cel Bătrân”

**Abstract:** *In the first part of the paper, the fundamental concepts of cybersecurity are analyzed, with a particular focus on the notion of malware, defined as malicious software designed to compromise the functionality of computer systems or to gain unauthorized access to data. In this context, spyware is presented as a tool used for the covert collection of information, while ransomware is described as a direct threat characterized by blocking access to data and demanding a ransom for its recovery. In the continuation of the paper, the role of the actors involved in cyberattacks is examined. The differences between black hat hackers, who engage in illegal activities for financial gain or destructive purposes, and white hat hackers, who use their technical knowledge ethically to identify and remediate vulnerabilities, are highlighted. Additionally, other categories such as grey hat and green hat hackers are mentioned in order to emphasize the complexity and diversity of the cybersecurity ecosystem. Another important aspect addressed in this paper concerns the methods and techniques used in cyberattacks. The main stages of an attack are analyzed, from information gathering to system compromise and covering tracks. At the same time, particular attention is given to attacks based on social engineering, such as phishing, vishing, and smishing, which exploit the psychological*

*vulnerabilities of users and demonstrate that the human factor represents one of the most significant weaknesses in cybersecurity. In the following section, the paper highlights the evolution of cyberattacks in the context of recent technological developments. There is a significant increase in the complexity of spyware and ransomware, as well as the emergence of “as-a-service” models, which facilitate the launch of attacks even by individuals with limited technical expertise. Furthermore, the use of artificial intelligence and deepfake technologies contributes to the increased effectiveness of attacks and makes their detection more difficult. Finally, the consequences of these threats on society are analyzed, highlighting financial losses, data breaches, and the erosion of trust in the digital environment. It is emphasized that prevention requires an integrated approach that includes both technical solutions and user education, as well as the implementation of appropriate security policies.*

**Keywords:** *Cybersecurity, Hackers, Cyber Attacks, Data Security*

## **28. (ID 126) Application of Palantir Platforms in Military Decision-Making and Information Superiority**

**Author:** stud. Nikolay DONKOV

**Scientific Advisor:** Assoc. Prof. Stoyan BARAMOV, PhD

**Institution:** „Vasil Levski" NMU, Bulgaria

**Abstract:** *In today's rapidly changing security landscape, the growing volume and complexity of data present serious challenges for modern military operations. To respond effectively, armed forces increasingly rely on advanced technologies that can integrate, process, and interpret large amounts of information in real time. One company that has gained significant attention in this field is Palantir Technologies, known for its data analytics platforms used across defense and intelligence communities. This paper examines the main capabilities of platforms such as Palantir Gotham and Palantir Foundry, with a focus on how they bring together diverse data sources and support more informed decision-making. Their role in areas like intelligence analysis, battlefield coordination, and counterterrorism efforts is discussed, highlighting how these tools can improve situational awareness in complex operational environments. At the same time, the paper does not overlook the challenges associated with the use of such systems. Issues related to*

*data privacy, ethical concerns, and reliance on proprietary technologies remain important and deserve careful consideration. Overall, the analysis suggests that platforms like those developed by Palantir can play a key role in achieving information superiority, which is increasingly seen as essential in modern warfare. Integrating advanced data analytics into military operations is therefore not just beneficial, but necessary for maintaining a strategic edge.*

**Keywords:** *Palantir, military intelligence, data analytics, information superiority, decision-making, defense technologies*

## **29. (ID 129) Tools of social influence and propaganda during modern conflicts. Case study: Memes in USA vs. Iran**

**Authors:** stud. M.-A. P., stud. F.-A. A.

**Scientific Advisor:** Assoc. Prof. E. D., PhD

**Institution:** "Mihai Viteazul" National Intelligence Academy, Bucharest

**Abstract:** *Given the context of nowadays conflicts, digital memes have become tools of high significance of social and political influence among people. This paper analyzes their role in the dynamics of the ongoing conflict between the United States and the Islamic Republic of Iran, by highlighting how state actors and non-state actors tend to use viral content on social media so as to shape public perceptions and build favourable narratives. On one hand, official American and even Israeli institutions have integrated memes from pop culture to promote military actions and mobilize internal support, turning a key conflict into a digital show for the many users of the Internet. On the other hand, users and adversaries exploit memes to use irony in their favour, to harshly criticize or discredit opponents. Therefore, memes contribute to the process of simplification and clarification of the reality, the amplification of propaganda, and the intensification of the contemporary global informational secret war.*

**Keywords:** *memes, social influence, USA, Iran, Israel, digital propaganda, information, war, social media, modern conflicts, disinformation*

### **30. (ID 139) The Role of the Romanian Gendarmerie in Wartime Internal Defense: A Scenario Analysis in Dobrogea**

**Author:** stud. Alessia GHIȚULESCU

**Scientific Advisor:** Assoc. Prof. Lt.col. Cătălin ENUȚĂ, PhD

**Institution:** "Alexandru Ioan Cuza" Police Academy

*Abstract:* In a wartime situation in Dobrogea, the Romanian Gendarmerie shifts quickly into internal defense roles, dealing with hybrid threats like sabotage, infiltration, and outbreaks of civil unrest. Several key units Special Unit 72, the Constanța County Gendarmerie Inspectorate, and the Tomis Mobile Gendarmerie Group work together to protect critical infrastructure and keep stability in areas behind the front lines. Special Unit 72 is mainly responsible for securing high-risk sites such as the Cernavodă Nuclear Power Plant. At the same time, the Inspectorate focuses on maintaining public order and managing civilian activity, while the Mobile Group is ready to intervene rapidly wherever needed. Given the proximity to strategic locations like the Danube, these forces also have to control population movement and ensure safety in potentially dangerous conditions. Their coordinated actions play a key role in maintaining security and supporting broader military efforts in the region.

**Keywords:** Romanian Gendarmerie, Internal Defense, Hybrid Threats, Critical Infrastructure, Rear-Area Stability

### **31. (ID 145) The Sky as a Theater of Operations: Strategic Decisions and Innovations in the History of Cold War Fighter Aviation**

**Authors:** stud. Eduard Mihai ACSÂN, stud. Gabriel COMAN

**Scientific Advisor:** Air Flotilla General (r.) Lect. Jănel TĂNASE

**Institution:** "Henri Coanda" Air Force Academy, Brașov

*Abstract:* titled "The Sky as a Theater of Operations: Strategic Decisions and Innovations in the History of Cold War Fighter Aviation," this project investigates the evolution and profound impact of fighter aircraft during a defining era of global military competition. It explores the intricate dynamic between the strategic imperatives of the United States and the Soviet Union and the rapid technological advancements that characterized their struggle for air superiority. The research details key milestones in aerospace

*engineering, including the shift to jet propulsion, breaking the sound barrier, and the introduction of advanced radar, guided missiles, and early stealth concepts. These breakthroughs drove the emergence of distinct fighter "generations," fundamentally altering combat doctrines. Moreover, the study analyzes how these theoretical and technological advancements were practically applied and continuously refined during proxy conflicts in Korea, Vietnam, and the Middle East. These real-world engagements forced a reevaluation of traditional aerial combat, particularly dogfighting tactics. Ultimately, the paper concludes that Cold War fighter aviation was instrumental in preserving the fragile global balance of power while establishing the crucial technological and doctrinal bedrock for contemporary military aviation.*

**Keywords:** *Cold War, Fighter aviation, Air superiority, Strategic decisions, Dogfighting*

### **32. (ID 146) Trojan Horse**

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**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This project explores the concept of the Trojan Horse as a modern cybersecurity threat, focusing on how it operates and how it is used in today's digital environment. A Trojan Horse is a type of malicious software that disguises itself as a legitimate or harmless program in order to trick users into installing it. Once activated, it can steal data, monitor activity, or provide unauthorized access to attackers. The project examines current pretexts used by cybercriminals, such as fake emails, software downloads, or seemingly trustworthy links, which exploit human curiosity or urgency. It also discusses key topics including social engineering, system vulnerabilities, and methods of prevention. By analyzing real-world examples, the project highlights how Trojan attacks have evolved and why they remain effective. The goal is to raise awareness about online safety and to demonstrate the importance of cautious behavior, updated security systems, and user education in preventing such cyber threats.*

**33. (ID 148) *The use of Artificial Intelligence in maritime surveillance and intelligence activities on the Black Sea coast***

**Author:** stud. Robert-Alexandru RASALIU

**Scientific Advisor:** Lieutenant Colonel, Assoc. Prof. Cătălin ENUȚĂ, PhD

**Institution:** „Alexandru Ioan Cuza” Police Academy, Bucharest

**Abstract:** *Maritime security has become a key component of national and regional security, particularly in the context of increasing globalization and the intensification of commercial flows. The Black Sea region, due to its strategic geographical position, represents a critical area both for economic development and for the manifestation of transnational organized crime, including drug trafficking, human trafficking, illegal migration and arms smuggling. The present paper examines the role of artificial intelligence in supporting maritime surveillance and intelligence activities carried out by structures of the Ministry of Internal Affairs along the Black Sea coast. The research hypothesis of this paper is that the integration of artificial intelligence into maritime surveillance and intelligence activities leads to an increase in the operational efficiency of MAI structures and improves the capacity to prevent and combat illegal trafficking on maritime routes in the Black Sea area. The study is based on the analysis of specialized literature, institutional reports and operational practices regarding maritime security and intelligence. It highlights the limitations of traditional surveillance systems, such as the high volume of data, dependency on human factors and delayed response time. The findings indicate that the implementation of artificial intelligence technologies, such as machine learning algorithms and automated data analysis systems, contributes to faster processing of information, identification of behavioral patterns and improved risk assessment. Consequently, artificial intelligence represents a valuable tool for enhancing operational capabilities and adapting law enforcement structures to emerging security threats in the maritime environment.*

**Keywords:** *maritime security, artificial intelligence, intelligence activities, Black Sea, organized crime, drug trafficking, law enforcement, Ministry of Internal Affairs*

### **34. (ID 149) The Psychology of Decision-Making in High-Risk Military and Police Operations**

**Author:** stud. Andrei Nicolae CIORBA

**Institution:** „Alexandru Ioan Cuza” Police Academy, Bucharest

**Abstract:** *Decision-making in military and law enforcement contexts frequently occurs under conditions of extreme stress, uncertainty, and time pressure. This paper examines how key psychological factors influence judgment in such high-risk environments, with particular focus on stress responses, cognitive biases, and situational awareness. Research in cognitive psychology demonstrates that acute stress can narrow attentional focus and accelerate reaction times, while simultaneously reducing accuracy and increasing reliance on heuristic-based thinking. Theoretical frameworks such as dual-process theory, developed by Daniel Kahneman, and recognition-primed decision-making, introduced by Gary Klein, help explain how professionals make rapid judgments under pressure. Additionally, neurobiological mechanisms associated with threat perception, explored by Joseph LeDoux, further shape behavioral responses in critical situations. The paper also evaluates how experience and structured training programs can mitigate cognitive limitations, enabling more effective and legally sound decisions. By linking psychological theory with operational practice, this study highlights the importance of mental preparedness and adaptive expertise. Understanding these mechanisms is essential for improving performance, ensuring accountability, and maintaining ethical standards in high-risk operations.*

**Keywords:** *Decision-making under stress, Situational awareness, Recognition-primed decision-making*

### **35. (ID 151) Temperament**

**Author:** stud. Alexandra-Mălina MATEI

**Scientific Advisor:** Assoc. Prof. Carmen-Luminița COJOCARU, PhD.

**Institution:** Romanian Naval Academy ”Mircea cel Bătrân”

**Abstract:** *This presentation explores the concept of temperament as the biological foundation of personality, emphasizing its role in shaping emotional responses, behavior intensity, and reaction patterns. Temperament is distinguished from character and*

*personality, being largely inherited and linked to the nervous system, while character is formed through education and experience. The project outlines the four classical types of temperament—sanguine, choleric, phlegmatic, and melancholic—highlighting their defining traits and behavioral tendencies. Each type is analyzed in terms of emotional reactivity, social interaction, and adaptability, with particular attention to their strengths and limitations. A key focus of the presentation is the relevance of temperament in the military environment. It examines how different temperaments influence stress response, adaptability to challenging conditions, teamwork dynamics, and emotional discipline. The study demonstrates that understanding individual temperaments can enhance team efficiency, improve communication, and support better role distribution within military units. Additionally, the presentation connects temperament to leadership styles, suggesting that each temperament type can contribute uniquely to leadership effectiveness from decisive action and motivation to stability and strategic thinking. The conclusion emphasizes the importance of self-awareness, arguing that understanding one’s own temperament is essential for emotional control, professional development, and effective integration into demanding environments such as the military.*

**Keywords:** *Temperament, Personality, Character, Sanguine temperament, Choleric temperament, Phlegmatic temperament, Melancholic temperament, Military psychology*

### **36. (ID 154) Analysis of the Impact of Climate Change on the Operational Capabilities and Strategic Priorities of the European Union’s Common Security and Defence Policy**

**Author:** stud. Petar TENEV

**Scientific Advisors:** Assoc. Prof. Stoyan BARAMOV, Lieutenant Colonel Nikolay PYDAREV

**Institution:** “Vasil Levski” National Military University, Bulgaria

**Abstract:** *This study examines the impact of climate change on the operational capabilities and strategic priorities of the European Union’s Common Security and Defense Policy (CSDP). It analyzes climate change as a threat multiplier affecting missions, logistics, and personnel. The research identifies gaps between political commitments and legal frameworks and proposes measures for*

*integrating climate security into EU defense planning and improving institutional and operational resilience.*

**Keywords:** *Climate Change, Security and Defence Policy, Operational Capabilities, Climate Security, EU Strategic Adaptation*

### **37. (ID 172) Pulmonary Barotrauma in Diving: Risk Factors, Training Protocols and Preventive Strategies**

**Author:** stud. Daria-Maria SAVA

**Scientific Advisor:** OF4 Daniel NICA, PhD

**Institution:** The Military Medicine Institute, “Carol Davila” University of Medicine and Pharmacy, Bucharest

**Abstract:** *Pulmonary barotrauma continues to be one of the main causes of injury and death among divers. In certain high-risk training situations, such as emergency free-ascent exercises, its incidence has been reported to reach up to 12% per dive. Among breath-hold divers, pneumothorax occurs in approximately 5–10% of cases. The most important risk factors include rapid ascent rates (greater than 10 m/min), a history of previous barotrauma and decreased lung compliance. Also, during descent to greater depths, increased ambient pressure causes nitrogen to dissolve more readily into the blood and tissues. Then, nitrogen is progressively saturating the body and is setting the path for potential complications if ascent is not properly controlled. To better understand this issue, a review of the literature was conducted using peer-reviewed studies and clinical reports published between 1995 and 2025. The analysis focused on the frequency of barotrauma, the physiological and pathological factors that increase risk and clinical outcomes in both recreational and professional divers. Particular attention was given to ascent rates, training methods, hyperbaric exposure involving prolonged oxygen breathing and reported fatalities. If we want fewer cases of pulmonary barotrauma, the answer is clear: stick to the protocol of how we train. Get rid of dangerous emergency free-ascent drills. Use realistic simulations, which help divers gain vital experience without the real-world risk. These steps directly address the underlying cause of rapid pressure fluctuations and reduced lung flexibility. Plus, simulations offer a safe environment for skill-building. Finally, it's important to keep studying how hyperbaric*

*exposure affects the body, so safety protocols can continue to improve and save lives.*

**Keywords:** *Pulmonary barotrauma, rapid ascent, hyperbaric exposure, pneumothorax, risk factors*

### **38. (ID 175) The Invisible War: Whoever Controls Perception, Control Reality in The Digital Age**

**Author:** stud. Ionuț-Nicușor AFRĂSÎNEI

**Scientific Advisor:** Assoc. Prof. Andreea CÎRCIUMARU, PhD

**Institution:** "Alexandru Ioan Cuza" Police Academy Bucharest

**Abstract:** *In the digital age, the boundary between reality and perception are becoming increasingly subtle, and the control of information no longer represent just a tool of influence, but a form of strategic power. In this context, modern warfare is being redefined as an invisible conflict, no longer fought on physical battlefields, but in the digital and cognitive space, where the beliefs, emotions and people's decisions are shaped. The paper explores the mechanisms by which public perception influenced in the digital environment, highlighting the role of algorithms, social platforms and emerging technologies in the selection and amplification of information. It analyzes the processes by which reality is filtered and reinterpreted, generating divergent and often manipulative narratives. In this context, the psychological side of this phenomenon plays a crucial role, how human vulnerabilities can be exploited to influence mass perception, and how controlling perception no longer just about transmitting information, but a way to influence reality. This paper proposes a perspective on the relationship between information, technology and psychology, arguing that, in the digital age, control no longer belongs exclusively to those who own the material resources, but to those who manage to shape the way reality is perceived, the reality of a war that we don't see.*

**Keywords:** *Perception Control, Digital Reality, Information Manipulation, Disinformation, Algorithms and Influence*

### **39. (ID 187) The Three Malware that Changed Cibersecurity Over the Last Two Decades**

**Author:** stud. Marius-Cosmin GHIȚULETE

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Three major pieces of malware have significantly shaped the current cybersecurity landscape. Unlike many studies of how the threat has evolved over time, this research explores the impact of key events – rather than gradual developments -- that have shown how connected we are across the globe. When Stuxnet surfaced in the early 2010's; it was one of the first examples of government sponsored cyber war, where software was used to physically destroy an asset – thus forcing all levels of government and private sector security practitioners to rethink what constituted National Security. With Zeus Game Over being the first example of peer-to-peer botnets; the way cybercrime organized itself changed forever and made traditional law enforcement tactics of dismantling crime rings useless. Additionally, this created the ability for thieves to steal hundreds of millions of dollars worldwide from banks. In addition, Crypto Locker provided the template for future attacks (hospitals, infrastructure, government) with its use of unbreakable encryption combined with anonymity via payment, which enabled them to create a scalable business model for ransomware. These three were game changers – not only did they result in tremendous loss when they occurred – but also, they forever changed how security is thought about strategically, technically and legally. This research will argue that today's security environment was developed almost entirely due to the impact of these types of threats, and therefore understanding their legacies will be crucial for developing strategies to combat threats that exist today.*

**Keywords:** *Cybersecurity, Malware, Preparation*

#### **40. (ID 194) Hacking Etic vs Hacking Criminal**

**Authors:** stud. Mihai-Lucian MARINESCU, stud. Riana-Bianca CRIVAT, stud. Mariana-Ioana ȘERBAN

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This project analyzes how skills in the field of computer science can be used in two opposing directions: for ethical purposes and for illegal purposes. Ethical hacking represents an activity carried out with the consent of organizations, aiming to identify system vulnerabilities and improve their security. In contrast,*

*criminal hacking involves unauthorized access to computer systems and is associated with intentions such as obtaining sensitive data, committing fraud, or disrupting digital services. The main elements of a cyberattack are highlighted, including its purpose, the methods used, and the vulnerabilities that are exploited, along with the different motivations of those involved. Through the studying of concrete examples, the impact of such actions is emphasized, as well as the need to promote responsible behavior in the digital environment.*

**Keywords:** *Ethical hacking, criminal hacking, cybersecurity, vulnerabilities, cyberattack, data security, digital environment*

#### **41. (ID 208) The Read String Between Our Mind and Body**

**Authors:** stud. Ștefania ROȘU, stud. Karina DRAGOMIR

**Scientific Advisor:** Assoc. Prof. Daniel SOLESCU, PhD

**Institution:** "Nicolae Bălcescu" Land Forces Academy of Sibiu

**Abstract:** *The beneficial effects sport has on our minds are often difficult to fully comprehend. We tend to give in to various temptations, often overlooking the negative consequences that come with them. For the military, the connection between training and psychological strength should be as strong as an unbreakable will. Since soldiers must always be prepared for any situation, they should always maintain good physical condition, as well as mental readiness. We should always keep in mind the saying: "A healthy mind in a healthy body," because sport and training are not only about physical development, but also about discipline, dedication, pushing one's limits, self-improvement, and becoming a better version of oneself – capable of making better decisions in critical situations. Time management should also be considered an essential skill in this context, as every task must be carefully organized.*

**Keywords:** *improvement, mentality, physique, discipline, devotement*

#### **42. (ID 226) Spyware Malware Analysis**

**Author:** stud. Darius-Gabriel BERBECE

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The rapid digitalization of modern society has significantly increased reliance on information systems, both for individuals and*

organizations. As a result, the cyber attack surface has expanded, allowing threats to evolve and become more sophisticated. Among these threats, spyware stands out as one of the most subtle and problematic forms of malware, mainly due to its ability to gather sensitive information without the user's knowledge and without causing obvious immediate effects. This paper explores spyware as a persistent and intrusive cybersecurity threat, focusing on its impact on data privacy, system security, and user protection. Compared to other types of malwares, spyware typically operates in the background for long periods, which makes it difficult to detect and remove. The topic is particularly relevant given the growing number of cyber incidents reported worldwide, including in Romania, where malware-related attacks have increased noticeably in recent years. In addition, the paper provides an overview of key cybersecurity concepts, common types of cyberattacks, and the role of malware in today's threat landscape. Special attention is given to different forms of spyware, such as keyloggers and adware. The study also highlights the importance of preventive strategies, user awareness, and effective security tools in reducing risks and improving overall cybersecurity.

**Keywords:** Cybersecurity

### **43. (ID 231) Personality in military psychology: theoretical perspectives, classifications and professional relevance**

**Author:** stud. Andreea - Gabriela NEAGU

**Scientific Advisor:** Assoc. Prof., Carmen COJOCARU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** This paper examines the concept of personality from the perspective of military psychology, highlighting the main definitions, classifications, and theoretical models developed over time. It presents both classical and modern approaches, ranging from psychodynamic theories and trait theories to biological, cognitive-affective, and integrative perspectives. The paper emphasizes the role of personality in an individual's adaptation to the environment, in explaining behavior, and in anticipating reactions in professional and military contexts. It also underlines traits such as conscientiousness, emotional stability, extraversion, and adaptability, which are considered essential for performance, leadership, resilience, and team cohesion in the military

*environment. In conclusion, the study of personality represents an important tool for the selection, training, and development of military personnel, contributing to the optimization of professional efficiency and to a deeper understanding of the complexity of human behavior.*

**Keywords:** *personality, military psychology, personality traits, typologies, human behavior, adaptation, resilience, military performance, psychological selection*

#### **44. (ID 232) Implementation of Radiolocation Technologies in Security and Surveillance Applications**

**Author:** stud. Andrada ȘERBANOIU

**Scientific Advisor:** Lt.Col. Eng. Liviu GAINA, PhD

**Institution:** "Henri Coandă" Air Force Academy of Brașov

**Abstract:** *This paper highlights the essential role of radiolocation technologies in modern security and surveillance applications, emphasizing their advantages over conventional optical systems, particularly in low-visibility or adverse weather conditions. The fundamental principles of radar are presented, including distance estimation based on signal propagation time and velocity estimation using the Doppler effect. The applied part of the study consists of a MATLAB-based case study that models a pulse-Doppler radar system using a chirp signal. The simulation includes the generation of echoes from multiple targets located at different ranges and moving with different velocities, the addition of noise, and signal processing through matched filtering, Fourier transform, and Range-Doppler analysis. Target detection is performed using a CFAR algorithm, followed by a clustering stage for identifying real objects. The obtained results demonstrate the system's ability to simultaneously detect and characterize multiple targets, highlighting the effectiveness of radiolocation technologies in applications such as perimeter surveillance, traffic monitoring, and the protection of critical infrastructure.*

**Keywords:** *Radar systems, Doppler effect, CFAR detection, Range estimation*

#### **45. (ID 237) The Role of NATO Military Infrastructure in Romania's Black Sea Security Architecture**

**Author:** stud. Petre Florin BETEA

**Scientific Advisor:** Lt.Col. Cătălin ENUȚĂ, PhD

**Institution:** "Alexandru Ioan Cuza" Police Academy

***Abstract:** In recent years, the security architecture of Eastern Europe has undergone a marked transformation, driven by the growing strategic importance of NATO's military presence on its eastern flank, particularly in Romania. Positioned at the Black Sea crossroads, Romania hosts key military bases that strengthen collective defense and enhance deterrence against potential adversaries. Traditionally focused on support and rotational deployments, these infrastructures have increasingly assumed a central operational role in response to evolving regional threats. Heightened tensions in the Black Sea and the persistence of hybrid challenges have accelerated this shift. Multinational exercises, the deployment of advanced capabilities, and improvements in rapid response readiness reflect a move toward a more robust and permanent posture. This evolution underscores the dual importance of operational effectiveness and strategic integration, including interoperability among allied forces, coordinated defense planning, and host-nation support. At the same time, sustaining these bases involves complex challenges, such as logistical management, infrastructure modernization, and the coordination of multinational contingents, while adapting to emerging threats including cyber and hybrid warfare. Their strategic relevance is further reinforced by civil-military engagement and public support. Against this backdrop, NATO's military infrastructure in Romania constitutes a critical component of regional security, bolstering stability in the Black Sea area and reinforcing the broader Euro-Atlantic defense architecture.*

**Keywords:** NATO military bases, Romania, Black Sea security, Deterrence and collective defense, Hybrid threats

#### **46. (ID 238) Balancing Authority and Public Trust: The Modern Challenges of Gendarmerie Forces**

**Author:** stud. Maria-Ionela LUPEȘ

**Scientific Advisor:** Lt.Col. Cătălin ENUȚĂ, PhD

**Institution:** "Alexandru Ioan Cuza" Police Academy

***Abstract:** This paper analyzes the role of the Gendarmerie in contemporary society, highlighting the need to maintain a constant balance between the exercise of authority and the consolidation of*

*public trust. In the current context, characterized by complex social dynamics, the intensification of protests, and the increased visibility of interventions through mass media and social networks, law enforcement actions are subject to continuous public evaluation. The study emphasizes that the effectiveness of gendarmerie interventions does not depend solely on the ability to enforce order, but also on the legitimacy perceived by citizens and on how the relationship with the community is managed. It examines key institutional challenges, such as managing tense situations, ensuring the proportional use of force, respecting fundamental rights, and maintaining a credible public image. At the same time, it highlights the importance of communication and transparency in strengthening public trust. In conclusion, it is argued that balancing authority and public trust is essential for the effective and legitimate functioning of the Gendarmerie in modern society.*

**Keywords:** *Gendarmerie, public trust, social dynamics, mass media, authority*

#### **47. (ID 247) Artificial Intelligence in Tactical Combat Casualty Triage: Between Decisions Assistance and Autonomous Decision - Making**

**Authors:** stud. Cosmina-Ștefania FOCȘA, stud. Miruna-Ștefania VASILE

**Scientific Advisor:** Second Lieutenant Albert ROZENAUER MD

**Institution:** Military-Medical Institute of Bucharest

**Abstract:** *OBJECTIVE: In the context of modern naval missions, where access to comprehensive medical infrastructure is limited, artificial intelligence is becoming an essential tool for supporting clinical decision-making. This project examines the use of AI in patient triage, the interpretation of medical data, and the provision of assistance to personnel in emergency situations aboard ships. It highlights benefits such as increased efficiency and continuous support for the crew, as well as challenges, including algorithmic errors, data security, and difficulties in integrating AI into military environments. The analysis offers a balanced perspective on the role of AI, emphasizing both its transformative potential and current limitations. MATERIAL AND METHOD: The study examines the use of artificial intelligence (AI) in medical triage in naval scenarios*

*involving multiple casualties and limited resources. First, it assessed decision-making efficiency and triage time, highlighting AI's potential to accelerate the process compared to conventional triage performed exclusively by medical personnel, as well as the risk of overreliance on technology. Second, it analyzed the accuracy of interpreting physiological data under operational stress, highlighting the advantages of standardized decision-making and potential algorithmic errors. Third, it examined the integration of AI into the naval environment, considering continuous support for the crew and challenges related to data security and interoperability. The results were interpreted in the context of tactical triage principles and recent literature on AI applications in military and emergency medicine.*

**Keywords:** *medical triage, naval missions, decision-making efficiency, data security, operational stress, algorithmic errors, survival rates, limitations of AI*

#### **48. (ID 250) Simulation of the Static Nautical Qualities Using AUTOSHIP Software**

**Author:** stud. Alexandra-Mălina MATEI

**Scientific Advisors:** Assoc. Prof. Eng. Mihaela Greti MANEA, PhD  
Lecturer Eng. Elisabeta BUZILĂ, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents the analysis of the static nautical qualities of ships using the AutoSHIP software, focusing on the evaluation of hydrostatic characteristics under various loading conditions. The study highlights the importance of static stability and equilibrium in ensuring the safe operation of vessels in different operational scenarios. The research is based on the numerical modeling of ship hull geometry and the computation of essential hydrostatic parameters, including displacement, draft, center of buoyancy, and stability-related characteristics. These parameters are fundamental for assessing the ship's ability to maintain equilibrium and operate safely under changing loading conditions. The use of AutoSHIP allows an efficient and accurate evaluation of static nautical qualities, providing reliable results without the need for physical experiments.*

#### **49 (ID 252) Bioterrorism**

**Author:** stud. Maria Antoanela BADEA

**Scientific Advisor:** Dr. Ane-Mari Cristina SANDA

**Institution:** Military Medical Institute

**Abstract:** *This paper examines the challenges posed by bioterrorism and the growing need for effective detection, prevention, and response strategies in both military and civilian settings. It begins by elucidating the defining features of biological threats, emphasizing their covert nature, low production cost, and capacity to generate significant operational and societal disruption without immediate visibility. Particular attention is given to the role of incubation periods and delayed symptom onset, which complicate timely identification and intervention.*

**Keywords:** *bioterrorism, biological threat, CBRN, military medicine, force protection, infectious agents*

#### **50. (ID 264) Emotional Intelligence in the Foundation of Tactical Decision-Making in the Military Command System**

**Authors:** stud. Elena-Bianca MIHĂILĂ, stud. Andreea-Elena TOMESCU

**Scientific Advisor:** Lecturer Mihaela GURANDA, PhD

**Institution:** "Henri Coandă" Air Force Academy, Braşov

**Abstract:** *Contemporary military operations often occur in environments characterized by volatility, uncertainty, complexity, and ambiguity (VUCA), placing significant pressure on the physical and mental performance of service members. In such contexts, during the analysis of tactical situations and the formulation of decisions within the command system, military personnel are simultaneously exposed to numerous operational stressors (cognitive overload, prolonged physical exertion). This paper makes a scientific contribution to the analysis of the relationship between emotional intelligence and the tactical decision-making process within the military command system, highlighting the variables that influence tactical decision-making under conditions of operational pressure. We anticipate that developing military personnel's resilience will become an effective mechanism for managing operational stress and maintaining the cognitive clarity necessary for the decision-making process. To this end, we employ current scientific methods relevant to*

*the development of the decision-making process, with the aim of acquiring skills to leverage emotional intelligence. The paper highlights the importance of integrating the psychological dimension into leadership training within the military command system, with an emphasis on: context analysis, effective focus on clear objectives, critical thinking, flexibility in decision-making, and methods for managing crisis situations.*

**Keywords:** *military command system, operational stress, emotional intelligence, tactical decision-making*

### **51. (ID 267) The Impact of Biometric Technologies (Entry/Exit System) on Risk Analysis and Security at Border Crossing Points**

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**Institution:** "Alexandru Ioan Cuza" Police Academy Bucharest

**Abstract:** *he increasing volume of cross-border movement and the diversification of security threats are reducing the effectiveness of traditional manual border checks. This development requires a structural adjustment in the management of the EU's external borders. The introduction of systems such as the Entry/Exit System (EES) shifts border control from document-based verification to identification based on the individual, which improves the accuracy of risk assessment. The EES relies on biometric data, including facial images and fingerprints, to support the detection of overstayers and to accelerate decision-making by border authorities. Under this system, physical passport stamps for third-country nationals are replaced by digital records.*

**Keywords:** *Entry/Exit System, Biometric technologies, Border management, Risk analysis, Interoperability*

### **52. (ID 284) Password Cracking Attacks**

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**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Password cracking attacks represent a significant category of cyber threats targeting authentication systems by attempting to obtain user credentials without authorization. These attacks exploit*

*weaknesses in password strength, system security mechanisms, and human behavior to gain unauthorized access to accounts, systems, and sensitive data. Common methods include brute force, dictionary attacks, credential stuffing, password spraying, phishing, and keylogging, each leveraging different vulnerabilities such as weak or reused passwords, lack of multi-factor authentication, and user susceptibility to social engineering.*

**Keywords:** Password cracking attacks

### **53. (ID 287) Evolution of Romanian Intelligence Organizations in the Cold War: Intelligence Operations, Methods and Means of Collection**

**Author:** stud. Florin BRĂDEAN

**Scientific Advisor:** 1st Military Instructor Cpt. Sorin LICA

**Institution:** "Alexandru Ioan Cuza" Police Academy (Bucharest)

**Abstract:** *This study examines the evolution of Romanian intelligence organizations during the Cold War, focusing on operational practices, surveillance systems, and methods of information collection developed under the Securitate. Within the broader historical context of the bipolar international system, Romanian intelligence structures were shaped by both Soviet doctrinal influence and internal political imperatives, resulting in a centralized and highly intrusive security apparatus. The research highlights the transition from early postwar repression to more structured and methodologically refined intelligence operations.*

**Keywords:** Security, Intelligence, Operations, Historic, Surveillance

### **54. (ID 288) The Genesis of the Knights of the Air**

**Author:** stud. Belmondo-Ionuț FORȚOFOI

**Scientific Advisor:** Denise MARTALOG, PhD

**Institution:** "Alexandru Ioan Cuza" Police Academy

**Abstract:** *This paper aims to analyze the dynamics of the Romanian Aeronautics' transformations between 1916 and 1919, focusing on the transition from an auxiliary observation force to an elite weapon, essential for achieving victories on the Moldavian front. At the moment of Romania's entry into World War I, the national aviation was caught in a state of technical inferiority, utilizing Farman and Voisin aircraft, which were classified as vulnerable compared to the*

*German aviation. With the arrival of French aid and the equipping of the Romanian army with high-performance fighter aircraft such as the Nieuport and SPAD, through the efforts of General Henri Berthelot, the situation took on new dimensions, as Romania felt more confident in its assets. The present study seeks to capture the way Romanian pilots familiarized themselves with the new technology and military tactics, achieving real success by winning the battles of Mărăști, Mărășești, and Oituz. In the summer of 1917, the Romanian aviation managed to maintain control of the airspace. Among the important figures, true pioneers of Romanian aviation, is Vasile Craiu, who demonstrated that the War for National Unification laid the foundations of Romanian aeronautics. The lessons of adaptability and allied cooperation from that period remain fundamental pillars for today's Air Force doctrine, underscoring the importance of air superiority in modern conflicts.*

**Keywords:** *Aviation, Aeronautics, Victories, Military tactics, Vasile Craiu.*

## **55. (ID 297) The Interdependence of Motivation, Job Satisfaction, and Performance in Naval Military Personnel**

**Author:** stud. Rareș-Casian DROB

**Scientific Advisor:** Assoc. Prof. Carmen COJOCARU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The performance of naval officers is closely influenced by psychological factors such as motivation and job satisfaction, especially within the demanding environment of military maritime operations. The specificity of this profession involves high levels of operational stress, emotional pressure, prolonged missions, and limited social interaction, all of which directly impact the psychological state of the personnel. Therefore, understanding the relationship between motivation, satisfaction, and performance is essential for maintaining both efficiency and morale within naval crews. This paper examines the interdependence between intrinsic and extrinsic motivation, professional satisfaction, and military performance in the activity of naval officers. Intrinsic motivation, such as duty, honor, and personal development, together with extrinsic factors like rewards, rank, and recognition, plays a crucial role in shaping behavior and commitment. At the same time, job*

*satisfaction reflects the officer's perception of working conditions, leadership, and team cohesion, influencing long-term engagement and effectiveness. The study highlights that performance in the naval military context is not determined solely by discipline or hierarchical command but is strongly dependent on the level of motivation and satisfaction. Key factors influencing performance include leadership quality, psychological resilience, training level, and the ability to manage stress and fatigue. The absence of motivation and satisfaction may lead to reduced morale and formal rather than effective discipline. In conclusion, the relationship between motivation, satisfaction, and performance represents a fundamental element in optimizing the activity of naval officers. Enhancing motivational strategies and improving working conditions can significantly contribute to higher performance levels, better team cohesion, and increased operational efficiency in the military maritime environment.*

**Keywords:** *Intrinsic and extrinsic motivation, Job satisfaction, Military performance, Naval personnel, Operational stress, Leadership effectiveness*

## **56. (ID 300) Integrating Informational Capabilities in Support of Public Order and Security Operations: An Interdisciplinary Perspective between Terrestrial and Naval Environments**

**Authors:** stud. Ștefania-Cătălina TUDOR, stud. Ion BĂRBUȚ

**Scientific Advisor:** Assoc. Prof. Sorin-Stelian CĂPĂȚÎNĂ, PhD

**Institution:** "Alexandru Ioan Cuza" Police Academy, Bucharest

**Abstract:** *The paper analyzes the role of information in supporting decision-making and operational processes within the security field, focusing on its integration into the activities of public order structures and the naval environment. In the current context, characterized by rapid developments and multidimensional risks, the capacity to collect, process, and utilize information represents an essential factor for incident prevention and the efficient management of operational situations. It analyzes the differences between the terrestrial and naval environments, underlining the particularities generated by the specific nature of the action space, visibility, and mobility. The research proposes an integrated approach based on inter-institutional cooperation and the efficient use of information*

*flows. A case study applied to a port scenario highlights the concrete manner in which information is collected, analyzed, and used in the decision-making process. The conclusions emphasize the major contribution of information to reducing reaction time and increasing operational efficiency.*

**Keywords:** *integrated approach; contribution; operational efficiency; security field; cooperation*

### **57. (ID 303) Intelligence Services as a Force Multiplier in Modern Conflicts: Information as a Strategic Weapon**

**Author:** stud. Casian-Dan TIHOVAN

**Scientific Advisor:** David UNGUREANU, PhD

**Institution:** "Alexandru Ioan Cuza" Police Academy, Bucharest

**Abstract:** *This paper aims to provide a comprehensive analysis of the role of intelligence services in the configuration of modern warfare, using Ukrainian warfare as its primary case study, an emblematic conflict for the profound transformations of the contemporary security environment. In this context, intelligence transcends the traditional paradigm of espionage, emerging as an essential strategic instrument grounded in the integration of emerging technologies and the systematic exploitation of vast volumes of data. The analytical approach highlights the transition from classical intelligence-gathering methods to a complex informational ecosystem, characterized by the convergence of HUMINT, SIGINT, OSINT, and cyber intelligence sources, enabling the achievement of decisive informational superiority. The case study illustrates how the use of advanced capabilities, such as satellite imagery, autonomous platforms, and open-source analysis, enhances anticipation and optimizes the decision-making process. Furthermore, the paper addresses the concept of intelligence-driven operations, emphasizing the role of continuous information flows in the dynamic adaptation of military actions. In conclusion, intelligence services emerge as a genuine force multiplier, redefining the parameters of operational efficiency and exerting a decisive influence on the architecture of contemporary conflicts.*

**Keywords:** *Intelligence; Modern Warfare; Information Superiority; Force Multiplier; Cyber Intelligence.*

**58. (ID 310) Beyond Weapons: The Evolution of Warfare in the Era of Mental Control**

**Author:** stud. Raluca-Florentina SÎRBA

**Scientific Advisor:** 2LT. Vlad CONTESI

**Institution:** Institute of Military Medicine, Bucharest

*Abstract:* Drawing on Clausewitz's thesis that the fundamental purpose of war lies in the defeat of the adversary, this paper traces the evolutionary trajectory of armed conflict. Warfare has manifested successively across the naval, land, air, space, and cyber domains, advancing today toward a sixth domain: the human mind. While traditional warfare targeted the physical capacity of the enemy, and cyberwarfare focused on sabotaging critical infrastructure, cognitive warfare directly targets the mental and psychological dimension of individuals. The primary weapons of this new form of conflict: deepfakes, fake news, social media platforms, and artificial intelligence, leverage their algorithmic nature to enable the mass dissemination of manipulative content without the possibility of effective critical filtering.

