

Artificial Intelligence in Military

Sagar Gopinath Shingare

*U.G Student, Department of Information Technology, B.K Birla College of Arts Commerce and science
(Autonomous), Kalyan, Maharashtra, India*

Submitted: 10-09-2021

Revised: 19-09-2021

Accepted: 23-09-2021

ABSTRACT: This paper is about the use of Artificial intelligence in military. Artificial intelligence is intelligence demonstrated by machines, AI entered in field of computer science in early 1956, since then the field has made a remarkable progress. With the faster and more powerful computers access to the larger amount of data and algorithm improvement AI systems have taken up the next level.

AI applications are rapidly growing and have taken the entire world's government attention towards the military applications. Combat power of any armed force in the world getting more defined by the ability to absorb new technology. Generic programming and neural networks are used to develop AI algorithm which can further be used to military applications for device that can perform different tasks like finding mines, radars, missiles etc. Artificial intelligence is making its way in becoming a critical and essential part of modern warfare.

KEYWORDS: AI, Robotics, Autonomous, UAV, CAIR, DARPA, USV

I. INTRODUCTION:

What is Artificial intelligence?

John McCarthy is a father of AI, was a pioneer of artificial intelligence in the field of AI. [1] He coined the word "Artificial intelligence" in 1956. According to him 'Any aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate'. He believed in developing machines that will embody the abstract thinking and problem solving nature of human brains.

There are three types of AI depending upon the intelligence

- Artificial Narrow Intelligence (ANI)
- Artificial General Intelligence (AGI)
- Artificial Super Intelligence (ASI)

We have currently achieved narrow AI. As machine learning capacities continue to evolve, scientists get closer to achieve general AI.

Artificial intelligence in military mainly focuses on robotics, surveillance, autonomous systems such as,

- Robots driven by AI can travel through the dangerous areas, perform operations or surveillance by itself without any control by any military base.
- Unmanned Aerial Vehicles (UAV)
- Unmanned Sea vehicles (USV)

Above AI and robotics can be used for identification, classification of targets and guiding missiles, automated robots can be used to transport ammunition, use to find landmines etc. Now military industries are gradually shifting towards more robust autonomous weapon systems.

II. HOW ARTIFICIAL INTELLIGENCE IS EVOLVING GLOBALLY

There is a competition ongoing between different countries in the world for making more effective and efficient AI-based applications for military. The United States and China dominate the world of AI.

United States of America

[2]. US government is highly investing billions of dollars for development of next generation warfare using Artificial intelligence. According to the data science and analytics firm Govini, the US Department of Defense increased investment in AI, Big data and cloud computing in both government and private sectors. One of the largest sources of funding for AI research projects comes from the Defense Advanced Research Project Agency (DARPA). DARPA provides the development of new technology for use of military. The US has numerous military AI combat programs, one of which is sea hunter, an autonomous warship which is designed to operate for extended periods at sea without a single crew member or external support. Project Maven is a Pentagon project involving machine learning and engineering to distinguish people and objects in drone videos which are used for surveillance, intelligence and reconnaissance data from drones.

US don't want to take risk of losing race of AI to china and Russia, therefore US highly investing its efforts, money in Artificial intelligence.

China

China is focusing on strategic policy of military-civil fusion on AI for global tech dominance. Chinese industries has numerous home grown AI accomplishment of its own. Beijing roadmap aim to create \$150 billion AI industries by 2030. Before 2013 Chinese defence budget was mainly restricted to a few conglomerates, however since 2017 Chinese starts developing emerging technology such as drones, AI surveillance robots etc. china investing minimum \$2billion for Research Park in Beijing. Chinese defence budget in 2021 is over \$209 billion.

China has mission 2025, to reach a leading level in AI for betterment of china's economic transformation. Artificial intelligence in china is on high level of priority, as they aim to become global superpower in Artificial intelligence.

Russia

Russia is developing new missiles and drones that will use Artificial intelligence to think by selves. Russia is developing a AI guided missiles that could decide to switch the targets mid flight or destroy it.. Russian military committee has approved planes to drive 30% of Russian combat power from remote controlled and AI enabled robotics platform by 2030, in Russia potential military use of artificial intelligence increase in mid 2017.russia has been testing several autonomous and semi-autonomous combat systems, such as Kalashnikov's neural net combat module with machine gun, camera and AI that make its own targeting, judgments without any human intervention.

