

Issue Brief

August 2025
No : 455

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Abstract

The concept of moving and expanding the field of conflict is characterised by the use of unregulated armed drones. Although, the Hague Regulations, Customary International Laws and Treaties prohibit the use of CBRN weapons, however exploitation of drones are now felt to be treated in the prohibition list because of its miniaturisation, autonomous design and deliverables which are lethal. In addition, this would evolve into smart nanobots from the nanoweapon technology with the potency of causing mayhem and pandemics. This deep impact can challenge the governance and may create a colossal action towards its countermeasures and counterattacks. These applications, if accessed by terror organisations, can create an uncontrollable situation due to lack of international legal bindings, accountability of actions for using autonomous weapons and humanitarian laws, thus challenging the very survivability of humanity in itself. Whilst the autonomous delivery systems are advancing, the technology of Directed Energy Weapons (DEWs) is also advancing with development of futuristic IEDs and effect to leaps and bound technology creating killing robots.

Keywords: Conflict, International laws, Miniaturisation, Nanoweapons, Autonomous Systems, DEWs

Introduction

Improvised Explosive Devices (IEDs) are often considered as ideal delivery systems by anti-national elements for generating asymmetry of target destruction and misperception load on the governance and security establishments. Such conscienceless elements have continuously evolved to baffle the security forces through premeditated delivery of destruction, not just by explosives but also by chemical and biological toxins. IEDs have been deployed by terrorist organisations with varied firing devices and explosive charges (Asthana and Nirmal, 2008), however usage of soundless technology of drones and nanoweapons through nanobots can be devastating and cannot be ruled out as a potent killing platform. The drone technology is achieving resilience, speed, stealth, decoy and above all autonomy of operations. Moreover, drones are continuously being miniaturised and armed with variant ammunition including NBC payloads with potency of causing pandemics. Further miniaturisation of drones would be very

evasive, deadly and capable of being exploited to unimaginable ends, against the concept of Rules of Engagement.

The destructive application of Nanobots by exploiting disruptive technology of delivering toxins through mosquito sized flying objects (Del Monte, 2018) into a population can be catastrophic. Nanobots infused with Artificial Intelligence (AI) is a prelude for autonomous technology towards threat to human life. Warfare has always been conjoined with defined rules of engagement, however targeted killings is a factor to both asymmetric and conventional warfare. Sub-national groups and terrorists can use dirty weapons like IEDs against a conventional enemy nation that would utilise a drone for targeted killings. Terrains too make a visible impact in utilisation of drones— treacherous terrains, walled compounds and caves generate challenges in deploying Special Forces and such would cause profound risk to own troops and civilians in vicinity (Agwu, 2018). World Militaries are combating global terrorism; modern technology and seamless communication networks within the terrorists groups, causing the forces to face threats at transnational levels. Intricate networking, hawala transactions and improvisation of techniques through terrorist global infrastructure has made the battlefields disruptive and collaterally destructive (Swamy, 2008).

Robots and Autonomous Robotics

Military robotics have history dated from 1898 with Nicola Tesla developing a wireless Remote Control (RC) boat for the US Navy. Similarly, Germany and UK were also ferociously developing the technology of remote robotics. However, turning point of remote robotics came into the attention of nations in 1930s when the Soviet Union developed a wireless remote controlled unmanned tank, often called as 'Teletanks'. Deployment of Teletanks was undertaken by the Soviet Union on eastern front during World War II (WW II). The Soviet Union further developed Telecutters – RC Boats and Teleplanes – RC Aircrafts for deployments. The Germans developed RC land vehicles with demolition charges to disrupt and destroy enemy targets. The Nazi Germany also developed robotic missiles which created large scale destruction in London during WWII. The USA began its military exploitation of robotics with RC Drones in 1940 called as Dennymites and accumulated about 15,000 of these drones for utilising them in Operations Aphrodite and Anvil in 1944. The upscaling of RC weapon delivery platforms slowed considerably post WWII. However, the 1991 Persian Gulf war saw usage of Israeli drones by US Forces resulting in surrender of Iraqi soldiers— an event to reckon, as this was the maiden surrender of humans to a robot. In 1995, the Global Positioning

System (GPS) of USA was integrated into the newly named Unmanned Aerial Vehicle (UAV) that ushered a game changer for the modern warfare.

