IAMU
International Association of Maritime Universities

THE NIPPON FOUNDATION
For Social Innovation

21st Annual General Assembly

IAMU AGA21

26th-28th October 2021

Alexandria - Egypt

The 21st Annual General Assembly

The International Association of Maritime Universities (IAMU) Student Session

Arab Academy
for Science, Technology and Maritime Transport

21ST Annual General Assembly

IAMU AGA21

26TH -28TH October 2021

The International Association of Maritime Universities (IAMU) Student Session

Conference Book

Alexandria, Egypt
26 October 2021

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Program Editor

Capt. Amr Moneer Ibrahim

Arab Academy for Science, Technology and Maritime Transport, Egypt

"A publication of the International Association of Maritime Universities"

Publisher

Arab Academy for Science, Technology and Maritime Transport

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Preface

The 21st Annual General Assembly (AGA 21) is the annual meeting of the International Association of Maritime Universities (IAMU). The IAMU Student session (IAMUS), held annually as part of the AGA, brings together students and official representatives of IAMU member universities from all over the world to discuss, exchange, and share recent progress and future trends in maritime education, training, research and other matters within the scope of IAMU.

The 21st AGA and IAMUS are hosted by The Arab Academy for Science, Technology, and Maritime Transport (AASTMT), in the beautiful city of Alexandria, Egypt.

Due to travel restrictions imposed by the COVID-19 pandemic, the IAMUS was canceled in 2020. In 2021, the International Executive Board (IEB) of the IAMU found it challenging to decide on how to proceed with the student session. Yet, after due consideration, it was decided to hold the session in a hybrid mode, combining the regular "face to face" meeting with "online" participation, thus, enabling students from around the globe to meet, disseminating the latest research advancements in the field of maritime education, training, research, and development.

The theme of the AGA21 IAMUS is "Challenges of New Technology and IT Applications in the International Maritime Industry".

The IAMUS Conference book contains abstracts of papers presented at the technical sessions. This year's IAMUS has received 55 high-level abstract submissions from 11 different countries and 18 different IAMU universities. Based on the following Power Point submissions and the double peer-review process, 17 abstracts were accepted for inclusion in the Conference book.

We hope your experience with AGA 21 and IAMUS is a fruitful and long-lasting one. With your support and participation, the student session will continue its success for a long time.

Finally, we would like to thank the organizing committee, the members of the program committees, and reviewers. They have all collaborated to execute a world-class scientific conference appropriate to the respected work of the International Association of Maritime Universities and all member universities.

Capt. Amr Moneer
IAMUS 21 Program Editor

Theme:

Challenges of New Technology and IT Applications in the International Maritime Industry

Organization Committees:

To make the AGA 21 IAMUS a success, the Arab Academy for Science, Technology and Maritime Transport (AASTMT), as the host, the organized Executive Committees and International Program Committee with the cooperation of IEB members and members of the working groups supervised by Academic Affairs Committees.

Local Executive Committee (LEC):

Head	**Ismail Abdel Ghafar Ismail Farag** Arab Academy for Science, Technology and Maritime Transport, Egypt
Executive Director	**Gamal Ahmed Ghalwash** Arab Academy for Science, Technology and Maritime Transport, Egypt
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Local Organizing Committee	**Akram Soliman** Arab Academy for Science, Technology and Maritime Transport, Egypt **Alaa Morsy** Arab Academy for Science, Technology and Maritime Transport, Egypt
Program Editing Committee	**Amr Moneer Ibrahim** Arab Academy for Science, Technology and Maritime Transport, Egypt

International Program Committee (IPC):

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Program Editor	**Amr Moneer Ibrahim** Arab Academy for Science, Technology and Maritime Transport, Egypt
Session Chairs and Reviewrs	**Amr Moneer Ibrahim** Arab Academy for Science, Technology and Maritime Transport, Egypt **Matthew Rooks** Kobe University, Graduate School of Maritime Sciences, Japan

IAMU AGA21
26TH-28TH October 2021

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Online Supporting Team:

Mohamed Abdel Aal, Gamal Abd El-Nasser A. Said, Mohamed Kamal, and Ahmed Hassan
Arab Academy for Science, Technology and Maritime Transport, Egypt

Venue

The IAMU Student Session is held in two venues:

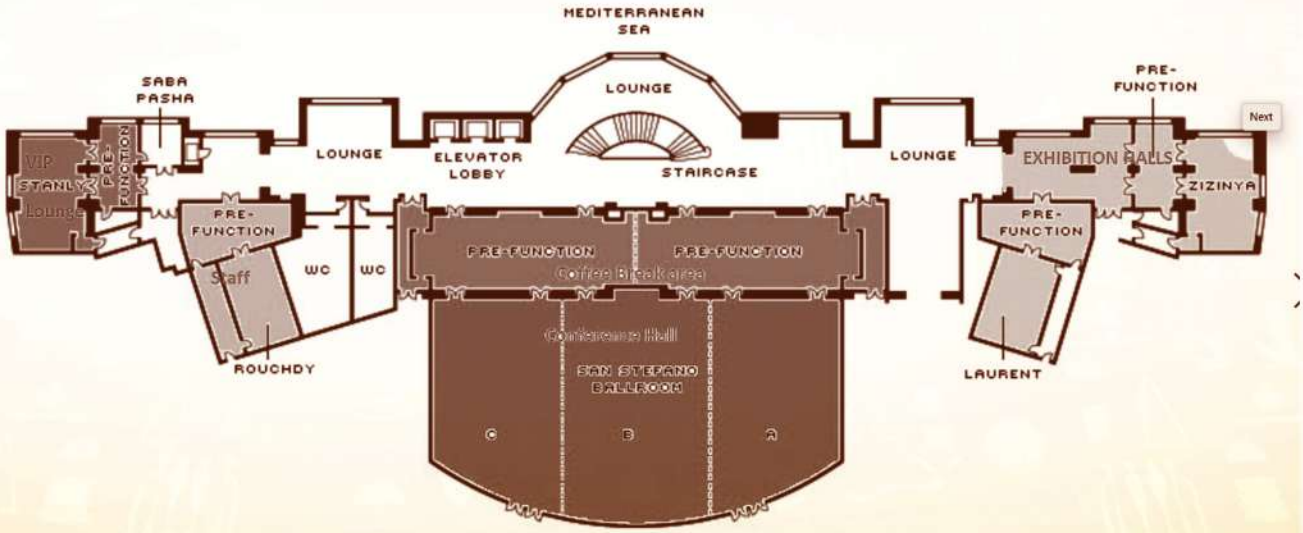
A. The Arab Academy for Science, Technology and Maritime Transport Abu Qir Campus Alexandria, Egypt.