Russia recently created defence research organization, roughly equivalent to DARPA dedicated to AI and robotics. Russian military plans to incorporate AI into crewless ground, aerial and undersea weapons system.

Israel

Despite the small country size Israel always in dispute situation with the neighboring countries, so Israel tries to build weapons with advanced technology. Israel spent about 4.5% of its GDP on research and development, 30% of Israeli research and development activity is spent on military products. Israel Defence Force (IDF) technical unit C4i is behind most of its AI development. In C4i there is branch of 'sigma' whose aim is to develop research and implement

the latest artificial intelligence system to keep Israel Defence Force up to date.

Other countries like UK Germany, India, France, Turkey, European Union and many other countries are also working on AI embedded robotics, drones, UAV or planning to incorporate autonomous weapons systems into its future military plans.

III. ARTIFICIAL INTELLIGENCE IN INDIAN DEFENCE

[3].India is also working to equip the armed force of the nation with modern AI and robotics. Therefore India joined the US and china as one of the world's largest military expenditures. In January 2019 Chief of Defence Staff(CDS) Gen Bipin Rawat said that India will be too late if the armed forces do not embrace with AI soon enough. Ministry of defence (MOD) constituted a multistakeholder task force for strategic implementation of Artificial intelligence in military sector in 2018.

In February 2019 ministry of defence established a higher level defence AI council (DAIC) under the chairmanship of MOD assigned with a task providing the strategic direction towards the adoptions of AI in defence.

Indian Defence Development in AI

[4].Defence Research and Development Organization (DRDO) has a specialized division, Centre of Artificial Intelligence and Robotics (CAIR) which focus on robotics controlled system, command control communication and Intelligence (C3I), networking and communication. They have produced a family of robots for observation and survey applications. Robosen a mobile for reconnaissance and surveillance, low intensity conflicts walking robot with four or six legs for logistics support. CAIR has developed a network traffic analysis (NETRA) which can monitor internet traffic.

CAIR is developing intelligent mobile robots that are specifically designed for Indian armed forces that will be used to assist with self-reliant adoptable for executing operations in various conditions including both environmental and terrain.

Robotics and AI Applications in Indian Defence

Indian defence sector is highly focus on developing remotely operated vehicles (ROV), DAKSH robot for diffusion and clearance of bomb, UAV, RUSTOM, NETRA, and various mini robots. There are around 500 DAKSH robots are currently in Indian military

NETRA

DRDO netra is a light-weight; autonomous drone used for surveillance and reconnaissance operations. This drone is designed to be used in hostage situations, border infiltration monitoring, surveillance etc.



Figure 1 NETRA

DAKSH

DRDO DAKSH is an electrically powered and remotely controlled robot developed for handled and destroy unsafe objects safely.



Figure 2: DAKSH

RUSTOM

Rustom is a medium altitude long endurance unmanned air vehicle (UAV) being developed by DRDO for three services.



Figure 3: RUSTOM

India is working together with countries like Japan, Israel, and Russia in the field of AI and robotics in a military sector to enhance the next level in the world of Artificial intelligence.

The Indian Navy has taken a lead and has divided AI usage into short, medium and long term goals for implementations. Indian military also has a Harop searcher, sea guardian UAV that are used to surveillance and air strike. Since the drone will be the key of future warfare therefore Indian defence sector is working on developing drone technology, India has several drone programs one of them is project 'cheetah'.

Indian Army during Army Day 2021 demonstrated a Swarm attack by drones on multiple targets.



Figure 4: Indian Army Drone Swarm demonstration during Army Day 2021

Way Ahead

[5].The Indian navy and Air Force are focusing on UUV, UAS weapon system. The Indian army focuses on a few issues which are as image interpretation for identification and classification, analysis of trajectory, logistic applications particularly in high altitude terrain.

In June 2020 a drone attacked on Indian Air Force based from then India is planning to buy anti drone system to tackle such situation.

