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The Future of Warfare is Now: Robots and AI

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The idea of using robots in warfare dates back to the 1940s. From WW2-era German Goliaths and Soviet teletanks to Cold War Unmanned Aerial Vehicles (UAV), we are steadily moving towards a more robotised battlefield. Projects are many, and development is encouraging, but not without its problems: military and ethical questions quickly come to the surface with high costs.

1. The state of the art

As the international landscape shifts and the battlefield changes, so does the nature of warfare. The robotisation of the battlefield will be a revolutionary, albeit complex, change Army Futures Command (AFC), a US ad-hoc detachment, is pioneering development thanks to many projects. Still, they are not alone: in recent years, the Chinese People's Liberation Army finished its Sharp Claw I and II designs, a series of combat and reconnaissance Unmanned Ground Vehicles (UGV). It was much to the surprise of the Indian armed forces when they started deploying them on the mountains of Arunachal Pradesh, a historically contested area with prohibitive altitudes and temperatures. But the Indians themselves are in the race: from the initial work of the Defence Research and Development Organisation (DRDO) on a new line of UGV to UAV research from Hindustan Aeronautics Limited (HAL) and Aeronautical Development Agency (ADA), much progress has been made.

Citing a few projects from AFC, the last few years have been witnessing a constant development, namely the automation of all weapon systems. Intended to improve effectiveness and streamline action on the battlefield, automation interested both the M1299 ERCA and the M-SHORAD, the first a long-range artillery vehicle (of up to 70 km) outfitted with a 23 rounds autoloader (Roque, 2021), the latter a new self-propelling anti-air which autonomously «detects, identifies and tracks air threats» (Leonardo DRS, 2021). Optionally Manned Fighting Vehicles (OMFV) are another big step towards robotisation, with the US army intending to replace its Bradley Armored Fighting Vehicle with this new generation of devices.

2. Military uses

Aside from the automation of ordinary tasks, areas where robots show great potential are dull, dirty or dangerous (DDD) missions, offering safety by reducing human exposure. High-risk operations become less unforgiving, while chemically or radioactively contaminated environments become more accessible, opening new operational scenarios. Accuracy and timeliness are other advantages of robots. For example, it was reported that they could conduct minesweeping missions in a fifth of the time of a human operator, and much better so (Pradhan, 2012). However, the effectiveness does not limit human responsibilities; on the contrary, it increases them: the remote operators will be expected to conduct normal missions using robotic assets, a proposition that presents practical difficulties. Studies showed that adding automated tasks (e.g. remotely controlling the movement of a UGV) to ordinary tasks (e.g. gun control) increases the problem of coordination and worsens human performance. In a 2009 simulation by Chen and Joyner (Chen et al., 2009), operators were asked to hold key points while operating UGV, a task for which it became evident that their target detection and accuracy worsened as they needed to control or even monitor their unmanned vehicle (Barnes et al., 2009).

Reconnaissance and intelligence gathering missions are a classic on the menu. While UAV have historically provided aerial reconnaissance, UGV can significantly bolster ground reconnaissance, as shown by both AFC and Chinese designs. Unmanned Maritime Vehicles (UMV) are another great tool used in fleet exercises, maritime mine sweeping, recovery missions, hydrographical surveys, and anti-submarine warfare. Unmanned Combat Aerial Vehicles (UCAV) are a variation of UAV that became an important tool for conducting clinical strikes. In particular, the MENA region has seen an unprecedented amount of such operations: from American strikes, most notably the one that killed Iranian general Qasem Soleimani, to Turkish drones during the Syrian Civil War and Azeri UACV in the Nagorno-Karabakh insurrection.

A key problem arising throughout development is how little we know about how autonomous robots and AIs behave during unforeseen situations. While humans react to the immediacy of combat in different ways, robots do not have the same behavioural flexibility. This has significant practical consequences: how to define engagement rules? What is an enemy? What if said enemy behaves differently than expected? Based on previous experiences, machine learning is a common answer, but it brings its series of problems, as I will discuss later.

3. Some lessons from development

Aside from military evaluations, the aforementioned experience of AFC helps us to understand a few core principles of robotic development. First, experimentation and prototyping always help, but a key challenge is the speed with which private companies can provide such prototypes. In general, flexibility is preferable for everyone: for companies, where it is not always easy to respect deadlines and processes; for the armed forces, where it's challenging to measure progress and inconvenient to exclude providers from their roster. In fact, as an age-old law of markets, competition works best, reducing both costs and military dependence on single companies, which in the past obliged many armed forces to stick with the same provider. An incremental approach to development is also best suited, with new projects every set number of years, each building upon their predecessors.

An external problem comes from leadership shakeups, which can cripple development and reduce funding. As always, a lack of faith from the political world is an underlying factor; convincing the elites that what is being researched is beneficial or pivotal is an age-old concern. In general, stability is key.

4. Questions for the ethics

Robotic warfare is not a unidimensional topic. Ethical and military questions come into play. First, an evident value of robots and unmanned vehicles is to reduce human casualties by reducing human exposure to dangerous operations, but in the case of combat vehicles, especially UACV, it remains to be debated whether casualties are reduced at all. If that is true for those using the drones, that may not be the case for the rest. In theory, clinical strikes are a more polished form of decapitation strikes, the latter usually being aerial tactical bombardments directed towards political and military high commands. While the former show results by taking out VIP targets more cleanly and selectively, they still lack precision. During operation Haymaker, a U.S. mission in Afghanistan, out of 200 killings, only 35% were actual targets – and in a particular 5-months period of that operation, a staggering 90% of all killed were unintended victims (Scahill, 2015).

Moreover, accidents happen, and sometimes civilians are caught in the crossfire. In 2013, the UN reported that the USA might have violated international human rights law during these operations. The problem was reignited in 2018, when former President Donald J. Trump repealed a law that forced the CIA director to report on drone strikes and the deaths caused by them, thus reducing civilian oversight on the process. It is also true that a quality may become a flaw. With these tools opening previously unimaginable operational scenarios, we might witness strong incentives to conduct more and more strikes in a sort of perpetual low-intensity hybrid warfare.

Second, machine learning, while a great instrument, is still subject to the laws of determinism. Amongst other conclusions, this means that war could become a simple subtraction between one's firepower and what they think the enemy's firing capabilities are. Simpler, but no less deadly. Some go as extremely as suggesting that we could witness a robotic version of the old-age Mutual Assured Destruction, a scenario in which «the last two machines will mutually destroy each other, or only one of them will be left standing, half-burned on the battlefield» (Matei, 2021).

Third, there is another dimension to the problem. In March 2020, a Turkish-manufactured Kargu-2 quadcopter attacked and killed a retreating Libyan soldier supporting the faction guided by general Khalifa Haftar while in autonomous mode. It did so without data connectivity between the operator and the drone, essentially misidentifying its target while still operating autonomously (Zitser, 2021). This sparked an intense debate, with both the UN and Human Rights Watch trying to limit the use of UACV in warfare. Thus, it remains unclear whether robots can be programmed to act following an ethical code in warfare – if so, what such code will entail, and perhaps more interestingly, how it will hold up as soon as shots start firing.

In conclusion, while witnessing a high amount of progress, many variables are still to be discussed. It is safe to say that we may be finding answers to them quite rapidly, given the long way we have come. Contemporary warfare has already entered a new phase, whatever the case may be.

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