Location:

B. The Four Seasons Grand Plaza Hotel
399 El-Gaish Rd, San Stefano, El Raml 1, Alexandria, Egypt.

Location:

Floor Plan



Program Overview:	IAMUS Technical Sessions Wednesday, October 27th Location: AASTMT	
Time	**Main Library 2nd Floor (A)** ***Chair**: Mr. Matthew Rooks (online)* ***Co-Chair**: Capt.Ahmed Ismaiel*	**Main Library 3rd Floor (B)** ***Chair**: Capt. Amr Moneer* ***Co-Chair**: Capt. Alaa Ammar*
09:00 – 10:30	**Session IAMUS-1 (A)**	**Session IAMUS-1 (B)**
	0900: Nika Lortkipanidze and Aleksandre Shervashidze *"Use of Thermal Imaging Cameras and Sound Detection System for COLREGs"* **0930: Jherico James Espinosa (online)** *"Comparative Analysis of the Physical Fitness Status of the Cadets of the Maritime Academy of Asia and the Pacific Before and During Lockdown"* **1000: Junto Yamashita and Aina Nakano (online)** *"Challenges for Earthquake-Predictive Technology"*	**0900: Nithish Balaji and Hmanshu Uppal** **"***A Step Towards IMO's GHG Emission 2030: Engine Derating Optimization Using Predictive Analytics"* **0930: Zaldy Noel Tumapang (online)** *"Satisfaction Of MAAP Cadets on The Adaptive Coping Strategies Against COVID-19 Stress"* **1000: Vinay Ranjan Jaiswal, Prathamesh Thube and Fazal Fazal (online)** *"AI And Its Adoption in Shipping"*
10:30	Coffee Break	
11:00 – 12:30	**Session IAMUS-2 (A)**	**Session IAMUS-2 (B)**
	1100: Rafael Kanev and Martin Yankov *"Innovations In Maritime Industry"* **1130: Sosuke Nakamura (online)** *"Development Of Tsunami Fragility Curve Using Remote Sensing and Multi-Scale CFD Simulation"* **1200: Christine Dane Garcia (online)** *"The Effectiveness of Online Classes in Maintaining the Academic Competency of MAAP Midshipmen Fleet"*	**1100: Patrycja Boratynska and Kacper Malinowski** *"Trend, New Technology and Future Outlook"* **1130: John Cullen (online)** *"Predictors of Fatigue-Related Maritime Accidents in Canadian Waters"* **1200: Tamaz Svanishvili (online)** *"Autonomous Ships – Future of The Maritime Shipping"*
12:30	Lunch	
14:00 – 15:30	**Session IAMUS-3 (A)**	**Session IAMUS-3 (B)**
	1400: Miral M. Armanious, Khaled Hazzaa, and AblaEid *"Egyptian Classification Society"* **1430: Kim Lawrence Galvan (online)** *"Effectiveness Of E-Learning in Navigation 7: Voyage Planning"* **1500: Cole Long (online)** *"Women in Marine Industries: The Importance of Female Leadership"*	**1400: Abraham Noel** *"A Hybrid Approach to Optimizing Ship Performance Using Convolutional Neural Network and Principal Component Analysis"* **1500: Emily Walsh (online)** *"Cold Exposure in Maritime Industries: A Scoping Review"*
15:30	Coffee Break	
16:00 – 17:00	**Session IAMUS-4** **Main Library 2nd Floor**	
	Conclusion, Q & A Session *Capt. Amr Moneer & Mr. Matthew Rooks (online)*	
17:30	Dinner	
18:45	Bus Shuttle to "City Center" shopping mall (Optional free tour)	
22:30	Buss Shuttle back to the AASTMT	

Technical Instructions

Oral Presentation Guidelines

- Oral presentation slots have 30 minutes (20 minutes presentation + 10 minutes discussion).
- Session Chairs will strictly demand time to allow members of the audience to switch sessions between presentations.
- All session rooms are equipped with LED Screens, a computer (MS Windows, MS PowerPoint, and Adobe Acrobat), microphone, remote control, and laser pointer. To avoid software compatibility problems, please embed all fonts in your PPTX file and bring a backup PDF file of your presentation.
- Please bring your presentation on a USB storage device and report to the Session Chair indicated in IAMUC Program 15 minutes before the start of the Session.
- For Online Oral Presentations:
    - Please make sure to have a good stable connection during your live presentation.
    - ***Zoom Webinar*** is the application used for the conference sessions.
    - You will login as a panelist only via the link that has your session's name or number.
    - Please make sure to stay online even after your presentation to participate in the discussion at the end of your session.
    - Please make sure not to share the link (with your session name or number) received on your email as it is intended only for you as a panelist.

Name Badge

All attendees must wear the name badge at all times to gain admission to IAMUC.

Mobile Phone

As a courtesy to our presenters and other attendees, please turn off your mobile phones during the sessions.

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Challenges of New Technology and IT Applications in the International Maritime Industry

Abstracts

Student Session

Challenges of New Technology and IT Applications in the International Maritime Industry

A hybrid approach to optimizing Ship performance using Convolutional Neural Network and Principal Component Analysis

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Keywords: Convolutional Neural Network, Principal Component Analysis, Blue economy, Ship performance, Energy efficiency

Energy efficiency in ships has become an important aspect for shipbuilders and operators since the implementation of the Energy Efficiency Design Index (EEDI) and Ship Energy Efficiency Management Plan (SEEMP) by the International Maritime Organisation (IMO) [1]. The functioning of EEDI resumed concepts such as the Blue economy and Green concept. Furthermore, the technological advancements in predictive analytics and artificial intelligence facilitated additional development in the sectors of the Blue economy. The ship operational data through conventional and unconventional sources are used for various optimization analyses such as design, route, speed, fuel and manpower [2-5].

This work presents a hybrid algorithm, developed to optimize ship performance using an image recognition Convolutional Neural Network (CNN) with Principal Component Analysis (PCA). Since such algorithms require a large set of trained data, a database is generated for a particular type of ship with a set of reference hull forms. This dataset is compressed into sets of scores using the method of PCA. The principal scores are programmed and automated to obtain large sets of hull shapes. The hull images thus obtained are categorized in a specific ratio with the help of splitting algorithms into training, validation and testing datasets. Later, an image classification algorithm is developed with these datasets using the deep CNN technique, which identifies the efficient hydrodynamic hull shape. Here, the CNN with PCA technique visually detects the energy-efficient hull without any human supervision. Therefore, the proposed hybrid algorithm offers significant breakthroughs in hull optimization and benefits ship designers towards new digital opportunities in a variety of domains.

