Collaboration Research and Innovation Proposal
(CIP)

The Impact of Using Firefighting Virtual Reality Simulation For Enhancing Capabilities of Port workers

VR-CAP

Port Training Institute
AASTMT

Project Title	The Impact of Using Firefighting **V**irtual **R**eality Simulation for Enhancing **CA**pabilities of **P**ortworkers
Acronym	**VR-CAP**
Keywords	Virtual Reality, Firefighting, Training System, Maritime, Ports
Funding and Duration	2 Years (24 Month)
Total Cost	**559.900 LE**
Project Theme	Maritime Science
Research Team	**Project PI: Professor. Akram Soliman Elselmy** **Prof. of Port Planning and Coastal Engineering** **Dean, Port Training Institute – AASTMT** Project Co-PI: Dr. Gamal Abdel Nasser Director, Education & Training, and Computer Department Head Project Researcher: Dr. Mohamed Bahnassy Director, Planning, Monitoring and performance Evaluation Administration Project Researcher: Capt. Ibrahim El Attar Head of Maritime Studies, Port Training Institute – AASTMT Project Researcher: Capt. Ahmed Yousry Gad Head of Unplanned Programs, Port Training Institute – AASTMT Project Researcher: Eng. Ahmed Hassan Samey Lecturer, IT Department, Port Training Institute – AASTMT Project Coordinator: Eng, Mohamed Abdel Aziz Head R&D, Port Training Institute – AASTMT

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Abstract:

When accidents occur in ports, the employees awareness and safety skills level is the determining factor. The fire safety skills training content is too large and complex, due to many problems in the actual training that requires a simulation training system.

The virtual seaport firefighting training system based on virtual reality (VR) technique plays an important role in training.

In this project, we propose an effective platform for firefighting training system in maritime, based on virtual reality applications. Also, a Comparative Study between Fire Fighting training using VR Simulation Techniques and Hands-on Training for Port Community is proposed in this research.

ملخص البحث

عندما تتعرض الموانئ لحوادث الحريق، فإن مستوى مهارة سلامة الطاقم هو العامل الحاسم، إن نظام التدريب على مهارات السلامة من الحرائق كبير جدًا ومعقد بسبب العديد من المشاكل التي تواجه التدريب الفعلي مما يتطلب استخدام نظم المحاكاة في التدريب، حيث يلعب نظام التدريب على مكافحة حرائق السفن القائم باستخدام تقنية الواقع الافتراضي (VR) دورًا مهمًا في اسلوب التدريب.

في هذا البحث، نقترح نظام تدريب فعال على مكافحة الحرائق في المجال البحري يعتمد على تطبيقات الواقع الافتراضي، وكذلك اقتراح دراسة مقارنة بين التدريب على مكافحة الحرائق باستخدام تقنيات محاكاة الواقع الافتراضي والتدريب العملي في مجتمع الميناء.

1. Introduction:

It is widely quoted that fire catastrophes are the most common cause of a massive loses of lives and properties. It can happen anywhere and anytime. Surprisingly, most people are not trained to deal with the fire when the fire incident has occurred. People often panic and don't know what to do to stop the fire or evacuate from the fire accident.

During the last five years, several fire accidents have been recorded that left disastrous effects, whether loss of life, buildings or equipment. For example, Beirut seaport accident represents one of the biggest disasters in the history of seaports, which almost completely destroyed the port, in addition to heavy losses of lives and equipment. In Egypt, the port of Alexandria recorded in 2020 a fire accident that led to the complete collapse of an administrative building in addition to some warehouses.

It is recognized that 80% of fire accidents occur due to human errors, whether in the prevention methods or the lack of skills and knowledge of firefighting. This requires developing of building capacities through abandoning traditional training methods and moving towards more innovative technologies

The virtual firefighting training system based on virtual reality technique could play an important role in delivering real time training. Fire accidents in seaports account for a large proportion of disasters. There are many restrictions on the crew's fire safety skills training such as: -

1- The fire safety skills training content is too large and complex, including a series of subjects such as fire command, equipment use, tactical coordination, etc. It requires multiple systems to cooperate with training, involving a wide range of human resources and many personnel. In actual training, it is often limited by time and funds. It is difficult to ensure that the training is in place (Hao et al., 2019).

2- Seaport firefighting equipment has many restrictions. Long-term in a state of waiting, personnel are not allowed to operate at will; fourth, fire training involves many risk factors, and the safety risks are high. In actual training, it is easy to cause casualties. Many of the above restrictions urgently require a realistic and easy-to-use simulation training system to replace actual training.

The port fire-fighting training system developed by virtual reality technology can realize a variety of training purposes. It mainly includes training of fire-fighting skills, familiarity of all firefighting equipment functions, handling of fire accidents in different locations in port, and decision- making command, including:

A). Fire equipment operation skills training. The trainers train the firefighting crew on the operation, maintenance and repair skills of the equipment by operating the virtual fire equipment and equipment, familiar with the installation principle, function and operating procedures (Hao et al, 2019).

