The Reality of AI Drones
Are they Overhyped?

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Drones, often referred to as 'dull, dirty and dangerous', are fast becoming crucial to militaries around the world as a force multiplier owing to their ability to perform diverse tasks. The term 'drones' is often used interchangeably with Unmanned Aerial Vehicles (UAVs) and they mostly refer to the same class of aerial devices which can be manually operated or pre-programmed.[1] Military drones are generally employed for varied tasks including surveillance and high-resolution monitoring during conflicts or in a contested environment, but now they are also being used for delivering weapons.

The introduction of Artificial Intelligence (AI) in military systems has been hitting headlines for some time now.[2] States have been building capabilities and systems in this direction. Autonomous drones, in this context, present a lucrative prospect. Drones in general are known for their mobility, ease of deployment, and versatility in varied environments. They have been noted to increase work efficiency and productivity, decrease workload and production costs, and improve accuracy.[3] Irrespective of their mode of operation, whether controlled by a remote control or accessed via a smartphone app, they possess the capability of reaching the remotest areas and difficult terrains while ensuring endurance, compared to humans.

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Evidently, introducing AI in such systems only increases potential efficacy, such as in undertaking repetitive and potentially boring tasks like logistics or delivery. At the same time, it also increases related risks, for instance while deploying autonomous drones to directly engage and take decisions in combat to reduce the sensor-to-shooter timeline. The prospect of eventually shifting control from humans to machines bring forth concerns of moral agency and accountability, among others.

Currently, around 90 countries have military drones for reconnaissance and intelligence missions and at least 38 of them have armed drones.[4] More concerning is the fact that many of these countries are simultaneously involved in the research and development of autonomous drones. The US, for instance, is cognisant of the impact military drones have had on combat in places like Yemen, Pakistan and Afghanistan.[5] Adding autonomous capabilities to the drones would not only further their military capabilities but also provide a strategic advantage. The Pentagon's efforts in AI primarily are part of the military's US$ 2.3 billion science and technology research budget, and revolve around the efforts of the Joint Artificial Intelligence Center (JAIC) in Washington.[6] Additionally, the U.S. Department of Defense had requested for US$ 874 million for artificial intelligence for the year 2022, which does not reflect the total investment of the department in AI.[7] As of now, around 685 projects have been identified where the element of AI is part of the broader programme.[8] For instance, the joint AI center is developing a targeting AI capability called 'Smart Sensor' which is 'a video processing AI prototype that can be fitted on drones and is trained to identify threats and transmit the data back to an analyst'.[9]

Following closely are China and Russia, the other two major players in the field of AI in terms of investment and research. An October 2021 report, published by the Centre for Security and Emerging Technology (CSET) at Georgetown University, highlighted that the People's Liberation Army (PLA) is spending around US$ 1.6 to 2.7 billion on AI research and procurement.[10] Its recent feat includes the launch of the world's first crewless drone carrier that employs AI to navigate autonomously in open waters.[11]

Although the data is a bit nebulous for Russia, reports suggest that the country invested around US$ 168 million in 2021.[12] Statements from the Russian leadership over the past years also indicate how drones are being considered as crucial in new-age warfare.[13] In 2020, President Putin stated that UAVs, as well as robotic systems and automated control

systems, are key to 'determining the outcomes of current and future battles'. Indeed, in Russia, the development of unmanned vehicles has been a significant area for R&D as well as investment. In 2019, the country produced its strategy for 'the Development of AI' through 2030.[14] The document is designed to ensure accelerated development of AI and to conduct research in this area, enhance the availability of information and computing resources for users, as well as to improve training in this area.[15]

Besides the individual efforts of countries, there have also been collaborations among states to accelerate the process while making it cost-effective. One noteworthy collaboration is between China and Russia. In 2020, the Huawei Russian Research Institute opened a lab to 'advance AI and deep learning and to leverage China's financial investments and Russia's talent pool'.[16] The major idea behind the collaboration was to lower the cost of technologies that would benefit countries. However, a side effect of reduced costs is that the rise in exportation would reduce the 'barriers to entry', that is, such technologies could easily be available to non-state actors or sold in black markets, which is again a matter of concern.[17]

Also noteworthy is the research and development of AI drones in the commercial space which would further bring down the cost, but also make the availability of advanced AI drones easier. There are drones available for aerial photography, food and medical delivery and most of these can be bought off the internet. Many of these developments and investments are happening without adequate checks and balances. The US and a few other countries have been working with a series of start-ups to explore the potential terrain of AI drones in the military.[18] Reports had highlighted that Google's AI technology is being used by the US military for its Project Maven to analyse a vast amount of data and detect objects, however, this was later pulled out in 2018 after a series of protests.[19] It indicates the tricky nature of dual-use technologies; what is being developed for use in the civil sector could later find its way to the military sector, which if unregulated could pose serious risks.

But, the question remains, essentially how concerned should we be regarding AI drones? It is worthwhile to note that most drones today operate with some autonomy. For instance, a surveillance drone might be programmed to fly a particular route to pick up significant patterns of a potential target. Employing fully autonomous drones in conflict

scenarios is still a work-in-progress as it would require gaining relevant combat zone training data which is very challenging.

