

ACADEMIA NAVALĂ „MIRCEA CEL BĂTRÂN”

*A XVI-a ediție a sesiunii de comunicări științifice
a studenților masteranzi*

MASTER-NAV 2026



20 Februarie 2026
CONSTANȚA

Comitetul de organizare

Cam. Fl. conf. univ. Dr. ing. Alecu TOMA

Cdor conf. univ. Dr. ing. Paul BURLACU

Cdor conf. univ. Dr. ing. Filip NISTOR

Col. conf. univ. Dr. Cătălin POPA

Cdor conf. univ. Dr. ing. Sergiu LUPU

Cdor Dr. ing. Cătălin Paul CLINCI

Cdor conf. univ. Dr. ing. Adrian POPA

Cpt. Cdor conf. univ. Dr. ing. Alexandru COTORCEA

Lt.cdor Conf. univ. Dr. ing. Cristian SCURTU

Conf. univ. Dr. Andrei BĂUTU

Cdor conf. univ. Dr. ing. Florențiu DELIU

Lt. Cdor S.L. Dr. ing. Sergiu ȘERBAN

Prof. univ. Dr. ing. Beazit ALI

Prof. univ. Dr. ing. Vasile DOBREF

Prof. univ. Dr. ing. Florin NICOLAE

Conf. univ. Dr. ing. Romeo BOȘNEAGU

Vineri, 20.02.2026

Aula universitară "Viceamiral Ion Coandă"

10.00 - 10.10: Deschiderea oficială a sesiunii de comunicări științifice Master-Nav 2026.

- *Ceremonialul ridicării Drapelului de stat;*
- *Mesajul Rectorului Academiei Navale "Mircea cel Bătrân".*

10.10 - 10.50: Sesiunea plenară:

- *"Soluție inovatoare pentru analiză și optimizare în activitățile din domeniul naval și portuar"*

Autor: Cătălin-Costin VLAD

Îndrumători: Prof. univ. dr. ing. Florin NICOLAE

Conf. univ. dr. ing. Florin POSTOLACHE;

- *"Integrarea vehiculelor autonome în structura operativă a navelor militare"*

Autor: Nicolae CARACOSTEA

Îndrumător: Conf. univ. dr. ing. Filip NISTOR;

- *"Operation, Management and Supervision of Naval Electrical Power Systems by the Electrical Officer"*

Autori: Marius Nicolae BĂRLĂDEANU și Valentin HARAS;

Îndrumător: Prof. dr. ing. Gheorghe SAMOILESCU;

- *"Bulk Carrier Vessel. Analysis of Ship Energy Systems Optimization through the Use of Dual-Fuel Engines"*

Autor: Florina DRĂGHICI

Îndrumător: S. L. Dr. ing. Narcis VOLINTIRU

10.50 - 11.00 Fotografie de grup

11.00 - 15.30 Prezentarea lucrărilor pe secțiuni

CUPRINS

1. Științe Nautice.....	5
2. Sisteme Electromecanice Navale.....	41
3. Operarea și conducerea sistemelor electroenergetice navale.....	55
4. Inginerie și management.....	84
5. Oceanografie și hidrografie.....	116

ȘTIINȚE NAUTICE

BIROUL SECȚIUNII

Președinte: Conf. univ. Dr. ing. Sergiu LUPU

Membri: Ș.L. univ. Dr. ing. Sergiu ȘERBAN

Ș.L. univ. Dr. ing. Andra Teodora NEDELCU

Sala L3A6

1. Ammonia as a Marine Fuel: Safety, Performance, and Environmental Impact

Autor: stud. Alexandru-Cristian ALBU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Sergiu LUPU

Abstract: Ammonia (NH₃) emerges as a promising zero-carbon marine fuel to address IMO's mandate for 70% emission reductions by 2050. This presentation examines ammonia's application in maritime shipping, covering technical implementation in dual-fuel and dedicated engines, safety protocols addressing toxicity hazards, and environmental lifecycle impacts. Green ammonia produced from renewable energy reduces emissions by approximately 80% compared to conventional marine fuels, while blue ammonia achieves 60% reduction. However, deployment requires specialized fuel systems, advanced gas detection, competent crews, and bunkering infrastructure. Key challenges include lower energy density necessitating larger tanks, nitrogen oxide emissions requiring aftertreatment, and corrosion risks. The study evaluates hydrogen production routes and vessel retrofitting strategies, concluding that ammonia's transition to mainstream maritime fuel hinges on regulatory frameworks, technological maturity, safety standardization, and investment in green ammonia production infrastructure.

2. Assessment of Cybersecurity Risks for the Octopus 9.3.V Navigation System

Autor: stud. Andi-Ionel ANTOHI, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. Andrei BĂUTU

Abstract: This scientific research paper primarily aims to identify, analyse, and formulate preventive measures for cybersecurity vulnerabilities present in the OCTOPUS navigation equipment, version 9.3.v. The study seeks to highlight the potential risks that may affect the integrity, confidentiality, and availability of the system within the context of its operational use. The analysis considers both the serial ports used to establish connections between host devices within the network and the USB 2.0 and 3.0 interfaces through which various peripherals or external storage devices can be connected. These access points are evaluated from the perspective of their potential exploitation by malicious actors. Furthermore, the paper presents the specific symptoms that may occur when a vulnerability within the OCTOPUS system is successfully exploited, as well as the potential impact of such incidents on the functionality of the navigation system and on overall operational safety.

3. Cybersecurity in Modern Navigation: Assessing Vulnerabilities in integRATED ECDIS–VDR–AIS Systems

Autor: stud. Andi-Ionel ANTOHI, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Sergiu LUPU

Abstract: This research aims to present the cybersecurity vulnerabilities identified in ECDIS, AIS and VDR navigation equipment. The study analyzes both international standards and specific security protocols from the maritime industry to provide a detailed assessment of potential IT risks.

Additionally, the hardware architectures of the navigation equipment are examined to determine whether they meet the latest standards and can withstand complex attacks using modern technologies. Finally, an evaluation is conducted to identify the causes and necessary methods to prevent the exploitation of these vulnerabilities by unauthorized individuals.

4. Emergency Management on a Damaged Oil Tanker: Decision-Making, Coordination, and Human Factors

Autor: stud. Robert – George CORNEA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Lect. univ. Dr. ing. Dumitru CORDUNEANU

Abstract: This paper focuses on the management of emergency situations on oil tankers with severe structural damage, emphasizing leadership, communication, and human performance. It analyzes the responsibilities of the master, the structure of onboard emergency teams, and the need for clear internal and external communication. The study highlights how stress, training, and crew cohesion influence decision-making during critical events. It also reviews logistical considerations and lessons learned from past maritime incidents, showing that coordinated actions and effective crisis management are essential to protect lives, the vessel, and the environment.

5. Identification and Analysis of Fire Risk Areas on Ro-Ro Vessels

Autor: stud. Mihai MARCU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Florin-Marius NICOLAE

Abstract: Fire safety represents a major concern for roll-on/roll-off (Ro-Ro) vessels, particularly in the context of the increasing frequency of vehicle-related fires, including those involving electric vehicles. Analysis of serious fire incidents

recorded between 2013 and 2025 indicates that many events originated within vehicle cargo decks, commonly associated with electrical malfunctions and compounded by operational constraints during loading and navigation. Conventional fixed carbon dioxide fire-extinguishing systems demonstrate variable effectiveness, largely dependent on timely activation and adequate compartment sealing, while showing limited capacity to fully mitigate lithium-ion battery fires. Despite these limitations, such systems can contribute to reducing fire propagation to surrounding vehicles and ship structures. This study examines critical fire risk areas on Ro-Ro vessels through the assessment of incident reports, regulatory provisions, and onboard firefighting constraints, emphasizing the necessity for enhanced detection methods, adapted suppression strategies, and innovative fire safety solutions.

6. Berthing Maneuver of a Port Container Ship in the Port of Yantian

Autor: stud. Antonia-Andreea MÎRLENEANU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. univ. Dr. ing. Sergiu ȘERBAN

Abstract: The berthing maneuver of large container vessels represents one of the most critical operations in modern port navigation, requiring precise coordination between ship, port infrastructure, and environmental conditions. This paper analyzes the berthing maneuver of a port container vessel in the Port of Yantian, one of the largest and most technologically advanced container terminals in Asia. The study presents the technical characteristics of container ships and port facilities, followed by a detailed description of the operational stages involved in the berthing process, including pilotage, tug assistance, speed control, and mooring arrangements. Special attention is given to the influence of external factors such as wind, currents, tides, shallow water effects, and traffic density.

A practical case study of the container vessel *Maribo Maersk* is used to illustrate real operational conditions and decision-making processes. The analysis highlights the importance of modern maneuvering equipment, effective communication, and port–ship compatibility in ensuring safe, efficient, and controlled berthing operations for ultra-large container vessels.

7. Fire Safety in Containerized Maritime Transport

Autor: stud. Robert-Marian PĂTRU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Florin-Marius NICOLAE

Abstract: Containerized maritime transport is a key component of global trade, but it involves significant fire safety challenges, especially in cargo spaces. Fires on board container ships are difficult to detect and control due to limited access to containers, high fire loads, and the variety of transported goods. This paper analyzes fire safety issues in containerized maritime transport, with a focus on fires originating in cargo spaces. The study is based on a review of recent scientific literature, incident analyses, and international regulations related to fire prevention, detection, and firefighting on container ships. The analysis highlights the main vulnerabilities associated with container ship fires, including limitations of existing fire protection systems and the influence of human and organizational factors. The paper emphasizes the importance of a risk-based approach to fire safety management in order to reduce fire-related risks to acceptable levels.

8. Maritime Navigation on the Europe–Africa Route in Areas of War and Piracy: The Role of the Human Factor and Navigation Equipment

Autori: stud. Mădălina-Valentina TUDOSE, stud. Antonia MÎRLENEANU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Sergiu LUPU

Abstract: Maritime navigation on international routes is increasingly affected by geopolitical instability, armed conflicts, and piracy activities, which generate significant risks to the safety of commercial vessels. The Europe–Africa route represents a relevant example of a high-risk maritime corridor due to the transit of areas affected by war and maritime insecurity. This paper analyzes the role of the human factor and modern navigation equipment in ensuring ship safety under such conditions, based on a case study derived from practical experience gained on board a commercial vessel operating on this route. The functionality and limitations of key navigation systems, such as ECDIS, radar, AIS, GPS, and NAVTEX, are examined, along with the influence of human decision-making in high-risk situations. The conclusions highlight that safe navigation in conflict and piracy-prone areas depends on an effective interaction between human operators and navigation technology, as well as on the crew’s training and ability to manage complex operational scenarios.

9. The Concept of Green Ship

Autor: stud. Rareș-Alexandru ANDREIEȘI, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Sergiu LUPU

Abstract: The concept of the green ship represents an important step toward reducing the environmental impact of the maritime industry. As global shipping continues to grow, conventional vessels contribute significantly to air and marine pollution through greenhouse gas emissions, fuel consumption, and waste discharge. This project presents the green ship concept, highlighting its main objectives, key technologies, and the role of international environmental regulations. Special attention is given to energy-efficient ship design, alternative fuels, emission reduction systems, and compliance with International Maritime

Organization (IMO) standards. The study also emphasizes the economic and environmental benefits of green shipping, as well as its importance for the future sustainability of maritime transport. The implementation of green ship solutions is essential for achieving cleaner oceans, reduced emissions, and a more responsible shipping industry.

10. Study on the Interaction Between Marine Currents and the Seabed: Effects on the Anchoring and Stability of Ships

Autor: stud. Mălina Andreea BUZAMĂȚ, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. univ. Dr. ing. Andra-Teodora NEDELCU

Abstract: The paper aims to analyze the interaction between marine currents and the seabed, highlighting how they influence the anchoring and stability of ships. The study begins with a presentation of basic concepts related to the typology of marine currents and the characteristics of the seabed, followed by an overview of the Black Sea. This paper examines the processes by which currents cause erosion, displacement, and accumulation of sediments, phenomena that can alter the configuration of the seabed over time. It also identifies the associated risks and possible solutions to minimize them.

11. Study on the Design of Propulsion for Multihull Vessels

Autor: stud. Vili-Alexandru CAPLAN, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. univ. Dr. ing. Sergiu ȘERBAN

Abstract: The growing interest in multihull vessels is driven by their superior stability, reduced resistance, and improved operational efficiency compared to conventional monohull ships. These advantages impose specific requirements on the design and integration of propulsion systems. This study investigates the principles and challenges associated with the design of propulsion systems for multihull vessels, with an

emphasis on hydrodynamic performance, propulsion efficiency, and structural integration. Various propulsion configurations, including conventional propellers, waterjets, and hybrid systems, are analyzed in relation to hull geometry, operating speed, and mission profile. The interaction between the hulls and the propulsion system is examined to assess its influence on resistance, cavitation, and overall energy efficiency. The study also considers environmental and economic aspects, highlighting the potential for fuel consumption reduction and emission control. The results contribute to a better understanding of propulsion design criteria for multihull ships and provide guidance for optimizing propulsion solutions in modern naval architecture.

12. Analysis of Factors Influencing Navigation Safety on the Danube

Autor: stud. Mihaela COSTACHE, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Alexandru COTORCEA

Abstract: Navigation safety on the Danube represents a key component of inland waterway transport, with significant implications for economic performance as well as for the protection of human life and the environment. This analysis examines the fundamental aspects of Danube navigation, including the river's geographical and hydrological features, the role of inland waterway transport at national and European levels, and the associated legal and institutional framework. Additionally, the analysis explores the range of factors affecting navigation safety, encompassing natural and technical conditions alongside human, economic, and regulatory influences.

13. Marine Casualties and Lessons Learned

Autor: stud. Cătălin DAN, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Lect. univ. Dr. ing. Dumitru CORDUNEANU

Abstract: This paper reviews maritime casualties, as defined in the IMO Casualty Investigation Code, as a source of evidence-based safety improvement across all commercial shipping. It outlines how casualties typically happen from a chain of events, where decisions, human performance, technical condition, and environmental factors break safety barriers. It talks about casualty types according to organizations like EMSA, and links them to recurring patterns. The lessons focus on preventing repeat scenarios like watchkeeping fatigue and control, clear communication and teamwork, etc. The aim of this paper is to translate the experience from the accident investigation reports and prevent future casualties.

14. Analysis of Cargo Tank Types on an LNG Carrier

Autor: stud. Ștefan Alexandru GÎNGU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Lect. univ. Dr. ing. Dumitru CORDUNEANU

Abstract: This topic focuses on the main types of cargo tanks used on LNG carriers and their role in the safe and efficient transportation of liquefied natural gas. The presentation examines the structural design, operating principles, and classification of LNG cargo tanks, including membrane and independent tank systems. Special attention is given to materials, thermal insulation, and containment methods required to maintain extremely low temperatures. The analysis also highlights the advantages and limitations of each tank type in terms of safety, reliability, construction complexity, and operational performance. Understanding these aspects is essential for optimizing ship design, ensuring compliance with

international regulations, and improving overall efficiency in LNG maritime transport.

15. Ship Maneuvering for Voluntary Grounding and Refloating – Methods, Calculations, and Procedures

Autori: stud. Samer-Ahmad KINJ, stud. Raluca-Gina POPA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. univ. Dr. ing. Sergiu ȘERBAN

Abstract: This paper, developed at the “*Mircea cel Bătrân*” Naval Academy in Constanța, analyzes the theoretical and practical aspects of voluntary grounding and ship refloating operations. Voluntary grounding is presented as a deliberate emergency maneuver intended to prevent more severe consequences such as sinking or loss of life. The study outlines the main causes of ship stranding, the operational circumstances that may justify voluntary grounding, and the procedural steps required for its safe execution. It also details the subsequent measures to ensure structural integrity, environmental protection, and compliance with international conventions such as SOLAS, MARPOL, and the ISM Code. The second part provides empirical calculations for the refloating of the vessel CMA CGM Volga, determining the forces involved, traction requirements, and the role of tug assistance. The conclusions emphasize strategic planning, coordination, and adherence to maritime safety regulations as essential factors in successful ship recovery operations.

16. Accident Scenario Analysis for Container Ships Using FTA and ETA within the FSA Framework

Autor: stud. Nicolae LIPOVANU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Instr. sup. drd. ing. Andrei POCORA

Abstract: Container ships represent a key element of global maritime transport, but their increasing size, speed and

operational complexity have also led to a higher risk of severe accidents. Events such as collision, grounding, fire and loss of stability may result in serious consequences for human life, the environment and the global economy. The objective of this paper is to identify and analyse the main accident scenarios involving container vessels by applying Fault Tree Analysis (FTA) and Event Tree Analysis (ETA) within the framework of a Formal Safety Assessment (FSA). The study focuses on the identification of basic events that may lead to major accidents and on the analysis of the possible evolution of their consequences depending on the performance of safety barriers. The results highlight the dominant role of human error, navigation system failures and adverse environmental conditions in the development of accidents. The conclusions of this study provide support for the early stages of FSA and may contribute to the improvement of safety measures and operational procedures for container ships.

17. Risk During Loading/Unloading of Oil Tanker Ships

Autor: stud. Cristian-Traian MARIN, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Florin Marius NICOLAE

Abstract: The loading and unloading operations of oil tanker vessels give rise to a wide range of risks, characterized by a high level of complexity and hazard. The handling of petroleum cargoes involves significant dangers, such as hydrocarbon spills, fires, explosions, or marine pollution, with a direct impact on the safety of the vessel, the crew, and the environment. Although the international regulatory framework and operational procedures are well defined, accidents continue to occur due to a combination of technical, organizational, and human factors. This paper analyzes the main risks associated with cargo handling operations on oil tanker vessels, with particular emphasis on the role of the human factor,

highlighting the influence of fatigue, communication errors, operational pressure, and non-compliance with safety procedures. Finally, the need for an integrated risk management approach is emphasized, based on continuous training, effective supervision of onboard activities, and the strict implementation of safety management systems, in order to reduce maritime accidents.

Keywords: tanker, operational risk, liquid bulk cargo, human factor, maritime safety, fatigue, communication errors

18. The Impact of Tariffs on Global Supply Chains: A Case Study of the Us-China Trade War

Autor: stud. Alex-George MIHAIL, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Lect. univ. Dr. ing. Dumitru CORDUNEANU

Abstract: This paper examines the impact of tariffs on global supply chains, with a particular focus on their logistical and economic consequences in the context of international trade tensions. The study begins with an overview of global supply chains, their historical development, and the role of tariffs as trade policy instruments. It also provides a brief comparative perspective on Russia’s position in the global economy and the effects of trade sanctions on logistical flows. The core of the paper is a case study of the US–China trade war, analyzing how increased tariffs have affected production costs, supply chain restructuring, logistics networks, and global economic stability. The conclusions emphasize that protectionist policies can disrupt the balance of international trade networks, directly influencing transport flows and the efficiency of the logistical systems that underpin global commerce.

19. Analysis of the Causal Chain Associated with Fires and Explosions on Tanker Vessels

Autor: stud. George-Iulian MILE, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Florin Marius NICOLAE

Abstract: This study investigates the primary causes of fires and explosions in tanker vessels, focusing on human error and violations of safety protocols. Using Fault Tree Analysis (FTA) and the 4M disaster analysis method, the research identifies unsafe tank atmospheric environments as the leading cause of these accidents. The study highlights the significant influence of management and media factors over human errors, emphasizing the need for improved safety management and training. Additionally, it discusses the importance of effective communication, adherence to procedures, and situational awareness in preventing such incidents. By analyzing the root causes of accidents and their probabilities, the study proposes preventive measures to reduce the occurrence of fire and explosion accidents, thereby enhancing safety management in the maritime industry.

20. Study on The Effects of “Storm Surge” Events on Coastal Harbors on the Western Shore of the Black Sea

Autor: stud. Narcis-Cristian NEAGOE, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. univ. Dr. ing. Andra-Teodora NEDELCU

Abstract: The paper analyses the effects of storm surge phenomena on ports located on the western coast of the Black Sea, focusing on their impact on port infrastructure, navigation safety and the continuity of maritime operations. The study starts from the theoretical basis of the storm surge phenomenon and the factors that generate it, followed by an analysis of the hydrographic and meteorological characteristics specific to the study area. The research includes an analysis of the main Romanian ports, namely Constanta, Midia, and Mangalia, as well as case studies based on significant events. The

methodology used combines the analysis of hydrometeorological data, the interpretation of specialized documentation, and the assessment of port vulnerabilities. The results obtained contribute to a better understanding of the risks associated with the storm surge phenomenon and to the identification of measures to prevent and mitigate its effects on seaports.