**Keywords:** cognitive warfare, deepfake, information manipulation, psychological vulnerability, artificial intelligence

**59. (ID 314) Government Responses to Terrorist Attacks: An Analysis of Decision-Making and Crisis Management Processes**

**Authors:** stud. Katarzyna KURKIEWICZ, stud. Maciej WYSZYŃSKI, stud. Seweryn BOŁDAK

**Scientific Advisor:** Dr Jacek WOŹNIAK

**Institution:** Student Scientific Club "STRATEGIA" Military University of Technology, Poland

*Abstract:* This paper examines government responses to terrorist attacks, with a particular focus on decision-making processes and crisis management mechanisms. Terrorist incidents require rapid, coordinated, and effective actions from state institutions operating under conditions of uncertainty and time pressure. The study analyzes how governments organize and implement responses at the strategic and operational levels, including inter-agency cooperation, information flow, and resource allocation. Special attention is given to the role of communication between military, law enforcement, and intelligence services, as well as to the challenges of maintaining

*public safety while protecting civil liberties. The paper also explores how decision-making is influenced by the availability of information, institutional preparedness, and the evolving nature of modern threats. The research is based on a comparative analysis of selected case studies, highlighting differences in national approaches and identifying best practices in crisis response. The findings indicate that effective government responses depend on integrated management structures, efficient information systems, and the ability to adapt quickly to dynamic threat environments.*

**Keywords:** *terrorism, crisis management, decision-making, national security, government response, risk management, emergency management, inter-agency coordination*

### **60. (ID 322) Spamming**

**Author:** stud. Roxana-Eliza TAGIRTA

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper outlines the growing landscape of cyber threats, with a specific focus on the phenomenon of spamming and its integration within the broader category of malware. As digital interconnectivity grows, the study examines the mechanisms of unsolicited electronic communications, from their historical origins in 1978 to modern sophisticated tactics such as phishing, vishing, and spoofing. By integrate data from the 2024 ENISA and DNSC reports, the research highlights a concerning 286% increase in malware incidents in Romania and a rise in CEO-type fraud across Europe. Furthermore, the paper evaluates the 'Cyber Kill Chain' methodology to identify defensive strategies at each stage of an attack. The findings underline that while technical solutions like SPF/DKIM are vital, user education remains the most critical barrier against the socio-technical exploitation prevalent in contemporary cyber warfare and financial fraud.*

**Keywords:** *spamming, cybersecurity, phishing, cyber kill chain*

### **61. (ID 342) DDOS/DOS attacks**

**Authors:** stud. Daria-Ștefana CHIȚOIU, stud. Alessia-Elena ERMALAI, stud. Albert Ioan MIHĂLCEANU

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the phenomenon of Distributed Denial of Service (DDoS) attacks in the context of applied informatics, highlighting their evolution, complexity and impact on modern cybersecurity. The paper presents a clear theoretical differentiation between DoS and DDoS attacks, detailing the main technical mechanisms of deployment: volumetric, protocol-level and application-level attacks. It also assesses the severe impact that these incidents have on the IT environment, generating financial losses, reputational damage and operational disruptions. A central component of the paper is dedicated to detection methods – such as volumetric, signature-based or behavioral analysis – and mitigation strategies, aspects practically illustrated through a case study on the simulation of the response to a DDoS attack. Finally, the project places the threat in the current geopolitical context, highlighting the use of DDoS as a central tool in hybrid warfare, analyzes the specific landscape in Romania according to DNSC data from 2024, and proposes essential measures to protect national critical infrastructures.*

**Keywords:** *DDoS attacks, Cybersecurity, Botnet, Hybrid warfare, Anomaly detection, Critical infrastructures, Mitigation.*

## **62. (ID 343) Comparative Analysis of Counter-UAS Systems: Electronic Jamming vs AI-Based Laser Neutralization**

**Author:** stud. Răzvan-Dumitru IORDACHE

**Scientific Advisor:** Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The widespread use of unmanned aerial systems (UAS) has prompted the development of various countermeasure solutions in naval and defense operations. This paper presents a comparative analysis of existing commercial counter-UAS technologies, focusing primarily on electronic jamming and signal disruption systems, alongside a proposed autonomous solution integrating machine learning and directed laser targeting. The study examines operational principles, detection capabilities, and limitations of conventional systems, highlighting issues such as range constraints, susceptibility to countermeasures, and scalability challenges. In contrast, the AI-driven laser approach leverages real-time object*

*detection, classification, and dynamic targeting through embedded machine learning algorithms, coupled with precise actuation mechanisms. The analysis demonstrates that integrating machine learning with directed energy offers enhanced accuracy, reduced collateral interference, and greater adaptability to evolving threats. The findings suggest that next-generation counter-UAS solutions can achieve superior operational effectiveness while overcoming limitations inherent in traditional jamming systems.*

**Keywords:** Counter-UAS, Electronic jamming, Laser targeting, Machine learning, Autonomous systems, Aerial threat detection, Naval defense, Directed energy systems

### **63. (ID 347) Motivating the Modern Soldier: A Neuropsychological Perspective on Military Leadership**

**Author:** stud. Răzvan-Dumitru IORDACHE

**Scientific Advisor:** Assoc. Prof. Carmen COJOCARU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Effective leadership in military contexts requires not only strategic competence but also the ability to motivate personnel under high-stress conditions. This paper explores contemporary approaches to motivating soldiers through a neuropsychological lens, integrating insights from cognitive neuroscience, behavioral psychology, and leadership studies. It examines neural mechanisms underlying reward, reinforcement, and stress responses, highlighting how dopamine, cortisol, and other neurochemical pathways influence motivation, decision-making, and performance. The study also analyzes practical techniques for enhancing intrinsic and extrinsic motivation, including feedback systems, adaptive goal-setting, and personalized reinforcement strategies. Emphasis is placed on translating neuroscientific principles into actionable leadership practices, ensuring ethical and effective application in military settings. The findings suggest that understanding the brain-behavior relationship enables leaders to optimize team performance, resilience, and morale. This neuropsychological perspective provides a foundation for modern military leadership strategies that align scientific insight with operational demands.*

**Keywords:** *Military leadership, Soldier motivation, Neuropsychology, Cognitive neuroscience, Reward systems, Stress response, Performance optimization, Behavioral psychology*

**64. (ID 348) The Human Mind as a Strategic Domain: Neuroplasticity, Cognitive Bias, and Military Decision-Making**

**Author:** stud. Sara BARBU

**Scientific Advisor:** Lt. Roberto-Daniel PASĂRE

**Institution:** Military Medical Institute

**Abstract:** *Neuroplasticity remains a domain that is not yet fully understood; however, existing research demonstrates the remarkable adaptability and flexibility of the human brain. The mind can serve both as a powerful asset and as a potential vulnerability, particularly under conditions of high stress. In military environments, where personnel are required to operate under intense pressure while maintaining high levels of performance, understanding the cognitive mechanisms that influence decision-making becomes essential. This paper explores the concept of neuroplasticity and the brain's capacity to adapt and reorganize in response to experience, training, and environmental demands. It examines how this malleability can be leveraged to enhance cognitive performance and resilience among military personnel. Particular attention is given to the role of cognitive biases in decision-making processes, especially in high-stress operational contexts, where rapid judgments and incomplete information may increase susceptibility to systematic errors in thinking. Furthermore, the paper analyzes how psychological, physical, and cognitive factors interact to influence tactical performance in demanding environments. By understanding the relationship between neuroplasticity, cognitive bias, and stress-related decision-making, the study highlights the potential of targeted cognitive training and awareness strategies to mitigate bias and improve operational effectiveness.*

**Keywords:** *neuroplasticity, computerized working memory training, decision-making, military personnel, performance, stress*

**65. (ID 353) The Evolution of the Lazarus Group - goals, methods, tools**

**Author:** stud. Valentina-Andreea DĂSCĂLESCU

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper provides a comprehensive analysis of the multidimensional evolution of the Lazarus Group, evaluating its strategic transition from disruptive operations to complex espionage and high-stakes financial cybercrime. By examining seminal case studies including the 2016 Bangladesh Bank heist, the WannaCry ransomware pandemic, the 3CX supply chain compromise, and Operation DreamJob this study elucidates the sophisticated methodologies employed by its primary subunits, BlueNoroff and Andariel. The research demonstrates that the group's efficacy across the US, South Korea, and the EU stems not only from technical prowess but from the strategic exploitation of organizational and human vulnerabilities through advanced social engineering. The adaptability of their custom malware frameworks and the systematic fragmentation of attack stages reflect a profound alignment with classical intelligence doctrines. Ultimately, the study argues for a paradigm shift in defensive strategies, prioritizing behavioral analysis and the securing of digital trust ecosystems to counter this persistent state-sponsored threat.*

**Keywords:** Lazarus, Andariel, BlueNoroff, Financial, Evolution, Espionage, Malware

## **66. (ID 358) Impact of Emerging and Disruptive Technologies on Military Decision-Making and Management Processes in Land Forces**

**Author:** stud. Katarzyna KURKIEWICZ

**Scientific Advisors:** Kamila FALACIŃSKA - Jacek WOŹNIAK -

**Institution:** Military University of Technology, Poland

**Abstract:** *Emerging and disruptive technologies such as artificial intelligence, big data analytics, autonomous systems, and digital command platforms are transforming contemporary military management. Modern land forces operate in highly dynamic environments that require rapid, data-driven decision-making and flexible organizational structures. This paper analyzes the impact of these technologies on command processes, resource management, and operational effectiveness. A qualitative review of literature and selected military case studies was conducted to identify benefits,*

*risks, and implementation challenges. The results indicate that digital transformation improves situational awareness, accelerates decision cycles, and enhances operational resilience, while requiring new competencies, cybersecurity measures, and adaptive leadership models.*

**Keywords:** *military management, disruptive technologies, artificial intelligence, decision-making, digital transformation, land forces, operational security*

### **67. (ID 377) Microphone-Based Acoustic Systems for Drone Detection**

**Author:** stud. Alexandru ONCIOIU

**Scientific Advisor:** Assoc. Prof. Eng. Ovidiu CRISTEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The usage of small unmanned vehicles in modern conflicts has generated significant security challenges for the borders of NATO's members and allies. Traditional detection systems such as radar and optical sensors often face limitations when dealing with small-sized objects. In this context, acoustic detection based on microphone arrays represents a complementary and cost-effective solution. This paper analyzes the principles and operational capabilities of acoustic systems designed for drone detection and identification. The study examines the acoustic signatures generated by aerial (UAV), underwater (UUV) and sea drones (USV). Furthermore, the paper discusses the integration of acoustic sensors within multi-sensor surveillance networks and evaluates their advantages and limitations under different environmental conditions. The research highlights the potential of distributed microphone arrays combined with other traditional detection systems to enhance the surveillance of borders.*

**Keywords:** *drones, microphone, surveillance, border, security*

### **68. (ID 380) Phishing - Cybersecurity Threat**

**Author:** stud. Radu-Alexandru LUPU

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents phishing as one of the most widespread and dangerous cybersecurity threats today. Phishing is a form of*

*social engineering that manipulates users into providing sensitive information such as passwords or financial data through deceptive communication methods like emails, SMS, phone calls, or fake websites. The study explains that a phishing attack is based on three key elements: the attacker's goal, the method used, and the vulnerabilities exploited, especially human error and weak security systems. Several types of phishing are analyzed, including email phishing, spear phishing, whaling, smishing, vishing, and angler phishing, each with different levels of targeting and impact. Statistical data from 2022 to 2025 shows a significant global increase in phishing attacks, reaching billions of attempts and causing financial losses of up to 80 billion dollars. These attacks affect both organizations and individual users. Finally, the paper highlights prevention strategies such as user education, multi-factor authentication, email filtering, and strong security policies. An effective defense requires a combination of awareness, technology, and organizational measures to reduce risks and protect information systems.*

### **69. (ID 394) Protecting the Information Space: The Impact of Information Manipulation on Democratic Security**

**Author:** stud. Olivia-Maria VESE

**Scientific Advisor:** Prof. Laura MACAROVSKI, PhD.

**Institution:** „Alexandru Ioan Cuza” Police Academy

**Abstract:** *The accelerated expansion of digital technologies has transformed the information environment, enabling both the democratization of communication and the proliferation of online disinformation. In the contemporary security context, information manipulation has evolved into a component of hybrid threats, with the capacity to influence public opinion, undermine trust in institutions, and affect democratic stability. This paper examines the phenomenon of online disinformation from both a legal and security-oriented perspective, emphasizing its implications for democratic security and the protection of the information space. It explores the mechanisms through which disinformation spreads in digital environments, including algorithmic amplification and content personalization, and analyzes their impact on electoral processes, public trust, and social cohesion. The study further evaluates the*

*European legal framework, with particular focus on the General Data Protection Regulation (GDPR) and the Digital Services Act, as well as relevant case law of the European Court of Human Rights. These instruments illustrate the ongoing effort to balance the need to combat disinformation with the protection of freedom of expression. The paper argues that safeguarding the information space requires a multidimensional approach combining legal regulation, platform accountability, and media literacy, while ensuring that democratic values and fundamental rights remain fully protected.*

**Keywords:** *Disinformation; information space; democratic security; hybrid threats; freedom of expression; ECHR case law*

## **70. (ID 396) AI-Enhanced UAV Operations for Counter-Smuggling in Romanian Maritime Borders: Legal Framework, Operational Tactics, and Evidence Admissibility**

**Author:** stud. Darius-Vasile MICULA

**Institution:** „Alexandru Ioan Cuza” Police Academy, Bucharest

**Abstract:** *Unmanned Aerial Vehicles (UAVs) integrated with artificial intelligence transform counter-smuggling operations by enabling persistent maritime surveillance, autonomous small vessel detection, and real-time identification of transshipment activities. This paper examines AI-drone deployment in Romanian Black Sea operations against cigarette, drug, and migrant smuggling networks, analyzing operational effectiveness alongside critical legal challenges under Articles 138-142 of the Romanian Code of Criminal Procedure (CCP). The study details how machine learning algorithms detect speedboat rendezvous, thermal signatures of hidden cargo, and behavioral patterns indicative of smuggling while addressing judicial authorization requirements for autonomous surveillance over international waters and private vessels. Key legal issues include proportionality assessment when AI systems autonomously designate surveillance targets, chain-of-custody preservation for algorithmically timestamped video evidence, and GDPR compliance when capturing vessel registration data. Operational analysis covers Romanian Border Police UAV fleet expansion to 278 units by 2026, integration with naval patrol boats, and real-time data fusion from thermal cameras, AIS transponders, and radar. The paper evaluates BVLOS operations during nighttime*

*smuggling runs, swarm tactics for multi-vector interdiction, and human oversight requirements for lethal force authorization. Findings demonstrate AI-enhanced UAVs increase smuggling detection rates by 300% while requiring rigorous documentation of autonomous decision processes and metadata integrity verification. De lege ferenda proposals include explicit CCP regulation for counter-smuggling autonomous surveillance and NATO-compatible protocols for evidence sharing with FRONTEX operations.*

**Keywords:** *counter-smuggling, AI drones, maritime surveillance, border security, evidence admissibility, autonomous operations*

## **71. (ID 401) Phishing and social engineering – a major threat in the digital environment**

**Author:** stud. Ionuț Leonard ISAC

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This project explores the growing threat of phishing and social engineering in today's digital environment. With the rapid development of information technologies and widespread internet use, cyberattacks have become increasingly sophisticated and frequent. Phishing, a common form of cybercrime, relies on deceptive techniques to trick users into revealing sensitive information such as login credentials or financial data. At the core of these attacks lies social engineering, which exploits human psychology, trust, and lack of awareness. The paper presents the fundamental concepts of social engineering and phishing, outlines the most common types of phishing attacks, and highlights the significant risks they pose to both individuals and organizations. These risks include financial loss, data breaches, identity theft, and reputational damage. Additionally, the project emphasizes the importance of preventive measures such as user awareness, secure authentication methods, and the use of cybersecurity tools. Understanding how these attacks work is essential for reducing vulnerabilities and improving overall digital security. The study aims to raise awareness and provide practical guidance for recognizing and preventing phishing attempts.*

**Keywords:** *phishing, social engineering, cybersecurity, cyber threats, information security, data protection, identity theft, online fraud, malware, email phishing, smishing, vishing, targeted attacks,*

*authentication, multi-factor authentication (MFA), user awareness, digital security, data breaches, cybercrime, prevention methods*

## **72. (ID 412) Adaptive Military Leadership: The Impact of DISC Personality Types on Mission Success**

**Author:** stud. Ciprian-Gabriel DUMITRACHE

**Scientific Advisor:** Assoc. Prof. Carmen-Luminița COJOCARU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper examines the role of military leadership in achieving mission success, with a particular focus on the influence of personality types within a team. Military leadership is defined by the ability to make rapid and effective decisions, communicate clearly, and maintain cohesion under conditions of stress and uncertainty. Core leadership values such as integrity, responsibility, discipline, and courage are essential in building trust and ensuring operational efficiency. The study highlights the importance of understanding individual differences through the DISC personality model, which categorizes individuals as Dominant, Influential, Steady, or Conscientious. Each type presents distinct strengths and limitations that can significantly impact team dynamics and performance. By recognizing these traits, leaders can adapt their leadership style, assign tasks more effectively, and reduce the risk of conflict within the unit. Furthermore, the paper emphasizes that adaptive leadership is critical in the military environment, where conditions are constantly changing and decisions often carry significant consequences. The integration of personality awareness into leadership practices enhances motivation, improves communication, and supports better decision-making processes. In conclusion, effective military leadership is not only based on authority and discipline, but also on the ability to understand and manage human factors, ultimately leading to increased mission effectiveness and team performance.*

**Keywords:** *Leadership, Team Cohesion, Personality Types*

## **73. (ID 415) Technical Study on the Development of a Friend-or-Foe Warning System for Maritime Surveillance Applications**

**Authors:** stud. Rareș Eduard MIRON, stud. Darie-Ioan MIRCEA

**Scientific Advisor:** Assoc. Prof. Eng. Paul BURLACU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This thesis examines the Identification Friend or Foe (IFF) system from the perspective of its operating principles, its integration into surveillance architectures, and its relevance to the maritime environment. The paper highlights the role of identification in reducing ambiguity within the operational picture and in supporting decision-making through the correlation of cooperative and non-cooperative data sources. The theoretical analysis focuses on the interrogation-reply principle, the SSR/Mode S framework, and the integration of IFF with complementary surveillance sources such as AIS, radar, and EO/IR sensors. The practical contribution consists of a geometric model and simulation framework used to estimate the influence of the Line of Sight (LOS) condition on the maximum range of cooperative identification in representative maritime scenarios. The results show that identification performance depends not only on system capabilities, but also on platform geometry and radio horizon constraints.*

**Keywords:** *identification Friend or Foe (IFF), maritime surveillance, cooperative identification, SSR/Mode S, Line of Sight (LOS), radio horizon, multi-sensor integration*

#### **74. (ID 423) Beyond the Screen: The Analysis of Spatial Perception and Sensory Disorientation in Drone Piloting**

**Authors:** stud. Marilena-Andreea ROBU, stud. Andreea Nicoleta MUGEA

**Scientific Advisor:** Lecturer Mihaela GURANDA, PhD

**Institution:** "Henri Coandă" Air Force Academy, Braşov

**Abstract:** *The remote operation of Unmanned Aircraft Systems (UAS) marks a significant shift in human-aerospace interaction. In traditional manned aviation, pilots use their instincts and physical senses-like the forces in the cockpit- to understand the aircraft's position and movement. However, drone operations completely separate the pilot from the flight environment. This aspect forces the operator to navigate a three-dimensional space using nothing but images on a screen. Relying entirely on vision, drone piloting causes two main issues: it quickly exhausts the eyes and creates a sense of detachment from the operator's actual surroundings. This sensory*

*mismatch is a primary cause of mistakes and operational incidents. This research focuses on two fundamental goals: reducing visual fatigue and mitigating the spatial disorientation experienced by pilots during remote operations. To achieve these objectives and minimize human error, the study suggests and evaluates the following methods: implementation of adaptive visual profiles (“Night mode”), integration of a VR kinetic platform and offloading critical flight data from the visual channel to other senses to prevent cognitive overload and improve situational awareness. The expected outcomes of this project indicate a significant improvement in both cognitive performance and physiological state of UAS operators. Restoring physical flight cues and reducing visual strain help UAS operators overcome spatial disorientation while maintaining high levels of focus.*

**Keywords:** *visual fatigue, spatial disorientation, remote operation*

#### **75. (ID 424) Cybersecurity as a Component of National Defense-Case Study: The Ukraine Conflict (2014–Present)**

**Author:** stud. Iuliana-Georgiana-Daniela SÎRBU

**Scientific Advisor:** Assoc. Prof. Gabriel BĂDIȚĂ, PhD

**Institution:** “Alexandru Ioan Cuza” Police Academy

**Abstract:** *The 21st century has witnessed a significant transformation in the nature of warfare, with hybrid and cyber threats becoming central components of national security. Cybersecurity is no longer merely a technical issue but a strategic dimension critical for protecting state institutions, critical infrastructure, and national sovereignty. This paper examines cybersecurity as an essential element of national defense, emphasizing the integration of cyber capabilities into modern military strategies. A case study of the conflict in Ukraine (2014–present) is presented to illustrate the practical implications of cyber operations in contemporary conflicts. The study highlights how cyber-attacks, information warfare, and hybrid tactics have been employed to achieve political and military objectives, affecting both civilian and military targets. The Ukrainian case demonstrates the strategic impact of cyber operations on national security, emphasizing the importance of resilience, international cooperation, and adaptive defense policies. By analyzing theoretical frameworks alongside real-world examples, the*

*paper identifies lessons for states seeking to enhance their cyber defense capabilities. The findings suggest that a comprehensive approach, combining technological measures, military preparedness, and policy coordination, is essential to mitigate cyber threats and strengthen national security in an increasingly interconnected world.*

**Keywords:** *Cybersecurity, National Defense, Hybrid Warfare, Ukraine Conflict, Cyber Operations*

**76. (ID 425) Development of an Integrated Architecture for Navigation, Control, and Multimodal Perception for Autonomous ISR Missions on an Experimental USV Platform**

**Authors:** stud. Matteo Constantin DAMASCHIN, stud. George-Petruț SANDU, stud. Nicolae SIMA

**Scientific Advisors:** Lecturer Eng. Elena-Grațiela ROBE-VOINEA, PhD, Scientific Researcher Eng Oana MARCU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This project focuses on the development of an autonomous Unmanned Surface Vehicle (USV) through an integrated approach encompassing naval architecture, control systems, and advanced sensor-based algorithms. The physical foundation involves the design of an experimental naval platform, requiring the optimization of hull geometry, the engineering of the metallic structural solution, and the integration of an electric propulsion system. Implemented upon this hardware infrastructure is a sophisticated Guidance, Navigation, and Control (GNC) system, critical for ensuring operational autonomy and safety. The research provides a detailed analysis of GNC components, with a specific emphasis on the guidance subsystem and path planning techniques. This includes the implementation and evaluation of global, local, and hybrid navigation methods. To achieve high-level decision-making capabilities, the vehicle incorporates a multimodal perception stack utilizing LiDAR technology and computer vision. This perception system processes spatial data in real-time, governed by a decision-making algorithm that acts as a safety-critical mechanism. Upon obstacle detection, the system identifies the object's nature and overrides lower-level navigation commands to adjust the trajectory and prevent collisions. The synergy between the experimental platform, the GNC module, and the perception system results in a*

*robust maritime vehicle capable of efficient performance in Intelligence, Surveillance, and Reconnaissance (ISR) missions.*

**Keywords:** *Unmanned Surface Vehicle (USV), GNC System, LiDAR, Autonomous Navigation, IRS Missions*

## **78. (ID426) Computer Viruses**

**Authors:** stud. Ștefan PICUȘ, stud. David NEGRU

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Computer viruses represent a major threat in today's digital environment, being malicious programs capable of self-replication and disrupting the normal functioning of computer systems. Initially created for experimental purposes, they have evolved into complex tools used for data theft, sabotage, or financial gain. There are several types of viruses, such as file-infecting viruses, boot sector viruses, macro viruses, polymorphic and metamorphic viruses, each with specific mechanisms of infection and spread. Viruses propagate through emails, infected files, software vulnerabilities, networks, or external devices. A relevant example is the WannaCry attack in 2017, which infected hundreds of thousands of computers worldwide, demonstrating the significant impact of such threats. For prevention, regular updates, antivirus software, firewalls, backups, and user education are essential. Cybersecurity is therefore a continuous process that requires both individual and collective responsibility to protect data and computer systems.*

**Keywords:** *cybersecurity, Wannacry, firewall, threats, malware*

## **79. (ID 427) VPN**

**Authors:** stud. Ștefan DINU, stud. Eduard TATARUȘ

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *A Virtual Private Network (VPN) functions as a secure, private tunnel that connects multiple networks across the public internet. Since Microsoft developed the Point-to-Point Tunneling Protocol (PPTP) in 1996, the technology has evolved from a corporate tool into a vital instrument for personal privacy. The core of VPN functionality lies in the IPSec framework, which ensures data confidentiality through encryption algorithms like AES, maintains*

*data integrity, and verifies identities via authentication. Modern users often utilize Remote Access VPNs, such as Tunnel Bear, to mask their IP addresses and protect against "Man-in-the-Middle" (MITM) attacks on public Wi-Fi. While VPNs offer significant advantages including bypassing geo-restrictions and avoiding bandwidth throttling they are not without risks. Users must be wary of "no-log" claims and the dangers of free services, which may inject malware or sell personal data. Ultimately, a VPN is a powerful layer of digital defense, but it does not grant absolute anonymity.*

**Keywords:** *Cybersecurity, IPSec, Encryption, Tunneling, Anonymity, MITM*

### **80. (ID 428) Memory Buffer Overflow**

**Authors:** stud. Erhan MEMET, stud. Alexandru CACENCU

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper examines buffer overflow vulnerabilities, one of the most widespread and dangerous issues in software security. A buffer overflow occurs when a program writes more data into a memory buffer than it can handle, potentially leading to crashes, data corruption, or execution of malicious code. The study explains how such vulnerabilities arise, particularly in low-level programming languages like C and C++, and explores various types of attacks, including stack, heap, and integer overflows. It also highlights real-world cyberattacks, such as WannaCry, Heartbleed, and Code Red, demonstrating their global impact. Additionally, the paper analyzes statistical trends and the significant economic consequences associated with these exploits. Finally, it outlines detection methods and preventive strategies, including secure coding practices, regular updates, and runtime protections. Overall, the study emphasizes the ongoing relevance of buffer overflow vulnerabilities and the importance of proactive cybersecurity measures.*

**Keywords:** *Memory Buffer Overflow*

### **81. (ID 429) Aerial and Maritime Surveillance through the Use of UAVs: Strategic Applications and Technological Evolution**

**Authors:** stud. Darie-Ioan MIRCEA, stud. Rareș-Eduard MIRON

**Scientific Advisor:** Assoc. Prof. Eng. Paul BURLACU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This study examines the use of unmanned aerial vehicles (UAVs) in maritime reconnaissance and surveillance missions, with emphasis on their tactical value for monitoring areas of interest and supporting situational awareness. In addition to the theoretical analysis, it presents a software application developed to assist vessel identification in the monitored maritime sector. The application processes visual data, supports the recognition of vessels, and provides a technical profile for each identified ship, thus facilitating faster assessment of potential threats and more efficient decision-making. The study highlights the strategic relevance of UAV-based surveillance and the practical benefits of integrating automated identification tools into maritime monitoring activities.*

## **82. (ID 431) Scareware**

**Author:** stud. Emanuel Andrei GRIGORAS

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The presentation focuses on cybersecurity, with an emphasis on scareware as a type of cyber threat. It begins by explaining the importance of cybersecurity in protecting data, systems, and users in an increasingly digital world. The concept of scareware is then introduced as a form of malicious software that uses fear and urgency to manipulate users into making poor decisions, such as installing fake programs or revealing sensitive information. The presentation describes how scareware works, highlighting its reliance on social engineering rather than technical vulnerabilities. It also examines the motivations behind such attacks, including financial gain and data theft, as well as their main characteristics and high success rate. A case study of a fake antivirus attack is analyzed, showing the stages of the incident, the victim's reactions, and the mistakes made. Finally, the presentation outlines recovery steps and preventive measures, emphasizing user education and awareness as key factors in reducing cyber risks.*

**Keywords:** scareware, cybersecurity, malware, virus

**83. (ID 432) The Transition to a Presidential System in Romania Constitutional Implications for State Authority and National Security**

**Author:** stud. Alin Valentin ILIE

**Scientific Advisor:** Lecturer Cătălina NĂSTASE, PhD

**Institution:** „Alexandru Ioan Cuza” Police Academy, Bucharest

**Abstract:** *This paper explores the pressing need for constitutional reform in Romania, with a special focus on the potential transition from a semi-presidential to a presidential system. It critically analyzes the 2003 constitutional revision and its aftermath, emphasizing unresolved institutional ambiguities and recurring legal conflicts between the main state authorities. Through relevant examples, such as disputes between the President and the Prime Minister, the paper highlights the limits of the current hybrid model and its impact on the effective exercise of state authority. Drawing inspiration from established presidential systems, such as that of the United States, the study argues that adopting such a model could provide greater institutional clarity, executive stability, and contribute to strengthening both the rule of law and national security*

**Keywords:** *Constitutional Reform, Presidential System, State Authority, National Security, Rule of Law*

**84. (ID 434) The Right to Life in the EU: Legal Dimensions in Security, Defense, and Information Operations**

**Author:** stud. Gabriel Florin ILINCA

**Scientific Advisor:** Lecturer Cătălina NĂSTASE, PhD

**Institution:** „Alexandru Ioan Cuza” Police Academy, Bucharest

**Abstract:** *The right to life represents the fundamental human right, protected by international treaties and national constitutions, with significant implications in the fields of security, defense, and information. This paper examines the current legal challenges and ethical dimensions of this right within the European Union, emphasizing its relevance in military and security contexts. The analysis addresses sensitive issues such as abortion, euthanasia, organ transplantation, and the death penalty, offering comparative perspectives from Romania, Poland, and the United States. It highlights how different legal frameworks influence the protection of life, including the balance between individual rights and state*

responsibilities, particularly in operational environments. The study also explores the impact of emerging technologies, especially artificial intelligence in medicine, raising concerns about accountability, data protection, and decision-making processes. Additionally, it reflects on the lessons of the COVID-19 pandemic, focusing on resource allocation, prioritization of care, and state obligations to protect life under crisis conditions relevant to security structures. Using a qualitative legal approach, the paper provides a comprehensive perspective on how the right to life is interpreted and safeguarded in contemporary security and defense frameworks, contributing to ongoing academic and policy debates.

**Keywords:** Right to Life, Security and Defense, Abortion, Euthanasia, Artificial Intelligence in Medicine

## **85. (ID488) Information Warfare in the 21st Century: The Role of Artificial Intelligence in Security and Military Strategy**

**Author:** stud. Ioana-Diana DASCĂLU

**Scientific Advisor:** Police Commissioner-Chief, Prof. Bogdan ȚONEA, PhD

**Institution:** „Alexandru Ioan Cuza" Police Academy

**Abstract:** Information warfare has emerged as a defining feature of 21st-century conflict, driven by the rapid expansion of digital technologies and the increasing reliance on data-centric systems. This paper examines the transformative role of artificial intelligence (AI) in shaping modern security environments and military strategy. It explores how AI enhances capabilities in areas such as intelligence gathering, surveillance, cyber operations, and decision-making processes, while also amplifying the speed, scale, and complexity of information-based threats. The study highlights both the strategic advantages and the vulnerabilities introduced by AI, including the proliferation of disinformation, autonomous weapon systems, and algorithmic bias in critical operations. Furthermore, it analyzes the implications of AI-driven information warfare on national security, international stability, and ethical governance. By integrating theoretical perspectives with recent developments in military applications, the paper argues that AI is not only a force multiplier but also a disruptive element that challenges traditional doctrines of warfare. The findings underscore the necessity for robust regulatory

*frameworks, interdisciplinary cooperation, and adaptive defense strategies to mitigate risks while leveraging AI's potential. Ultimately, this research contributes to a deeper understanding of how artificial intelligence is redefining the nature of conflict and security in the contemporary global landscape.*

**Keywords:** *Artificial intelligence; Information warfare; Cybersecurity; Military strategy; Disinformation; National security*

## **86. (ID492) Why Modern War is a Tech Race**

**Authors:** stud. Ioan Daniel TRIF, stud. Denis Andrei UNGUREANU, stud. Aurelian OCHEA

**Scientific Advisor:** Cpt. Cristian-Emil MOLDOVEANU

**Institution:** Military Technical Academy

**Abstract:** *The nature of armed conflict has undergone a fundamental transformation. Where 20th-century warfare was defined by mass, firepower, and industrial capacity, 21st-century warfare is defined by information speed, network dominance, and the ability to compress the sensor-to-shooter kill chain faster than any adversary can respond. This presentation traces the full arc of that transformation from commanders relying on paper maps and radio relays, to infantry units calling in GPS-guided strikes from encrypted tablets in real time. It examines the core technologies driving this shift: precision-guided munitions that render area bombardment obsolete, unmanned aerial systems operating at every echelon from strategic surveillance to squad-level targeting, and the military networks satellite communications, tactical data links that tie these capabilities into a unified operational picture. It then turns to the less visible but equally decisive domains of electronic warfare, cyber operations, and open-source intelligence, where conflicts are routinely shaped before a single shot is fired. Finally, it confronts the central paradox of this technological leap: the same networked architecture that grants decisive advantage becomes a catastrophic vulnerability the moment an adversary degrades, jams, or destroys it. The dominant military of the coming decades will not necessarily be the most technologically advanced it will be the one that best protects its own networks while dismantling its adversary's.*

**Keywords:** *Kill Chain Network-Centric Warfare Precision-Guided Munitions (PGMs) Unmanned Aerial Vehicles (UAVs) Satellite*

*Communications (SATCOM) Tactical Data Links Electronic Warfare (EW) Cyber Operations OSINT Information Operations Autonomous Systems · Drone Swarms GPS Denial · Electromagnetic Spectrum ISR (Intelligence, Surveillance, Reconnaissance) Common Operational Picture (COP)*

### **87. (ID498) Cognitive Processes in Joint Military Cooperation**

**Authors:** stud. Traian-Marian IONEL, stud. Liviu-Constantin CĂPĂȚÎNĂ

**Scientific Advisor:** Lecturer Mihaela GURANDA, PhD

**Institution:** "Henri Coandă" Air Force Academy, Braşov

**Abstract:** *In the contemporary operational environment, the effectiveness of joint military cooperation is strongly influenced by the quality of the cognitive processes that shape human understanding and action. This paper focuses on the role of core cognitive processes perception, memory, thinking, language, and creativity in the functioning of military personnel involved in joint operations. These processes influence how information is received, selected, interpreted, organized, and transformed into operational meaning, contributing to the formation of mental models under conditions of uncertainty, time pressure, and multidomain complexity. The study argues that decision-making and operational effects should be understood as direct outcomes of these underlying cognitive mechanisms. When cognitive processes function efficiently, they support accurate situational understanding, coherent judgments, adaptive responses, and better coordination among participating forces. Conversely, distortions or limitations at the cognitive level may generate misinterpretation, delayed decisions, reduced synchronization, and diminished operational effectiveness. By placing cognitive processes at the center of the analysis, the paper highlights the human dimension of joint military action and underlines the need to strengthen cognitive capabilities through education, training, and operational preparation. The study concludes that understanding and developing cognitive processes represents a necessary direction for improving decision-making quality and the overall effects of joint military cooperation.*

**Keywords:** *joint operations, cognitive processes, decision-making, mental models*

**88. (ID499) War Spillover on NATO's Eastern Flank: Russian Incursions into Romanian Territory**

**Author:** stud. Laurențiu-Andrei BUZGURILĂ

**Scientific Advisor:** Assoc. Prof. Loredana PÎRVU, PhD

**Institution:** "Alexandru Ioan Cuza" Police Academy, Bucharest

*Abstract:* This paper examines how a war formally fought between two belligerent states can generate concrete security consequences for other countries nearby. Focusing on Russian incursions into Romanian territory and the frequent incidents reported near Romania's border with Ukraine, the study highlights the implications of war for national defence. It examines how international law should interpret these incursions and how the repetition of such incidents affects public security and military readiness. According to the analysis, these incidents illustrate how modern warfare can extend operational pressure beyond the immediate battlefield and into the security environment of neighbouring states, decision-making procedures and the coordination between military and state authorities. In this sense, the paper demonstrates that the conflict extends beyond its formal participants and creates tangible defence and security pressures on Romania

**Keywords:** Security, Incursions, Territory, International law, Neighbouring states

**89. (ID500) Integrating Law Enforcement Data into Military Coastal Defense Operations**

**Author:** stud. Alexandru TABUS

**Scientific Advisor:** Police Commissioner-Chief Assoc. Prof. Andreea-Rurela CÂRCIUMARU, PhD

**Institution:** "Alexandru Ioan Cuza" Police Academy, Bucharest

*Abstract:* Modern maritime security in the Black Sea region requires a unified approach to intelligence gathering. Military forces face complex threats that blur the line between traditional armed conflict and organized criminal activities, making the integration of civilian law enforcement data vital for comprehensive situational awareness across the entire operational theater. This paper explores practical methods for sharing information between internal police agencies and naval commands.