References:

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A step towards IMO's GHG emission 2030: Engine derating optimization using Predictive Analytics

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Session Title: 5- Trends, New Technologies and Future Outlook

Keywords: GHG emissions, EEXI, engine derating, Predictive model, Fuel consumption

The IMO's strategy to reduce greenhouse gas (GHG) emissions for shipping has provided new norms in maritime transport. By 2030, it is expected to reduce the emissions to 30% and zero emission by 2100 [1]. IMO suggests many ways to reduce emissions viz., engine derating, employing energy saving devices, alternate fuels such as blended bio-fuels, hydrogen fuel and other similar methods. To improve the Energy Efficiency of Existing Ship Index (EEXI), derating the engine power could be the first choice for ship owners in meeting the IMO's GHG emission requirement. Guidelines on calculations, surveys and verification of the EEXI will follow and maybe finalized at MEPC 76 [2]. However, the implementation of new shipping policy and legislation to ensure the prevention of marine pollution may be imposed by adopting the instruments of IMO in regulating the GHG emissions.

The present study proposes a method to estimate the GHG emissions of ships by predicting the ship operational performance at various environmental conditions. An oil tanker is selected as the candidate vessel and a predictive model is developed with the vessel real time data. The predictive variables considered are engine brake power, engine RPM, draft, trim, speed over ground, speed through water and environmental factors. The predictive machine learning model is trained over the analyzed data and relations between parameters are established. Data is categorized into test and train datasets. Two methods to quantify the GHG emissions of the vessel per voyage are considered, fuel consumption (kg/ton) and engine power (g/kWh). Overall performance of the vessel is predicted by the machine learning model and subsequently the fuel consumption is obtained. The results are then used to forecast the GHG emissions as well as utilize the data to optimize the performance of vessel and fuel consumption.

References:

[1] Reducing greenhouse gas emissions from ships – IMO, https://www.imo.org/en/MediaCentre/HotTopics/Pages/Reducing-greenhouse-gas-emissions-from-ships.aspx

[2] IMO working group agrees further measures to cut ship emissions (23 October 2020)- IMO, https://www.imo.org/en/MediaCentre/PressBriefings/pages/36-ISWG-GHG-7.aspx

AI IN SHIPPING AND ITS ADOPTION

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Keywords: Artificial intelligence, Data, sustainability, Internet of things, economy

Abstract: The most important technology emerging at the forefront in present times is Artificial Intelligence. The question is, can it help drive efficiency along with achieving sustainable goals?

Artificial Intelligence or AI is defined as the study of "intelligent agents": any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals. This can be used to make machines, vehicles, and any other entity technically connected with a computer to profess its own intelligence in predicting the situation and taking decisions based on the algorithm written and the test data provided for the machine to learn.

75% of the 15,000 marine liability insurance industry claims assessed in its Safety and Shipping Review 2018 were the result of human error[(1)]. Human errors can be reduced drastically if we substantiate human work with AI-powered machinery. AI can be used in predictions, while important decision-making roles lie with humans.

Several of these techniques of AI can be used in shipping. A few of the ways are: -
Reducing fuel consumption

- Port terminal management
- Image recognition systems
- Navigation systems
- Unmanned vessels

Many hindrances cloud adoption of AI in the maritime industry due to its operation in places tending to the harsh climate and extreme weather conditions.

Major concerns include lack of quality data, storage, lack of understanding, lack of skilled workforce, regulatory issues.

AI wasn’t being used extensively, due to the lack of availability of quality data to power its functioning. Now it's easier to collect, clean, and use the data.

AI and Machine Learning algorithms need a large amount of data for it to predict patterns in it.

Data acquisition can be done with the use of IoT and other important devices. The next step concerns quality storage and sorting of data. This problem can be taken care of by establishing a high-tech storage infrastructure.
Advanced skillsets are required in order to translate the data into meaningful purposes and to design and program Machine learning algorithms. Other problems include designing IoT devices, compatible with the harsh environment of the sea.

A study by PricewaterhouseCoopers (PwC) estimates that global GDP may increase by up to 14 % (the equivalent of US$15.7 trillion) by 2030 as a result of the accelerating development and take-up of AI. Implementation of AI can be huge for enterprises and companies can't afford to not ride on this wave. Despite all the hindrances, we need to tackle them and help drive efficiency alongside sustainability in the maritime industry.

1. AGCS, Global Claims Review: Liability In Focus, 2017
2. Competing in the age of AI by Marco and Lakhani (fig, 2 and fig. 3)

FIG.1 – HINDERANCE IN ADOPTION

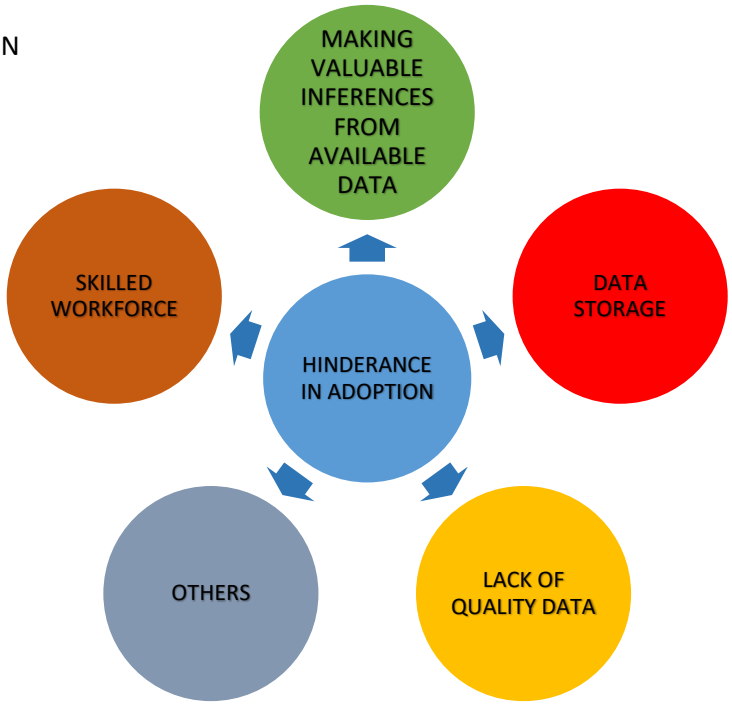

FIG.2 – AI FACTORY'S VIRTUOUS CYCLE[2]

