



Technological Improvement with Artificial Intelligence in Defense Sector is the Demand of Time: Bangladesh Perspective

¹Md. Touhidul Islam, ²Mst. Tahmina Sultana, ³Jasmin Aktar

¹Senior Lecturer, ²Assistant Professor, ³Senior Lecturer
¹Department of Business Administration,
¹Gono Bishwabidyalay, Dhaka, Bangladesh

Abstract: Today's era is no longer confined to any boundaries or chains, it is better to say that the world is becoming smaller day by day. It is not a big deal to face any digital warfare or bio-warfare at any time from any country. So, it will be wise to get prepared especially in the case of developing countries like Bangladesh. In this progressive world lack of using AI in the defense sector can become a threat to the country. It is for our sake to spot the attention on becoming more digitalized. It is no doubt that our country is one of the highly progressive countries that is following all tactical footprints which has already brought high achievements for the country. So, the defense sector which plays the most vital role as a think-tank on how the country should defend against an opponent's attack must come under the highest technology-based circle.

IndexTerms- Technological Improvement, Artificial Intelligence, National Security, Defense Sector, Bangladesh.

I. INTRODUCTION

As a peace-loving country, Bangladesh is always ahead of the slogan that 'war is strictly prohibited but defense is a must'. Since the birth of Bangladesh is the result of nine months long liberation war in 1971 by sacrificing more than 3 million people, it is well informed about the negative effects of war and conflicts. Though Bangladesh Armed Forces started its journey in 1971 at the time of the Bangladesh Liberation War, it contributed a lot to gaining independence and still working for ensuring safety, security, and peace inside or outside of the country. As an integrated army, the Bangladesh Army consists of three unified military services: Bangladesh Army, Bangladesh Navy, and Bangladesh Air Force. For the protective purposes on land, air, or sea all the above three sectors of the Bangladesh Armed forces need to be modernized. Presently with all other development agendas, modernization of armed forces is also a necessity for every country regardless of developed or developing and Bangladesh is not an exception. Having a lot of limitations Bangladesh is moving forward with a unique height in the world economy through the GDP over the last few years which are above 6 percent. In the South-Asian region Bangladesh has become the country of global attention for its remarkable economic development. At present the Bangladesh Government is more passionate to achieve the dream- of "Amar Sonar Bangla" by lifting its status from a developing country to a middle-income country and then to a developed country within her 70th anniversary of independence by establishing the Vission-2041 with incorporating numerous development projects in the field of communications, transportation, IT, power and energy. Day by day the size of Bangladesh's economy is increasing and now it is about one trillion dollars that need to be protected with its territorial area including land, air, or sea from any external threats. That is why a development program named Forces Goal-2030 has been initiated for the modernization of the Bangladesh Armed Forces as part of the fulfillment of Vission-2041.

Recently, Bangladesh has achieved an economic milestone, even in the face of a pandemic. It is considered to be the closest representative of the successful development models found at various stages in China, South Korea and Vietnam in the South Asian region. Therefore, it is expected that the Armed Forces of Bangladesh will also go through stages like China, Japan, South Korea, Turkey, the USA, the UK, or others as it has the financial ability right now. Then there is undeclared competition among the nations to modernize their army to defeat other nations, and mostly they are concerned with using up-to-date technology and technological knowledge, especially Artificial Intelligence

(AI) in modernizing their defense sector. So it is high time for implementing such AI-based modern technological weapon systems in the Bangladesh Armed Forces for achieving the Forces Goal-2030.

II. PROBLEM STATEMENT

In the age of globalization, many countries are investing a lot in Artificial Intelligence (AI) on the stage of the 4th Industrial Revolution. Most of the developed or developing countries are competing with one another and Bangladesh is a new bee in the race. However, there remains some empirical literature to link 'National Strategy for AI in Bangladesh' but none of these local studies has ever focused solely on the importance of improving the defense sector of Bangladesh by incorporating various latest technologies and technological weapons, especially with Artificial Intelligence (AI). Although Artificial Intelligence (AI) is still in its primary or intermediary stage, undoubtedly it can change the landscape of security and control systems of any country that will affect the balance of socioeconomic conditions and defense systems in the international arena. Hence, the study sought to explore the impacts of undertaking various research programs on Artificial Intelligence (AI) by the policymakers and its applications in the defense sector of Bangladesh to ensure a safe, secure, and prosperous country.