B). Emergency fire rescue and adaptive training. Construct various fire accident scenarios such as warehouses, container stacks, buildings. Firefighters can experience virtual disaster equipment through visual and auditory operations, operate virtual fire equipment, interact with virtual scenes, and play any role such as firefighters and firefighters, fire isolation, and other skills training.

Port Training Institute of the AASTMT is one of the institutes authorized by International Maritime Organization (IMO) to provide such mandatory training course; Upon which hands on training is highly needed for the reality of such courses.

Hence obtaining such technique "Virtual Reality" will certainly enable Port Training Institute to achieve one of the most highly nominated values of IMO which is Hands on Training, by providing near reality simulation of firefighting scenarios in seaports.

2. Literature Review:

Firefighting Training Using VR Simulation
The use of VR training technologies helps trainees to undergo a wide range of training scenarios in a single session. The environments being trained in vary depending on the job category of the firefighter and the incident being trained. The simulation environment of a fire on ships and in ports (Tao et al., 2017), complexity of the training which can range widely from the skill training of relatively fine motor skills for specific equipment to large scale live training operations, require the training of communication and coordination skills. Training of skills only applicable to situations with a high degree of complexity is a very expensive and difficult undertaking. For example, the repeated training of fire evacuation procedures (Sharma et al., 2017) or learning to communicate effectively between different emergency response services in crisis scenarios (Molka-Danielsen et al., 2018) would be immensely complex and expensive to coordinate in real life due to the large amount of equipment and personnel needed for these scenarios. Having the control over what is being trained in a VR simulation for each trainee individually further makes it easy to train different categories of personnel in a single unified scenario, without having to drain the personnel resource of the department for each aspect being trained. During training the same aspects of a scenario can be set up in the exact same way to improve subsets of skills needed. Being able to collect data during a highly standardized training process enables not only the exact identification of

trainee weaknesses, but also direct feedback to correct those weaknesses during training. In a few years from now this will become the new normal for training. If a technology push is not the persuading factor, then business case and cost savings will certain take its place.

3. **Objectives:**

Recently, many fire accidents have been recorded in seaports, and they have caused severe losses in lives and equipment, in addition to large financial losses that took a lot of time to be compensated and despite the presence of distinguished hands-on training in most of the ports, this training faces difficulties in providing the appropriate environment. In addition to creating scenarios that 100% simulate reality, accordingly.

1- An effective platform firefighting training system in maritime based on virtual reality applications will be proposed. Also, A Comparative Study between Fire Fighting training using VR Simulation Techniques and Hands-on Training for port in order to create a balanced environment that simulates the reality of firefighting training and meets all the needs of hands-on training in the most difficult conditions and hazards to ensure sustainability.

2- The project aims to direct the maritime transport sector and ports to head towards the training process in firefighting using virtual reality simulations and the flexibility it includes in the presence of possible scenarios that the firefighting crew may be exposed to in ports and with a great opportunity to reduce the risks of training to zero.

3- The project aims to raise training awareness for the usage of innovative applications in the maritime transport sector, such as the virtual reality techniques in fighting fire, through comparative study between applied training and virtual reality training technique.

4- The Project aims create a general trend to implement the project concept and methodology not only in Egyptian ports, but expand the implementation area in the future on various maritime transport bodies globally and internationally in order to ensure great opportunities for sustainability.

5- The project is characterized by flexibility, diversity of training techniques, and its coverage of various disciplines, including firefighting crews in particular, and safety and security crews in the port community in general, in addition to the most important element, which is training cost reduction, the matter that allows involving more of port workers and maritime transport sector than the traditional hands-on training techniques.

6- The project aims to popularize training innovations in various fields, especially combating fire accidents through implementation in some Egyptian ports, container terminals, and shipping companies as a start such as :
- Alexandria Port Authority.
- West Port-Said Port
- Alexandria Container and Cargo Handling Company
- Suez Canal Shipping Agencies

7- The project aims to cope with the development of mega future plan of Egyptian ports, as well as to fulfil the recommendations of The Egyptian Maritime Sector upon the recommendation of the Minister of Transport regarding continuing to

provide development and innovations in the fields of training during the last Port Training Institute Board.

8- The project aims to achieve the latest international requirements recommended by the International Maritime Organization IMO and the International Labor Organization ILO as well as the Occupational Safety and health Administration standards OSHA.

4. Project Description:

Simulations are recognized as an efficient and effective way of Training and development complex and dynamic systems. A simulation-based Training environment enables Trainees to acquire experience and consider their previous results. The simulation-based training reduces the gap between learning environment and "real" environment, and making available training of "real world" situations that are difficult to simulate in a hands-on lab environment.