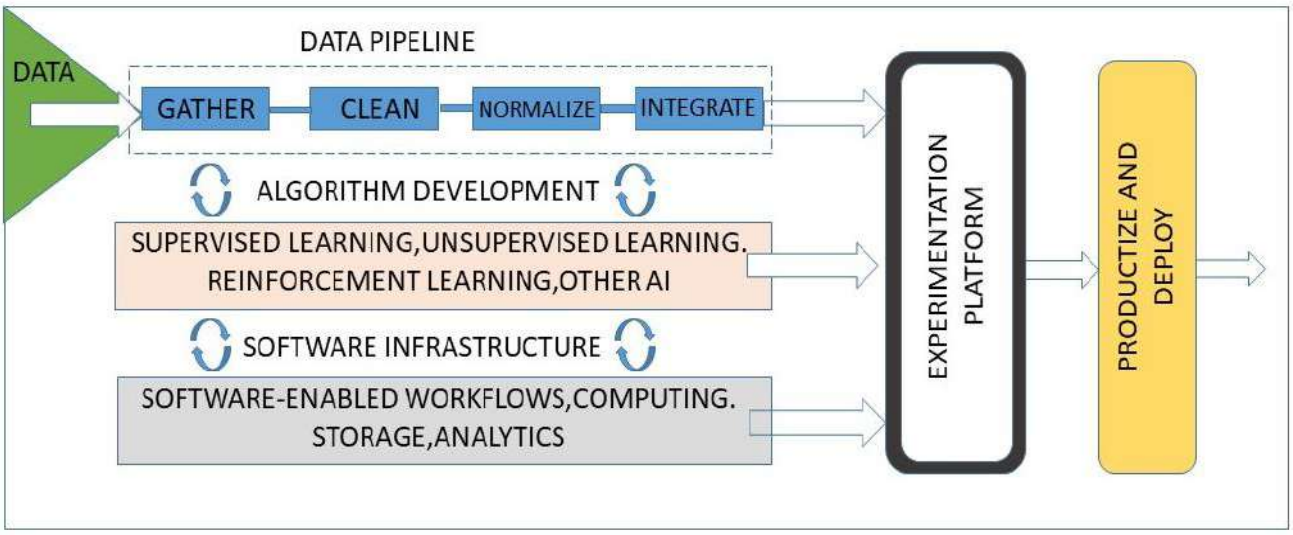

FIG.3 -AI FACTORY COMPONENT[2]

Arab Classification Society

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Classification societies stood up to ensure safe navigation, operation and to prevent marine pollutions. From the preliminary design to shipwrecking stages, classification societies provide shipping companies with the right information and adequate solutions at the right time to ensure efficient ship operations through reducing costs and preventing marine pollutions while increasing their availability, survivability and effectiveness. In addition, classification societies ensure compliance of both statutory and flag state requirements, through reviewing new ship designs, amendments, controlling the quality of new ship construction and life cycle repairs, as well as by providing advice during critical decision-making times, e.g. accidents, unforeseen circumstances, grounding, etc. As such, classification societies supports and ensures a sustainable marine industry.

This research investigates the key challenges of entry for the Arab Academy for science, Technology and Maritime Transport (AASTMT) for this sector by establishing a regional classification society to serve the maritime industry in the MENA region, while initially focusing on such small non-SOLAS vessels and finding ways to build up capacity to perform adequate services. Recently, the role of classification societies have extended to include providing technical advice and consultancy work for the International Maritime Organisation (IMO), flag states, shipping companies with regard to seakeeping of non-traditional ships, ship structure integrity, ship propulsion, energy management systems, statuary requirements, and statuary survey on behalf of governments.

Key challenges that this work focuses on are as follows: build up technical capacity, and to be recognised from relevant bodies, such as; the IMO, flag state administrations, ship owners, port states and insurance companies [2]. The developed survey comprises of twenty focused questions and spread out to relevant experts in the MENA region. Although, data will be analysed and post processed, in the near future, to build up quantitative conclusions and findings, the initial results showed a good potential for the AASTMT to establish a specialized classification society for statuary surveys, consultancy and technical advice for shipping companies and flag states in the MENA region.

This work shapes a step forward for the AASTMT to build up on the reputation of providing cutting-edge maritime education and training (MET) services to be much involved in servicing the maritime industry and governments by different means. The involvement would contribute also to minimizing the gap between provided MET and industry expectations, as too would enrich the resources of AASTMT that would reflect on the quality of MET provided by purchasing cutting-edge facilities and commercial computed design codes. In addition, enhancing rates of employment of graduates of the maritime sector, ensuring sustainable maritime industry and contributing the formation of high standards for regional ship design, construction and operation.

This project is aligned with the sustainable development goals, for example the goal for decent work and economic growth, quality education, clean water, industry innovation and infrastructure, climate action, life below water, gender equality and strong institutions [3].

References:

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Autonomous Ships – Future of The Maritime Shipping

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Abstract

The 21st century, as an age of technology, requires the use of technology in the activities of various industries, thus easing operations, ensuring lower costs and reducing environmental impact. The maritime industry can not be an exception in this process. The topic of launching "autonomous ships" is very relevant today.

According to Waterborne TP an autonomous ship is described as: *„Next generation modular control systems and communications technology will enable wireless monitoring and control functions both on and off board. These will include advanced decision support systems to provide a capability to operate ships remotely under semi or fully autonomous control."*[1]

This means balancing the benefits of new and modern technologies against safety problems, environmen and environmental impacts. The facilitation of international trade, the potential costs of the industry, and finally their impact on personnel, both on board and on land.

In 2017, the IMO Maritime Safety Committee agreed to put the issue of autonomous naval vessels on the agenda. Marine specialists talk about different types of automated ships[2] : 1) Ship with automated processes and decision support: Seafarers are on board to operate and control shipboard systems and functions. Some operations may be automated and at times be unsupervised but with seafarers on board ready to take control. 2)Remotely controlled ship with seafarers on board: The ship is controlled and operated from another location. Seafarers are available on board to take control and to operate the shipboard systems and functions. 3) Remotely controlled ship without seafarers on board: The ship is controlled and operated from another location. There are no seafarers on board. 4) Fully autonomous ship: The operating system of the ship is able to make decisions and determine actions by itself.

The appearance of this type of ships is expected after 2025. To summarize, it is possible to clearly identify the benefits that automated vessels can bring to international shipments, including: Safety; Cost; Sustainability; Risk; Business;

The presented article will discuss the different types of automated vessels, the benefits derived from them, which are related to international shipping.

Keywords: Autonomous Vessel; Shipping; Human Factors; Future;

[1] http://www.unmanned-ship.org/munin/about/the-autonomus-ship/ (applied: 10.03.2021)

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Challenges of new technology and IT application in international maritime industry

Innovations in maritime industry

Rafael I. Kanev
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Abstract. Any industry within the world cannot develop steadily without the utilization of recent technologies. Shipbuilding doesn't differ from them . It's actively applying modern technologies and is now developing at an increased speed. While the automotive and aviation industries have long gone ahead in automation, shipbuilding is in its infancy. But the variability of contemporary technologies will soon allow it to catch up with the previously designated industries and even get ahed of them within the field of IT application.