III. OBJECTIVES OF THE STUDY

Like many other countries, Bangladesh gained its independence through a bloody struggle in 1971. Now, it is free from the direct supervision of other countries but not free from the chance of any future interference of others in this turmoil world. If we watch around us then we can see that the superpowers are always busy capturing the less powered countries. A popular quote goes that 'it is harder to defend freedom than to gain it'. That is why there is no chance to sleep by keeping military power as remaining as before rather it needs to be improved. The main objective of the study is to focus on the importance of improving the defense sector of Bangladesh by incorporating various latest technologies and technological weapons, especially with Artificial Intelligence (AI). If the defense sector of a country becomes strong enough then the political-legal, social, and economic environments also remain stable within the country. That is why the other objective of the study is to influence the policymakers of the country to undertake various research programs on Artificial Intelligence (AI) and its applications in the defense sector to ensure a safe, secure, and prosperous country.

IV. ARTIFICIAL INTELLIGENCE

In the most recent few decades of the history of the world, there has been a remarkable advancement in the field of science and technology, particularly in technology for information and communication. This is especially true in the application of information and communication technology. The term "artificial intelligence," or "AI," refers to a type of technological breakthrough that is sometimes described as a "fusion" of many types of modern technology. John McCarthy was the one who helped it get off the ground in 1956, and he was the one who first described it as the application of science and technology to the creation of intelligent machines.

The Oxford Dictionary describes Artificial Intelligence as "the theory and advancement of a computer system that can perform jobs that generally require human intelligence such as speech recognition, visual perception, translation between languages, or decision making." Artificial intelligence can be defined as the study and development of a computer system that can perform jobs that generally require human intelligence. In later years, a multitude of academics attempted to define or otherwise discuss artificial intelligence (AI). According to Barton et al. (2017), artificial intelligence (AI) is the concept that a computer system is capable of performing functions on its own without any assistance from a human being that are typically associated with the human mind. AI has a huge amount of relevance to robotics, and it is an important concept in general. The ability to accomplish any activity while maintaining two distinct lines of thinking or concepts in one's mind at the same time is one definition of artificial intelligence (AI). Therefore, artificial intelligence is the present-day reality that was a futuristic hypothesis in the annals of human history (Singh et al., 2013). According to Cellan-Jones (2014), artificial intelligence (AI) is one of the most essential technologies of the Fourth Industrial Revolution (4IR). AI has revolutionized every facet of civilization, including individuals, companies, and societies, on a variety of different levels. For the last few decades, Artificial Intelligence is a known word to many but currently, it means something more for the enormous technological improvements in the various sectors like business, politics, health, economics, communications, transportation, security, or wars (Linde and Schweizer, 2019). AI and robotics combine modern technology with cognitive intelligence to build machines that can process knowledge and information, imitate human behavior, and perform economic, social, and military tasks (Nagpal, 2020).

V. TECHNOLOGICAL IMPROVEMENT AND ARTIFICIAL INTELLIGENCE

Now a day it is hard to imagine a developed world where the average person can do a task without any interaction from a machine. There is no space around us where there is no existence of technology. Technology is used as our assistant that performs all the day-to-day activities in various sectors like- agriculture, business, transportation, communication, education, healthcare or war, etc. In some cases, modern technology gets pace with the help of Artificial Intelligence (AI) and performs much better without any interference from a human being. Today, technological improvement and Artificial Intelligence seem two sides of a coin. For a little bit of change on one side, the other gets its momentum and the change is spontaneous. Though the history of Artificial Intelligence (AI) is not so old within its short journey it has started to show its future to all. It is said that Artificial Intelligence (AI) based on modern technology is the future of human lives.