The training techniques will be provided to Alexandria and Port Said port community.

The project depends on 4 main activities (Phases) that are integrated to reach the required research result:

4.1 Phase 1:

- Conducting a survey from the port community in Alexandria and Port Said, to determine the training environment and the most important training needs
- Preparing scientific materials for training programs, whether they are theoretical or practical programs.

4.2 Phase 2:

- Building the VR training platform from programs and applications.
- The virtual fire training system consists of two parts: software and hardware. Hardware devices include servers, switches, display devices, etc. The system adopts distributed network technology to establish a local area virtual port hazards environment where multiple members can participate at the same time. Such a system is an immersive system for multiple members, who can respond to local individual member actions, and also reflect the interaction between different members, and show the interaction effect of the overall environmental entity and all members. Processing data with global effects, the extension obtains global data from the main server, is responsible for interaction with independent members, and generates a partial view.
- Construction of the test scenario
  1. Collect port-related information and organize data.
  2. Adjustment and optimization. View actual rendering effects, adjust for individual situations, and optimize.
  3. Get the results of the model.

4.3 Phase 3:

Implementation of the training:

- Theoretical Lectures.
- Hands-on Training.
- VR Training.

4.4 <u>Phase 4</u>:
- Assessment and output analysis.
- Comparative study.

The analyses will compare levels of understanding in-between the computer-based and hands-on groups at the beginning and at the end of the activities. Did they gain the instructional activity with the same level of understanding? The statistical analyses results will completed using SPSS.

The purpose of this comparative study is to explore the impact of computer simulation design methodologies on trainees learning. In comparative study we will investigate the effect of simulation-based instruction with hands-on based training methodologies. Hence, the proposed research is to study the effects of simulation feedbacks on the Training Process.

5. Research Design and Methods:

This project is concerned with studying a real-time comparison between firefighting training with traditional methods such as hands-on training and innovative methods such as VR Simulation, with an assessment and analysis of the results and outcomes in both cases, as a result a comparative study will be obtained to determine the impact of firefighting VR simulation training, recommendations and outcomes [Fig. 1].
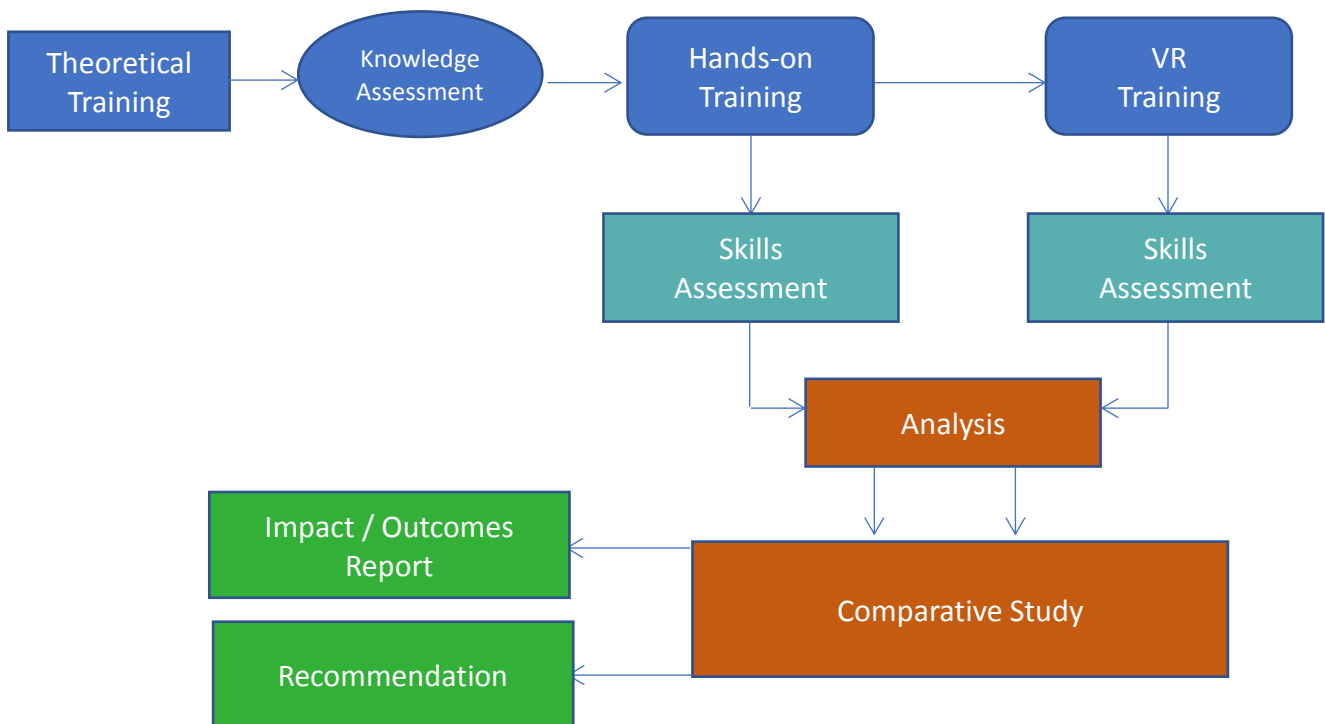