Some of today's technologies might be revolutionary for the industry. In this presentation, we'd wish to outline only a number of them, the advantages of which, we believe, are going to be felt at the turn of the subsequent 5-7 years. 3D printing, Robotics, Virtual and Augmented Reality (VR/AR), Engines powered by LNG, Laser Cladding Machine and other modern technologies that are setting out to be utilized in shipbuilding will be put in display in our report. we'll present their way of principle, application that they have within the field of shipping and shipbuilding. In order to get the maximum from them, certain personal competences are required.Our project will emphasize on ways to aquire all the theoretical knowledge needed and can show a way to put what has been learnt in practice. The following presentation will inevitably show you how above mentioned technologies will help shipbuilding industry to outstand and to leave automotive and aviation industries behind.

Key words: technology, innovations, robotics, shipbuilding, maritime industry

Cold Water Exposure in Maritime Industries: A Scoping Review

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Keywords: cold-water, safety, maritime, exposure, injury

Background: For many of those working in the maritime industry, it is very common to be exposed to harsh environments, such as cold water, on a regular basis. Previous studies suggest that motor and sensory performance decrements occur following acute exposure to cold water (2-10ºC) in laboratory settings, and chronic cold-water exposure can cause individuals to be more susceptible to a non-freezing cold water (NFCW) injury [1, 2]. Understanding maritime workers' experiences with cold water exposure is essential in creating safer industries.

Aims: We conducted a scoping review of peer reviewed published literature to determine what has been documented about seafarers' experiences with cold water exposure and NFCW injuries. It is hoped that this scoping review will help identify gaps in the literature and direct the focus of future research projects related to this topic. Our review was aimed to address the following questions: are NFCW exposures in the maritime industry being documented? What training protocols related to NFCW exposure are documented? What injuries have been reported as a result of NFCW exposure?

Method: Prior to beginning the review, experts from related industry backgrounds were consulted regarding the primary questions being investigated in the review. The methodology for this review followed a standardized framework [3, 4]. A PICO model was created to define the search terms for the review [5]. The initial search identified 690 abstracts and these were reviewed by two reviewers. Of these abstracts, 11 were considered to be relevant to the review's primary questions.

Results: This scoping review illustrated the lack of research that currently exists in relation to cold water exposure in the maritime industries. Within the available, albeit limited, literature, evidence suggests that there are several NFCW injuries that occur in the maritime industry. These include defects in skin barrier function [6], occupational dermatosis [6], Raynaud's phenomena [7], finger blanching, and hand numbness [7]. Performance decrements were also reported [8].

Conclusion: The results of this scoping review clearly show that there is a lack of research this area. The current gaps include a lack of documentation of minor and non-fatal injuries, the amount of exposure, and training protocols. There must be a call to improve cold-water training regulations for those working in the maritime industries and for proper injury documentation, both of which can significantly benefit safety in the maritime industry. It is important to note that of the relevant papers, more than half of the papers were specifically related to fish processing, indicating an even greater lack of research within the other maritime industries. Addressing these gaps in the literature is essential for creating safer industries.

References:

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Comparative Analysis of the Physical Fitness Status of the Cadets of the Maritime Academy of Asia and the Pacific Before and During Lockdown

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Abstract

The Pandemic (Covid-19) has caused a temporary lockdown all-around the globe, hence this caused a substantial change in the lifestyle of everyone affected by the pandemic. The dominant explanation for this is the changes that created a notion of adapting to the "new-normal" wherein the movement of the citizens was controlled by different means including the requirement of self-isolation or quarantine. Previous researches anticipated data gathering through online surveys and were able to extract the interests and goals of people in engaging with the pandemic. Maritime Academy of Asia and the Pacific raised strict preventive measures and restrictions by the Fleet Regulations in the form of total lockdown, including the faculty staff and Department of Midshipmen Affairs personnel. Hence, it reduced the levels of physical activity of the cadets. The study aims to identify the consequential effects of lockdown in the lifestyle of cadets. Overall, the findings in the present study may provide significant ways on how the cadets have coped with the lockdown and its detrimental effects on physical health. The researchers gathered all the necessary data and information that may aid in identifying any significant differences between the physical fitness of the midshipmen before and during the lockdown. It has been concluded that the lockdown significantly positively affects the physical fitness. Furthermore, it has also been found out that the profile (age, class, campus, and gender) gives no influence to the significant change of the midshipmen's physical fitness.

KEYWORDS: *Pandemic, new normal, lifestyle, physical health*

Damage from The Great East Japan Earthquake and challenges for earthquake-predictive technology

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Keywords: earthquake, tsunami, natural disasters, earthquake prediction technology

It is quite difficult to predict natural disasters. Because of this, many people are injured and killed all over the world when earthquakes occur. Living in Japan, which is an area that is highly susceptible to earthquakes, we got interested in technology that can predict earthquakes, reduce damage caused by them, and save many lives. Therefore, we conduct research on new technologies of disaster prevention.
Our paper examines;

- problems after previous disasters and potential future solutions
- better ways to predict earthquakes and tsunamis

Ten years have passed since The Great East Japan Earthquake and Tsunami occurred on March 11th, 2011. The magnitude of the earthquake was 9.0, which is the largest recorded earthquake in Japan and the fourth largest in the world so far [1]. Many buildings were destroyed in the earthquake, but the threat did not end with that; much of the damage and deaths occurred when the subsequent tsunamis struck. Some of these debris carried away by the tsunami drifted across the ocean to other countries' coasts. The number of deaths reached 19,729 and 2,559 people are still missing [1]. The total financial damage was about 16.9 trillion yen, or about 160 billion dollars [1].
Are there any means that can reduce these types of losses in the future? Is there anything that we can learn from it? To answer these questions, we revealed the problems related to this damage.
The problems are;
1. Not enough understanding how dangerous the disasters are
2. Not enough observation and insufficient monitoring network of earthquake and tsunami in the sea area [2]
3. Poor internet connectivity [2]
4. Poor technology of predicting earthquake

Problem 1 will be solved by changing consciousness of people. Problems 2, 3, and 4 are quite difficult, but we have some ideas for potential solutions which connect to the maritime industry.
The solutions are:
1. Prepare stronger IT system which will not be damaged by disasters
2. Long-term prediction system

There is a great need to reduce damage from natural disasters which cannot be controlled by human beings. There are many researchers who are trying to develop improved predictive technology. This is quite a challenging issue, but if the technology is realized, we can make our lives safer and richer. This time, we will introduce such hopeful technologies.

