AI-Enabled Kamikaze Drones Start Killing Human Soldiers; Ukrainian, Russian Troops “Bear The Brunt” Of New Tech

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Nearly three years ago, the war in Ukraine began as a conflict between Ukrainian and Russian soldiers. Today, it has evolved into a battle involving humans and robots on both sides.

This landmark shift to robotic warfare – driven by the recent deployment of AI-enabled kamikaze drones equipped with

machine vision, which can autonomously identify and attack targets – has largely gone unnoticed. Perhaps this is due to fatigue from the relentless stream of reports on drone warfare and technological advancements.

Evolution Of Drone Intelligence

When the war started, loitering kamikaze drones were considered the ultimate battlefield weapons. They could fly to the target area using a combination of INS (Inertial Navigation System) and SATNAV (Satellite navigation), loiter over the target area to acquire an adversary target using their optical sensor, and when commanded, execute a precision attack or relay target coordinates for an artillery or missile attack.

Soon after the start of the war, the adversaries realized that cheap, widely available quadcopter drones could be configured as loitering ammunition using their FPV (First Pilot View) mode of control and navigation.

Using FPV, the drones could be manually flown to their target by their operators, thereby eliminating the need to equip

the drone with expensive and bulky INS and SATNAV systems.

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FPV drones use LoS (line of sight) RF (radio frequency) communication links, which restricts their range. Using a communication relay to extend range does not work beyond a point because the range of the drones is also restricted by the limited storage capacity of their battery.

AI & Machine Vision

As the war continued, drone technology progressed rapidly as the two adversaries sought to gain technical advantage. Drones equipped with AI software, computing horsepower and machine vision were introduced, initially to identify targets.

Later, AI and machine vision, along with autonomous flight capability, started to be used to cut through EW (electronic warfare) and still strike the intended target or record its coordinates.

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In comms and GPS-denied environments, AI-enabled autonomous drones can accurately fix their ground positions through machine vision. They can also identify their targets. If required, they can then move out of the jamming area and relay target coordinates.

Two drones introduced into the battlefield recently, one by Ukraine and one by Russia, how AI and machine vision are changing the way we think about war.

V-BAT

Ukraine field tested a large AI-enabled kamikaze drone called V-BAT in May 2024.

Shield AI, the US defense technology company that developed the drone, recently announced it has "started training with Ukraine's Unmanned Systems Forces (USF) to prepare Ukrainian warfighters on operations with

V-BAT, the vertical take-off and landing (VTOL) uncrewed aerial system (UAS) proven in electronic warfare environments.”

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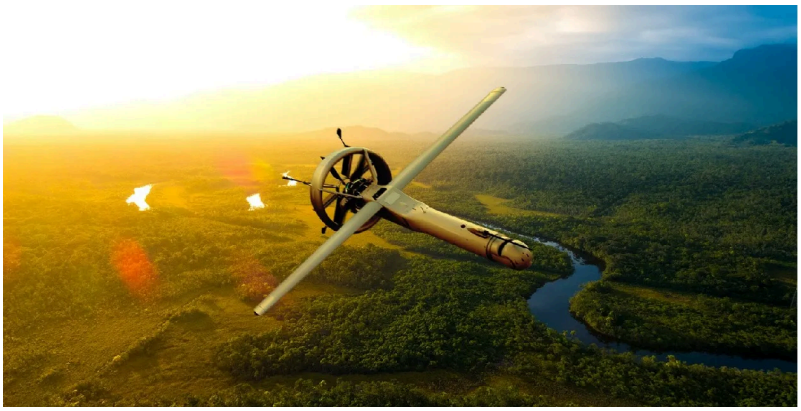
The V-BAT, which goes by the name MQ-35 in the US, can complete its mission, start to finish without an operator in the loop. A single operator can control a minimum of 5 drones, aircraft flight paths are not plotted by humans, they are always generated autonomously in real time.

It has a 500 km range. It can loiter over the target area for 10 hours in horizontal mode. In contrast, kamikaze drones currently available with Ukrainian and Russian forces cannot fly beyond 100 km and have a loiter time of 10 to 15 mins.

The V-BAT has a payload capacity of 11.3 kg and a service ceiling of 6 km.

The sensor fit comprises EO / mid-wave infrared (MWIR) cameras for high-

resolution imaging across diverse lighting conditions.



V-BAT A.I. Piloted Drone

You can find a more detailed analysis of the drone here.

The drone is small enough to fit in an SUV. More importantly, its vertical takeoff and landing capability gives the Ukrainians scoot and shoot capability. Also, the ability to launch from ships and austere terrain.

Recently, Ukrainian forces destroyed a Russian Pantsir AD system hundreds of kilometers away in Crimea using a kamikaze drone launched from a drone boat. It is believed that the drone used was V-BAT.

The Shields AI press release states, “Most recently, V-BAT showcased its versatility during maritime operations in

the Black Sea, underscoring its value for long-range missions across both land and sea.”

V-BAT features a single Suter TOA 288 two-cylinder engine that powers a ducted-fan. The duct increases thrust by 80%+ at equivalent engine power, enabling take-off and landing with a single power plan.

Russian Ovat-S

Russian AI and machine vision based drone capability is much more modest than Ukraine’s.

Russia’s Ovat-S drone, often referred to as “Ovod” or “Gadfly” in English, is a First Person View (FPV) kamikaze drone developed to address the urgent requirements of the Russian forces.

The drone features an onboard computer and uses neural network-based AI and machine vision to identify a target. If commanded to attack the target, the drone homes on it using machine vision.

Its machine vision tracking and homing capability allow it to operate under GPS denial and control channel jamming, as

well as when radio visibility is degraded due to low altitudes.

File Image: Drone FPV

The drone is equipped with a new, inexpensive drone ammunition shell.

The drone has a remote detonation and self-destruction function. The combat payload weight of the drone is approximately 3.5 kg. The flight range is about 8 km. It can cruise at speeds of 150 to 180 kph, flying for 8 to 10 mins.

The Ovat-S has evolved since it was first introduced, based on battlefield usage. Improvements incorporated include greater payload and integration of thermal imaging cameras. Early deployments of the drone were noted in combat zones like Avdeevka in the Donetsk People’s Republic.

Cost Comparison

Despite its significant combat capabilities, the Ovat-S is relatively cheap to manufacture. The cost of the drone is reported to be between 40,000 to 69,000 rubles, approximately $410 to $710 USD.

The exact unit cost of Shield AI’s V-BAT drone is not publicly disclosed. However, it’s unlikely to be below $50,000 USD based on the following contracts.

In July 2024, the U.S. Coast Guard awarded Shield AI a $198 million contract to provide Intelligence, Surveillance, and Reconnaissance (ISR) services using the V-BAT unmanned aircraft system.

In November 2024, Shield AI cut a deal to have JSW Defense and Aerospace make V-BAT drones in India. The deal included a $90 million investment for technology transfer, the establishment of a manufacturing facility, and compliance programs to support local and international production demands.

Conclusion

The Russian Ovat-S drone’s extent of autonomy is significant. If the comm link fails after the operator confirms the target, the drone continues its attack.

It’s not clear if the V-BAT similarly continues its attack.

The two drones represent significant milestones in AI-based warfare.

With no end in sight to the war and Ukraine already short of soldiers, robotic participation in the war will only increase as the years go by.

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