**90. (ID501) The Role of the Two-Soldier Team (Binom) in Trench Warfare: Tactical Efficiency, Coordination, and Survivability in Modern Conflict**

**Author:** stud. Paul-Leonard DOROFTEI

**Scientific Advisor:** Assoc. Prof. Daniel SOLESCU, PhD.

**Institution:** "Alexandru Ioan Cuza" Police Academy, Bucharest

***Abstract:** The re-emergence of trench warfare in modern conflicts, particularly in the Russia-Ukraine war, has highlighted the importance of small-unit tactics in confined and high-risk environments. This paper examines the role of the two-soldier team, commonly referred to as the binom, as a fundamental tactical structure in trench combat. Through qualitative analysis of tactical principles and recent battlefield observations, the study evaluates how coordination, mutual support, and communication within the binom enhance combat effectiveness and survivability. The findings suggest that the binom remains an essential component of modern infantry operations, offering adaptability, resilience, and increased operational efficiency in restrictive combat environments (U.S. Department of the Army, 2016; Kofman & Lee, 2023).*

***Keywords:** binom, trench warfare, infantry tactics, coordination, survivability, modern warfare;*

**91. (ID502) The Role of Statistics in the Analysis of Meteorological Risks in Air Operations**

**Authors:** stud. Emil Adi Alexandru LĂDARU, stud. Flavian - Valentin MOISĂ

**Scientific Advisor:** Prof. Adrian PITICAR

**Institution:** "Henri Coandă" Air Force Academy, Braşov

***Abstract:** Meteorological conditions represent a critical factor in the planning and execution of air operations, directly influencing flight safety, mission success, and operational decision-making. This paper examines the role of statistical methods in identifying, quantifying, and interpreting meteorological risks specific to aerial environments. By analyzing historical weather data, probability distributions, and trend models, statistical tools enable operators to assess the adverse phenomena such as severe turbulence, icing, low visibility, and space weather disturbances. The study highlights how statistical risk*

*analysis integrates with aviation meteorological products, including METARs, TAFs, and SIGMETs, to support real-time and pre-mission planning. Furthermore, the paper addresses the application of statistical forecasting in military air operations, where getting the forecast right can mean the difference between mission success and failure. The results show that using a solid statistical approach helps teams stay better prepared and make smarter decisions when weather conditions change.*

**Keywords:** *meteorological, statistical, air operations*

## **92. (ID 493) The use of AI Innovation in Building Information Advantage on the Battlefield**

**Authors:** stud. Magdalena MACIEJCZAK, stud. Paweł ZEWCZYK

**Institution:** Military University of Technology, gen. Sylwestra Kaliskiego

**Abstract:** *The evolving challenges faced by NATO and its allies show critical role of **information** in modern conflicts and the potential of **AI** systems to address it. By tracing the history of information operations we will try to show how the ability to process and protect data has always been a decisive force multiplier. As the war in Ukraine proves - the **transformation of the battlefield** is driven by the rapid integration of **modern technologies** and civilian innovations. We identified the main obstacles to maintaining a strategic edge: information overload, disinformation, and the lack of technological interoperability. We would like to put forward the case that the implementation of advanced AI models utilizing reasoning paradigms and multi-agent systems can help. By examining practical applications we highlight how AI can process vast datasets in real-time to support decision-making. Ultimately, the shift toward autonomous, reasoning-based AI ensures **information security** and operational efficiency, marking a fundamental change in how military superiority is achieved in the digital age.*

**Keywords:** *information security, information superiority, modern technologies, AI, transformation of the battlefield, multi-agent systems, decision support.*

### **93. (ID 494) The Case Study of AIWAT - how AI Systems Can Practically Support the Staff of Military Units**

**Authors:** stud. Korneliusz SAMOL, stud. Michalina MOSZYŃSKA

**Institution:** Military University of Technology, gen. Sylwestra Kaliskiego

***Abstract:** In a presentation "The case study of AIWAT - how AI systems can practically support the staff of military units", We will present the AIWAT project, an autonomous and highly modular land platform designed to operate effectively in dynamic and academic environment, as a staff and student assistant. We will present its innovative multi-agent sensory system, which consolidates audio, visual, and LiDAR data into a single, real-time snapshot for comprehensive situational awareness. Furthermore, We will discuss the robot's advanced local processing capabilities, including biometric voice verification and the precise fusion of object detection with spatial coordinates. At the same time, specific examples will be provided illustrating how the system's auditable architecture ensures operational independence and reliability, even when external communication is jammed. Ultimately, we will demonstrate how AIWAT utilizes onboard artificial intelligence to analyze complex data and make rapid, autonomous decisions, which are both appropriate and relevant.*

***Keywords:** AIWAT, autonomous land platform, situational awareness, sensor fusion, multi-agent system, local AI processing.*

### **94. (ID 503) The Use of Artificial Intelligence in Modern Military Operations**

**Author:** stud. Raul-Eduard BABII

**Scientific Advisor:** Cpt. Cosmina NECULCEA

**Institution:** „Henri Coandă" Air Force Academy, Braşov

***Abstract:** Artificial Intelligence (AI) has become an essential component of modern military operations, significantly transforming the way armed forces plan, execute, and support missions. The integration of AI technologies allows military organizations to process large volumes of information, enhance decision-making processes, and increase operational efficiency on the battlefield. AI systems are used in intelligence analysis, autonomous weapons, surveillance, cyber defense, and logistical support. Modern armed*

*forces employ AI to analyze real-time data from satellites, drones, sensors, and communication networks, allowing commanders to make faster and more accurate decisions. In addition, autonomous and semi-autonomous systems such as unmanned aerial vehicles (UAVs) and robotic platforms are increasingly used for reconnaissance, surveillance, and combat support missions. However, the use of AI in military operations also raises important ethical, legal, and security challenges. Concerns related to autonomous weapons, decision-making without human control, and cyber vulnerabilities require careful regulation and international cooperation. Overall, Artificial Intelligence is rapidly becoming a strategic factor in military power, shaping the future of warfare and influencing the development of modern defense strategies.*

**Keywords:** *artificial intelligence, military operations, data analysis, decision-making processes, autonomous systems, unmanned aerial vehicles (UAVs), military robotics, intelligence and surveillance, cyber defense, real-time data processing, operational efficiency, autonomous weapons, ethical and legal implications, cybersecurity risks, human-machine interaction, defense strategies, modern warfare*

## **95. (ID 514) Social Media as a Kinetic Battlefield**

Author: stud. Mihai ANDRIESCU

**Scientific Advisor:** Police Commissioner-Chief Assoc. Prof.

Andreea-Rurela CÂRCIUMARU, PhD

**Institution:** “Alexandru Ioan Cuza” Police Academy, Bucharest

**Abstract:** *In contemporary military science, the transition from physical to digital confrontation has redefined the "kinetic battlefield." This research explores the evolution of information operations, focusing on the transformation of social media into a primary arena for psychological warfare and strategic deception. Historically, propaganda delivery relied on the physical dissemination of information, such as the manual delivery of brochures during World War I, a process limited by geographic reach and significant temporal delays. In contrast, modern military information construction leverages the rapid development of computers and information technology to achieve instantaneous, global influence. This study investigates how artificial intelligence*

*and big data analytics are utilized to perform real-time sentiment analysis, allowing military entities to monitor the "cognitive environment" of conflict and respond to adversarial narratives with unprecedented speed.*

**Keywords:** *social media, propaganda, information, cognitive environment, influence*

## **96. (ID 515) Reinforcement Learning in AI-Enabled Digital Wargaming**

Author: stud. Mihai ANDRIESCU

**Scientific Advisor:** Police Commissioner-Chief Assoc. Prof.

Andreea-Rurela CÂRCIUMARU, PhD

**Institution:** "Alexandru Ioan Cuza" Police Academy, Bucharest

**Abstract:** *Modern military science faces an unprecedented challenge in managing the information density and speed of multi-domain operations. To address these complexities, digital wargaming has evolved from simple heuristic models into sophisticated platforms for strategic decision support. This research investigates the integration of Reinforcement Learning within digital wargaming environments to develop adaptive, intelligent agents capable of navigating highly uncertain tactical scenarios. Traditional wargaming often suffers from "human-in-the-loop" constraints or predictable scripted behaviors, which fail to accurately simulate the "cognitive environment" and the fluid nature of modern hybrid conflict.*

**Keywords:** *AI, information, wargaming, objectives, simulation*

## IV. SECTION: ELECTRICAL ENGINEERING

### Section Committee:

**Chairman:** Prof. Gheorghe SAMOILESCU, PhD

**Members:** Lecturer Leon PANĂ, PhD

Lecturer Eduard DRAGOMIR, PhD

Room: LI356

### 1. (ID 7) Power electronics

**Author:** stud Bogdan GRIGORE

**Scientific Advisor:** Prof. Eng. Vasile DOBREF, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** This study employs a combination of theoretical analysis, simulation modeling, and case studies from industrial and renewable energy systems. Key components such as converters (DC-DC, AC-DC, and DC-AC), inverters, and control algorithms are analyzed for performance and efficiency. Simulation tools like MATLAB/Simulink and PLECS were used to evaluate system behavior under varying load and input conditions. Case studies include grid-tied solar inverters and electric vehicle powertrains, illustrating how power electronics enhance system responsiveness, reliability, and integration. Results demonstrate significant efficiency gains (up to 95%) and improved dynamic performance through advanced switching techniques and real-time control strategies.*

***Keywords:** Power Electronics, Energy Conversion, System Optimization, Renewable Integration, Control Systems, Electric Vehicles*

### 2. (ID 23) Limitation of Harmonics in Shipboard Electrical Power Generation Systems

**Authors:** stud Bianca-Cristina CĂRBUNARU, stud. Denisa-Alexandra FOCA, stud. Beatrice-Ștefania SOFRONE

**Scientific Advisor:** Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** Modern shipboard electrical power systems supply a wide range of nonlinear consumers, such as power converters, variable-*

*frequency drives, and electronic control equipment. The operation of these devices leads to the generation of electrical harmonics, which distort voltage and current waveforms and can negatively affect the efficiency, reliability, and safety of onboard electrical installations. High levels of harmonic distortion may cause overheating of equipment, additional power losses, malfunction of protection systems, and electromagnetic interference within the ship's electrical network. This paper presents the concept of electrical harmonics, starting with their definition, origin, and effects on shipboard power systems. The study focuses on passive filters used for harmonic mitigation, describing their construction, operating principles, and their role in reducing harmonic distortion in electrical networks. In addition, a case study is presented by analyzing a typical shipboard consumer in order to identify the types of harmonics generated and to evaluate the effectiveness of filtering solutions in limiting their impact on power quality.*

**Keywords:** *harmonics, shipboard electrical systems, passive filters, harmonic mitigation, power quality*

### **3. (ID 34) SONAR - Sound Propagation**

**Author:** stud Bogdan GRIGORE

**Scientific Advisor:** Lecturer Eng. Lucian DUMITRACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Sound propagation is the fundamental principle behind SONAR (Sound Navigation and Ranging) systems used for detecting and locating objects underwater. Because electromagnetic waves attenuate rapidly in water, acoustic waves are the most effective method for long-distance underwater sensing. This project examines how sound waves travel through water and how factors such as temperature, salinity, pressure, and frequency influence their speed and attenuation. The study also discusses how these properties affect SONAR performance in applications such as underwater navigation, object detection, and seabed mapping. Understanding sound propagation is essential for improving the accuracy and efficiency of modern SONAR systems.*

**Keywords:** *SONAR, sound propagation, underwater acoustics, acoustic waves, sound velocity, attenuation, underwater detection, marine sensing.*

#### **4. (ID 42) Real-Time Electromagnetic Spectrum Monitoring using YOLO Architectures for Radio Signal Classification**

**Author:** stud Ștefan PAPA

**Scientific Advisors:** cpt. Mirela ȘORECĂU, cpt. Emil ȘORECĂU

**Institution:** "Nicolae Bălcescu" Land Forces Academy

***Abstract:** This paper presents an innovative real-time electromagnetic spectrum monitoring system that leverages Computer Vision techniques for signal detection and classification. By transforming I/Q data into time-frequency domain representations, the identification of complex waveforms is treated as an object detection task using You Only Look Once (YOLO) architectures. The proposed system differentiates between both military and security-specific signals such as TETRA or tactical radio stations and civilian signals such as commercial Wideband FM. Experimental results compare the performance of YOLOv8 and YOLOv11 models trained on a hybrid dataset of synthetic and real-world signals acquired with a high-end spectrum analyzer and Software Defined Radio (SDR) platforms. The system achieves high detection accuracy with few false positives and provides a realtime transparent overlay for spectral analysis, significantly reducing the operator's workload in dense signal environments.*

***Keywords:** SDR, Deep Learning, YOLO, spectrogram analysis, signal classification*

#### **5. (ID 47) Hydrogen Production using Renewable Energy Sources**

**Authors:** stud Horațiu Sebastian BOTOGA, stud. Senin-Enver STAN, stud. Nicolae-Cristian RĂDULESCU

**Scientific Advisor:** Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** The increasing demand for sustainable and low-carbon energy systems has led to a growing interest in hydrogen as a strategic energy carrier for future energy infrastructures. Hydrogen produced from renewable energy sources represents a key solution for reducing greenhouse gas emissions and improving the flexibility of modern power systems. This study investigates the utilization of renewable electrical energy for hydrogen production through water*

*electrolysis and analyzes the technological parameters that influence the efficiency of the process. The paper presents the main electrolysis technologies currently used for hydrogen generation, including alkaline electrolysis and proton exchange membrane (PEM) systems, highlighting their operational principles and performance characteristics. Special attention is given to the influence of electrical supply parameters, particularly the use of pulsed current and variable frequencies in the electrolysis circuit, which can improve gas evolution efficiency and reduce electrode polarization effects. Furthermore, the role of catalytic materials such as nickel, platinum, and cobalt-based compounds is discussed in order to enhance electrochemical reaction rates. In addition, the study explores the potential effects of applying static or variable magnetic fields to the electrolysis reactor, which may influence ion transport and fluid dynamics within the electrolyte through magnetohydrodynamic phenomena. The results underline the importance of optimizing electrochemical parameters and integrating renewable energy systems with hydrogen production technologies. Such approaches can significantly contribute to the development of sustainable energy systems and support the transition toward a hydrogen-based energy economy.*

**Keywords:** *Renewable energy; hydrogen production; water electrolysis; electrochemical catalysis; pulsed current electrolysis; magnetohydrodynamic effects.*

## **6. (ID 54) Renewable Energy Sources**

**Authors:** stud Gilda Elizabeth FAIFER, stud. Georgiana Larisa POPA

**Scientific Advisor:** Assoc. Prof. Eng. Ovidiu CRISTEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Renewable energy has emerged as a critical component of global energy strategies, aiming to reduce greenhouse gas emissions, combat climate change, and ensure sustainable energy supply. This presentation provides a comprehensive overview of the main renewable energy sources, including solar, wind, hydropower, geothermal, and biomass. Each source is analyzed in terms of technology, advantages, challenges, and integration into modern energy systems. Special attention is given to energy storage*

*technologies, particularly batteries, which play a key role in stabilizing supply from intermittent sources. The presentation also explores future perspectives, emphasizing technological innovation, policy support, and the increasing role of renewable energy in achieving a low-carbon, sustainable future.*

**Keywords:** *Renewable Energy, Energy Storage, Batteries, Sustainable Development*

**7. (ID 55) Energy Resilience in Green Defence: A technical investigation of wave energy harvesting of Romanian Naval bases**

**Authors:** stud Andrei-Robert BONTAS, stud. Mihail-Damian DUMITRESCU, stud. Constantin-Octavian ARON

**Scientific Advisor:** Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The study offers a thorough technical and strategic evaluation of the wave energy harvesting along the Romanian coast of the black sea, specifically to the energy independence of the military infrastructures along the coast. Through a 20-year data wind-wave forecast, this paper determines the energy potential of such areas as Midia, Constanta, and Mangalia. The littoral of the Romanian coast is a wide shelf of the continent, which, as a natural dissipator of the energy of the waves, makes the average flux of power 2-3 kW/m. The paper analyses the framework of Green Defence, comparing the operational advantages of the renewable integration to the technical constraints of the existing Wave Energy Converters (WECs) in low-energy settings. These results imply that although wave power may be used to complement micro-grids with non-critical sensor groups, it is still not high-density and dependable to provide power to large military facilities.*

**Keywords:** *Wave energy potential, Green Defence, Energy flux density*

**8. (ID 58) ST Delivers AI-Enhanced Motor Control Software**

**Authors:** stud Eduard-Tiberiu VIZITIU, stud. Iuliana HANGIU, stud. Corina PETRE

**Scientific Advisor:** Lecturer Eduard DRAGOMIR, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents the integration of Artificial Intelligence (AI) into motor control systems to improve performance and reliability. Traditional methods, such as PID controllers, have limitations in dynamic and nonlinear conditions. AI-based solutions, including machine learning algorithms implemented on embedded systems, enable real-time monitoring and classification of motor behavior. This allows early fault detection and supports predictive maintenance. The study highlights the advantages of edge AI in motor control, such as increased efficiency, adaptability, and reduced operational costs, with applications in industrial automation, robotics, and electric vehicles.*

**Keywords:** *Artificial Intelligence, Motor Control, Machine Learning, Embedded Systems, Predictive Maintenance*

## **9. (ID 62) Study on the Carbon Footprint of Energy Sources in Romania**

**Authors:** stud Geanina Teodora JÎGHIR, stud. Natalia RUSU, stud. Alexandra MATEI

**Scientific Advisor:** Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This study proposes to analyze the carbon footprint due to main energy resources used in Romania from this perspective of current transition phase towards sustainable energy system. It considers both traditional sources — coal; natural gas; nuclear power — and renewable ones, including wind, solar and hydroelectric energy. This study of the emitted CO<sub>2</sub> per energy unit produced is built on a comparative method based on statistical data from national and European institutions. The analysis has shown considerably different values for the carbon footprint between the energy categories analyzed, with renewable sources' figures being practically lower. In this context, the study highlights the importance of public policy measures and investments in clean technologies to reduce greenhouse gas emissions. The findings emphasize the imperative to step up efforts to decarbonize Romania's energy sector.*

**Keywords:** *carbon footprint, renewable energy, energy production, Romania*

## **10. (ID 65) Design and Demonstration of Integrated Electric Propulsion System for Naval Vessels**

**Authors:** stud Lavinia-Elena VULPE, stud. Robert-Andrei NEDELICU

**Scientific Advisor:** Prof. Eng. Gheorghe SAMOILESCU, PhD.

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* In contemporary naval engineering, there is a growing shift toward efficiency and sustainability, which represents a significant challenge for seafarers in their daily activities. The new standards regarding pollution and fuel consumption are causing mechanical systems to lose their efficiency. Through this paper, we aim to highlight the reliability of the integrated electric propulsion system, as well as to compare it with an internal combustion system with compression ignition (diesel), emphasizing the advantages and disadvantages of its use. The electric propulsion system offers quiet operation, which is essential for naval military vessels, as well as more available space on board, allowing for a reduction of the physical footprint by 10–15%. In conclusion it involves certain limitations and higher costs, electric propulsion systems are an efficient alternative to conventional diesel systems and are recommended not only for the future of marine engineering, but also for protecting the planet against pollution.

**Keywords:** seafarers, electrical, diesel, pollution

## **11. (ID 80) Soil Moisture Measurement System**

**Authors:** stud David-Marian ANTON, stud. Pavel Daniel VLASCEANU

**Scientific Advisor:** Assoc. Prof. Eng. G. BUCUR, PhD

**Institution:** University of Oil and Gas of Ploiești

*Abstract:* This paper presents the development of an intelligent and automated soil moisture measurement system designed to optimize water resource management in small-scale agricultural applications. The core of the system is built around the Arduino Uno R3 microcontroller, which processes analog signals from a v2.0 capacitive soil moisture sensor. Unlike traditional resistive sensors, the capacitive approach was selected for its high resistance to corrosion and superior stability in varying soil conditions. The system's architecture follows a modular logic: data acquisition,

*signal processing through an analog-to-digital (A/D) conversion with a 10-bit resolution, and a decision-making layer based on predefined moisture thresholds. The software implements mapping and scaling algorithms to translate raw sensor data into a 0–100% moisture scale. Experimental results, documented through comparative analysis, demonstrate the system's ability to distinguish between dry (0–35%), optimal (35–65%), and saturated (>65%) soil states, triggering real-time visual feedback via an I2C LCD and an RGB signaling module. The study includes a detailed error analysis, comparing the performance of capacitive versus resistive sensing technologies. The findings indicate that the capacitive system significantly reduces measurement deviations (limiting absolute error to approximately 2–5%), providing a reliable and cost-effective solution for sustainable irrigation. The project concludes that such autonomous systems are essential for reducing manual intervention and preventing water waste in modern precision agriculture.*

**Keywords:** soil moisture measurement system

## **12. (ID 101) Network and Signal Filter Analysis**

**Authors:** stud George Bogdan ȚUȚUI, stud. Robert HERGHILIGIU

**Scientific Advisor:** Lecturer Eng. Iancu CIOCIOI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This analysis synthesizes key concepts regarding network and signal filters for electromagnetic compatibility (EMC). The documents detail the critical role of EMC filters in managing conducted emissions (both differential-mode and common-mode) on power supply lines, as outlined by international standards like CISPR. A fundamental framework is established, defining noise sources, transfer pathways, and the necessity of filtering to prevent device malfunction. The application of specific filter components such as common-mode chokes, X-capacitors, and Y-capacitors is discussed. Furthermore, advanced debugging techniques are presented, emphasizing the use of dual LISNs and oscilloscopes to separate and analyze noise modes for efficient filter optimization. Proper filter mounting, grounding, and adherence to safety standards are highlighted as essential for ensuring regulatory compliance and reducing development costs.*

**Keywords:** *EMC, Conducted Emissions, Common-Mode Noise, Differential-Mode Noise, EMI Filter*

### **13. (ID 102) Installing Sensors in Areas with Potentially Explosive Atmospheres**

**Authors:** stud Robert HERGHILIGIU, stud. Onur DERVIS

**Scientific Advisor:** Lecturer Eng. Iancu CIOCIOI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Zener barriers provide a cost-effective, intrinsically safe interface between safe-area equipment and hazardous-area field devices. Their operating principle relies on zener diodes, a current-limiting resistor, and a fuse. In normal operation, the barrier is transparent to the control loop. During a fault in the safe area, the zener diodes clamp the voltage, diverting excess current to a dedicated intrinsic safety ground and causing the fuse to open, thereby preventing hazardous energy from reaching the explosive atmosphere. Key considerations include correct grounding, as circuits without galvanic isolation must be grounded with a dedicated conductor. The barriers are available in single, dual, and triple-channel versions with positive, negative, or alternating polarity to suit various applications. They feature a compact 12.5 mm housing for DIN rail mounting, simplifying installation and space optimization. Proper selection requires matching voltage, resistance, and entity parameters to the field device and ensuring compliance with relevant installation standards.*

**Keywords:** *Intrinsic Safety, Zener Diode, Hazardous Area, Grounding, Explosion protection*

### **14. (ID 103) The Realization of a Safety System for the Navigation of Vessels on Inland Waters**

**Authors:** stud Andrei-Adrian ENOIU, stud. Bianca-Maria ANTON

**Scientific Advisor:** Prof. Eng. Gheorghe SAMOILESCU, PhD.

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper proposes a safety system for vessel circulation on inland waters, developed in accordance with international regulations. According to IAS norms, vessels navigating these waterways are required to provide specific identification data, information regarding the transported goods, and their route. The*

*proposed system is ecological, offering the advantage of continuous operation and the capability to generate electrical energy through the movement of water. Furthermore, the work presents a prototype designed to convert kinetic energy into a determined by two fundamental physical parameters: the velocity of the water flow ( $v$ ) and the diameter of the hydraulic turbine rotor ( $D$ )*

**Keywords:** *navigable channel, river buoy, axial-flow turbine, inland waterway navigation, kinetic energy conversion, renewable energy*

### **15. (ID 104) Protection and Distribution Systems for Marine Generators-Selectivity and Reliability**

**Authors:** stud Alexandra BĂLAN, stud. Darius-Răzvan ATANASOAI

**Scientific Advisor:** Prof. Eng. Gheorghe SAMOILESCU, PhD.

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *In this paper, we have presented the fundamental principles of generator protection in marine electrical systems, focusing on preventing total loss of power through selective tripping strategies. When an overload occurs, the system uses preferential tripping relays to disconnect non-essential consumers, thus protecting the operation of the remaining machines in parallel and avoiding cascading tripping. Overcurrent protection is calibrated to ensure rigorous discrimination, intervening only if local distribution circuit protections fail or if a major fault occurs on the busbars.*

**Keywords:** *Generator protection, marine electrical systems, total loss of power, selective tripping, overload, preferential tripping relays, non-essential consumers, parallel operation, cascading tripping, overcurrent protection, discrimination, local distribution circuit protections, busbars.*

### **16. (ID 105) Ship Electromagnetic Compatibility**

**Author:** stud Ionela-Bianca NICOLCEA

**Scientific Advisor:** Prof. Eng. Gheorghe SAMOILESCU, PhD.

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the systemic architecture of Electromagnetic Compatibility (EMC) within the complex framework of marine engineering, defining it as a fundamental property for the coexistence of electrical, electronic, and mechanical systems. The*

*study explores the etiology of interference, identifying transfer vectors such as magnetic induction, capacitive coupling, and radiated emission, with a particular focus on the common impedance phenomenon within the ship's ground plane. It details electromagnetic hardening strategies, immunity testing methodologies involving lamp current injection, and mitigation protocols based on BS 1597:1985 and BS 5260:1975 standards. Finally, the work emphasizes the importance of spatial management, the use of LC suppressors with specific values, and the rigorous segregation of type 1 and type 2 cabling to maintain the functional integrity of composite naval systems.*

**Keywords:** *Electromagnetic compatibility, electromagnetic hardening, common impedance, cable segregation, LC suppressors, BS standards, systemic immunity.*

## **17. (ID 106) Electromagnetic Interference**

**Authors:** stud David PÂRLIȚEANU, stud. Alexandru Ioan REBENCIUC, stud. Elena Alessia ERMALAI

**Scientific Advisor:** Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Any electrical device emits unwanted electromagnetic radiation that adds to the natural radiation and can affect the operation of other equipment. Electromagnetic disturbances are classified according to their origin (natural or artificial), location (internal or external), and the transmission way (by conduction or electromagnetic field). The main types of disturbances are atmospheric, industrial, cosmic, electrical contact, and reciprocal ones. These can produce noise, pulses, or secondary radiation that distorts useful signals. Electromagnetic compatibility is the ability of the equipment to operate correctly in an electromagnetic environment without generating interference. It is assessed by parameters such as compatibility level and reserve or sensitivity to disturbances.*

**Keywords:** *electromagnetic compatibility, disturbances, interference, parasitic radiation, immunity.*

### **18. (ID 107) Autonomus Mechatronic System: Solar Tracker and Smart Security Barrier**

**Authors:** stud Crinu Marian BUSIOC, stud. Ioana Ana-Maria CONTOR

**Scientific Advisor:** Lecturer Eng. Laura Mihaela LELUȚIU, PhD

**Institution:** Transilvania University of Brasov

***Abstract:** This advanced, Arduino-based mechatronic project integrates a dual system: a dual-axis solar tracker and a smart security barrier. The tracker uses a network of photoresistors and servomotors for automatic alignment, while also allowing manual control via a joystick. The security subsystem combines PIR detection, anti-collision ultrasonic telemetry, acoustic alarms, and remote control via Bluetooth. Energy-independent, the setup utilizes solar panels, Li-Ion batteries, a BMS protection circuit, and a buck converter. Monitoring is achieved through a touch-sensitive dashboard, switching a relay for real-time voltage reading.*

***Keywords:** Autonomus, solar tracker, security*

### **19. (ID 110) Analysis of Dielectrics (Insulators) in Developing Mixtures for Electrical Engineering Applications**

**Author:** stud Geaner EMURLA, stud. Răzvan Iosif CHIRITĂ

**Scientific Advisor:** Prof. Eng. Gheorghe SAMOILESCU, PhD.

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** This work analyzes the variation in electrical permittivity of several insulating materials used in electrical engineering. The electrical permittivity is calculated, compared with experimental measurement results, and the specific characteristics of these mixtures are plotted. Both the theoretical results and the measurements lead to conclusions that can be applied to the practical development of insulating material blends.*

***Keywords:** Dielectric, Relative permittivity, Viscosity, Electrical and mechanical resistance (strength)*

### **20. (ID 111) Electric Motor Control Gear**

**Authors:** stud Marian-Cristian VASII, stud. Liviu-Gabriel NOAGHE

**Scientific Advisor:** Prof. Eng. Gheorghe SAMOILESCU, PhD.

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Electric motors represent essential components in most modern industrial systems, being widely used to drive a variety of equipment and technological processes. The safe and efficient operation of these motors largely depends on the control and protection systems integrated within motor control units, commonly known as Motor Control Gear. This paper presents the role and importance of motor control gear, as well as the main components and functions of these systems within industrial installations. The study analyzes methods of overload protection, including the use of thermal relays and electronic motor protection relays, which allow continuous monitoring and protection of motors against abnormal operating conditions. Furthermore, the paper addresses aspects related to short circuit protection, switching devices used in motor control systems, and starting methods for three-phase AC motors.*

**Keywords:** *Motor Control Gear, electric motors, overload protection, electronic motor protection, relays, short circuit protection, electromagnetic contactors, three-phase motor starters, electric motor control, control gear maintenance, synchronous motors*

## **21. (ID 115) Programmable Logic Controllers with Arduino Mega 2560**

**Authors:** stud Onur DERVIŞ, stud. George Bogdan TUTUI

**Scientific Advisor:** Lecturer Eng. Iancu CIOCIOI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Programmable Logic Controllers (PLCs) are essential devices widely used in industrial automation to monitor inputs, execute control logic, and manage outputs in processes such as manufacturing, energy systems, and building automation. This paper presents a friendly and accessible approach to PLC design using the Arduino Mega 2560 platform. The proposed solution combines educational value with practical implementation, offering a cost-effective alternative for learning and prototyping. The hardware setup integrates input protection circuits, relay modules, and basic industrial interfacing elements, while the software is developed in C/C++ to emulate core PLC functions, including timers, counters, and sequential logic control. Communication protocols such as serial communication are also implemented for system expansion. Experimental validation demonstrates that the system performs*

*reliably in simple automation tasks. Although it lacks industrial certification, the solution is well-suited for academic use and small-scale applications, bridging the gap between theory and real-world automation.*

**Keywords:** *PLC, Arduino Mega 2560, automation, embedded systems, control systems*

## **22. (ID 117) Engineering Principles of Electromagnetic Shielding**

**Authors:** stud Mircea-Gabriel LUNGU, stud. Andrei-Gabriel ROMANESCU

**Scientific Advisor:** Lecturer Eng. Iancu CIOCIOI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Shielding effectiveness relies on reflection, absorption, and multiple reflections. Reflection depends on impedance mismatch, making highly conductive materials like copper ideal for electric fields. Absorption follows skin depth, where each skin depth adds roughly 9 dB of attenuation. For low frequency magnetic fields, high permeability materials such as steel are preferred. Practical shielding depends heavily on construction details. Joints and seams must maintain low impedance, while openings can act as unintended radiators when their dimensions become significant relative to wavelength. Near field behavior varies with distance and source type, as wave impedance differs for electric and magnetic sources. Thermal management demands solutions like honeycomb vents or waveguides below cutoff, which balance airflow with shielding integrity. Gasket compression, fastener spacing, and proper grounding ultimately determine real world performance.*

**Keywords:** *shielding effectiveness, skin depth, wave impedance, reflection, absorption*

## **23. (ID 118) Analysis of the Underwater Radiated Noise Generated by Ships**

**Authors:** stud Andrei-Gabriel ROMANESCU, stud. Mircea-Gabriel LUNGU

**Scientific Advisor:** Lecturer Eng. Iancu CIOCIOI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper addresses the growing environmental concern of underwater radiated noise (URN) from ships, which has been*

*shown to adversely affect marine ecosystems—from causing physical hearing damage to disrupting behavior across a range of marine species. It begins by analyzing the primary sources of ship-generated noise: propeller cavitation, machinery vibration, and flow-induced noise, along with their associated frequency characteristics and transmission pathways. The study then examines the relationship between energy efficiency (EE), greenhouse gas (GHG) reduction, and URN mitigation, finding that these objectives are often complementary, though trade-offs can occur in specific cases.*

**Keywords:** *underwater radiated noise; ship energy efficiency; greenhouse gas emissions; noise mitigation*

#### **24. (ID 122) Investigation of the Relationship Between Electrostatic Potential and Height Above Ground in Relation to Atmospheric Electrical Charge Formation**

**Authors:** stud Mariana RUSU, stud. Andrei PARLOG, stud. Roxana TAGIRTA

**Scientific Advisor:** Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The study of electrostatic potential in relation to height above the ground represents an important field for understanding natural electrical phenomena occurring in the Earth's atmosphere. The atmosphere contains electrically charged particles that are unevenly distributed, generating a natural electric field between the Earth's surface and the upper layers of the atmosphere. Variations in altitude lead to changes in electrostatic potential, influencing the intensity and behavior of the atmospheric electric field. This research examines the mechanisms responsible for the formation and distribution of electrical charges in the atmosphere and analyzes the role of the Earth's electric potential in maintaining the global electrostatic balance. Particular attention is given to the relationship between height difference from the ground and electrostatic potential, as well as to the physical processes that contribute to atmospheric ionization. Furthermore, the study explores the operating principles of devices designed to utilize radiant energy or ambient electrostatic potential differences, such as Corona Motor systems, which exploit air ionization and electrostatic phenomena. Understanding these processes may contribute to the development of*

*alternative methods for harvesting environmental energy and improving knowledge of the interaction between the Earth and its atmospheric electrical system.*

**Keywords:** *electrostatic potential, atmospheric electric charges, atmospheric electric field, Earth potential, radiant energy, Corona Motor.*

## **25. (ID 124) Simplifying Motor Control for Drones with ESC Reference Design**

**Authors:** stud. Horațiu-Sebastian BOTOGA, Sebastian-Andrei IGNAT, stud. Marius BOCÎRNEA

**Scientific Advisor:** Lecturer Eduard DRAGOMIR, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Motor control is a critical element in the operation of modern drones, directly influencing system stability, energy efficiency, and overall performance. This paper analyzes the role of the Electronic Speed Controller (ESC) and highlights how the use of a reference design contributes to simplifying motor control. The ESC converts commands received from the flight controller into electrical signals that regulate motor speed and direction. The main components of an ESC are presented, including the microcontroller, gate driver, MOSFET transistors, and current sensing systems, along with their role in achieving efficient and reliable motor control. Furthermore, the advantages of using a reference design are emphasized, enabling optimized integration of components and reducing development complexity. In conclusion, the adoption of ESC reference design solutions facilitates the rapid implementation of drone motor control systems while ensuring high energy efficiency and reliability.*

**Keywords:** *ESC, Drones, Motor control, Microcontroller*

## **26. (ID 136) A.T.H.E.N.A. – Algorithmic Threat Hunting and Evasion Network Architecture**

**Author:** stud Maria - Bianca BADEA

**Scientific Advisor:** Prof. Eng. Simona MICLAUS, PhD

**Institution:** "Nicolae Bălcescu "Land Forces Academy

**Abstract:** *his paper presents the design, development, and implementation of A.T.H.E.N.A. (Algorithmic Threat Hunting and*

*Evasion Network Architecture*), deployed via a custom-engineered tactical hexapod. The project focuses on building an advanced military robotics system from the ground up, integrating optimized 3D-printed components and proprietary algorithms. Unlike traditional wheeled rovers that are susceptible to terrain-induced immobility, the A.T.H.E.N.A. platform utilizes a six-legged locomotion system to seamlessly navigate complex, unstructured environments. The system's primary objective is to enhance troop survivability by conducting forward reconnaissance, utilizing Artificial Intelligence for environmental scanning, and executing offensive cyber operations against hostile networks.

**Keywords:** Hexapod Robotics Human–Machine Interaction Tactical Systems Gesture-Based Control Cybersecurity Operations

## **27. (ID 160) Integrated sensor system for naval drones designed to avoid obstacles during autonomous missions**

**Authors:** stud Marius-Ionuț OANCEA, stud. Răzvan-Mihai ANTIPOV, stud. Cosmin GHEORGHÎĂ

**Scientific Advisor:** Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The paper presents the development and implementation of an integrated sensor system for autonomous naval drones, with the main purpose of detecting and avoiding obstacles in dynamic environments. The proposed system uses a combination of sensors, including ultrasonic sensors and vision modules, integrated through an ESP32 platform, to ensure efficient data collection and processing in real time. The control algorithm allows for obstacle identification and trajectory adaptation without human intervention, contributing to increased safety and autonomy in naval missions. The solution is optimized for low energy consumption and low costs, being suitable for educational applications and functional prototypes. The results obtained highlight the efficiency of the system in simulated and real scenarios, demonstrating its potential for extensive use in the field of autonomous maritime robotics.*

**Keywords:** *naval drones, autonomous navigation, obstacle avoidance, integrated sensor system, ESP32, ultrasonic sensors, computer vision, marine environment*

## **28. (ID 176) Efficient Energy Harvesting using the Joule Thief Circuit**

**Authors:** stud Tudor Alex MUREȘAN, stud. Daria Ștefana CHIȚOIU, stud. Crina Alexia BELLECIU, stud. Georgiana Elena POPA

**Scientific Advisor:** Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** The widespread reliance on battery-powered devices often leads to significant energy waste, as most electronics stop functioning once a battery's voltage drops below a certain threshold (typically 1.0V – 1.1V). Even though these "dead" batteries still contain a usable amount of energy, standard circuits cannot tap into it. This paper explores the Joule Thief, a minimalist self-oscillating voltage booster designed to "steal" this remaining energy to power high-voltage loads like LEDs. The study analyzes the circuit's transition from a low-voltage DC input to a high-frequency AC pulse through the use of a simple transistor, a resistor, and a handmade toroid transformer. By utilizing the principle of magnetic induction, the circuit creates rapid "on-off" switching that causes the magnetic field in the transformer to collapse, generating high-voltage spikes. Our analysis compares the Joule Thief's performance against standard direct connections. The results demonstrate that while a standard connection fails to light an LED at low voltages, the Joule Thief successfully boosts the output to over 3V, making it an effective tool for energy harvesting. Furthermore, the study evaluates how the frequency of these pulses (thousands of times per second) ensures a steady light output visible to the human eye while minimizing heat loss. Finally, the project identifies the practical benefits of this circuit for DIY electronics and sustainability, proving that simple, low-cost components can significantly extend the life of power sources and reduce electronic waste.*

***Keywords:** Joule Thief, Energy Harvesting, Magnetic Induction, Battery Scavenging*

## **29. (ID 177) Smarter Temperature Control**

**Author:** stud Laurențiu Constantin PISĂU

**Scientific Advisor:** Lecturer Eng. Laura Mihaela LELUTIU, PhD

**Institution:** Transilvania University of Brașov

**Abstract:** *it's a smart thermostat that communicates in real time with a wood furnace. This thermostat will be installed on the radiator and will open or close the radiator's flow valve based on the room temperature, radiator temperature, and furnace temperature. The goal is to use thermal energy as efficiently as possible, reduce wood consumption, and increase comfort.*

**Keywords:** *temperature control, optimisation, smart home, wood furnace control, reduced pollution*

### **30. (ID 178) Comparative Analysis of Conventional Starting Methods for Induction Motors in Isolated Shipboard Electrical Grids**

**Authors:** stud Mihail-Damian DUMITRESCU, stud. Andrei-Robert BONTAS, stud. Constantin-Octavian ARON

**Scientific Advisor:** Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The widespread use of three-phase induction motors for critical auxiliary equipment such as cooling pumps and ventilation fans in marine applications requires a thorough understanding of how they start. Since they are connected to an electrical grid that is primarily ship based, starting problems using direct-on-line (DOL) can cause large inrush currents that produce large electrical voltage surges which endanger the reliability of sensitive electronic devices. This paper compares the traditional means of starting motors - namely using conventional and newer techniques, including star-delta methods and electronic soft starters - and evaluates the effect of those different methods on the transitory electrical behavior and on mechanical torque output. The analysis will establish how the various methods used to start the motor affect power quality within the vessel's microgrid network.*

**Keywords:** *Three-phase induction motors, Shipboard microgrids, Power quality*

### **31. (ID 197) Predictive Maintenance: Diagnosing Faults Using Vibration Analysis**

**Author:** stud Marian MĂRTIȘCĂ

**Scientific Advisor:** Lecturer Eng. Tiberiu PAZARA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Vibration analysis is a fundamental technique for diagnosing defects and maintaining of oscillating equipment. While fault detection locates potential issues, maintenance ensures machines operate within defined limits. Condition monitoring evaluates the operational state, reducing costs compared to traditional time-based strategies by performing tasks only when required. Among various techniques like thermography or signal analysis, vibration monitoring is paramount, providing accurate data on the condition of a machine, including fault severity and location. The modern industry is discarding reactive repairs for a predictive approach as it enhances production and quality. Predictive maintenance anticipates potential failures before they happen and schedules downtime effectively. This is based on the principle that mechanical failures alter vibration signals.*

### **32. (ID 206) 400V vs. 800V: Unmasking the Truth Behind the Battery Transition**

**Authors:** stud Mihai Marian GHIOCEL, stud. Denis Gabriel GIRBACEA, stud.

**Scientific Advisor:** Lecturer Eduard DRAGOMIR, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The automotive industry is currently undergoing a significant paradigm shift, transitioning from the traditional 400V battery architecture to 800V systems. This evolution aims to address the primary barriers to electric vehicle (EV) adoption: charging speed and thermal efficiency. By doubling the voltage, the system can deliver the same power with half the current, leading to a theoretical 75% reduction in Joule heating losses. This allows for thinner, lighter cabling, which optimizes the vehicle's total mass and improves energy density. However, this transition introduces complex engineering challenges. It requires advanced wide-bandgap semiconductors, such as Silicon Carbide (SiC), to manage higher switching frequencies and thermal loads. Furthermore, compatibility with existing 400V infrastructure necessitates on-board DC-DC converters, adding complexity to the powertrain. While 800V systems currently dominate the premium segment due to higher manufacturing costs, they represent the future of maritime and land-*

*based e-mobility, offering a scalable solution for high-performance transport.*

**Keywords:** *800V Architecture, DC-DC Converters, Joule Heating Losses, Wide-Bandgap Semiconductors, High Switching Frequency, Ultra-Fast Charging, E-mobility Scalability*

### **33. (ID 210) Bridge Navigational Watch Alarm System (BNWAS)**

**Authors:** stud Robert-Ștefan COTET, stud. Lucian-Sorin BALCAN

**Scientific Advisor:** Lecturer Eng. Iancu CIOCIOI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The Bridge Navigational Watch Alarm System (BNWAS) represents a vital automated safety mechanism on ship bridges, as required by the International Maritime Organization (IMO) through SOLAS Chapter V, Regulation 19. It combats officer fatigue a major cause of maritime accidents by monitoring the Officer of the Watch (OOW) on the bridge. The OOW must interact with bridge equipment (e.g., helm, radar) every 12 minutes to reset the system. Non-compliance triggers a personal alert, followed by bridge-wide audible and visual alarms, then escalations to the captain's cabin and engine room. This ensures timely intervention, aligning with STCW watchkeeping standards and reducing navigation risks. This project creates a cost-effective BNWAS prototype using an Arduino UNO microcontroller. A PIR motion sensor detects OOW movement near the console and resets the timer. A high-decibel buzzer provides audible warnings, while RGB LEDs deliver visual signals flashing red for bridge alarms and pulsing for escalations. A 5V regulator with battery backup ensures reliable power. Panel-mounted push buttons enable manual alarm silencing and resets. Arduino code manages timing, sensor integration, and sequential triggers, providing a scalable solution for training or small-vessel use.*

**Keywords:** *BNWAS, navigational safety, Arduino UNO, motion sensor, fatigue monitoring, maritime alarm system, SOLAS compliance, watchkeeping, PIR sensor, buzzer alert*

### **34. (ID 213) Integration of Vertical Wind Turbines into Ship Emergency Power Systems**

**Author:** stud Daniel PÂRLOG

**Scientific Advisor:** Assoc. Prof. Ovidiu-CRISTEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper investigates the integration of vertical axis wind turbines (VAWTs) into shipboard emergency power systems as a sustainable solution for energy supply during naval casualties. In critical situations where conventional power sources fail, ensuring the operation of essential onboard systems is vital for safety and damage control. The study analyzes the feasibility, performance, and reliability of VAWTs under maritime conditions, highlighting their advantages such as omnidirectional wind capture, compact design, and reduced maintenance requirements. A case study is presented to evaluate the potential of VAWTs to supply emergency loads, considering factors such as wind availability, installation constraints, and energy storage integration. The results demonstrate that vertical wind turbines can enhance the energy resilience of ships and contribute to safer and more efficient emergency management at sea.*

**Keywords:** *vertical axis wind turbines, renewable energy, shipboard emergency power systems, naval casualties, maritime engineering*

### **35. (ID 218) Technical Analysis of the Design, Operation and Reliability of the Steering Gear**

**Authors:** stud Daniel PÎRLIȚEANU, stud. Alexandru Teodor JOIȚĂ

**Scientific Advisor:** Prof. Eng. Gheorghe SAMOILESCU, PhD.

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This study explores the critical engineering principles of marine steering gear systems, focusing on the mechanical and electrical configurations used to ensure vessel maneuverability. The primary focus is on hydraulic transmission units, specifically the ram-type system noted for its use of the Rapson Slide to increase mechanical advantage and the compact rotary vane design. The analysis further examines the Ward-Leonard all-electric steering arrangement and the stringent redundancy requirements for vessels over 10,000 tons, which mandate automatic failure recovery within 45 seconds. By synthesized review of operational maintenance, system charging, and mandatory pre-departure testing, this work emphasizes that maritime safety is a product of both robust automated design and disciplined human oversight.*

**Keywords:** Rotary Vane, Telemotor, Hunting Gear, Twin System Redundancy

### **36. (ID 219) Shipboard Electric Motor Protection and Control**

**Authors:** stud Alexandru Teodor JOITA, stud. Daniel PIRLITEANU

**Scientific Advisor:** Prof. Eng. Gheorghe SAMOILESCU, PhD.

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** Motor control gear represents the system used to control and protect electric motors onboard ships. It includes protection devices, switching devices and control elements that ensure safe operation. Protection Systems Short-circuit protection is provided by fuses or circuit breakers, while overload protection prevents overheating. Thermal relays operate based on heat, magnetic relays act instantly based on current, and electronic systems provide advanced monitoring. Starting Methods Different starting methods are used depending on the motor and application. Direct-on-line starting is simple but produces high current. Star-delta starting reduces current by lowering voltage during startup. Auto-transformer starting allows adjustable voltage levels, while soft starters ensure smooth and controlled acceleration. A properly designed motor control system is essential for safe and efficient ship operation. Correct coordination of protection and starting methods prevents failures and increases equipment lifespan.