The USA in 2003 commenced developing robotics on a higher technology by bringing in the Autonomous Robotic Systems. In 2005, US Army developed an unmanned autonomous rotorcraft with sniper system and by 2017 the US Navy developed autonomous boats which could be deployed in swarms (Del Monte and Louis A., 2018). The refinement of drone technology advanced to development of hummingbird drone by AeroVironment in 2011 that are being utilised by troops on ground for surveillance. The control unit is no larger an Xbox controller and with a visual headsets, the troops on ground can gain actionable intelligence (Agwu, 2018). In the mid 2010-2020s, Russia and China were heavily investing in autonomous robotic systems. Whilst the robotics and autonomous systems were systemically developed, a new requirement of shrinking these robots was felt by the USA, thus the onset of Nanobots was initialised.

Nanobots

Nanobots are miniscule robots or are rather nanoscale robots utilised for targeted exploitation to neutralise both medical conditions at cellular level and in a subversive condition for eliminating targets of interest at precise level. The DARPA invested its interest in sensor loaded micro drones of the size of birds and insects and thus commenced the human intervention in developing nano drones and nanobots (Krishnan, 2009). The military application of these new found shrunk technology can be of great utility, however, the subsequent application of nanobots in medical provides a separate facet of its utility. Whilst nanobots layered with AI can assist in medical interventions for cancer and other autoimmune diseases, however reversal exploitation by subversive elements can generate immense surveillance load on security forces. A micro drone can explode thus crippling the enemy's command and control facility and a nano drone can be made capable of injecting DNA nanobots with toxins to assassinate the living targets. The simultaneous evolution of nanotechnology and nanoelectronics, nanobots through the deployment of swarming can become a weapon of mass destruction and can be mounted with AI enabled smart devices causing irreversible losses to life and property (Del Monte and Louis A., 2018).

Smart Nanobots

AI enabled smart nanobots can create havoc in varied environment such as nanobots contaminating potable water of a major metropolis to achieve its main objective. If a terrorist organisation launches such an attack, the target country would be unable to point finger at any

one adversary. Thus, nanobots are inherently hazardous and any deliberate, accidental or terror-based attacks would ignite global conflict. It is a view that by 2045, AI would exceed the combined cognitive intelligence of humanity and reach the level of 'Singularity'. Thus, computers reaching the level of singularity would manufacture and multiply nanobots with minimal or without human intervention. Thus, a self-generating nanobot manufacturing computer can swarm a target facility and collapse the functional capability of the facility — even causing lethal damage to life. The nanobots can be exploited passively, offensively, defensively, tactically and strategically (Del Monte and Louis A., 2018) ranging from precision targeting to disarming an IED to Weapon of Mass Destruction (WMD).

Countermeasures

Invoking the articles of Non- Proliferation of Nuclear Weapons, Limited Test Ban Treaty and Biological Weapons Convention, the possession and exploitation of nanoweapons should be brought under these treaties and conventions. The advent of hypersonic missiles with capability of carrying nuclear and nanoweapon warhead can be a matter of concern as there is a general consensus amongst the nations that such missiles would carry only conventional warheads. It would be prudent that the Autonomous Smart Nanobots (ASN) be treated at par with WMD and the United Nations ratified countries unanimously declare nanoweapons as equivalent to nuclear weapons and WMDs. Further, to counter the threat of nanoweapons, countries should be allowed to develop anti- nanoweapon missile technology under the doctrine of Mutually Assured Destruction (MAD) to avert nuclear war (Del Monte and Louis A., 2018). Such a doctrine would benefit of not generating a widespread and uncontrolled war zone but allow countries to attack such terror facilities manufacturing nanoweapons tactically and surgically.

