

INTRODUCTION OF KARRAR COMBAT DRONE FOR BOLSTERING IRANIAN AIR DEFENCE

DINESH KUMAR PANDEY

Iran, a nation always looking forward to innovatively arming its forces, has lately demonstrated new combat drones that have been equipped with missiles capable of destroying other aircraft. These combat drones, which are known as 'Karrar' (striker in Farsi) and have long-range kill capabilities, were manufactured in Iran. The Karrar combat drone is the first Iranian jet drone. These units have been outfitted with a specialised missile known as the Majid, which can destroy targets positioned up to 8 km away. These combat drones will be employed to safeguard Iran's borders. They can perform the same functions as fighter jets but at a lesser cost.¹

Professor **Dinesh Kumar Pandey** is a Senior Fellow at the Centre for Air Power Studies, New Delhi.

1. "New Drones Delivered to Iran's Army Have Attack, Reconnaissance, and Interception Capabilities", The Memri TV, January 23, 2024, <https://www.memri.org/tv/new-drones-delivered-iran-army-attack-recon-interception-karrar-arash-ababil-majid-almas/>. Accessed on April 3, 2024.

COMPLEX THREAT PERCEPTIONS

There is an extensive degree of instability in the Middle East, and Iran has conflicted with several countries, notably Israel, for a very long time. Israel has carried out air strikes in Syria to attack Iranian installations, while Iran is known to sponsor militant organisations that are seen to be a threat to Israel. Increasing the strength of the Iranian air defences may be considered a deterrent against such assaults in the future. Such a tense environment is a point of concern for the rest of the world. Iran's development of military technology is significant to the country, and investing in air defence systems demonstrates a dedication to self-sufficiency.

There are several other complexities to the geopolitical landscape in the Middle East. The unveiling of the new weaponry is taking place at a time when regional tensions are at an all-time high due to the conflict between Israel and Hamas, which Tehran supports. Iran praised Hamas for its unexpected attack on October 7, 2023, but denied any involvement in it. Meanwhile, terrorist groups supported by Tehran in Syria, Lebanon, Iraq, and Yemen have been intensifying their attacks on the United States and anti-*jihadi* coalition troops that have been sent to Iraq and Syria.²

In response to the Houthis' ongoing attacks on commercial shipping, the United States of America and the United Kingdom have carried out multiple operations against the Houthis, who are located in Yemen. The Houthis are supported by Iran. The Houthis have claimed that their strikes in the Red Sea are being carried out as a show of solidarity with the Palestinians of Gaza.

Due to the uncertain geopolitical situation in the Middle East, Iran's desire to bolster its air defences may shift over several years. The precise nature of the threat most likely to impact Iran cannot be ascertained. Some alternative possibilities exist even though Israel is a serious worry. The United States plays a crucial role in the region and has a significant military presence. The escalating tensions could potentially prompt Iran to fortify its air defence capabilities.

2. "Iran Unveils Air Defense Systems as Middle East Tensions Soar", The VOA, February 19, 2024, <https://www.voanews.com/a/iran-unveils-air-defense-systems-as-middle-east-tensions-soar/7494108.html>. Accessed on April 3, 2024.

The nuclear programme that Iran is working on is a significant source of conflict. Despite Iran's insistence that its programme is for peaceful purposes, the West has a strong suspicion that Iran is working towards the development of nuclear weapons. Iran's nuclear programme has faced severe criticism from Israel. Prime Minister Benjamin Netanyahu made an appeal in 2023 for Iran to be confronted with a "credible military threat" in order to prevent the country from generating nuclear weapons. It is believed that if Iran were to have a robust air defence network, it would be more difficult for other nations to take military action on Iranian nuclear sites.

IRAN BOLSTERING ITS AIR DEFENCE

The Iranian Air Force, responsible for all air defence operations, primarily depends on aircraft-based air defence operations. The United States Air Defence Doctrine has significantly influenced it. Due to the decline in the air force network, the focus turned towards ground-based air defence systems. However, without a functional and unified air defence network, the only feasible option was to defend specific strategic points. The acquisition of 30 improved HAWK firing units significantly strengthened the Iranian air defence, which relied on them as the primary defence system until the 1990s. These units are still in service today, even as Iran develops and deploys its claimed 'indigenous' missile systems.³

In a significant development in 2008, the Iranian Air Defence Force was established as an independent division of the armed forces, distinct from the Islamic Republic of Iran Air Force. Its primary responsibility is to oversee and operate all land-based air defence systems, marking a new phase in the Iranian military's air defence operations.