### **37. (ID 230) Variable-Reluctance Sensors: From Fundamentals to Speed Sensing**

**Authors:** stud Andreea-Bianca MĂRGEAN, stud. Emanuela-Dumitrița CIOACĂ

**Scientific Advisor:** Lecturer Eduard DRAGOMIR, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** Variable reluctance (VR) sensors are widely used in engineering applications for motion and speed detection due to their simple construction, durability, and reliability. These sensors operate based on the variation of magnetic reluctance caused by the movement of a ferromagnetic target, which induces a voltage in a coil. This paper presents the fundamental principles of VR sensors, including their structure, working mechanism, and signal generation process. It also examines their application in speed sensing systems,

where the frequency of the generated signal is directly proportional to the rotational speed of the target.

**Keywords:** variable reluctance sensors, speed detection, magnetic sensors, signal conditioning, engineering applications

### **38. (ID 234) The Silent Listener: Optical Audio Reconstruction via Photodiode and MATLAB-Based Filtering**

**Author:** stud Robert CIOBU

**Scientific Advisor:** Annamaria SÂRBU, PhD

**Institution:** "Nicolae Bălcescu" Land Forces Academy

**Abstract:** This paper presents the design, implementation, and testing of an electronic device that can detect the surface vibration from a reflected laser beam. The beam is captured by an integrated circuit (a photodiode and a transimpedance amplifier). A primary objective is the minimalist hardware design, enabling the direct compatibility with 3.5mm audio ports. The recorded data is processed in MATLAB to perform noise reduction, demonstrating a simple yet effective method for remote acoustic monitoring.

**Keywords:** Photodetector, Laser Vibrometry, Optical Microphone, MATLAB,

### **39. (ID 239) PWM Improvement Designs**

**Author:** stud Valentin MAXIM

**Scientific Advisor:** Lecturer Eduard DRAGOMIR, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** Pulse width modulators (PWM) are essential for encoding analogue values into digital waveforms for applications like motor control and power supplies. Standard low-pass RC and LC filters often face challenges in resonance oscillations, balancing ripple attenuation with settling time, limited bandwidth with susceptibility to load changes or high-frequencies, usually resulting in requirements for big physical components. This presentation explores transition strategies from the commonly used LC filters. The upgraded versions of the LC circuit is to switch to LCL filters including its referent upgrades to structure and more. To reduce and even eliminate risks of resonant instability this research examines ways on which a LCL filter can be improved to LCL-LC and passive or activate methods of damping.

**Keywords:** *resonance oscillations, resonant instability, ripple attenuation, LCL filters*

#### **40. (ID 244) New Atomic Watch**

**Authors:** stud Andrei COSIȚEANU, stud. Dragoș-Marian MOCANU

**Scientific Advisor:** Lecturer Eduard DRAGOMIR, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *While most digital systems rely on quartz crystal oscillators for timing, high-stakes applications like GPS and 5G telecommunications require stability that only atoms can provide. This article explores the transition from quartz to atomic references, focusing on the feedback control loops and miniaturization techniques (CSAC) that make modern precision timing possible.*

**Keywords:** *New atomic clock*

#### **41. (ID 280) Study of Linear Voltage Stabilizers**

**Author:** stud Remus-Andrei MOCANU

**Scientific Advisor:** Lecturer Eng. Iancu CIOCIOI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This presentation tracks the evolution of voltage regulation, from Ohm's Law and discrete components (Zener diodes, transistors) to advanced control systems. It provides a comparative analysis of Linear Regulators (78xx, LDOs) valued for simplicity and low noise and Switching Regulators (Buck, Boost), essential for high efficiency and thermal management. Concluding with PWM control and practical selection criteria, the slides demonstrate how these theoretical concepts power real-world hardware, like the motherboards we use every day.*

#### **42. (ID 289) Near-Field and Far-Field Regimes in the Electromagnetic Vulnerability Assessment of UAV Platforms**

**Author:** stud Maria-Denisa CHIRIAC

**Scientific Advisors:** Assoc. Prof. Eng Dinu ATODIRESEI, PhD, Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Understanding the distinction between the near-field and far-field regimes is essential for the accurate assessment of*

*electromagnetic effects on UAV platforms. Starting from the model of an electromagnetic pulse generator based on an LC circuit, the analysis highlights the main field-coupling and conducted-coupling mechanisms, as well as the vulnerability of the drone's critical subsystems, particularly the flight controller, the IMU, and the power and signal interfaces. The theoretical framework shows that, for a compact coil, the magnetic near-field component decays rapidly with distance, approximately as  $1/r^3$ , which severely limits its influence at longer ranges. By contrast, in the far-field regime, the radiated component follows the much more favorable  $1/r$  dependence characteristic of electromagnetic wave propagation over distance. Within this perspective, local disturbances can be interpreted in terms of near-field behavior, whereas the influence on electronic systems located at greater distances requires a radiative far-field interpretation. The resulting approach provides a unified view that connects the mathematical source model, distance-dependent field decay, and the electromagnetic vulnerability of UAV platforms.*

**Keywords:** *UAV platforms, near field, far field, electromagnetic coupling, conducted coupling, electromagnetic pulse generator, LC circuit, flight controller, IMU, electromagnetic vulnerability*

### **43. (ID 308) Study of a Hybrid Control Architecture for an Autonomous Unmanned Surface Vehicle Using ESP32 and Smartphone Integration**

**Author:** stud Bogdan-George SANDU

**Scientific Advisor:** Associate Professor, Eng. Paul BURLACU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents the technical development of an Unmanned Surface Vehicle (USV) designed for maritime research, focusing on a robust hybrid control architecture. The system's core is built around the ESP32 D1 R32 microcontroller, selected for its power efficiency and superior resistance to electromagnetic interference. A key architectural innovation is the integration of a smartphone as a high-level processing unit for AI tasks and image processing, communicating with the microcontroller via Bluetooth. Navigation and positioning are achieved through a GY-273/HMC5883L triple-axis compass and a NEO 6M GPS module. The propulsion system utilizes L298 H-bridges or relay modules for*

*motor control, while steering is managed by an SG90 servomechanism. To ensure operational stability, the design employs 18650 Li-Ion battery arrays with isolated power branches and a passive Faraday cage shielding to protect sensitive sensors from motor-induced noise. This configuration offers a scalable and cost-effective solution for autonomous aquatic data collection.*

**Keywords:** *Unmanned Surface Vehicle (USV), ESP32 D1 R32, Hybrid Control System, Autonomous Navigation, Smartphone Integration*

#### **44. (ID 315) Implementing Remote Control in the Maritime and Offshore Industry**

**Authors:** stud David VOICU, stud. Liviu TUNSU

**Scientific Advisor:** Lecturer Eng. Iancu CIOCIOI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Both American Bureau of Shipping and Bureau Veritas emphasize that autonomous and remote-control technologies must be introduced gradually, within a risk- and safety-based framework, ensuring reliability, cybersecurity, and clear human oversight at every stage of vessel design and operation.*

**Keywords:** *Automation, human roles, control modes, navigation, propulsion, machinery, communications, cargo, testing*

#### **45. (ID 340) Radar Integration in Modern Naval Fire Control Systems**

**Author:** stud Alin-Andrei BERTEA

**Scientific Advisor:** Lecturer Eng. Iancu CIOCIOI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents the integration of radar systems in modern naval fire control systems, emphasizing the electrical engineering principles involved in their operation and interconnection. The study examines the role of radar in the acquisition, processing, and transmission of electronic signals used for target detection and tracking. Attention is given to the integration of radar with processing units, automated control structures, and other electronic subsystems that support accurate and efficient fire control. The paper underlines the importance of signal processing, automation, and real-time data exchange in increasing system*

*reliability, response speed, and operational performance. In conclusion, radar integration is a key factor in enhancing the efficiency and precision of modern naval electronic systems.*

**Keywords:** *radar integration, electrical engineering, signal processing, target detection, data acquisition*

#### **46. (ID 344) Modeling and Simulation of a Three-Phase Synchronous Generator**

**Authors:** stud Leonard-George BUTNARU, stud. Petrică TABAC

**Scientific Advisor:** Prof. Eng. Vasile DOBREF, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper focuses on the modeling and simulation of a three-phase synchronous generator, an essential element within shipboard electrical networks. Using Matlab/Simulink, the research evaluates the generator's dynamic performance across steady-state conditions and transient events, including load fluctuations and potential faults. Through the development of a detailed mathematical model, this study verifies key theoretical principles and examines the electromechanical characteristics crucial for maritime safety. Ultimately, the work highlights the practical application of marine engineering concepts in monitoring and managing complex naval power systems.*

**Keywords:** *Three-Phase Synchronous Generator, Simulation, Naval Electrical Systems, Transient Regimes.*

#### **47. (ID 350) Cesium Atomic Clock**

**Authors:** stud Luca Adrian PARTEBUNA, stud. Robert Mihai MIRON, sud. Iulian Andrei BURLACU

**Scientific Advisor:** Lecturer Eduard DRAGOMIR, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Ultra-precise time synchronization is the foundation of modern technological infrastructures, ranging from 5G/6G telecommunication networks to financial transactions and navigation systems. Currently, these systems are vulnerable due to their heavy reliance on satellite signals (GNSS/GPS), which can be jammed or interrupted. This paper analyzes the development and performance of the new cesium atomic clock, an innovation that addresses this vulnerability by offering an exceptional autonomous operation*

*(holdover) capability. The present work explores the architecture of this new metrological system, highlighting its ability to maintain a 100-nanosecond (ns) precision over a period of several months without requiring external synchronization. The mechanisms for interrogating cesium atoms, along with techniques for reducing phase noise and long-term frequency drifts, will be discussed. In conclusion, the presentation will emphasize how this temporal stability redefines security and reliability standards for critical terrestrial infrastructures and future deep-space exploration missions.*

**Keywords:** *time metrology, cesium atomic clock, autonomous precision, GNSS, critical infrastructure, nanoseconds.*

#### **48. (ID 351) Renewable resources. Wave energy.**

**Authors:** stud Ramona PETREA, stud. Larisa Mihaela POPA

**Scientific Advisor:** Assoc. Prof. Eng. Ovidiu CRISTEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *In the context of the global energy transition and the increasing need to reduce greenhouse gas emissions, the use of renewable energy resources has become a strategic priority. Among these, wave energy represents a promising source due to its predictability, high energy density, and availability in maritime areas. This paper analyzes the energy potential of ocean waves, the operating principles of the main conversion technologies, and the advantages of using this type of energy compared to conventional sources. It also highlights the technical, economic, and environmental challenges associated with the implementation of wave energy capture systems, as well as future development perspectives in the context of current technological progress. The study emphasizes that wave energy can make a significant contribution to the diversification of the energy mix and to the strengthening of energy security, especially for countries with access to the sea and a strategic interest in exploiting marine resources.*

**Keywords:** *wave energy, renewable energy, marine energy, energy conversion, sustainable development, offshore technologies, green energy*

#### **49. (ID 354) Study on the Current Status and Necessity of Using Wireless Power Transfer Underwater for Charging Autonomous Underwater Vehicles**

**Author:** stud Denis-Marian BARBIERU

**Scientific Advisor:** Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** This study examines the current status and the necessity of implementing underwater wireless power transfer (UWPT) technologies for charging autonomous underwater vehicles (AUVs). Traditional power supply methods, such as batteries, fuel cells, and tethered systems, present significant limitations in terms of operational range, maintenance requirements, and mission flexibility. While battery-based systems are widely used due to their reliability and ease of integration, they restrict mission duration and require frequent recovery for recharging. Similarly, fuel cells and tethered power solutions introduce complexity, safety concerns, or reduced mobility.*

***Keywords:** Underwater wireless power transfer (UWPT), Autonomous underwater vehicles (AUVs), Inductive coupling, Resonant magnetic coupling*

#### **50. (ID 356) Interface of the Electronic Equipment Installed on Board the Ship**

**Author:** stud Matei-Cosmin NEMTEANU

**Scientific Advisor:** Lecturer Eng. Iancu CIOCIOI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** This presentation explores the critical standards governing digital interfacing for shipboard electronic equipment, focusing on the evolution from NMEA 0183 to OneNet. It details the technical architectures of serial simplex communication and CAN-Bus networks, emphasizing hardware safety through opto-isolation and single-point grounding. By examining IEC 61162-1 roles in ECDIS integration and checksum validation processes, the project highlights how standardized protocols ensure data integrity. Finally, it addresses the shift toward high-speed Ethernet and unified IPv6 networks to support modern maritime bandwidth and cybersecurity requirements.*

***Keywords:** NMEA 0183, NMEA 2000*

### **51. (ID 357) Analysis of Three-Phase Induction Motor Operation Under Variable Load Conditions Using Static Frequency Converters**

**Authors:** stud Petrică-Valentin TABAC, stud. Leonard-George BUTNARU

**Scientific Advisor:** Prof. Eng. Vasile DOBREF, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** This paper investigates the operational behavior of three-phase induction motors under variable load conditions when supplied by static frequency converters. The increasing emphasis on energy efficiency and advanced control in industrial drive systems has established frequency converter-based supply as a standard solution for variable-speed applications. The study addresses both steady-state and transient performance of the induction motor, with particular focus on the influence of load torque variations and supply parameters, namely voltage and frequency. A detailed analysis is conducted using mathematical modeling and numerical simulation techniques to assess key performance indicators, including efficiency, power factor, torque response, and system stability. The interaction between control strategies and motor performance is also considered.*

***Keywords:** Three-phase induction motor, Variable frequency drive (VFD), Electric drive systems, Energy efficiency, Mathematical modeling*

### **52. (ID 360) Study of Linear Voltage Stabilizers**

**Author:** stud Matei-Cosmin NEMTEANU

**Scientific Advisor:** Lecturer Eng. Iancu CIOCIOI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** This presentation explores voltage regulation's evolution, from Ohm's Law and discrete components (Zener diodes, transistors) to advanced control systems. It provides a comparative analysis of Linear Regulators (78xx, LDOs) prized for simplicity and low noise and Switching Regulators (Buck, Boost), essential for efficiency and thermal management. Concluding with PWM control and selection criteria, the study demonstrates how these theoretical principles*

*power modern hardware, such as motherboard voltage regulator modules (VRMs).*

**Keywords:** *Zener diode, hardware*

### **53. (ID 361) Interface of the Electronic Equipment Installed on Board the Ship**

**Author:** stud Remus Andrei MOCANU

**Scientific Advisor:** Lecturer Eng. Iancu CIOCIOI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This presentation explores the critical standards governing digital interfacing for shipboard electronic equipment, focusing on the evolution from NMEA 0183 to OneNet. It details the technical architectures of serial simplex communication and CAN-Bus networks, emphasizing hardware safety through opto-isolation and single-point grounding. By examining IEC 61162-1 roles in ECDIS integration and checksum validation processes, the project highlights how standardized protocols ensure data integrity. Finally, it addresses the shift toward high-speed Ethernet and unified IPv6 networks to support modern maritime bandwidth and cybersecurity requirements.*

### **54. (ID 369) Propagation of Acoustic Waves in the Marine Environment**

**Authors:** stud Valentin FEODOR, stud Antonio ROȘCA

**Scientific Advisor:** Lecturer Eng. Iancu CIOCIOI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Propagation of acoustic waves in the marine environment the seas and oceans of the world, with all their characteristics, represent an extremely complex environment for the study of acoustic waves. The complexity of this environment derives from the specific particularities of acoustic waves and their application in an environment dominated by a multitude of factors and physical phenomena that influence and shape their trajectory. Knowledge of the notions related to the propagation of acoustic waves in the marine environment is motivated by the need to understand the activities and procedures, the optimal operation of specific equipment, mainly in the following fields: research, defense (navy), exploration and exploitation of marine resources, naval transport.*

*This paper aims to present the ways of forming acoustic waves, types of acoustic waves, characteristics and specific sizes of acoustic waves. It will also explain the notions related to the parameters of the marine environment and the physical phenomena that take place in this environment and that fundamentally influence the way of propagating acoustic waves. Last but not least, the necessity and methods of correlating equipment parameters, acoustic wave characteristics and the marine environment will be presented in order to obtain the desired information and its correct use within the applications.*

**Keywords:** *Propagation of acoustic waves in the marine environment*

### **55. (ID 371) Radar Target Detection in The Presence of Noise**

**Authors:** stud Valentin FEODOR, stud Antonio ROȘCA

**Scientific Advisor:** Lecturer Eng. Iancu CIOCIOI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Radar target detection in the presence of noise Radar is today an omnipresent technical device, equipping means of transport or ground installations, with the aim of detecting targets in the atmosphere or on the terrestrial/maritime surface, determining parameters and generating solutions. Essential in the management of aerial and surface targets, it is used in both the military and civil fields. However, the efficiency of the radar is mainly conditioned by the management of noise, as the main form of distortion of the received information, encompassing all parasitic signals. Since, in practice, the possibility of total cancellation of noise is impossible, it is necessary to know the ways in which target detection can be done in the presence of noise. This paper aims to define noise and its influence in the detection process, followed by the presentation of the main ways of detecting targets in the presence of noise. The emphasis will be on modern digital signal processing methods, on the presentation of CFAR (Constant False Alarm Rate) algorithms, on the description of GPS technology and databases, on the importance of FDSR/TFSR filters and superheterodyne receivers. The final goal of the work is to fully understand the influence of noise and the use of modern methods in order to ensure optimal radar detection.*

**Keywords:** *Radar target detection in the presence of noise*

## **56. (ID 373) Port Microgrids: Integrating Renewable Energy and Battery Storage Systems**

**Authors:** stud Bianca Maria SCARLAT, stud. Ana Maria ONOFREI

**Scientific Advisor:** Prof. Eng. Gheorghe SAMOILESCU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** Modern ports are transitioning into "Smart Ports" by adopting microgrid technologies to achieve energy efficiency and decarbonization. This paper explores the design and integration of Port Microgrids, focusing on the synergy between Renewable Energy Sources (RES), such as solar and wind, and Battery Energy Storage Systems (BESS). The study highlights how these localized grids manage the high-power demands of "Cold Ironing" and terminal operations while mitigating the intermittency of renewables. By utilizing an advanced Energy Management System (EMS), ports can achieve "peak shaving," reducing operational costs and grid strain. The research emphasizes the technical role of storage in ensuring power stability and resilience. Ultimately, transforming port electrical infrastructure into green microgrids is essential for sustainable maritime development, offering a scalable model for reducing carbon footprints and ensuring a reliable, autonomous energy supply.*

**Keywords:** Port Microgrids, BESS, Renewable Integration, Smart Ports, Energy Management

## **57. (ID 398) General Presentation of Autopilots**

**Authors:** stud Luciano-Nicolas DUMA

**Scientific Advisor:** Assoc. Prof. Eng. Ovidiu CRISTEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** This study examines the fundamental principles and the technological trajectory of autopilot systems, highlighting their transformation from rudimentary mechanical stabilizers into sophisticated autonomous controllers. Originally conceived by Lawrence Sperry in the early 20th century to alleviate pilot fatigue, these systems have become indispensable across aviation, maritime navigation, and the automotive industry. The research details the operational architecture of modern autopilots, specifically focusing on multi-axis control and specialized flight modes such as altitude and heading retention. In the maritime sector, the paper emphasizes*

*the integration of self-learning algorithms and high-precision radar components (including X-band and S-band magnetron specifications) which facilitate optimal trajectory management. Furthermore, the analysis extends to the automotive field, evaluating the shift toward various levels of vehicle autonomy. The conclusion argues that while modern autopilots can execute complex maneuvers like automated landings, their primary function remains a collaborative one, where human supervision is essential to ensure safety and manage system limitations in unpredictable environments.*

**Keywords:** *automated guidance, flight dynamics, maritime navigation, autonomy levels, control theory, aerospace history*

## **58. (ID 402) Modeling and Design of a Vertical Axis Wind Turbine**

**Authors:** stud Adelin Sorin TIPU, stud. Ionuț Valentin PETCU, stud. Leonard Andrei ȘOIMU

**Scientific Advisor:** Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The design and modeling of vertical axis wind turbines (VAWTs) represent a growing field of interest in the context of renewable energy development and the optimization of wind energy conversion systems. This paper analyzes the fundamental operating principles of vertical axis wind turbines, highlighting their advantages compared to horizontal axis wind turbines, such as independence from wind direction, lower noise levels, and easier integration into urban and offshore environments. The design process includes the selection of the aerodynamic profile, the dimensioning of the main components, and the determination of optimal operating parameters, such as the tip speed ratio and power coefficient. The modeling of the turbine is carried out using numerical methods and computational simulations (CFD), which allow the evaluation of aerodynamic and structural performance under various operating conditions. Additionally, the effects of turbulence, wind speed variation, and environmental interaction on system efficiency are analyzed. The obtained results contribute to the optimization of turbine design and the improvement of energy efficiency, providing viable solutions for implementing this type of turbine in naval, offshore, and urban applications.*

**Keywords:** vertical axis wind turbine, aerodynamic design, CFD modeling, renewable energy, power coefficient, airfoil profile, optimization, numerical simulation, wind energy, offshore applications

**59. (ID 405) Power Management System for Naval Power System**

**Authors:** stud Andrei-Daniele ILIE, stud. Ștefan SOARE

**Scientific Advisor:** Prof. Eng. Gheorghe SAMOILESCU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** This paper analyses the Power Management System (PMS) within the framework of marine power grids, with a particular emphasis on the Power Management Naval System (PMNS) architecture. The study details the system's primary automated functions, including load-dependent start/stop sequences, automatic synchronisation, load sharing, load shedding, and blackout prevention protocols. Additionally, it examines various operational modes and the specialised management of heavy consumers. The research highlights the integration of Gamma PLC controllers and Graphic Operating Stations (GOS), emphasising their critical role in interfacing with modern vessel alarm and monitoring systems (AMS).

**Keywords:** Power Management System, PMS, PMNS, diesel generator, load sharing, blackout

**60. (ID 407) Impact of AI-Driven Real-Time Optimization of Multi-Source Renewable Energy Systems: Solar, Wind, and Wave Energy Harvesting**

**Authors:** stud. Dragoș-Constantin TOMA, stud. Stelian ALEXANDRU, stud. Cristo CARACOTA

**Scientific Advisor:** Lecturer Eduard DRAGOMIR, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** This paper investigates the use of Artificial Intelligence (AI) for real-time optimization of multi-source renewable energy systems combining solar, wind, and ocean wave power. By applying machine learning to dynamic environmental data, the system continuously adjusts key operational parameters to maximize energy output and improve grid integration under intermittent conditions. Unlike most existing work, which focuses primarily on solar and wind, this study incorporates ocean wave energy into a unified, AI-

*driven predictive framework and demonstrates that real-time optimization can significantly enhance overall harvesting efficiency.*

**Keywords:** *ai, neural networks, energy harvesting, power generation, renewable energy sources, real-time optimization, solar energy, eolic energy, wind energy, wave power, analysis, ai-driven, machine learning*

### **61. (ID 408) Identification of Essential Parameters in the Design of a Gorlov Vertical Axis Turbine**

**Author:** stud. Liviu NOAGHE, stud. Marian-Cristian VĂȘII, stud. Adrian-Ștefan STRĂMBEANU

**Scientific Advisor:** Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The present paper addresses a highly topical issue in the field of renewable energy harvesting, focusing on a versatile technology applicable in both wind and hydro-kinetic environments: the Gorlov vertical axis turbine. Representing a superior mechanical evolution of the classic Darrieus design, the Gorlov rotor employs a helical blade profile that eliminates torque pulsations and reduces structural vibrations by up to 90%, ensuring constant energy capture regardless of the rotor's position. The main objective of this study is the identification and in-depth analysis of the geometric and dynamic parameters that govern the operation and performance of this system. The paper critically evaluates design indicators such as the aspect ratio essential for ensuring axial stability, the influence of the blade chord length on the starting torque, and the impact of the number of blades, with the 3-blade configuration being considered the optimal standard for the balance between cost and efficiency.*

**Keywords:** *Gorlov turbine, vertical axis wind turbine, helical blades, Tip Speed Ratio, power coefficient, energy optimization*

### **62. (ID 409) Design and Implementation of a Monitoring and Security System using Arduino-Based Sensors**

**Authors:** stud. Mihail Raul STAN, stud. Cătălin CĂLIN

**Scientific Advisor:** Lecturer Eng. Iancu CIOCIOI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents the design and implementation of a monitoring and security system based on the use of sensors*

*integrated with the Arduino platform. The main objective of the study is to develop a system capable of detecting various types of environmental risks, such as motion, flammable gases, and flame, using dedicated sensors: HC-SR501 (PIR), MQ-2, and KY-026. Within the paper, the operating principles of each type of sensor are analyzed, highlighting their technical characteristics, advantages, and limitations. Furthermore, practical applications developed in the Wokwi simulation environment are presented, where the sensors are integrated with an Arduino Uno board to generate visual and acoustic alerts depending on the detected conditions. The obtained results demonstrate the efficiency of using these sensors in the development of accessible, reliable, and easy-to-implement security systems. The proposed system can be used in smart home applications, environmental monitoring, or fire prevention systems. The paper highlights the importance of sensors in the development of intelligent systems and contributes to understanding their integration into modern microcontroller-based applications.*

### **63. (ID 413) Technological Analysis and Securing of High Voltage Installations with Sulfur Hexafluoride**

**Authors:** stud Ianis Teodor ANGHEL, stud. Ștefan-Ionuț CRĂCIUN

**Scientific Advisor:** Prof. Eng. Gheorghe SAMOILESCU, Ph.D.

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the technical engineering solutions adopted for the connection of the CEF Colacu photovoltaic plant to the electricity distribution network, involving major interventions at the Mavrodin and Alerion substations. The study covers the transition from conventional oil-insulated equipment to SF<sub>6</sub> gas-insulated technology, the electro-physical properties of sulfur hexafluoride, the thermodynamic principle of self-compression (puffer), monitoring and cybersecurity systems, and the environmental impact in accordance with European regulations.*

**Keywords:** *sulfur hexafluoride, SF<sub>6</sub>, high-voltage installations, hybrid module, electrical substation, cybersecurity, SCADA, fluorinated gas, puffer mechanism, grid connection*

### **64. (ID 414) Integrated electric propulsion (IEP)**

**Authors:** stud Denisa DUMITRU, stud. Andreea Claudia SCARLAT

**Scientific Advisor:** Prof. Eng. Gheorghe SAMOILESCU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *These systems constitute a pivotal component in the technological evolution of modern vessels, including military, offshore, and research ships. They rely on a unified power architecture that manages the generation, distribution, and conversion of electrical energy, optimizing power flows and overall energy efficiency. The deployment of high-performance power electronics and advanced electric motors, such as permanent magnet synchronous machines, enables precise control of operational regimes, enhancing maneuverability while reducing acoustic and vibrational signatures critical factors in military and scientific applications. The integration of advanced monitoring and protection systems ensures real-time oversight of operational parameters, thereby improving system reliability and availability. Hybrid solutions, leveraging energy storage in batteries, facilitate fuel consumption optimization, peak load management, and system redundancy.*

**Keywords:** *integrated electric propulsion, power electronics, energy efficiency, naval systems, electrical measurements, advanced control*

## **65. (ID 416) IoT System for Monitoring and Analysis of Energy Consumption**

**Author:** stud Martha-Ștefania BOICIUC

**Scientific Advisor:** Prof. Gheorghe SAMOILESCU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents the design and implementation of a smart energy consumption monitoring system for military infrastructure, utilizing Internet of Things (IoT) technologies. The proposed system is based on the ESP32 microcontroller with integrated WiFi and the ACS712 Hall-effect current sensor, enabling indirect and non-invasive current intensity measurement. The analog signal is digitally converted through the integrated ADC, calculating electrical parameters: current ( $A$ ), active power ( $W$ ), and consumed energy ( $Wh$ ). Data is transmitted via WiFi protocol to the Blynk cloud platform, providing a graphical interface accessible from mobile devices for real-time monitoring. Tests showed an average relative error of  $\pm 2.8\%$ , an acceptable value for energy efficiency*

*applications in military units, where precise resource management is essential for operational effectiveness and security.*

**Keywords:** *IoT, consumption monitoring, military infrastructure, Hall effect, ESP32, energy efficiency*

## **66. (ID 421) Challenges and Solutions in Integrating Renewable Energy Sources into Modern Power Systems**

**Author:** stud Miruna BENGHEA, stud. Liviu-Gabriel NOAGHE, stud. Adrian-Ștefan STRÂMBEANU

**Scientific Advisor:** Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the complexity of transitioning toward a sustainable energy mix, focusing on the mechanisms for integrating renewable energy sources into current electrical grids. In the context of global decarbonization goals, the inherent intermittency of solar and wind energy poses significant challenges to frequency stability and grid congestion management. This paper analyzes the complexity of transitioning toward a sustainable energy mix, focusing on the mechanisms for integrating renewable energy sources into current electrical grids. In the context of global decarbonization goals, the inherent intermittency of solar and wind energy poses significant challenges to frequency stability and grid congestion management. The article explores advanced technological solutions, such as the implementation of Smart Grids, the use of Battery Energy Storage Systems, and the role of green hydrogen as a long-term energy carrier. By examining integration models and the concept of Virtual Power Plants, the study demonstrates that the digitalization of energy infrastructure is essential for transforming passive consumers into active prosumers. The conclusions highlight the necessity of a holistic approach that combines regulatory policies with technical innovation to ensure a resilient grid capable of supporting a carbon-neutral economy.*

**Keywords:** *Renewable Energy Sources, Smart Grids, Energy Storage, Decarbonization, Intermittency, Grid Stability, Prosumer, Energy Transition*

**67. (ID 433) Autonomous Aerial Target Identification System for Naval Perimeter Defense using Embedded Machine Learning**

**Authors:** stud Răzvan-Dumitru IORDACHE, stud. Alexandra-Ioana ISOPESCU

**Scientific Advisor:** Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** Autonomous identification systems have become essential components in modern naval defense environments, where rapid response and high accuracy are critical. This paper presents the design and conceptual implementation of an autonomous system for the detection and identification of aerial targets within a defined maritime perimeter, with the purpose of supporting subsequent neutralization actions. The system utilizes a Raspberry Pi Zero and servo-actuated mechanisms for dynamic target tracking and stabilization. This hardware is integrated with a machine learning module for real-time image-based identification, focusing on the synergy between software inference and physical component response. Emphasis is placed on the data processing pipeline, model inference, and the interaction between software algorithms and physical components. The results demonstrate that pairing low-cost hardware with intelligent algorithms creates a viable autonomous detection system. Ultimately, these scalable solutions enhance situational awareness and response efficiency in naval operations.*

***Keywords:** Autonomous target acquisition, Embedded systems, Computer vision, Raspberry Pi*

**68. (ID 435) Modern solutions for automatic load transfer on board military vessels**

**Author:** stud Adrian Dumitru BISOCIANU

**Scientific Advisor:** Lecturer Eng. Leon PANĂ, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** Automatic load transfer is an essential element in ensuring the continuity of the power supply on board military vessels, where system reliability and redundancy are critical. This paper analyzes modern solutions used to achieve automatic transfer between power sources, such as main generators, emergency generators, and uninterruptible power supply (UPS) systems. The operating principles of ATS (Automatic Transfer Switch) systems are presented,*

*as well as implementations based on programmable logic controllers (PLCs) and power management systems (PMS). Additionally, the paper highlights the advantages of using modern digital technologies, such as real-time monitoring, advanced automation, and integration into smart onboard networks. Finally, the specific requirements of the naval military environment such as shock resistance, redundancy, and operational security are analyzed, emphasizing the importance of modern solutions in enhancing the ship's safety and energy efficiency. Translated with DeepL.com (free version)*

**Keywords:** *load, automation, power*

### **69. (ID 436) Harnessing Urban Air Currents to Drive Tesla-Type Turbines**

**Authors:** stud Răzvan-Dumitru IORDACHE, stud. Alexandra-Ioana ISOPESCU, stud. Miruna BENGHEA

**Scientific Advisor:** Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *With the increasing need for the use of renewable energy sources and sustainable urban development, the use of alternative energy sources has become a priority. This project aims to explore the use of urban air currents for the rotation of Tesla-type turbines. This form of energy exploiting is based on the adhesion and viscosity properties of fluids. This project aims to present the characteristics of the flow of urban currents, which are usually generated by the movement of vehicles, the difference in temperature between the urban environment and the buildings, and the channeling effect between buildings. In addition, the project aims to present the possibilities for the efficient harnessing of urban currents for the rotation of Tesla-type turbines, which are known for their efficiency even at low fluid velocities, in order to highlight its efficiency as a viable option for the generation of green energy.*

**Keywords:** *Tesla turbines, Urban wind harvesting, Sustainable energy*

### **70. (ID 440) Automatic control with direction reversal of the asynchronous motor**

**Author:** stud Alexandru BĂLAN

**Scientific Advisor:** Lecturer Eng. Leon PANĂ, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents the principles and methods for implementing automatic control with direction reversal of a three-phase induction motor, widely used in industrial and naval applications. Both classical solutions based on electromagnetic contactors and modern approaches using programmable logic controllers (PLC) are analyzed. Particular emphasis is placed on safe operation conditions, protection methods, and control logic required to prevent hazardous operating states. The paper includes electrical schematics, functional description, and practical applications specific to the naval field.*

**Keywords:** *PLC; automatic; electromagnetic; naval*

### **71. (ID 442) Design and Implementation of a Fully Autonomous Mini Quadcopter with Vision-Based Object Tracking.**

**Authors:** stud Darius GAVRILOAE, stud. Ciprian MĂRGINEANU

**Scientific Advisor:** Prof. Gheorghe SAMOILESCU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This project presents the design and implementation of an autonomous mini quadcopter capable of flying without human pilot intervention. The system is built around a flight controller responsible for stabilization and motor control, while an ESP32 microcontroller acts as the decision-making unit. The electrical architecture includes a shared battery power distribution, UART communication between the ESP32, AI camera, and flight controller, and proper voltage regulation for safe operation. The primary focus of the system is fully autonomous flight, where the drone generates its own control commands based on sensor input. As a secondary feature, the system integrates a HuskyLens AI camera for real-time object, person, or target recognition, enabling the drone to detect and follow selected subjects.*

**Keywords:** *Autonomous drone, mini quadcopter, object recognition, pilotless control, computer vision.*

### **72. (ID 445) The Analysis of Magnetic Field on a Maritime Vessel.**

**Author:** stud Eduard POPESCU

**Scientific Advisor:** Prof. Eng. Gheorghe SAMOILESCU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The magnetic field of a vessel is determined by the nature of the material from which the ship is built, the onboard installations and equipment, the type of vessel, and the location where it is constructed, latitude, longitude, and the composition of the water. Based on all these elements, a model for measuring the magnetic field is proposed. The vessel's characteristics are derived from the measurements, and the results are presented in relation to other measured data.*

**Keywords:** *Ship magnetic field, Onboard electrical systems, Experimental data analysis*

### **73. (ID 462) ARIA Sensing, Algorized Unveil AI-Enabled UWB Radar Platform**

**Authors:** stud. Andrei Denis SÂRBU, stud. Maria Denisa BULGARU, stud. Daniel Valentin SIMESCU, stud. Andrei Sorin RIPAS

**Scientific Advisor:** Lecturer Eng. Eduard DRAGOMIR, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *While conventional ultra-wideband (UWB) chips are primarily designed for secure ranging, the growing demand for human-centric awareness in automotive and smart environments requires more sophisticated sensing architectures. To address this limitation, ARIA Sensing and Algorized have collaborated to develop a breakthrough AI-enabled UWB radar platform. This system integrates ARIA Sensing's HYDROGEN 4x4 UWB radar System-on-Chip (SoC), the world's first true 3D UWB radar featuring digital beamforming and ultra-low power consumption with Algorized's edge-native AI foundation model. Unlike legacy radar solutions, this combined hardware and software approach was engineered specifically for advanced environmental perception. The resulting platform delivers high-resolution in-cabin sensing capable of accurately detecting micro-motions, respiratory activity, precise occupancy, and behavioral patterns, all while significantly reducing latency, power consumption, and system costs. The practical efficacy of this platform is demonstrated through its first implementation: a next-generation Automotive Child Presence Detection (CPD) system*

*unveiled at Mobile World Congress 2026. Ultimately, this integration of a purpose-built 3D UWB architecture with edge artificial intelligence unlocks new capabilities for reliable, context-aware human detection across automotive, smart building, industrial, and healthcare applications.*

**Keywords:** *UWB Radar, Edge AI, Child Presence, Detection (CPD), In-cabin Sensing, 3D Environmental Perception, System-on-Chip (SoC)*

#### **74. (ID 464) Studies on the Integration of Solar Renewable Energy into the Architecture of Hydroacoustic Monitoring Systems**

**Author:** stud Sebastian Andrei POȘIRCĂ

**Scientific Advisor:** Assoc. Prof. Eng. Dinu ATODIRESEI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents the design of an autonomous underwater acoustic monitoring system for deployment in the Black Sea. The system aims to passively detect and monitor anthropogenic acoustic sources, such as submarines and unmanned underwater vehicles, using a vertically distributed array of hydrophones. The proposed architecture integrates a low-visibility surface buoy powered by solar energy, with onboard battery storage and satellite communication for real-time data transmission. Acoustic signals are processed locally through digital signal processing techniques, reducing data volume while preserving relevant information. By positioning the hydrophones at multiple depths, the system ensures effective coverage of the entire water column, improving detection capability under complex propagation conditions. Additionally, a telemetry system provides continuous monitoring of operational parameters, enhancing reliability and maintenance. The project offers an efficient and autonomous solution for underwater acoustic surveillance with applications in maritime security and environmental monitoring.*

**Keywords:** *solar energy, underwater acoustic monitoring, hydrophone array, passive detection, autonomous system, satellite communication, submarine detection*

**75. (ID 481) Study on the Implementation of an Automated System for Star Detection and Monitoring CMOS Sensor, OpenCV, Image Processing, Celestial Navigation**

**Author:** stud Elena-Raluca ZAMFIRESCU

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* This paper proposes an autonomous electronic system for real-time detection and monitoring of celestial bodies. The project focuses on optimizing the parameters of a high-resolution CMOS sensor to capture low-intensity optical signals. Using computer vision algorithms (OpenCV), the system performs automated segmentation of stellar objects and calculates their coordinates. The results demonstrate the viability of the solution for celestial navigation and space monitoring applications, providing an efficient and affordable digital alternative.