21. Study on the Management and Reduction of Fatigue Risk on Board Ships

Autor: stud. Adrian-Alexandru NEGOIȚĂ, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. univ. Dr.ing. Sergiu ȘERBAN

Abstract: Fatigue represents a significant operational risk in maritime activities, with direct implications for navigational safety, human performance, and environmental protection. This study examines the management and reduction of fatigue risk on board ships, emphasizing the role of organizational, operational, and human factors. The research analyzes the physiological mechanisms of fatigue, including sleep deprivation and circadian rhythm disruption, as well as the impact of work–rest schedules and operational pressures on seafarers’ performance. Furthermore, the study explores methods for identifying, assessing, and monitoring fatigue risk within the framework of safety management systems. A case study of the Exxon Valdez accident is used to highlight fatigue as a decisive contributing factor in major maritime accidents. The findings underline the necessity of integrating fatigue risk management into the Safety Management System, promoting a proactive safety culture and implementing preventive strategies to enhance operational safety and reduce the likelihood of fatigue-related incidents at sea.

22. Study on International Cooperation in Sar Missions Conducted in the Black Sea and the Mediterranean Sea

Autor: stud. Gabriel POPA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Lect. univ. Dr. ing. Dumitru CORDUNEANU

Abstract: This paper examines the evolution and operational framework of international cooperation in Search and Rescue (SAR) missions within the Black Sea and the Mediterranean Sea. The study traces the historical transition from moral obligation to a structured global architecture governed by the 1979 Hamburg Convention and the IAMSAR Manual. It analyzes the critical role of Maritime Rescue Coordination Centres (MRCC) and the integration of advanced technologies, such as AIS, VTMIS, and satellite surveillance through EMSA and FRONTEX. Special focus is placed on the Romanian SAR system's professionalization and the regional challenges posed by geopolitical instability and migration. By evaluating the synergy between legal standards and digital innovation, this research highlights how institutional interoperability remains the cornerstone of maritime safety, ensuring a rapid and coordinated response to life-threatening incidents in increasingly complex maritime environments.

23. Analysis of the Effectiveness of Implementing the Crew Management System Under Conditions of Prolonged Isolation on Board Ships

Autor: stud. Maria-Mădălina POPA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. univ. Dr. ing. Sergiu ȘERBAN

Abstract: The main purpose of this study is to analyze and evaluate the well-being of seafarers, which is essential not only for their mental and physical health but also for the efficient and safe operation of ships, given the long-term contracts that isolate crew members on board. The mental and emotional

health of the crew can directly impact work performance, decision-making, ship's safety, and the safety of other crew members. The well-being of maritime personnel has long been neglected; however, measures are being taken to balance personal life and the working environment, as minimizing maritime accidents of any kind is a key objective.

24. Maneuver of the container ship CMA CGM Lyra on the Singapore – North America – Europe route

Autor: stud. Camelia-Bianca ȘTEFAN, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. univ. Dr. ing. Sergiu ȘERBAN

Abstract: The maneuvering of the container ship **CMA CGM Lyra** represents an essential element for maritime navigation safety, considering the vessel's large dimensions and the complexity of the intercontinental Singapore–North America–Europe route. The study highlights the importance of controlling the ship's direction, speed, and position, particularly in restricted waters and in ports with heavy traffic. Maneuverability is influenced by high inertia and reduced rudder efficiency at low speeds, which requires thorough planning and precise coordination. The analyzed route includes ports in Asia and along the east coast of North America, each presenting specific navigational conditions such as currents, tides, and congested infrastructure. The use of local pilots and tugboats, as well as continuous adaptation to local conditions, is essential. The conclusion emphasizes that the correct application of maneuvering principles contributes decisively to enhancing the safety of port and maritime operations.

25. Modern Maritime Electronic Navigation

Autor: stud. Madalin Andrei SURUIANU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Lect. univ. Dr. ing. Dumitru CORDUNEANU

Abstract: Modern maritime electronic navigation has revolutionized how ships are guided at sea. It encompasses a range of advanced systems and equipment, including GPS, ECDIS, radar, sonar, and AIS, which collectively improve safety, efficiency, and precision. Historically, navigation relied on traditional tools such as the compass, sextant, and paper charts, but technological advances have enabled real-time position tracking, obstacle detection, and route optimization. Integrated electronic systems provide a comprehensive overview on the bridge, helping navigators make accurate decisions. Advantages include high positional accuracy, reduced risk of collisions, and optimized fuel consumption. Despite these benefits, reliance on technology brings risks such as equipment failure or power loss, making proper training and knowledge of traditional navigation methods essential. Overall, modern electronic navigation is indispensable for safe maritime operations, complementing traditional methods and ensuring efficient and secure sea transport.

26. Gender and Leadership Onboard Ships – Dynamics, Perceptions, and Performance

Autor: stud. Elena-Cristina TAIFAS, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. univ. Dr. ing. Andra NEDELUCU

Abstract: This project analyzes the intersection of gender identity and authority within the isolated, hierarchical environment on board. In a traditionally male-dominated sector, the rise of women into command roles brings profound transformations to crew dynamics, challenging deep-seated stereotypes. The study explores how perceptions of subordinates and peers influence the legitimacy of female leaders, highlighting socio-cultural barriers and the advantages of a diversified leadership style. Additionally, the focus is placed on the correlation between gender diversity and

operational performance, suggesting that mixed-gender teams exhibit more effective communication and enhanced conflict resolution. The analysis emphasizes the importance of emotional intelligence and resilience at sea, demonstrating that onboard efficiency is not determined by gender, but by professional competence and management skills. Ultimately, the theme advocates for an inclusive organizational culture, essential for modernizing the maritime industry and attracting talent in a constantly evolving and demanding global market.

27. Water Pollution and Marine Ecosystems

Autor: stud. Florin-Theodor TĂNASE, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Lect. univ. Dr. ing. Dumitru CORDUNEANU

Abstract: This scientific research presents an overview of the environmental impacts of maritime transport on aquatic ecosystems, with a focus on water quality degradation and disruptions to marine biodiversity. It analyzes key pollution sources, including oil and chemical spills, wastewater discharges, solid waste, and ballast water transfer. These pollution pathways contribute to ecosystem toxicity, reduced oxygen availability, and disturbances in marine food webs, leading to negative effects on both natural systems and sea-dependent economic activities. The study also examines the introduction of invasive species through ballast water as a significant vector of ecological imbalance, highlighting its role in altering native communities. Taken together, by examining multiple ship-related pollution sources, this analysis presents an integrated description of the cumulative environmental pressures linked to maritime transport.

28. Ro-Ro Cargo Vessel Maneuvering for Berthing on Entry, Either Stern-To or Alongside the Terminal, and Its Operation

Autor: stud. Mădălina-Valentina TUDOSE, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. univ. Dr. ing. Sergiu ȘERBAN

Abstract: The present paper examines in depth the handling of Ro-Ro Cargo vessels during the critical moments of port entry, as well as during berthing procedures whether stern-to or alongside and in the subsequent operational activities. The first section includes an extensive theoretical analysis, addressing the structural and functional characteristics of these vessels, the ways in which hydrometeorological conditions influence maneuvering behavior, the specific stages of berthing, and the crew's responsibilities in preventing and managing risk situations. The chapter dedicated to case studies analyzes two examples that differ significantly in outcome and operational context. The first is the successful maneuver of the MV *Capucine* in the port of Djibouti, carried out under adverse conditions caused by strong winds and currents. In contrast, the second case examines the incident involving the *Clipper Point* in the port of Heysham, where a series of improper operational decisions and the exceeding of the vessel's technical limitations led to a loss of control. Comparing the two situations highlights the essential role of rigorous planning, effective communication among crew members, optimal use of available technical means, and strict adherence to safety regulations. The conclusions emphasize that the success of a maneuver depends fundamentally on the crew's level of training, the accurate assessment of real conditions in the operating area, and strict compliance with the vessel's technical and operational limits. Combining theoretical knowledge with practical experience, alongside efficient management of human factors, enables Ro-Ro vessels to be maneuvered in a manner that maximizes both safety and operational efficiency.

29. SWOT Analysis of the Implementation of Route Optimization Software Onboard Military Vessels: Case Studies for Different Types of Ships

Autor: stud. Daiana-Maria VĂDUVA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Dinu ATODIRESEI

Abstract: Navigation efficiency is an incredibly critical component of both mission success and crew safety in the often complex environment of military maritime operations. This paper presents a comprehensive SWOT analysis of the implementation of route optimization software onboard military vessels, considering the specific characteristics of different ship types. These examples include modern technologies, such as machine learning techniques used to predict and address future hydrometeorological events; to facilitate analysis around future challenges faced by the maritime operator, as well as application to their operational plan for maritime operations. The results are presented with the strengths and the prospects that the technologies offer, and also limitations, risks and issues that should be controlled on the successful operation. On the basis of these findings, concrete suggestions for policy-makers of the naval military are presented to facilitate and coordinate the optimization of the navigation strategy and optimize the operational capability of naval forces.

30. Study on Rock Dumping Operations in the Offshore Industry: Case Study of M/V Rollingstone

Autor: stud. Iulian Florin TALASMAN, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Sergiu LUPU

Abstract: This dissertation focuses on offshore rock dumping operations as they are applied in practical subsea projects. The study describes the main stages of a rock dumping campaign, from project preparation and material handling to offshore

execution and monitoring. Emphasis is placed on operational aspects such as vessel capability, positioning accuracy, weather limitations, and coordination between onboard systems. A case study of the rock dumping vessel M/V Rollingstone is used to illustrate how these factors influence day-to-day offshore operations. The analysis is based on real operational practices and highlights challenges commonly encountered during offshore works. Environmental aspects and basic risk control measures are also addressed in order to provide a realistic overview of the activity. The study aims to offer a practical perspective on rock dumping operations and their importance for the protection and stability of subsea infrastructure.

31. The Use of Satellite Data in the Management of Coastal Marine Pollution in The Western Area of the Black Sea

Autor: stud. Ioan-Adrian ALRADI, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Dinu ATODIRESEI

Abstract: Marine pollution caused by ship operations represents a significant threat to the marine environment and coastal ecosystems. This thesis examines the International Convention for the Prevention of Pollution from Ships (MARPOL) as the primary global legal instrument aimed at preventing and reducing pollution generated by maritime activities. The paper presents a structured analysis of the six MARPOL annexes, addressing pollution by oil, noxious liquid substances, harmful substances in packaged form, sewage, garbage, and air emissions from ships. Emphasis is placed on the technical and operational measures introduced by each annex, as well as their role in minimizing both accidental and operational pollution. The study highlights the effectiveness of MARPOL regulations in improving environmental protection and underscores the importance of strict implementation, monitoring, and international cooperation to ensure sustainable

maritime transport and the protection of the marine environment.

32. Key Operational Observations on Crew Organization and Fire Emergency Response on LPG Carriers

Autor: stud. Andrei ANDRUS, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Lect. univ. Dr. ing. Dumitru CORDUNEANU

Abstract: This paper presents a set of key operational observations regarding crew organization and fire emergency response on LPG carriers. The focus is placed on the role of the crew during fire-related emergencies, emphasizing organization, training, drills, and operational preparedness rather than technical system design. The study is based on a review of relevant international regulations, including SOLAS Chapter II-2, the Fire Safety Systems (FSS) Code, and the IGC Code, complemented by the analysis of selected fire incident reports involving LPG carriers. The analysis highlights recurring operational patterns related to role clarity, crew coordination, and decision-making under conditions of high stress and time pressure. Particular attention is given to the gap between formal procedural compliance and effective practical response. The observations underline the importance of simplified roles, standardized actions, and realistic training in supporting an effective and timely fire emergency response on board LPG carriers.

33. Study on Rescue and Research Actions of Divers Using Rovers

Autor: stud. Sonia-Monica ILIESCU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Lect. univ. Dr. ing. Dumitru CORDUNEANU

Abstract: The research that we are about to explore is based on simulated rescue exercises, field experiences, and a review of

real rescue cases. This article aims to find the advantages and disadvantages of using an ROV before and with a diver for rescue and research, and most importantly, how we can improve the missions for the people risking their lives underwater. Rescue divers often face dangerous missions to save people, to detect mines, or recover important items underwater, especially when visibility is low or natural conditions make things harder. To make these missions safer and to improve survival rates for these fearless people, we should use better, easier-to-operate remotely operated vehicles (ROVs) that can handle tough environments.

34. Optimizing Maritime Voyages Using Artificial Intelligence through the Processing of Onboard-Received Hydrometeorological Parameters

Autor: stud. Ioan BULBOACĂ, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Dinu ATODIRESEI

Abstract: This research examines how artificial intelligence can improve maritime voyage planning by using real-time hydrometeorological data standardized under the International Hydrographic Organization’s S-100 data model. Although weather routing technologies have developed significantly, traditional deterministic methods remain limited in supporting adaptive, real-time decision-making, especially in the context of rising operational costs, stricter environmental regulations, and increasing navigational complexity. The study follows a conceptual applied approach to develop and validate an AI-assisted voyage optimization model. The proposed model combines standardized hydrometeorological data with existing shipboard systems to generate dynamic route recommendations, while ensuring that navigation officers retain full decision-making authority. The findings suggest that AI-based decision support can improve navigational safety, operational efficiency,

and situational awareness without replacing human expertise. This research supports the role of artificial intelligence as a practical extension of e-Navigation and human-machine cooperation in maritime operations, with relevance for future system development, training, and regulatory considerations.

35. Measures and Procedures Employed for The Interception of Suspicious Targets with the Romanian Coast Guard Patrol Boat, Project Kewatec 1850

Autor: stud. Alexandru-Costel PLĂEȘU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. univ. Dr.ing. Sergiu ȘERBAN

Abstract: The paper deals with the measures and procedures taken with the Romanian Coast Guard CPB for the interception of suspicious targets, focusing on migrant boats, during a mission that took place in the Island of Lampedusa, Italy, which is the hot spot for illegal migration in the Mediterranean. The first chapter describes the framework of the operations which are undertaken at the external sea borders of the European Union by the FRONTEX agency and offers a presentation of the Agency, of its operations in the Mediterranean, which are meant to deal with the illegal migration phenomenon. It also reveals the history of FRONTEX operations in Italy with Romanian presence. Also, in the first chapter, I have included a presentation of the Romanian Coast Guard CPB MAI 3064, which was deployed in the operation in Lampedusa, with the author of the paper being the commanding officer and a presentation of the harbor, hydrometeorological conditions throughout the period, especially winds, tides and waves, which can influence maneuvering the CPB. The second chapter reveals a case study of one of the interceptions of a migrant boat, in somewhat rough weather conditions, and the description of the whole rescue process of the people on board, including detailed

description of the CPB maneuvering when leaving and entering the harbor, and the process of interception and embarkation/debarkation of the rescued people on/off the CPB. The third chapter was reserved for conclusions drawn at the end of the operation and the things that were learned from it.

36. Inattention and Routine During Navigational Watchkeeping – Risks to Safe Navigation

Autor: stud. Ioana-Cosmina IGNAT, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Instr. sup. drd. ing. Andrei POCORA

Abstract: Monotony and inattention during navigational watchkeeping can have a serious impact on the safety of ship operations. During long voyages, especially in areas with low traffic and calm weather, the officer of the watch may experience reduced alertness due to routine and lack of stimulation. This situation increases the risk of delayed reactions and poor decision-making. This paper focuses on the main causes of inattention and routine at the navigational watch and examines how these factors can affect the safe operation of a vessel. Issues such as fatigue, prolonged watchkeeping, over-familiarity with procedures, and excessive reliance on electronic navigation equipment are discussed. The project also highlights practical management measures that can help reduce these risks, including proper watch organization, effective bridge procedures, and increased awareness of the human factor. The aim of this study is to emphasize the importance of maintaining alertness and good operational management in order to ensure safe navigation.

37. Static Analysis Using the Finite Element Method on Structural Cutouts in Beams

Autori: stud. Ioana-Cosmina IGNAT, stud. Andreea-Erica ROBU, stud. Daniel STAVARACHE, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. univ. Dr. ing. Elisabeta BUZILĂ

Abstract: In order to obtain a lighter hull, solutions are needed to reduce the mass of the structural elements that make up the ship's hull. In the development of the ship's hull, in addition to the shell, there are a number of other elements of the system, transverse and longitudinal beams, which ensure the rigidity, strength, and stability of the ship. The purpose of this paper is to use the finite element method to perform an analysis between a deck area that has transverse beams with circular relief touts and another that has transverse beams with elongated relief touts. The purpose of this analysis is to determine which type of cutout is more efficient for beams that support a uniformly distributed load on the deck.

38. Digitalization of Safety Procedures Onboard: Implementation of Imo E-Navigation Standards

Autor: stud. George LUNGU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Sergiu LUPU

Abstract: This paper examines how digital safety procedures used onboard modern vessels support the practical implementation of the IMO e-Navigation concept. The analysis is based on the operational setup of a General Cargo vessel operating in European waters where safety management, maintenance planning, regulatory documentation, and navigational information are handled through integrated electronic systems, such as SMS, PMS, digital maritime libraries, and ECDIS with continuously updated ENC and Publications. The study highlights clear operational benefits, including improved access to information, better compliance with international regulations, and reduced risk of human error.

At the same time, it acknowledges challenges related to cybersecurity, technical failures, and the need for proper crew training. Overall, the findings show that digital safety management is a key element in the ongoing transition toward effective e-Navigation in commercial shipping.

39. Optimization of Navigation and Fuel de Consumption Through Digital Twin Technology

Autor: stud. Cosmin MAZILU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Lect. univ. Dr. ing. Dumitru CORDUNEANU

Abstract: This thesis investigates the implementation of Digital Twin technology to enhance maritime navigation and operational efficiency. As the industry strives to meet IMO decarbonization targets, the transition to data-driven "Smart Shipping" becomes essential. The research focuses on how virtual ship replicas, integrated with real-time IoT sensor data, enable precise route optimization and significant fuel consumption reduction. By analyzing technical parameters such as weather conditions, hull resistance, and engine performance, the study demonstrates the transition from traditional passage planning to dynamic, AI-supported modeling. The core research includes a comparative analysis supported by technical tables and performance graphs, highlighting the reduction in greenhouse gas emissions and operational costs. Ultimately, this project proves that Digital Twin technology is a critical tool for the future of sustainable and competitive maritime transport.

40. Use of Software Systems in the Implementation of Regulations and Procedures in the Nautical Domain

Autor: stud. Iulia-Ioana MIHAI, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. Andrei BĂUTU

Abstract: The growing complexity of activities in the nautical domain requires clear and effective ways to apply regulations and operational procedures. This paper explores the use of software systems to support the implementation and monitoring of maritime regulations and standard procedures. Modern software tools allow procedures, documents, and compliance requirements to be managed in digital form, improving clarity, consistency, and access to information. By organizing regulatory data in a centralized system and supporting regular updates, these solutions help reduce errors and support correct operational practices. The paper also discusses how software systems assist decision-making by providing accurate and up-to-date information. The results show that the use of software systems contributes to better compliance with regulations, increased operational efficiency, and improved safety in the nautical domain.

41. Docking Passenger Ship During High Tide

Autor: stud. Ion Andrei MUNTEANU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. univ. Dr. ing. Sergiu ȘERBAN

Abstract: In the presentation will be presented an example of real life passenger ship docking in a Canadian port at high tide. Content will have as well ship`s characteristics, weather details, master`s orders for docking the ship. The procedures will be explained as well for this kind of maneuver. Items like risks and issues that can occur will be discussed as well.

42. Study on Cargo Operations for Tanker Vessels Equipped with FRAMO Pumping Systems and Turbine-Driven Machinery

Autor: stud. Rebeca NICOLAIE, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Lect. univ. Dr. ing. Dumitru CORDUNEANU

Abstract: This study examines cargo operations on tanker vessels equipped with FRAMO pumping systems and turbine-driven machinery. Modern tankers require efficient, safe, and reliable cargo handling systems to manage large volumes of liquid cargo such as crude oil, petroleum products, and chemicals. FRAMO pumps are submerged, electrically driven centrifugal pumps installed inside cargo tanks, offering high efficiency, reduced suction problems, and improved safety due to the elimination of mechanical shaft seals. Turbine-driven systems, commonly steam or gas turbines, provide high power output and are well suited for large tankers with high discharge capacity requirements. The study highlights operational procedures during loading and discharging, including system preparation, monitoring, and coordination with shore terminals. Safety aspects such as explosion prevention, emergency shutdowns, and environmental protection are emphasized. The integration of FRAMO systems with turbine-driven machinery improves cargo transfer efficiency, reduces turnaround time, and enhances overall operational reliability, making these systems a preferred solution for modern tanker operations.