A study published in 2017 in the quarterly journal *Strategic Defence Studies* by the Supreme National Defence University of Iran highlighted 15 significant vulnerabilities of the Iranian air defence system in the event of an enemy's initial attack. Although

3. Mandeep Singh, "Iranian Air Defences", *Indian Defence Review*, September 18, 2024, <https://www.indiandefencereview.com/spotlights/iranian-air-defences/>. Accessed on April 12, 2024.

Iran has deployed modern air defence systems to address some of these threats, many still pose a viable risk.⁴ Iran is in the process of reinforcing its air defence network. In addition to the Karrar combat drones, various other technological weapons are being developed. February 2004 saw the appearance of two systems developed by the Ministry of Defence: the Arman anti-ballistic missile system and the Azarakhsh low-altitude air defence system. Iran has also unveiled its first hypersonic ballistic missile, which was produced in the country and named Fattah. It has a range of 1,400 km and was exhibited in June 2023. The capabilities of the Islamic Republic of Iran to defend itself against air attacks will improve significantly as a result of the introduction of new equipment into the country's strategic defence network.⁵

The deployment of Iran's formidable Karrar⁶ combat drones, armed with air-to-air missiles, is a significant move in fortifying the nation's air defences. The decision to station hundreds of these drones along the borders, as announced by the head of the Iranian Army, has raised concerns among several nations, notably the United States of America and Israel, due to the potential strategic implications.⁷ As reported by the state media, Iran has bolstered its air defence capabilities by including combat drones armed with air-to-air missiles.

The Iranian military displayed these combat drones during a ceremony at the Khatam Al-Anbia Air Defence Academy in Tehran, which was telecast. This follows the recent presentation of the Fattah-2 ballistic missile, which boasts of an upgraded warhead and a hypersonic glide pod.

4. Ibid.

5. AFP, "Iran Unveils Air Defense Systems as Middle East Tensions Soar", *The Arab News*, February 17, 2024, <https://www.arabnews.com/node/2461551/middle-east>. Accessed on April 3, 2024.

6. Heena Sharma, "Iran Unveils Advanced Karrar Combat Drones Armed with Majid Air-to-Air Missiles to be Used Along the Border", *WION*, December 10, 2023, <https://www.wionews.com/middle-east/iran-unveils-advanced-karrar-combat-drones-armed-with-majid-air-to-air-missiles-to-be-used-along-border-668190>. Accessed on December 16, 2023.

7. "Iran's 'Karar Warning' For Israel; New Drones Equipped With Majid Missiles Unveiled", *The Hindustan Times*, December 11, 2023, <https://www.hindustantimes.com/videos/irans-karar-warning-for-israel-new-drones-equipped-with-majid-missiles-unveiled-details-101702317477014.html>. Accessed on December 16, 2023.

General Abdolrahim Mousavi, the commander-in-chief of Iran's army, was reported by IRNA as saying that Iran's militarisation would cause the enemies to rethink their strategies. The Karrar interceptor combat drone introduced a decade ago now showcases the capability to carry a thermal missile, boasting of an impressive range. This self-sufficient advancement is a testament to Iran's commitment to its military capabilities. At the Tehran military event, the combat drones were displayed, and the commander of Iran's army stated that Iran's military has been working on upgrading its capabilities for some time now. The country has even developed a new drone known as the Mohajer-10, which can travel up to 2,000 km.⁸

General Mousavi emphasised the effectiveness of the operational testing carried out during military drills. "The [Iranian] Army fulfils its requirements by collaborating with scientists from the Ministry of Industry, Mines and Trade, and knowledge-based cores," stated Mousavi, emphasising the significance of bolstering defence capabilities all along the borders. Brigadier General Alireza Sabahifard, the Iranian Army's Air Defence Force commander, has hailed the Karrar combat drone as a remarkable accomplishment. He commends the tireless research and scientific endeavours of the country's young minds that led to this significant achievement.⁹