Fig1. Research Phases

To ensure the achievement of project integration the project is divided into Six Work packages:

Project coordination (WP01)
This work package includes administrative aspects, coordination of work schedules, follow-up of project implementation, issuance of reports on task implementation, in addition to reviewing contracts of equipment purchasing required for the project, and following up on the budget and project expenditures. In addition to:
- The establishment of memorandum of understanding with port communities in order to implement training.

Communication and awareness (WP02)
Communication work package is specialized in implementing and holding workshops to raise awareness of the project's terms, facilities and outcomes for the port community, as well as explanation of the project implementation procedures and facilities.
This work package coordinates communications with the relevant authorities and stakeholders.
It handles the implementation of promoting plans, brochures, websites and social media dissemination for the project trends, objectives and news to the port and maritime transport community as well as disseminating the project outcomes and reports.

Courses establishment and training materials (WP03)
This work package either establishes new scientific materials for firefighting or develops programs that Port Training Institute training materials already provides. In addition to:
- Establishment of practical training scenarios, Hands-on Training, and VR simulation training.
- Preparation of exams and trainees assessments before and after training using both techniques (hands-on, VR).
- Reviewing the training materials to cope with and fulfil the modern trends of IMO, ILO for safety and security, as well as OSHA standards.

VR simulation and Project Equipment installation (WP04)
This work package is specialized in determining and following up the technical specifications of the simulation system for fighting fire with virtual reality technology, as well as, the installation of the training operating system and applications.
- The Installation of software and application used in comparative studies such as analysis of the assessment results.
- Also, the development of port equipment scenarios in terms of fire accidents during cargo handling.

Project Implementation (WP05)
This work package implements:
- Theoretical training for trainees
- Operational and hands on training
- VR training
- Assessment of trainees' knowledge, skills and attitude.

Comparative study, assessments analyses, and outcomes analyses (WP06)
- Establishment of assessment criteria to be a platform for the project outcomes analyses.
- Establishment A Comparative Study between Fire Fighting training using VR Simulation Techniques and Hands-on Training for Port in order to create a balanced environment that simulates the reality of firefighting training and meets all the needs of hands-on training in the most difficult conditions and hazards to ensure sustainability.

6. Anticipated Results and Evaluation Criteria:

This research compares the effectiveness of simulation-based, hands-on and feedback mechanism on trainees learning by answering the following questions:

1.) Does the use of simulation improve trainees 'learning outcomes?

2.) What is the effect of feedback mechanisms on trainees learning in the use of simulation-based labs?

3.) How do lecturers perceive the use and effectiveness of simulation in the delivery of technical course content?

4.) How do trainees perceive the instructional design features embedded in the simulation program such as exploration in Training new concepts?

Furthermore, the research presents recommendations to improve trainees learning through the use of simulation-based, hands-on, and feedback-based training methodologies.

7. Expected Outcomes and Impacts on AASTMT:

7.1 Technical output and Impact:

The project will provide an opportunity to develop vocational training techniques, which is one of the most important activities provided by AASTMT to the port community and maritime transport in the field of firefighting, in addition to creating an innovative training that includes the following:

- Vocational training programs integrate the requirements of training development in the AASTMT and the training needs of the port community and maritime transport.
- Enhancing AASTMT vocational training potentials through establishment of and innovative real-time platform (VR simulation) and, this platform includes all the risk factors of fire accidents and anticipated hazards in addition to the optimum techniques of firefighting, such elements cannot be grouped into single traditional hands-on platform.
- Development of accurate and real-time methodologies and criteria for assessment Knowledge, Skills, and Attitude (KSA), as well as the efficiency of firefighting crew in ports.

Overall, the project enhances the AASTMT's role in supporting human resources of the Egyptian and Arab seaports, and maritime transport sector in general.

7.2 <u>Financial feasibility & Socio-economic Impact:</u>
Given the costs of purchasing firefighting training equipment and various fire extinguishing equipment used in hands-on training, which are limited to a validity period and need continuous renewal, in addition to the transportation costs of the equipment to the Hands-on training sites, and the provision of spaces, training environment and other auxiliary equipment which can be easily vulnerable to damage and causes risk factor We find that such costs constitutes an annual financial burden on the labs of AASTMT.
VR can handle all these training scenarios in the same location.
While the initial cost for development of the training simulations and the purchase of the equipment may be reasonable, and even such costs can arguably be offset by the relatively cheap adaptation of the content for different scenarios, the lower cost regarding upkeep of the training equipment, the portability of the equipment for saving transport cost of trainees to training sites and the relatively modest space needed for the training itself.
Training or education using VR Techniques can be done with relatively little funds if lower fidelity is acceptable.