43. Adaptation of Navigation Officers to Modern Maritime Technologies

Autor: stud. Teodor-Daniel OPREA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Instr. sup. drd. ing. Andrei POCORA

Abstract: This paper explores the adaptation of navigation officers to modern maritime technologies, focusing on the transition from paper charts to ECDIS and the advantages of digital navigation for safer and more efficient operations. The study also highlights the use of modern meteorological applications, such as Octopus and SPOS, which provide real time data on weather and oceanographic conditions. The main point of this study tries to showcase the importance of ongoing

training for improved performance and current understanding of the newest released navigational equipments.

44. The ONE APUS Incident: An Analysis of Container Loss and Its Implications for Navigational Safety

Autor: stud. Izabela-Alexandra OȚELEA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Sergiu LUPU

Abstract: The container loss incident involving ONE APUS occurred during severe weather and resulted in the loss of a large number of containers. Strong vessel motions, challenging environmental conditions, and limitations in cargo securing played a key role in the event. This case highlights how weather, ship handling, and operational decisions can combine and lead to serious safety consequences, underlining the importance of good planning and risk awareness in container shipping.

45. Maneuvering of the Border Police Patrol Vessel for the Rescue of Survivors from Illegal Migration

Autor: stud. Vasile Claudiu POPA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. univ. Dr. ing. Sergiu ȘERBAN

Abstract: FRONTEX, the European Border and Coast Guard Agency, assists EU Member States in the integrated management of external borders through coordinated surveillance, joint maritime operations, and cooperation with European and international organizations. Romania supports these efforts by deploying specialized personnel and compatible technical assets, including participation in search and rescue (SAR) missions. On 12 October 2025, patrol vessel MAI 1107, located in Crotona, Italy, received a SAR request for a drifting 15-meter fishing boat carrying approximately 80 people under hazardous weather conditions. Operating alongside the Italian

Coast Guard vessel CP 302, designated On-Scene Coordinator, the crews executed a controlled approach, created a sheltered transfer area, and safely evacuated the persons in distress. This case emphasizes the critical role of crew preparedness, thorough knowledge of vessel capabilities, and realistic training in ensuring effective intervention during severe maritime situations

46. Modeling and Simulation of a Guidance Head for Autonomous Underwater Vehicles

Autor: stud. Ionuț- Daniel RĂDULICEA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. univ. Dr. ing. Andra NEDELUCU

Abstract: This paper focuses on the design, modeling, and simulation of an autonomous guidance head intended for underwater autonomous vehicles, capable of detecting, identifying, and tracking submerged objects using multiple sensing systems. The proposed guidance head integrates heterogeneous underwater detection technologies, such as active and passive sonar, acoustic signal processing, and optional optical or magnetic sensors, in order to enhance target recognition accuracy in complex underwater environments. The study presents a mathematical and functional model of the guidance head, including sensor fusion algorithms, signal filtering methods, and decision-making logic required for autonomous operation. Special attention is given to the challenges posed by underwater conditions, such as limited visibility, acoustic noise, signal attenuation, and environmental disturbances. Simulation models are developed to evaluate the performance of the guidance head under various operational scenarios, including different target types, distances, and environmental parameters. The results demonstrate the effectiveness of the proposed system in reliably identifying underwater objects and supporting autonomous navigation and

guidance. This research contributes to the advancement of autonomous underwater vehicle technologies, with potential applications in naval operations, underwater surveillance, mine countermeasures, and scientific exploration.

47. Fuel Efficiency and Ship Performance Management

Autor: stud. Andreea-Erica ROBU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Instr. sup. drd. ing. Andrei POCORA

Abstract: Fuel efficiency represents a critical performance indicator in modern shipping, directly influencing operational costs, environmental compliance, and fleet competitiveness. Ship performance management involves the systematic monitoring, analysis, and optimization of technical and operational parameters affecting fuel consumption. This paper examines advanced methods for improving fuel efficiency, including engine performance optimization, hull and propeller condition monitoring, trim optimization, weather routing, and speed management strategies. Emphasis is placed on the integration of digital performance monitoring systems, real-time data analytics, and Key Performance Indicators (KPIs) to support evidence-based managerial decisions. Furthermore, the study evaluates the impact of international environmental regulations on operational strategies and highlights the role of continuous performance assessment in achieving sustainable maritime operations. Effective ship performance management contributes not only to cost reduction but also to enhanced safety, regulatory compliance, and long-term operational sustainability.

48. Analysis and Improvement of Response Time in SAR (Search and Rescue) Operations in Romania's Exclusive Economic Zone

Autor: stud. Alexandru SCARLAT, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Lect. univ. Dr. ing. Dumitru CORDUNEANU

Abstract: This study examines response time in Search and Rescue (SAR) operations conducted within Romania's Exclusive Economic Zone in the Black Sea, focusing on its critical role in operational effectiveness and survival outcomes. The research analyzes the existing SAR operational framework, including institutional coordination, command-and-control structures, and resource allocation, in order to identify systemic factors contributing to response delays. Particular attention is given to communication processes, environmental conditions, and logistical constraints. The analysis is supported by operational data and comparative assessment with internationally recognized SAR standards and best practices. Based on the findings, the paper proposes a set of strategic and operational measures aimed at reducing response time, such as strengthening inter-agency cooperation, modernizing surveillance and communication capabilities, optimizing the deployment of SAR assets, and enhancing personnel training. The study concludes that a comprehensive and integrated approach to SAR management can substantially improve response efficiency and maritime safety within Romania's Exclusive Economic Zone.

49. Study on the use of Drone Technology and Autonomous Vehicles in Search and Rescue Operations in the South Atlantic

Autor: stud. Andrei-Cătălin STAVILA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Lect. univ. Dr. ing. Dumitru CORDUNEANU

Abstract: This study examines the application of drone technology and autonomous vehicles in search and rescue operations in the South Atlantic, a region characterized by vast

distances, severe weather conditions, and limited response infrastructure. The research analyzes how unmanned aerial vehicles and autonomous surface and underwater vehicles enhance situational awareness, reduce response times, and improve personnel safety during maritime emergencies. Operational capabilities such as real-time surveillance, thermal imaging, autonomous navigation, and data transmission are evaluated alongside current technological and regulatory limitations. Case studies and simulation-based assessments are used to identify best practices and integration challenges within existing search and rescue frameworks. The findings indicate that drone and autonomous vehicle deployment significantly increases search efficiency and operational coverage while reducing risk to human responders. The study concludes that continued technological development and coordinated international regulations are essential for maximizing the effectiveness of autonomous systems in South Atlantic search and rescue operations. Future research should focus on system interoperability, long-endurance platforms, and real-time coordination with manned assets.

50. Measures and Procedures Engaged for Towing Targets with Migrants on Board with the Romanian Coast Guard Patrol Boat, Project Kewatec 1850 on Bad Weather Conditions

Autor: stud. Marian BRANCIOG, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. univ. Dr. ing. Sergiu ȘERBAN

Abstract: The presentation examines the operational maneuver of a coastal patrol boat involved in towing a migrant boat and transporting the migrants safely to the port of Lampedusa. It highlights illegal migration as a major challenge for the European Union and explains the role of Frontex, along with the contribution of the Romanian Coast Guard, in maritime

surveillance and SAR missions. A contextual overview describes the Central Mediterranean migration route as the most active, where overcrowded and improvised boats frequently are always in high risks of capsizing. Lampedusa is a strategically important operational area with constant migratory pressure, often with periods of bad weather, making coordinated maritime interventions essential. The case study focuses on an operation from 2024, on south of Lampedusa, involving a boat with 59 migrants, and despite difficult hydrometeorological conditions strong southeast winds, moderate waves, and low visibility the patrol boat detected the target using radar and visual observation, approached in a controlled manner, and established communication with the migrants before initiating towing procedures.

51. Study on the Influence of Mediterranean Cyclones on Maritime Activity in the Black Sea

Autor: stud. Anamaria ȚURCANU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. univ. Dr. ing. Andra NEDELICU

Abstract: The general circulation of the atmosphere determines the formation and evolution of pressure systems that significantly influence weather and climate conditions on both regional and global scales. Within this complex system, extratropical cyclones represent the main generators of atmospheric instability in mid-latitudes, being responsible for a wide range of weather phenomena such as heavy precipitation, wind intensification, rapid temperature decreases or increases, and pronounced changes in atmospheric pressure. The Mediterranean region is one of the most active cyclogenetic areas in the Northern Hemisphere, due to strong thermal contrasts between air masses and the geographical and dynamical characteristics of the basin. Mediterranean cyclones frequently form in zones of interaction between cold air of

polar origin and warm, moist air of subtropical origin, being favored by relatively warm sea surfaces, the configuration of the relief, and the influence of the jet stream. Although generally smaller in size compared to oceanic extratropical cyclones, they can intensify rapidly and generate severe weather events with significant impacts on the affected regions. Numerous studies have shown that an important proportion of Mediterranean cyclones follow eastward or northeastward trajectories, affecting the Balkan Peninsula, the Black Sea basin, and adjacent regions.

52. The Importance of a Safety Management System in Shipping

Autor: stud. Alexandru-Victor VÎRTAN, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Dinu ATODIRESEI

Abstract: The shipping industry operates in a high-risk environment where accidents can have serious human, environmental, and economic consequences. A Safety Management System (SMS) provides a structured and proactive approach to identifying hazards, managing risks, and ensuring compliance with international maritime regulations. This paper examines the importance of SMS in shipping, highlighting its role in improving operational safety, enhancing crew competence, and promoting a strong safety culture onboard and ashore. It also discusses the contribution of SMS to accident prevention, environmental protection, and continuous improvement through monitoring, audits, and corrective actions.

SISTEME ELECTROMECHANICE NAVALE

BIROUL SECȚIUNII

Președinte: Prof. univ. Dr. ing. Beazit ALI

Membri: Conf. univ. Dr. ing. Cristian SCURTU

Ș.L. univ. Dr. ing. Octavian Narcis VOLINTIRU

Sala E121

1. Reliability and Maintainability Study of Equipment on Offshore Platforms. Case Study on the Subsea Control System

Autor: stud. Bogdan-Gabriel APOSTU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. Dr. ing. Doru COȘOFREȚ

Abstract: The dissertation entitled “Reliability and Maintainability Study of Equipment on Offshore Platforms. Case Study on the Subsea Control System” aims to evaluate the reliability and maintainability levels of the subsea control system within the oil and gas production system of offshore platforms, considering its essential role in maintaining hydrocarbon exploitation processes and preventing technical malfunctions that may lead to a total production shutdown. In this context, the paper capitalizes on data and models commonly used in practice to analyze the failure behavior of offshore equipment. The case study is conducted on a subsea control system associated with an offshore platform located in the North Sea. The practical usefulness of this work lies in the applicability of the proposed methodology for optimizing operating costs, increasing the availability of offshore systems, and improving operational safety, being relevant both for offshore platform operators and for engineers involved in the design and operation of subsea systems.

2. Study on the Modernization of Commercial Ships with Appropriate Equipment for Storing Alternative Fuels

Autor: stud. Cătălin-Ionuț BARABAȘA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr. ing. Ionel POPA

Abstract: Maritime transport faces a critical energy transition driven by IMO regulations targeting decarbonization and pollutant reduction (CO_2 , SO_x , NO_x). This study analyzes the evolution of the environmental framework and examines the shift from heavy fuels to sustainable alternatives. We evaluate the technical viability of LNG, methanol, ammonia, and hydrogen, focusing on energy density, storage challenges, and safety. While LNG and methanol serve as viable transitional solutions, carbon-free fuels like hydrogen present long-term potential despite infrastructure barriers. The paper provides a strategic overview of how "clean" fuels can balance operational efficiency with climate goals, shaping the future of sustainable naval propulsion.

3. 18,000 TEU Container Ship. Analysis of the Optimization Of The Ship's Energy Systems Through the use of Dual-Fuel Engines.

Autor: stud. Liviu-Daniel NANU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. Dr. ing. Octavian VOLINTIRU

Abstract: The global maritime industry is facing increasing pressure to reduce greenhouse gas emissions while maintaining high operational efficiency. This paper analyzes the optimization of energy systems for an 18,000 TEU container ship through the adoption of dual-fuel propulsion technologies. The study examines current trends in the use of alternative fuels, such as liquefied natural gas and other low-carbon options, focusing on their impact on energy efficiency and emission reduction. A detailed assessment of ship resistance,

propulsion power requirements, and engine selection is conducted using theoretical calculations and specialized software tools. Comparative analyses of modern dual-fuel marine engines from leading manufacturers are performed, considering performance, efficiency, and regulatory compliance, including the Energy Efficiency Existing Ship Index (EEXI). The results highlight the potential of dual-fuel engines to significantly improve energy efficiency and reduce environmental impact for large container vessels.

4. Considerations Regarding Advanced Command and Control Systems for Marine Engines. Case Study: Wärtsilä WinGD Type Engine

Autor: stud. Bogdan Stefan SUSANU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Daniel MĂRĂȘESCU

Abstract: This chapter presents a CFD-based analysis of the hydrodynamic performance of a large-diameter tanker propeller operating at 79 RPM under nominal load conditions. The static pressure distribution on the blade surfaces is examined to explain the physical mechanism of thrust generation, highlighting the pressure differential between the pressure and suction sides and its radial variation along the blade span. Results show that the outer blade regions contribute most to thrust while also being more susceptible to cavitation. The relationship between pressure distribution, thrust, and torque is analyzed to assess propulsive efficiency and hydrodynamic losses. Cavitation risk is evaluated using the cavitation number, indicating generally safe operating conditions with only localized potential for incipient cavitation near the blade tips. Overall, the findings confirm a stable, efficient, and operationally suitable propulsion regime for tanker applications

5. Considerations Regarding Advanced Command and Control Systems for Marine Engines. Case Study: Wärtsilä WinGD Type Engine

Autor: stud. Elvis ABDULCAI, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr.ing. Narcis VOLINTIRU

Abstract: Modern marine engines increasingly rely on advanced command and control systems to improve efficiency, safety, and environmental performance. This paper presents an overview of advanced control and monitoring solutions used in contemporary marine propulsion systems, with a particular focus on electronically controlled two-stroke engines. The study analyzes the architecture, functionality, and operational advantages of such systems, highlighting their role in optimizing fuel injection, exhaust valve timing, and engine protection. As a case study, the Wärtsilä WinGD engine is examined, emphasizing its integrated control platform, automation features, and contribution to reduced fuel consumption and emissions. The findings demonstrate that advanced command and control systems significantly enhance engine reliability, operational flexibility, and compliance with international maritime regulations, making them essential components of modern ship propulsion systems.

6. 15,000 TEU Container Ship. Analysis of Ship Energy Systems Optimization by Using Dual Engines

Autor: stud. Adrian-Constantin BURNETE, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr.ing. Narcis VOLINTIRU

Abstract: In the context of increasing pressure on the maritime sector to improve energy efficiency and reduce environmental impact, the optimization of ship energy systems has become a topic of significant interest. This dissertation focuses on a 15,000 TEU container ship and investigates the potential of

dual-engine configurations as a means of improving overall energy performance compared to conventional propulsion arrangements. The study provides a general analysis of the ship's energy system, taking into account propulsion requirements, auxiliary power demand, and typical operational profiles. Particular attention is given to the role of dual engines in enhancing operational flexibility, improving engine load management, and increasing system reliability. The potential implications of such configurations for fuel consumption and emission reduction are discussed in a broader regulatory and operational context.

7. Modeling the Propulsion System of a 5,000 TEU Container Ship

Autor: stud. Adrian DIACU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Daniel MĂRĂȘESCU

Abstract: This paper presents the modeling of the propulsion system of a 5000 TEU container ship, with the objective of analyzing its energetic and operational performance under different operating conditions. In the context of increasingly strict requirements on energy efficiency and emission reduction in maritime transport, accurate propulsion system modeling represents an essential tool in ship design and operation. The study develops a mathematical and functional model of the propulsion system, including the main diesel engine, mechanical transmission, marine propeller, and hull-propeller interaction. Engine characteristics, propeller performance curves, and hydrodynamic influences on fuel consumption and required propulsion power are examined using established marine propulsion theory and representative data for a medium-size container ship. Simulation results highlight the relationship between engine speed, delivered power, and propulsion efficiency under nominal and partial load conditions,

supporting optimization strategies for fuel consumption and CO₂ emission reduction.

8. Optimizing Propulsion System Performance on Bulk Carriers: An Analysis of Marine Propulsion Efficiency

Autor: stud. Ionuț DINU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr.ing. Narcis VOLINTIRU

Abstract: This dissertation analyzes the optimization of diesel propulsion systems for bulk carriers, focusing on the M/V Sohar Max. The study examines two-stroke low-speed diesel engines with direct mechanical transmission, evaluating their operational efficiency and environmental compliance. The research encompasses four main areas: current diesel propulsion technologies for bulk carriers, technical characteristics of the reference vessel, calculation of hull resistance and main engine selection, and comprehensive propulsion system optimization. The analysis employs hydrodynamic modeling to determine resistance components and power requirements, followed by engine selection based on specific fuel consumption and thermal efficiency criteria. The optimization phase addresses EEXI and CII compliance while maintaining commercial viability. Results demonstrate that proper engine-hull matching achieves 5-8% fuel reduction, with the selected MAN B&W configuration meeting regulatory requirements and operational objectives for modern bulk carrier service.

9. Bulk Carrier Vessel. Analysis of Ship Energy Systems Optimization through the Use of Dual-Fuel Engines

Autor: stud. Florina DRĂGHICI, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr.ing. Narcis VOLINTIRU

Abstract: This paper analyzes the optimization of ship energy systems for a bulk carrier through the use of dual-fuel engines. In the context of increasingly strict international regulations regarding fuel efficiency and greenhouse gas emissions, dual-fuel propulsion solutions have become an important alternative for modern bulk carriers. The study focuses on evaluating the energetic performance and environmental impact of dual-fuel engines operating with conventional marine fuels and alternative fuels such as liquefied natural gas (LNG). A comparative analysis is conducted between conventional diesel engines and dual-fuel configurations, considering parameters such as fuel consumption, engine efficiency, and emission reduction potential. The results highlight the advantages of dual-fuel engines in improving overall energy efficiency and reducing CO₂ and pollutant emissions. The paper demonstrates that integrating dual-fuel technology represents an effective solution for optimizing the energy systems of bulk carrier vessels while complying with current maritime environmental regulations.

10. Study on the Development of Alternative Technologies Equivalent to the Use of On-shore Power Supply

Autor: stud. Florian-Alexandru HONDRU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr. ing. Ionel POPA

Abstract: This dissertation explores the integration of hydrogen fuel cells and Battery Energy Storage Systems (BESS) as an alternative to traditional diesel-electric propulsion for ferries. The core objective is to develop a hybrid architecture equivalent to On-shore Power Supply (OPS) to eliminate emissions during port stays and maneuvering.

By implementing **Proton Exchange Membrane Fuel Cells (PEMFC)**, the system achieves energy efficiency exceeding 50-60%, significantly outperforming the 35-42% efficiency of

internal combustion engines. The proposed architecture utilizes a **DC Grid** to seamlessly synchronize the fuel cell's steady output with the dynamic response of **Lithium Iron Phosphate (LFP) batteries**. This "Peak Shaving" strategy protects the fuel cell membrane from load fluctuations while ensuring silent, zero-emission operations. Ultimately, this study demonstrates that hybrid hydrogen-battery systems provide a viable, eco-friendly solution for modernizing ferry fleets and protecting port environments.

11. Optimization of the Propulsion System Operation on a 41,000 DWT Oil/Chemical Tanker. Analysis of the Ship Propulsion. Efficiency

Autor: stud. Darius Ciprian POPAENE, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr.ing. Narcis VOLINTIRU

Abstract: Chapter one highlighted the aspects regarding the development of dual fuel engines for naval use and the challenges faced by specialized builders. Thus, it can be stated that the development of dual fuel engines has a sufficient technological momentum on all continents, the results obtained being intensely debated and analyzed at specialized conferences and forums. Chapter two of the paper presents the main dimensions and installations of the ship. It has a length of 183 m, a width of 32.0 m, a draft of 10.50 m. The main engine of the ship is of the 6S50 MC-C type, with 6 cylinders in line, with a diameter of 500 mm, a stroke of 2000 mm, a speed of 127 rpm, a power of 9480 kW.

12. Modelling of the Propulsion System of a 14,000 TEU Container Vessel

Autor: stud. Alexandru STANCU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Daniel MĂRĂȘESCU

Abstract: This dissertation addresses the modelling and analysis of the propulsion system of a 14,000 TEU container vessel, with emphasis on the main propeller and the shaft line. The study is based on the vessel's main technical characteristics and propulsion system data, and numerical simulations were carried out using the ANSYS software package. The hydrodynamic behavior of the propeller was investigated through CFD analysis in order to determine thrust generation and performance coefficients. Furthermore, a structural analysis of the propeller shaft was performed, focusing on total deformation and equivalent von Mises stress under combined torsional and axial loading conditions. The results provide an assessment of the structural integrity of the shaft and contribute to the evaluation of the propulsion system performance and reliability.