In the 21st century, modern information technologies and AI-powered machines have a great influence on the world of work while computers, algorithms, and other software are frequently used in everyday tasks. Now it is hard to imagine such a world where most of our life could be managed without them (Wisskirchen et al., 2017). Every major technological innovation or improvement may have some adverse effects with its positive impacts on society. Artificial Intelligence (AI) is also such a technological improvement of the modern age that changing the way of doing in organizations and governments around the globe, and bringing potential significant interference with human rights. But the data processing and analyzing capabilities of AI can indeed help to mitigate some of the world's pressing problems like- diagnosis and treatment of disease, revolutionizing transportation, and climate change (Andersen, 2018). As a catastrophic technology, artificial intelligence (AI) technology is globalizing at China's most well-known high-speed development stage. China is showing its trend towards

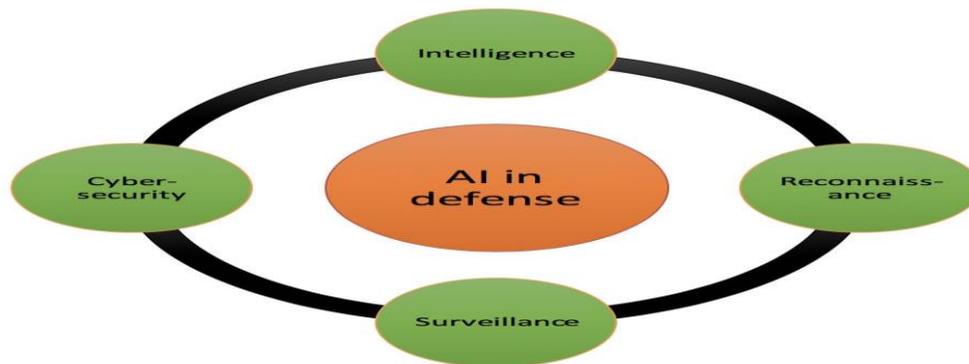
the rapid development of AI technology in both civilian and military applications. The development of AI technology is currently unbalanced in both areas, but the country's top-level strategic goals are increasing its application to military purposes (Xue et al., 2021). As a wide-ranging technological tool AI enables people to think again that how we integrate data and analyze information for better decision making. AI has already transformed every field of human life by acting as the key driver behind new technologies such as robotics, machine learning, big data, and ICT, and will continue to be innovators. There is no doubt that it will continue as (West and Allen, 2018).

VI. AI IN DEFENCE SECTOR

There are many ways in which AI may be used in the military industry, but the question of whether or not to use AI in this capacity is now being debated in academic and industry circles throughout the world. Today's the world's leaders regardless of the East or the West is mostly concerned with the installation of AI-based technologies in their defense sector. Day by day they are going to increase the amount of investment for research and development purposes in the AI-based defense sector. The importance of such an initiative can be forecasted from the speech of the Russian President Mr. Vladimir Putin in 2017 for the Russian schoolchildren. He states: "Artificial intelligence (AI) is the future for all humanity, not just Russia. As such, whoever rises to the top of this industry will inevitably become global dictator. According to the aforementioned quotation, in 2021 he will have achieved this. November of Russia's "Year of Science and Technology," which is currently underway, has been designated "Artificial Intelligence Month" (Ministry of Science and Higher Education of the Russian Federation, 2021). There is a longstanding relationship between artificial intelligence (AI) and the defense sector. Now the superpowers are trying to gather more knowledge on AI as it seems like the new paradigm of power among the superpowers. AI-based technology is becoming a vital factor for determining genuine power in the fields of warfare. For these reasons, military agencies and various countries around the world are trying to find areas where this metal information is rarely connected to military operations (Kumar and Das, 2021). In 2020, the importance of AI-based military weapons come to the forefront with the greatest interest among the defense analysts while Turkey lent some AI-based military UAVs especially TB2 attack drones to Azerbaijan at the time of the Nagorno-Karabakh conflict between Armenia and Azerbaijan. By using such AI-based attack drones Azerbaijan was able to a significant gain over Armenia (Shaikh and Rumbaugh, 2020). Undoubtedly, in the upcoming future AI-based commercial or military robots will administer their tasks and missions in their way. But the use of such robots on the military base will be increased as it is appropriate to use where there is the chance of losing military personnel or they are at a stake (Cummings, 2017). Artificial Intelligence-based weapon systems are capable of demolishing the opponent's kinetic and non-kinetic targets at a greater speed. Moreover, such technology can mount simultaneously the concept of 1990's parallel warfare with extensive cross-domain attacks. But these qualities are rarely expected in contemporary narrow-intelligent weapon systems or machine technologies. For this reason at present's complex Warfield, the demand for AI technology is at another height (Layton, 2018).