Disruptive Technology and Survival of Humanity

Cases observed on introduction of new technologies, especially with the rapidly developing AI applications, pertains to removal of human element from an environment of conflict. Robots are well utilised for mine clearing duties, IED detection and clearance. Robots would also start appearing in non-combatant roles of perimeter protection of installations and facilities and would take autonomous or near autonomous decisions during a provoked situation. However, providing complete autonomy to such robotics, though appears profitable in respect to human resource, administration and logistics, but would require a robust model and program to allow human intervention and termination for controlling the eventualities of attack. Robot autonomy can eliminate human errors, slack responses,

information explosion, fatigue and network centric communication. However, survival of humanity is supreme and actions of humans to positively use this technology is of prime importance. Robot autonomy is to be permitted to a level post being cognitively assessed by a human being. Limited autonomy can be permitted, however, complete autonomy presently, in experimental levels, should be backed up with firm legal bindings and developed in a manner to enhance human capabilities for its survival rather than becoming a destructive technology (Krishnan, 2009).

Future of IEDs and Development of Futuristic Devices for Subversive Activities

The entire gambit of exploiting IEDs by terrorist organisations, which presently have human interface, whether by VBIED, PBIED, Drone IED, SVBIED, TATP, HMTD, Booby Trap etc. (Asthana and Nirmal, 2016), would alter with the advent of futuristic disruptive devices. The uncontrolled and unmonitored manufacturing and usage of nanoweapons and nanobots would be catastrophic. However, development of invisible technology in terms of the DEWs can also be catastrophic if it falls into hands of terrorist organisations. These technologies of DEW can be used as standalone weapons for target elimination. Following are some developing technologies of the said field:

- **Laser Weapons.** These weapons have been employed in targeting, guidance and countermeasures. Before Lockheed's advance, one stand out was the High Energy Liquid Laser Area Defence System (Anderberg and Wolbarsht, 1992).
- **Particle Beam and Plasma Weapons.** The particle beam is still on drawing boards of DEW technology, however, they are based upon channeling particle beams — a theoretical possible implementation and can be endo-atmospheric and exo-atmospheric. The plasma weapons fire beams, bolts, or streams of plasma— an excited state of matter comprised of electrons and nuclei, or other particles (Zohuri, 2019).
- **Microwave Weapons.** These weapons employ 300 MHz to 300 GHz frequencies. A non-lethal application is the Active Denial System— a millimetric wave source that heats up water in skin, with resultant searing pain incapacitating targets. The weapon has been deployed by USAF research laboratory for riot control. Microwave weapons are deployed for bolstering defence of key installations like airports. The Vigilant Eagle takes down aircrafts with direct high frequency microwaves. Bofors HPM Blackout (non-lethal system that blacks out electronics) and EL/M-2080 Green Pine Radar (a

missile guidance system and memory scrambles) are some offensive countermeasures that uses this technology (Nielsen, 1994).

- ***Sonic Weapons.*** These systems employ high-powered sound waves to incapacitate human targets, be it via damaging eardrums or even by vibrating eyeballs to blur vision. They are also used as non-lethal deterrents, as evidenced by the sound cannons used against protestors at the G20 summit in Pittsburgh in 2009. Long Range Acoustic Device (LRAD) is extensively used by ships at sea to stave off pirates as in the case of cruise ship Seabourn Spirit in 2016 (Goodman, 2012).
- ***Kinetic Energy Weapons (EM Rail Guns).*** The EM rail gun uses a magnetic field to launch projectiles rather than utilising the propellant based projectiles. The velocities obtained by the projectiles through EM is as high as 4500 mph to 5600 mph. The rail gun uses the EM force and has the ability to propel a projectile to a range of 125 miles at 7 ½ times the speed of sound. The sheer speed of projectile is lethal to the target upon being hit. However, a single shot of EM rail gun will require upto 06 million amps of current. Development of pulsed power sources (alternators) that can generate such energy and metallurgy of the gun itself are critical issues, which are being addressed at trial levels. Naval EM gun is being extensively trialed by General Atomics for US Navy project. The advent of rail guns will greatly reduce the storage of explosives and flammable materials, which are utilised by a conventional gun whilst increasing the precision and lethality of projectiles (Hawke and Scudder, 1980).