Keywords: marine propulsion system, container vessel, propeller, shaft line, CFD analysis, ANSYS

13. Reliability Modeling and Determination of Mean Repair Times for a Marine Equipment Assembly. Case Study: Bilge Electric Pump

Autor: stud. Dorin-Valentin-Nicolae BUCUR, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr.ing. Narcis VOLINTIRU

Abstract: Reliability is a critical parameter for shipboard equipment, with a direct impact on operational safety, maintenance efficiency, and vessel availability. This paper presents a reliability modeling approach and the determination of mean repair times for a marine equipment assembly, using a bilge electric pump as a case study. The bilge system plays an essential role in ensuring ship safety by removing accumulated liquids from machinery spaces and other compartments. The study involves the identification of the main components of the bilge electric pump and the analysis of their associated failure

modes. Reliability block diagrams and classical statistical models are applied to evaluate the overall system reliability under normal operating conditions. Mean Time to Repair values are estimated based on maintenance documentation, manufacturer data, and typical onboard repair scenarios.

The results allow the assessment of system availability and the identification of critical components affecting reliability. The conclusions support the optimization of preventive maintenance strategies for marine equipment.

14. Optimization of the Operation of the Propulsion System on a 300,000 DWT oil Tanker. Analysis of the Ship's Propulsion Efficiency

Autor: stud. Andrei-Robert CHIHAI, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr.ing. Narcis VOLINTIRU

Abstract: The dissertation aims to analyse and optimize the operation of the propulsion system of a large-capacity oil tanker with a displacement of approximately 300,000 DWT. The topic addresses essential aspects related to the energy efficiency of marine propulsion, taking into account current requirements for reducing fuel consumption and pollutant emissions, as well as improving the operational performance of maritime vessels. The study analyses the main components of the propulsion system, including the main engine, propeller, and auxiliary systems, highlighting their influence on the overall efficiency of the ship. In addition, methods for evaluating propulsive efficiency under different operating conditions are presented, along with external factors that may affect vessel performance, such as operating conditions, loading condition, and hull condition. Based on the conducted analysis, the dissertation proposes solutions and optimization directions for the operation of the propulsion system, with the aim of improving energy

efficiency, reducing operating costs, and contributing to the sustainable operation of modern oil tankers.

15. Optimization of the Operation of the Propulsion System on a 24,000 TEU Container Ship. Analysis of the Ship's Propulsion Efficiency

Autor: stud. Adrian-Marius CHIRU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr.ing. Narcis VOLINTIRU

Abstract: This dissertation focuses on the analysis and optimization of the operation of the propulsion system of a large container ship with a capacity of approximately 24,000 TEU. The topic is addressed in the context of modern maritime transport, where energy efficiency, fuel consumption reduction, and the limitation of pollutant emissions have become essential objectives for the operation of commercial vessels.

The study examines the main components of the propulsion system, including the main engine, transmission system, propeller, and auxiliary systems, highlighting their influence on the overall propulsive efficiency of the ship. Methods for evaluating propulsion efficiency under different operating conditions are presented, taking into account factors such as vessel speed, loading condition, hydrometeorological conditions, and hull condition. Based on the conducted analysis, the dissertation proposes optimization solutions aimed at improving energy performance, reducing operational costs, and enhancing the sustainable operation of large-capacity container ships.

16. 300,000 DWT Oil Tanker. Analysis of the Optimization of the Ship's Energy Systems through the Use of Dual-Fuel Engines

Autor: stud. Robert Ionuț CHISCOP, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr.ing. Narcis VOLINTIRU

Abstract: This paper analyzes the optimization of energy systems for a 300,000 DWT oil tanker through the implementation of dual-fuel engine technology. The study focuses on the technical and operational benefits of using dual-fuel engines capable of operating on conventional marine fuels and liquefied natural gas (LNG). Key aspects include fuel efficiency, emission reduction, compliance with international environmental regulations, and overall energy performance of the vessel. Comparative analyses are conducted between conventional propulsion systems and dual-fuel configurations to evaluate potential improvements in fuel consumption and environmental impact. The results indicate that dual-fuel engines can significantly reduce greenhouse gas emissions and operating costs while enhancing the flexibility and sustainability of the ship's energy system. The study highlights dual-fuel technology as a viable solution for optimizing large tanker energy systems in the context of increasingly strict environmental requirements.

17. CO2 Fire Extinguishing System on a Container Ship. Automation and Maintenance

Autor: stud. Adrian-Laurențiu DAVID, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Beazit ALI

Abstract: It is well established that on board a maritime vessel there is a variety of fire-fighting systems. The port container ship *Cosco Hope* is no exception, especially since it is a very large vessel with a relatively small crew. Moreover, for the studied vessel, being equipped with reliable fire-fighting installations is essential, given that the ship was involved in an incident in which a fire broke out on board on May 3, 2016, around midnight, when it was about to berth on the eastern side of Port Said. The vessel collided with a quay crane, and the

impact generated sparks that ignited a container containing flammable materials. Approximately 20 containers caught fire instantaneously. Two crew members were injured.

18. Study on the use of Methanol as Fuel for Marine Engines. Case Study

Autor: stud. Alexandru-Andrei GAVRILAȘ, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr. ing. Ionel POPA

Abstract: This paper presents the increasing pressure to reduce greenhouse gas emissions in the maritime sector has accelerated the search for alternative marine fuels. Methanol has emerged as a promising solution due to its low carbon content, availability, and compatibility with existing engine technologies. This dissertation examines the use of methanol as a fuel for marine engines, focusing on technical, operational, and environmental aspects. The study analyzes methanol fuel properties, engine modifications required for its implementation, and safety considerations associated with storage and handling onboard ships. A case study is presented to evaluate the performance and efficiency of a marine engine operating on methanol, as well as the potential emission reductions compared to conventional marine fuels. The results highlight the feasibility of methanol as a marine fuel and its potential contribution to achieving sustainable and environmentally compliant maritime transport.

19. Dimensioning of the Cargo Heating Installation. Automation of Area Operation.

Autor: stud. Alexandru-Robert SAVULESCU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Beazit ALI

Abstract: Chapter one highlights the main technical and operational characteristics of an oil tanker, with emphasis on

cargo properties and operating conditions that require the use of cargo heating systems. The general arrangement of cargo tanks, environmental conditions during navigation, and operational requirements for safe cargo transportation are presented, forming the basis for the design of the cargo heating installation. Chapter two presents the cargo heating installation used on oil tankers, describing its main components, schematic layout, technical characteristics, and operating principles. The system is designed to maintain the cargo temperature within prescribed limits using heating coils supplied by steam or hot water, ensuring proper cargo handling, pumpability, and safe operation during the entire voyage.

OPERAREA ȘI CONDUCEREA SISTEMELOR ELECTROENERGETICE NAVALE

BIROUL SECȚIUNII

Președinte: Prof. univ. Dr. ing. Vasile DOBREF

Membri: Ș.L. univ. Dr. ing. Leon PANĂ

Ș.L. univ. Dr. ing. Iancu CIOCIOI

Sala LI356

1. Factors that Affect Electromagnetic Interference Shielding

Autor: stud. Alexandru-Gabriel AVĂDĂNEI, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr. ing. Iancu CIOCIOI

Abstract: Electromagnetic interference (EMI) is considered the fourth major form of environmental pollution, following air, water, and noise pollution. It originates as an unintended consequence of electronic devices and significantly degrades the performance of electronic systems, while also posing potential risks to human health. Common manifestations include signal noise and image distortion in televisions, radios, and computer screens caused by wireless communication sources. As a result, EMI shielding has become essential for microwave-frequency applications such as telecommunications, radar systems, and electronic enclosures. Modern shielding solutions increasingly favor lightweight carbon-based composites over conventional metallic materials due to their efficiency and reduced weight. EMI shielding works by limiting electromagnetic wave propagation through reflection, absorption, and scattering, mechanisms influenced by material electrical and magnetic properties. This work outlines the fundamentals of EMI shielding theory, material

characterization techniques, shielding mechanisms, and recent advances in electromagnetic materials, emphasizing their role in next-generation shielding technologies.

2. Fault Analysis in High Voltage Power Systems Based on the Symmetrical Components Method

Autor: stud. Emanuel-Nicolae BADEA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Leon PANĂ

Abstract: Power systems are the critical infrastructure of modern society, providing the generation, transmission and distribution of electricity to industrial, commercial and residential consumers. In normal operation, they operate in a three-phase configuration, characterized by balanced voltages and currents, 120° out of phase between phases. This arrangement allows the transmission of electricity with maximum efficiency and maintains system stability. In the context of a continuous increase in energy demand and regional interconnection of power networks, maintaining phase balance is becoming an essential factor in the safe and reliable operation of high-voltage networks. Throughout the evolution of power systems, their complexity has increased significantly. In the past, networks were relatively simple, with a single major energy source and evenly distributed consumers, which allowed relatively easy control of voltage and current regimes. With industrial development, increased consumption and regional interconnection of systems, networks have become complex and dynamic.

3. Operation, Management and Supervision of Naval Electrical Power Systems by the Electrical Officer

Autors: stud. Marius Nicolae BĂRLĂDEANU, stud. Valentin HARAS, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Gheorghe SAMOILESCU

Abstract: This chapter presents the fundamental aspects of the shipboard electrical power system, focusing on its architecture, functions, and operating modes. Unlike shore-based networks, a marine electrical system operates as an isolated microgrid, requiring high levels of reliability, redundancy, and continuity to ensure the safety of the vessel, crew, and cargo. The chapter analyzes the main components of the system, including power generation using diesel-driven generators, emergency power sources, energy storage solutions, and modern alternatives such as hybrid and fully electric configurations. Particular attention is given to power distribution architectures, voltage and frequency levels, and the classification and prioritization of onboard consumers according to their operational importance. Additionally, the chapter examines protection systems and power quality issues specific to marine environments, such as insulation monitoring, fault selectivity, voltage and frequency stability, and harmonic distortion. Overall, the chapter highlights the critical role of proper design and operation of shipboard electrical power systems in maintaining safe, efficient, and continuous vessel operation under both normal and emergency conditions.

4. Practical Study on the Design and Testing of a UAV

Autor: stud. Anamaria-Daniela BÎRZAN, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Paul BURLACU

Abstract: This paper presents the study of the design, implementation, and testing of an unmanned aerial vehicle (UAV), analyzed from a mechatronic perspective. The UAV represents a complex mechatronic system resulting from the integration of mechanical engineering, electronics, computer engineering, and control engineering. Within the project, a small quadcopter was developed for educational and research purposes, capable of operating in both assisted and autonomous

flight modes. The paper describes the mechanical structure of the drone, the electrical schematic and power supply, as well as the electronic components used, including BLDC motors, the flight controller, and communication systems. Special emphasis is placed on the navigation system, which is based on sensor fusion using GPS, an inertial measurement unit, and a barometric sensor, as well as on PID control algorithms employed for flight stabilization. UAV control and monitoring are achieved through open-source software, enabling trajectory planning and safety functions such as automatic landing. Experimental results confirm the system's stability, an autonomy of approximately 16 minutes, and the platform's potential for future developments in autonomous flight applications.

5. Energy Project Proposal – Photovoltaic Park

Autor: stud. Alexandru – Mihăiță DEDIȘ, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Vasile DOBREF

Abstract: The proposed project aims to develop a solar photovoltaic (PV) park to generate clean and sustainable electricity. The main objective is to harness renewable solar energy to reduce greenhouse gas emissions and support the transition toward a low-carbon energy system. The park will include the installation of high-efficiency PV panels, inverters, transformers, and grid connection infrastructure, designed to operate reliably and efficiently over its lifetime. By generating electricity from a renewable source, the project will contribute to energy security, meet local energy demand, and reduce environmental impacts associated with fossil fuels. In addition to its environmental benefits, the project will create employment opportunities during both the construction and operational phases, foster technological development in the renewable energy sector, and promote awareness of sustainable

energy practices. This initiative aligns with national and global sustainability goals, providing long-term economic, environmental, and social benefits.

6. Antennas Specific to the Radio-technical Equipment on Board Ships

Autor: stud. Iulian-Mihai DUMITRAȘCU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr. ing. Iancu CIOCIOI

Abstract: This study examines antennas specific to radiotechnical equipment installed on board maritime vessels, emphasizing their fundamental role in ship communication, navigation, and operational safety. The study describes the principal categories of shipborne antennas used for VHF, MF/HF, radar, GNSS, and satellite communication systems. The analysis addresses antenna operating principles, frequency characteristics, radiation patterns, polarization, and installation constraints imposed by the maritime environment. Special attention is given to the impact of antenna placement, electromagnetic interference, and environmental factors on system performance. The study highlights the necessity of proper antenna selection, installation, and maintenance in order to ensure reliable radiocommunication, compliance with international maritime regulations, and the safe operation of radio-technical systems on board ships.

7. Development and Implementation of a Large-Capacity Photovoltaic Park in the Dobrogea Region for Sustainable Electricity Production and Increased National Energy Security

Autor: stud. George-Răzvan GAVRILĂ, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Vasile DOBREF

Abstract: This paper addresses the development and implementation of a large-scale photovoltaic power plant in the Dobrogea region of Romania, an area characterized by high solar potential and strategic importance for renewable energy deployment. The proposed project involves the design, construction, and commissioning of a photovoltaic park with an installed capacity of approximately 100 MWp, aimed at increasing renewable electricity production and strengthening national energy security. The study presents the project objectives, technical configuration, implementation phases, and applied methodologies, including advanced photovoltaic modules, high-efficiency inverters, and intelligent monitoring systems. Furthermore, the paper discusses the alignment of the project with national and European energy policies and evaluates its expected economic, social, and environmental impacts. The results indicate a significant contribution to greenhouse gas emission reduction, estimated at over 90,000 tons of CO₂ annually, while ensuring long-term technical reliability and sustainability.

8. AI-Driven Decision Support System for Multi-Objective Path Planning and Propulsion Optimization in Hybrid Wind-Assisted Vessels

Autori: stud. Valentin-Rareș HARAS, stud. Marius Nicolae BÂRLADEANU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Gheorghe SAMOILESCU

Abstract: This research proposes an AI-driven Decision Support System designed to revolutionize maritime efficiency by integrating Flettner rotor technology with advanced path planning. The framework begins with a robust data acquisition layer, processing real-time hydro-meteorological variables and the physics of the Magnus effect. At its core, the system utilizes Machine Learning algorithms to predict sea states and optimize

propulsion, strategically balancing engine load with wind-generated thrust. By employing multi-objective reinforcement learning, the system calculates optimal trajectories that prioritize fuel economy and emission reduction. The study concludes with high-fidelity simulations demonstrating the system's ability to navigate complex conditions while maximizing energy compensation through wind assistance.

9. Analysis of Measures to Reduce Emissions in Order to Increase the Reliability and Durability of Commercial Ships in the Car Compartment in Terms of Energy

Autor: stud. Valentin-Rares HARAS, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Gheorghe SAMOILESCU

Abstract: Reducing emissions in the engine rooms of commercial ships increases energy efficiency, reliability, and sustainability. Key measures include: optimizing engines through predictive maintenance and waste heat recovery (WHR) systems, which increase efficiency by up to 10%. The transition to clean fuels (LNG, green methanol, ammonia) reduces CO₂, SO_x, and NO_x emissions but requires technical adaptations and infrastructure. Scrubbers allow the use of HFO but have limited environmental impact. Partial electrification (hybrid systems) and renewables (solar) support port operations. Digitalization through EMS, digital twins, and AI optimization reduces consumption by 5–15% and extends equipment life. IMO regulations (EEDI, EEXI, CII) accelerate the adoption of these solutions. Integrated implementation of these measures ensures compliance, operational savings, and long-term competitiveness in the context of decarbonization targets by 2050. Success depends on investment, training, and alignment with port infrastructure and technological developments.

10. Construction of a Green Hydrogen Production and Storage Station

Autor: stud. Ionuț-Sorin NEDELUCU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Vasile DOBREF

Abstract: This project aims to design and implement a green hydrogen production and storage station (Power-to-Hydrogen), with the main objective of decarbonizing industrial consumers and heavy transport. The proposed technical architecture integrates renewable energy sources with a water electrolysis system, the process being supported by high-pressure compression and storage units. The central element of the work is the advanced energy management system (EMS) and SCADA, which ensures safe operation through real-time monitoring of critical parameters (pressure, temperature, flow) and the implementation of complex interlocking and emergency shutdown (ESD) matrices. The project demonstrates the technical viability of transforming surplus green energy into hydrogen, providing a scalable solution for grid stability and carbon emission reduction, in accordance with international safety standards.

11. Automatic Encryption and Decryption of Onboard Network Traffic

Autor: stud. Dan-Iulian NICHITEANU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr. ing. Paul VASILIU

Abstract: This paper explores the problem of securing data transmission in maritime communication systems, where the protection of navigation, control, and monitoring data is essential. The study analyzes classical symmetric cryptographic methods, namely the affine cipher, the Vigenère cipher, and the Hill cipher, from both theoretical and practical perspectives. A comparative evaluation is carried out using a software

implementation developed in the C++ programming language, which enables encryption, decryption, and execution time measurement for each algorithm. The results emphasize the trade-offs between computational efficiency, simplicity, and security offered by the analyzed techniques. Among the studied methods, the Vigenère cipher exhibits a balanced combination of low implementation complexity and acceptable performance, making it suitable for demonstrative and prototyping purposes in resource-constrained environments. The paper provides insight into the applicability of classical cryptographic approaches in maritime data communication scenarios and outlines directions for future extensions toward modern encryption methods.

12. 20 MW Photovoltaic Park with a 5 MW Battery Energy Storage System

Autor: stud. Cristian NISTOR, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Vasile DOBREF

Abstract: This project presents the design, sizing, and techno-economic analysis of a 20 MW photovoltaic power plant equipped with a 5 MW battery energy storage system (BESS). The main objective is to produce renewable electricity while improving grid stability and reducing carbon emissions. The photovoltaic park uses high-efficiency monocrystalline solar panels, centralized and string inverters, and is connected to the medium-voltage grid through dedicated transformers and monitoring systems. The integrated lithium-ion battery storage system, with a capacity of 10 MWh, enables energy balancing, peak shaving, and improved reliability of energy supply. The project includes an analysis of energy flows, technical configuration, and economic performance, highlighting an estimated annual energy production of approximately 30,000 MWh. Economic evaluation shows attractive profitability, with

significant environmental benefits, including a reduction of around 15,000 tons of CO₂ emissions per year. Overall, the project supports sustainable development and the transition to a modern, secure, and resilient energy system.

13. Study of the Effects of Electromagnetic Interference on Naval Equipment and Devices

Autor: stud. Armand Cristian TRIFU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr. ing. Iancu CIOCIOI

Abstract: This study examines the effects of electromagnetic interference (EMI) on naval equipment and onboard devices, focusing on reliability, operational safety, and the continuity of critical ship systems. It reviews the main EMI sources in the maritime environment electric motors, power converters, radio communications, radar, and inadequate cabling or grounding and explains coupling mechanisms through conducted and radiated paths. The work highlights EMI impacts on sensors, automation and control units, communication links, and navigation systems, with typical symptoms such as measurement errors, controller resets, false trips/alarms, and signal degradation. Finally, it outlines practical EMC-based mitigation approaches, including shielding, filtering, proper grounding and bonding, cable routing separation, optimized installation/layout, and compliance testing to ensure electromagnetic compatibility and robust performance under real operating conditions.

14. Monitoring and Control of Electrical Installations on Board Maritime Vessels Using Automation and SCADA Systems

Autor: stud. Sebastian UNGUREANU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Leon PANĂ

Abstract: This paper presents an overview of monitoring and control solutions for electrical installations on board maritime vessels using automation and SCADA systems. Modern ships rely on complex electrical networks that require continuous supervision to ensure safety, efficiency and operational reliability.

15. T2000 Fire Detection and Extinguishing System in The Maritime Sector

Autor: stud. Marius ALEXANDRU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Paul BURLACU

Abstract: This paper presents the structure and operation of the T2000 fire detection and extinguishing system used in maritime environments. Shipboard equipment and environmental conditions increase fire risk, requiring automated protection systems capable of continuous monitoring and fast response without immediate human intervention. The study analyzes the system architecture, including detectors, the central control unit, and execution components organized on field, control, and supervision levels. It describes functional schemes, operating modes, alarm response sequences, and integration with ship monitoring systems, emphasizing modular design and zone-based fire localization. The paper also outlines current implementation practices and future development trends, such as digital integration, advanced diagnostics, and centralized monitoring. The research highlights the importance of automation and control engineering in improving fire safety, reliability, and operational efficiency in maritime systems.

