

Analysis of Artificial Intelligence in Future Warfare

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Abstract— Artificial Intelligence is the machine or software displayed intelligence. Artificial Intelligence (AI) is the simulation by computers, particularly computer systems, of human intelligence procedures. These procedures include learning, reasoning and self-correction. Artificial intelligence involves reasoning, the natural language of processing, and even different algorithms are used to bring the intelligence into the scheme. As artificial intelligence advances into sectors such as healthcare, finance, education and social media, countries around the globe are increasingly investing in other fields like automated weapons systems. Artificial Intelligence will be an important part of modern warfare. Military systems equipped with AI can handle bigger quantities of information more effectively compared to standard systems. Also, because of its intrinsic computing and decision-making capacities, AI increases self-control, self-regulation, and self-actuation of fighting systems. AI is implemented in almost every military implementation, and enhanced funding from military research organizations for research and development to develop new and advanced artificial intelligence applications is expected to drive enhanced acceptance of AI-driven military-sector technologies. In this paper, we explore the motivations and expectations for the development of weapon systems in the modern battlefield using Artificial Intelligence.

Keywords: Artificial Intelligence, Robotics, Weapon Systems, AI Systems, Automated Weapons, Modern Warfare, Military Technology, International Security

I. INTRODUCTION

Due to the growth of electronic computers since 1940, AI technology became accessible to produce machine intelligence. The world then started to go through this topic and the individuals who have always been engaged in this topic want to do research and also want to create machines linked to this topic. Theories and principles established and created in the Artificial Intelligence term began at the Dartmouth Conference in 1956 and now, after about four centuries, there is a range of AI programs in the globe that have a notable effect on other advances in technology. Electronics technology has given AI a fresh route. Since machines took control of today's human inputs with greater effectiveness and effectiveness, armies started to be more interested in these machines to use them for useful tasks. Therefore, after successful use of the World War I application as a storage for data and as analysers, all essential activists used them operationally during World War II. The growth of the AI sector accelerated with Nanotechnology invention.

II. ADVANTAGES OF AI IN WARFARE

Artificial Intelligence is beneficial in the quick and efficient production of data, in extracting useful information, in collecting and aggregating data from different data sets, as

well as in collecting and summarizing information supersets from a variety of sources, and this detailed analysis allows soldiers to spot patterns and draw connections. AI, if correctly coded, would have a small error rate compared to humans. They'd have amazing precision, precision, and velocity. They're not going to be influenced by hostile settings, so they're going to be able to finish hazardous assignments, discover a room, and endure issues that would hurt or kill us. Replace people with repetitive, tedious duties and many toiling workplaces. AI can enhance an organization's logistics; it can enhance the pace at which choices are made and implemented.

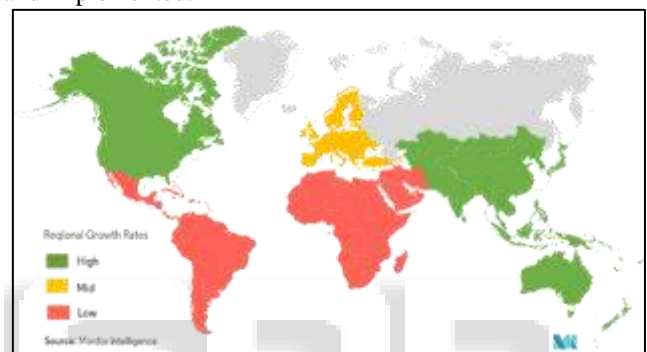


Fig. 1: AI in Modern Warfare Market- Growth Rate by Region (2019-2024)

III. APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN FUTURE WARFARE

A. Warfare Platforms

Military powers from various nations around the world bring AI into weapons and different procedures utilized ashore, marine, airborne, and space platforms. Using Artificial Intelligence in these stage-based frameworks has empowered the advancement of proficient fighting frameworks that are less subject to human commitment. It additionally prompted improved cooperative energy and upgraded viability of fighting frameworks while requiring less support. Simulated intelligence is additionally expected to enable self-sufficient and fast weapons for joint assaults.

