Report by Mark Bruno, Dyami Contributing Analyst – August 2021

Opening Pandora's box in Automated Weapons Systems:

The Growing Industry of Loitering Munitions

In the Fall of 2020, a full scale state-on-state conflict unfolded in Nagorno-Karabakh (also known as Artsakh), a contested region between Armenia and Azerbaijan. After six weeks, a ceasefire was called, and Armenia ceded several areas to Azerbaijan. The utilization of drone technologies, including an increased reliance on so-called "Loitering Munitions," was considered one of the critical factors in Azerbaijan's victory. Occasionally referred to as a "kamikaze drone", this specific class of unmanned aerial vehicle demands the world's attention as they become increasingly affordable and sophisticated, while demonstrably altering the outcome of terrestrial engagements. With the conflict between the two nations threatening to spark again, Loitering Munitions could make another appearance.

Satellite Image of a T-72, destroyed by a Loitering Munition, published by Oryx

It May Seem Like Science Fiction

Imagine a battlefield wherein whole swarms composed of hundreds of independently-thinking and precision-guided explosives are just waiting to drop on combatants and vehicles from overhead. Most of them are only slightly visible from the ground (if at all), but are still capable of destroying the heaviest armor most ground forces can bring to bear. Their automated systems have them programmed to attack quickly, quietly, and accurately at anything below that emits an electronic signal. They fly too low for traditional air defenses to engage with them, and yet appear silently and too swiftly to effectively counter them with small arms. This nightmare battlespace, a coalescence of innovations in unmanned flight and artificial intelligence, is very close to the reality facing contemporary ground forces. The technology is already here, embodied in a little-discussed class of drone weaponry known as the Loitering Munition.

What is a Loitering Munition?

Often, the term “drone warfare" conjures images of the Predator or Reaper series of unmanned aircraft favored by the United States in places like Pakistan, Yemen, or Somalia where they’ve targeted suspected terrorists. Reapers are typically remote-operated, are nearly as large as a conventional aircraft, and are relatively expensive. They are depicted as weapons of assassination and precision. The legitimacy of their use in conflict is still a matter of intense debate. However, with the rise of Loitering Munitions, this image of drone warfare is already starting to appear dated.

A Loitering Munition is a weapon system that fills in a tactical niche between the traditional conception of drone weaponry and a guided missile. Often called “kamikaze” or “suicide” drones in the media, Loitering Munitions can be either autonomously or remotely piloted flying vehicles that collide with ground-based targets and are themselves the weapon (self-destructing on impact). In aviation, “loitering” is the word used to describe aircraft hovering over a small area in order to provide quick reaction times for close-support. This need for continual replacement incentivizes manufacturers to build them cheaply and in large numbers.

The concept is remarkably simple, and with expendability as part of the design, they can appear primitive, but this is deceptive. Loitering Munitions are reliant on extremely sophisticated cameras and sensors that simply weren’t cost effective only a few years ago. These technologies enable a human operator on the ground, or in an armored vehicle platform, to pilot the Loitering Munition in any weather or lighting conditions.

Of even more concern is their implementation of automated and algorithmic flight, formation, and decision-making softwares. These allow for ever more complex and widespread adoption of the weapons, and indicates that they’ll be even further divorced from human hands in the future. Organizations such as the International Committee of the Red Cross have sounded the alarm over this sort of automation in warfare for several years.

Affordable, Sophisticated, and Effective

The low cost and learning curve for these weapons has propelled rapid adoption in several countries that may have previously been unable to invest in state-of-the-art air assets. While Israel has historically been cited as the developer of affordable Loitering Munitions systems, more recently, Ukraine and Poland have come out as innovators in this space.

Image of the ST-35 courtesy of Athlon Avia

Ukraine-based weapons developers CDET and Athlon Avia have been showcasing their extremely versatile RAM and somewhat more powerful ST-35 “Silent Thunder” Loitering Munitions platforms at various international events. Athlon Avia claims that the ST-35 can launch, loiter, ascertain targets, approach, and dive for an attack without the input of a human operator. Both systems offer anti-tank, fragmentation, and incendiary options for warheads.

Poland’s WB Group has developed their own system known as WARMATE. WARMATE can be deployed and operated by a single soldier, and is incredibly hard to detect. Though faster to deploy (estimated ten minutes), it carries a smaller payload than its Ukrainian

counterparts. It is also developed for compatibility with automated systems.

Poland's WB Group showcasing WARMATE

Massive improvements continue to be researched for the software utilized by these automated systems. These updates can impact the lethality and complexity of attacks, even by legacy units. Recent research in swarm information sharing has shown that Loitering Munitions will only continue to increase in sophistication.

Azerbaijan's recent victories over Armenia demonstrated the effectiveness of Loitering Munitions in the context of a full-scale, state-on-state conflict. Many of these drones were sold to them by Israel, and Azerbaijan is now licensed to manufacture their own derivative variations. As the uneasy ceasefire continues to be tested, accurate numbers of material loss are elusive. That said, open source intelligence efforts continue to chronicle the effectiveness of the Azeri drone campaign, particularly their use of the Turkish Bayraktar TB2 UAV and various Loitering Munitions. This conflict showed that traditional infantry tactics and defenses are extremely vulnerable to these weapons systems.

Having Opened Pandora's Box

Participants in conflict, international regulators, and informed consumers of media have to understand the massive implications Loitering Munitions are having on 21st century warfare. If unregulated, their automated systems will validate many fears about the use of artificial intelligence in combat (and in many ways already are). Many of the proposed tactical countermeasures are expensive, and seem to only contribute to the escalation of the sophistication of these technologies. Some of these suggestions include new implementations of laser and microwave-based weaponry, automated counter-munitions, and other obvious proliferation rabbit holes.

Legal recourse must be implemented sooner rather than later in regards to Loitering Munitions. As more states (and non-state actors) find that they're able to facilitate their manufacture and deployment, there is a sense that it will only get harder to turn away from this troubling direction.

Recommendations by the Netherlands-based organization Pax for Peace, highlight the urgency of reaching out to these new actors in drone production, as most are not participants in existing arms trade agreements and treaties. A regulatory framework, including a re-examining of the widely-accepted definition of what makes a platform a "drone", and a discussion of why these technologies are so enticing to the actors moving on them, must be brought to the scrutiny of regulatory bodies and media discourse. The safety of civilian populations, the direction in which we take the development of artificial intelligence technologies, and the integrity of human rights in armed conflict will be adversely affected by a failure to recognize the changes in warfare embodied in Loitering Munitions.

About the author:

Mark Bruno

Mark Bruno is a noncommissioned officer in the United States military, where he serves as a Combat Medic and a Public Affairs Representative. He is currently a Master's Student of Information Assurance at the University of Maryland's Global Campus, and holds a Bachelor of Science in Communication. Aspiring to a career in Conflict Journalism, his areas of security interest are in military medicine, information security, and weapons technology.

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