16. Industrial Battery Energy Storage System (BESS) – 50 MW / 100 MWh for System Services and Integration of Renewable Sources

Autor: stud. Marius ALEXANDRU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Vasile DOBREF

Abstract: Electromagnetic interference (EMI) is considered the fourth major form of environmental pollution, following air, water, and noise pollution. It originates as an unintended This paper presents the design of a 50 MW / 100 MWh Battery Energy Storage System (BESS) for supporting the Romanian National Power System, especially in the Dobrogea region. The project addresses challenges caused by high renewable energy penetration, such as frequency deviations, production consumption imbalance, and grid congestion. BESS systems can store excess energy and rapidly supply it when needed. The study describes the technical structure of the system, including lithium-ion batteries, bidirectional inverters, transformers, and SCADA monitoring. It explains operating regimes, grid connection, and performance characteristics, emphasizing fast response for system services and energy balancing. The paper also analyzes economic feasibility, operational safety, and environmental impact. The results show that BESS technology increases grid flexibility, supports renewable energy integration, and improves long-term stability and efficiency of the national power system.

17. Implementation of a SCADA System for Monitoring Electric Propulsion Motors (Temperature, Current, Vibrations)

Autor: stud. Marius ALEXANDRU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Florentiu DELIU

Abstract: This paper presents the implementation of a SCADA (Supervisory Control and Data Acquisition) system designed for monitoring electric propulsion motors by tracking key operational parameters such as temperature, current

consumption, and vibration levels. The system integrates industrial sensors, data acquisition modules, and real-time visualization software to ensure continuous supervision and early fault detection. By collecting and analyzing operational data, the SCADA solution improves reliability, increases operational safety, and supports predictive maintenance strategies. The proposed architecture enables remote monitoring, alarm management, and historical data analysis, allowing operators to optimize motor performance and reduce downtime. Experimental validation demonstrates the system's effectiveness in detecting abnormal operating conditions and preventing potential failures. The implementation highlights the importance of modern automation technologies in enhancing efficiency and extending the lifespan of electric propulsion systems.

18. Implementation of a Mechatronic System for Cargo Handling in Ports

Autor: stud. Flavia Ioana FLOREA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Paul BURLACU

Abstract: This paper explores the integration of mechatronic principles in the development of advanced cargo handling systems, focusing on the **Maxtech fixed marine crane** as a primary case study. In the context of the information society, mechatronics has evolved from a simple synergy of mechanics, electronics, and informatics into a comprehensive philosophy of "intelligent machines." The study analyzes the system's architecture, highlighting how the integration of high-performance hydraulic actuators, specialized sensors, and advanced control algorithms transforms conventional lifting equipment into an intelligent system. Key features such as anti-collision logic, smart overload protection, and real-time data acquisition ensure operational safety and efficiency in

demanding maritime and offshore environments. The paper concludes that the transition from raw mechanical power to information-driven control, validated by international industrial certifications, is essential for modernizing port logistics and achieving sustainable progress in 21st-century naval engineering.

Keywords: Mechatronics, Cargo Handling, Port Logistics, Intelligent Systems, Marine Engineering.

19. General Considerations Regarding the Use of Artificial Intelligence in the Maritime Domain

Autor: stud. Maria Gabriela CULCEA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Paul BURLACU

Abstract: This paper analyzes the growing role of artificial intelligence (AI) in the maritime domain, focusing on its integration into ship navigation, monitoring, and decision-making processes. Modern vessels rely on automated systems supported by sensors, data acquisition equipment, and advanced algorithms such as Machine Learning and Deep Learning, enabling real-time data processing and improved situational awareness. AI technologies support key navigation functions, including obstacle detection, collision risk estimation, and route optimization, significantly increasing operational safety and efficiency. The study also highlights the transition from traditional ship control toward semi-autonomous and autonomous vessels, emphasizing the importance of cybersecurity and updated international maritime regulations. Furthermore, AI helps reduce operational costs and environmental impact by optimizing fuel consumption and resource management. Overall, AI-based systems represent an important step toward safer, smarter, and more sustainable maritime transport.

20. The Concept of Mechatronics

Autor: stud. George-Răzvan GAVRILĂ, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Paul BURLACU

Abstract: This paper presents the concept of mechatronics as an interdisciplinary engineering field resulting from the synergistic integration of mechanics, electronics, and computer science. Starting from the historical evolution of technical systems, the study highlights the transition from purely mechanical systems to intelligent mechatronic systems enabled by advances in electronics, automation, and information technology. Various definitions, models, and classifications of mechatronic systems are analyzed, emphasizing their structure, functionality, and domains of application. The paper also discusses the key principles of mechatronic system design, including functional and spatial integration, intelligence, and flexibility, as well as the shift from sequential to concurrent engineering approaches. Furthermore, representative applications in industry, robotics, transportation, medicine, agriculture, and micro-mechatronics are presented. The analysis underlines the essential role of mechatronics in modern technological development and its growing importance in achieving high-performance, reliable, and intelligent engineering systems.

21. Hybrid Photovoltaic System for Optimizing Energy Consumption in Areas with High Solar Radiation (Case Study: The Black Sea Coast)

Autor: stud. Florescu-Adrian GEAPANA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Leon PANĂ

Abstract: This paper analyzes the design and implementation of a hybrid photovoltaic system for optimizing energy consumption in areas with high solar radiation, using the Black Sea coast as a case study. In the context of the energy transition

and European objectives for reducing carbon emissions, photovoltaic solar energy has emerged as a mature and sustainable solution. The Dobrogea region benefits from significant solar potential, favorable for the development of high-efficiency photovoltaic systems. The paper proposes an integrated system based on monocrystalline panels, a smart hybrid inverter, and energy storage units adapted to the climatic and salinity conditions specific to the marine environment. The research methodology includes solar irradiance analysis, energy production modeling, and system performance evaluation under real operating conditions. The results highlight an increase in self-consumption, a reduction in CO₂ emissions, and the technical and economic viability of the proposed solution, confirming the relevance of solar energy for the sustainable development of coastal areas.

22. Analysis of Hybrid Propellant in a Marine Vessel

Autor: stud. Ștefan Teodor LĂBUNȚ, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Gheorghe SAMOILESCU

Abstract: This project addresses the analysis of hybrid propulsion systems applied to modern marine vessels, focusing on their technical configuration, operational advantages, and future development perspectives. Hybrid marine propulsion combines conventional internal combustion engines with electric machines and energy storage systems, enabling flexible power management and improved efficiency across different operating profiles. The study aims to evaluate the performance of hybrid propulsion architectures in comparison with traditional propulsion solutions, with particular emphasis on fuel consumption, emission reduction, and operational reliability. A key objective of the research is the development of a dedicated simulation program for hybrid marine propulsion. The proposed simulation model is intended to

represent the interaction between diesel engines, electric motors, power electronics, batteries, and propellers under various navigational scenarios. By implementing numerical modeling and control strategies, the simulation tool will allow the assessment of energy flows, propulsion efficiency, and dynamic system behavior in different operating modes, such as diesel-only, electric-only, and combined propulsion. The expected results of the study include the identification of optimal operating strategies, quantitative evaluation of efficiency gains, and estimation of environmental benefits. The research aims to demonstrate that hybrid propulsion systems represent a viable and sustainable solution for future marine applications, supporting compliance with increasingly stringent environmental regulations and contributing to the modernization of naval propulsion technologies.

23. Energy Project Management in Naval Electrical Engineering

Autor: stud. Ștefan Teodor LĂBUNȚ, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Vasile DOBREF

Abstract: This project analyzes the planning, implementation, and management of a 100 kWp ground-mounted photovoltaic power plant developed for an industrial small and medium-sized enterprise located in the rural area of Casimcea, Tulcea County, Romania. The primary objective of the investment is to cover the beneficiary's own electricity demand through on-site renewable energy generation, while exporting surplus energy to the national power system. The study is motivated by increasing electricity prices, market volatility, and the need to reduce carbon emissions in accordance with European energy transition policies. The paper presents an integrated approach combining technical design, operational planning, financial evaluation, and risk assessment. The proposed system

configuration ensures an estimated annual energy production of approximately 120 MWh, with an auto consumption rate of around 80%, maximizing economic benefits. Financial analysis demonstrates the project's viability, with a positive net present value, a payback period of approximately eight years, and stable long-term cash flows over a system lifetime of 20–25 years. In addition to economic performance, the project evaluates social and environmental impacts, highlighting contributions to local development, increased acceptance of renewable energy technologies, and annual reductions of greenhouse gas emissions. The results confirm that small-scale photovoltaic projects can represent a rational management decision, combining economic efficiency, environmental responsibility, and sustainable energy system integration.

24. Intelligent Hybrid System (Solar-Piezo) for Green Energy Generation in High-Traffic Urban Pedestrian Areas (Eco-Walk)

Autor: stud. Cristian-Adrian MATEI, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Leon PANĂ

Abstract: This paper presents the design and evaluation of an intelligent hybrid solar–piezoelectric system for green energy generation in urban areas with intense pedestrian traffic, referred to as ECO-WALK. In the context of smart city development and Net Zero urban strategies, the proposed solution transforms passive pedestrian infrastructure into an active source of renewable energy. The system integrates thin-film photovoltaic cells with piezoelectric transducers embedded within modular pavement units, enabling simultaneous harvesting of solar radiation and kinetic energy generated by pedestrian movement. This hybrid architecture ensures continuous and more predictable energy production, including nighttime and low-irradiance conditions. The research

methodology includes material selection, mechanical and electrical modeling, power conversion optimization, and real-world performance validation using IoT-based monitoring. Results indicate improved energy stability, increased power density per square meter, and enhanced urban energy efficiency. The study demonstrates the technical feasibility and sustainability of hybrid energy-harvesting pavements, positioning ECO-WALK as a viable solution for smart urban infrastructure and decentralized renewable energy generation.

25. Study on the Influence of Superstructure Elements on The Directivity Characteristics of a Shipboard Antenna

Autor: stud. Bogdan-Constantin MOISEI, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr. ing. Iancu CIOCIOI

Abstract: This study investigates the influence of ship superstructure elements on the directivity pattern of an onboard antenna used in maritime communication, radionavigation, or radar systems. Large metallic structures (masts, upper decks, funnels, cranes, etc.) located in the immediate vicinity of the antenna generate complex electromagnetic effects, including multiple reflections, diffraction, partial shadowing, and unwanted coupling. The research combines full-wave electromagnetic numerical simulations (using MOM, FEM, and/or FDTD methods) with realistic modeling of actual ship geometry, supplemented by experimental measurements (scale-model and/or in-situ). Analyzed parameters include deviation of the main radiation direction, changes in beamwidth, increase in sidelobe levels, appearance of additional nulls, and variation of effective gain as a function of azimuth and elevation angle. Results demonstrate a significantly stronger impact at VHF, UHF, and higher frequencies, where superstructure dimensions become comparable to the wavelength. Practical solutions are proposed for optimizing antenna placement and improving

performance (reconfigurable antennas, beamforming techniques, digital compensation), contributing to enhanced reliability of shipboard communication systems.

26. Digital Evolution in the Maritime Sector: From SCADA to Artificial Intelligence

Autor: stud. Nicolae NICOLĂESCU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Gheorghe SAMOILESCU

Abstract: This paper analyzes the digital transformation of the maritime industry, highlighting the transition from conventional automation and SCADA systems to the integration of Artificial Intelligence (AI) and Maritime Autonomous Surface Ships (MASS). Within the framework of new IMO regulations regarding energy efficiency (EEXI, CII) and the urgent need to reduce human error accountable for over 90% of maritime accidents the study explores the fusion between mechatronics and Cyber-Physical Systems (CPS). Critical components of naval digital infrastructure are examined, ranging from field devices (intelligent sensors, Lidar) and communication protocols (NMEA 2000, Modbus) to complex architectures like Power Management Systems (PMS). The conclusions emphasize that digitalization is not merely a fuel optimization method but an essential Decision Support System (DSS) that redefines the safety of modern navigation.

27. Integrating Machine Learning Algorithms and Real-Time Weather Data for Shipboard Energy Consumption Optimization

Autor: stud. Nicolae NICOLĂESCU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Gheorghe SAMOILESCU

Abstract: This paper presents an innovative methodology for reducing fuel consumption on board ships through the use of a

proactive energy management system. Unlike conventional Power Management Systems (PMS) that react to load variations, the proposed solution integrates meteorological data via external APIs and utilizes Random Forest regression models developed in Python to anticipate thermal and electrical requirements. Simulation results on a commercial route demonstrate a reduction in auxiliary consumption of up to 20.5%, highlighting the positive impact on the Carbon Intensity Indicator (CII).

28. The Role of Actuators in the Maritime Field

Autor: stud. Adrian-Robert NISTOR, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Paul BURLACU

Abstract: This paper explores the critical role of actuators in naval engineering, highlighting their evolution from traditional mechanical systems to advanced mechatronic components. Actuators serve as essential devices that convert electrical, hydraulic, or pneumatic energy into mechanical motion to control vital ship functions, including steering gear, ballast systems, and cargo handling. The study provides a comparative analysis of hydraulic, pneumatic, and electric technologies, evaluating their operating principles, maritime applications, and technical limitations. Particular emphasis is placed on the transition toward "Smart Shipping" and "All-Electric" vessels, where electric actuators offer superior precision and environmental safety by eliminating hydraulic leak risks. Furthermore, the paper details a Planned Maintenance System (PMS) comparison, noting that while hydraulic systems require intensive fluid monitoring, electric alternatives shift the focus toward electronic diagnostics and predictive maintenance. Ultimately, modern actuators are identified as key drivers of maritime efficiency and "Green Shipping".

29. POD/AZIPOD-Type Propulsion and Steering Systems for Surface and Submersible Military Vessels

Autor: stud. Cristian NISTOR, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Gheorghe SAMOILESCU

Abstract: This investigates POD and AZIPOD-type propulsion and steering systems applied to surface and submersible military vessels, with a particular focus on their integration on a patrol vessel platform. The study is based on the STAN Patrol 5009, a patrol ship developed by Damen Shipyards Group, designed for missions such as maritime surveillance, coastal patrol, emergency response, and security operations. The main objective of the research is to analyze, compare, and evaluate the technical, operational, and energetic performance of conventional POD systems versus more advanced AZIPOD systems. The analysis covers key aspects such as propulsion efficiency, maneuverability, space requirements, fuel consumption, maintenance complexity, and operational reliability. A detailed SWOT analysis is conducted for both systems to highlight their strengths, weaknesses, opportunities, and limitations in military naval applications.

30. Implementation of a Robotic System on a USV Drone

Autor: stud. Adrian-Nicolae PASCU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Florențiu DELIU

Abstract: This paper investigates the integration of robotic systems on autonomous maritime vehicles for the identification and neutralization of marine threats, with a focus on optimizing operational efficiency through the use of renewable energy sources. The study aims to develop an innovative and secure solution for eliminating naval hazards while significantly reducing human exposure to risks. The analysis examines the evolution of mine clearance technologies, the classification of

naval mines, and the design of an advanced robotic arm, mathematically modeled and optimized for tactical operations. Additionally, the research explores the implementation of renewable energy sources to power these autonomous systems, enhancing their operational autonomy and sustainability. The prototype's design and testing were conducted using specialized software and 3D printing technology, with integration on an ARDUINO UNO platform. The results confirm the viability of this solution, offering prospects for further improvements in both military and civilian applications.

31. Construction and Operation of a Bank-Mounted Micro-Hydropower Plant for Renewable Energy Production

Autor: stud. Vlad POPOVICI, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Florențiu DELIU

Abstract: The project aims to construct a bank-mounted micro-hydropower plant on the lower course of the Danube. The primary objective is to produce renewable energy with an installed capacity of 500 kW, utilizing low-head turbines such as Kaplan or Archimedes screw types. Unlike wind or photovoltaic sources, the MHP offers high predictability due to the constant flow of the river. The implementation employs "low-impact" and "fish-friendly" technologies, ensuring biodiversity protection within Natura 2000 sites and maintaining the water's physico-chemical parameters. The process is structured into construction (estimated at 12 months), operation, and decommissioning stages, monitored via the "critical path" methodology. The final result contributes to the decarbonization of the national energy sector, providing local economic benefits and grid stability without affecting navigation or riverine socio-economic activities.

32. SMALL Hydropower Plant on the SOMEȘ River

Autor: stud. Alexandru-Daniel ROMAN, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. Dr. ing. Vasile DOBREF

Abstract: This paper presents the technical, environmental, and project management aspects of a small hydropower plant developed on the Someș River, Romania. The project is designed as a run-of-river facility with an installed capacity of 2.5 MW, aiming to ensure efficient renewable energy production with limited environmental impact. The study outlines the main technical components of the hydropower plant, including hydraulic structures, turbines, electrical systems, and automation, as well as the construction and operational stages. Environmental impacts on water, biodiversity, soil, and the socio-economic environment are analyzed, together with mitigation measures in compliance with national and European regulations. The paper also addresses project management elements such as planning, resource allocation, risk management, quality control, and communication. The results indicate that, through proper design and effective management, small hydropower plants can contribute to sustainable development and regional energy security.

33. The Role of Scada Systems in the Operation of Modern Ships

Autor: stud. Mihnea Andrei STĂNCULESCU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Gheorghe SAMOILESCU

Abstract: SCADA (Supervisory Control and Data Acquisition) systems play a crucial role in modern ship operations. They enable real-time monitoring, control, and automation of various shipboard systems, including engines, power distribution, navigation, and safety equipment. SCADA improves

operational efficiency by providing accurate data, alarms, and performance analytics, helping crews make informed decisions. It also enhances safety by detecting anomalies early and allowing rapid corrective actions. Integration with remote diagnostics and predictive maintenance reduces downtime and maintenance costs. Overall, SCADA systems are essential for modern vessels, ensuring efficient, safe, and environmentally friendly maritime operations.

34. Analysis of Hydroelectric Applications in the Electrical Field Using Black Sea Wave Energy

Autor: stud. Mihnea Andrei STĂNCULESCU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Gheorghe SAMOILESCU

Abstract: The study "Analysis of Hydroelectric Applications in the Electrical Field Using Black Sea Wave Energy" explores integrating wave energy from the Black Sea into hydroelectric systems. It examines the potential of waves as a renewable energy source, evaluates technological solutions for converting wave motion into electricity, and considers efficiency, environmental impact, and grid integration. The research highlights how combining wave energy with traditional hydroelectric infrastructure can enhance power generation reliability, reduce dependence on fossil fuels, and contribute to sustainable energy development in coastal regions.

35. AI-Driven Predictive Maintenance and Energy Optimization Framework for Smart Ship Operations

Autor: stud. Mihai TIMOFTE, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumători: Prof. univ. Dr. ing. Gheorghe SAMOILESCU, Conf. univ. Dr. ing. Florențiu DELIU

Abstract: This research introduces an artificial intelligence framework for predictive maintenance and energy optimization

in maritime operations. Leveraging deep learning architectures including LSTM networks and isolation forests, the system analyzes multi-dimensional sensor data to forecast equipment failures and optimize power distribution patterns. The framework implements real-time anomaly detection algorithms that identify irregular consumption patterns 48-72 hours before critical failures occur. A novel contribution includes adaptive load balancing between auxiliary generators using reinforcement learning, achieving optimal fuel efficiency under varying sea conditions. Validation using simulated vessel data across 500 operational scenarios shows 18% reduction in unplanned maintenance events and 14% improvement in fuel economy, demonstrating significant potential for autonomous ship energy management systems.

36. Intelligent Software Platform for Electrical Energy Management Aboard Maritime Vessels

Autor: stud. Mihai TIMOFTE, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumători: Prof. univ. Dr. ing. Gheorghe SAMOILESCU, Conf. univ. Dr. ing. Florențiu DELIU

Abstract: This paper presents an advanced intelligent software platform designed for real-time electrical energy management on maritime vessels. The system integrates IoT sensors, MQTT communication protocols, and time-series databases to monitor power consumption across critical ship systems including propulsion, HVAC, and auxiliary generators. Machine learning algorithms enable predictive analytics for consumption forecasting and anomaly detection, while optimization engines provide actionable recommendations for fuel efficiency improvement. The platform features a responsive web interface with 3D digital twin visualization, offering operators comprehensive insights into energy flows. Implementation results demonstrate 12-15% potential energy savings through

intelligent load distribution and predictive maintenance scheduling, contributing to reduced operational costs and environmental compliance with IMO regulations.