B. Cyber Security

Weapon systems are frequently susceptible to cyber-attacks, which can result in the loss of secret military data and damage to weapons systems. But, AI-equipped systems can safeguard networks, computers, programs, and information autonomously from any type of security breaches. Furthermore, web security systems enabled by AI can record cyber-attack patterns and create counter-attack instruments to address them.

C. Logistics and Transportation

In military logistics and transportation, AI is anticipated to play a vital role. An essential component of successful

military activities is the efficient transport of products, ammunition, armaments, and soldiers. Integrating AI with military transport can decrease transportation expenses and decrease the attempts of human operations. It also allows military fleets to detect anomalies readily and to predict failures of components rapidly. As of late, the Logistics Support Activity of the U.S. Armed force Materiel Command worked with IBM and its Watson AI to help recognize support issues in Stryker battle vehicles battling before they occurred.

D. Target Recognition

In complicated fighting settings, AI methods are being created to improve target identification precision. By evaluating reports, records, news feeds, and other types of unstructured information, these methods enable defence forces to obtain a thorough knowledge of prospective operational fields. Also, AI enhances the capacity of these systems to recognize the position of their objectives in target identification schemes. AI-enabled target identification systems capabilities include enemy behaviour predictions based on probability, aggregation of weather and environmental circumstances, anticipation and flagging of future supply line bottlenecks or vulnerabilities, mission approach assessments, and proposed mitigation strategies. Machine learning is also used for learning, tracking, and discovering goals from the information. For instance, with the assistance of Synthetic-Aperture Radar (SAR) pictures, the DARPA Target Recognition and Adaptation in Contested Environments (TRACE) program utilizes machine learning methods to automatically locate and recognize objectives.

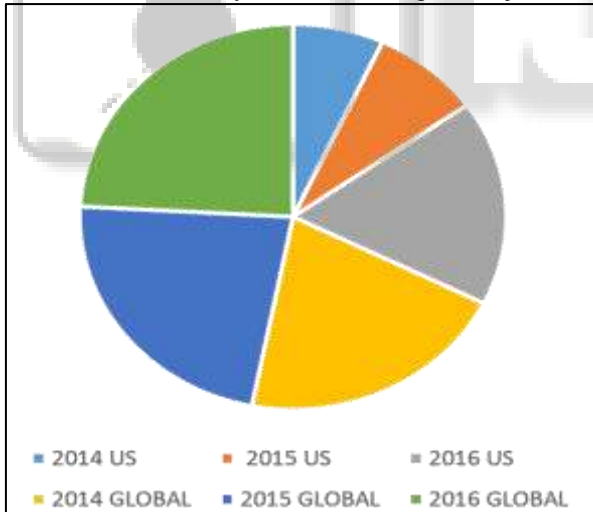


Fig. 2: R&D Spending by Sector

E. Battlefield Healthcare

For distant medical support and rescue operations, AI can be incorporated with Robotic Surgical Systems (RSS) and Robotic Ground Platforms (RGPs) in war zones. The US is engaged in the growth of RSS, RGPs, and other battlefield healthcare systems in specific. Under challenging circumstances, AI-equipped systems can mine the medical records of troops and help with complicated diagnosis. For example, IBM's Watson study team developed a clinical reasoning prototype known as the Electronic Medical Record Analyser (EMRA) in partnership with the U.S. Veterans

Administration. This technology is intended to use machine learning methods to handle electronic health records of individuals and to recognize and classify their most critical health issues automatically.