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Development of tsunami fragility curve using remote sensing and multi-scale CFD simulation

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Tsunami is a natural hazard, which is caused by earthquakes, volcanic eruptions and submarine mass movements. Japan was severely damaged by the 2011 Great East Japan tsunami, which had not been experienced for the last 1,200 years. In recent years, the occurrence probability of the Nankai Trough earthquake is increased, and the event is more destructive than the 3.11 tsunami. In order to reduce the tsunami damage, it is necessary to clarify the conditions under which buildings are damaged. Therefore, the development of tsunami fragility-curves that expresses the degree of damage to buildings as a function of the external force of tsunami (e.g. inundation depth) is progressing. In this paper, I present the tsunami fragility-curve I devised for each building structure, by using remote sensing and multi-scale numerical simulation. Although there are field-based methods to assess building damages, they require extensive time on the ground. The method I propose combines aerial imagery and numerical simulations, so that the process can be scaled up and within a short time-frame. For the present research, the tsunami damage was read from the aerial photograph of the MLIT with GIS (using the QGIS solution). The simulation was performed using the iRIC's solver ELIMO and Nays2DFlood. The first one was used to simulate the tsunami propagation at sea and to the shore. The second model was used to simulate the water propagation on land by using the result of the first as an input at the shore. To construct the fragility-curve, I used the impacted buildings of Tohoku area, and estimated the related water-depth from the model. The model was calibrated using known water heights at the coast from the 3.11 tsunami. The simulation results were comparable to the field observations with waves of about 6 m, about 1 hour after the earthquake. To a few 10s of centimeters, the simulated waves were similar to observations. In detail, combining the simulation data and the GIS data of the impacted building, the author constructed the fragility curve as follows: For reinforced concrete construction, the damage rate rises sharply when the inundation level exceeds 3m inundation. The damage level reaches 100% at 7m. For steel structures, the damage rate gradually increases as the inundation depth increases, reaching about 55% at 7m, and finally for wooden structures, the damage rate

rises sharply from an inundation depth of about 2m and reaches 100% at 5m. From this research, it is possible to link inundation depth with damage levels, and I would argue that such data needs to be integrated during the planning process, so that cities are design with building best-survival rate as a criterion. It is necessary to increase the number of buildings to create robust damage prediction.

EFFECTIVENESS OF E-LEARNING IN NAVIGATION 7: VOYAGE PLANNING

A Research Paper Submitted
In Partial Fulfillment of the
Requirements for the Degree of
Bachelor of Science in Marine Transportation

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Abstract

This research looks into the Effectiveness of E-Learning in Navigation 7 Voyage Planning. According to the 99 2nd class respondents of MAAP Deck Cadets taking up the said course, they have answered an online survey resulting to a high level of precision, teaching pressure, and social presence. The implementation in terms of Relativity of E-Learning in Navigation 7-Voyage Planning scored a mean value of 3.775 corresponding to ‘moderately implemented’; in terms of Timeliness of E-Learning in Navigation 7-Voyage Planning scored a mean value of 3.575 corresponding to ‘moderately implemented’; in terms of Objectiveness of E-Learning of Navigation 7-Voyage Planning scored a mean value of 3.7 corresponding to ‘moderately implemented’; in terms of Topic Precision of E-Learning of Navigation 7-Voyage Planning scored a mean value of 3.525 corresponding to ‘moderately implemented’; interms of Teaching Presence of E-Learning of Navigation 7-Voyage Planning scored a mean value of 3.525 corresponding to ‘moderately implemented’; in terms of Social Presence of E-Learning of Navigation 7-Voyage Planning scored a mean value of 3.425 corresponding to ‘somewhat implemented’; in terms of Materials of E-Learning of Navigation 7-Voyage Planning scored a mean value of 3.5625 corresponding to 'moderately implemented'. However, the sub-category of "Technical features" under 'Materials' scored a mean value of 3.4 corresponding to 'somewhat implemented.' The midterm grades ranged from a minimum of 52.68 and a maximum of 90.54 having a mean of 79.9462. The F-statistic value and the null hypothesis rejects at a level of significance indicating that E-Learning significantly affects the respondents performance in NAV7 (Voyage Planning) positively. Hence, E-Learning is a useful tool that can be used in NAV7 mainly.

KEYWORDS: ***E-learning, Navigation 7, Voyage Planning, Blended Learning***

Predictors of Fatigue-Related Maritime Accidents in Canadian Waters

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Keywords: maritime accidents, fatigue, risk factors

Fatigue is an important concern when considering safety at sea[1]–[3]. Fatigue-related occurrences (FROs) are seen as modifiable risk factors that should be addressed at the organizational, environmental, and individual levels[4]. Our goal was to identify environmental, ship-specific, and organizational factors that predict maritime accidents where fatigue has been identified as contributing cause.

Methods

The Transportation Safety Board (TSB) of Canada investigates marine accidents in Canadian waters where there are risks to individuals, property, or the environment. Data from these investigations are publicly available for occurrences between 1995 and 2020. Variables from the dataset were examined using descriptive statistics and non-parametric bivariate tests of significance (Kruskal-Wallis Rank Sum Test, Chi-Square). The examined variables were: number of crew members on the vessel, total people on board the vessel, vessel gross tonnage, length, and type, occurrence location (e.g., at sea, harbour, channel), occurrence month, vessel phase of transit (e.g., stationary, towed, underway), type of accident (e.g., grounding, sinking), weather conditions, and wave height.

Results

Of the 42,401 occurrences contained in the database, 128 (0.30%) included an investigation of fatigue as a contributing factor to the occurrence. From those 128 cases, the TSB determined that 47 cases (36.7%) did have fatigue as a contributing factor. Total people on board, gross tonnage, and vessel length all demonstrated significant differences between FROs and non-FROs (Table 1). For each variable, fatigue-related occurrences had vessels with fewer people on board, lower weight, and shorter length. For occurrence location, FROs took place most often in channels, straights, or sounds, whereas non-FROs were evenly distributed across area types.

Vessel type demonstrated a significant difference between FROs and non-FROs. More than half (53.2%) of FROs involved fishing vessels. For non-FROs, cargo vessels were most frequent (29.6%), followed by fishing vessels (18.5%). The type of accident also differentiated between FROs and non-FROs. For FROs, 87.4 % of these occurrences were either groundings (57.4%) or collisions (29.8%). For non-FROs, the distribution of occurrences was more balanced across groundings (25.9%), collisions (21.0%), personal injury (19.8%), and other (22.2%). Vessel phase of transit, weather conditions, wave height, and month of occurrence were not statistically different between FROs and non-FROs.

Discussion

Examination of the TSB database has revealed two surprising results. First, given the focus on the impact of fatigue on maritime safety by regulators, the small number of investigations including a fatigue component was unexpected. Second, the frequency of FROs associated with fishing vessels was notable. These vessels appear to be more at risk of experiencing a maritime occurrence attributed to fatigue compared to other vessel types. The reporting requirements of fishing vessels in Canada are not the same as other vessel operation and requires examination[5].