37. Analysis of Electromechanical and Electrical Systems on Board Ships

Autor: stud. Liviu – Gabriel MITROI, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Gheorghe SAMOILESCU

Abstract: This paper analyzes the electromechanical and electrical systems on board ships, highlighting their importance in ensuring safe, efficient, and sustainable maritime transport. The structure of the ship's power system is examined, including energy generation, distribution networks, and onboard consumers. Particular attention is given to propulsion systems, comparing conventional mechanical propulsion with diesel-electric, hybrid, and fully electric solutions in relation to energy efficiency and emission reduction requirements. The study also addresses essential auxiliary installations such as pumps, ventilation systems, air compressors, and HVAC systems, emphasizing their role in the reliable operation of main equipment and in maintaining crew safety and comfort. In addition, modern monitoring and control systems are discussed, focusing on real-time supervision, power management, and fault prevention through advanced automation. The analysis concludes that integrating electromechanical, electrical, and automation systems is a key factor in improving operational safety, optimizing energy consumption, and supporting environmentally sustainable ship operations.

38. Proposals for the Optimization of Electrical and Automation Systems

Autor: stud. Liviu – Gabriel MITROI, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Gheorghe SAMOILESCU

Abstract: This paper presents optimization strategies for electrical and automation systems on board ships, addressing current requirements related to energy efficiency, operational safety, and environmental protection. The study analyzes technical and operational solutions aimed at reducing energy losses and improving system performance through optimized power distribution, efficient generator operation, and intelligent automation of auxiliary consumers. Special attention is given to modern control solutions based on Programmable Logic Controllers (PLC), SCADA systems, and integrated automation platforms, which enable real-time monitoring, fault detection, and optimized control. The integration of alternative energy sources is also discussed, focusing on hybrid systems with battery energy storage and their benefits in terms of flexibility, emission reduction, and system reliability. The study concludes that combining automation and hybrid energy solutions supports safer, more efficient, and more sustainable ship operation.

39. Use of Network Filters on Board Ships

Autor: stud. Dan-Iulian NICHITEANU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: S.L. Dr. ing. Paul VASILIU

Abstract: Modern ships increasingly rely on integrated communication networks that combine critical operational technology (OT) systems with traditional information technology (IT) services. While this convergence improves efficiency and connectivity, it also expands the cyber-attack surface and introduces new risks to safety-critical functions. This paper analyzes the role of network filtering as a practical and effective mechanism for enhancing security, reliability, and traffic predictability in shipboard networks. Key filtering approaches including VLANs, access control lists, stateful

firewalls, application-level filtering, and IDS/IPS are discussed in relation to maritime constraints such as high availability requirements, limited maintenance windows, and heterogeneous equipment. The study highlights the importance of network segmentation, DMZ architectures, and allow-listing policies for controlling data flows between IT, OT, and crew networks. Current regulatory and industry developments are reviewed, demonstrating a clear trend toward standardized cyber-resilient architectures. Finally, practical recommendations are provided for implementing layered network filtering strategies on board modern vessels.

INGINERIE ȘI MANAGEMENT

BIROUL SECȚIUNII

Președinte: Prof. univ. Dr. ing. Florin NICOLAE

Membri: Conf. univ. Dr. ing. Alexandru COTORCEA

Conf. univ. Dr. Gheorghe GRECU

Conf. univ. Dr. ing. Elena Rita AVRAM

Sala L120

1. Challenges, Costs and Benefits in Implementing Green Logistics in Romanian Ports

Autor: stud. Iulia-Georgiana BARBU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Alexandru COTORCEA

Abstract: This paper, entitled “*Challenges, Costs and Benefits of Implementing Green Logistics in Romanian Ports*”, analyses one of the key development directions of the transport and logistics sector in the context of the transition towards a sustainable economy. The study combines theoretical and applied approaches, focusing on the role of Romanian ports in the decarbonization and modernization of logistics chains. The first part examines the concept of green logistics, its evolution, principles and objectives, as well as the European legislative framework, particularly the European Green Deal and the “Fit for 55” package. The strategic role of ports as essential nodes in sustainable maritime logistics is also highlighted. The second part analyses the implementation of green logistics in Romanian ports, with particular emphasis on the Port of Constanța and initiatives such as shore-side electricity, equipment electrification and energy infrastructure modernization. The paper identifies major technological, economic and institutional challenges, including high investment costs and infrastructure limitations, while also

assessing implementation costs and available funding sources. The conclusions underline that green logistics represents both a regulatory requirement and a strategic opportunity for enhancing competitiveness and sustainable development in Romanian ports.

2. Ports Go Green: A Cost-energy Analysis Applied to a Case Study on Evaluating the Electrification of Yard Tractors

Autor: stud. Isabela Maria BILIBOACA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Florin- Marius NICOLAE

Abstract: Electrification of handling equipment and vehicles used in seaports is becoming increasingly common, offering potential benefits in terms of reduced local environmental impact and lower operating costs. However, the initial investment required for electrification remains high. This paper aims to provide a decision-support tool to assess the technological and financial feasibility of electrifying yard tractors in container terminals. Taking into account the expected development of battery technologies in the coming years, the study analyzes when such electrification could become cost-effective. A combined technical and economic-financial methodology is proposed to evaluate the transition from diesel internal combustion engines to electric vehicles. The approach is applied to a case study of the PSA-SECH container terminal in the port of Genoa, Italy. The results indicate that electric yard tractors are technically feasible and efficient from an energy perspective. Nevertheless, under current cost and technological conditions, the investment is not yet economically profitable. A comprehensive assessment of the entire energy chain and alternative powertrains is therefore recommended.

3. Innovative Solution for Occupational Health and Safety in Container Terminal Operations

Autor: stud. Andreea-Daniela BURHAI, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumători: Prof. univ. Dr. ing. Florin-Marius NICOLAE,
Conf. univ. Dr. Andrei BĂUTU

Abstract: Ensuring high levels of performance and safety in logistics operations represents a critical challenge, particularly in port and logistics terminal warehousing activities. As key interfaces within logistics supply chains, terminals require the coordination of complex operations, including storage, cargo handling, internal transport, and transshipment, which are associated with significant occupational and operational risks. An integrated approach to safety management is therefore essential, encompassing workplace safety, operational environment safety, and accident prevention and protection. The framework presented is based on a structured process involving activity analysis, hazard identification, risk assessment, and the application of preventive and control measures. The integration of safety principles into operational processes supports accident reduction, minimizes material losses, and contributes to improved efficiency, reliability, and long-term sustainability of logistics terminal operations.

4. Analysis of Value-Added Logistics Services in The River Transport of Cereals on the Ismail port – Constanta Port Route

Autor: stud. Costel BURLIBAȘA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Filip NISTOR

Abstract: Analyze of the segmented intermodal river transport of cereals on the route Port Ismail – Port Braila – Port Constanta, focusing on efficiency, costs, and the role of value-added logistics services in improving the overall supply chain

performance. The main purpose is to highlight how inland waterway transport on the Danube can support a competitive logistics solution for bulk cargo, such as cereals, where large volumes, loading and unloading operations, and quality requirements have a direct impact on final results.

5. Integrating Autonomous Vehicles into the Operational Structure of Military Vessels

Autor: stud. Nicolae CARACOSTEA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Filip NISTOR

Abstract: The paper “Integrating Autonomous Vehicles into the Operational Structure of Military Vessels” examines the transformative role of autonomous systems in enhancing naval combat and surveillance capabilities, driven by the need to extend situational awareness and reduce risks to personnel. The study is structured into four chapters. The first outlines the theoretical framework and current use of aerial, underwater, and surface autonomous vehicles, with a focused assessment of the Romanian Naval Forces’ platforms and their compatibility with such systems. The second chapter analyzes technical and functional integration through the ship autonomous vehicle “binomial,” highlighting the transition of naval vessels into command and control hubs while addressing launch, recovery, and maintenance challenges. The third chapter evaluates tactical applications in ISR, anti-submarine warfare, and mine countermeasures, supported by a cost–benefit analysis. The final chapter presents a practical case study on UAV design. The paper concludes that integrating autonomous vehicles represents a fundamental operational paradigm shift essential for modern naval missions.

6. Business Plan – Development of a Photovoltaic Park

Autor: stud. Alina-Elena CRĂCIUN, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Gheorghe GRECU

Abstract: This business plan aims to build a photovoltaic park with an installed capacity of approximately 1 MWp, developed by ALINA S.R.L. in the city of Hârșova, Constanța County. The project aims to produce and deliver electricity from renewable sources to the National Energy System, in a sector characterized by constant demand and operational stability. The total investment is estimated at €1,200,000 and will be financed through own resources and bank loans. Annual energy production is estimated at approximately 1,200 MWh, generating estimated revenues of €96,000 per year. Low operating costs and an efficient organizational structure allow for stable cash flow and good loan repayment capacity. The investment is expected to be recouped in 7–8 years, and the economic life of the park exceeds 20 years. The project contributes to the energy transition and sustainable development at the regional level.

7. Optimizing Intermodal Operations Using Simulation

Autor: stud. Cosmin DOBRE, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Alexandru COTORCEA

Abstract: This research explores the use of simulation as a decision-support tool to evaluate and optimize intermodal freight transport operations. Intermodal systems, combining road, rail, and sea transport, are vital for modern logistics chains, helping to reduce costs, transit times, and environmental impact. As freight flows grow in complexity and volume, optimizing these operations becomes increasingly important. Simulation allows modeling and testing scenarios without disrupting real systems, providing detailed insights into

performance, identifying bottlenecks, and assessing alternative strategies. The study reviews current research on logistics and intermodal transport simulation, alongside practical examples demonstrating its effectiveness in process improvement. By analyzing key factors influencing system efficiency, the research aims to propose methods to enhance intermodal operations, ultimately supporting productivity, cost reduction, and informed managerial decision-making.

8. Methodology for Cyber Risk Assessment of Ships

Autor: stud. Mihaela-Aurelia DRĂGAN, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Florin-Marius NICOLAE

Abstract: The paper presents a case study dedicated to the development and application of a methodology for the assessment of cyber risks on board ships, focusing on the military ship Midia. According to the paper, the ship is an intricate cyber-physical system that has significant vulnerabilities for safety and operational continuity due to the interconnection of IT/OT systems. A methodology of its own, inspired by CRASH (Cyber Risk Assessment for Ships), adapted to the military operational specificity and resilience requirements is proposed. The methodology includes structural steps to identify critical assets, threat and vulnerability analysis, probability and impact assessment, risk score calculation and reduction measures. The application of the methodology on the Midia vessel validates its usefulness as a practical decision support tool for increasing maritime cyber resilience.

9. Causal Factors Influencing the Safety of Inland Waterway Transport

Autor: stud. Florina GHEONEA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Florin-Marius NICOLAE

Abstract: Although inland navigation is considered one of the safest transport modes, accidents can have serious consequences due to the large volumes of cargo carried. Inland waterway incidents occur throughout the year, leading to fatalities, injuries, financial losses, and environmental damage. However, research that thoroughly examines the causes and outcomes of such accidents remains limited. To address this gap, this study collected and analysed data from real accidents on the Danube River. It provides a comprehensive overview of the main hazards (causal factors) and the resulting risks in inland waterway transport. Two methods were used: a cause-and-effect diagram for hazard identification and a risk matrix for risk assessment. The results reveal recurring hazards, mainly related to human behavior. These findings support the development of effective preventive measures and can contribute to improving safety in inland navigation.

10. A Comparative Analysis of Port Performance: A Case Study of the Danube Ports

Autor: stud. Denisa IBRAM, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Florin-Marius NICOLAE

Abstract: This paper presents a comparative analysis of the performance of a sample of inland ports located along the Danube River, with the aim of assessing operational efficiency and the dynamics of port activity over the period 2017–2024. The study adopts an applied approach and focuses on the comparative evaluation of five Danube ports Smederevo, Ruse, Galați, Giurgiu-lești, and Izmăil integrated within the same inland waterway transport network but operating under different economic and infrastructural conditions. The analysis reveals significant disparities in efficiency levels and cargo throughput trends among the ports, reflecting differences in the utilization of infrastructural resources and the influence of

external factors on port activity. The results enable the identification of ports with superior performance as well as those with potential for improvement, providing valuable insights for port management and supporting strategic decision-making aimed at enhancing inland waterway transport and increasing the competitiveness of Danube ports.

11. Military Logistics. Case Study: Optimal Storage of Ammunition and Explosive Materials.

Autor: stud. Maria-Denisa ION, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Florin-Marius NICOLAE

Abstract: In the current security environment, characterized by complex, multi-domain operations and elevated risk, the storage of ammunition and explosive materials represents a decisive element of military logistics and operational sustainability. Beyond simple warehousing, military depots function as critical infrastructure that must ensure continuous availability while complying with strict safety, physical security, compatibility, and environmental protection requirements. At the same time, armed forces manage increasingly diverse ammunition stocks within storage facilities that may be affected by capacity limitations and uneven levels of modernization, which reinforces the need for optimization and evidence-based decision-making. This dissertation examines these challenges through a case study focused on identifying optimal storage configurations for ammunition and explosive materials. The analysis integrates domain-specific constraints, including classification by hazard divisions and compatibility groups, rules governing permitted and prohibited co-storage, and the correlation between material “attractiveness” (risk of theft or misuse) and the security level of each depot. Using Excel Solver, the study evaluates multiple allocation scenarios and demonstrates that distinct

configurations may achieve equivalent minimum-risk outcomes, thereby supporting flexible and robust planning.

12. Enhancing Cyber Resilience in Inland Ports: Risk Mitigation and Incident Response Strategies

Autor: stud. Andrei-Cosmin MUȘAT, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumători: Prof. univ. Dr. ing. Florin-Marius NICOLAE, Conf. univ. Dr. Andrei BĂUTU

Abstract: Inland ports are becoming increasingly dependent on digital systems to manage operations, traffic, and logistics flows. While this digital transformation brings clear efficiency benefits, it also exposes port infrastructures to a growing range of cyber risks. This presentation explores how inland ports can strengthen their cyber resilience by adopting effective risk mitigation and incident response strategies tailored to their specific operational context. The study highlights practical measures such as structured incident response planning, improved coordination between technical and operational teams, and continuous staff training to reduce human-related vulnerabilities. Rather than focusing solely on advanced technologies, the approach emphasizes the importance of organizational readiness and timely decision-making during cyber incidents. By aligning technical, organizational, and human factors, inland ports can better protect critical systems, ensure operational continuity, and support the sustainable development of inland waterway transport.

13. Logistics on Liquefied Natural Gas Storage – Identification of Risks and Safety Measures

Autor: stud. Florentina-Marieta PĂPĂLU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Florin-Marius NICOLAE

Abstract: Liquefied Natural Gas (LNG) plays an important role in ensuring energy security and supporting the transition to cleaner energy sources. The logistics of LNG storage represent a critical part of the supply chain, involving complex operations that require high safety standards. This paper analyzes liquefied natural gas storage logistics, focusing on the identification of the main risks associated with storage and handling processes. The study addresses hazards such as cryogenic temperatures, gas leakage, fire and explosion risks, as well as environmental and operational threats. Furthermore, essential safety measures are highlighted, including modern technological solutions, monitoring systems, personnel training, and emergency response planning. The analysis shows that effective risk management and the implementation of appropriate safety measures are essential for ensuring safe LNG storage operations and minimizing the risk of accidents

14. S.C. AVS Photography S.R.L.

Autor: stud. Andreea-Cătălina PASĂRE, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Gheorghe GRECU

Abstract: This paper presents an applied project in the form of a business plan, developed within an educational framework, using as a case study the development of a professional photography studio in the municipality of Constanța, under the name “S.C. AVS Photography S.R.L.” The project aims to realistically simulate an entrepreneurial initiative in the field of photographic services, integrating elements of market analysis, managerial organization, and financial forecasting. The proposed services are analyzed event photography, specialized photo sessions, and personalized photo albums along with the potential of the local market, characterized by a constant demand for high-quality creative services. The proposed economic model highlights favorable performance indicators, such as rapid investment recovery and a high rate of

profitability. The project demonstrates the ability to practically apply acquired theoretical knowledge, offering a coherent perspective on the operation and sustainability of a business in the photography sector.

15. Evaluation of Packaging Systems in Freight Logistics

Autor: stud. Andra – Larisa POPA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Florin-Marius NICOLAE

Abstract: The paper addresses packaging systems and logistical supports as active elements of the transport system, playing an essential role in operational safety, economic efficiency, and the reduction of environmental impact. It highlights the complex requirements imposed on packaging in maritime transport, including mechanical strength, compatibility with the marine environment, sanitary safety, and sustainability throughout the entire life cycle. It is emphasized that traditional materials, such as virgin wood and petrochemical-based plastics, lead to high resource consumption and significant greenhouse gas emissions, while inadequate waste management further amplifies their ecological impact. The study argues for the necessity of an integrated approach that correlates operational safety with material sustainability. Life Cycle Assessment is presented as a central methodological tool for identifying critical stages and achieving ecological optimization of packaging systems used in freight logistics.

16. Analysis of the Security Level in Port Logistics Hubs

Autor: stud. Darius PUȘCAȘU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Florin-Marius NICOLAE

Abstract: This paper investigates the transformation of the port security paradigm, shifting from the traditional approach focused on physical perimeter protection (in accordance with

the ISPS Code) to a hybrid resilience model adapted to today's technological complexity. In the context of the accelerated digitalization of logistics hubs, ports have become critical infrastructures vulnerable to coordinated attacks that exploit the interdependencies between the physical and cyber domains. The research substantiates the need to implement advanced Hybrid Situational Awareness (HSA) systems, based on the architecture of the European SAURON project. Methodologies for mapping port assets using Mealy mathematical automata and interdependency graphs are analyzed, as these are essential tools for identifying critical points of failure and anticipating cascading effects. The paper details how the fusion of physical security data (PSA) with cyber security data (CSA) enables the detection of sophisticated attack vectors, such as navigation system manipulation (AIS/GNSS spoofing) or digital sabotage of vessel loading and stability processes. A central component of the study is the adaptation of these guidelines to the specific characteristics of the Balkan region an area with a rapidly expanding geopolitical and logistical role, yet facing unique challenges related to digital maturity levels and integrity risks. The research findings provide a strategic framework for port authorities, proposing incremental security solutions and the automation of audit processes to reduce vulnerability to organized crime and asymmetric threats. The conclusions emphasize that the systemic resilience of modern ports depends on the ability to correlate anomalies in the digital space with operational realities on the ground.

Keywords: port security, hybrid threats, systemic resilience, critical infrastructure, situational awareness, Balkan logistics hub.

17. Black Sea Security: Hybrid Threats to Critical Infrastructure

Autor: stud. Ionuț-Cristian URECHE, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Florin-Marius NICOLAE

Abstract: This project examines the evolving security landscape of the Black Sea. As countries around the Black Sea try to be more independent when it comes to energy like with Romania’s Neptune Deep project, the Black Sea is becoming a place where Russia is trying to exert its influence through what it calls New Generation Warfare. The Black Sea is facing threats, including physical attacks, as well as legal battles and electronic jamming that can disrupt the flow of energy and information, in the Black Sea. By analyzing real-world incidents (including GPS spoofing and aggressive naval posturing), this project highlights the inadequacy of current legal frameworks like UNCLOS in addressing operations below the threshold of open conflict. Ultimately, the research argues that safeguarding the Black Sea's infrastructure is not merely a technical challenge but a geopolitical necessity for European energy resilience.

18. Model for the Calculation of Vessel Transit Tariffs on the Danube–Black Sea Canal

Autor: stud. Sabrina Victoria VÂLCOV, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Florin-Marius NICOLAE

Abstract: The purpose of this paper is to establish a methodology for the preliminary estimation of fees associated with the operation of each vessel on the Danube–Black Sea Canal. The study is based on the premise that European inland waterway transport practices require an analysis of the services provided to vessels and cargo. Under these conditions, the identification of an optimal tariff system for transport charges

on the Danube–Black Sea Canal is not only appropriate but also necessary. The paper opens up new perspectives that may contribute to the development of the field through: the optimization of operating costs, the assessment of the impact of tariffs on vessel traffic and the environment, and the implementation of innovative strategies for the development of inland waterway transport infrastructure.

Keywords: waterborne transport, inland waterways, managerial efficiency, transit costs, transport costs.