F. Combat Simulation and Training

Simulation and training is a field that combines system engineering, software engineering, and computer science to build computer-aided models that familiarize troops with the different fighting technologies deployed during military activities. The US is rapidly spending on projects for simulation and training. The U.S. Army and navy conducted each warfare assessment, which led to several simulation projects for sensors being initiated. The U.S. Navy has engaged businesses like Leidos, SAIC, AECOM, and Orbital ATK to promote their projects, while firms such as SAIC, CACI, Torch Technologies, and Millennium Engineering assist the programs of the U.S. Army.

G. Threat Monitoring and Situational Awareness

Threat surveillance and situational awareness are highly dependent on activities involving intelligence, surveillance, and recognition (ISR). To assist a variety of military operations, ISR activities can be used to obtain and process data. Unmanned devices which are used to perform ISR tasks can either be controlled remotely or sent along a predefined path. Deploying these devices with AI supports defence officers in tracking threats while increasing their understanding of the situation. Unmanned aerial vehicles (UAVs), often known as drones, are capable of patrolling boundary regions with embedded AI, identifying prospective threats, and transmitting data on these threats to reaction teams. UAVs can enhance the protection of army bases and enhance the safety and effectiveness of military staff in fight or distant places.

H. AI and Data Information Processing

AI is especially helpful to process big quantities of data rapidly and effectively to acquire useful data. AI will help in the collection and aggregation of data from multiple data-sets and the acquisition and summation of data from distinct sources. This sophisticated assessment allows to acknowledge patterns and obtain correlations from military staff.

IV. LATEST USE OF AI SYSTEMS

A. Unmanned Aerial Vehicles (UAV)

The UAV is an acronym for Unmanned Aerial Vehicle, an aircraft that does not have any pilot on board. UAVs can be remotely operated aircraft or operate independently based on early-programmed flight information or more complicated dynamic control systems. UAVs are presently being used for a set of tasks, such as roles of recognition and attack. Unmanned aerial systems composed of the element of the aircraft, the payload of the sensor and a flight control station. They can be regulated from the floor either through internal electronic devices or through control equipment. It is called RPV (Remotely Piloted Vehicle) when remotely piloted from the floor and needs secure wireless transmission to be controlled.

B. Armed Robotic Vehicle (ARV)

Armed robot vehicle (ARV) includes editions the variant attack and the version Reconnaissance, Surveillance and goal Acquisition (RSTA). The attack version will offer remote reputation abilities; installation sensors, direct firearms, and unique ammunition to houses, bunkers, and other urban characteristics; become aware of or pass threats in homes, bunkers, and tunnels and different city traits; examine war damage; act as a communications relay; assist set up and dismantled troops with direct attack. the popularity, Surveillance and goal Acquisition (RSTA) model will provide far off popularity capabilities in urban fight operations in urban Terrain (MOUT) and different struggle areas; install sensors, direct firearms and special munitions in homes, bunkers and other city characteristics; become aware of or pass threats in homes, bunkers, tunnels and different city characteristics.

C. Multifunctional Utility/Logistics and Equipment

Multi-function Utility / Logistics and Equipment Vehicle (MULE) is a customizable, robotic, Sub-autonomous land vehicle providing transportation of materials and/or goods in assistance of dismantled manoeuvring forces. It will be able to be deployed in close and aerial attack supporting dismantled infantry. The MULE offers adequate flexibility to manoeuvre within an operating region with the motorized FCS force, and a bigger car is driven to the operating region. The MULE offers partly-autonomous navigation, including potentially autonomous loading/unloading of chosen supplies.

D. Mounted Combat System (MCS)

The Mounted Combat System (MCS) of the Future Weapon system is an assault platform using a 120-mm firearm. The Mounted Combat System (MCS) offers offensive firepower capacity for Line-of-Sight (LOS) and Beyond-Line-of-Sight (BLOS) enabling BCTs to close enemy troops and attack them. The MCS provides high-speed accuracy shots to rapidly kill numerous objectives at standoff distances and complements the fires of other BCT schemes.