In summary, the costs of the firefighting VR simulation system can be compensated within a short period of time; Maximum one year after the end of the project period, through the training courses provided to port community and maritime transport authorities.

7.3 <u>Publication</u>:
At least one peer-reviewed original research paper is accepted for publication (received a DOI) in a Q1 journal or its equivalent.

8. PTI Resources dedicated to the project:
The following table provides a list of resources that will be used in the project:

No.	Laboratory Space and Equipment	Existing/Requested
1	Firefighting Lab	Existing
2	Port Equipment Simulator	Existing
3	Computer Lab	Existing
4	Data Analysis software and application	Existing
5	VR Training Lab for Electrical equipment and computers	Existing
6	VR Hardware Equipment for Firefighting	Requested Will be partially funded by PTI
7	VR firefighting software (Application)	Requested
8	Webinars Facilities (software-hardware-network)	Existing

No.	Human Resources Capabilities	Existing/Requested
1	Maritime Studies	Existing
2	Information Technology (IT)	Existing
3	Sustainability	Existing

4	Fire Fighting Trainers	Existing
5	Port Development	Existing
6	Coordinators	Existing

No.	Other Facilities	Existing/Requested
1	Transportation Facilities	Existing
2	Accommodation	Will be funded by PTI
3	Sustainability	Existing
5	Port Community trainees and case studies • Alexandria Port Authority • Port Said Port Authority	Beneficiaries of port authorities are already members in PTI board

9. Team Information:

Name of Res. Team Member in English	Name of Res. Team Member in Arabic	University / Institute In English	Position / Title	% of time spent on project	No. of months	Incentive per month (LE)	Number of other projects and their IDs	Total % of time spent on other projects	Contact No
Prof. Akram Soliman	اكرم سليمان	AASTMT (PTI)	Dean of Port Training Institute. Professor of Coastal Engineering and Port planning, college of Engineering and Technology.	35%	8	2200	----	----	+01001708865
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Dr. Mohamed Bahnassy	محمد بهنسي	AASTMT (PTI)	Director, Planning, Monitoring	50%	12	1190			

			and performance Evaluation Administration						
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Eng. Ahmed Farouk	احمد فاروق	AASTMT (PTI)	Lecturer, simulator department, Port Institute, AASTMT	80%	20	Technician Training costs	----	----	+01025544026
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2.Scientific Achievements		
H Index:8	Citation:223 https://scholar.google.com/citations?hl=en&user=n1Zd5w8AAAAJ	Publications:37
Last recent relevant publications		

- Ahmed, Y., Al-Faraj, F., Scholz, M., and Soliman, A. "Assessment of Upstream Human Intervention Coupled with Climate Change Impact for a transboundary River Flow Regime: Nile River Basin", *Water Resources Management,* Volume 33, No. 7, May 2019, pp 2485-2502, ISSN 0920-4741, https://doi.org/10.1007/s11269-019-02256-1.
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2.Scientific Achievements		
H-Index:5	Citation: 136 http://scholar.google.com/citations?user=n-sqDsMAAAAJ&hl=en	Publications:12
Last recent relevant publications		

- Gamal Abd El-Nasser A. Said, and El-Sayed M. El-Horbaty," Optimizing Solution for Storage Space Allocation Problem in Container Terminal using Genetic Algorithm", *Handbook of Research on Natural Computing for Optimization Problems, IGI-*Global, pp.159-184, 2016.
- Hebatallah ElMesmary **and** Gamal Abd El-Nasser A. Said, " Smart Solutions for Logistics and supply chain Management", International Journal of Recent Technology and Engineering (IJRTE), Vol. 8, No. 4, pp.2996-3001, 2019
- Gamal Abd El-Nasser A. Said. "Nature Inspired Algorithms in Cloud Computing: A Survey", International Journal of Intelligent Information Systems, Vol. 5, No. 5, pp. 60-64, 2016.
- Gamal Abd El-Nasser A. Said, and El-Sayed M. El-Horbaty," An Intelligent Optimization Approach for Storage Space Allocation at Seaports: A case study", *Proceedings of IEEE Seventh International Conference on Intelligent Computing and Information Systems (ICICIS'15)*, pp. 66-72, Dec.12-14, 2015, Cairo, Egypt.
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Last University Degree PhD in Engineering (Electrical Eng. Dept.) 2019	**Faculty, University, Country** Faculty of Engineering, Alexandria University, EGYPT	**Graduation Date** November 2019
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Affiliation:	Port Training Institute, Arab Academy for Science, Technology and Maritime Transport	
Current Position:	Director of Planning, Monitoring and Performance Evaluation Administration	
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2.Scientific Achievements		