VII. POTENTIAL USE OF AI WITH RESPECT TO NATIONAL SECURITY ISSUES OF BANGLADESH

Today, in the 21st century, artificial intelligence (AI) is a cutting-edge technology that is being implemented at an ever-increasing rate across a wide variety of industries. Because of its transformative potential AI has an enormous implication for national security issues especially in providing the countries with military advantage. That is why the key world leaders from superpowers like-USA, as China, and Russia have recognized the potentiality of AI in the defense and security issues of their countries and for the reason, AI has become another area of rivalry among the great powers (Kugler, 2021). Like the other countries our neighbor country, India also has started to use AI but Bangladesh is still on the backside that utilizes the early stages of the latest version of such technology. Though there is a huge opportunity for the use of AI in various sectors including military applications (Pandit, 2021). The military application of AI technology is inevitable, as future wars will focus on the control of information rather than the typical weapon system. That is why it is high time to reemerge and reconcile the BD intellectuals who working on AI technology around the globe to prepare the defense forces competent enough (Ahmed, 2019). For the future war-fighters to command over the opponent on their battlefield prompt decision-making advantage will and AI the only option that will be able to ensure such facilities with high speed in the digital battle-space. Bangladesh is not the exception to getting such an advantage in a future situation. Though presently Bangladesh is not in a position to face conflicts with others precaution is a must to overcome any unwanted future possibilities. Again Bangladesh is geographically situated in an area where there is a chance of future external torsion in its land or sea area. That is why it needs to give keen attention to modernizing the Armed Forces with AI-based modern technologies in the externally developed world. Moreover, Bangladesh is an emerging country that is doing much better in various economic aspects and going to be established as a new power in the South-Asian region. So, Bangladesh needs to ensure socio-political stability with economic development by upgrading the law and order enforcement agency of the country and maintaining an up-to-date Armed Force within the country. Therefore time demands to upgrade the Bangladesh Armed Forces with up-to-date technological improvements like- the use of Artificial Intelligence (AI) in the defense sector for the National Security Issues of the country. According to Singh and Gulhane (2018), Artificial intelligence (AI) has many private purposes. There are eight major military uses, including the following, which will prove their importance in the coming years. So Bangladesh can take the opportunity to improve its defense sector by implementing such AI-based technologies in specific fields.

Figure: AI based Global Defense Forces

Source: (Joshi, 2018)

a. Warfare Platforms

Artificial intelligence-based autonomous weapons technology is evolving very rapidly without sufficient public debate and accountability. At this time, for a variety of reasons including but not limited to the following: empowering authoritarian rulers; improving terrorist tactics; undermining democratic peace; and being susceptible to bias, hacking, or malfunctioning in the system, self-determination in the warfare system is extremely important. And the leading contenders in this competition are the European Union, the United States of America, Russia, China, and South Korea (Haner and Garcia, 2019).

b. Cyber-Security

Undoubtedly the surface of cyber-attack in modern enterprise environments is massive and it is also growing very rapidly. That is why improving and analyzing cyber-security needs more than mere human intervention (Belani, 2022).