19. Assessment of the Impact of Implementing Electric Batteries in Logistics Activities in the Naval and Port Sector

Autor: stud. Marian-Drăguțu VÎNĂ, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Florin-Marius NICOLAE

Abstract: This paper analyzes the impact of implementing electric batteries and electric propulsion systems in logistics activities within the naval and port sectors, in the context of the transition toward sustainable maritime transport. The study highlights the role of battery-based energy storage systems in reducing greenhouse gas emissions, operational costs, and local pollution, particularly for port service vessels. The proposed methodology focuses on the assessment of environmental and economic impacts using Life-Cycle Assessment (LCA) and Life-Cycle Cost Assessment (LCCA) approaches, applied to two representative case studies: a port tugboat and a port service vessel. The analysis includes the determination of energy demand, annual energy consumption, and associated emissions for different propulsion configurations. The results indicate that electric and hybrid propulsion systems represent a technically feasible and environmentally advantageous solution for port operations.

20. Innovative Solution for Analyzing and Optimizing Maritime and Port Operations.

Autor: stud. Cătălin-Costin VLAD, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Florin-Marius NICOLAE

Abstract: This paper introduces "Port Manager," a decision-support system for the Port of Constanta designed to enhance terminal efficiency and sustainability. The application features an "Advanced Terminal Optimizer" utilizing a Leaflet-based digital twin and a multi-speed simulation engine to model berth operations. To address scheduling variability, a Random Forest Regression model is integrated to predict service durations from historical logs. The system offers multi-objective optimization strategies, including Earliest Finish Time, Minimize Waiting Time, and Minimize Operational Cost. Furthermore, it provides real-time monitoring of environmental metrics, such as energy consumption and carbon footprint, calculated via specific Ship-to-Shore (STS) and Fixed Pedestal (FCC) crane configurations. An innovative "Refine ETA" functionality allows operators to detect efficiency gains or delays through mathematical predictive analytics. This framework provides a holistic approach for transitioning towards automated, data-driven, and green maritime logistics.

21. Institutional and Individual Carbon Footprints in the Naval Academy Campus: A Calculator-Based Study

Autor: stud. Elena-Andreea ZVÂNCĂ, stud. Andrei-Viorel CHIRU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Florin-Marius NICOLAE

Abstract: This study evaluates the carbon footprint of a higher education institution through a case study of the campus of the Naval Academy “Mircea cel Bătrân”, combining an infrastructural assessment with an individual-level perspective. At institutional scale, the analysis quantifies key emission

sources linked to campus buildings and operations, with emphasis on electricity use, heating-related energy demand and mobility-associated impacts. In parallel, an individual carbon footprint calculator was developed and applied to students, focusing on household-related activities outside the campus (electricity, gas and water consumption at home, private car use, public transport and air travel). The calculator was implemented in Google Sheets and fed through structured survey data, enabling consistent data processing and comparative outputs across respondents. Integrating these two levels of assessment supports a more complete understanding of campus-related emissions and highlights practical directions for targeted reduction measures.

22. Analysis of the Role of Constanța Port as a Strategic Logistics Hub in the Black Sea Region

Autor: stud. Diana-Anamaria BOANTĂ, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Alexandru COTORCEA

Abstract: This study analyzes the role of port logistics and the importance of maritime ports within international logistics chains, highlighting their contribution to the development of global trade and the support of economic growth. The analysis is based on the theoretical foundation of the logistics concept and the examination of its evolution within the maritime industry, with a focus on the integration of transport, handling, storage, and distribution activities of goods. The main components of the international logistics chain are analyzed, as well as the relationship between physical goods flows and the information flows associated with port operations. The paper highlights the strategic role of maritime ports as multimodal logistics nodes, essential for connecting hinterlands with regional and global markets. Furthermore, the importance of digitalization and modern logistics management models in

optimizing operational performance, increasing efficiency, and supporting the sustainable development of port activities is examined. In conclusion, port logistics is emphasized as a key determinant in the adaptation of maritime ports to current economic and technological requirements.

23. Study on the Efficiency of Using Photovoltaic Solar Panels on Refrigerated Containers

Autor: stud. Alexandru-Paul BONCU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Rita AVRAM

Abstract: Global energy consumption is rapidly increasing due to population growth, economic development, and global trade. This trend represents a major challenge for sustainability in the 21st century. The transport sector is a significant contributor to energy use and greenhouse gas emissions. Maritime transport accounts for a notable share of global anthropogenic emissions. Despite its efficiency for long-distance freight, maritime transport faces pressure to reduce its environmental impact. Refrigerated container transport is one of the most energy-intensive maritime segments. These containers are vital for preserving perishable goods such as food and pharmaceuticals. Maintaining the cold chain requires continuous operation of refrigeration systems. This results in high electrical energy demand during voyages and port operations. Energy is typically supplied by diesel generators or port-based electricity. Such practices increase dependence on fossil fuels and contribute to pollution. Global decarbonization goals are driving stricter regulations in maritime transport. Alternative energy solutions for refrigerated containers are therefore increasingly necessary. Photovoltaic solar systems offer a promising option to improve energy efficiency and reduce emissions.

24. Analysis of Risks and Opportunities in The Supply of Critical Raw Materials for Romania's Industry

Autor: stud. Anne-Lise Laolia BUZNĂ, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Alexandru COTORCEA

Abstract: This paper analyzes the risks and opportunities associated with the supply of critical raw materials for Romania's industry, using a structured approach that combines supply chain management theory with applied analysis. The research is highly relevant within the current global geopolitical and economic context, marked by instability, energy transition, and strong dependence on strategic imports. First part introduces the concept of critical raw materials, outlining their definitions, classifications, industrial importance, and the main European and national policies supporting supply security, alongside inventory and preventive planning strategies. Second part focuses on identifying and assessing key supply risks, including geopolitical, economic, logistical, technological, and operational factors, while also highlighting opportunities such as supply diversification, procurement localization, recycling, and innovation. The case study evaluates procurement vulnerabilities and proposes resilience measures of a Romanian company, applying the PESTEL framework and quantitative performance indicators. The paper concludes by emphasizing the importance of integrated and proactive risk management strategies to ensure sustainable supply chains, industrial resilience, and long-term competitiveness.

25. Analysis of Logistic Activities in a Service Enterprise

Autor: stud. Iulian Valentin COCIUBEI, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Beazit ALI

Abstract: The thesis analyzes logistics activities within a service company, emphasizing the strategic role of logistics in

improving operational performance and customer satisfaction in the context of globalization and the rapid development of e-commerce. The research focuses on the logistics activities of DHL, a leading global logistics service provider, selected due to the complexity of its operations and the extensive use of modern information technologies. The study combines theoretical analysis with a practical case study, examining key logistics processes and evaluating their performance using relevant indicators. A simulation-based approach is applied to analyze the national distribution network in Romania, using the Analogistic software to assess delivery times, logistics costs, and overall system efficiency under different operational scenarios. The results demonstrate that the efficient organization of logistics activities, supported by digitalization and simulation tools, plays a significant role in enhancing operational efficiency and competitiveness in service-providing logistics companies.

26. Coordination of Resources within the Field of Military Logistics

Autor: stud. Cătălin-Nicolae DARDAC, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Filip NISTOR

Abstract: This Master's Thesis examines the coordination of resources within military logistics, focusing on the operational specificities of naval and diving missions. Using a support vessel for divers as a case study, the research analyzes how resource planning directly impacts mission autonomy and diver safety. The study evaluates the transition from manual record-keeping to digital integration through NATO's LOGFAS system and RFID technology to enhance supply chain visibility. Furthermore, it addresses the critical role of interoperability and NATO STANAG compliance in multi-national maritime environments. By simulating a complex

underwater recovery mission and a MEDEVAC emergency, the paper demonstrates that logistics in the naval domain transcends administrative support, becoming a vital force multiplier and an essential component of risk management and operational success.

27. The Impact of Regional and Global Crises on The Resilience of Logistics Supply Chains

Autor: stud. Melisa DENISLEAM, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Alexandru COTORCEA

Abstract: Regional and global crises have a significant impact on the resilience of logistics supply chains. Events such as pandemics, geopolitical conflicts, natural disasters, and economic instability disrupt transportation networks, production capacity, and the availability of raw materials. Regional crises often create localized bottlenecks, while global crises can simultaneously affect multiple nodes of the supply chain, leading to widespread delays and shortages. These disruptions have highlighted the vulnerability of highly centralized and cost-focused supply chain models. As a result, companies are increasingly investing in resilience strategies such as supply chain diversification, nearshoring, digital tracking technologies, and stronger risk management practices. Flexibility and transparency have become essential for rapid adaptation during crises. In conclusion, regional and global crises act as stress tests for logistics supply chains, exposing weaknesses but also encouraging innovation. Building resilient supply chains is now a strategic priority for ensuring long-term stability and continuity in global trade.

28. Management of Logistic Resources in Support of Naval Groups Deployed in Theaters of Operations

Autor: stud. Tudor-Alexandru DEOANCA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Filip NISTOR

Abstract: The management of logistic resources plays a critical role in supporting naval groups deployed in theaters of operations. Effective logistics ensure the continuous availability of fuel, ammunition, spare parts, food, medical supplies, and technical support necessary for sustaining naval missions over extended periods. Operating far from home bases and often in complex and hostile environments, naval forces depend on well-coordinated supply chains, flexible planning, and rapid response capabilities. Logistic resource management also involves coordination between naval units, joint forces, allied partners, and civilian contractors to ensure interoperability and efficiency. Modern challenges such as asymmetric threats, long lines of communication, and limited port access require innovative solutions, including modular logistics, forward support bases, and advanced information systems. By optimizing logistic processes and resource allocation, commanders can enhance operational readiness, maintain combat effectiveness, and ensure mission success while reducing costs and risks. Ultimately, robust logistic support is a decisive factor in the sustainability and effectiveness of deployed naval groupings.

29. Logistics Interoperability within NATO Operations

Autor: stud. Andrei-Cătălin DRAGOTOIU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Filip NISTOR

Abstract: Interoperability represents a fundamental requirement for the effective conduct of multinational military operations within NATO. In the context of increasing operational complexity and the diversity of national capabilities, logistics interoperability plays a critical role in ensuring operational

coherence, efficiency, and sustainability. This paper analyzes the concept of logistics interoperability from a doctrinal and operational perspective, emphasizing its importance in NATO operations. The study examines the main types of interoperability defined in NATO doctrine technical, operational, procedural, organizational, and human and highlights their relevance for military logistics. Furthermore, the paper addresses key challenges related to integrating national logistics structures into NATO frameworks and outlines the role of standardization and common procedures in overcoming these challenges. The analysis aims to provide a structured understanding of logistics interoperability as a prerequisite for effective multinational military operations

30. Safety Stock Management in the Context of Energy Price Volatility

Autor: stud. Ionuț FODORUȚ, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Alexandru COTORCEA

Abstract: This paper analyzed the risks and opportunities associated with the supply of critical raw materials for Romanian industry, using a structured approach that combined supply chain management theory with an applied assessment of industrial resilience solutions. The research emphasized the relevance of critical raw materials in the current geopolitical and economic context, characterized by instability, energy transition, and strong dependence on strategic imports. The theoretical framework clarified the concept of critical raw materials, their classifications, and their role in modern industrial development, while also highlighting European and national policy measures aimed at securing supply chains. The study further identified key risk categories affecting procurement processes, including geopolitical, economic, logistical, and technological risks, and examined opportunities

such as supply diversification, procurement localization, and innovation. An applied case study of a Romanian industrial company was conducted, using PESTEL analysis and performance indicators to evaluate real supply vulnerabilities and opportunities.

31. The Impact of Emerging Technologies on the Efficiency of Logistics Systems Within the Armed Forces

Autor: stud. Cosmin-Andrei GRĂDINARIU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Filip NISTOR

Abstract: This paper examines the impact of emerging digital technologies on the efficiency of logistics systems within the armed forces, with particular emphasis on inventory management processes. The theoretical section outlines the fundamentals of modern logistics, the specific characteristics of military logistics, and the role of automatic identification technologies in enhancing logistical performance. The applied component focuses on the design and implementation of an automated inventory management system for military vehicle equipment, based on QR code technology. The proposed system integrates software solutions developed using Python, along with a local database, enabling improved traceability, reduced processing times, and minimized human error. The results highlight a significant improvement in logistical efficiency compared to traditional manual inventory methods, demonstrating the practical benefits of digitalization in a military logistics context.

32. Business Plan of Marine Subcontract SRL – Naval Subcontracting Services

Autor: stud. Narcis-Andrei MERMAMBET, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. Gheorghe GRECU

Abstract: This business plan describes the creation of a naval subcontracting company providing specialized services such as welding, mechanical fitting, and metal structure assembly in shipyards. The company will operate mainly in the Galați area, collaborating with shipyards and main contractors involved in shipbuilding and ship repair. The plan analyzes the target market, client categories, competition, and service demand, showing a stable need for qualified subcontractors in the naval industry. The organizational structure is designed to ensure efficient coordination, quality control, and compliance with safety regulations. Financial forecasts over a five-year period are based on conservative assumptions regarding workload, pricing, and expenses. The initial investment focuses on equipment, safety gear, and skilled personnel. Projections indicate sustainable revenue growth, controlled costs, and gradual profitability. The company aims to build long-term partnerships, expand its services, and become a reliable subcontractor in the naval sector.

33. S.C. Logistic Fast S.R.L. – Business Plan

Autor: stud. Bogdan-Iulian MOROIANU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. Gheorghe GRECU

Abstract: This business plan has been prepared for the purpose of establishing and developing a commercial company specialized in logistics and freight transport services, named S.C. LOGISTIC FAST S.R.L., with the main objective of providing integrated transport, warehousing, and goods distribution services throughout Romania. The company will carry out road freight transport, distribution logistics, handling, and warehousing activities, primarily addressing commercial and industrial companies that outsource their logistics operations. The activity will be conducted on the basis of firm contracts with corporate clients.

34. The business Plan as Decision Support for Investments in the Port Sector

Autor: stud. Emil-Iulian NICULESCU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. Gheorghe GRECU

Abstract: This paper explores the role of the business plan as a decision-support tool for investments in the port sector. In a highly competitive and regulated environment, port companies must adopt strategic planning instruments to ensure sustainable development and operational efficiency. The study highlights how the business plan integrates strategic objectives, financial projections, risk assessment, and investment justification into a coherent managerial framework. A case study model is developed for a medium-sized port logistics company operating in the Port of Constanța, focusing on the acquisition of modern handling equipment through bank credit financing. The analysis includes a diagnostic audit, market evaluation, investment planning, and financial scenarios over a five-year horizon. The findings emphasize that a well-structured business plan enhances decision-making, improves access to financing, and supports competitiveness in port logistics. The paper contributes to understanding business planning as a strategic instrument for investment-driven growth in port enterprises.

35. Vulnerabilities Analysis in the Operation of Inland Waterway Ports with Strategic Military Purpose

Autor: stud. Cristian POPA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Filip NISTOR

Abstract: Inland River ports are essential elements of the national transport and logistics infrastructure, ensuring the connection between maritime, land, and air transport. In Romania, inland river ports hold major strategic importance

due to their location along the maritime–navigable sector of the Danube, being connected both to the European intermodal transport network and to the national defense and security system. Over the past decade, in the context of geopolitical transformations in the Black Sea region and conflicts occurring in close proximity to the eastern borders of the European Union, Romanian inland river ports have strengthened their dual role civil and military. In addition to commercial activities, they can be used for logistical operations involving transport, supply, or military mobility, particularly within NATO and EU strategic partnerships.

36. Management of Risks Associated with Cyber Attacks on Critical Logistics Infrastructure

Autor: stud. Valeriu ROȘU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Alexandru COTORCEA

Abstract: The increasing digitalization of critical logistics infrastructure has created unprecedented vulnerabilities to cyber-attacks, making risk management an essential priority for organizations and governments worldwide. This paper examines the multifaceted challenges posed by cyber threats targeting supply chains, transportation networks, warehousing systems, and distribution centers. As logistics infrastructure becomes increasingly interconnected through Internet of Things devices, cloud computing, and automated systems, the potential attack surface expands significantly. The study analyzes prevalent threat vectors, including ransomware, supply chain compromises, and advanced persistent threats, while evaluating their potential impacts on operational continuity, economic stability, and national security. Furthermore, this research proposes a comprehensive risk management framework incorporating threat identification, vulnerability assessment, mitigation strategies, and incident response protocols. The

findings emphasize the necessity of adopting a proactive, multi-layered security approach that integrates technological solutions, organizational policies, and cross-sector collaboration to ensure the resilience of critical logistics systems against evolving cyber threats.

37. Optimization of Specific Multimodal Transport Activities

Autor: stud. Ioan-Sebastian SIDOR, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Beazit ALI

Abstract: This thesis examines the optimization of multimodal transport activities in the naval sector, focusing on the Port of Constanța, Romania's largest seaport and the biggest port on the Black Sea. The research analyzes the theoretical framework of multimodal transport, port operations, and logistics activities, identifying key performance indicators such as container dwell time, crane productivity, and rail transport share. The case study reveals significant challenges: outdated railway infrastructure, dwell times of 5-7 days compared to 3-4 days in efficient ports, and low rail modal share (15-20%). The paper proposes optimization measures across three-time horizons: short-term digitalization through Port Community System implementation, medium-term infrastructure modernization and intermodal terminal development, and long-term capacity expansion. Expected benefits include 35-45% dwell time reduction, increased rail shares to 30-35%, and 20-25% CO2 emission decrease.

Keywords: multimodal transport, port optimization, container terminal, Port Community System, Port of Constanța, TEN-T, sustainability.

38. Fundamentals of Goods Logistics. The Connection with Production and Marketing. The Logistics Mix

Autor: stud. Iulian STANGA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Beazit ALI

Abstract: Maritime ports play a crucial role in international trade and the efficiency of global supply chains. Acting as key nodes between maritime and inland transport, ports facilitate the handling, storage, and distribution of goods. Efficient port logistics contributes to reduced vessel waiting times, optimized operational costs, and increased competitiveness at regional and global levels. This paper analyzes the importance of port logistics within the supply chain, focusing on cargo flows, logistical processes, and current challenges such as congestion, insufficient infrastructure, and incomplete digitalization. The study combines theoretical research with a case study of the Port of Constanța, the largest maritime port in Romania. The analysis highlights the role of automation, integrated information systems, and process optimization in improving operational efficiency. The findings emphasize that continuous modernization and digital transformation are essential for ports to remain competitive and sustainable in the global logistics network.

39. Optimization of the Procurement Process in a Shipyard

Autor: stud. Andrei ȘTEFAN, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Beazit ALI

Abstract: The shipbuilding industry is undergoing continuous change, driven by rising costs, increasing project complexity, and the need to meet strict delivery deadlines. In this context, the procurement process plays a key role in the efficient operation of a shipyard. This paper analyzes how the supply chain influences the operational performance of a shipyard, based on a case study from the shipbuilding industry. The main stages of the procurement process, common problems, and their

impact on production are presented. Based on this analysis, several directions for optimization are proposed, focusing on improved planning, better coordination between departments, and stronger relationships with suppliers, with the aim of increasing efficiency and reducing delays.

40. Management and Logistics of Port Operations for Tankers

Autor: stud. Gabriel VASILIU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Prof. univ. Dr. ing. Beazit ALI

Abstract: The dissertation examines the management and logistic of port operation for tankers vessels, with focus on the coordination between vessels, terminals and port Authorities. The study addresses key processes such as berth allocation, cargo handling, documentation and risk management, highlighting their impact on the overall supply chain performance. It analyses how infrastructure, operational planning and the flow of information influence safety, efficiency and turnaround time during tanker vessel's port calls. Using operational analysis and practical case references, the research identifies best practices and constraints specific to tanker's operations and proposes measures to optimize port logistic while maintaining regulatory compliance and environmental protection.

41. GPS-Denied Autonomous Take-off and Landing of Multirotor UAVs on High-Speed Intervention Boats in the Black Sea

Autor: stud. Daniel-Andrei AVRAM, Academia Tehnică Militară „Ferdinand I”, București

Îndrumător: Lector univ. Dr. ing. Ioana-Raluca ADOCHIEI

Abstract: Multirotor UAVs are commonly employed for maritime surveillance, quick-response missions, and search-

and-rescue assistance, primarily due to their ability to be rapidly deployed and fly directly above the required locations. That being said, flying a copter from a fast-response vessel in the Black Sea remains a complicated task. The scenario worsens further when GNSS positioning is absent, unreliable, or affected by deliberate or accidental disruptions. This paper presents a GPS-denied autonomy concept for precise vertical takeoff and landing on a moving deck under realistic sea dynamics. The approach estimates the relative UAV vessel state through sensor fusion combining visual inertial odometry, optical flow, downward LiDAR altitude, and IMU data. A vessel-aware guidance strategy matches platform velocity and shapes a stable descent, while predictive control compensates for wave-induced deck motion. Landing is confirmed through redundant cues, improving robustness in glare, sea spray, and low-contrast conditions.