A thermal missile known as the "Majid" with a range of 8 km and "made entirely in Iran" was fitted to the first iteration of the Karrar interceptor combat drone, unveiled in 2010. However, Unmanned Aerial Vehicle (UAV) Karrar drones began to be developed by Iranian aerospace technology experts in 2008. The Unmanned Combat Aerial Vehicle (UCAV) Karrar is outfitted with a turbojet engine of the brand Toloue-4 (it can also be equipped with an engine of the brand Toloue-5), which has traction of 3.7 kN (Kilonewton). This gives the drone the potential to accelerate its movement to a high speed, which can reach 900 km per hour. This satisfies all of the goals associated

-
8. Seth J. Frantzman, "Iran Claims to Have Armed its Karar Drones with Missiles", *The Jerusalem Post*, December 10, 2023, <https://www.fdd.org/analysis/oped/2023/12/10/iran-claims-to-have-armed-its-karar-drones-with-missiles/>. Accessed on March 27, 2024.
 9. "Iran Unveils Advanced Karrar Combat Drones, Boasts Enhanced Border Security", *The Hello Scholar*, December 13, 2023, <https://news.helloscholar.in/iran-unveils-advanced-karrar-combat-drones-boasts-enhanced-border-security/>. Accessed on April 12, 2024.

with using drones. The device has a maximum flight range of 400 km. The Karrar combat drone can be utilised for a variety of tasks related to the exploration of land, air, and sea, and can serve as a drone target for testing new weapon systems. It can also function as a fully functional combat unit since it is capable of mounting and releasing bombs and missiles.¹⁰

The Karrar design's origins may be traced back to the BQM-126A target drone, which was created by the American corporation Beechcraft in the 1970s. Similar to the Iranian unmanned aircraft, the BQM-126 utilised a disposable turbojet engine that generated around 4 kN of thrust. Whether the Karrar combat drone is a "one way only" cruise missile or an unmanned aerial vehicle (used as a reusable asset?), the Karrar could reasonably and successfully complete both objectives because it is based on a target drone. With more advanced flight controls already available to the Iranians with their UAVs and anti-ship missiles, the Karrar could 'improvise' with evasive manoeuvring to evade potential threats, which are typical characteristics of a cruise missile. However, unlike a conventional UAV, it is not designed to operate with real-time, man-in-the-loop operations. Instead, it is most likely to fly a pre-programmed mission. After purchasing the Kh-55 missiles from Ukraine, the Iranians already had access to cruise missile technology. The Karrar combat drone is an example of such technology.¹¹

The Karrar combat drone can be outfitted with surveillance cameras in addition to the radar installation. It is also equipped with an electro-optical and infrared camera, both of which contribute to enhancing the efficiency of the combat drone's operating capabilities. Karrar has dimensions of 4 m in length, a wingspan of 3.4 m, a height of 0.8 m, and a maximum take-off weight of 420 kg. Operating at a cruising speed of 700 km/h, this aircraft boasts of an impressive maximum flight speed of 900 km/h. It can cover a maximum distance

10. "Karrar: Specifications", *Avia.Pro*, July 23, 2016, <https://avia-pro.net/blog/karrar-tehnicheskie-harakteristiki-foto>. Accessed on December 16, 2023.

11. "Karrar Iran's New Jet-Powered Recce and Attack Drone", *The Defense-Update*, August 24, 2010, https://defense-update.com/20100824_karrar_jet_powered_drone.html. Accessed on April 6, 2023.

of 1,000 km and reach a height of 9,000 m. Equipped with a turbojet engine, specifically the Toloue-4, it generates a power of 3.7 kN.¹²

In contrast to a cruise missile, the Karrar appears to possess a distinctive ability to transport comparatively weighty weapons attached beneath the wings or on the centreline. However, it can be expected that using such weapons would significantly decrease its operational range. In addition to deep reconnaissance missions, the combat drone has the potential to be utilised for two offensive operations: extended-range anti-ship or missile-defence suppression. Combat drone systems like the Karrar can be deployed from the ground or an airborne transport plane. The drone's range could be expanded even more through aerial delivery by utilising transport aircraft like the C-130, P-3, or Il-76 to launch it from the reinforced underwing pylons.¹³

The nation also needs to possess the appropriate radars to assist in detecting and possibly directing drones. There is a lack of clarity regarding how the drone would fly to discharge its missile and intercept its target. In addition, it is not apparent how this will improve Iran's existing air defences, such as the 3rd Khordad system.¹⁴

