

Role of Nanotechnology in Futuristic Warfare **Vinnakota Tarun***

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Abstract

Although warfare technology is very advanced in terms of the development and availability of deadly directed energy weapons, their delivery platforms, surveillance technologies in acquisition of military targets with great accuracy. Three technologies, namely Nano, information, and biotechnology, are believed to be the technologies of the twenty-first century that will have their impact felt in the futuristic war scenarios. The combination of information and nanotechnology in the form of artificial intelligence may lead to the replacement of human beings with unmanned intelligent robotic systems performing duties in highly hazardous environments in areas affected by the use of weapons of mass destruction. The nanotechnology-enabled quantum communication may lead to highly secured unbreakable information sharing between friendly forces. Furthermore, a combination of Nano- and biotechnologies is expected to generate a new class of Nano- and bioweapons hitting human targets even indoors without their presence being noticed by the enemy. Some of such weapons may prove to be the weapons of mass extinction. Nanotechnology on the other hand may also provide protective measures against such weaponries.

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Introduction

War is defined as an exercise of fighting among two or more inter or intrastate armed forces, leading to each other's killing, destruction of property, and/or capture of loser's territory as well. The nature of war does not change, what changes is only its character. The unchanging nature of war lies in its essence of violence, interactiveness, and political will of the warring states or groups. Absence of any of such elements is not war but something else. The nature of a particular war depends on three things, namely passion and primordial violence, chance and uncertainty, and objectives or precisely to be the policy matters of the authorities behind the war. The character of a war is very much dynamic, circumstantial, and adaptive to the prevalent technology. For example, during the Stone Age and earlier eras, war essentially started with tribes killing each other with stones and spears. Then, as technology evolved with progress of civilization, humans found novel ways to kill their enemies with swords and arrows. What followed were states that tried to kill their enemies with the aid of guns and explosives. The Industrial Revolution led to the development of war machines such as tanks, missiles, planes, submarines, and ships, all entering the battlefield. It was at this point that human civilization hit a threshold with the advent and deployment of

nuclear weapons during World War II. The future battlefield will be characterized by short and intense engagements; nonlinear battles, simultaneity of operations, increased battlefield transparency, synergized and orchestrated employment of firepower resources, and employment of precision and high-lethality weapon systems in a hybrid warfare environment. In addition, the threat from weapons of mass destruction (WMD), that is, nuclear, biological, and chemical warfare threat will continue to haunt. Nuclear weapons, though available only to some of the technologically advanced countries, are still the most dreadful of the entire weapon systems and act as a deterrent for any major war [1].

Discussion

Besides technology, the conduct of war is also influenced by several other factors such as military organizations bound by laws of the land, regulations, and socio-political issues along with other factors that change across time and place. It is worth to mention that in recent years, asymmetric war, that is, the war waged by terrorists the nonstate actors in many parts of the world is supported by other nation-states and part of the society around. This kind of war takes place in crowded urban areas, such as markets, religious places, schools, railway stations, bus

stands, etc., and is very dangerous and difficult to predict. The attacker may be an unidentifiable suicide bomber, looking like a commoner or disguised as a security personnel, inflicting heavy casualties and damage to public property. Terrorists are also seen attacking security forces on duty in their barracks. Such spearheaded persons get shelter and support even from fanatic elements in the neighbourhood, making their surveillance rather a near to impossible task. It is beyond the scope of the present work to discuss the influence of socio-political factors on war. We, therefore, concentrate here on the role of emerging technologies in the futuristic battlefields of wars. It is believed that the convergence of nanotechnology, information technology, and biotechnology will define and dominate a futuristic war. The accessibility of such technologies to state and nonstate actors alike, including multinational private companies, may, however, be very dangerous. Before we touch upon such technologies, it is prudent to discuss the perspectives of the recent advancements in weapons and technologies, which is going to find a prominent place in futuristic wars. Today, we are at the crossroad of the way of rapid change in technologies and techniques of warfare. It is believed that with the advancement of technologies, the future war might be fought by using smaller drones and robots. Cyber-war capabilities with advanced accurate surveillance and target acquisition technologies as well as reliance on non-conventional warfare tactics along with convergence of information and biotechnologies are leading to the development and deployment of bioweapons [2].

The emergence and convergence of three great technologies namely, Genetics, Artificial Intelligence, and Nanotechnology (**GAIN**) toward the last leg of last century, which on the hand resulted the great impacts on health benefits such as treatment of many of life-threatening diseases including cancer, checking with the aging process leading to greater human life. On the other hand, these pose a great threat leading to the extinction of living species, including the human beings on Earth. The developments in the future would include, for example, genetics

through modified organisms and super viruses; artificial intelligence would create computers with more thinking abilities than the human brain; and nanotechnology leading to self-replicating molecular machines having no precedent in the existing world [3].

The use of nanotechnology, in particular, is going to bring great changes in the present existing weapon technologies. For example, stealth, unmanned aerial vehicles (UAVs)/drones, precision-guided weapons, and firearm technologies are expected to have a great phase shift. It is believed that soldiers can move freely with no danger of them being detected using the upcoming cloaking technologies during patrolling or combat situations [4]. Army commanders would be capable of attacking a target at any time even from remote areas with greater accuracy.

Conclusion

The combination of information and nanotechnology in the form of artificial intelligence may lead to the replacement of human beings with unmanned intelligent robotic systems performing duties in highly hazardous environments in areas affected by the use of weapons of mass destruction. The nanotechnology-enabled quantum communication may lead to highly secured unbreakable information sharing between friendly forces. Furthermore, a combination of Nano- and biotechnologies is expected to generate a new class of Nano- and bioweapons hitting human targets even indoors without their presence being noticed by the enemy. War is defined as an exercise of fighting among two or more inter- or intrastate armed forces, leading to each other's killing, destruction of property, and/or capture of loser's territory as well. The nature of war does not change, what changes is only its character. The unchanging nature of war lies in its essence of violence, interactiveness, and political will of the warring states or groups. Absence of any of such elements is not war but something else.

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