**Keywords:** CMOS Sensor, Image Processing, Autonomous System, Astronomical Navigation

**76. (ID 482) The Evolution of Electric Cars Based on the Work and Life of Nikola Tesla**

**Author:** stud. Elvin CADIR

**Scientific Advisor:** Prof. Eng. Gheorghe SAMOILESCU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* The work highlights how the AC induction motor, patented by Tesla in 1887, remains the centerpiece of contemporary electric propulsion. Furthermore, it analyzes the decisive role of alternating current in creating the global charging infrastructure and Tesla's futuristic vision regarding wireless energy. The summary demonstrates that while battery technology evolved independently, the electromechanical architecture of modern cars is a direct realization of Tesla's scientific legacy.

**Keywords:** The evolution of electric cars based on the work and life of Nikola Tesla

**77. (ID 504) Mobile Obstacle Avoidance Robot**

**Authors:** stud. Viorel RĂPITEANU, stud. George Marian VOICILA

**Scientific Advisor:** Assoc. Prof. Eng. Gabriela BUCUR, PhD

**Institution:** University of Oil and Gas of Ploiești

**Abstract:** *The presented robot is an omnidirectional autonomous mobile mechatronic system designed to intelligently navigate in static and dynamic environments. Its main function is real-time obstacle detection and avoidance, using a reactive approach based on distance sensors. In addition to its autonomous mode, the robot is equipped with a WiFi communication module and a video camera, allowing manual remote control (teleoperation) and environment monitoring through video streaming (Human-Robot Interaction)*

**Keywords:** *mobile robot, obstacle avoidance, remote control*

## V. SECTION: WEAPONS AND COMMUNICATIONS

### Section Committee:

**Chairman:** LCDR Assoc. prof. Ovidiu CRISTEA, PhD

**Members:** Lecturer Gheorghe ICHIMOAEI, PhD

Lieutenant jg. Silviu POPA, PhD candidate

Room LI125

### 1. (ID 9) Army Modernization: Weapons and Communications

**Author:** stud. Bogdan GRIGORE

**Scientific Advisor:** Captain Cătălin CLINCI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** Weapons and communication systems form the backbone of modern military operations, enabling coordination, precision, and strategic dominance. Advances in defense technology have transformed conventional weaponry into highly integrated systems supported by secure and real-time communication networks. Command and control (C2) structures rely on satellite communication, encrypted digital networks, and cyber-secure platforms to ensure operational effectiveness across land, air, sea, space, and cyber domains. The emergence of electronic warfare and information warfare has further highlighted the strategic importance of disrupting adversarial communication while protecting one's own networks. Additionally, artificial intelligence and autonomous systems are reshaping battlefield dynamics by enhancing decision-making speed and accuracy. As warfare becomes increasingly network-centric, the integration of weapons and advanced communication technologies remains critical to maintaining national security and strategic superiority.*

***Keywords:** Weapons systems, military communications, command and control (C2), cybersecurity, electronic warfare, information warfare, satellite communication, defense technology, network-centric warfare, surveillance systems, secure communication, artificial intelligence in defense.*

## **2. (ID 10) Impact of Information Latency on Guidance Performance in Hit-to-Kill Weapon Systems**

**Authors:** stud. Andreea-Cătălina ILIE, stud. Andreea-Alexandra VLAD

**Scientific Advisor:** Lt. Col. Marian-Cristian ENE, Senior Instructor

**Institution:** "Henri Coandă" Air Force Academy of Braşov

*Abstract:* Hit-to-kill weapon systems neutralize aerial or ballistic threats through direct kinetic impact, requiring extremely high interception accuracy. The effectiveness of such systems depends not only on interceptor performance but also on the timeliness of targeting information used by guidance and control mechanisms. Information latency, defined as the delay between target detection and data utilization, represents a critical factor influencing interception success. This paper analyzes the impact of information latency on guidance performance and intercept probability in Hit-to-Kill weapon systems. Latency occurring during sensing, data transmission, processing, and command execution generates target position prediction errors that increase proportionally with target velocity. These errors affect mid-course trajectory corrections, terminal seeker acquisition, and maneuvering efficiency. The study examines how latency degrades guidance accuracy, increases miss distance, and reduces the probability of successful interception, particularly against high-speed and maneuverable threats. Engineering approaches aimed at mitigating latency effects, including onboard processing, sensor fusion, and high-speed communication links, are also discussed. Reducing information latency within the weapon guidance loop is essential for maintaining interception effectiveness in modern missile defense environments and represents a key requirement for future hit-to-kill interceptor development.

**Keywords:** Hit-to-Kill; information latency; weapon guidance systems; missile defence; sensor-to-shooter delay; weapon systems performance

## **3. (ID 50) Greek Naval Warfare: Weapons, Communication, and Tactics in the Greco-Persian and Peloponnesian Wars**

**Authors:** stud. A.C., stud. A. D.

**Scientific Advisor:** Assoc. Prof. C. T., PhD

**Institution:** "Mihai Viteazul" National Intelligence Academy

**Abstract:** *Naval warfare transformed the conduct of military conflicts in the Eastern Mediterranean, particularly during the Greco-Persian Wars and the Peloponnesian War. This study aims to analyze the weapons employed by Greek fleets and the communication systems used to coordinate naval engagements. Emphasis is placed on the structure and functionality of the Trireme, including the naval ram (embolón) and the role of hoplite crews during boarding actions. The methodology is based on a critical examination of primary sources, particularly the accounts of Herodotus and Thucydides, complemented by modern studies on naval tactics and fleet organization. Communication techniques are discussed, including visual signaling through flags and torches, acoustic signals via the salpinx trumpet, and rhythmic commands to synchronize rowers, highlighting the importance of crew discipline and coordination in combat operations. The results indicate that Greek naval success derived not solely from the technical capabilities of ships, but from the integrated effectiveness of armament, crew discipline, and coherent tactical communication systems. In conclusion, the performance of Greek fleets can be interpreted as an early model of interoperability between naval technology, military organization, and strategic communication, demonstrating the critical role of coordination and training in achieving maritime superiority.*

**Keywords:** *Greek naval warfare, trireme, embolón (naval ram), hoplite crews, communication systems, maritime tactics*

#### **4. (ID 78) Interoperability in Air Defense Systems: National and Allied Perspectives**

**Author:** stud. Mădălina-Corina ȘCHEIANU

**Scientific Advisor:** Col. Assoc. Prof. Cătălin CIOACĂ, PhD

**Institution:** "Henri Coandă" Air Force Academy, Brașov

**Abstract:** *The interoperability of air defense systems represents a fundamental pillar for the effectiveness of modern military operations and the strengthening of integrated security within military alliances. In the context of evolving aerial threats, states are focusing on the development of integrated systems capable of rapidly detecting, identifying, and countering these risks through the implementation of standardized technical specifications, integrated operational*

*processes, and secure communication infrastructures. At the national level, implementing interoperability involves the development of military infrastructure, personnel training, and participation in multinational programs, while future development trends emphasize process automation using digital technologies, integration of artificial intelligence, and integrating modular structures into a 'system-of-systems' framework. Within allied military organizations, interoperability is crucial for establishing an integrated air and missile defense system, facilitating synchronization of member states' capabilities and enabling a rapid response to aerial threats across the alliance. However, its implementation faces several significant challenges, including technological discrepancies between states, high modernization costs, classified information security, and harmonization of military doctrines. At both national and allied levels, interoperability is a strategic factor that optimizes military capabilities, strengthens military cooperation, and reinforces regional and Euro-Atlantic security*

**Keywords:** *interoperability, air defence systems, aerial threats, capabilities*

## **5. (ID 82) Modern Military Communication Technologies and Their Importance**

**Author:** stud. Eduard Călin PUIU

**Scientific Advisor:** Police Commissioner-Chief Assoc. Prof. Andreea-Rurela CÂRCIUMARU, PhD

**Institution:** "Alexandru Ioan Cuza" Police Academy, Bucharest

**Abstract:** *Modern military activities increasingly depend on advanced communication technologies to achieve effective coordination, high efficiency, and secure information exchange. This paper examines the main categories of contemporary military communication systems, such as radio, satellite, and digital solutions, along with the expanding use of unmanned aerial vehicles (drones) for real-time data transmission. These technologies facilitate fast communication, improve decision-making, and contribute to the success of military operations. Furthermore, the paper emphasizes the critical role of secure and reliable communication in both domestic and international contexts, where timely and accurate information can directly affect operational outcomes. However, these*

*modern systems also present certain challenges, including signal disruption, cyber attacks, and a growing reliance on complex technological infrastructures.*

**Keywords:** *Communication, military, technologies*

## **6. (ID 83) The Integration of Radar, Communication and Missile Systems in Modern Air Defense**

**Author:** stud. Mihnea-Radu MODROGAN

**Scientific Advisor:** Col. Assoc. Prof. Eng. Laurian GHERMAN, PhD

**Institution:** "Henri Coandă" Air Force Academy, Braşov

**Abstract:** *Modern air defense operations depend on the rapid exchange of information between different military systems. Communication networks play a crucial role in coordinating radar stations, command centers, and missile units in order to detect, track, and engage aerial threats effectively. This paper analyzes the importance of communication networks in the operation of modern air defense missile systems. It highlights how real-time data transmission improves situational awareness, decision-making, and response time during air defense operations. The integration of radar systems, command and control centers, and missile launch units through secure communication channels allows for better coordination and increased operational efficiency. Furthermore, the study examines the advantages and challenges of modern military communication networks, including cybersecurity risks, system interoperability, and the need for reliable data transmission in complex operational environments. The research emphasizes that efficient communication systems are essential for ensuring the success of air defense missions and for maximizing the performance of missile defense systems in modern warfare.*

**Keywords:** *Air defense systems, communication networks, real-time data transmission, command and control (C2), situational awareness, missile defense*

## **7. (ID 85) The Role of Communication Systems in Modern Weapon Operations**

**Author:** stud. Călin-Ştefan POPESCU

**Scientific Advisor:** Col. Assoc. Prof. Eng. Laurian GHERMAN, PhD

**Institution:** "Henri Coandă" Air Force Academy, Braşov

**Abstract:** *This presentation examines the role of communication systems in modern weapon operations and their importance in contemporary military environments. Modern weapon systems rely heavily on advanced communication technologies to ensure efficient coordination, rapid information exchange, and effective command and control. Communication networks enable real-time transmission of tactical data between command centers, sensors, and weapon platforms, significantly improving operational efficiency and decision-making speed. The study highlights the integration of communication systems within modern military structures, emphasizing their role in target identification, data sharing, and coordinated responses during combat operations. Particular attention is given to the concept of command, control, and communication which forms the backbone of modern battlefield management. Furthermore, the presentation discusses the advantages and challenges associated with military communication systems, including issues related to electronic warfare, signal security, and cyber threats. The findings underline that reliable and secure communication infrastructure is essential for the successful operation of modern weapon systems and will remain a critical factor in the development of future military technologies.*

**Keywords:** • Communication systems • Modern weapon systems • Command and control (C2) • Tactical data transmission • Electronic warfare • Cyber threats • Battlefield management

## **8. (ID 88) Military Use of Satellite Communication**

**Author:** stud. Diana-Carmen PETREȚCHI

**Scientific Advisor:** Police Commissioner-Chief, Prof. Bogdan ȚONEA, PhD

**Institution:** "Alexandru Ioan Cuza" Police Academy

**Abstract:** *Ever since we entered the Space Age, satellite technology has become a cornerstone in global communication, making it possible to transmit data around the world in real-time. The military application of satellite communication (SATCOM) in particular, has transformed significantly, forming the underpinning of today's*

*defense systems and military strategies. SATCOM is a crucial component in the military's C4ISR system: Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance. It facilitates real-time communication between dispersed forces, assists in navigation, and enables remote monitoring, thereby enhancing the efficiency of military operations. With the advancements in technology, the quality, speed, and accuracy of satellite communication have significantly improved, which contributes to better strategic planning and execution.*

**Keywords:** *satellite, communication, military, data*

## **9. (ID 94) Age of Laser Warfare: The Future of Air Defense and the Shift to Directed Energy**

**Author:** stud. Marian LUCACI

**Scientific Advisor:** Assist. Prof. Cosmina NECULCEA, PhD

**Institution:** "Henri Coandă" Air Force Academy of Braşov

**Abstract:** *In the context of rapidly evolving aerial threats, including drone swarms, loitering munitions, and advanced missile systems, modern militaries are facing unsustainable cost-per-interception ratios with traditional kinetic weapons. A central element in the future architecture of air defense is the transition to Directed Energy Weapons (DEWs), specifically High-Energy Lasers (HELs). "The Age of Laser Warfare" examines this paradigm shift, highlighting how laser systems provide a highly precise, cost-effective, and logistically streamlined capability with a virtually unlimited magazine capacity. By integrating directed energy into multi-layered joint defense networks, armed forces can effectively counter asymmetric aerial threats, reduce collateral damage, and maintain a decisive strategic advantage in contemporary and future combat environments.*

**Keywords:** *Laser Warfare, Directed Energy Weapons (DEWs), Air Defense Architecture, High-Energy Lasers, Asymmetric Threats, Combat Innovation*

## **10. (ID 99) Influence of Oceanographic Conditions on Naval Mine Deployment and Mine Countermeasure Operations in the Black Sea**

**Authors:** stud. Iaris Gabriel MORARU, stud. Maria Alexandra POP

**Scientific Advisor:** Lecturer Eng. Gheorghe ICHIMOAEI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Naval mines remain one of the most effective and widely used weapons in maritime warfare due to their ability to deny access to strategic maritime areas and restrict enemy naval movement. The efficiency of mine warfare operations, including mine deployment and mine countermeasure activities, is strongly influenced by environmental and oceanographic conditions. Factors such as sea currents, wave height, water depth and seabed characteristics can affect the positioning, stability and detection of naval mines. This study analyses the influence of oceanographic conditions on naval mine deployment and mine countermeasure operations in the western sector of the Black Sea. Oceanographic data regarding sea currents, temperature and wave conditions were obtained from the Copernicus Marine Service in order to evaluate how environmental parameters may influence mine laying accuracy and the effectiveness of mine sweeping operations. A comparative analysis between summer and winter conditions is also conducted in order to highlight the impact of seasonal variations on the marine environment. The results are interpreted through a simplified operational scenario, illustrating how environmental factors may affect mine warfare operations conducted in the Black Sea region.*

**Keywords:** *naval mines, mine warfare, mine countermeasures, oceanographic conditions, Black Sea*

## **11. (ID 150) How Past Conflicts Shaped Modern Military Communication and Strategy**

**Author:** stud. Andrei Nicolae CIORBA

**Institution:** „Alexandru Ioan Cuza” Police Academy, Bucharest

**Abstract:** *Effective communication has long been a decisive factor in military success, shaping coordination, strategy, and command efficiency across historical periods. This paper explores the evolution of military communication systems, from early methods such as messengers and signal flags to the transformative introduction of telegraphy, radio, and contemporary digital networks. By examining major conflicts, including World War I and World War II, the study highlights how both advancements and failures in communication directly influenced operational outcomes. Particular attention is*

*given to the increasing speed, volume, and complexity of information flow, which has fundamentally reshaped command structures and decision-making processes. The paper further considers how lessons derived from past conflicts continue to inform modern military strategy, especially in the domains of real-time coordination, interoperability, and secure communication systems. Ultimately, contemporary military communication is presented not only as a product of technological innovation but also as the result of accumulated historical experience and institutional adaptation.*

**Keywords:** *Military communication, Command and control, Information flow*

## **12. (ID 157) Optical assistance of remotely operated EOD missions through autonomous spectral adaptation.**

**Authors:** stud. Ionuț-Valentin OPREA, stud. Ana-Maria FECEA

**Scientific Advisors:** Eng. Isac HRISTACHE, PhD student, Lecturer  
Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper proposes an integrated mechatronic system for mine clearance and neutralization (EOD) in high turbidity aquatic environments. The identification of unexploded ordnance and the placement of neutralization charges are compromised underwater by asymmetric light absorption and backscatter. To overcome these limitations, the system uses a remotely operated underwater vehicle (ROV) equipped with an active RGB lighting module and an Edge Computing processing console (Raspberry Pi 5). Through an automatic control loop, the system analyzes the video stream and dynamically adjusts the lamp spectrum. The algorithm uses Dark Channel Prior (DCP) metrics for haze suppression and UIConM for contrast maximization. It suppresses blue emission to eliminate spurious reflections and adaptively amplifies red light. Restoring visibility facilitates warhead classification and precision approach to placing the destruction charge, significantly increasing operator safety and the success rate of tactical interventions.*

**Keywords:** *ROV, Automation, Spectral Compensation, DCP, EOD*

**13. (ID 158) Electromagnetic Interference in UAV Platforms: Vulnerability of Navigation and Control Subsystems and Implications for the Human Biotic Factor**

**Author:** stud. Maria-Denisa CHIRIAC

**Scientific Advisors:** Assoc. Prof. Eng Dinu ATODIRESEI, PhD.  
Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** With the increasing deployment of UAV platforms in both civilian and military applications, assessing their electromagnetic vulnerability has become essential for defining their operational limits in disturbed electromagnetic environments. This paper investigates the effects of electromagnetic interference on critical onboard subsystems, particularly those responsible for navigation, control, and communications, emphasizing their impact on flight stability, functional integrity, and mission reliability. At the same time, the analysis is extended to the military operator, considering both the operational dimension, reflected in the degradation of orientation, coordination, and communication capabilities, and the perspective of human biotic factor protection. The study therefore proposes an integrated framework in which electromagnetic compatibility, operational safety, and personnel protection are examined as closely interconnected aspects of UAV deployment in electromagnetically contested environments*

***Keywords:** UAV, electromagnetic compatibility, electromagnetic interference, GPS, IMU, microcontroller, human biotic factor, electromagnetic exposure, EMC protection*

**14. (ID 203) The Synergy of Network-Centric Naval Warfare**

**Author:** stud. Dragoș PATRAȘCU

**Scientific Advisor:** Assoc. Prof. Gabriel-Călin NISTOR, PhD

**Institution:** „Alexandru Ioan Cuza" Police Academy, Bucharest

***Abstract:** The modern naval battlespace is defined by the absolute necessity of seamless integration between kinetic and non-kinetic weapon systems and robust tactical communication networks. This paper explores the critical intersection of "Weapons and Communications" within contemporary maritime operations, emphasizing the shift from isolated platform-centric engagements to network-centric warfare. We examine how advanced data links (such*

as Link 16 and Link 22) and resilient satellite communications enable real-time, over-the-horizon targeting, coordinated fleet air defense, and distributed lethality. Furthermore, the research addresses the inherent vulnerabilities of modern combat systems in highly contested electromagnetic environments. As weapon systems increasingly rely on high-bandwidth, low-latency data transfer for precision strikes and mid-course guidance updates, the threat of electronic warfare (EW), signal jamming, and cyber-attacks becomes a primary concern. By analyzing the communication requirements of modern anti-ship missiles, close-in weapon systems (CIWS), and unmanned surface vehicles (USVs), this study highlights that the survivability and lethality of a naval force are directly proportional to the resilience of its communication infrastructure. Ultimately, the paper provides a forward-looking perspective on how emerging technologies, including artificial intelligence and quantum encryption, will shape the future integration of naval weapons and C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance) architectures.

**Keywords:** Network-centric warfare, tactical data links, electronic warfare, naval weapon systems, over-the-horizon targeting

## **15. (ID 220) The Use of Naval Mines in the Russo-Ukrainian Conflict and Their Impact on Security in the Black Sea**

**Author:** stud. Silviu-Gabriel NISTOR

**Scientific Advisor:** Lecturer Eng. Gheorghe ICHIMOAEL, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** This paper analyzes the use of naval mines in the conflict between Russia and Ukraine, focusing on their implications for maritime security in the Black Sea. Naval mines have been used both to protect coastlines and ports and to block navigation routes, generating major risks for commercial and military vessels. Special attention is given to the phenomenon of drifting mines, resulting from the detachment of moored mines, which increase unpredictability and danger in the maritime area. The paper presents modern methods of mine detection and neutralization, including the use of sonar, underwater drones, and EOD diver intervention. The analysis of incidents occurring after 2022 highlights the direct impact on maritime security, freedom of navigation, and regional stability,

*emphasizing the need to develop adapted naval capabilities and international cooperation in managing these threats.*

**Keywords:** *naval mines, drifting mines, Black Sea, Russia, Ukraine, maritime security, detection and neutralization*

## **16. (ID 225) Effective Communication of the Gendarmerie Forces in Special Actions and Anti-Terrorist Intervention**

**Author:** stud. Mihai TUDORIE

**Scientific Advisor:** Assoc. Prof. Lt Col. Cătălin ENUȚĂ, PhD

**Institution:** "Alexandru Ioan Cuza" Police Academy

**Abstract:** *Introduction: Effective communication is a critical determinant of success in high-risk law enforcement operations. This paper explores the communication strategies employed by the Gendarmerie during special actions and anti-terrorist interventions, where rapid, secure information exchange is vital for neutralizing threats and preserving life. Methods and Results: Through a comprehensive review of relevant literature and a thorough analysis, this study examines the theoretical and practical frameworks of crisis communication. The analysis highlights that adopting secure communication technologies and standardizing operational protocols fundamentally minimizes critical errors, enhances situational awareness, and optimizes coordination during dynamic, high-stress interventions. Conclusion: The findings underscore that resilient communication frameworks are as crucial as tactical prowess. Continuous investment in modern communication infrastructure and specialized crisis-communication training is essential to enhance the overall effectiveness and safety of the Gendarmerie's anti-terrorist units.*

**Keywords:** *Crisis Communication, Anti-Terrorist Intervention, Gendarmerie Forces, Tactical Operations, Situational Awareness*

## **17. (ID 233) Design of a Demonstrator of an Artillery System on an USV**

**Author:** stud. Andreea-Gabriela NEAGU

**Scientific Advisors:** Lt. Jr.g. Silviu POPA, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents the design and development of a demonstrator for an artillery system integrated on an Unmanned*

*Surface Vehicle (USV). The proposed system is intended to detect, track, and engage potential targets by combining sensing, target acquisition, and control functionalities within a compact experimental platform. The demonstrator was developed to validate the feasibility of mounting an artillery-type system on a USV and to assess its operational response in simulated engagement scenarios. The study highlights the system architecture, main subsystems, and the role of automation in improving target tracking and engagement efficiency*

**Keywords:** *Unmanned Surface Vehicle (USV), artillery system, demonstrator, target tracking, target engagement, autonomous navigation, weapon integration, control system*

### **18. (ID 286) SeaFox Anti-Mine Drone**

**Authors:** stud. Andreea-Ysabela TRUȚESCU, stud. Anamaria-Raluca RISTACHE

**Scientific Advisor:** Lecturer Eng. Gheorghe ICHIMOAEI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The SeaFox system, developed by the German company Atlas Elektronik, represents a state-of-the-art solution for modern mine countermeasures (MCM). These unmanned underwater vehicles (UUVs) are designed to detect, identify, and neutralize various types of naval mines while significantly reducing risks to human personnel. The system is highly versatile, capable of being launched from diverse platforms including specialized ships, rubber boats, and helicopters. The SeaFox family includes specialized variants: the SeaFox-I for reusable inspection and identification, the SeaFox-C "combat" version for one-way neutralization missions using an explosive charge, and the training and COBRA variants for specialized EOD tasks. Technically, the drone features a range of 1,200 meters, an operational depth of up to 300 meters, and utilizes high-resolution sonar and live fiber-optic video transmission for precise control. Currently utilized by NATO allies, including Romania in Black Sea exercises like POSEIDON 25, the SeaFox system enhances maritime security through efficient and safe mine clearance operations.*

**Keywords:** *SeaFox, Mine Countermeasures (MCM), Unmanned Underwater Vehicle (UUV), Neutralization, Maritime Security*

### **19. (ID 312) Underwater diver monitoring system**

**Author:** stud. Robert-Cristian ANGHEL

**Scientific Advisors:** Assoc. Prof. Eng. Ovidiu CRISTEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Development of an improved monitoring system, designed to increase safety during underwater missions. The solution consists of integrating sensors mounted directly on the equipment, with the role of measuring vital parameters in real time. Each diver is thus constantly monitored, and through a communications system, the data flow is transmitted to the control station on the surface. This approach allows the rapid identification of any physiological or technical anomalies, facilitating the fastest possible intervention and ensuring the proper execution of the mission.*

**Keywords:** *diver, communications, sensors, monitoring, parameters, equipment, data*

### **20. (ID 319) Study on the Implementation of Airborne Relay Systems for Naval Forces Operations**

**Author:** stud. Alexandru DIACU

**Scientific Advisor:** Assoc. Prof. Eng. Ovidiu CRISTEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Introduction In the current context of maritime communications, maintaining a stable radio link between naval platforms represents a major challenge, especially in situations where long distances, physical obstacles, or weather conditions affect signal propagation. Communication in the VHF band, widely used in the maritime domain, is limited by the radio line-of-sight, leading to connection loss between vessels located beyond the radio horizon. This issue becomes even more relevant in the current geopolitical context of the Black Sea region, where communication disruptions and interference have become increasingly frequent. In this framework, the present study proposes the development of an airborne relay module capable of restoring radio communication between two nodes located outside direct communication range, using a UAV platform and Software Defined Radio (SDR) technology.*

**Keywords:** *Software Defined Radio, UAV relay, maritime communications, wireless relay, VHF communications, Raspberry Pi*

## **21. (ID 321) Introducing Naval Guided Ammunition in the RNF**

**Authors:** stud. Eduard-Mihai COJOCARIU, stud. Mario-Alexandru-Alin DĂESCU

**Scientific Advisor:** Lieutenant jr. g. Silviu POPA, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *In the current complex security environment of the Black Sea, countering modern asymmetric threats and A2/AD challenges requires the urgent modernization of the Romanian Naval Forces (RNF). Upgrading the existing Type 22 Frigates with precision-guided munitions (PGM) offers a highly cost-effective tactical advantage without replacing the main armament. The main objective of this paper is to introduce the concept of naval guided ammunition to the RoNF by developing the tactical framework and the mechanical 3D design for a functional prototype of a beam-riding shell, specifically focusing on the 76mm DART system. The methodology combines theoretical naval doctrine analysis with advanced Computer-Aided Design (CAD). Autodesk Fusion 360 was utilized to engineer a modular 3D model of the sub-caliber projectile. A significant focus was placed on Design for Manufacturing (DFM) and additive manufacturing to ensure the viability of the physical model. Precision threaded joints were integrated, and the internal cavity was dimensioned to accommodate optical guidance electronics. The resulting 3D-printed prototype serves as an accurate structural demonstrator, bridging the gap between theoretical tactical requirements and practical mechanical engineering within the Romanian Naval Academy.*

**Keywords:** *Precision Guided Munitions, Naval Artillery, Beam-Riding, 3D Prototyping, Type 22 Frigate, Guided Ammunition*

## **22. (ID 323) Modernization of the 76mm Caliber Projectile for the RNF**

**Authors:** stud. Mario-Alexandru-Alin DĂESCU, Eduard-Mihai COJOCARIU

**Scientific Advisor:** Lt. jr.g. Silviu POPA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents a modernization concept for the 76 mm caliber projectile used by the Romanian Naval Forces (RNF), with*

*the primary objective of enhancing ballistic performance and terminal effects while maintaining compatibility with existing systems. The proposed approach is based on structural redesign using CAD/CAE environments, specifically Fusion 360, where the three-dimensional model and associated simulations were developed. The proposed configuration incorporates a hybrid material structure, featuring a tungsten-based frontal section to improve penetration capability and mechanical resistance, and a lightweight steel body optimized for mass reduction and in-flight stability.*

**Keywords:** *Fusion 360, tungsten, high-energy explosive, hybrid material structure, multicriteria comparative analysis*

### **23. (ID 325) Applying modern technology to the design, reconstruction, and modernization of underwater weapons**

**Author:** stud. Robert Gabriel ONETE

**Scientific Advisor:** Lt. jg Silviu Nicolae POPA, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The primary objective of this paper is to leverage cutting-edge technologies for the construction, reconstruction, and modernization of underwater weapons by transposing armament elements such as naval mines, river grenades, galvanic cells, and dredges into scaled physical formats. The project aims to achieve high-fidelity virtual representations and their subsequent additive manufacturing. The technological workflow began with component digitization using the EinScan Pro HD scanner. The raw data underwent a rigorous process within point cloud editing software for project alignment and mesh generation. Processing the models in the SolidWorks CAD environment allowed for geometric refinement, ensuring the removal of imperfections and the preparation of volumes for 3D printing. This initiative aims to enhance the educational resources of the Underwater Weapons Laboratory at the Romanian Naval Academy "Mircea cel Bătrân".*

**Keywords:** *Virtual CAD reconstruction, Precision 3D digitization, Additive manufacturing, Reverse engineering*

#### **24. (ID 326) Utilizing Modern Technology for the Construction, Reconstruction, and Modernization of Artillery System Armament**

**Author:** stud. Medina Mihaela DIACONU

**Scientific Advisor:** Lt. jg Silviu Nicolae POPA, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** This study leverages 3D scanning and printing technologies in the construction, reconstruction, and modernization of artillery armament, materialized through the creation of a scaled model of the 14.5 mm caliber machine gun. The project focuses on transposing mechanical components into high-fidelity virtual models and their additive manufacturing, aimed at enhancing the Artillery Laboratory at the Romanian Naval Academy "Mircea cel Bătrân". The execution process began by scanning individual parts using the EinScan Pro HD equipment, followed by data processing in specialized software for point cloud editing, project alignment, and mesh generation. To eliminate geometric errors and define technical details, the models were processed in the SolidWorks CAD environment, ensuring each component's conformity with the physical part. The final stage of the project consisted of the additive manufacturing of the components, resulting in an essential educational resource for the advanced study of artillery systems within the naval university environment.*

***Keywords:** High-resolution 3D scanning, Additive manufacturing, reverse engineering, scale model, CAD Design, modernization of educational resources*

#### **25. (ID 345) Emerging Cybersecurity Trends and Patterns. Exploring the Relationship Between Cybersecurity and Cybercrime.**

**Author:** stud. Daria-Maria BOCOCI

**Scientific Advisor:** Col. Andrei IGNAT

**Institution:** "Alexandru Ioan Cuza" Police Academy

***Abstract:** Nowadays, most of our daily activities include our using the internet, the cyberspace. A lot of sensitive information is being stored online, therefore exposed to threats. Cyberspace challenges are complex and multifaceted in a world dependent on electronic technology. From identity theft to credit card fraud, these challenges*

*make every user a vulnerable target. Basic knowledge of the existence of these challenges is crucial. At least once, a person has been the target or victim of cyberspace crime.*

**Keywords:** *cybersecurity, ransomware, dangerous, cybercrime, information*

## **26. (ID 384) The Japanese Long Lance Torpedo**

**Author:** stud. Mark TIMOTITY

**Scientific Advisor:** Chief Police Commissioner, Assoc. Prof. Andreea CÎRCIUMARU, PhD

**Institution:** "Alexandru Ioan Cuza" Police Academy Bucharest

**Abstract:** *The best naval weapons in history are defined by their ability to change the paradigm of maritime warfare, provide overwhelming power projection, or dominate combat engagements. One of the most significant weapons used during naval conflicts was the Japanese "long lance" torpedo. The Type 93 torpedo, often nicknamed the "Long Lance," was one of the most advanced and feared naval weapons of World War II. Designated for Imperial Japanese calendar year 2593, it was a 610 mm diameter torpedo of the Imperial Japanese Navy (IJN), launched from surface ships.*

**Keywords:** *Weapon, Torpedo, Japanese, Type 93*

## **27. (ID 403) Evolution of Maritime Communication. From GMDSS Safety to Allied Tactical Command**

**Author:** stud. Vlad-Georgian PINTICA

**Scientific Advisors:** Assoc. Prof. Eng. Ovidiu CRISTEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This presentation examines the evolution of maritime radio systems from standard safety protocols to advanced naval tactical execution. It first details the transition of the Global Maritime Distress and Safety System (GMDSS) from analog watchkeeping to Digital Selective Calling (DSC), highlighting how Software-Defined Radio (SDR) and "Time Diversity" transmissions ensure signal integrity in high-noise environments. The focus then shifts to the tactical application of these links within allied naval formations, specifically exploring the Executive Method under ACP 125 standards to mathematically synchronize weapon launches and fleet maneuvers. By analyzing the distinctions between commercial safety*

*and the high-security requirements of the Romanian Naval Forces, including frequency hopping, strict circuit discipline, and cryptographic authentication. The presentation demonstrates how standardized communication serves as a critical "weapon system multiplier" in modern naval warfare.*

**Keywords:** VHF DSC, SDR, ACP 125, Prowords

**28. (ID 457) Advanced Fiber-Optic Data Links for UUV Operations: Secure Transmission and Tactical Intelligence, Surveillance, and Reconnaissance.**

**Author:** stud. Mihail Alexandru DIGĂ

**Scientific Advisor:** Lieutenant Eng. Emanuil OVADIUC, PhD student

**Institution:** "Alexandru Ioan Cuza" Police Academy

**Abstract:** *The integration of fiber-optic technology into Unmanned Aerial Vehicle (UAV) systems has represented a definitive game changer, offering a communication method characterized by ultra-low latency and total resistance to electronic jamming. This study explores the transition and implementation of this high-performance technology within Unmanned Underwater Vehicle (UUV) operations, addressing both defense and scientific research requirements. By analyzing the advantages of optical data links, the paper highlights their critical role in overcoming the bandwidth and security limitations of traditional underwater communication. The research investigates the tactical and strategic benefits of fiber optics, emphasizing the ability to maintain high-fidelity data transmission in contested or complex environments. A key focus is placed on the mechanical management of the tether, ensuring operational safety and preventing entanglement during sensitive missions, such as critical infrastructure monitoring. Despite the inherent challenges of the subsea medium, the adoption of fiber-optic links marks an essential milestone in the evolution of autonomous underwater systems, significantly increasing their effectiveness in modern maritime security and deep-sea exploration.*

**Keywords:** Unmanned underwater vehicles, underwater communication, low latency, fiber-optic

## **29. (ID 483) Kamikaze Marine Drone as Counter Measure to Marine Mines**

**Author:** stud. Liviu-Gabriel ZAMFIRACHE

**Scientific Advisor:** Assoc. Prof. Eng. Ovidiu CRISTEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** Marine kamikaze drones are emerging as a simple and effective way to deal with naval mines, which remain a serious danger to ships and coastal areas. Traditional mine-clearing methods can be slow, expensive, and risky for crews. In contrast, these small drones can be quickly deployed to find and neutralize mines without putting people in harm's way. Using onboard sensors and basic autonomous navigation, the drone can approach a detected mine and destroy it on contact or from a safe distance. Because they are relatively low-cost, multiple drones can be used at once to clear larger areas faster. This makes operations more flexible and efficient, especially in high-risk zones. Overall, kamikaze marine drones provide a practical, safer, and more modern approach to mine countermeasures.*

***Keywords:** Kamikaze marine drones, maritime security, naval defence, low-cost defence solution*

## **30. (ID 505) V-M.O.X. Guided Bomb**

**Authors:** stud. Brian-Adrian ANDREA, stud. Ștefan BOTEZAN, stud. Ingrid-Maria BUNESCU, stud. Ștefan Andrei DULEA

**Scientific Advisor:** Laviniu BOJOR

**Institution:** "Nicolae Bălcescu" Land Forces Academy

***Abstract:** The Visual-Marking Ordnance eXplosive (V-M.O.X.) Guided Bomb represents a low-cost precision munition designed for deployment from unmanned aerial systems. Unlike conventional precision weapons that rely on satellite navigation or laser designation, the V-M.O.X. platform uses onboard computer vision for autonomous target acquisition and trajectory correction. The munition integrates a Raspberry Pi 4 as the processing unit and an ESP-32 camera module positioned in the nose section for real-time visual data acquisition. Captured frames are processed using OpenCV algorithms capable of recognizing predefined targets such as vehicles, infantry formations or fortified positions. Once the target is detected, the algorithm determines the deviation vector between*

*the target coordinates and the central trajectory axis of the munition. A set of four servo-actuated aerodynamic fins mounted on the tail section perform course correction during free fall. This system enables the munition to compensate for environmental disturbances such as wind drift and release inaccuracies. The architecture focuses on minimal resource consumption and maximum operational efficiency, allowing the munition to be produced using commercially available components at a significantly reduced cost compared to traditional guided weapons. Such a platform is particularly relevant in modern wars of attrition where cost-effective and scalable precision strike capabilities are essential.*

**Keywords:** *ComputerVision; Cost; Modern; Drone; Warfare.*

**32. (ID 506) Technical solutions for the preliminary design of a multipurpose USV (torpedo launch, mines, self-destruction, etc.) by integrating existing weapons and ammunition systems in the FNR equipment**

**Author:** stud. Luiza-Gabriela BOUROȘ

**Scientific Advisor:** Assoc. Prof. Eng. Dinu ATODIRESEI, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This thesis focuses on the development of a preliminary design solution, at a Bachelor's degree level, for a multi-purpose Unmanned Surface Vehicle (USV) capable of utilizing existing ammunition from the Romanian Naval Forces' inventory through the integration of weapon and ammunition systems. The design is conducted at a conceptual level, emphasizing the platform's naval architecture and the preliminary integration of armament-related subsystems, treated as representative loads. Complementing the theoretical analysis, the work includes an experimental evaluation, conducted using a small-scale model ( $L = 1$  m), of the relative influence of mass distribution and equivalent volumes of the weapon systems on the USV platform's transverse stability characteristics. The experimental model is employed to identify trends and constraints relevant to the preliminary design, without aiming for the direct extrapolation of results to full scale.*

**Keywords:** *design, USV, weapon, preliminary, architecture*

**33. (ID 507) Autonomous Command and Control= (C2) System for Tactical HF Networks: Dynamic Propagation Prediction**

**Author:** stud. Raul Nicolae VĂDUVA

**Scientific Advisor:** Prof. Eng. Simona MICLAUȘ, PhD

**Institution:** "Nicolae Balcescu" Land Forces Academy, Sibiu

**Abstract:** *In the context of modern hybrid warfare and the inherent vulnerability of satellite communication systems in operational theaters, I consider the revitalization of High Frequency radio links as a resilient fallback to be a strategic necessity. In this paper, I present the development of the HF Predictor – Tactical Edition software, an advanced Command and Control (C2) platform I designed to optimize ionospheric radio links. My methodology integrates the VOACAP mathematical prediction engine with custom algorithms for real-time solar data processing from NOAA and live measurements provided by the GIRO global ionospheric radio observatory network. Unlike conventional prediction tools, I implemented a superior level of automation within this application by calculating distances and azimuths directly on the WGS-84 geodesic ellipsoid, ensuring the precise orientation of tactical antenna systems. The central innovation of my project lies in the decision-support modules: I automated the calculation of LPI power levels for discreet transmission, dynamic skip zone warnings, and NVIS feasibility analysis based on local topography. Furthermore, I developed a digital contingency protocol that automatically activates an FSK software modem for transmitting coordinates via audio telemetry upon detecting a critical degradation of the Signal-to-Noise Ratio. The results demonstrate that the system I created effectively reduces the radio operator's cognitive load, maintaining the continuity of critical information flow under hostile ionospheric conditions.*

**Keywords:** *HF Communications, VOACAP, Ionospheric Propagation, Tactical Decision, NVIS, Vincenty's Algorithm.*

#### **34. (ID 508) Communication Structures and NATO**

**Authors:** stud. Viktoriya MARINOVA, stud. Damyan KANEV, stud. Tsvetomir MARINOV

**Scientific Advisor:** Daniela G. KOSTADINOVA

**Institution:** Naval Academy "N. Vaptsarov", Bulgaria

**Abstract:** *This paper examines the role of communication in the military sphere, emphasizing its importance for coordination, decision-making, and operational success. It explores the two main*

*types of military communication systems - hierarchical and network-centric, highlighting their structures, advantages, and limitations. The paper also analyzes how NATO integrates both systems within its communication structure. By combining political decision-making bodies, military leadership, and modern communication networks, NATO ensures effective coordination among its member states. The study concludes that the integration of both communication models is essential for achieving efficiency, adaptability, and success in modern military operations.*

**Keywords:** *communication, military committee, hierarchical structure, network-centric structure, chain of command, interoperability, NATO, multinational operations.*

### **35. (ID 509) Silent Weapons: The power of electronic warfare**

**Authors:** Stud.frt. Teodora PÂRVU

**Scientific Advisor:** Lt.col. Lecturer Liviu GĂINA, PhD

**Institution:** "Henri Coandă" Air Force Academy of Braşov

**Abstract:** *Electronic Warfare (EW) has become a key component of modern military operations, enabling armed forces to control and exploit the electromagnetic spectrum. This paper analyzes the principles of electronic warfare and its operational role in contemporary air defense environments. The study focuses on the three primary components of EW - 1. electronic support, 2. electronic attack, 3. electronic protection - and also examines how they interact to detect, analyze and counter adversary electromagnetic emissions. Special attention is given to current operational challenges, including advanced radar systems, unmanned aerial vehicles and complex communication infrastructures.*

**Keywords:** *electronic warfare, electromagnetic spectrum, electronic attack*

## VI. SECTION: MECHANICAL ENGINEERING

Chairman: Prof. Beazit ALI, PhD

Members: Lecturer Aurelia CHIOIBAȘ, PhD

CDR Lecturer Narcis VOLINTIRU, PhD

Prof. assist. Levent ALI, PhD

**Room:** E122

### **1. (ID 16) The Role of 3D Printing in Mechanical Engineering**

**Author:** stud. Bogdan GRIGORE

**Scientific Advisor:** LCDR Assoc. Prof. Eng. Ionuț SCURTU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** 3D printing, also known as additive manufacturing, is revolutionizing the field of mechanical engineering by allowing for the rapid prototyping and production of complex parts with high precision. This technology enables engineers to create intricate designs that would be difficult or impossible to achieve with traditional manufacturing methods. It also reduces material waste, speeds up product development, and allows for greater customization. In mechanical engineering, 3D printing is particularly valuable for producing spare parts, creating test prototypes, and designing lightweight structures for industries such as aerospace and automotive. However, the technology still faces challenges, including material limitations, cost, and the need for advanced knowledge to operate the machines effectively. As 3D printing continues to evolve, it holds significant potential to transform how mechanical engineers approach design and manufacturing.*

***Keywords:** 3D Printing, Additive Manufacturing, Mechanical Engineering, Rapid Prototyping, Customization, Aerospace, Automotive, Spare Parts, Design Innovation, Material Efficiency.*

### **2. (ID 31) Compressed Air Installation on Board an LNG Carrier Vessel**

**Author:** stud. Bogdan-Nicușor AFTINICI

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The bachelor's thesis project consists of the design of a compressed air installation program on board the vessel ARISTOS I. This installation includes four compressed air systems: compressed air for engine starting (auxiliary diesel engines and the main engine/engines), compressed air for control and monitoring, service compressed air for the entire ship, and compressed air for the Selective Catalytic Reduction (SCR) system, introduced in accordance with MARPOL Annex VI to reduce nitrogen oxide emissions. Additionally, interactions for valves, consumers, the control panels of each individual compressor with their parameters, and an alarm system have been added to the program.*

**Keywords:** *Compressed air system installation within an interactable program*

### **3. (ID 41) Design of the Manufacturing Technology for the Rotor Shaft of a Centrifugal Pump Used in a Water Jet Firefighting System on a 55,000 DWT Oil Tanker**

**Author:** stud. Vlad PANAIT

**Scientific Advisor:** Lecturer Eng. Aurelia CHIOIBAȘ, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This project presents the design of the manufacturing technology for the rotor shaft of a centrifugal pump used in a water jet firefighting system on a 55,000 DWT oil tanker. The shaft is a critical mechanical component responsible for transmitting torque and ensuring the proper operation of the rotating assembly. The study includes the analysis of mechanical stresses acting on the shaft, such as torsion, bending, and fatigue, under a rotational speed of 1800 rpm. Based on these conditions, the main constructive dimensions are established, taking into account strength requirements and functional constraints. A suitable material is selected to ensure adequate mechanical performance and durability in a marine environment. The technological process is then defined, including machining operations, heat treatment, and finishing processes required to achieve the desired dimensional accuracy and surface quality.*

**Keywords:** *shaft design*

#### **4. (ID 60) Design and Operation of the Propulsion System on an LNG CARRIER**

**Author:** stud. Bogdan-Andrei DINȚICĂ

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* The paper focuses on the design and operation of a dual-fuel engine used in modern LNG carriers. My research explores both the theoretical and practical aspects of such propulsion systems, emphasising automation.