Ethical Exploitation of Drones

The drone strike programme of the United States of America utilises the concept of targeted killings outside the declared war zones. The US has been invoking the international law of the inherent right for self-defence, as provided by the UN Charter. The US has argued that the legitimate use of drone strike on the interpretation of self-defence against terrorist organisations like Al-Qaeda and Taliban, is belligerent to the US, though not located in the country. The US further argues that, precision targeting against specific belligerent leaders whilst acting in self-defence or during an armed conflict is not unlawful and hence does not constitute 'assassination'. It is a known fact that most of the countries do not provide information on their drone programmes and these platforms loiter in the airspace as a continual threat to the populace below. However, the US has always claimed that the drone strike has

killed only militants, however, as a case in point, the Pakistan government and the militants themselves have claimed that victims of drone strike are always civilians (Boyle, 2017).

Conclusion

The development of AI platforms would create an Artificial Life (AL) robot, which would display autonomous capabilities. These AL robots would permit cancellation of entire human factor in a conflict situation or a terror situation as the case may be. The international laws is yet to deliberate a decision on utilising robotic warfare, but exploiting such a warfare is wrong, unfair and irrational. Creating nanoweapons through application of AL robots as smart nanobots can be a potent threat to a security scenario and good order of a populace. The nanobots can be highly destructive towards their capability to breach target security construct through techniques such as swarming and inserting CBRN toxins into populace, livestock and poultry. Usage of nanobots for such utility by antinational elements can deeply impact the machinery of governance, medical and veterinary facilities and psychological wellbeing of people affected. Though the United Nations is progressing with member countries to ban autonomous weapons including nanoweapons, however the progress is much at snail pace. In future, the nations power prowess would balance on its capacity to deliver nanoweapons and thus the power balance would shift from nuclear capability to nanoweapons capability. The concept of moving and expanding the field of conflict from a battlefield is amply possible by using unregulated armed drones. Moreover, humans should have humanitarian laws, legal bindings and accountability of actions for autonomous weapons. The lethal autonomous weapons with advanced AI under human supervision are presently utilised by various countries for defensive purposes. Notwithstanding, increased autonomy, if utilised without human partnership, would create 'centaur warfighters' without the need for human command. It has to be a conscious and deliberate action of the humanity to allow this niche technology to be precise, humane but including the facet of human judgement. Hence, protecting these futuristic improvised weapon delivery systems through land, sea and air from unwarranted usage by anti-national elements and conventional enemy forces, remains a critical and strategical decision for nations.

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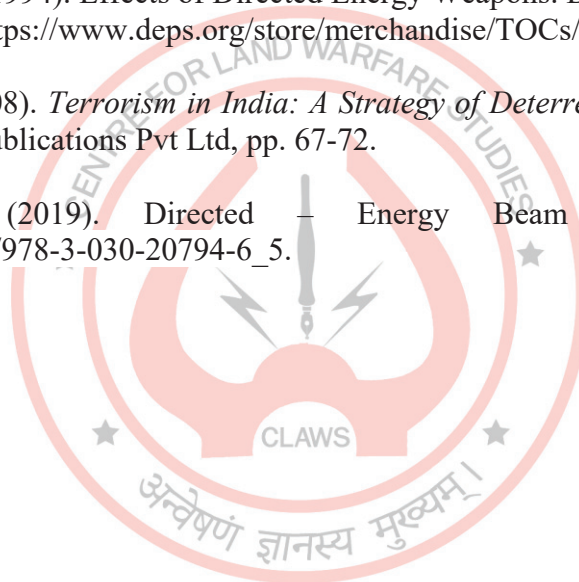
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