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Table 1: *Descriptive statistics and bivariate analyses of organizational, environmental, and ship-specific characteristics of maritime occurrences investigated for fatigue.*

		Fatigue Related Occurrence		
	Total	No	Yes	P-Value
	n = 128	n = 81	n = 47	
Number Of Crew	7.6 (28.7)	10.7 (35.8)	2.4 (2.7)	0.153
Total People On Board	18.9 (83.6)	25.6 (102.0)	7.5 (31.2)	0.033
Gross Tonnage	7611.2 (17703.2)	10983.4 (20827.8)	866.7 (2770.0)	<.001
Length (Meters)	64.8 (77.0)	88.0 (87.4)	25.7 (25.6)	<.001
Area type				0.014
At sea	21 (16.4%)	14 (17.3%)	7 (14.9%)	
Bay	9 (7%)	8 (9.9%)	1 (2.1%)	
Channel/strait/sound	52 (40.6%)	24 (29.6%)	28 (59.6%)	
Harbour	26 (20.3%)	20 (24.7%)	6 (12.8%)	
Lake/river	20 (15.6%)	15 (18.5%)	5 (10.6%)	
Missing	0 (0%)	0 (0%)	0 (0%)	
Vessel type				<.001
Barge	9 (7%)	5 (6.2%)	4 (8.5%)	
Cargo	26 (20.3%)	24 (29.6%)	2 (4.3%)	
Ferry/passenger	16 (12.5%)	13 (16%)	3 (6.4%)	
Fishing	40 (31.2%)	15 (18.5%)	25 (53.2%)	
Other	19 (14.8%)	14 (17.3%)	5 (10.6%)	
Tug	18 (14.1%)	10 (12.3%)	8 (17%)	
Missing	0 (0%)	0 (0%)	0 (0%)	
Vessel phase				0.109
Stationary	19 (14.8%)	15 (18.5%)	4 (8.5%)	
Towed/pushed	12 (9.4%)	5 (6.2%)	7 (14.9%)	
Underway	97 (75.8%)	61 (75.3%)	36 (76.6%)	
Missing	0 (0%)	0 (0%)	0 (0%)	
Accident type				<.001
grounding	48 (37.5%)	21 (25.9%)	27 (57.4%)	
Sink/capsize	11 (8.6%)	9 (11.1%)	2 (4.3%)	
Collision	31 (24.2%)	17 (21%)	14 (29.8%)	
Personal	17 (13.3%)	16 (19.8%)	1 (2.1%)	
Other	21 (16.4%)	18 (22.2%)	3 (6.4%)	
Missing	0 (0%)	0 (0%)	0 (0%)	
Weather conditions				0.413
Clear	68 (53.1%)	43 (53.1%)	25 (53.2%)	
Weather	47 (36.7%)	34 (42%)	13 (27.7%)	
Missing	13 (10.2%)	4 (4.9%)	9 (19.1%)	
Wave height				0.269
Calm (0 to 0.5 meters)	73 (57%)	44 (54.3%)	29 (61.7%)	
Moderate/rough (>0.5m)	37 (28.9%)	27 (33.3%)	10 (21.3%)	
Missing	18 (14.1%)	10 (12.3%)	8 (17%)	

*Note: Occurrence month (p = 0.244) was omitted due to space constraints.

SATISFACTION OF MAAP CADETS ON THE ADAPTIVE COPING STRATEGIES AGAINST COVID-19 STRESS

A Research Paper Submitted in Partial Fulfillment
of the Requirements for the Degree of Bachelor of Science in Marine Transportation

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Abstract

The restrictions imposed to minimize the spread of the COVID-19 pandemic resulted to unprecedented stress levels on the general population, and even more so for the cadets of the Maritime Academy of Asia and the Pacific. This study aims to determine the effectiveness of the adaptive coping strategies implemented by the Department of Midshipman Affairs for reducing the stress levels of the cadets. It is well established that individuals have unique preferences in adapting to stress, so this study also aims to find out the correlation of the cadets' demographic profiles to their satisfaction on the adaptive coping strategies. Participants were 181 Class 2022 cadets under the 3-1 scheme. The researchers used Google Forms to gather data on the respondents' demographic profile and their satisfaction levels. This correlational research design utilized Pearson's chi-square test to determine the associations between the two factors. Results showed that (a) the cadets are satisfied with the adaptive coping strategies, (b) the age of the respondents is associated with their satisfaction on gardening and electronic sports activities, and (c) the gender of the respondents is associated with their satisfaction on gardening and physical sports activities. These results imply that certain improvements must be made on the implementation of the adaptive coping strategies, and activities appropriate to an individual's profile and preferences would yield better satisfaction levels. Results are discussed in terms of implications in stress-handling methods in broader fields and also in terms of further analysis of factors affecting stress and coping among individuals.

KEYWORDS: ***COVID-19, Adaptive Coping Strategies, Stress, Satisfaction, Demographic Profile, Correlational Research Design, Chi-square Test***

THE EFFECTIVENESS OF ONLINE CLASSES IN MAINTAINING THE ACADEMIC COMPETENCY OF MAAP MIDSHIPMEN FLEET

Dagomay et.al (2020)
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ABSTRACT

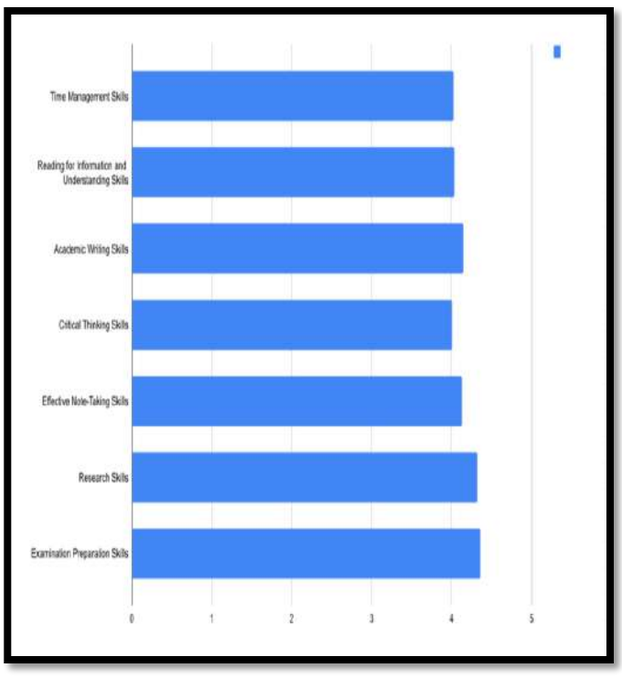
The COVID-19 pandemic has already prompted some educational institutions in the country for closure. However, the Maritime Academy of Asia and the Pacific remained steadfast with its academic calendar and still upholds and is dedicated to providing quality education and training to its students to develop competent graduates. This study sought to determine the level of effectiveness of online classes in maintaining the academic competency of the MAAP midshipmen fleet. Two-hundred eighty-seven of the 862 currently enrolled midshipmen/women for A.Y. 2020-2021, 1st semester, were the respondents. Furthermore, the following results were obtained: Online classes are highly effective in maintaining the academic competency of the midshipmen fleet in terms of their: Time Management Skills, Reading for Information and Understanding Skills, Academic Writing Skills, Critical Thinking Skills, Effective Note Taking, Research Skills, and Examination Preparation Skills; The profile of the respondents such as their gender, age, year-level, course/program, and the campus they are currently enrolled in having a p-value less than 0.05 level of confidence ($\alpha = .05$) have significantly affected singly or in combination the level of the competency of the midshipmen fleet; Lastly, the total weighted mean values of all the competencies have descriptive equivalences of Highly Effective, which implies that online classes thus help maintain the academic competency of the midshipmen fleet of the Maritime Academy of Asia and the Pacific.