*As part of the project, I have put together a 3D model of the dual-fuel engine, which visually represents its main components and operational structure. In addition, I have created a software application designed to monitor and analyze the performance of two engines in real time. The current version of the application tracks parameters such as fuel and air line data, engine performance variables, and operational status. Based on these parameters, it automatically generates alerts in case of anomalies. The next stage of development will focus on improving the interface and integrating additional automation features to support predictive maintenance and performance optimization.*

**Keywords:** design, propulsion, LNG, dual-fuel, 3D, blender, software

#### **5. (ID 64) Hydrodynamic Simulation of a Propeller Using SolidWorks Flow Simulation**

**Author:** stud. Sebastian-Nikolas ALISTARH

**Scientific Advisor:** Lecturer Eng. Narcis-Octavian VOLINTIRU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* This study presents the hydrodynamic analysis of a five-bladed naval propeller with a diameter of 0.9 m, designed and modeled using SolidWorks. Computational Fluid Dynamics (CFD) simulations were conducted in SolidWorks Flow Simulation to evaluate the propeller's performance at rotational speeds of 100, 200, and 300 RPM. The analysis focuses on thrust generation along the Z-axis, pressure distribution on the blade surfaces, and the structure of the water flow downstream of the propeller. The results show a significant increase in thrust with rotational speed, accompanied by accelerated and well-organized flow patterns. At all

*tested speeds, the flow remains stable, with a uniform pressure distribution and no risk of cavitation. Visualization of velocity fields and particle trajectories confirms efficient propulsion and proper hydrodynamic behavior. Overall, the simulations demonstrate that the propeller design ensures consistent performance, safe operation, and efficient thrust generation across different operating regimes.*

**Keywords:** *Computational Fluid Dynamics (CFD), Propeller Hydrodynamics, Thrust Performance*

## **6. (ID 72) Design and Operation of the Steam Generating Plant on an LNG Carrier**

**Author:** stud. Viorel CHIHAIA

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The bachelor's degree project focuses on the design and operation of the steam generating plant aboard a liquefied natural gas (LNG) carrier. This installation comprises two auxiliary boilers (type ALFA LAVAL Aalborg OS-TCi) and two exhaust gas boilers (type ALFA LAVAL Aalborg XS-7V). Both the equipment and the vessel on which the project is based were fully 3D modeled using Blender. Furthermore, an interactive application was developed in Unity to simulate the operation of the boilers; the program features interactions for valves, pumps, Engine Load adjustments, steam consumers, and a complex Master-Slave pressure control system.*

**Keywords:** *Lng Steam Plant Instalation and Projecting*

## **7. (ID 100) The benefits of the Renewable Energy: Providing a Photovoltaic Park at the Romanian Naval Academy "Mircea cel Bătrân"**

**Authors:** stud. Ecaterina Andreea DAVID, stud. Bianca Andreea DAMIAN, stud. Andrei-Marian SEMEȘ-IRODI

**Scientific Advisor:** Lecturer Eng. Vlad MOCANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Photovoltaic energy is the energy that converts sunlight directly into electricity, acknowledged of being one of the cleanest and most efficient forms of energy at present. It has constantly provided efficiency independence both for domestic consumers and for industrial ones. In this paper, we focused on analyzing the topics*

*carefully related to the implementation of a photovoltaic park within the Romanian Naval Academy “Mircea cel Bătrân”. This study examines the operating principles of a photovoltaic park, as well as the benefits and drawbacks of using this technology and the improvements it may bring within a military educational institution. Particular attention is given to the methods of implementation, based on existing projects used for the development of photovoltaic parks in Romania. In consequence, this paper presents the main reasons for developing such a program, highlighting its importance not only for reducing energy consumption, but also for maintaining a favorable climate balance on multiple levels.*

**Keywords:** *photovoltaic energy, solar power, sustainable development, energy storage, safe environment*

## **8. (ID 156) Development of a Computational Model for Pressure Loss Estimation in Hydraulic Systems**

**Authors:** stud. Mircea-Georgian APOSTOL, stud. Robert BOCA, Lucian-Cosmin CHIȚU

**Scientific Advisor:** Lecturer Eng. Doru COȘOFREȚ, PhD

**Institution:** Romanian Naval Academy “Mircea cel Bătrân”

**Abstract:** *This paper presents the development of a software application for calculating pressure losses in hydraulic pipeline systems, intended for use in system analysis and design. The implemented model is based on the Darcy–Weisbach equation for evaluating linear losses and on local loss coefficients to account for the influence of components such as elbows, valves, and fittings. The algorithm integrates the computation of flow velocity, Reynolds number, and friction factor, adapting to the flow regime. The application allows users to input key system parameters and quickly obtain results in terms of total and partial pressure losses. The implementation of a graphical user interface ensures intuitive use and enables comparative analysis of different configurations. The developed tool provides practical support for the design and optimization of hydraulic systems, reducing calculation time and minimizing the risk of errors.*

**Keywords:** *pressure losses, software application, hydraulic pipelines, hydraulic calculation*

## **9. (ID 159) The Turbocharger Between Help and Reliability**

**Author:** stud. Alexia-Mădălina IOSIF

**Scientific Advisor:** Lecturer Eng. Ionel POPA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The paper presents the turbocharger as an essential element for increasing engine performance, but also as an assembly whose reliability directly depends on correct operation and maintenance. By using the energy of the exhaust gases, the turbocharger compresses the intake air, improves combustion, increases the specific power and allows the engine to maintain small dimensions. At the same time, operation at very high speeds and at high temperatures imposes severe lubrication, cooling and assembly conditions. Defects frequently occur due to dirty oil, clogged pipes, carbonization of the lubricant, the ingress of foreign bodies, excessive exhaust gas temperature and material wear. Consequently, the turbocharger represents an important technical aid for increasing efficiency and power, but its reliability is maintained only through periodic checks, proper lubrication, correct diagnosis and compliance with operating conditions.*

**Keywords:** turbocharger, combustion, lubrication, efficiency, conditions

## **10. (ID 161) Design of Hybrid Propulsion Systems for Commercial Vessels – Case Study**

**Author:** stud. Ovidiu BOLOHAN

**Scientific Advisor:** Lecturer Eng. Ionel POPA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper investigates the design of hybrid propulsion systems for commercial vessels in the context of increasingly stringent environmental regulations imposed by the International Maritime Organization (IMO). The objective is to identify and justify an optimal hybrid architecture that improves energy efficiency while reducing emissions. The methodology includes a comparative analysis of conventional and hybrid propulsion systems, along with the assessment of integrated energy management solutions such as Power Management Systems (PMS) and Energy Management Strategies (EMS). A case study is developed for a reference vessel, including resistance estimation, system configuration, and*

*component sizing. System performance is evaluated through simulations under representative operating conditions. The results indicate reduced fuel consumption and emissions, as well as enhanced operational flexibility. The study highlights the feasibility and advantages of hybrid propulsion systems in supporting sustainable maritime transport.*

**Keywords:** *Hybrid propulsion, commercial vessels, energy efficiency, emissions reduction, PMS, EMS, marine engineering*

### **11. (ID 166) Systems for Detecting, Locating and Extinguishing Fire Outbreaks are Being Developed. The Aim is to Make Them Compatible with Unmanned Aerial Vehicles.**

**Authors:** stud. Paulina STACHNIO, stud. Paula BIEŃ, stud. Michał KOŻUCHOWSKI, stud. Karolina PIELA, stud. Jakub MICHALSKI

**Scientific Advisor:** DSc Barbara NASIŁOWSKA

**Institution:** Military University of Technology, gen. S. Kaliskiego Warsaw, Poland

**Abstract:** *Fires, particularly those that originate in inaccessible forested, agricultural and industrial areas, pose an increasing threat to life, property and the environment. The early detection of fire outbreaks and the rapid delivery of fire suppressants to the source of the fire significantly increases the chances of containing it effectively with minimal damage. Traditional intervention methods, such as manned firefighting flights and ground crews, are often insufficient due to limited availability, high costs and inherent dangers, especially in conditions of limited visibility, complex terrain or risks to rescue personnel. This publication covers the development, design and construction of systems for detecting, locating and extinguishing fire outbreaks. These systems form an integral part of an autonomous, unmanned aerial system. The system's primary task is to respond immediately to a detected fire source by precisely releasing a fire-suppressing agent, thereby eliminating the threat in its earliest phase. The fire suppression system was evaluated during field tests at the Military University of Technology's designated testing ground. The DJI Mini 2 SE model was chosen for use as the unmanned aerial system due to its advantages in terms of size, ease of use and simplicity. These advantages allow for quick repairs and the addition of new components, as well as enabling the system to be scaled up to*

*a larger drone. Scalability and simple design affect operational efficiency and safety, reducing the need for direct human intervention in the early stages of a fire.*

**Keywords:** *unmanned aerial vehicle (UAV), fire detection, fire suppression system, early fire detection, autonomous systems, drone-based firefighting, fire extinguishing agent delivery, emergency response systems, wildfire monitoring*

## **12. (ID 169) Diesel-Electric Propulsion System**

**Authors:** stud. Rareș GHEORGHE, stud. Marius TĂNASE, stud. Marcel-Marius STRĂTULAT

**Scientific Advisor:** Lecturer Edith KAITER, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents an overview of diesel-electric propulsion systems, focusing on their operating principles, main components, and practical applications. In such systems, the diesel engine is not directly connected to the propeller or driving wheels, but instead drives an electric generator that produces electrical energy. This energy is then supplied to electric motors responsible for propulsion. The study highlights the advantages of diesel-electric systems, including improved efficiency at variable loads, enhanced control of speed and torque, reduced mechanical complexity, and increased flexibility in system design. In addition, the paper discusses the main disadvantages, such as higher initial costs and energy losses during conversion processes. Applications of diesel-electric propulsion in marine vessels, locomotives, and submarines are also analyzed, emphasizing their importance in modern transportation systems. Finally, recent developments, including hybrid propulsion technologies and energy optimization strategies, are briefly presented.*

**Keywords:** *Diesel engine, power generation, electric drive system, energie efficiency, hybrid propulsion*

## **13. (ID 173) Preliminary design of the propulsion system from the perspective of increasing energy efficiency for 50,000-tone oil tanker ships.**

**Author:** stud. Rareș-Cristian FOCȘA

**Scientific Advisor:** Lecturer Eng. Doru COȘOFREȚ, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This thesis focuses on the preliminary design of propulsion systems for 50,000-ton oil tanker vessels, with an emphasis on improving energy efficiency and reducing environmental impact. The study analyzes the main components of marine propulsion systems, including engines, propellers, and auxiliary systems, and evaluates their performance under various operating conditions. Special attention is given to optimizing fuel consumption through improved hydrodynamic design, efficient engine selection, and the integration of modern technologies such as waste heat recovery systems and energy-saving devices. The research also considers international regulations related to emissions and energy efficiency, aiming to align the proposed solutions with current maritime standards. By combining theoretical analysis with practical design approaches, this work provides recommendations for enhancing the overall performance and sustainability of tanker ships, contributing to more efficient and environmentally friendly maritime transport.*

**Keywords:** *Energy efficiency, Propulsion system design, Oil Tanker ships, Hydrodynamic performance, Emissions reduction, Marine engineering*

#### **14. (ID 180) Fabrication of Microstructures using Direct Laser Writing (DLW) and their Characterization for Biomedical Applications**

**Authors:** stud. Paula BIENĆ, stud. Marta KUTWIN

**Scientific Advisor:** DSc Barbara NASIŁOWSKA

**Institution:** Military University of Technology, gen. S. Kaliskiego 2, 00-908 Warsaw, Poland

**Abstract:** *A key driver of the miniaturization of electronic devices and biomedical sensors is the rapid advancement of advanced techniques for fabricating metallic microstructures. Among the materials capable of enhancing performance characteristics, gold (Au) is of particular importance, as it exhibits excellent electrical conductivity, chemical stability, and biocompatibility. This paper presents the results of titanium and gold microstructures designed (Clewin 5) and fabricated using the Direct Laser Writing (DLW) method on a silicon surface coated with a graphene layer. The sample preparation process involved applying a photoresist layer,*

*exposure, development, and then sputtering a 1.5 nm layer of titanium and a 30 nm layer of gold. In addition to structural characterization of the surface, including imaging using scanning electron microscopy and confocal microscopy, cell viability tests on HT-22 cells were also conducted on the resulting structures. These tests demonstrated improved cell adhesion and an increase in viability of approximately 10%. Metal microstructures prepared in this way can serve as a functional substrate for biological research and for subsequent biomedical applications.*

**Keywords:** *Microstructures, laser lithography, biomedical applications, graphene, HT-22 cell line, gold, titanium*

## **15. (ID 215) Design and Performance Analysis of Renewable Energy Systems for Shipboard Emergency Applications**

**Author:** stud. Daniel PÂRLOG

**Scientific Advisor:** Assoc. Prof. Ovidiu CRISTEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents the design and performance analysis of renewable energy systems intended for shipboard emergency applications. In the event of power failure during naval casualty scenarios, the availability of reliable alternative energy sources is essential for maintaining critical onboard operations. The study focuses on the integration of renewable technologies, such as vertical axis wind turbines and photovoltaic systems, into a hybrid emergency power framework. Key parameters including energy output, system efficiency, environmental conditions, and installation constraints are evaluated. A case study is conducted to assess the capability of these systems to supply essential loads under varying maritime conditions. The results highlight the potential of renewable energy solutions to improve energy autonomy, reduce dependency on conventional backup systems, and enhance overall safety and resilience in emergency situations at sea.*

**Keywords:** *renewable energy systems, shipboard emergency power, photovoltaic systems, hybrid energy systems, maritime engineering, system performance, energy efficiency*

## **16. (ID 270) Use of Fuel Mixtures in the Maritime Industry**

**Authors:** stud. Baraa ALHENBAZLI, stud. Marin-Viorel BANDRABUR

**Scientific Advisor:** Lecturer Eng. Ionel POPA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** The maritime transport sector is essential to global trade but remains a major source of atmospheric pollution and greenhouse gas (GHG) emissions. As international regulations become stricter, identifying sustainable and technically viable solutions is increasingly important. This dissertation examines the reduction of GHG emissions through the use of fuel mixtures in marine propulsion, focusing on both practical and regulatory aspects. The study analyzes the current legislative framework, particularly MARPOL 73/78 Annex VI, which sets limits for SO<sub>x</sub> and NO<sub>x</sub> emissions and introduces energy efficiency measures such as EEXI, CII, and SEEMP. These regulations drive the adoption of alternative fuels and innovative propulsion solutions. A comparative analysis of conventional and alternative fuels such as HFO, VLSFO, LNG, methanol, hydrogen, and biofuels is conducted, considering emissions, energy efficiency, feasibility, safety, and infrastructure. Special attention is given to fuel blending and dual-fuel systems as transitional solutions. The research includes a case study of a multi-fuel bunker barge capable of supplying various fuels, including LNG, hydrogen, e-methanol, and conventional fuels. The results show that fuel mixtures and multi-fuel systems can significantly reduce emissions, especially in port areas. Overall, the study highlights that flexible fuel strategies and multi-fuel infrastructure represent practical steps toward maritime decarbonization.*

**Keywords:** Energy efficiency, Maritime transport, Marine propulsion systems, MARPOL Annex VI

## **17. (ID 272) Hydrogen as an Alternative Fuel in Commercial Marine Propulsion Systems.**

**Authors:** stud. Marin-Viorel BANDRABUR, stud. Baraa ALHENBAZLI

**Scientific Advisor:** Lecturer Eng. Ionel POPA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The maritime transport sector is undergoing a significant transformation driven by increasingly stringent environmental regulations and the global imperative to reduce greenhouse gas (GHG) emissions. Among the emerging solutions, hydrogen has gained considerable attention as a zero-carbon fuel with the potential to decarbonize marine propulsion systems. This dissertation investigates the feasibility, challenges, and nepcnekmybъ of utilizing hydrogen as an alternative fuel in commercial marine propulsion.*

**Keywords:** *Hydrogen fuel; Maritime transport; Marine propulsion systems; Alternative fuels; Decarbonization; Greenhouse gas emissions (GHG); MARPOL Annex VI.*

### **18. (ID 273) Splines in Quadrature Problems**

**Authors:** stud. Amalia Gabriela EFTIMIE, stud. Florentina Miruna COSTACHE

**Scientific Advisor:** Lecturer Ligia-Adriana SPORIȘ, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The main goal of this note is to present some applications of splines in numerical quadrature problems.*

**Keywords:** *Splines in Quadrature Problems*

### **19. (ID 292) Performance Analysis of a Gas Turbine Based on the Brayton Cycle in Naval Applications**

**Author:** stud. Anamaria-Raluca RISTACHE

**Scientific Advisor:** Lecturer Eng. Narcis-Octavian VOLINTIRU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper analyzes the thermodynamic performance of a gas turbine used in marine propulsion, employing a computational model based on the real Brayton cycle. The numerical implementation allows for the evaluation of how compression ratios and component efficiencies influence overall thermal efficiency and net power output. A key feature of this study is the integration of a monitoring system for critical thermal thresholds, essential for operational safety in maritime environments. Temperatures at the compressor discharge ( $T_2$ ), turbine inlet ( $T_3$ ), and exhaust ( $T_4$ ) are evaluated against material strength limits and the risk of blade degradation. The results highlight the necessary balance between*

*increasing thermal power and maintaining the structural integrity of the plant. The model serves as a diagnostic and optimization tool, enabling the identification of operating regimes that maximize efficiency without compromising the reliability of the propulsion system under variable load conditions.*

**Keywords:** *Brayton cycle, Gas turbine, Marine propulsion, Thermal efficiency, Thermal monitoring*

## **20. (ID 352) The Steering System of the Piranha III C Armored Amphibious Personnel Carrier: Role, Structure, Operation, and Control Mechanism**

**Author:** stud. Elena DOLINSCHI

**Scientific Advisor:** Prof. Toma PLEȘANU, PhD

**Institution:** "Nicolae Bălcescu" Land Forces Academy

**Abstract:** *The paper analyzes the steering system of the Piranha III C armored amphibious personnel carrier, highlighting its role in ensuring mobility, maneuverability, and operational safety in various conditions. The study presents the structure of the system, composed of mechanical and hydraulic components, as well as its operating principle based on hydraulic power steering, which reduces driver effort and ensures precise vehicle control. The main characteristics of the two-axle steering system are examined, along with its contribution to vehicle stability on rough terrain and in urban environments. The research methodology includes document analysis, direct observation, and computer simulation, providing a comprehensive perspective on system performance. The results indicate a high level of maneuverability and efficiency of the steering system, while also identifying certain limitations, such as dependence on the hydraulic system and the relatively large turning radius. In conclusion, the analyzed system meets operational requirements but can be further optimized through the integration of modern technological solutions to enhance performance and reliability.*

**Keywords:** *Piranha III C; Steering system; Hydraulic power steering; Maneuverability; Armored vehicle*

## **21. (ID 368) Cost/benefit Analysis of Operational Energy Efficiency on a Ship, By Implementing the Speed Reduction Method**

**Author:** stud. Ioan Sebastian TAGARICI

**Scientific Advisor:** Lecturer Eng. Doru COȘOFREȚ, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The paper analyzes energy efficiency on board seagoing vessels, focusing on methods for reducing fuel consumption and optimizing propulsion performance. The first chapter presents international regulations and applicable measures for increasing energy efficiency, along with relevant studies in the field. The second chapter introduces the analyzed vessel, a 2200 TEU container ship, highlighting the constructive and functional characteristics of the main engine, as well as the calculation parameters used. The third chapter calculates the forward resistance and evaluates the power required for different speeds, including the influence of weather and ocean conditions on the vessel's performance. The last chapter is dedicated to the analysis of energy efficiency for the studied vessel, identifying optimal solutions for operating and reducing energy consumption. The results obtained provide practical directions for increasing efficiency in modern maritime transport.*

**Keywords:** *energy efficiency, ships, propulsion, resistance, engine*

## **22. (ID 379) Techniques for Modeling and Virtual Simulation of Diesel Engines**

**Author:** stud. Mihail-Andrei GHEORGHIU

**Scientific Advisor:** Scientific Researcher Eng. Alexandru PINTILIE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Modeling and virtual simulation of diesel engines represent essential tools in the modern process of design, analysis, and optimization of propulsion systems used in transport industry. By using computer-aided modeling technologies and advanced numerical methods, the complex physical processes that occur inside the engine can be analyzed in a virtual environment, reducing the need for costly experimental tests and development time.*

**Keywords:** *propulsion systems, Dynamic simulation, diesel engines, Virtual simulation*

### **23. (ID 418) Buckling Optimization**

**Authors:** stud. Denisa DUMITRU, stud. Andreea Claudia SCARLAT

**Scientific Advisor:** Assoc. Prof. Eng. Mihai BEJAN, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Buckling is the phenomenon in which a compressed structure loses its stability. Usually buckling is considered the global one which does not cover the entire phenomenon. Local buckling is also an important phenomenon who deserves to be considered. On the other hand, optimization leads us to a solution which satisfied the requirements using the minimum amount of resources. The object of this study is the optimization of a compressed column, with a ring shape cross - section, from both point of view of global and local buckling. These two criteria are opposite and this is why the problem has a sense. The analytical equations of the phenomenon were used. Writing the equation of the optimization, mathematical problem was the most demanding part of the process. As conclusions we must note that the optimization offered us a better solution than the initial one. The chart reveals us about design space and solution.*

**Keywords:** *buckling, optimization*

### **24. (ID 420) CFD Simulation of a Propeller Using ANSYS Fluent**

**Author:** stud. Ioan ȚUȚUIANU

**Scientific Advisor:** Lecturer Eng. Octavian VOLINTIRU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents the numerical analysis of fluid flow around a propeller using ANSYS Fluent. The aim is to determine the pressure distribution and velocity field generated by its rotation. The model was discretized and analyzed using CFD methods and an appropriate turbulence model. The results highlight pressure variations on the blades, velocity distribution, and vortex formation. Relevant graphs are also presented for performance evaluation. The study demonstrates the usefulness of CFD simulations in propeller analysis and design optimization.*

**Keywords:** *CFD, propeller, ANSYS Fluent, pressure distribution, velocity field, numerical simulation*

## **25. (ID 430) Structural Analysis of a Propeller Shaft under Combined Pressure and Bending Loads using Finite Element Method in ANSYS**

**Author:** stud. Ioan ȚUȚUIANU

**Scientific Advisor:** Lecturer Eng. Octavian VOLINTIRU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* This paper presents the structural behavior analysis of a propeller shaft subjected to combined pressure and bending loads, using the finite element method implemented in ANSYS. The objective of the study is to evaluate the stress and deformation distribution under specific operating conditions, highlighting critical regions prone to failure. The numerical model is developed based on a representative geometry, with boundary conditions and loads defined according to real operating regimes. The material is assumed to be homogeneous and isotropic, and the analysis is performed within the linear elastic domain. The obtained results are interpreted using strength criteria, providing a detailed insight into the mechanical behavior of the shaft. The study contributes to design optimization and improved reliability of propulsion systems, demonstrating the effectiveness of numerical simulations in modern mechanical engineering applications.

**Keywords:** propeller shaft, FEM analysis, ANSYS, bending, mechanical stress

## **26. (ID 437) Lubrication System Maintenance**

**Authors:** stud. Ionel-Valentin PETCU, stud. Adelin Sorin TIPU, stud. Leonard-Andrei ȘOIMU

**Scientific Advisor:** Assoc. Prof. Eng. Daniel MĂRĂȘESCU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* The efficiency and lifespan of the 274 pirogue's reversing gearbox depend heavily on the proper functioning of its lubrication system. This system, comprising filters, spray nozzles, and pumps, requires periodic maintenance including oil changes, tank cleaning, and pressure checks to ensure optimal performance. Beyond ensuring safety and operational reliability, regular lubrication significantly reduces long-term costs. Furthermore, proper maintenance has a positive environmental impact by extending the equipment's life cycle, thereby reducing waste and pollutant

*emissions caused by frequent parts replacement. In conclusion, maintaining the lubrication system is a vital investment for both economic efficiency and environmental protection.*

**Keywords:** *Gear box, lubrication system, safety, maintenance, equipment*

## **27. (ID 449) Performance analysis and modernization of gas turbine propulsion systems for military ships**

**Authors:** stud. Mihai-Claudiu BABUS, stud. Iris Maria POPA

**Scientific Advisor:** Lecturer Eng. Octavian VOLINTIRU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper addresses an essential and highly topical topic in the field of naval engineering, focusing on the calculation, construction and optimization of gas turbines for high-speed military ships. The main objective of the research is the detailed analysis of the operation of a complex propulsion system and the proposal of modernization solutions, having as a reference study the American Arleigh Burke-class destroyer. This class of ships is recognized worldwide for its tactical and navigational performances, supported by a propulsion system configured in the COGAG (Combined Gas and Gas) system, which usually uses high-performance aeroderivative turbines.*

**Keywords:** *Brayton cycle Kinematic transmission chain Hydrodynamic analysis Adjustable pitch propellers*

## **28. (ID 450) The Influence of Hull Form on Ship Resistance**

**Author:** stud. Ema-Diana CALIMAN

**Scientific Advisor:** Assoc. Prof. Eng. Mihaela-Greti MANEA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper investigates the influence of hull form on ship resistance, with the aim of highlighting how geometric characteristics of the hull affect the hydrodynamic behavior of a vessel during forward motion. The study focuses on the main components of resistance, namely frictional resistance, form resistance, and wave-making resistance, and examines their dependence on hull geometry. The methodology is based on a theoretical assessment of resistance using established naval architecture principles, combined with a qualitative analysis of how*

*variations in hull form parameters influence the total resistance. Particular attention is given to the relationship between hull shape characteristics and energy efficiency. The results emphasize the significant role of hull form optimization in reducing ship resistance, leading to improved propulsion efficiency and overall operational performance. The paper concludes that even moderate changes in hull geometry can have a measurable impact on resistance, making hull form design a key factor in ship performance and efficiency.*

**Keywords:** *hull form, ship resistance, hydrodynamics, energy efficiency, wave resistance, frictional resistance*

## **29. (ID 452) Calculation and Design of a Gas Turbine for a Military Ship**

**Authors:** stud. Mihai-Claudiu BABUS, stud. Iris Maria POPA

**Scientific Advisor:** Lecturer Eng. Octavian VOLINTIRU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper addresses a crucial and highly relevant theme in modern naval engineering, focusing on the calculation, construction, and optimization of gas turbines designed for high-speed military vessels. The main objective of the research is a detailed functional analysis of a complex propulsion system, using the American Arleigh Burke-class destroyer as a benchmark. This naval class is globally recognized for its exceptional tactical performance, supported by a propulsion system configured in a COGAG (Combined Gas and Gas) arrangement, which utilizes high-performance aeroderivative turbines to ensure superior mobility and rapid response times. The first part of the thesis provides a comprehensive overview of the theoretical principles and the structural architecture of naval gas turbines. It highlights the major advantages these units offer in a military context, such as an excellent power-to-weight ratio, extremely short startup times, and high reliability under intense operational conditions. Furthermore, the paper details the primary components of the kinetic chain, ranging from the air intake system and the combustion chamber to the power transmission systems and the ship's propellers. The second section of the work is dedicated to the specific case study of the Arleigh Burke-class destroyer*

**Keywords:** *gas turbine, naval propulsion, COGAG system, Arleigh Burke destroyer*

### **30. (ID 476) Structural and Mechanical Analysis of Optical Interfaces Under Hydrostatic Pressure**

**Author:** stud. Sebastian-Pavel ORZEA

**Scientific Advisor:** Lecturer Daniel DANECI PĂTRĂU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *An optical interface, such as a pressure viewport or dome, is a specialized protective component designed for underwater research equipment, primarily used in oceanography, marine robotics, and deep-sea exploration. This presentation explores the structural design, material selection, and mechanical behavior of these optical interfaces, focusing on their significance in ensuring the reliable operation of sensitive cameras and sensors while maintaining optical clarity and withstanding hydrostatic pressure. Furthermore, this presentation will highlight the engineering methodologies used to optimize interface designs, including Finite Element Analysis (FEA) for stress distribution, advanced sealing mechanisms, and the evaluation of high-strength transparent materials. Simulation models and analytical data will be presented to illustrate the real-world durability and structural efficiency of these interfaces in deep-ocean environments.*

**Keywords:** *optical interface, hydrostatic pressure, structural analysis, underwater equipment, mechanical behavior*

### **31. (ID 510) Aerodynamic Analysis of the Aero-naut Triple Neo Speed Model**

**Author:** stud. Ionuț-Riccardo VASILE

**Scientific Advisor:** Assoc. Prof. Vasile PRISACARIU, PhD

**Institution:** "Henri Coandă" Air Force Academy, Braşov

**Abstract:** *The Aero-naut Triple Neo Speed is an RC electric glider designed for efficient flight, combining a lightweight structure, aerodynamic refinement, and responsive control surfaces for operation in multiple flight regimes. This paper presents a software-based aerodynamic analysis of the model, with emphasis on the evaluation of lift, drag, and moment characteristics through numerical simulation in XFLR5. The study investigates the*

*aerodynamic behavior of the aircraft in both 2D and 3D configurations, focusing on the influence of flap deflection, elevator input, and geometric setup on flight performance and longitudinal stability. The simulations were conducted under standard atmospheric conditions, with aerodynamic coefficients analyzed over a wide angle-of-attack range in order to identify the model's behavior during equilibrium flight, climb, and landing. In addition, the paper examines the influence of wing loading, mass distribution, and center-of-gravity positioning on overall stability and control.*  
**Keywords:** *aerodynamic analysis; XFLR5; longitudinal stability; flap deflection.*

**32. (ID 515) Modeling and simulation of a gearbox in Python. Validation of results using Autodesk Inventor CAD**

**Author:** stud. Margareta ROȘCA

**Scientific Advisor:** Prof. Assist. Paul PASCU PhD Candidate

**Institution:** “Dunărea de Jos” University of Galati

**Abstract:** *Within this project, a detailed study of the operation of a mechanical gearbox was carried out, involving the mathematical modeling and simulation of the system using the Python programming language, with a focus on analyzing the kinematic and dynamic behavior of gears and shafts, as well as determining the key functional parameters that influence the overall performance of the assembly. Subsequently, the results obtained from the simulations were validated through a three-dimensional model developed in the Autodesk Inventor CAD environment, aiming both to verify the accuracy of the calculated data and to correlate theoretical methods with practical ones in order to confirm the optimal and reliable operation of a real mechanical system.*

**33. (ID 516) Design and 3D printing of a two-stage gearbox and shaft line in accordance with DNV rules**

**Authors:** stud. Marian TĂNASE, stud. Robert ILIESCU, stud. Adelina ȘTEFAN, stud. Henrietta HAJDU, stud. Vlad NEGRAU, stud. Margareta ROȘCA

**Scientific Advisors:** Lecturer Alina MODIGA, PhD, Prof. Assist. Paul PASCU, PhD Candidate

**Institution:** “Dunărea de Jos” University of Galati

**Abstract:** *This project focuses on the design and 3D printing of a two-stage gearbox and the shaft line, developed in accordance with the rules of the DNV classification society. The main objective is to transform an initial concept into a functional and testable 3D prototype, while ensuring compliance with standards in the naval field. The study includes the selection and integration of the main components of the propulsion system, such as the engine and the propeller, based on a reference vessel (Eberhart Essberger). The design process involves analytical calculations, the dimensioning of the input shaft and gear stages, as well as the development of a complete 3D model. In addition, the project explores the potential use of biogas (GNV) as an alternative marine fuel. A case study based on the municipality of Galați evaluates the feasibility of producing biogas from organic waste.*

#### **34. (ID 518) Comparative Analysis Between Gyroid Structures and Conventional Infill in Mechanical Parts Design**

**Authors:** stud. Dinu COJOCARU, stud. Molnar Gyorgy

**Institution:** “Babeș Bolyai” University of Reșița

**Abstract:** *Additive manufacturing, also known as 3D printing, has improved many aspects of manufacturing simple parts, machines, diverse mechanisms and so on. In this report our team will describe a couple of methods on how to create Gyroid infill structures, touch upon the core principles behind the creation of a gyroid surface and its main properties. In addition, we will attempt to create physical prints in convenient materials for further testing. Thus, this paper attains to have the integral process of conception, computer assisted design, printing, and optimization of a Gyroid containint part.*

## VII. SECTION: FUNDAMENTAL SCIENCES

### Section Committee:

Chairman: Assoc. prof. Anda OLTEANU, PhD

Members: Assoc. prof. Eleonora RĂPEANU, PhD

Lecturer Adriana SPORIȘ, PhD

Lecturer Cristina TUDOR, PhD

Room: Lp-A5

### 1. (ID 22) Synaptic development and state obligations for a neurohealty environment.

**Author:** stud. Ema IURIETI

**Scientific Advisor:** Police Commissioner-Chief, Prof. Bogdan ȚONEA, PhD

**Institution:** „Alexandru Ioan Cuza" Police Academy

**Abstract:** *Brain growth and learning represent fundamental pillars of human potential, promoting health and mental strength. A healthy environment plays a vital role in memory and learning, acting as a foundation for cognitive success. This paper analyzes the critical role of brain health and how pollution prevents our natural progress. It highlights the obstacles faced by authorities, including industrial resistance and the lack of strong laws. Additionally, the work explores how state responsibility can significantly improve our protection. By integrating these principles, societies can drive sustainable, human-centric development.*

**Keywords:** *Brain, Synapse, Environment, Law, Protection*

### 2. (ID 26) Prison Psychology

**Author:** stud. Oana MĂRGINEAN

**Scientific Advisor:** Lecturer, Police Chief Victor DRĂGHICI, PhD

**Institution:** „Alexandru Ioan Cuza" Police Academy Bucharest

**Abstract:** *In this paper, I will present the main aspects of penitentiary psychology, a field that studies the behavior and psychological processes of individuals deprived of liberty, as well as the relationships between inmates and prison staff. The paper will*

*analyze the factors that influence criminal behavior and the way individuals adapt to the prison environment, highlighting the effects of detention on personality. It also addresses the role of the psychological evaluation of inmates, carried out to identify the risk of recidivism and to develop intervention programs. Another important aspect is the contribution of penitentiary psychology to maintaining a balanced institutional climate and to supporting the social reintegration process of convicted persons through psychological interventions adapted to individual needs.*

**Keywords:** *adaptation; behavior; psychological evaluation; recidivism; reintegration*

### **3. (ID 30) Behavioral Science and Criminology: Quantitative Methods in Understanding Criminal Conduct**

**Author:** stud. Dragoş PĂTRAŞCU

**Scientific Advisor:** Lecturer Emil Răzvan GATEJ, PhD

**Institution:** „Alexandru Ioan Cuza" Police Academy Bucharest

**Abstract:** *The application of quantitative methods from behavioral science and criminology to the study of criminal conduct represents a significant advancement in the capacity of law enforcement institutions to understand, predict, and prevent crime. Traditional qualitative approaches to criminology, while valuable, have been increasingly complemented by statistical modeling, psychometric profiling, and data-driven behavioral analysis, enabling more precise identification of risk factors, criminal typologies, and recidivism patterns. This paper examines the principal quantitative methodologies applied in contemporary criminological research, including regression analysis, cluster modeling, and psychological profiling instruments, evaluating their validity, limitations, and practical applicability in operational law enforcement contexts. Drawing on findings from European criminological studies and behavioral science research, the paper argues that the systematic integration of quantitative behavioral analysis into police training and investigative practice significantly enhances institutional capacity for evidence-based decision-making. The implications for Romanian law enforcement education and reform are discussed in light of ongoing alignment with EU standards.*