- Selected to be a speaker in the **Laserfiche EMPOWER 2021** international conference (the only one from outside USA and CANADA), **February 22-26, 2021, California, USA.**
- Selected as a **Run Smarter Award winner** in the Regional Choice – **Middle East and North Africa** category. A winner over a hundred submissions in a contest due to high caliber, creativity, and operational improvements of PTI system.
- First Class Medal of Long Service and Perfection from **Mr. President of EGYPT Republic** due to an impeccable record for integrity and high distinguish professional ethical standards.
- **Certified** Oracle Developer 2000 Master (7 Courses), **Oracle University USA**, May. 2001
- High Experience in **Simulators** (Designing & Implementing an Air Defense approved simulator).

Last recent relevant publications
- **Mohamed A. Bhnassy**, Esam A. A. Hagras, El-Sayed A. El-Badawy, Mohamed A. Mokhtar, Moustafa H. Aly: Image Encryption and Watermarking Combined Dynamic

Chaotic Hopping Pattern with Double Random Phase Encoding DRPE, Optical and Quantum Electronic, **Springer**, **IF 1.6**, DOI: 10.1007/s11082-019-1961-2, (2019).

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2. Scientific Achievements		

Last recent relevant publications
- 2 April 2004: New Technologies Applied on Board and the Need to Amend STCW
- 95. Mealha 2004 Conference, Cairo. Egypt.
- 3 September 2004: Distance Learning, the Trends and The Future. 13th
- International Maritime Lecturers Association. ST Petersburg. Russia.
- 5 November 2004: GPS Navigation System Limitations and Vulnerabilities.
- International Magazine, Cairo, ARE.
- 2004: Interpretation of the International Safety management Code. Publisher: Sokhna Port Training Institute. Egypt.
- 6 February 2010: Distance learning, Applying Modern Technologies. PTI, 26th
- International Conference. Alexandria.
- Safety & Security Affairs. Saudi 2nd Coast Guard Conference. Al Khobar. KSA. October 2011.
- "SIRE" Ship Inspecting Report System for vessels transiting Suez Canal. Marlog, March 2013.

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Affiliation: Port Training Institute	AASTMT
Current Position:	Head, R&D port Training Institute
Contact Information: Mobile Phone:+201014627627 E-mail: m_abdelaziz73@hotmail.cm	

2. Scientific Achievements
MedPorts Courses Design Participation in Eni YEPMED - EU commission Sustainable development and port resilience Conducting Simulation Training for Marsa Maroc , Morocco
Last recent relevant publications
• Akram Soliman, Mohamed E Abdel Aziz "The Impact of Applying Port City integration strategy in emerging port", IAPH 2018 • Akram Soliman, Alaa Morsy, Mohamed E Abdel Aziz, Challenges And Opportunities for Enhancing Port Competitiveness in Africa , IAMU conference 2017

1.Basic Information	
Full Name in Arabic: أحمد حسن سامي	Full name in English: Ahmed Hassan Samy
Date of Birth:	4th of September 1978
National ID	

Last University Degree Diploma in Computer Science	Faculty, University, Country College of Computers & Information Technology – Arab Academy for Sciences	Graduation Date 2016

Title: Eng.	**Field of specialization:** Computer Science
Affiliation:	Port Training Institute, Arab Academy for Science, Technology and Maritime Transport

Current Position:	Lecturer

Contact Information:
MobilePhone: +201001708913   E-mail: ahmed.sami@pti-aast.org

2.Scientific Achievements

Last recent relevant publications

1.Basic Information		
Full Name in Arabic: أحمد يسري جاد	**Full name in English:** Ahmed Yousry Gad	
Date of Birth:	13th of December 1978	
National ID		
Last University Degree Master in Maritime Education and Training	**Faculty, University, Country** College of Collage of Maritime and technology – AASTMT	**Graduation Date** 2009
Title: Eng.	**Field of specialization:** Maritime Transport	
Affiliation:	Port Training Institute, Arab Academy for Science, Technology and Maritime Transport	
Current Position:	Head Unplanned programs	

Contact Information:
MobilePhone: +201001708913 - E-mail: ayousrlygad68@hotmail.com

2.Scientific Achievements

Last recent relevant publications
- Y Ahmed , M El Bokl, Use of ROV devices with remote tug, AASTMT
- Y Ahmed, S Saisha Marine accident investigations using VDR. AASTMT

10. Project management
Based on previously mentioned in project methodology, the detailed project plan, project's activities, and tasks are determined as follows:

Activity Name	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
1: Project coordination												
1.1: Project supervision and budget plan	■											
1.2: MOU establishment and signing			■									
1.3: Contracts of equipment purchasing							■					
2: Communication and Dissemination												
2.1: Workshops Alexandria Port Community				■								
2.2: Workshops Port Said Port Community					■							
2.3: Promoting and Dissemination				■				■				■
Main 3: **Courses establishment and training materials**												
3.1:Theroritical course TT1		■	■									
3.2:Hands-on Course HT2				■	■	■						
3.3:VR Training Course and scenarios ST1											■	■
4: VR Platform installation												
4.1: Preparation of Specification Criteria		■										
4.2: SW, HW, application Installation							■	■	■	■		
5: Project Implementation												
5.1: Theoretical Training				■	■							
5.2: Hands-on Training												

Activity Name	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
5.3: VR Training						■	■	■				
Main 6: Outcome Analysis, Comparative Study												
6.1: Establishment of an assessment criteria			■			■						■
6.2: Assessment and outcomes analyses												
6.3: Comparative Study												
6.4: Reporting and recommendations												

Activity Name	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
1: **Project coordination**												
1.1: Project Budget Plan	■											
1.2: MOU Establishment and Signing												
1.3: Contracts of Equipment purchasing												
2: **Communication and Dissemination**												
2.1: Workshops: Alexandria Port Community	■											
2.2: Workshops: Port Said Port Community		■										
2.3: Promoting and Dissemination			■			■						■
Main 3: **Courses establishment and training materials**												
3.1:Theroitical course TT1												

Task												
3.2:Hands-on Course HT2												
3.3:VR Training Course and scenarios ST1	■	■										
4: VR Platform installation												
4.1: Preparation of Specification Criteria												
4.2: SW, HW, application Installation												
5: Project Implementation												
5.1: Theoretical Training	■	■										
5.2: Hands-on Training												
5.3: VR Training			■	■	■							
Main 6: Outcome Analysis , Comparative Study												
6.1: Establishment of an assessment criteria		■										
6.2: Assessment and outcomes analyses						■	■					
6.3: Comparative Study								■	■	■	■	
6.4: Reporting and recommendations												■

Tasks:

Project PI:
- The project PI will supervise the researchers, the training at different stages of the project.
- Communicate with the decision-makers of the beneficiaries (port authorities)
- Provides engineering advice and technical solutions
- At different stages of the project.
- Supervising workshops, and select the international conferences and figure out which data will be presented
- Supervising the data that will be submitted, and required reports and papers that will be published
- Monitor the overall stages to be sure that the tasks will be accomplished in the proposed schedule.

Project Co-PI:
- Supervises the collection of data, questionnaire results and evaluation results with the assistance of the project coordinator
- Analysing evaluation results and reports and conducts a comparative study for training techniques
- Conducting the final report of the project with the assistance of the project coordinator and under the supervision of the principal investigator

Project Researcher – Simulation and Digitalization:
- Researcher will Supervise VR simulation Specs and criteria
- Will supervise VR system installation as well as conducting scenarios
- Will Provides Technical advice and solutions in terms of simulation and digitalization
- Will obtain and develop impact / outcomes reports as well as recommendations
- Will participate in dissemination planning and implementation

Project Researchers – Master Mariner Foreign Going:
- Researchers will prepare theoretical scientific materials according to the latest requirements of the International Maritime Organization IMO and the World Ports Sustainability Program WPSP.
- Develop the Training Scenarios of firefighting hands-on training.
- Establish the Firefighting Training Scenarios using VR technique.
- Establish Assessment Criteria and evaluation tests.
- Participate to the comparative study and reports.

Project Researcher – IT and digitalization:
- Install the virtual reality simulation system.
- Testing operating systems and applications.
- Participate in conducting VR training scenarios.
- Operation and maintenance of all IT and digitalization issues.

Project Coordinator:
- Follow up questionnaires and assessment tests.
- Follow up workshops holding.
- Participate to communication with beneficiary authorities.
- Participate to the comparative study and reports.

Trainers:

- Training the trainees from Alexandria and Port Said Port Authorities under the supervision of the project researchers.
- Holding assessments and exams for the trainees under the supervision of the project researchers.