E. Medical and Evacuation Vehicle (MEV)

The Medical Vehicle is intended for providing sophisticated assistance to seriously wounded troops for trauma life within 1 hour. As the main medical scheme within the Unit of Action (UA), the Medical Vehicle will have two mission components: evacuation and treatment. The time-sensitive nature of assisting seriously wounded troops needs a suitable field rescue system with an instantly responsive force health protection scheme. The FCS Medical Vehicle-Evacuation (MV-E) car enables trauma experts to be nearer to the point of injury of the accident, manoeuvring with fighting forces, and used for the emergency of the accident. The Medical Vehicle - Treatment (MV-T) vehicle fortifies the ability to convey Advanced Trauma Management (ATM)/Advanced Trauma Life Support (ATLS) medicines and procedures for quicker loss medications and fight space leeway. The two modules of the FCS Medical Vehicle Mission will have the option to perform therapeutic intercessions and medications using introduced associated telehealth interfaces, Medical

Communications for Battle Casualty Treatment and the Medical Information Theatre Program (TMIP).

V. AI IN INDIAN ARMED FORCES

Artificial Intelligence is primarily used in the business sector in India and is increasing rapidly in the defence industry. The mixture of Artificial Intelligence and Robotics transforms India into the implementation of areas of social, defence and economics. India has over 233 AI firms operating in various AI industries such as gaming, aerospace, social, military, etc. CAIR is undertaking the Indian AI for the defence industry. India's current annual AI income is \$180 million. India is progressing greatly in the AI race with an average of 6.6 years of professional experience for more than 29,000 AI experts.

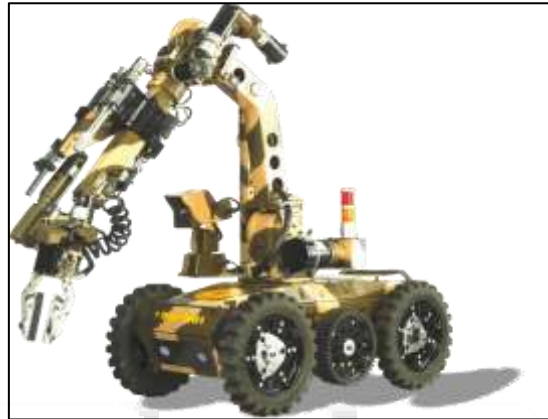


Fig. 3: DRDO Daksh- Battery-Operated Remote-Controlled Robot

VI. MILITARY MICRO UNMANNED AERIAL VEHICLE OR MINIATURE UAV

A miniature UAV or small UAV (SUAV) is an unmanned aerial vehicle tiny adequate to be portable. Miniature UAVs are micro-air vehicles (MAVs) and man-portable air defence system for infantry. MAVs can be used for Intelligence, Surveillance and Reconnaissance. A reasonable cost, multi-pay, Micro-UAV device small in body mass with decreased size, allowing it to be transported, deployed and retrieved very readily. A stealthy and silent solution, allowing it to go unseen anywhere under any conditions Can function for lengthy periods and has a wireless communication variety of 2-10 km. The UAV's acoustic signature is small and can be set up and rebooted within 10-15 minutes.



Fig. 4: Black Hornet Nano- Micro UAV

VII. CONCLUSION

India is the fastest increasing nation in the manufacturing, economic and military sectors with fresh innovations. India needs to create weapons and surveillance equipment powered by artificial intelligence (AI) for modern wars. India can be readily carried out to guard the lengthy frontier with Pakistan and China by creating autonomous robots with armed guns, unmanned tanks, submarines and planes that can be used for military conflict with enemies. The nation's military institution is working closely to harness IT sector and academic knowledge in this region, working in parallel with nations such as the US and China that are extremely focused on Artificial Intelligence and Machine Learning to create Lethal Autonomous Weapon Systems (LAWS). For the army portion of AI, the long-term vision is the centre for progress, innovation and growth. This vision can assist the Indian government to cover a variety of AI fields such as autonomous guns and AI's involvement in cyber-defence and would also benefit the nation most.

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