c. Target Recognition

Automatic Target Recognition (ATR) works through a fusion of information that depends on the platform of signal processing and pattern recognition. Presently, there is an extended interest to improve the traditional ATR by implementing Artificial Intelligence and machine learning on it (Blasch et al., 2019).

d. Logistics & Transportation

The usage of artificial intelligence (AI) technology in logistics is no longer a luxury but rather a requirement for modern businesses that wish to acquire and keep a competitive edge in their respective industries. According to study carried out by Forbes Insight, there is a belief held by 65 percent of industry leaders that logistics, transport, and distribution network have an influence on entering an era of deep transition. [Citation needed] It is also hypothesized that artificial intelligence will improve productivity by even more than 40 percent by the year 2035. This is due to the fact that AI has already been reshaping the business in a variety of ways (Spirina and Zharovskikh, 2021).

e. Combat Simulation & Training

Prompt decision making is very important for military purposes and plays a vital role across the various domains like- land, air, maritime, or cyberspace. For supporting to take such prompt military decisions simulation and modeling are recognized as an important tool that generates and evaluates potential course-of-action (Kerbusch et al., 2019).

f. Threats Monitoring & Situational Awareness

Today, warships with all other weapons systems also implement autonomous systems for threat monitoring, situational awareness, and targeting systems. The excellent level of safety as well as the efficiency of marine navigation is improved as a result of this. Artificial intelligence (AI) can assist these types of autonomous vessels in performing autonomous spatial awareness and monitoring the integrity of sensing devices (Thombre et al., 2022).

g. AI & Data information Processing

In the present world, AI is the most important tool for processing and analyzing of big data and information. It is said that future warfare will center on the dominance of information through a complex network of all the battle-space domains like air, water, or cyber-space that are mostly based on sensors and augmented contributors (Kasapoğlu and Kirdemir, 2019).

h. Battlefield Healthcare

One of the most critical jobs is to rescue the wounded soldiers from the active battlefields that cause many military deaths. As per the military researchers around 86 percent of battlefield deaths occur within the first thirty minutes of their injury. That is why researchers around the globe are working on developing Artificial Intelligence technologies that will be helpful to rescue wounded military personnel and give several healthcare facilities on an active battlefield. The application of robotics and unmanned ground vehicles to provide aid on such active battlefields is such an attempt like this. That will finally reduce the number of serious injuries and battlefield deaths (Heydenburg, 2019).

VIII. CONCLUSION

The Warfield environment for both cases- defensive or offensive is changing very rapidly than our thinking. Using modern technology, especially AI-based weapon system is the part and parcel of modern warfare. Recently people all around the world witnessed the impacts of such modern technology in two different warfare fields'- Azerbaijan vs Armenia and Russia vs Ukraine. The ongoing conflict between Russia and Ukraine shows how the various technologies can be used vastly on the battlefield irrespective of land, air, or water. With the huge spread of Artificial Intelligence (AI) technologies in weapon systems, it is becoming more efficient and more accurate to attack and conduct huge damage on the opponents and Russia vs Ukraine war is such an example to prove that (Sharma, 2022). The conflict between Ukraine and Russia is an example of how technology can play an important role in today's war. Ukrainian troops may not be as powerful as Russia, but they are doing their best with the help of Western nations through the use of modern techniques to protect their troops from Russian troops (Dangwal, 2022).

After observing such a war situation at present days every country regardless of Eastern or Western is now conscious and becoming to develop their armed forces with new technologies. As a peace-loving developing country to protect it from the future enemies Bangladesh needs to upgrade its armed forces with modern technologies, especially Artificial Intelligence-based weapon systems. Therefore it is high time for Bangladesh to join the race to modernize the defense sector by implementing Artificial Intelligence-based technologies.