11. **Allowable Project Costs:**

Team Member	Participation % of Time	Salary per Month	Total cost (LE) of the Project
PI	35%	2200	18000
Co PI	50%	1190	14280
2 Researchers Overseas Captains	60%	1000	28000
1 Researcher IT Engineer	60%	900	12000
Coordinator	35%	800	6400
Trainers/ Technician Team 3 trainers	80%	600	34560
Total			113,240

Note: Port Training Institute will participate to approximately 50% of the total Staff costs = 56,240

#	Item	Requested for	costs
1	Firefighting VR Hardware kit	VR Training	220000
2	Firefighting VR Software, Applications	VR Training	375000
3	Spare parts for Firefighting Hands-on training Equipment and Training Materials	Hands-on training	80,200
4	SPSS Software	Data Analysis	Purchased
5	Workshops facilities	Awareness and communications	30,200

Note:
- **The actual costs of the Equipment includes VR Hardware, software and applications is 595,500 LE , Port Training institute will contribute to such costs by 220,000 LE**
- **Port Training Institute will contribute to the Total Accommodation Costs in Port Said: Approximately 30.800**
- **Port Training institute will contribute to the total stationary costs 10,000**
- **Port Training contribution In Staff Cost = 56,240**

Total contribution of Port Training Institute to the Project = 307,040

12. Breakdown costs excluding the contribution of Port Training Institute:

Eligible costs	Break downs		AASTMT support (L.E.)
	Professor. Akram Soliman Elsemly		9,000
	Dr. Gamal Abdel Nasser		7,000
	Dr. Mohamed Bahnasy		7,000
	Capt, Ibrahim El Attar		7.000
	Capt. Ahmed Yousry Gad		7,000
	Eng, Ahmed Hassan Samy		6,000
	Eng. Mohamed Abdel Aziz		4,000
	Technicians and/or Labour		16,000
	Total		63,000
	Equipment		375,500
	Spare parts		6,000
	Total Equipment		381,500
	Stationary		0,000
	Miscellaneous Laboratory, Field supplies, Materials		80,200
	Total expendable Supplies & Materials		80,200
	Internal Transportation		4,000
	Accommodation		0,000
	Total travel		4,000
		Manufacture of specimens & prototypes	00.00
		Acquiring access to specialized reference sources databases or computer software	1,500
		Computer services	0,000
	Report preparation		2,000
	Publications & Patent Costs		3,500
	Workshops organization or Training		24,200
	Others (explain)		00.000
	Total other direct costs		31.200
(G) Total Costs			**559.900 LE**

13. Dissemination of Research Results / Sustainability:

1. The software, the results, training methods and materials used for this study will help provide more future training for the trainees at Port Training Institute, Arab Academy for science, technology, and Maritime Transport.
2. Results of this study could be used as a base for issuing a guideline for firefighting in the Maritime Industry which goes in line with the updated requirements and regulations of the IMO and ILO.
3. The guidelines resulted from this comparative study will be used to lead the Maritime Transport Sector in Egypt and the Arab Region toward the development of training using more innovative techniques as the Virtual Reality.
4. Periodic reports regarding the progress, results and recommendations will be issued during the study (24 months).
5. This study could be the base for more advanced research, and the data could be used in for research papers written by AASTMT staff.
6. Workshops will be held at Port Training Institute to introduce the new system, to engage related stakeholders, raise awareness regarding the importance of such new training techniques, and to target key stakeholders.
7. The study will be available to all related parties in this field for continued development and research.
8. Results and guidelines will be disseminated on PTI website, and social media channels (Linkedin, Facebook, etc.,) to make sure to research the widest group of related parties.
9. Focused presentations of the study findings will be made throughout the duration of the project to all key stakeholders and to guarantee community involvement.
10. Feedback will be gathered via focus groups, surveys and questionnaires for future development of the training technique.

Acknowledgment Form

By signing below, I acknowledge that I have read, understand and accept to comply with all the terms of the foregoing application, mentioned in AASTMT general conditions and guidelines for submitting a research proposal, including, but not limited to:

- The total number of the application pages should not exceed **30 pages** excluding a cover page, as well as all sections of the proposal (as mentioned in AASTMT General Conditions and Guidelines for Submitting Research Proposal).
- At any time, a contracted AASTMT project team member should only be participating in a maximum of one project.
- Allowable budget maximum limit should be strictly adhered to in the project proposal. In all cases, requested budget has to be justified in detail.
- AASTMT guidelines, IPR rules, code of ethics, etc. (www.aast.edu), should be read carefully and adhered to. These are integral parts of the contract.
- All proposals – in addition to PI and other data - must be uploaded to the AASTMT website by the designated deadline. Uploaded PI data should conform to the corresponding data in the application form.

Application will not be considered eligible and will be discarded in the following cases:

- Proposals submitted by e-mail or sent as hard copies or uploaded to the AASTMT website after the deadline.
- Proposals not conforming to the designated format.
- Proposals whose uploaded PI data does not conform to PI data in the proposal file.

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- Proposals in which the allowable budget maximum limit has been exceeded.
- Proposals in which maximum allowable contracted AASTMT project participation limit has been exceeded.
- Proposal letter does not include a scanned copy of the signed and stamped PI institution endorsement letter in case of team member work outside AASTMT.
- Proposal does not include a scanned copy of the signed acknowledgment form.

Signature: _A'Gran Soliman_

Date: _11 / 03 / 2021_

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