IV. ARMS DEVELOPED USING ARTIFICIAL INTELLIGENCE

Different countries in the world are developing autonomous weapons for military applications from transport, search and rescue to attack. Many such arms are currently being used, many are under development.

HAROP

[6].The Israel Aerospace Industries (IAI) Harop is a loitering munition weapon developed by the MBT division of Israel Aerospace Industries. Also known as suicide drone, it is autonomous drone that attack the target by self and if the target is not engaged, then drone return back to the base. The range of Harop drone is about 1000 Km.

The Harop drone was used by Azerbaijan in Nagorno-Karabakh conflict with Armenia in 2020 along with Turkish Bayraktar TB2, these drones play a big role in the victory of Azerbaijan.



Figure: 5 Harop

SEA HUNTER

[7].Sea Hunter is an autonomous unmanned Surface Vehicle (USV), developed by DARPA in 2016. It is capable of hunting submarines, detecting torpedoes and avoiding objects in the sea. It has range of 10,000 nautical miles and capable of sailing without any external support and crew members for 30 to 90 days.



Figure: 6 Sea Hunter

TALON

[8].A TALON is lightweight, unmanned, tracked military robot designed and built by Foster-Miller and it is owned by QinetiQ North American Company. It is used to protect military personals and first responders against the explosives.

It can be used by military, regular police and other security personal to conduct range of missions, it also deployed to support special weapons and tactics (SWAT) and military police operations.



Figure: 7 Talon

V. FUTURE OF AI AND ROBOTICS IN DEFENCE

AI and robotics will certainly have a big role in future military. It has many applications where it will enhance its productivity, reduce workload and operate more quickly than the regular military personal. Current research will continue to improve its potential, explain ability and resilience. Many countries are working on future UAV, Aerial vehicles, UMSV, autonomous drones that can worked alongside with soldiers or by self in battlefield.

Recently in July 2020 the conflict between Armenia and Azerbaijan, shows the true3 potential of autonomous drones the use of Israel Harop and

Turkish Bayraktar TB2 drones by Azerbaijan Army owned the battlefield in Nagorno-Karabakh and show the future of warfare. Similarly the conflict between Israel Defence Force and Hamas there was used of drones by IDF to tackle Hamas, also IDF iron Dome a air defence system was capable to stop missile launched by Hamas in mid air.

Israel Defence Force (IDF) claimed that the conflict between, IDF and Hamas was a first AI war. Since then many countries get the importance of autonomous armed drones and weapons, also Drones are less expensive than traditional Air power.

Robotics and Artificial Intelligence could take on a centre and key important role in future warfare.

VI. CONCLUSION

Artificial Intelligence is at the centre of new enterprise to builds computational model as of intelligence and solve complex problem in military which is not possible by normal armed soldiers. The long term vision for military plan of AI is the centre for advance innovation and development.

There is much debate on the use of Lethal Autonomous Weapons in warfare but AI researchers are continuing research to achieve advanced level of AI. Artificial Intelligence will intensively use in future military conflicts, weapons with AI will be one of the strongest weapons in military, which can identify the targets and make

decision whether to destroy it or not. The right use of AI could be revolution for defence sector.

Overall Artificial Intelligence is one of the most advantageous technologies in the military sector.

REFERENCES

- [2]. Analytixlabs. (2020, Mach) analytixlabs.co.in. [Online]. <https://www.analytixlabs.co.in>
- [3]. Manohar Mahipal Une and Sushil Laxman Khikade, "Artificial Intelligence in Defence sector," IRJET, vol. 05, no. 06, pp. 2-3, June 2018.
- [4]. Ambuj Sahu. (2019, August) www.orfonline.org. [Online]. <http://www.orfonline.org>
- [5]. Ambuj Sahu. (2019, August) www.orfonline.org. [Online]. <http://www.orfonline.org>
- [6]. R K Chakroborty. (2021, May) bhatshakti.in. [Online]. <https://bhatshakti.in>
- [7]. Israel Aerospace Industries. (2020, July) www.iai.co.in. [Online]. <https://www.ioi.co.il>
- [8]. NAVAL Technology. (2018, May) naval-technology.com. [Online]. <https://www.naval-technology.com>
- [9]. ARMY Technology. (2018, March) army-technology.com. [Online]. <https://army-technology.com>