IX. ACKNOWLEDGEMENT

Three authors, each with expertise in a separate academic discipline (Finance, Economics, and Social Works, respectively), were responsible for carrying out the entirety of the research. We would like to thank every one of the authors for their work in putting the manuscript together and giving their approval before it was published.

References

- 1)Ahmed, L.C.N.U. (2019). Emergence of Artificial Intelligence in Future Warfare: Preparedness of Bangladesh Armed Forces. NDC Journal. 2019. file:///C:/Users/ICT/Downloads/258-Article%20Text-491-1-10-20200703%20(1).pdf
- 2)Andersen, L. (2018). Human Rights in the age of Artificial Intelligence. Access Now. November, 2018. <https://www.accessnow.org>
- 3)Barton, D., Woetzel, J., Seong, J., & Tian, Q. (2017). Artificial Intelligence: Implications for China. McKinsey Global Institute. April 2017. McKinsey & Company www.mckinsey.com/mgi
- 4)Belani, G. (2022). The Use of Artificial Intelligence in Cybersecurity: A Review. IEEE Computer Society. 2022. <https://www.computer.org/publications/tech-news/trends/the-use-of-artificial-intelligence-in-cybersecurity>
- 5)Blasch, E., Majumder, U.K., Rovito, T., Zulch, P., & Velten, V. (2019). Automatic Machine Learning for Target Recognition. Automatic Target Recognition XXIX, Edited By Riad I. Hammoud, Timothy L. Overman, Proc. of SPIE. Vol. 10988. 109880L @2019 SPIE. CCC Code: 0277-786X/19/\$18. DOI: 10.1117/12.2519221
- 6)Cellan-Jones, R. (2014). Stephen Hawking warns Artificial Intelligence could end mankind. BBC News (2), p. 2014.
- 7)Cummings, M. L. (2017). Artificial Intelligence and the Future of Warfare. International Security Department and US and the Americas Programme, January 2017.
- 8)Dangwal, A. (2022). Ukraine Uses 'Controversial' Artificial Intelligence Tech In Its War Against Russia As Kiev Looks To Win The 'Digital War'. The EurAsian Times. April 07, 2022. <https://eurasianimes.com/ukraine-uses-artificial-intelligence-tech-in-its-war-against-russia/>
- 9)Haner, J., & Garcia, D. (2019). The Artificial Intelligence arms race: trends and world leaders in autonomous weapons development. Global Policy Volume 10 . Issue 3 . September 2019. doi: 10.1111/1758-5899.12713
- 10)Heydenburg, N. (2019). How AI can help in battlefield healthcare. Military Embedded Systems of Open systems Media. June 11, 2019. <https://militaryembedded.com/ai/big-data/how-ai-can-help-in-battlefield-healthcare#:~:text=According%20to%20researchers%2C%20around%2086,that%20can%20bolster%20battlefield%20healthcare.>
- 11)Joshi, N. (2018). 4 Ways Global Defense Forces Use AI. Forbes. <https://www.forbes.com/sites/cognitiveworld/2018/08/26/4-ways-the-global-defense-forces-are-using-ai/?sh=36e3325a503e>
- 12)Kasapoğlu, C., & Kırdemir, B. (2019). Wars of none: Artificial Intelligence (AI) and the future of conflict. Centre for Economics and Foreign Policy Studies. EDAM. Foreign Policy & Security 2019/8
- 13)Kerbusch, P., Keijser, B., & Smit, S. (2019). Roles of AI and Simulation for Military Decision Making. S & T Organization. STO-MP-IST-160. file:///C:/Users/ICT/Downloads/MP-IST-160-PT-4.pdf
- 14)Kugler, M. (2021). The United States of America's Embrace of Artificial Intelligence for Defense Purposes. In: Visvizi, A., Bodziany, M. (eds) Artificial Intelligence and Its Contexts. Advanced Sciences and Technologies for Security Applications. Springer, Cham. https://doi.org/10.1007/978-3-030-88972-2_12
- 15)Kumar, M., & Das, A. (2021). AI Technology in Military will Transform the Future Warfare. 'AI in Military' is published in BW Businessworld Defense cover Edition Print (19 July -02 August) 2021.
- 16)Layton, P. (2018). Algorithmic Warfare: Applying Artificial Intelligence to War fighting. Department of Defense, the Royal Australian Air Force or the Government of Australia. National Library of Australia. ISBN: 978192562267. 2018.
- 17)Linde, H. & Schweizer, I. (2019). A White Paper on the Future of Artificial Intelligence. 10.13140/RG.2.2.32564.19844.