**Keywords:** *criminology, behavioral science, quantitative methods, criminal conduct, predictive analysis, law enforcement*

#### **4. (ID 32) Remotely Operated Surface Drone for Intervention and Monitoring in Ports and Coastal Areas**

**Authors:** stud. Bogdan GRIGORE, stud. Sergiu FLEȘERIU

**Scientific Advisor:** Assoc. Prof. Eng. Ionuț SCURTU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper presents the design and development of a remotely operated surface drone intended for intervention and monitoring in port environments and coastal areas. The system integrates remote navigation, real-time communication, and onboard sensing technologies to support surveillance, environmental monitoring, and rapid-response operations in maritime zones. The drone platform is designed to operate safely in constrained and dynamic environments such as harbors, docks, and near-shore waters. It can assist in tasks including water quality assessment, infrastructure inspection, and incident response while reducing risks to human personnel. The proposed solution emphasizes modular hardware, reliable wireless control, and data acquisition capabilities, making it suitable for both routine monitoring and emergency interventions. Experimental tests demonstrate the feasibility of the platform for efficient and flexible maritime operations.*

**Keywords:** *Remotely operated surface vehicle (ROV/USV); surface drone; port monitoring; coastal surveillance; maritime robotics; environmental monitoring; remote sensing; unmanned systems; wireless communication; maritime safety.*

#### **5. (ID 52) Discipline, Empathy, Modesty**

**Author:** stud. Leonard-Antonio KOZMA

**Scientific Advisor:** Assoc. Prof. Luminița COJOCARU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The project analyzes the role of discipline, empathy and modesty in the formation of an effective leader, with an emphasis on the particularities of the military environment. These values are essential for the development of character and for ensuring cohesion and efficiency within a team. In the military environment, discipline*

*is manifested through self-control and strict adherence to rules, empathy through the ability to deeply understand subordinates without losing objectivity, and modesty through the lack of arrogance and awareness of one's own limits. The paper also highlights the differences between the way these values are applied in the military environment and in civilian life. Thus, while in civilian society they are more flexible and influenced by individuality, in the military environment they are more rigorous and oriented towards fulfilling the mission. The analysis emphasizes that the balance between discipline, empathy and modesty contributes to the formation of authentic leadership, capable of inspiring trust, respect and performance in any context.*

**Keywords:** *Empathy, Modesty, discipline*

## **6. (ID 53) The Impact of Artificial Intelligence on Commercial Organizations**

**Author:** stud. Elena-Ariana MANDA

**Scientific Advisor:** Prof. Daniel METZ, PhD

**Institution:** „Nicolae Bălcescu” Land Forces Academy of Sibiu

**Abstract:** *This research examines the impact of artificial intelligence on commercial organizations, focusing on its operational and strategic implications. Artificial intelligence has become a major driver of digital transformation, influencing internal processes, customer relations, and organizational competitiveness. The study aims to identify the main AI technologies used in commercial organizations, evaluate their effects on process efficiency, analyze their influence on customer experience, and determine the competitive advantages generated by AI adoption. A mixed research methodology is proposed, combining qualitative and quantitative approaches, including document analysis, case studies, and questionnaire-based data collection. The research assumes that AI implementation improves productivity, supports better customer interaction, and contributes to sustainable competitive advantages. In addition, the study emphasizes the growing role of AI in supporting innovation, improving decision-making processes, and helping organizations adapt more effectively to the changing demands of the modern business environment.*

**Keywords:** *artificial intelligence, commercial organizations, digital transformation, process efficiency*

### **7. (ID 70) "Can Infinity Be Compared? Insights from Georg Cantor Theory"**

**Authors:** stud. Andra-Antonia MIHALCEA, stud. Răzvan NAN

**Scientific Advisor:** Prof. habil. Dan LASCU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Infinity is a concept that describes something without limit, beginning, or end. In mathematics, it denotes a quantity or process that continues indefinitely. The idea has long fascinated mathematicians and philosophers, raising deep questions about size, quantity, and comparison. Georg Cantor revolutionized the study of infinity by proving that not all infinities are equal. He showed that infinite sets can differ in size, transforming our understanding of mathematics. This idea is illustrated by his famous diagonal argument, which reveals that some infinite sets, such as the real numbers, are strictly larger than others. The argument shows that any complete list of real numbers must miss at least one element. Cantor's work established that infinity is not a single uniform concept, but a hierarchy of different sizes that can be rigorously defined and compared, and it remains central to modern mathematics.*

**Keywords:** *Infinity, limit, real numbers, comparison, diagonal argument*

### **8. (ID 74) An Analysis of the Potential for Cultivating Cereals at Future Extraterrestrial Bases, As Well As Research into the Structural Properties of Lhs-1d Regolit**

**Authors:** stud. Dawid CIS, stud. Martyna OSTROWSKA, stud. Weronika DWOJAK, stud. Małgorzata DURKO, stud. Bogumiła PRZYBYŁA

**Scientific Advisor:** DSc Barbara NASIŁOWSKA

**Institution:** Military University of Technology, Poland

**Abstract:** *Ensuring food self-sufficiency in future extraterrestrial bases requires the effective use of in-situ resources (ISRU). This paper presents the results of structural regolith studies, including microstructural images obtained using a scanning electron*

*microscope, particle size distribution, elemental composition and wettability.*

**Keywords:** *Regolith, biomass production, space research*

### **9. (ID 90) Analysis of the Functioning and Integration of the ECDIS System in Maritime Route Planning**

**Author:** stud. Alina Mihaela PREDA

**Scientific Advisor:** Prof. Assist. Eng. Cristina ALECSE, PhD student

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This project explores the evolution of maritime navigation with a focus on Electronic Chart Display and Information Systems (ECDIS) and their growing importance in modern shipping. It highlights the transition from traditional paper charts to digital navigation, emphasizing increased efficiency, accuracy, and safety at sea. The paper discusses how ECDIS integrates real time data from multiple onboard sensors, providing a centralized and dynamic navigational platform. Special attention is given to the main components of an ECDIS system, including hardware units, software interfaces, electronic navigational charts (ENC), and sensor inputs such as GPS, AIS, radar, and gyrocompass. Additionally, it examines route planning and monitoring functions, alarm systems, and data layering capabilities that support decision-making. The project also addresses the challenges associated with ECDIS use, such as overreliance on automation, alarm fatigue, and the need for proper training. Furthermore, it underlines the importance of system familiarity due to variations between manufacturers. The study concludes that while ECDIS significantly enhances navigational safety, its effectiveness depends on the operator's competence and the balance between digital tools and traditional navigational skills.*

**Keywords:** *ECDIS; ENC; Maritime Safety*

### **10. (ID 95) Principles of Environmental Sensing in Advanced Autonomous Robots**

**Author:** stud. Alexandru OCHIAN

**Scientific Advisor:** Lecturer Sebastian POP, PhD

**Institution:** „Henri Coandă” Air Force Academy, Brasov

**Abstract:** *Advanced autonomous robots depend on the ability to detect and interpret information from their surrounding environment in order to function effectively and safely. Environmental sensing represents a fundamental component of autonomous robotic systems, allowing robots to gather data about objects, terrain, distance, and movement through different sensing technologies. This paper explores the main principles that support environmental sensing in advanced autonomous robots, focusing on the role of sensors such as cameras, radar, lidar, and other detection systems. The study analyzes how these sensing technologies contribute to the collection and processing of environmental data and how this information can be used to build an accurate representation of the surrounding space. Particular attention is given to the reliability and efficiency of sensing mechanisms in dynamic and complex environments. Understanding these fundamental principles is essential for the development of more capable autonomous robotic platforms that can operate in real-world conditions with improved awareness and adaptability.*

**Keywords:** *autonomous robots, environmental sensing, sensor systems, robotics, autonomous technology*

### **11. (ID 127) Developing New Images That Prove That the Sum of The First N Odd Integers Is a Perfect Square**

**Authors:** stud. Alexandru SOLTUZ, stud. Emilian VAVILOV

**Scientific Advisor:** Assoc. Prof. Anda OLTEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *It is well known that the sum of the first  $n$  odd integers, starting from 1, is  $n^2$ . We will give several pictorial proofs of this result.*

**Keywords:** *Sum of the first  $n$  odd numbers*

### **12. (ID 138) How Small Discoveries Made a Big Difference**

**Author:** stud. Marius Cătălin SINDILAR

**Scientific Advisor:** David UNGUREANU, PhD

**Institution:** „Alexandru Ioan Cuza" Police Academy

**Abstract:** *Small discoveries have frequently catalyzed major transformations throughout human history. This presentation examines how seemingly simple scientific insights have profoundly*

*influenced everyday life and shaped modern society. From Isaac Newton's observation of gravity to Alexander Fleming's serendipitous discovery of penicillin, these examples demonstrate how minor observations can drive major breakthroughs. By focusing on key discoveries in physics, biology, and chemistry, the study highlights their far-reaching impact on technology, medicine, and daily activities. Moreover, it underscores the essential role of curiosity, careful observation, and experimentation in fostering scientific advancement. The findings emphasize that transformative changes often emerge not from complex innovations alone, but from simple, insightful discoveries that fundamentally reshape our understanding of the natural world and improve human life.*

**Keywords:** *Scientific discoveries, Innovation, Technology impact, Medicine, Curiosity-driven research*

### **13. (ID 140) Applying the Aristotelian Principle of the 'Golden Mean' In Contemporary Military Decision-Making**

**Authors:** stud. Ariteea-Maria ALBU, stud. Emmyly PAVEL, stud. Raul-George FLOSTOIU

**Scientific Advisor:** Associate Professor Maria-Lucia TALMAȚCHI

**Institution:** „Nicolae Bălcescu” Land Forces Academy, Sibiu

**Abstract:** *The article examines the relevance of Aristotle's "golden mean" principle in the context of contemporary military decision-making, which is characterized by rapid technological advancement and the integration of autonomous systems. Starting from the question of the role of ethics within an operational environment dominated by decision-making speed and automation, the paper analyzes to what extent moral responsibility can remain a central element of military action. Grounded in Aristotle's virtue ethics, the research highlights the importance of balance between extremes in shaping appropriate ethical decisions, emphasizing that virtues such as courage, discipline, or obedience require contextual calibration to avoid moral pitfalls. At the same time, the article explores the limitations of technological systems in replicating human moral judgment, arguing that while such systems can optimize decision-making processes, they cannot fully substitute for deliberative capacity and ethical responsibility. The main conclusion asserts that, despite technological transformations, military decision-making*

*remains inextricably linked to the human factor, and the principle of the “golden mean” emerges not only as a theoretical reference point but also as an indispensable practical tool for managing contemporary ethical dilemmas.*

**Keywords:** *military ethics, the golden mean, virtue ethics, military decision-making, technology, moral responsibility.*

#### **14. (ID 163) Mathematical Modeling of Resilience in Global Shipping Networks: Analysis of Chokepoints and Cascading Failures**

**Authors:** stud. Alexandra ANGHEL, stud. Ștefan-Ricardo ROMAN, stud. Emirhan CADAR

**Scientific Advisor:** Assoc. Prof. Eleonora RĂPEANU, PhD

**Institution:** Romanian Naval Academy ”Mircea cel Bătrân”

**Abstract:** *In this work, apart from the method of producing a sorption coating on an optical fiber using a photopolymerization process, leading to the creation of an SPME fiber, the results of structural studies of the polymer TCDMA (tricyclo (5.2.1.0) decanedimethanol diacrylate), used as a sorption coating, are also presented. SPME (Solid Phase Microextraction) is a technique developed in the early 1990s. It is a method that combines the extraction and concentration of analytes in a single step, without the use of solvents. The extraction process is based on establishing a dynamic sorption equilibrium between the sample (gas, liquid, or solid) and the sorption layer (coating) located on a fiber. Sorption coatings in SPME are a key component responsible for the selective capture of analytes from the sample and determine the sensitivity and efficiency of the entire method. The most commonly used coatings include absorption coatings (e.g., PDMS, PA), adsorption coatings (e.g., CAR), and composite coatings (e.g., CAR/PDMS, DVB/CAR/PDMS), which differ in their affinity for compounds of varying polarity and volatility. The selection of an appropriate coating depends mainly on the physicochemical properties of the analyte and the sample matrix, and therefore usually requires experimental optimization.*

**Keywords:** *Mathematical, Chokepoints, Global Shipping, Queueing Theory, Extreme Value Theory*

## **15. (ID 195) Development of a New Sorption Coating for SPME Methods used in the Analysis of Toxic and Hazardous Compounds.**

**Authors:** stud. Dawid CIS, stud. Bogumila PRZYBYLA

**Scientific Advisor:** Doc. Eng. Barbara NASILOWSKA

**Institution:** Biophotonics Student Research Group, Institute of Optoelectronics, Military University of Technology, gen. S. Kaliskiego 2, 00-908 Warsaw, Poland

**Abstract:** *In this work, apart from the method of producing a sorption coating on an optical fiber using a photopolymerization process, leading to the creation of an SPME fiber, the results of structural studies of the polymer TCDMA (tricyclo (5.2.1.0) decanedimethanol diacrylate), used as a sorption coating, are also presented. SPME (Solid Phase Microextraction) is a technique developed in the early 1990s. It is a method that combines the extraction and concentration of analytes in a single step, without the use of solvents. The extraction process is based on establishing a dynamic sorption equilibrium between the sample (gas, liquid, or solid) and the sorption layer (coating) located on a fiber. Sorption coatings in SPME are a key component responsible for the selective capture of analytes from the sample and determine the sensitivity and efficiency of the entire method. The most commonly used coatings include absorption coatings (e.g., PDMS, PA), adsorption coatings (e.g., CAR), and composite coatings (e.g., CAR/PDMS, DVB/CAR/PDMS), which differ in their affinity for compounds of varying polarity and volatility. The selection of an appropriate coating depends mainly on the physicochemical properties of the analyte and the sample matrix, and therefore usually requires experimental optimization.*

**Keywords:** *SPME fiber, sorption coatings, photopolymerization, optical fibers, polymeric materials*

## **16. (ID 196) On the Reliability of Radar Systems**

**Author:** stud. Daria COJOCARU

**Scientific Advisor:** Lecturer Bogdan MUNTEANU, PhD

**Institution:** "Henri Coandă" Air Force Academy, Brasov

**Abstract:** *This paper investigates the role of mathematical modeling in the analysis and optimization of systems used in military*

*technology. Modern defense systems comprise complex platforms, sensors, command and control (C2) systems, and communication networks operating within dynamic operational environments. Such systems require thorough analytical methods for performance evaluation and to support the military decision-making process. Mathematical modeling characterizes system behavior through formal equations, algorithms, and numerical simulations. Furthermore, the paper outlines the fundamental principles of military system reliability. These abstracted concepts facilitate a comprehensive understanding of various operational scenarios required to achieve specific mission objectives. In addition to operational reliability, the concepts of weapon system reliability and time-dependent reliability degradation are introduced. The application of these methods provides an effective framework for developing and assessing the lifecycle of modern military systems. Specifically, it evaluates the mean degradation time of selected military hardware across two distinct operational scenarios: peacetime operations versus active conflict.*

**Keywords:** *Reliability, mean degradation time, the hazard function*

### **17. (ID 198) On the mathematical modeling of target detection with radar systems**

**Author:** stud. Ancuța-Iulia BUGA

**Scientific Advisor:** Lecturer Bogdan MUNTEANU, PhD

**Institution:** "Henri Coandă" Air Force Academy

**Abstract:** *Radar systems are an essential element in the field of surveillance and navigation, being used to detect and locate various types of targets under different operating conditions. The performance of these systems depends on how the received signals are analyzed and interpreted, as well as on the methods used to separate useful information from the noise present in the propagation environment factors that can be expressed and analyzed through mathematical models. The paper addresses the issue of mathematically modeling the target detection process, highlighting the role of mathematical methods in describing and analyzing this process. General concepts regarding radar signal detection are presented, along with the factors that may affect the target identification process. By using appropriate mathematical models, a*

*better understanding can be achieved of how radar systems operate and of the parameters that influence their performance. Thus, mathematical modeling and the simulation of various scenarios in MATLAB contribute to the analysis and improvement of the detection process, providing useful theoretical support for the study and development of radar applications.*

**Keywords:** Radar, target, detection, MatLab

**18. (ID 199) The Impact of LHS-1D Lunar Regolith Concentration and Radiation Ranges (ePAR and Cosmic) on the Growth and Coloration of Plants Cultivated on this Substrate.**

**Authors:** stud. Filip DŁUGOŁĘCKI, stud. Aleksander WEDMAN, stud. Maja PYSIAK, stud. Izabela BORKOWSKA, stud. Izabela BORKOWSKA, stud. Joanna SZEWIŃSKA,

**Scientific Advisor:** Barbara NASIŁOWSKA

**Institution:** Biophotonics Student Research Group, Institute of Optoelectronics, Military University of Technology, gen. S. Kaliskiego 2, 00-908 Warsaw, Poland

**Abstract:** *With the development of concepts for building research stations on the Moon and Mars, the requirements for their nutritional and medical self-sufficiency are increasing. Preliminary in-house studies include structural analysis, granulometric distribution, and Raman spectroscopy of LHS-1D lunar regolith, while further research will focus on the cultivation of rock plants, including narrow-leaved lavender (*Lavandula angustifolia*).*

**Keywords:** Lunar regolith LHS-1D, plants, radiation

**19. (ID 200) New Methods for Determining Harmful Compounds in Explosives the SERS Method**

**Authors:** stud. Alexia-Maria ZAHARIEA, stud. Bianca-Elena MIHĂILĂ

**Scientific Advisor:** Lecturer Eng. Chim. Cristina-Andreea TUDOR

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *SERS is a spectroscopic method that identifies minute amounts of a substance based on molecular vibrations; it is generally used for silver and gold. This is primarily due to local plasmonic effects, which lead to a significant increase in the intensity of the electromagnetic field at the level of the nanostructures. This paper*

*presents the use of SERS in the detection and identification of chemical compounds in very small quantities. The results highlight the potential of SERS as a rapid and ultra-sensitive analytical method for applications in fields such as security and forensic analysis. Thus, SERS helps develop clear strategies for detecting traces of explosives under real-world conditions.*

**Keywords:** *SERS, Explosive detection, Portable spectroscopy, Molecular identification*

## **20. (ID 207) Digital Images as Matrices**

**Authors:** stud. Andrei-Adrian ENOIU, stud. Bianca-Maria ANTON

**Scientific Advisor:** Assoc. Prof. Anda OLTEANU, PhD

**Institution:** „Alexandru Ioan Cuza" Police Academy

**Abstract:** *In this presentation we will connect digital images to matrices. More precisely, we will represent each image as a matrix and we will use tools from linear algebra to transform it: changing colors, shape and so on.*

**Keywords:** *Images, Matrix, digital, linear algebra*

## **21. (ID 221) Adsorptive Removal of Cefotaxime on Granular and Powdered Activated Carbons: A Comparative Evaluation**

**Authors:** stud. Paula Alexandra FRĂȚILĂ CIUBOTARU, stud. Erika Antonia BLAJ, stud. Alexandru-Teodor BALAN, stud. Diana HARJA

**Scientific Advisor:** Assoc. Prof. Eng. Nicolae APOSTOLESCU, PhD

**Institution:** “Gheorghe Asachi” Technical University of Iași

**Abstract:** *Antibiotics are increasingly recognized as emerging pollutants due to their persistence in the environment and their potential to contribute to antimicrobial resistance. Cefotaxime is among the frequently detected antibiotics in wastewater, while conventional treatment processes often prove insufficient for its effective removal. This study evaluates the adsorption performance of several grades of activated carbon, including both granular activated carbon (GAC) and powdered activated carbon (PAC), for the removal of cefotaxime from aqueous solutions. Batch experiments were conducted to examine the effects of contact time, initial antibiotic concentration, and the physicochemical properties of the*

adsorbents. Cefotaxime concentrations were quantified using UV-Vis spectrophotometry at a maximum absorption wavelength of 234 nm. The results show that PAC exhibits faster adsorption kinetics and higher adsorption capacities than GAC, primarily due to its larger accessible surface area and reduced intraparticle diffusion limitations. Equilibrium data were best fitted by the Freundlich isotherm model, indicating heterogeneous multilayer adsorption, while the adsorption kinetics followed a pseudo-second-order model. Overall, the study provides a comparative assessment of different activated carbon types and identifies the key factors governing cefotaxime adsorption, offering valuable insights for optimizing treatment strategies targeting antibiotic-contaminated waters.

**Keywords:** Cefotaxime, Adsorption kinetics, Wastewater treatment

## 22. (ID 235) Uranium

**Authors:** stud. Andrada Ștefania CRĂCIUN, stud. Rareș Ioan BRÎNZEĂ

**Scientific Advisors:** Lecturer Adrian-Ioan STOIAN; Lecturer Alina ONEȚ

**Institution:** "Nicolae Bălcescu" Land Forces Academy, Sibiu

**Abstract:** Uranium, a silvery-grey metal of the actinide series with atomic number 92, serves as a dual-purpose cornerstone for both global carbon-free energy and national defense. This presentation explores the technical and strategic complexities of this naturally radioactive element, focusing on its isotopic composition and the critical processes required to harness its energy. The core of the study highlights the fundamental role of the fissile isotope U-235 in nuclear fission, a process where the absorption of a neutron triggers the release of immense energy. Achieving the necessary concentration of U-235 for various applications requires sophisticated enrichment methods, most notably the modern gas centrifuge process using uranium hexafluoride (UF<sub>6</sub>). These enrichment levels are categorized into Low Enriched Uranium (LEU) for conventional power, High-Assay Low-Enriched Uranium (HALEU) for next-generation reactors, and Highly Enriched Uranium (HEU) for naval propulsion and weaponry. Furthermore, the research addresses the military utility of enrichment byproducts, specifically Depleted Uranium (DU), which is utilized in specialized

*munitions due to its high density. By incorporating recent global monitoring data from the IAEA, the presentation emphasizes the strategic importance of uranium while advocating for a necessary balance between its immense energy potential and the responsibilities of safety and non-proliferation.*

**Keywords:** *Uranium, Nuclear fission, Enriched Uranium*

**23. (ID 243) On the Comparative Study of Combat Scenarios for the Morse-Kimball Mathematical Model**

**Author:** stud. Mihai-Cristian CRUCERU

**Scientific Advisor:** Lecturer Bogdan MUNTEANU, PhD

**Institution:** "Henri Coandă" Air Force Academy

**Abstract:** *The paper analyzes mathematical models of combat, especially Morse-Kimball models on different scenarios, to highlight their role in the study of modern armed conflicts. The theoretical foundations of these models, their limits and their usefulness in the analysis of the ratio of forces are presented. The applied part consists of simulations carried out in the MATLAB programming environment, through which the evolution of the confrontation between two forces and the influence of the parameters on the final result of the combat action are highlighted, corresponding to the formulated scenarios.*

**Keywords:** *Morse-Kimball mathematical model, MatLab, combat scenarios*

**24. (ID 257) The Euler Number  $E$  and Its Application in Science**

**Authors:** stud. Elvin CADIR, stud. Damian GHEORGHE

**Scientific Advisor:** Assoc. Prof. Anda OLTEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *One of the most important constants in mathematics is the Euler number  $e$ . We recall its definition and study its properties. We consider its application in several areas such as finance, statistics, probability theory, biology and healthcare.*

**Keywords:** *The Euler number  $e$  and its applications in science*

**25. (ID 276) A Group of Pythagorean Triples Using the Inradius**

**Authors:** stud. Isabella Andreea ȘTEFAN, stud. Stefano AFLOAREI, stud. Cosmina Elena CONSTANTIN

**Scientific Advisor:** Assoc. Prof. Anda OLTEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Pythagorean triples are triples of integers of the form  $(a, b, c)$  which verify Pitagora's theorem. On the set of the Pythagorean triples one can define several multiplication functions such that the set becomes a group. By using the inradius of triangles we show that one can obtain the group structure from a distinct one.*

**Keywords:** *Pythagorean triples, Group structure, Inradius of a triangle*

## **26. (ID 333) Why the Exponential Function Appears in Electrical Circuits**

**Authors:** stud. Emurla GEANER, stud. Răzvan Iosif CHIRIȚĂ

**Scientific Advisor:** Assoc. Prof. Anda OLTEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The exponential function is a key ingredient in the study of electrical circuits. If one considers a simple series circuit such as RC or RL, the voltage and the current are described by a differential equation of order one. The solutions of these equations are given by the exponential function.*

**Keywords:** *Time Constant, Growth and Decay, Euler's Identity, Differential Equations*

## **27. (ID 372) The Connection Between Fibonacci Spiral and the Banach Fixed Point Theorem**

**Author:** stud. Andreea MARIN

**Scientific Advisor:** Professor habil. Dan LASCU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The connection between Fibonacci Spiral and the Banach fixed point theorem The Fibonacci spiral and its associated sequence, along with Banach's fixed point theorem, are found in extremely abstract and fundamental topics of modern mathematics such as Topology. The Fibonacci sequence is defined by a simple recursive rule producing numerical patterns visible not just in math but also in nature. Its ratios approach the golden ratio, while Fibonacci spirals model logarithmic growth, convergence, and play an important role in discrete mathematics. Banach's theorem or contraction principle underlines the convergence in complete metric*

*spaces where all Cauchy sequences are convergent. This ensures unique solutions for differential, integral, and nonlinear equations, making Banach's fixed-point theorem a key tool for proving convergence and approximating solutions. In this presentation we will focus on what the two have in common. Both describe iterative processes that converge in different perspectives. A practical example is presented where we will solve a sequence related to Fibonacci sequence that will use the contraction principle.*

**Keywords:** *convergence, Fibonacci, Banach, Fixpoint, Theorem, sequence*

## **28. (ID 376) Mathematical Optimization in the field of Microeconomics**

**Author:** stud. Ioan ASTEFĂNOAE

**Abstract:** *The focus of this paper is to clearly portray the practical application of mathematical analysis in problems of an economic nature. With basic economic theory stating that any given consumer (be it individuals, firms or entire industries) strives towards maximizing profits and lowering costs, making sound financial decisions from a set of preliminary information can be perfectly translated into analytic terms. For a profit maximization problem we can consider the following set of data entry points; a demand function which will be specified and estimated by using least squares optimization on a set of arbitrary data points. This estimated model will then be integrated into a profit maximization framework, at which point the consumer's optimal pricing choice can be determined analytically. First-order conditions are used to deduced the upmost profit maximizing price, and comparative statistics are employed to study how potential changes in the base parameters of cost and demand affect the final optimal solution. The example illustrates how different mathematical optimization processes can greatly inform future economic solutions based on data-driven models.*

**Keywords:** *Mathematical Optimization in the field of Microeconomics*

## **29. (ID 410) Underwater Intelligence: The Role of Science in Modern Naval Defense**

**Author:** stud. Gheorghe Mihăiță IONESCU

**Institution:** „Alexandru Ioan Cuza" Police Academy

**Abstract:** *In an era defined by technological advancement and evolving security threats, underwater environments have become critical domains for naval defense. The concept of “underwater intelligence” refers to the use of scientific principles and technologies to monitor, detect, and respond to potential threats beneath the surface. Fundamental sciences such as physics, mathematics, and computer science play a central role in enabling these capabilities. This paper explores how acoustic physics underpins sonar systems, which remain essential tools for underwater detection and communication. The propagation of sound waves in water, influenced by variables such as temperature, salinity, and pressure, is analyzed to highlight the complexity of accurate signal interpretation. Furthermore, mathematical models and signal processing techniques are examined as key elements in transforming raw data into actionable intelligence. Advances in artificial intelligence and machine learning are also discussed, particularly their role in enhancing pattern recognition and anomaly detection in large datasets collected from underwater sensors. These interdisciplinary applications demonstrate how fundamental sciences contribute directly to operational efficiency and strategic awareness in naval contexts. In conclusion, underwater intelligence represents a sophisticated integration of scientific knowledge and technological innovation. By relying on core principles from fundamental sciences, modern naval defense systems are better equipped to address emerging challenges in maritime security. The continuous development of these scientific approaches will be essential for maintaining strategic advantage and ensuring safety in increasingly complex underwater environments.*

**Keywords:** *Underwater intelligence, Naval defense, Fundamental sciences, Acoustic physics, Sonar systems, Signal processing, Maritime security, Artificial intelligence,*

### **30. (ID 419) Advanced Modeling and Visualization of Bidimensional Surfaces in MATLAB. Graphical Analysis and Extrema Determination**

**Authors:** stud. Denisa DUMITRU, stud. Andreea Claudia SCARLAT

**Scientific Advisor:** Assoc. Prof. Eleonora RAPEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** This paper addresses the three-dimensional graphical representation of functions of two variables within the MATLAB environment, highlighting methods for generating and analyzing surfaces. It presents the fundamental concepts underlying surface construction using Z coordinates defined over a rectangular grid in the XOY plane, as well as the role of the mesh and surf functions in visualizing matrix-based data. The differences between these two functions are emphasized, namely the structural representation through line frameworks versus fully shaded surface rendering. The study describes the use of the meshgrid command to transform input vectors into matrices corresponding to the domain of definition, thereby facilitating the evaluation of bidimensional functions. Furthermore, an applied example is illustrated, focusing on the representation of a function over a finite domain, including the determination of extrema and their localization through graphical representations and contour plots generated using the contour function.*

***Keywords:** MATLAB, surface visualization, two-variable functions, meshgrid, contour analysis*

### **31. (ID 438) Matrix-Based Image Filtering**

**Authors:** stud. Robert Andrei NEDELCU, stud. Ciprian MĂRGINEANU

**Scientific Advisor:** Assoc. Prof. Anda OLTEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** Matrix-Based Image Filtering Digital images can be viewed as matrices, therefore one may use techniques from linear algebra for processing them. We will use one-dimensional convolution and two-dimensional convolution for applying filters to our images.*

*Keywords: Image filtering, Linear algebra, Convolution, Digital images, Matrices*

**32. (ID 441) Automatic Determination of the Elements and the Inverse of a Square Matrix in the Ring of Residue Classes Modulo**

**Authors:** stud. David-Adrian NIȚU, stud. Rareș-Ștefan IONESCU, stud. Eduard POPESCU

**Scientific Advisor:** Lecturer Paul VASILIU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract: In this paper, the author solves the problems of the automatic determination of the set of invertible elements and their inverses in the ring of residue classes, of testing the invertibility and the calculation of the inverse of a square matrix with elements in the ring of residue classes modulo  $n$ , unsolved problems in Matlab and Octave.*

*Keywords: ring residue classes modulo  $n$  matlab octave*

**33. (ID 473) Comparison of Numerical Integration Methods**

**Author:** stud. Bogdana MOISE

**Scientific Advisor:** Assoc. Prof. Eleonora RAPEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract: Comparison of Numerical Integration Methods Abstract Numerical integration is used to approximate integrals when exact calculation is not possible. The main methods are the rectangle method, trapezoidal method, and Simpson's method. The rectangle method is simple but less accurate. The trapezoidal method provides better results. Simpson's method is the most accurate. The choice of method depends on the required accuracy and the situation.*

*Keywords: Numerical integration, Trapezoidal method, Simpson's method, Accuracy*

**34. (ID 487) Calculated Swimming – How Mathematics Helps Us Become Faster in Water**

**Authors:** stud. Bogdan-Lucian-Marian NICOLAE, stud. Matei-Marian NECULAI

**Scientific Advisor:** Prof. Dan LASCU, PhD Habil

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper examines the connection between mathematics and swimming performance, showing how mathematical principles can improve efficiency and speed in water. It focuses on the relationship between speed, distance, and time, and how these variables influence a swimmer's results. The study also highlights the importance of body positioning, angles, and movement trajectories, demonstrating how technique can be optimized through precise calculations. Additionally, it references modern approaches to applying mathematics in sports, including perspectives inspired by Ken Ono. In conclusion, the paper emphasizes how mathematical concepts can be transformed into practical tools that enhance performance and support the development of high-level athletes.*

**Keywords:** *swimming performance, mathematical modeling, motion efficiency, biomechanics, optimization, sports science*

### **35. (ID 491) Legal Logic vs. Mathematical Logic: Between Formal Rigour and Contextual Interpretation**

**Author:** stud. Maria RAPEANU

**Scientific Advisor:** Prof. Dan LASCU, PhD Habil

**Institution:** University of Bucharest, Faculty of Law

**Abstract:** *This paper examines the differences and connections between legal logic and mathematical logic, two fundamental frameworks of reasoning. Mathematical logic, rooted in the field of Matematică, relies on formal rules, symbolic language, and strict methods of proof, aiming to produce precise and universally valid conclusions. In contrast, legal logic, associated with the domain of Drept, involves interpretation, contextual analysis, and the consideration of social values. The study highlights that while mathematical logic offers clarity and structural precision, it cannot be fully applied to legal reasoning, where ambiguity of language and the diversity of real-life situations require flexibility. Legal reasoning therefore combines deductive methods with analogical and interpretative approaches in order to reach fair and context-sensitive outcomes. The main objective of this paper is to demonstrate that these two types of logic are not contradictory but complementary. Mathematical logic contributes to the development of clear and structured thinking, while legal logic enables the practical application of reasoning within dynamic social contexts. This paper*

*provides an accessible perspective for students on how different forms of logic influence decision-making processes.*

**Keywords:** *legal logic, mathematical logic, reasoning, interpretation, argumentation*

### **36. (ID 490) Conic Sections: Applications in Daily Life in Algebra, Analytical and Differential Geometry**

**Author:** stud. Alexandra Cătălina GHEORGHE, stud. Amalia Mihaela PĂTRU

**Scientific Advisor:** Assoc. Prof. Eleonora RĂPEANU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This project explores the importance and versatility of conic sections, such as the circle, ellipse, parabola, and hyperbola, as fundamental geometric shapes derived from the intersection of a plane with a cone. Their stability and aesthetics in architecture, where sections are often not just straight lines, but rather chosen for their structural properties, are highlighted. Physics explains why orbits are conic. According to Newton's law of universal gravitation, a body moving in the gravitational field of another will always describe a conic section.*

**Keywords:** *Geometry, Physics, Orbits, Parabola*

### **37. (ID 510) Impact of Severe Convective Phenomena on M.A.I. Communication Systems**

**Author:** stud. Alexandru GĂITAN

**Scientific Advisor:** Assoc. Prof. Mimi-Carmina COJOCARU, PhD

**Institution:** „Alexandru Ioan Cuza" Police Academy

**Abstract:** *Operational efficiency within the Ministry of Internal Affairs (M.A.I.) structures is critically dependent on the integrity and continuity of strategic communication networks. This paper explores the impact of severe convective phenomena, specifically thunderstorms and lightning discharges, on the physical and functional infrastructure of M.A.I. emergency services. From a fundamental sciences perspective, the research analyzes the electromagnetic interference (EMI) generated by atmospheric discharges and the signal attenuation caused by hydrometeors in high-frequency transmissions. By examining the physical interaction between atmospheric ionization and radio wave propagation, the*

*study identifies vulnerabilities in ground-based communication towers and mobile tactical units. The findings emphasize the necessity of advanced electromagnetic shielding and resilient network architectures to ensure uninterrupted coordination during crisis management and public safety interventions in extreme weather conditions.*

**Keywords:** *operational efficiency, convective phenomena, atmospheric ionization, radio wave propagation, electromagnetic shielding*

### **38. (ID 511) Optimization of thoracic robotic surgery on Today's frontline**

**Authors:** stud. Ebaa MVONDO, stud. Emilia TUDALA

**Scientific Advisor:** Daniel NICA, MD, PhD

**Institution:** Carol Davila University of Medicine and Pharmacy Institute of Military Medicine, Bucharest

**Abstract:** *This paper presents the advantages of developing robotic thoracic surgery and the role it can play in optimizing medical care in operating theaters of ROL 3 hospitals.*

### **39. (ID 517) The Influence of pH Decrease on Calcium Carbonate Stability Under Simulated Seawater Conditions**

**Authors:** stud. Miruna Iulia CIOBANU, stud. Ștefania JIPA

**Scientific Advisor:** Lecturer Phd.chem.eng. Cristina – Andreea TUDOR

**Institution:** Romanian Naval Academy "Mircea cel Batran", Constanța

**Abstract:** *Ocean acidification, specifically the decrease in pH, is a growing concern for marine researchers today because it directly influences the stability of calcium carbonate, which is very important for marine biodiversity. As a results, industrialization and increased carbon dioxide emissions have led to the acidification, a process fueled by the oceans' absorption of carbon dioxide.*

*This paper studies the influence of decreasing pH on the stability of calcium carbonate in simulated seawater conditions, observing how changes in acidity modify mineral saturation and accelerate dissolution processes. Reducing pH below critical levels changes the way calcareous structures are formed, which affects the proper*

*development of marine biodiversity. This paper aims to highlight the link between the decrease in water pH and the deterioration of the chemical composition of seawater, contributing to the foundation of strategies for the protection of marine ecosystems.*

**Keywords:** *pH, acidification, marine biodiversity, ecosystems.*

## VIII. SECTION: FOREIGN LANGUAGES

### Section Committee:

Chairman: Assoc. prof. Laura CIZER, PhD

Members: Lecturer Camelia ALIBEC, PhD

Lecturer Corina SANDIUC, PhD

Lecturer Raluca APOSTOL-MATEȘ, PhD

Room: CI101,102

### 1. (ID 1) The Rise of the British Empire: From Sea Power to Global Dominance

**Author:** stud. Cosmin-Daniel MOCANU

**Scientific Advisor:** Lecturer Lucia-Larissa MORAR, PhD

**Institution:** "Nicolae Balcescu" Land Forces Academy of Sibiu

**Abstract:** *This paper examines the historical trajectory of the British Empire, focusing on the central role of naval supremacy in its expansion and eventual decline. Starting with the maritime beginnings in the 16th century, the study identifies the 1588 defeat of the Spanish Armada as a critical turning point that established England as a formidable naval force. The analysis further explores how strategic trade networks and ideological frameworks such as the "Civilizing Mission" justified and propelled imperial growth across North America, the Caribbean, and Africa. A significant portion of the research is dedicated to the Seven Years' War, analyzed here as Britain's first global victory that solidified its status as the leading colonial power. Finally, the paper discusses the 20th-century transition, where the economic and moral costs of the World Wars shifted global influence toward new superpowers, triggering the era of decolonization. The findings conclude that while the British Empire shaped the modern world through its maritime doctrine, its legacy remains a complex intersection of progress and oppression.*

**Keywords:** *British Empire, maritime, Royal Navy, Age of Discovery, colonial expansion*

## **2. (ID 3) Compulsory Military Service – A Solution for Educating the Youth?**

**Author:** stud. Daniela TILĂ

**Scientific Advisor:** Assist. Prof. Alina Elena ONET, PhD

**Institution:** "Nicolae Bălcescu" Land Forces Academy of Sibiu

*Abstract:* Compulsory military service can play a significant role in shaping the character and discipline of today's youth. In an era marked by a decline in civic values, a lack of structure, and growing individualism, military training offers a framework that promotes responsibility, respect, teamwork, and resilience. Young people are exposed to experiences that challenge both their physical and mental limits, encouraging personal growth and stronger social awareness. National identity and a sense of duty can also be reinforced through shared service. While critics argue that such programs may infringe on personal freedom or delay career paths, the benefits in terms of maturity, leadership, and civic education are notable. Countries with established conscription systems often report positive long-term impacts on youth behavior and social cohesion. Therefore, despite ongoing debates, mandatory military service remains a relevant and potentially effective tool in the holistic development of the younger generation.

**Keywords:** discipline, military training, respect, service, leadership

## **3. (ID 11) The Cognitive Benefits of Learning a Foreign Language**

**Author:** stud. Bogdan GRIGORE

**Scientific Advisor:** Assoc. Prof. Laura CIZER, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* Learning a foreign language offers significant cognitive benefits that extend beyond communication skills. Research in bilingualism shows that acquiring and using multiple languages enhances executive function, strengthens working memory, and improves attention control. Language learners develop greater cognitive flexibility, enabling them to switch between tasks and adapt to new situations more efficiently. The mental effort required to manage two linguistic systems promotes neuroplasticity, supporting long-term brain health. Studies also suggest that bilingual individuals may experience delayed cognitive decline in later life.