IRANIAN OBJECTIVES OF DRONE EXPLOITATION

The technological and industrial basis of the Iranian military has compiled a massive database that was collected through military operations. The Iranian drone design demonstrates significant traces of influence from established participants in the drone development sphere, including inspiration from global leaders. To further upgrade its drone warfare weapons, Iran possesses a sophisticated defensive ecosystem that is able to make use of the information it has gathered from its operations in Ukraine. Such contributions are extremely valuable for the operation of vital military programmes that have the potential to enhance Iran's capabilities in drone warfare. Iran has benefited from the drone warfare that has been taking place in the confrontation between Russia and Ukraine. Iranian advancements

12. Ibid.

13. Ibid.

14. Frantzman, n. 8.

in the field of drone warfare have been among the most significant accomplishments of the country during the conflict.¹⁵

Drones that are based on Iranian designs are being utilised in a number of nations, including Sudan, Syria, and Ukraine. Therefore, Iran's drone technology is having a significant impact on conflicts worldwide. These unmanned aerial vehicles, such as the Zagal-3, which is based on Iran's Ababil model, are getting increasingly sophisticated and are being utilised by militaries and militias all over the world. Iran is able to project power and influence far beyond its boundaries because of its drone industry, which is targeted by sanctions, and has evolved ingenious techniques to avoid them. This sector is a vital component of Iran's military strategy.¹⁶

Iran is becoming a formidable arms dealer with the ability to transform the nature of conflict worldwide. Thanks to Iran's drone diplomacy, foreign revenue is generated to fuel the country's military sector, strategic alliances are being established, and Iran is becoming a formidable arms dealer. Iran's expertise in drone warfare, which includes low-tech tactics, poses serious emerging dangers to the stability of the Middle East.¹⁷

Iran's drone design is continuously undergoing significant developments in several ways. More dangerous drones are being designed, such as the Shahed-136, a "kamikaze" drone intended to overwhelm defences and directly hit targets. Capabilities that have been improved include improved precision for hitting targets even in challenging weather conditions. Newer generation drones have these capabilities. The design is also evolving aerodynamically. The delta-wing design, which is seen in the Shahed-136, is currently undergoing enhancements. Countries such as Russia are working

-
15. Farzin Nadimi, "Iran-Syria Air Defense Pact Could Disrupt Allied Operations", The Washington Institute, July 24, 2020, <https://www.washingtoninstitute.org/policy-analysis/iran-syria-air-defense-pact-could-disrupt-allied-operations>. Accessed on April 12, 2024.
 16. Peter Waldman, Sheridan Prasso and Simon Marks, "Iran's Better, Stealthier Drones are Remaking Global Warfare", *The Economic Times*, April 9, 2024, <https://economictimes.indiatimes.com/news/defence/irans-better-stealthier-drones-are-remaking-global-warfare/articleshow/109158989.cms?from=mdr>. Accessed on April 9, 2024.
 17. Ibid.

with India to expand the aircraft's range and possibly incorporate improved navigation systems.¹⁸

Iran claims that different kinds of Karrar drones, such as targets for defence systems, attack drones, and air interceptor drones have been created and constructed. These combat drones can fly at an altitude ranging from 25,000 to 40,000 ft, depending on the type of operation they are undertaking. An additional feature of the drone is its capability to launch a Kowsar anti-ship cruise missile approximately 25 km away from a naval target. The public displays clearly indicate that the Karrar (strike) UCAV bomber, reconnaissance drone, and potential attack Submarine-Launched Cruise Missile (SLCM) is a near identical primary copy of a South African (Denel Aerospace Systems) Kentron-designed HTD -1 Skua high-speed target drone. However, it also has some modification adaptations from the Russian TU-143 Reis VR-3 reconnaissance drone and potential offensive cruise missile.¹⁹

The Karrar possesses the exceptional capacity to carry comparatively massive armaments slung beneath its wings or on the centreline. Nevertheless, it may be deduced that the inclusion of these missiles would significantly decrease its operational range. In addition to conducting deep reconnaissance missions, the drone could be utilised for offensive tasks, like extended-range anti-ship operations and missile defence suppression. The drone's range may be enhanced through airborne delivery by employing transport aircraft like the C-130, P-3, or Il-76. These aircraft would launch the Karrars from reinforced underwing pylons.²⁰

In contrast to the drone defences and capabilities that are already in place with the Iranian Revolutionary Guard Corps (IRGC), the new capacity, which was developed expressly for Iran's official air force, carries a huge strategic significance. Although Iran's choice to equip the Karrar combat drone with missiles is primarily motivated by the need to save costs, it is a strategic move that highlights the

18. AFP, "Iran Displays Missile Capability Amid Gaza War", *The Economic Times*, January 19, 2024, <https://economictimes.indiatimes.com/news/defence/iran-displays-missile-capability-amid-gaza-war/articleshow/106993453.cms?from=mdr>. Accessed on April 9, 2024.