- 18) Ministry of Science and Higher Education of the Russian Federation, (2021). "2021 Is Announced as the Year of Science and Technology in Russia," n.d., <https://www.minobrnauki.gov.ru/god-nauki/>.
- 19) Nagpal, K. (2020). Artificial Intelligence in Defense Sector. Q Tech Synergy. Defense ProAc Biz News. Indian Defense Production and Acquisition Biz News. 2020. file:///D:/AI%20and%20global%20War/Artificial%20Intelligence%20in%20Defence%20Sector.html
- 20) Pandit, H. (2021). Using Artificial Intelligence: Bangladesh has a long way to go. The Business Standard. 06 August, 2021. <https://www.tbsnews.net/thoughts/using-artificial-intelligence-bangladesh-has-long-way-go-284371>
- 21) Shaikh, S., & Rumbaugh, W. (2020). The Air and Missile War in Nagorno-Karabakh: Lessons for the Future of Strike and Defense. Centre for Strategic and International Studies. December 08, 2020. <https://www.csis.org/analysis/air-and-missile-war-nagorno-karabakh-lessons-future-strike-and-defense>
- 22) Sharma, S. (2022). Russia's AI enabled military ecosystem and its algorithmic. IDSA COMMENT, MANOHAR PARRIKAR INSTITUTE FOR DEFENSE STUDIES AND ANALYSIS. March 16, 2022. <https://idsa.in/idsacomments/russias-ai-enabled-military-ecosystem-ssharma-160322>
- 23) Singh, G., Mishra, A., & Sagar, D. (2013) An Overview of Artificial Intelligence. SBIT Journal of Science and Technology. ISSN: 2277-8764 VOL-2, ISSUE 1, 2013.
- 24) Singh, T., & Gulhane, A. (2018). 8 key Military applications for Artificial Intelligence in 2018. On October 3, 2018. Market Research Blog. Market Research.com. <https://blog.marketresearch.com/8-key-military-applications-for-artificial-intelligence-in-2018>
- 25) Spirina, K., & Zharovskikh, A. (2021). AI in Logistics and Transportation: Data-Driven Shifts to Boost Business. InData Labs. 29 July, 2021. <https://indatalabs.com/blog/ai-in-logistics-and-transportation>
- 26) Thombre, S., Zhao, Z., Ramm-Schmidt, H., García, J. M.V., Malkamäki, T., Nikolskiy, S., Hammarberg, T., Nuortie, H., Bhuiyan, M.Z.H., Särkkä, S., & Lehtola, V.V. (2022). Sensors and AI Techniques for Situational Awareness in Autonomous Ships: A Review. IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS, VOL. 23, NO. 1, JANUARY 2022.
- 27) West, D. M., & Allen, J. R. (2018). How artificial intelligence is transforming the world. BROOKINGS. April 14, 2018.
- 28) Wisskirchen, G., Biacabe, B. T., Bormann, U., Muntz, A., Niehaus, G., Soler, G. J., & Brauchitsch, B. V. (2017). Artificial Intelligence and Robotics and their impact on the workplace. IBA Global Employment Institute. April 2017.
- 29) Xue, Y., Fang, C., & Dong, Y. (2021). The impact of new relationship learning on artificial intelligence technology innovation, International Journal of Innovation Studies, Volume 5, Issue 1, 2021, Pages 2-8, ISSN 2096-2487, <https://doi.org/10.1016/j.ijis.2020.11.001>.