KEY WORDS: *Academic Competency, COVID-19 Pandemic, Educational Institutions, Effectiveness, Online Classes.*

Table 1. *Frequency Distribution of the Respondents*

Profile	Predictors	Frequency (f)	Percentage (%)
Age	19 years	31	10.80%
	20 years	122	42.51%
	21 years	111	38.68%
	22 years	23	8.01%
	TOTAL	**n=287**	**100%**
Gender	Male	258	89.90%
	Female	29	10.10%
	TOTAL	**n=287**	**100%**
Year Level	2nd Year (3cl)	153	53.31%
	3rd Year (2cl)	114	39.72%
	1st Year (1cl)	20	6.97%
	TOTAL	**n=287**	**100%**
Campus	CGSO (Main Campus)	144	50.17%
	IMMAJ-JSU Campus	143	49.83%
	TOTAL	**n=287**	**100%**
Course/Program	BS Marine Engineering	139	48.43%
	BS Marine Transportation	148	51.57%
	TOTAL	**n=287**	**100%**

Table 2. *Level of the Effectiveness of Online Classes*



Descriptibe Equivalence

4.50 — 5.00 Very High Effectiveness

3.50 — 4.49 High Effectiveness

2.50 — 3.49 Moderate Effectiveness

1.50 — 2.49 Low Effectiveness

1.00 — 1.49 Not Effective at All

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Trends, New Technologies and Future Outlook

How Maritime Technology Developments are affecting changes in the curriculum and ways of education, risk assessment and Safety of Navigation and life at sea?
The goal of the work is to discuss topics related to the development of Technological Navigation Systems, which, as a result of the changes in the way for the future Officers are trained.

The particular, the learning aspects of risk assessment in crisis cases will be analysed:
- risk of collision,
- „blackout",
- Man Overboard (MOB),
- human factors,
- grounding,
- environmental disasters.

The fundamental question here relates to assessing the risk situation and coping with the circumstances of excessive stress, which is the body's natural response: does the development of technology, navigation systems and thus the way in which maritime universities are educating make us more prepared for this kind of reality?

The methodology of work will be based on navigation devices (simulators) and on the highly developed Planetarium located at the Faculty of Navigation of the Maritime University of Gdynia. Simulators have updated software that allows you to illustrate many of the critical circumstances that are encountered by the sea.

The result will be the presentation of new knowledge gained at the level of this field, which will allow for an objective view of the safety of navigation and the conclusions arising from it in the future, taking into account the form of training for future Officers. New Technologies will allow to increase the level of preparation to make working environment of future Seafarers safer. This is aspect that, why it is important for all Maritime Universities to keep up with Technological Advances.

Use of Thermal Imaging Cameras and Sound Detection System for COLREGs

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Keywords: COLREGs, thermal imaging cameras, sound detection system

Abstract: The research deals with the current topics dealing with safety of navigation and revolves around the proposal of integration of innovative electronic aids with already existed rules of Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs).

Thus, the aim of the research is to put possibilities of the modern thermal imaging cameras and sound detection system technologies into the COLREGs, providing high level sustainable means aimed at improved safety of navigation.

Each existed convention or code, developed by the International Maritime Organization is periodically amended due to different trends and challenges of rapidly changing marine industry. Accordingly, such system of amendments ensures constant evolution of the instruments regulating marine industry, considering necessities of marine industry and advanced technologies of the twenty first century.

However, the COLREGs, being one of the vitally important conventions ensuring safety at sea, is an unfortunate exception standing apart from the benefits of application of the modern electronic means and devices.

Accordingly, the research is focused on three rules of the COLREGs: Rule 5 – Look-out, Rule 19 - Conduct of Vessels in Restricted Visibility and Rule 35 – Sound signals in restricted visibility, which foresee vitally important situations, when the whole load of collision prevention lies on the officer in charge of navigational watch and requires a critical overwork of human capacity.

At the same time, use of thermal imaging cameras and sound detection system technologies on board the ships will provide decrease of overload of navigation officers and deck crew, providing a rapid and correct decision making ensuring effective means to avoid collisions.

Therefore, both current and further development of the COLREGs shall include requirements of installation of thermographic cameras and sound recognition system to reduce the human mistakes and errors.

Women in Marine Industries: The Importance of Female Leadership

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Keywords: women, education, leadership, sustainability

Background: In recent years progress has been made in developing women's involvement in marine industries. However, there is still a significant gender imbalance in various aspects of achieving a successful maritime career. Marine industries are traditionally male-dominated, where women make up only 2% of the workforce [1,2]. For the sustainability and growth of marine industries it is important to bring more diversity into the workforce. Understanding the nature of the current workplace for women in marine industries will help find solutions to attracting more women into maritime careers.

Aims: The aim of this project was to conduct a scoping review on peer reviewed published literature that examined the roles and experience of women working on the water over the past 25 years. It is hoped that the results of our review will help guide the formulation of future empirical projects on the topic of women in marine industries, with the goal of increasing women's representation across all sectors of the industry.

Method: To conduct this scoping review standardized methodology was followed [3]. We consulted with content experts (master mariners and a scholar on the topic of gender and industrial workplaces) and a librarian to ensure we used an optimal search strategy and research questions. A PICO model [4] was created to identify search terms and criteria. A total of 1028 abstracts were identified in our initial search and were reviewed by two reviewers. A total of 207 abstracts were accepted to have relevance to our topic. The papers associated to these abstracts were then reviewed and were used to address the following questions: What has been the experience and participation of women in marine industries? What kinds of jobs have women held? What kind of training have they received? What are the barriers to women participating in marine industries? What have been the opportunities?

Results: The review highlighted among other factors, the importance of marine industries recruiting more women in order to sustain its growth and success. The literature noted that women leaders are needed to help promote female interest in maritime careers and education as female enrolment in educational institutions needs to increase. Female leaders ameliorate women feeling isolated in the absence of female peers.

Conclusion: The lack of adequate recruitment and education were among the barriers reported preventing women entering marine industries and this has led to a solitary and negative experience by some female mariners. Women leaders are needed to help recruit, educate, and train the next generations of women mariners. Literature suggests that these solutions will reduce the gender gap within marine industries.

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The International Association of Maritime Universities