19. John Pike, "Karrar - Reconnaissance/Strike Drone", *The Global Security.org*, February 12, 2024, <https://www.globalsecurity.org/wmd/world/iran/karrar.htm>. Accessed on April 11, 2024.

20. Ibid.

inventive approach of the government in the development of military technology. The new capability is far more cost-effective than manned combat aircraft. The fall in price can be attributed to the fact that Iran's actual air force is getting older, and Iran appears to be aware that it is not capable of carrying out the mission at hand. In general, Iran is facing significant challenges in its efforts to modernise its air force despite looking to Russia for new jets.

Tasnim News has reported that the combat drone is capable of tracking targets. As reported by *Tasnim News*, the Karrar combat drone, which was equipped with the Majid missile, was able to effectively participate in the drone drill that was conducted by the army in October 2023.²¹ Although initially thought to be a redesign of a target drone used in the Western world, the Karrar combat drone possesses an intriguing platform for missiles. The manner in which it returns to base is not known. Additionally, the combat drone's design is more reminiscent of a cruise missile than a drone.²²

IMPLICATIONS FOR INDIA

The extensive spread of Iran's military arsenal has raised apprehensions among several nations. Notably, the United States and Israel, recognised as opponents of the Islamic Republic, have expressed their apprehensions over Iran's continuous advancement of its military capacities, which originated in the 1980s during its prolonged struggle with Iraq. The United States of America and Israel have expressed concern over this matter, and have imposed sanctions on Iran due to its drone programme. Iran is also suspected of providing drones to its friends in the region such as Hezbollah in Lebanon and the Houthi rebels in Yemen. In the conflict that took place in Ukraine, Russia went so far as to employ these drones. Israel, and Hamas, a party that is funded by Iran, are currently engaged in a fight in the Gaza Strip, and news about the drones comes at a time when the conflict is intensifying.

21. "Iran Unveils New Air Defence Missile System", *The Tehran Times*, June 10, 2019, p.2, <https://media.mehrnews.com/d/2019/06/09/0/3149345.pdf>. Accessed on April 11, 2024.

22. Ibid.

Iran's continuous supply of assistance, along with accusations of supplying drones to other factions in the Middle East, notably the Lebanese Shiite party Hezbollah and the Houthis rebels in Yemen, has led to an increasingly complex situation. Iran provides backing to the Palestinian militant group Hamas, which has been engaged in a conflict with Israel since October 2023 after it carried out a lethal attack on Israel.

Tehran has been accused by Kyiv and its Western allies of supplying Russia with unmanned aerial vehicles (drones) to be deployed in the conflict in Ukraine, an allegation that Tehran refutes. The Western nations, however, have implemented many rounds of stringent sanctions on Iran due to the purported arms shipments. Iran commenced the production of unmanned aerial vehicles in the 1980s, coinciding with its eight-year conflict against Iraq.

The Karrar combat drone is an Iranian drone that is propelled by a jet and can carry various weapons, including air-to-air missiles. Iran has lately displayed the powerful Karrar combat drones equipped with Majid thermal missiles, with a range of up to 1,000 km in its operational territory. These drones are designed to bolster Iran's air defence capabilities and discourage potential threats along its borders.

The implications of the introduction of the Karrar combat drone for India remain obscure, but several potential possibilities can be considered. India may perceive the Karrar combat drone as a possible concern for its air space and security interests, mainly if Iran offers these combat drones to its allies in the region, like Pakistan (through the Organisation of Islamic Countries) or Afghanistan. India may attempt to address this threat by creating or obtaining its own cutting-edge drones or anti-drone technologies. To address these defence and security challenges, India may consider collaborating with the USA or some other country to design and produce combat drones. India may also motivate private drone enterprises to conduct research and development of combat drone technology by providing a conducive environment, including essential financial support.