Use of AI Drones in Recent Conflicts

In the ongoing Ukraine–Russia War, drones are playing an important role but probably not the autonomous ones.[20] KUB-BLA made by ZALA Aero[21], owned by Russia, is a small kamikaze drone aircraft that smashes itself into enemy targets and detonates an onboard explosive. This drone employed in the war was proclaimed to have some AI capabilities such as visual identification. Although the drone boasts of the ability of autonomous target identification, it is still nebulous if the drone did operate autonomously in Ukraine. An executive from Rostec, a part of Russia's government-owned defence industrial complex, indicated KUB-BLA to be domestic analogous of Israel's Orbiter 1K drone.[22] This Israeli counterpart has a ground control station where an operator monitors the incoming videos using the sensors of the drone and manually selects the target. This stands true for KUB-BLA as well, wherein the target selection and engagement are undertaken by human operators and not the machine alone.[23]

In March 2022, the Biden administration had stated that they would provide Ukraine with Switchblade, a small US single-use drone that comes equipped with 'explosives, cameras, and a guided system'.[24] This loitering munition comes with some autonomous capabilities but needs an operator to lock the target.[25]

In March 2020, a Turkish Kargu-2 kamikaze drone was used in Libya to mount autonomous attacks on human targets. As per a report by the United Nations Security Council (UNSC), the Kargu-2 struck down retreating logistics and military convoy, 'attack[ing] targets without requiring data connectivity between the operator and the munition'.[26] Although Turkish military sources did confirm its usage in Libya, they denied that the drones operated autonomously to select and hit the target.[27]

Additionally, there were reports suggesting the use of Turkish Bayraktar TB2, a medium altitude long endurance unmanned combat aerial vehicle capable of remotely controlled or autonomous flight operations, in the recent Nagorno–Karabakh conflict, but again the target was selected by a human operator.[28]

Most of the states as well as companies that produce and operate advanced drones have publicised the autonomous characteristics of the

deployed drones, however, in each case, these features have been limited to basic tasks such as flight corrections, manoeuvring or engaging a target identified by a human operator and not autonomously selecting and engaging a target.[29] Enterprises that produce military AI tend to make expansive claims about what the technology can do and often portray them as almost equivalent to a sci-fi movie. However, in reality, these technologies are still in a nascent stage on the battlefield and militaries are going through a phase of experimentation.

Managing Expectations

The current state of affairs raises two potent questions. First, are the proclaimed autonomous capabilities of drones overhyped and more so to create a psychological threat perception? Second, are states cognisant of the dangers that could unfold owing to the black box nature of these autonomous systems? There is no denying the fact that states are investing in drones that display more autonomous features, such as Israel's Harpy[30] or Russian Lancet, both have claimed to possess autonomous capabilities. However, it is pertinent to understand that AI system exists within an AI ecosystem that involves algorithms as well as a huge amount of data which facilitates the algorithms to learn and adequately determine targets in varied environments. Obtaining adequate training data as well as quality data especially for combat zones remains a significant hurdle in many AI development projects. The absence of such data would mean fear of many unknowns such as not being able to effectively differentiate between friendly forces and adversaries and the failure of autonomous systems in a 'complex and unpredictable manner'. Therefore, it is vital to set more realistic expectations about what AI can do in a conflict zone.

Meanwhile the guardrails for such developments, that is, ethics and accountability, still remain on the backburner. Nation states are guided by their own self-interest of possessing stronger offensive forces and winning the arms race. This brings to forth the fact that treaties on nuclear weapons proliferation and ban only came into discussion when nations observed the threat and destruction caused by nuclear weapons in Hiroshima and Nagasaki.

So, does it mean that we can expect concrete actions only when an AI disaster unfolds due to a wrong decision taken by machines? Maybe or maybe not. Many nations that are actively engaged in the research and development of AI systems, have not yet formulated policies or military doctrines. As per reports, there is currently 'no international

consensus governing how autonomous technology can be developed or weaponised'.[31] To add to this mix, is the threat of rogue states and non-state actors owning these capabilities without the straitjacket of ethics and morality, especially when the commercial drone industry is booming and many such technologies maybe available as commercial-off-the-shelf (COTS). Contrarily, in 2015, researchers like Stephen Hawking and Elon Musk signed an open letter on AI calling for research on its societal impact. In 2018, Google pulled out of Project Maven following protests and outrage of employees.[32] In 2019, Pentagon announced hiring an ethicist that reflects an acknowledgment that bringing intelligent machines would mean answering some tough questions on the chain of accountability and safeguarding of human rights.[33] High-profile AI researchers like Yoshua Bengio (winner of the Turing Prize), Demis Hassabis, Shane Legg, and Mustafa Suleyman, the founders of leading AI lab DeepMind, have also pledged not to work on lethal AI.[34]

Conclusion

The current status of AI development is that the technology is 'purpose-built, problem specific and context driven'.[35] It operates effectively on 'discrete tasks over well-bounded problems'. Even in the most well-known defence applications, like drone video analysis, the technical maturity and capability of AI currently present a visible fear of unknowns and an unacceptable risk of relying completely on machines. To operate in a fully autonomous mode would also mean being able to access humongous quality training data and volumes of labelled datasets.

Although the promise of autonomous machines may sound enticing, it is vital to manage expectations. Often enterprises tend to make grand promises of developing AI drones with matrix-like capabilities which often turn out to be damp squib as they are unable to work as advertised, and conflict zones are perhaps the most technically challenging areas in which to deploy AI systems owing to the limited availability of relevant training data, which may lead to failure in a complex and unpredictable manner.[36]

This development also entails the need to have effective guardrails of ethics and regulations on the current developments in AI drones. Even in the recent Nagorno–Karabakh conflict or the ongoing war between Ukraine and Russia, drones have been noted to play a vital role which in future may have far more advanced features and capabilities.

We are at a peculiar junction wherein it is not only important to talk about ethics and governance but also about managing expectations regarding the hype surrounding AI within military force related systems. Introduction of AI would not mean the emergence of an army akin to sci-fi movies, but rather a well-calibrated approach to enhance human capabilities.

Notes

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