*Furthermore, foreign language learning enhances problem-solving skills and metalinguistic awareness, fostering deeper understanding of language structure and meaning. Overall, learning a foreign language serves as a powerful tool for cognitive development across the lifespan.*

**Keywords:** *bilingualism, cognitive flexibility, executive function, neuroplasticity, memory enhancement, attention control, problem-solving skills, multitasking ability, delayed cognitive decline, metalinguistic awareness, brain plasticity, decision-making, working memory*

#### **4. (ID 20) The Role of Secret and Encoded Language in Military History**

**Author:** stud. Alina POPA-NICULESCU

**Scientific Advisor:** Prof. Bogdan-Nicolae TONEA, PhD

**Institution:** “Alexandru Ioan Cuza” Police Academy, Bucharest

**Abstract:** *Throughout history, wars have not been won only through weapons and strategy, but also through language. Hidden messages, coded signals, and secret communication systems have often determined the success or failure of military operations. This paper explores the strategic role of encoded language in military history and examines how secrecy in communication has shaped major conflicts and intelligence operations. From early substitution ciphers to complex encryption systems used in modern warfare, secret communication has been essential for maintaining operational security. Historical examples demonstrate that the ability to create and decode secret messages has frequently provided a decisive advantage on the battlefield.*

**Keywords:** *Military linguistics, operational security, encryption, information protection, coded language*

#### **5. (ID 29) Translation and Interpretation in Crisis Situations: Accuracy, Ethics and Operational Impact**

**Author:** stud. Dragoş PĂTRAŞCU

**Scientific Advisor:** Assoc. prof. Carmina COJOCARU, PhD

**Institution:** “Alexandru Ioan Cuza” Police Academy, Bucharest

**Abstract:** *In crisis situations - whether military operations, humanitarian interventions, or law enforcement emergencies -the*

*quality of translation and interpretation can determine the difference between successful resolution and catastrophic miscommunication. Translators and interpreters operating in high-stakes environments face a unique convergence of linguistic, ethical, and operational pressures that standard professional frameworks are often ill-equipped to address. This paper examines the critical role of translation and interpretation in crisis contexts, analyzing the accuracy challenges posed by technical military and legal terminology, the ethical dilemmas inherent in serving multiple principals simultaneously, and the documented operational consequences of translation failures in recent multinational missions. Drawing on case studies from NATO operations and international law enforcement cooperation frameworks, the paper argues that translation and interpretation must be recognized as a core operational competency rather than a peripheral support function. Recommendations are offered for integrating language professionals more effectively into crisis management planning and training structures.*

**Keywords:** *translation, interpretation, crisis communication, military operations, ethics, operational effectiveness*

## **6. (ID 36) Ernest Shackleton and His Significance in British Culture**

**Author:** stud. Bogdan Cristian LALUȘI

**Scientific Advisor:** Assoc. Prof. Brândușa-Oana NICULESCU, PhD

**Institution:** "Nicolae Balcescu" Land Forces Academy of Sibiu

**Abstract:** *This paper explores the life and leadership of Sir Ernest Shackleton, an important figure in the heroic age of Antarctic exploration. It examines his transition from an ambitious explorer to a master of crisis management during the ill-fated Endurance expedition. It is also focused on how his leadership principles – emphasizing psychological resilience, empathy, and small-unit cohesion – ensured the survival of his crew against impossible odds. By analyzing his strategic shifts and interpersonal methods, the paper reflects on how Shackleton’s legacy continues to influence modern military leadership and organizational behavior in high-stakes environments. The paper also briefly examines key moments from Shackleton’s personal life and his major expeditions,*

*highlighting the experiences that shaped his leadership philosophy. Through this perspective, Shackleton emerges not only as an explorer but also as a cultural symbol of perseverance, reinforcing the British tradition of exploration and the enduring values of resilience, responsibility, and collective survival in extreme conditions.*

**Keywords:** *personal life, expedition career, leadership, resilience, survival*

## **7. (ID 37) Vikings in Britain: Conquest, Settlement and Cultural Influence**

**Author:** stud. Emilian ROȘU

**Scientific Advisor:** Assoc. Prof. Brândușa-Oana NICULESCU, PhD

**Institution:** "Nicolae Balcescu" Land Forces Academy of Sibiu

**Abstract:** *This paper presents the way the Vikings influenced the British Isles during the early medieval period. The Vikings, who came from Scandinavia, first arrived in Britain in the late 8th century. At first, they were mainly known for their raids, but over time many of them settled there and became part of local society. Their presence brought important changes, including new trade connections, the growth of certain towns, and interactions with the Anglo-Saxon kingdoms. This paper will explore how the Vikings affected different aspects of life in Britain, such as language, culture, and the names of places, and how their influence can still be noticed in Britain nowadays.*

**Keywords:** *Vikings, invasions, influence on trade and towns, Anglo-Scandinavian heritage, decline of Vikings*

## **8. (ID 38) Australia: From Prison Colony to Modern Nation**

**Author:** stud. Adi ROȘU

**Scientific Advisor:** Assoc. Prof. Brândușa-Oana NICULESCU, PhD

**Institution:** "Nicolae Balcescu" Land Forces Academy of Sibiu

**Abstract:** *This paper explores the transformation of Australia from a distant and isolated continent into one of the most developed countries in the world. It begins by discussing the early inhabitants of the land, the Aboriginal Australians, who lived there long before European exploration. It explains the arrival of Europeans and the exploration led by James Cook, which resulted in the territory being claimed by the United Kingdom. It also examines the reasons why*

*Britain established a penal colony in Australia and how the transportation of prisoners led to the creation of the first settlements. Finally, it describes how these early colonies developed over time and eventually formed the modern nation of Australia, highlighting the major changes that helped transform it into a prosperous and influential country.*

**Keywords:** colonisation, British Empire, evolution, federation, exploration

### **9. (ID 66) Richard Davis Winters - Leading into the Unknown**

**Authors:** stud. David-Vlad VĂTĂMANU, stud. Tudor-Mihai CIOBANU

**Scientific Advisor:** Assoc. Prof. Brândușa-Oana NICULESCU, PhD

**Institution:** "Nicolae Balcescu" Land Forces Academy of Sibiu

**Abstract:** *As the fog of war grew stronger across the European continent and the Axis Powers ravaging the land, one experimental unit of airborne troops led by 2nd Lieutenant Richard "Dick" Winters dropped deep into enemy territory during the Normandy Campaign. Thrust into chaos behind enemy lines, the unit faced relentless combat, scarce resources, and decisions that would test the limits of leadership and resolve. Winters' firm leadership and bold courage allowed him to climb the ranks with ease, assuming command of the battalion that fought alongside him through multiple critical military operations across Europe. United by hardship and discipline, the men endured the brutal realities of war together until its end, with Winters ultimately receiving his discharge in January 1946, leaving behind a legacy forged in sacrifice and command.*

**Keywords:** World War 2, Allied Powers, leadership qualities, 101st Airborne Division

### **10. (ID 67) The Structural Resilience of English: A Study in Historical Convergence**

**Author:** stud. Elisa Petronela PINOSANU

**Scientific Advisor:** Assoc. Prof. Alina NEGOESCU, PhD

**Institution:** "Nicolae Bălcescu" Land Forces Academy of Sibiu

**Abstract:** *The global dominance of English is not a result of linguistic design, but rather the world's most successful "accident." This paper argues that English's supremacy stems from a chaotic*

*evolutionary process rather than structural perfection. Historically, the language was forged through accidental collisions: Viking invasions forcefully simplified its Germanic grammar, while the Norman Conquest infused it with a sophisticated Latinate vocabulary. This produced a unique, hybrid lexicon characterized by unparalleled flexibility. In the modern era, this "accidental" adaptability has translated into significant military success. English has become the indispensable "operating system" for NATO, where its simplified syntax and vast technical vocabulary ensure seamless interoperability. The study concludes that the strength of English lies in its capacity to turn historical mishaps into a strategic asset, providing the essential linguistic framework for international security and global cooperation.*

**Keywords:** *Global dominance, Accidental evolution, Linguistic flexibility, NATO interoperability, Strategic asset.*

## **11. (ID 68) Military Teasing and Humor in Language**

**Authors:** stud. Elena-Beatrice MACHIDON, stud. Denis-Mario LUPAȘCU

**Scientific Advisor:** Lecturer Tania MORARU, PhD

**Institution:** "Henri Coandă" Air Force Academy, Brașov

**Abstract:** *Lots of studies reveal that social interactions are often facilitated by teasing and humor. In military environments, the teasing technique is used in order to strengthen group cohesion, communication and cooperation. Humor plays also an important role in "breaking the ice", but there are also lots of negative aspects that will be pointed out in this research. The objective was to evaluate whether teasing is a way of bonding or a form of social pressure, through an anonymous questionnaire, in which military students state their opinion and their beliefs. The results of the study show that teasing and humor are differently perceived by each person, because of other factors that influence the perspective, like: mimics, body language and tone. To sum up, understanding the boundaries between humor and harassment is essential for maintaining healthy military group dynamics.*

**Keywords:** *Humor, teasing, military environment, group cohesion, communication*

## **12. (ID 96) Fictional Perspective on Ukraine war: "Boarding School" by Serhiy Zhadan**

**Author:** stud. Silvia Amalia TOMA

**Scientific Advisor:** Lecturer Ramona HĂRȘAN, PhD

**Institution:** "Henri Coandă" Air Force Academy, Brașov

***Abstract:** This paper explores the representation of civilian experience in Boarding School by Serhiy Zhadan, focusing on how fiction captures the human and psychological impact of the War in Donbas. Rather than presenting the conflict through political or military perspectives, the novel approaches war from the point of view of an ordinary civilian whose initially apolitical attitude reflects the experience of many people living in a conflict zone. The narrative follows Pasha, a school teacher who travels across the war-affected region of Donbas to bring his nephew home from a boarding school. His journey through damaged towns, military checkpoints, and deserted streets becomes both a physical and emotional confrontation with the reality of war. As the familiar landscape gradually turns into a space of fear, silence, and uncertainty, the protagonist begins to understand how deeply the conflict has transformed everyday life. The paper argues that Zhadan deliberately focuses on personal experiences and fragmented perceptions rather than battlefield action. Through this intimate perspective, Boarding School reveals the quiet trauma experienced by civilians and highlights how literature can express the human dimension of contemporary war more personally than political or historical narratives.*

***Keywords:** War in Donbas, contemporary Ukrainian, apolitical perspective, trauma*

## **13. (ID 128) The Strait of Hormuz**

**Author:** stud. Bogdan-Cristian BADICA

**Scientific Advisor:** Lecturer Camelia ALIBEC, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** The Strait of Hormuz is one of the most important maritime routes in the world, connecting the Persian Gulf to the Indian Ocean. A large part of the global oil and liquefied natural gas supply passes through this narrow passage, making it essential for the world economy. This project analyzes the strait from geographical,*

*economic, legal, and geopolitical perspectives. It explains how its narrow structure and heavy traffic make it vulnerable to disruptions, which can quickly affect global energy prices, transport costs, and economic stability. The study also examines the strategic and military importance of the region, as well as the role of international law (UNCLOS) in ensuring freedom of navigation. In addition, it highlights recent events (2025–2026) that show how tensions in the area can influence global markets. Although there are some alternative routes, they cannot fully replace the Strait of Hormuz. Therefore, the strait remains a key element of the global energy system and an important factor in international stability.*

**Keywords:** *Geographical, economic and geopolitical analysis*

#### **14. (ID 170) Dots and Dashes: The language that saved lives at sea**

**Authors:** stud. Andra-Antonia MIHALCEA, stud. Sergiu-Adelin FLEȘERIU

**Scientific Advisor:** Lecturer Camelia ALIBEC, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *Morse code, a system of communication based on sequences of dots and dashes, played a crucial role in maritime history by enabling long-distance communication in conditions where other methods failed. Its efficiency and adaptability made it the foundation of early wireless telegraphy, particularly at sea, where reliable communication could mean the difference between life and death. The internationally recognized distress signal "SOS" became a universal call for help, notably during events such as the RMS Titanic disaster, when it facilitated rescue efforts and highlighted the importance of rapid communication. Despite its historical significance, Morse code has largely been replaced by modern digital and satellite-based systems that offer greater speed and accuracy. Nevertheless, it remains an enduring symbol of resilience, simplicity, and the evolution of global communication technologies.*

**Keywords:** *Morse code; SOS; maritime history; distress signals; Titanic*

**15. (ID 188) La vie Quotidienne À Bord D'un Navire-École Militaire: Formation, Discipline Et Expérience Maritime**

**Author:** stud. Lavinia-Irina BLĂJUȚ

**Scientific Advisor:** Lecturer Corina SANDIUC, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* La vie quotidienne à bord d'un navire-école militaire constitue un cadre complexe de formation, où la discipline propre au milieu militaire s'articule avec l'instruction pratique et l'expérience directe du milieu marin. Cette étude analyse l'organisation journalière des activités des élèves-officiers, structurée entre cours de spécialité, exercices de navigation, manœuvres maritimes et services de quart à bord. Sont mises en évidence les exigences du programme et leur rôle dans le développement des compétences professionnelles, de l'esprit d'équipage et du sens des responsabilités individuelles. L'étude aborde également l'adaptation au milieu confiné, les relations hiérarchiques et interpersonnelles, ainsi que l'impact des traditions navales sur la formation de l'identité militaire. Ce travail souligne l'importance de l'équilibre entre formation théorique et pratique dans la préparation des futurs officiers de marine, en mettant en valeur la contribution de l'expérience au bord du navire au développement professionnel et personnel.

**Keywords:** discipline militaire, navire-école militaire, traditions navales

**16. (ID 201) Navigating the Waves: The Perks and Challenges of Marine Electro-Technical Engineering on Merchant Ships**

**Authors:** stud. Rafael-Gabriel MALDAIANU, stud. Cristian-Iulian PASCALE

**Scientific Advisor:** Lecturer Mariana BOERU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* The role of a Marine Electro-Technical Engineer (ETO) aboard merchant ships is both rewarding and complex, presenting a unique blend of opportunities and challenges. This paper explores the multifaceted nature of the ETO profession, highlighting the significant perks such as career stability, competitive salaries, and the chance to work on cutting-edge technologies that enhance maritime operations. With the maritime industry increasingly relying

*on advanced electrical and electronic systems, ETOs play a crucial role in ensuring the safety and efficiency of vessel operations. However, the profession is not without its challenges. Engineers must navigate the demanding work environment of the sea, which includes long hours, isolation, and the need for continuous adaptation to rapidly evolving technologies. This paper will delve into the skills required for success in this field, including problem-solving, teamwork, and effective communication in multicultural settings. By examining both the advantages and the obstacles faced by METEs, this study aims to provide a comprehensive understanding of the profession, encouraging aspiring engineers to embrace the dynamic and impactful nature of marine electro-technical engineering.*

**Keywords:** *Marine Electro-Technical Engineering, Merchant Ships, Career Opportunities, Challenges, Maritime Technology*

## **17. (ID 205) Rasing Awareness of the Negative Effects of AI Overuse on Students**

**Authors:** stud. Matei SÎRBU, stud. Rareș-Ioan SPIRIDON

**Scientific Advisor:** Lecturer Mariana BOERU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *This paper deals with the use and abuse of AI for studying by undergraduate students. It discusses recent warnings which indicate that excessive reliance on generative AI can lead to "cognitive debt" and a significant decline in critical thinking and problem-solving skills. The paper insights are based on the findings of a research study conducted by MIT using EEG scans. The study revealed that individuals using AI for writing tasks showed weakened neural connectivity and less activity in brain networks responsible for cognitive processing compared to those working independently. This phenomenon, often referred to as "cognitive offloading," suggests that the brain essentially "lets go" of the effort required for synthesis and memory, potentially leading to long-term passivity and diminished independent problem-solving abilities. The paper aims to sound an alarm about the potential harmful impact of generative AI overuse by students citing research evidence to support its claims.*

**Keywords:** *Gen AI, learning, critical thinking, cognitive decline, brain activity*

**18. (ID 211) Dive into the Depths of History: The Story of Delfinul, Romania's Only Submarine.**

**Author:** stud. Teodora-Carina DAVIDOV

**Scientific Advisor:** Lecturer Corina SANDIUC, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

***Abstract:** This paper presents a concise examination of the structural design and historical evolution of Delfinul, Romania's only submarine and a longstanding landmark of the Constanța naval port. The study outlines the vessel's key engineering features and traces its operational timeline, emphasizing its role within Romania's maritime defense heritage. Additionally, the paper highlights aspects of life on board a submarine an environment shaped by discipline, technical precision, and closeknit teamwork. The choice of topic is rooted in a personal connection to the military world, which has inspired a deeper interest in naval technology and the unique challenges of underwater service. Through this integrated perspective, the paper aims to contribute to a clearer understanding of the submarine's significance in Romania's naval history.*

***Keywords:** Romanian naval history, Delfinul submarine, military tradition, Constanța Naval Base.*

**19. (ID 222) Memorable Languages and their Specific Use**

**Authors:** stud. Ioana-Mădălina SCÎRTOCEA, stud. Ianyș-Cătălin POPESCU

**Scientific Advisor:** Assist. Prof. Alina Elena ONEȚ, PhD

**Institution:** Nicolae Bălcescu" Land Forces Academy

***Abstract:** Our presentation explores the concept of uncommon languages, within the broader category of foreign languages, focusing on their specific applications in various fields. It examines how specializing in different dialects serve you as essential tools for precise communication, help you integrate in different groups of people, and expand your knowledge of the whole wide world. Our vision highlights how these languages differ from general linguistic usage, and their role in various contexts such as professional and academic encounters. The session concludes with insights into the importance of mastering specialized language for career advancement and cross-cultural collaboration.*

***Keywords:** communication, multilingual, culture, skills*

## **20. (ID 236) The Strategic Advantage of the Italian Language in Multinational Naval Operations**

**Author:** stud. Viktor VARADI

**Scientific Advisor:** Assoc. Prof. Filip BACALU, PhD

**Institution:** „Alexandru Ioan Cuza" Police Academy

*Abstract: The Strategic Advantage of the Italian Language in Multinational Naval Operations Within NATO and EU operations, knowledge of partner languages represents an undeniable tactical and strategic advantage. Italy, a key naval power in the Mediterranean Sea, plays an essential role in the Alliance's southern flank, actively participating in missions such as SEA GUARDIAN and IRINI. Its strategic bases Taranto, La Spezia, and Augusta – are vital hubs for regional security. In this context, familiarity with Italian naval terminology becomes crucial. Specific vocabulary, such as nave (ship), sommergibile (submarine), portaerei (aircraft carrier), and ammiraglio (admiral), facilitates onboard communication and joint exercises. A compelling example is Mare Aperto, Italy's largest naval exercise, which sees the participation of numerous allies. Here, a common language is essential for effective coordination. Furthermore, officers who master Italian gain direct access to original technical documentation from industrial giants such as Fincantieri and Leonardo, as well as to specialized military publications and training courses at elite institutions, including the Naval Academy in Livorno. This linguistic competence transforms a mere communication skill into a genuine instrument of power.*

**Keywords:** Multinational naval operations, communication, southern flank, Italian naval terminology, common language, military publications, Mare Aperto exercise, Italian naval bases

## **21. (ID 254) The Fragmentation of Culture and Heritage Loss in Sudan's Civil War**

**Authors:** stud. Alexandra-Marina TIMARU, stud. Alina-Elena ȘORODOC

**Scientific Advisor:** Lecturer Ramona HĂRȘAN, PhD

**Institution:** "Henri Coandă" Air Force Academy of Brașov

*Abstract: This study investigates the profound and multifaceted impact of the ongoing Sudanese civil war, which erupted in April*

2023, on the nation's cultural heritage and social fabric underpinning national identity. At the heart of the conflict lies a deeper struggle over cultural recognition and inclusion, shaped by decades of state-led efforts to impose a singular national identity. This strategy has intensified tensions between the central government and peripheral regions, contributing to violent confrontations, widespread destruction of cultural sites, and disturbance of longstanding customs that have historically bound communities together. Anchored in the belief that cultural heritage is a cornerstone of healing divided societies, the research highlights how the loss and neglect of cultural assets erode collective memory and fracture the possibility of reconciliation. Revitalizing Sudan's cultural traditions and reshaping educational frameworks to reflect its true pluralism are crucial for restoring social harmony and nurturing a renewed sense of unity and mutual respect. Sustainable peace requires moving beyond exclusionary narratives toward a shared national identity that honors diversity rather than suppressing it. Sudan's cultural challenges are inextricably intertwined with complex historical and geopolitical realities. Colonial histories, regional power struggles, and international actors have deepened internal divisions and complicated efforts to build lasting peace. Addressing these challenges requires a shift of perspective, from viewing cultural heritage as a casualty of conflict to recognizing it as a powerful catalyst for healing and rebuilding.

**Keywords:** cultural heritage; national identity; humanitarian crisis; reconciliation; post-conflict recovery

## **22. (ID 256) The Importance of Maritime English Communication Competence at Sea**

**Authors:** stud. George Emil CAPLAN, stud. Eduard Marius COBZARENCU

**Scientific Advisor:** Lecturer Mariana BOERU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** Miscommunication is a leading cause of maritime disasters, especially as crews have become more and more linguistically and culturally diverse. This paper examines fatal maritime accidents where failures in communication such as: language barriers, lexical ambiguity, and lack of standardized

*phrases played a decisive role. The presentation begins by highlighting the importance of effective communication in maritime safety, then analyzes several major incidents caused by misunderstandings or unclear instructions. Research shows that miscommunication and language barriers account for a significant proportion of maritime accidents, with lexical ambiguity alone increasing accident risk by over 80%. The findings emphasize the urgent need for improved training in Maritime English and the use of Standard Marine Communication Phrases (SMCP) to enhance safety at sea.*

**Keywords:** *Maritime English. Communication, maritime disasters, SMCP*

### **23. (ID 269) British Innovations in Shipbuilding**

**Author:** stud. Silviu-Constantin PAVEL

**Scientific Advisor:** Lecturer Dana-Carmen ZECHIA, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The presentation titled "British Innovations in shipbuilding" highlights the major contributions the United Kingdom had in the enhancement of modern marine structural engineering. Starting with the Industrial Era, British engineers developed great innovations which radically changed ship design and construction. One of the most important changes was the transition from wooden ships to iron and later steel structures, which improved strength, durability, and safety. In addition, the development and enhancement of the steam engine, strongly associated with engineers like James Watt, played a crucial role in increasing the efficiency and range of ships. Another key innovation was the screw propeller, adoption of the paddle wheels and later the screw propeller, which gradually replaced sails as the main propulsion system. Engineers such as Isambard Kingdom Brunel contributed to the design of revolutionary vessels. These technological advancements established Britain as a global leader in shipbuilding and influenced the future of marine engineering worldwide.*

**Keywords:** *engine; technical design; steam; industrialization; iron ships; shipyards; efficiency; technological progress*

#### **24. (ID 307) An Overview of the Seafaring Career for Young Professionals: Opportunities and Challenges.**

**Authors:** stud. Andrei-Ciprian RĂCEALĂ, stud. Tiberiu David PENCIULESCU

**Scientific Advisor:** Lecturer Corina SANDIUC, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* Pursuing a career as a young seafarer can be exciting and rewarding, especially for those with a passion for travel and adventure. The maritime industry offers various career opportunities, skill development, financial benefits, early independence, and valuable networking prospects. Seafarers also get to explore diverse cultures and gain experience in navigation, engineering, and other maritime roles. However, this profession also comes with notable challenges. These include long periods away from family and friends, physically demanding working conditions, health risks such as seasickness and fatigue, complex certification requirements, and potential cultural and language barriers. In addition, mental health can also be affected due to isolation and stress. Therefore, it is essential for those considering this path to bear in mind these advantages and disadvantages, as with the right mindset and preparation, seafaring can lead to personal growth and success.

**Keywords:** Seafaring, career opportunities, challenges, maritime industry.

#### **25. (ID 334) Navigation and Cetaceans, Vaquita – The Most Endangered Porpoise in The World**

**Authors:** stud. Ayan-Arun IDRIS, stud. Andreea MARIN

**Scientific Advisor:** Lecturer Camelia ALIBEC, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* Maritime navigation has long been essential to global trade, yet its expansion has increasingly intersected with vulnerable marine ecosystems and species. Among the most critically affected are cetaceans, whose habitats are disrupted by vessel traffic, noise pollution, and incidental bycatch. This paper focuses on the Vaquita, the world's smallest and most endangered porpoise species, examining the impact of navigation-related activities on its rapidly declining population. It further discusses current conservation efforts

*and international regulatory measures aimed at minimizing human-induced threats and preventing the extinction of this species.*

**Keywords:** *conservation, bycatch, regulations*

## **26. (ID 341) Tiktok exposed**

**Authors:** stud. Andrei BARBU, stud. Ersin APTULA

**Scientific Advisor:** Lecturer Mariana BOERU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The Good, the Bad and the Ugly: A Closer Look at Tiktok*  
*This presentation explores the rapid rise of TikTok as a global social media phenomenon, specifically focusing on its explosive growth between 2019 and 2021. By analyzing its unique short-form video format, the paper investigates the platform's "double-edged sword" nature. On one hand, it highlights TikTok's role in democratizing creativity and providing education. On the other hand, it addresses critical disadvantages, including the spread of misinformation, the prevalence of cyberbullying, and the risks of "addiction-like" behavioral patterns. The paper further provides insights on how the platform affects memory and attention span. Finally, the presentation examines the high-stakes U.S.–China controversy regarding ByteDance's ownership and data privacy. The authors conclude that while TikTok is a powerful tool for modern connection, it requires a careful balance between technological freedom, user safety, and international security. Keywords: Tiktok, advantages and disadvantages, US-China controversy*

**Keywords:** *Tiktok, cyberbullying, controversy*

## **27. (ID 365) Maritime myths and folklore**

**Author:** stud. David VOINEA

**Scientific Advisor:** Lecturer Mariana BOERU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

**Abstract:** *The presentation will convey information and detailed descriptions on the cultural phenomenon known as "maritime myths" or "maritime folklore". Maritime myths and folklore have captivated seafarers and coastal communities for centuries, offering explanations for the mysteries and dangers of the sea. From legendary sea monsters like the Kraken and Leviathan to enchanting mermaids and ominous ghost ships such as the Flying Dutchman,*

*these stories reflect humanity's awe and fear of the ocean. They not only reflect our fascination and fear of the unknown, but also reveal the superstitions, rituals, and beliefs that shaped seafaring cultures. These timeless stories not only shed light on the hopes and anxieties of earlier generations, but also serve as a reminder that some mysteries remain unexplained to this day.*

**Keywords:** *Folklore, Mythology, Legends, Superstitions, Tales*

## **28. (ID 382) Hungarian Military Slang**

**Author:** stud. Mark TIMOTITY

**Scientific Advisor:** Assoc. Prof. Andreea CÎRCIUMARU, PhD.

**Institution:** „Alexandru Ioan Cuza" Police Academy Bucharest

**Abstract:** *Hungarian military slang is a vivid and evolving reflection of the country's turbulent history, shifting political systems, and the everyday experiences of soldiers. From the days of the Austro-Hungarian Empire through the socialist era and into modern NATO integration, military slang in Hungary has served not only as informal communication but also as a cultural record of hierarchy, hardship, humor, and resistance. The development of Hungarian military slang into a distinct form and recognizable shape occurred during the Austro-Hungarian Empire, as Hungarian soldiers served alongside German, Czech, Croatian, and other ethnic groups. This multilingual environment fostered a hybrid slang, blending Hungarian with German military terminology. Words like "bakancs" (boot) and "kaszárnya" (barracks) were widely used. During World War I and World War II, Hungarian soldiers developed slang shaped by trench warfare, deprivation, and shifting alliances. Terms often reflected the brutality of frontline life, with ironic or darkly comic expressions. Military slang under Soviet influence following World War II absorbed Russian loanwords and reflected the bureaucratic, ideological nature of the armed forces. Generations of young men contributed to a shared slang culture and humor became a subtle form of resistance: soldiers mocked authority, political indoctrination, and outdated equipment through coded language. After the fall of communism and Hungary's eventual entry into the NATO in 1999, military slang began to shift again. English loanwords entered the vocabulary, particularly in areas related to technology, training, and international cooperation so today*

*hungarian soldiers often mix traditional slang with global military jargon. Across all periods, Hungarian military slang has served several key functions such as building solidarity among soldiers, humor and irony to help soldiers deal with stress, danger, and boredom, subtle criticism of authority and institutional life. To conclude with, the history of Hungarian military slang mirrors the broader history of Hungary itself: multilingual beginnings, the scars of global conflict, decades of ideological control, and eventual integration into a globalized military framework. \*examples of Hungarian military slang based on historical period and categories will be presented in the upcoming PowerPoint Presentation.*

**Keywords:** *Hungarian, Military, Slang, War*

## **29. (ID 458) The Language of Silence: Chernobyl's Propaganda**

**Author:** stud. Maria-Karina LUCA

**Scientific Advisor:** Assoc. prof. Carmina COJOCARU, PhD

**Institution:** „Alexandru Ioan Cuza" Police Academy

**Abstract:** *The 1986 Chernobyl nuclear disaster was not only a catastrophic technical failure but also one of the most significant communication crises of the 20th century. This paper investigates the concept of "The Language of Silence," analyzing how the Soviet regime utilized "wooden language" (langue de bois) and strategic censorship to manage public perception and ensure state survival. By employing a comparative discourse analysis between official Soviet reports (Pravda) and international media coverage, the research highlights the linguistic patterns of minimization, euphemism, and evasion used to shroud the reality of the disaster. From a psychological perspective, the study explores the "cognitive dissonance" imposed upon the population, where the physical reality of the fallout stood in stark contrast to the official verbal narrative. The paper argues that silence was used as a deliberate tool of propaganda, transforming a technical jargon into a weapon of social control. Ultimately, the research emphasizes the ethical responsibility of communication in crisis management and the long-term psychological impact of state-sponsored misinformation on collective memory.*

**Keywords:** *Chernobyl, Propaganda, Linguistic Manipulation, Crisis Communication, Soviet Discourse, Psychology of Silence*

### **30. (ID 480) Hidden Data in Plain Sight: Steganography Techniques for Secure Information Transmission**

**Author:** stud. Marius-Cristian TOANCĂ

**Scientific Advisor:** Assoc. Prof. Eng. Florin POSTOLACHE, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* This paper explores the concept of Steganography as a modern method of concealing sensitive information within digital images. Unlike traditional encryption, which protects the content of a message, steganography hides the very existence of the data. The study focuses on simple yet effective techniques for embedding text-based information, such as passwords, into image files by modifying pixel-level data. A practical demonstration is conducted using HexEd.it, highlighting how hidden messages can be inserted and later extracted without visibly altering the image. Steganography has been historically associated with intelligence and military communication, where covert transmission of information is essential. In modern contexts, similar techniques can be used in cybersecurity, digital watermarking, or, in some cases, malicious activities. The aim is to raise awareness about hidden data transmission and encourage responsible handling of digital information.

**Keywords:** Steganography, Cyber Security, Hidden Data, Digital Images, Information Security, Data Protection, Covert Communication

### **31. (ID 484) Ports as Global Hubs of Intercultural Dialogue and Multicultural Exchange**

**Authors:** stud. Andrei LUTIC, stud. Matei SUTEU

**Scientific Advisor:** Lecturer Mariana BOERU, PhD

**Institution:** Romanian Naval Academy "Mircea cel Bătrân"

*Abstract:* This paper discusses maritime ports as key sites of global interaction, which have enabled the exchange of goods, people, and cultural practices. This paper explores ports as hubs of intercultural dialogue and multicultural exchange, highlighting their role in shaping diverse and dynamic urban societies. The paper shows how port cities bring together different ethnic, linguistic, and religious communities, fostering cosmopolitan identities and cultural hybridity.

*By examining ports within the broader context of globalization, the paper argues that they continue to function as important arenas for intercultural communication and coexistence in the modern world.*

**Keywords:** *port cities, intercultural dialogue, multiculturalism, migration, globalization*

### **32. (ID 485) From Integration to Impact: Women in Modern Armed Forces**

**Author:** stud. Denisa RADU

**Scientific Advisor:** Assoc. Prof. Alina NEGOESCU, PhD

**Institution:** Academia Forțelor Terestre “Nicolae Bălcescu” Sibiu

**Abstract:** *This presentation examines the evolving role of women in modern armed forces, focusing on their integration across operational, support, and leadership domains. It highlights how female personnel contribute to mission effectiveness, particularly in peacekeeping and humanitarian operations. It emphasizes the importance of gender integration in enhancing adaptability, communication, and overall operational performance. It also considers real mission contexts, where interaction with civilian populations is essential. In conclusion, the increasing presence of women represents not only a structural development but also a key factor in improving mission success in modern military environments.*

**Keywords:** *Women in the military; operational effectiveness; gender integration; modern armed forces; peacekeeping operations*

### **33. (ID 489) A Nation Divided – The Causes, Consequences, and Legacy of the American Civil War**

**Authors:** stud Călin-Alexandru ȘTEFAN, stud. Alexandru-Traian COCIS

**Scientific Advisor:** Assoc. Prof. Brândușa-Oana NICULESCU, PhD

**Institution:** "Nicolae Bălcescu" Land Forces Academy of Sibiu

**Abstract:** *The American Civil War (1861–1865) was one of the most transformative conflicts in United States history, arising from deep political, economic, and social divisions between the North and the South. Central to the conflict was the issue of slavery, which shaped economic systems, political ideologies, and regional identities. Additional tensions developed from differences in industrial and*

*agrarian economies, as well as debates over states' rights and federal authority. Political compromises such as the "Missouri Compromise" and the "Compromise of 1850" temporarily delayed confrontation, but events like the "Kansas-Nebraska Act" and the Dred Scott decision intensified sectional conflict. The election of Abraham Lincoln in 1860 ultimately triggered the secession of Southern states and the outbreak of war. Major military developments, including the battles of Antietam and Gettysburg and the Siege of Vicksburg, shifted the balance in favor of the Union. The "Emancipation Proclamation" redefined the war as a fight against slavery and allowed African Americans to participate in the Union Army. The conflict ended in 1865 with the surrender of Confederate forces. Its consequences were profound, leading to the abolition of slavery and the adoption of the 13th, 14th, and 15th Amendments. Reconstruction attempted to rebuild the South and integrate formerly enslaved people into society. Although many challenges remained, the war permanently strengthened the federal government and reshaped American political and social structures. The legacy of the Civil War continues to influence debates on equality, citizenship, and national identity today.*

**Keywords:** *American Civil War, slavery, secession, emancipation, reconstruction, federal authority*

#### **34. (ID 512) Ethical and Legal Considerations on Euthanasia**

**Author:** stud. Elena-Isabela CHELARU

**Scientific Advisor:** Assoc. Prof. Mimi-Carmina COJOCARU, PhD

**Institution:** "Alexandru Ioan Cuza" Police Academy

**Abstract:** *Euthanasia represents one of the most complex and controversial topics in contemporary bioethics, situated at the intersection of medicine, law, philosophy, and morality. This paper analyzes the concept of euthanasia from an interdisciplinary perspective, aiming to evaluate the ethical, legal, and social arguments that support or challenge the legalization of this practice. The main forms of euthanasia voluntary, non-voluntary, and involuntary are examined, as well as the distinction between active and passive euthanasia. The study highlights the conflict between the principle of patient autonomy and the physician's obligation to preserve life, with particular emphasis on the right to dignity and*

*quality of life in cases of terminal illness. Furthermore, the paper compares existing legal regulations in different countries and analyzes their impact on medical practice and public perception. The findings suggest that the debate on euthanasia remains deeply influenced by cultural, religious, and legal factors, with no universal consensus having been reached. In conclusion, the research underlines the need for a balanced approach based on respect for patients' rights, medical ethical principles, and the applicable legal framework.*

**Keywords:** *euthanasia, patient autonomy, right to die, palliative care, terminal illness, human dignity*

### **35. (ID 513) Language and National Identity: How Words Define Nations**

**Authors:** stud. Gratiela GRIGORE, stud. Daniel CORCIOV

**Scientific Advisor:** Assoc. Prof. Isabela-Anda DRAGOMIR, PhD

**Institution:** "Nicolae Bălcescu" Land Forces Academy of Sibiu

**Abstract:** *The world is evolving at a fast pace. From technology to different fields, everything is changing, shaping, and adapting the world. Some of these new discoveries completely change our perspectives. These changes are added to a nation's culture, yet there is something that rarely changes: language. Languages have existed since time immemorial and are a nation's cultural treasure, with a vast history behind them, integral to a nation's identity. With a complex history, languages have been influenced by numerous factors, including geography, time, and the cultures of the people themselves. In this paper, we will explain how languages have been, are, and will be impacted by geographic factors and why, providing strong examples to support our claims. Moving on, we will discuss NATO's policies and the official languages, as language is a key factor in communication and understanding within international alliances. To summarize the preceding points, this paper will present a brief review and offer a different perspective on why languages are crucial to a nation's culture and lifestyle.*

**Keywords:** *Language, culture, lifestyle, NATO, geographic, communication.*

## IX. SECTION: STUDENTS' EXPERIENCES IN INTERNATIONAL EXCHANGES

### Section Committee:

**Chairman:** Colonel Assoc. prof. Cătălin POPA, PhD

**Members:** CDR Marius CUCU, PhD candidate

Ens. eng. Elena ZVÂNCĂ

### 1. (17) My Winter Experience in Lithuania

**Author:** stud. Bogdan GRIGORE

**Scientific Advisor:** Assoc. Prof. Laura CIZER, PhD

**Institution:** "Alexandru Ioan Cuza" Police Academy

**Abstract:** *During the winter of 2023, I had the opportunity to participate in the Erasmus program at the Lithuanian Maritime Academy in Klaipeda, Lithuania. My journey began with a flight from Bucharest to Vilnius, followed by a scenic bus ride to Klaipeda, where I would spend several months studying and experiencing Lithuanian culture. The winter weather was cold, but it added a unique charm to my time there, with snow-covered streets and cozy local traditions. At the Maritime Academy, I had the chance to meet students from all over Europe, learning not only about maritime studies but also about Lithuania's rich history and culture. This experience was an unforgettable adventure that helped me grow personally and academically, fostering new friendships and expanding my global perspective.*

**Keywords:** *Winter Experience, Lithuania, Erasmus Program, Lithuanian Maritime Academy, Bucharest to Vilnius, Bus to Klaipeda, International Exchange, Cultural Experience, Study Abroad, Travel, Maritime Studies, Erasmus Exchange Journey.*

# EU COMMON SECURITY AND DEFENCE POLICY

## SYNDICATES TOPICS

1. Identify and describe the major maritime threats to which the EU should respond in the actual dynamics of global security context.
2. Define the EU needs for a maritime strategy and identify its capabilities in managing the maritime security risks.
3. Identify the major pillars of EU Common Security and Defence Strategy and explain how are these challenges handled in relation with the CSDP imperatives?
4. Define the pillar of "cooperation with partners" importance and explain how is this imperative covered within the framework of CSDP and EU Maritime Security Strategy.
5. Identify the EU Maritime Operations and explain how are these operations responding both to the CSDP policy and EU Maritime Security Strategy.
6. The new paradigm of an EU Armed Forces option. Overview of political, strategic and operational interpretations.
7. The new strategic roles of European Union in the new security global context.

Reserve topic: The effects of security turbulences in maritime area - the impact against the European Union strategies.

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Evaluation paper for presenting essays on syndicates

Officer Cadet's / Student's NAME, Forename	Country

Evaluator's (Commission Member's) NAME, Forename	Country

Description	Achievable points	Points achieved
The Cadet/Student introduces him-/herself ([rank] / name / country / service / institution).	4	
The Cadet/Student mentions which topic he/she presents.	4	
The problem and/or the research question(s) are mentioned.	6	
It is mentioned, which methodology is used to solve the problem and/or to answer the research questions.	6	
The results are described (contents / main part).	20	
The Cadet/Student mentions his/her own opinion onto the result(s). He/she discusses the result(s) from different points of view.	10	
The entire presentation has a clear structure (table of contents – main part – summary).	10	
The entire presentation has a certain quality of visualisation (sketches, graphs, tables, etc. – not just reading from a paper or the slides).	10	
The Cadet/Student has a clear and understandable language.	10	
The Syndate complies with the given time-limit (max. 15 minutes). Each student shall present at least one topic/slide/idea	20	
Total	100	