42. Case Study on Supply Function in a Maritime Company

Autor: stud. Marian-Alberto ROȘIE, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. Cătălin POPA

Abstract: This paper, “Case Study on Modeling the Supply Function at an Economic Agent in the Naval Sector,” analyzes the supply process within maritime and port logistics. Its main objective is to understand and model the supply function to ensure efficient support for operational activities. The first part presents the theoretical foundations of the agency function and its role in logistics management. The second chapter examines vessel provisioning, focusing on logistical, technical, and technological aspects, as well as the planning and coordination of essential resources. The applied section presents a case study of a maritime operator, including procurement planning, organizational analysis, process modeling, and efficiency improvement measures. Based on the findings, the paper

proposes strategies to optimize supply flows, reduce costs, and enhance operational performance, highlighting the importance of supply function modeling in the naval industry.

43. The Implementation of the Integrated Logistics Concept in National Defense Structures

Autor: stud. Denisa Florentina PETER, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Filip NISTOR

Abstract: This study analyzes the implementation of the integrated logistics concept within national defense structures from the perspective of the role of logistics in generating operational capability. Starting from the theoretical foundation of logistics and its evolution toward integrated approaches, the principles of coordination, continuity, flexibility, and efficiency are highlighted as the basis for resource management. From an applicative standpoint, the study assesses the particularities of military logistics compared to civilian logistics, the operational constraints and security requirements, as well as the organization across strategic, operational, and tactical levels and the responsibilities of logistical structures. Civil–military cooperation and the use of national infrastructure in supporting mobility and resilience are also analyzed. The methodology combines documentary analysis, doctrinal synthesis, and comparative interpretation. The results support the need for informational integration and unified planning to enhance response speed, reduce dysfunctions, and optimize resource utilization in the context of contemporary risks. The paper proposes modernization directions: digitalization of logistical flows, standardization of procedures, strengthening of critical reserves and alternative routes, as well as the development of partnerships to ensure interoperability and continuity in major crisis situations.

44. The impact of global economic volatility on containerized through the Port of Constanța

Autor: stud. G.-F. Andreea-Theodora IACOBESCU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Alexandru COTORCEA

Abstract: This paper examines the impact of global economic volatility on containerized import and export flows through the Port of Constanța, a strategic maritime hub in the Black Sea region. The study analyzes how fluctuations in global and regional economic activity are transmitted through supply chains to influence container traffic volumes, composition, and directional balance. Employing a quantitative econometric approach, the research uses time-series data on container throughput, disaggregated by import and export flows, alongside key volatility indicators related to industrial production, freight rates, exchange rates, and economic policy uncertainty. Special attention is given to the post-2020 period, marked by the COVID-19 pandemic, supply chain disruptions, inflationary pressures, and geopolitical instability in the Black Sea region.

OCEANOGRAFIE ȘI HIDROGRAFIE

BIROUL SECȚIUNII

Președinte: Conf. univ. Dr. Romeo BOȘNEAGU

Membri: Conf. univ. Dr. ing. Dinu ATODIRESEI
Ș.L. univ. Dr. ing. Lucian DUMITRACHE

Sala L252

1. The use of Topograph Online to Increase Accuracy of ROV Underwater Positioning

Autor: stud. Florian GHEORGHE, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Lucian DUMITRACHE

Abstract: Because Topograph Online is equipped with RTK capability, it can be employed to enhance the overall accuracy of underwater positioning. Specifically, the GPS coordinates obtained with the RTK-enabled handheld device are recorded and subsequently introduced into the web interface of the underwater positioning system. By using these centimeter-level corrected coordinates as reference values, the entire underwater survey benefits from improved positional accuracy, achieving centimeter-scale precision throughout the data acquisition process.

2. Risk Analysis Associated with The Specific Activities Carried Out by A Research Vessel

Autor: stud. Ionuț STAN, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Alexandru COTORCEA

Abstract: This paper provides a systematic **risk analysis** of the specialized operations conducted by **research vessels (R/V)**, emphasizing the unique challenges that distinguish them from conventional commercial shipping. Beyond standard

navigation, research vessels perform high-complexity tasks such as the deployment and recovery of scientific instrumentation, subsea sampling, and the operation of **remotely operated vehicles (ROVs)**. The study utilizes the **Formal Safety Assessment (FSA)** methodology to identify and evaluate hazards associated with technical maneuvers, dynamic positioning failures, and environmental constraints. By assessing both the probability and the potential impact of these risks, the research proposes integrated mitigation strategies focused on **Safety Management Systems (SMS)** and specialized crew training. The findings underscore the critical need for advanced operational protocols to protect human life, high-value technological assets, and the marine environment, ensuring the resilience and success of maritime scientific missions in complex offshore scenarios.

3. Utilization of Uncrewed Surface Vessels (USVs) in Hydrographic and Oceanographic Research: Innovations, Applications and Future Perspectives

Autor: stud. Emanuel Cristian CERCEL, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. Romeo BOȘNEAGU

Abstract: This study provides an overview of the use of Uncrewed Surface Vessels (USVs) in modern hydrographic and oceanographic research, focusing on technological innovations, operational applications, and future development directions. The growing adoption of autonomous and remotely operated surface vessels reflects ongoing efforts to improve data acquisition efficiency, operational safety, and spatial coverage in marine investigations. The study outlines the main concepts and classifications of USVs, key onboard systems and sensors, and their role in hydrographic surveying and meteorological data collection. Representative applications, including bathymetric mapping and the monitoring of physical

and chemical marine parameters, are examined alongside technical and operational considerations, highlighting the contribution of USVs to the advancement of hydrographic and oceanographic research practices.

4. Role of Software Applications in the Analysis of Oceanographic and Hydrographic Data for Navigation Safety

Autori: stud. Andreea-Bianca GRECU, stud. Iulia-Ioana MIHAI, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Lucian DUMITRACHE

Abstract: The continuous development of maritime activities requires accurate and timely information about the marine environment to ensure navigation safety. This paper examines the role of software applications in the analysis of oceanographic and hydrographic data and their contribution to reducing navigational risks. Modern software tools enable the collection, processing, visualization, and interpretation of large volumes of marine data, including bathymetry, tides, currents, waves, and meteorological parameters. By integrating data from on-site measurements, remote sensing, and numerical models, these applications support a comprehensive understanding of marine dynamics and underwater terrain. The study highlights how advanced data analysis techniques and digital mapping systems improve situational awareness and decision-making in navigation. Emphasis is placed on the importance of data accuracy, real-time processing, and system compatibility between different software platforms. The results demonstrate that software-based analysis of oceanographic and hydrographic data plays a critical role in enhancing navigation safety and supporting sustainable maritime operations.

5. Black Sea Oceanography: Water Mass Dynamics and Their Impact on Ecosystems

Autori: stud. George HONȚ, stud. Gabriel MOREA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Lucian DUMITRACHE

Abstract: This paper examines the oceanography of the Black Sea, focusing on the dynamics of its main water masses and the processes that control their mixing and circulation. It discusses how stratification, freshwater inputs, and seasonal variability influence temperature, salinity, and nutrient distribution. The study highlights the role of these physical mechanisms in shaping ecosystem structure, productivity, and oxygen conditions. Finally, it outlines key implications for biodiversity, fisheries, and the management of coastal and offshore marine environments.

6. Navigation Route Optimization for Underwater Gliders Using Artificial Intelligence Algorithms

Autor: stud. Petrică-Iulian LUNGU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Lucian DUMITRACHE

Abstract: This dissertation explores the enhancement of autonomous maritime operations by focusing on the optimization of navigation routes for underwater gliders. Given the stringent energy constraints and the unpredictability of ocean currents, traditional path-planning methods often fall short in ensuring mission efficiency. This research proposes the implementation of Artificial Intelligence algorithms, specifically Genetic Algorithms and Reinforcement Learning, to compute optimal trajectories that minimize energy consumption while maximizing data collection coverage. By integrating real-time hydrodynamic data, the proposed model adaptively reconfigures the glider's path to leverage favorable currents. The performance is validated through numerical simulations, demonstrating a significant reduction in navigational error and operational costs compared to

conventional methods. The findings provide a scalable framework for integrating autonomous underwater vehicles (AUVs) into modern maritime monitoring systems, contributing to the advancement of intelligent maritime navigation and oceanographic research.

7. Influence of Oceanographic Processes on Maritime Navigation and Route Optimization

Autori: stud. Gabriel MOREA, stud. George HONȚ, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Lucian DUMITRACHE

Abstract: Oceanographic processes such as currents, waves, and sea surface temperature have a significant influence on maritime navigation and ship route planning. Understanding these processes is essential for improving navigation safety, fuel efficiency, and voyage optimization. This paper analyzes the impact of major oceanographic parameters on ship maneuverability and navigational decision-making. The study emphasizes the importance of integrating oceanographic data into modern navigation systems and forecasting models. By using oceanographic observations and numerical models, navigators can optimize routes, reduce operational costs, and minimize environmental risks.

8. The of METOC in Military Missions

Autori: stud. Lia-Gabriela PASCARU, stud. Sorin-Mugurel SCORUȘ, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Lucian DUMITRACHE

Abstract: The operational environment directly influences the conduct of military actions, and neglecting meteorological, oceanographic, and environmental factors can negatively affect the success of a mission, even under conditions of proper planning. The Romanian Navy conducts operations in all combat environments and relies on knowledge of current and

forecast environmental conditions to increase operational efficiency. In this context, accurate, up-to-date, and reliable meteorological and oceanographic (METOC) information provides essential support to the decision-making process, contributing to situational awareness and the identification of favorable moments for planning, executing, and supporting military operations. The METOC process includes steps such as collecting, processing, analyzing, forecasting, adapting, disseminating, integrating, and mitigating environmental information. By applying mission- and platform-specific METOC thresholds, specialized personnel support commanders in anticipating the impact of the environment on operations and in taking appropriate measures.

9. Utilizing Underwater Glider Networks for Intrusion Detection and Monitoring in Exclusive Economic Zones

Autor: stud. Daniela-Florentina PETCU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Lucian DUMITRACHE

Abstract: This dissertation investigates the strategic deployment of autonomous underwater glider networks as a cost-effective solution for maritime surveillance within Exclusive Economic Zones (EEZ). Traditional monitoring methods, such as surface vessel patrols and fixed acoustic arrays, often face limitations in persistence and scalability. This research proposes an integrated framework for intrusion detection, leveraging the long-endurance capabilities and low acoustic signature of gliders. By employing distributed sensor networks and coordinated path-planning algorithms, the study analyzes the gliders ability to detect, track, and report unauthorized underwater or surface activities in real-time. The methodology includes simulation-based scenarios to evaluate detection probability and communication reliability under varying hydro-acoustic conditions. The findings highlight the

potential of autonomous swarms to enhance maritime situational awareness, providing a proactive defense layer for protecting critical infrastructure and sovereign waters. This work contributes to the advancement of automated border security and the modernization of naval monitoring protocols.

10. Case Study on Hydrometeorological Beacons And Offshore Wind Installations

Autor: stud. Lavinia-Maria ROIU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Lucian DUMITRACHE

Abstract: This case study analyses the role of hydrometeorological beacons in the development and operation of offshore wind installations. The beacons ensure continuous monitoring of essential meteo-oceanographic parameters, such as wind, sea state, currents and water temperature, data necessary for the assessment of energy potential, operational safety and maintenance planning. The study highlights the importance of integrating hydrometeorological monitoring systems into offshore wind infrastructure, contributing to risk reduction, increased energy efficiency and sustainable development of marine renewable energy.

11. Influence of Extreme Hydrodynamic Events on Shoreline Retreat along the Romanian Coastline

Autori: stud. Sorin SCORUȘ, stud. Lia PASCARU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Lucian DUMITRACHE

Abstract: Coastal erosion represents a major environmental challenge along the Romanian coast of the Black Sea, being influenced by both long-term sea level variability and short-term extreme hydrodynamic events. This study investigates the influence of extreme hydrodynamic events, including storm surges and high-energy wave conditions, on shoreline retreat

along the Romanian coast. The analysis is based on a comparative assessment of satellite imagery acquired before and after selected storm events, combined with sea level and wave data. Changes in shoreline position were identified through visual interpretation and basic spatial measurements, allowing the assessment of spatial variability in shoreline retreat. The results indicate significant shoreline retreat associated with extreme events, with noticeable differences between coastal sectors depending on local coastal morphology and human interventions. These findings emphasize the dominant role of extreme hydrodynamic events in driving short-term coastal changes and highlight their relevance for coastal risk assessment.

12. Maritime Drones (USV): Concepts and Classification

Autor: stud. Daniel SMĂRĂNDESCU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Lucian DUMITRACHE

Abstract: Maritime drones, also known as Unmanned Surface Vehicles (USV), are an essential component of modern technologies for monitoring and operating in the maritime environment. These autonomous or semi-autonomous systems are used in a variety of civil and military applications, such as maritime surveillance, oceanographic research, bathymetric mapping, critical infrastructure protection and security operations. Conceptually, USVs are characterized by the level of autonomy, type of propulsion, load capacity and control mode. Their classification is based on size, mission, degree of autonomy (teleoperated, autonomous or hybrid) and field of use. The rapid evolution of sensors, artificial intelligence and communication systems has contributed to increasing the efficiency and reliability of maritime drones, strengthening their role as flexible and efficient solutions for operations in complex maritime environments.

13. Remotely Operated Vehicles (ROVs): Key Technologies and Applications in Modern Marine Operations

Autori: stud. Malina VLADOIU, stud. Carlos-Constantin BRATUIANU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Lucian DUMITRACHE

Abstract: Remotely Operated Vehicles (ROVs) play a crucial role in modern marine and offshore operations by enabling underwater exploration and intervention without direct human presence. These systems are widely used in environments that are too deep, dangerous, or inaccessible for divers. This presentation outlines the main characteristics of ROVs, including their core components, control systems, and classification based on operational capabilities. Key applications are discussed, such as hydrographic surveying, offshore infrastructure inspection, scientific research, and naval operations. The advantages of ROV technology in terms of safety, operational efficiency, and data accuracy are highlighted, along with their current limitations. The objective of this presentation is to emphasize the importance of ROVs in contemporary maritime activities and their contribution to the development of advanced underwater technologies.

14. Oceanographic Gliders: Autonomous Platforms for Long-Endurance Marine Monitoring

Autori: stud. Malina VLADOIU, stud. Carlos-Constantin BRATUIANU, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Lucian DUMITRACHE

Abstract: Oceanographic gliders are autonomous underwater vehicles designed for long-duration marine observation with minimal energy consumption. Unlike conventional underwater vehicles, gliders use changes in buoyancy to move through the

water column, allowing them to collect data over extended periods and large spatial areas. This presentation introduces the operating principles of oceanographic gliders, their main structural and functional components, and typical mission profiles. Key applications include oceanographic research, climate monitoring, environmental assessment, and support for naval and maritime operations. The advantages of gliders, such as endurance, low operational cost, and reduced environmental impact, are discussed alongside their limitations, including speed and payload capacity. The presentation highlights the growing role of oceanographic gliders in modern marine monitoring and their contribution to improved understanding of ocean dynamics.

15. Performance Evaluation of the Kongsberg EM2040P Multibeam System in High-Resolution Mapping of Submerged Relief

Autor: stud. Alexandru-Ștefan BEREA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Lucian DUMITRACHE

Abstract: This paper analyzes the performance of the Kongsberg EM 2040P multibeam echosounder in the acquisition of high-resolution bathymetric data. As a leading technological solution in the portable segment, this system provides advanced signal processing and an extended bandwidth, essential for centimeter-scale mapping of the submerged relief. The study examines the system's architecture, highlighting its multi-frequency operational capability (200-700 kHz) and the use of frequency modulation technology to optimize the signal-to-noise ratio. By integrating inertial positioning systems, the EM2040P ensures high point density and rigorous precision in correcting platform motion. The results demonstrate the equipment's efficiency in generating 3D digital terrain models and inspecting hydrotechnical structures,

while adhering to the highest international hydrographic standards. The findings underscore the system's versatility in the context of underwater environmental monitoring and critical infrastructure management.

Keywords: *EM 2040P, multibeam echosounder, bathymetric data, hydrographic standards, versatility.*

16. Usage of UAV in Hydrography and Oceanography

Autor: stud. Andrei CĂLIN, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. ing. Sergiu LUPU

Abstract: This dissertation explores the use of Unmanned Aerial Vehicles (UAVs) in hydrography and oceanography, focusing on their growing role as efficient tools for data acquisition and environmental monitoring. Recent technological advancements have enabled UAVs to collect high-resolution spatial and temporal data in coastal and marine environments, complementing traditional survey methods. The study analyzes the main types of UAV platforms and sensors employed in hydrographic and oceanographic applications, including photogrammetry, bathymetric mapping, shoreline monitoring, and water quality assessment. Particular attention is given to the advantages of UAV-based surveys, such as cost efficiency, operational flexibility, rapid deployment, and improved safety in hazardous or hard-to-reach areas. At the same time, the research discusses current limitations related to flight endurance, sensor accuracy, data processing, and regulatory constraints. Through a review of recent case studies and practical applications, the dissertation highlights the potential of UAV technology to enhance data accuracy and support informed decision-making in marine sciences. The results suggest that UAVs represent a valuable and increasingly indispensable tool for modern hydrographic and oceanographic research.

17. Analysis and Implementation of the S-102 Standard, Within the S-100 Standards Framework, for the Modernization of Hydrographic Capabilities

Autor: stud. Paul-Alexandru CIOCAN, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Lucian DUMITRACHE

Abstract: The modernization of hydrographic capabilities requires the adoption of advanced data standards capable of supporting high-resolution, interoperable, and data-centric maritime information systems. The S-102 Bathymetric Surface standard, developed within the S-100 framework, enables the production and management of gridded bathymetric data in a standardized digital format suitable for modern navigation and operational applications. Its implementation facilitates improved data integration, enhanced accuracy of seabed representation, and interoperability with other S-100 product specifications. By transitioning from legacy hydrographic products to S-102-compliant datasets, naval structures can strengthen decision-making processes, mission planning, and maritime domain awareness. The integration of S-102 contributes to the development of a coherent digital hydrographic environment aligned with contemporary operational and technological requirements.

18. The Ecology and Conservation of Coral Reefs

Autor: stud. Vlad Mihai CONSTANTIN, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Lucian DUMITRACHE

Abstract: Coral reef is a term used to describe the collective structure of hard corals that contribute to the formation of the coral reef ecosystem. Coral reefs are the most biodiverse ecosystem in our oceans. They are found in over 100 countries and territories and, although they cover less than 1% of the

seabed, they support at least 25% of marine species, harbouring the greatest biodiversity of any ecosystem globally and making them one of the most valuable ecosystems on the planet. According to a 2020 report by the Global Coral Reef Monitoring Network, 14% of the world's coral reefs have disappeared since 2009. In the face of reef devastation, restoration has become a priority around the world. Despite progress in reef restoration, there are also challenges. One of the main problems is that the coral species used in transplants tend to be branching species, which are more vulnerable to bleaching.

19. The use of Remotely Operated Submersibles in Hydrographic and Oceanographic Research

Autor: stud. Alexandru-Octavian GURITA, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Conf. univ. Dr. Romeo BOȘNEAGU

Abstract: The study addresses the main applications of UUVs in hydrography and oceanography, including seafloor bathymetric mapping, detection of submerged hazards, inspection and maintenance of offshore subsea infrastructure such as pipelines and cables, and marine environmental monitoring. Particular attention is given to the use of UUVs for observing benthic habitats, marine fauna and vegetation, as well as identifying areas affected by pollution or active geomorphological processes.

20. Symmetrical Maritime Drone Concept for Extreme Conditions

Autor: stud. Gabriel-Marian LEIZERIUC, Academia Navală „Mircea cel Bătrân”, Constanța

Îndrumător: Ș.L. univ. Dr. ing. Lucian DUMITRACHE

Abstract: This project presents the concept of a surface maritime drone with a completely symmetrical structure,

designed to operate efficiently in extreme marine environmental conditions. The drone's design is such that there is no fixed "up" or "down" orientation, allowing continuous operation even when overturned by strong winds, waves, or sea currents. Geometric symmetry and uniform distribution of components ensure stability, constant buoyancy, and functional redundancy. The propulsion system is designed to allow controlled movement regardless of the drone's orientation, and the control system uses inertial sensors to automatically adapt the controls. The drone is intended for applications such as marine environment monitoring, oceanographic data collection, maritime surveillance, and intervention in difficult situations. The proposed concept highlights the importance of symmetry as a technical solution for increasing the reliability and safety of autonomous surface vehicles used in extreme conditions.