

Iran's Game of Drones

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Brief Analysis

After decades of steady development, Tehran now uses drones to complement its missiles and support the broader effort to bring the entire Middle East within its range.

On February 14, mysterious explosions in western Iran rocked a military airfield that houses unmanned aerial vehicles (UAVs). High-resolution overhead imagery later added credence to initial suspicions that a kinetic strike—possibly by loitering explosive drones—was responsible for the extensive damage inflicted on a large hangar. In fact, the damage was very similar to a June 2021 explosion at the TESA centrifuge parts factory near Tehran and a July 2020 explosion that destroyed the Natanz centrifuge assembly plant in Isfahan province. Although Iran accused Israel of orchestrating the previous incidents using suicide drones or other means, it has yet to place blame for the latest explosion. Whoever was responsible, it appears that other players in the Middle East are taking a page from Tehran's playbook, which in recent years has focused on weaponizing drones to augment the regime's other capabilities and proxy forces.

Indeed, the drone enterprise has claimed a prominent place on the spectrum of Iranian threats to the region, even matching the country's troubling precision and **ballistic missile programs**

(<https://www.washingtoninstitute.org/policy-analysis/iran-takes-next-steps-rocket-technology>). The increasingly aggressive use of drones by Tehran and its proxies has worried U.S. Central Command and regional military officials considerably, pressing them to find active and passive countermeasures that include **unmanned equalizers** (**<https://www.washingtoninstitute.org/policy-analysis/new-navy-task-force-aims-deter-iran-unmanned-systems>**) (e.g., the Hunter 2-S swarming drones produced by the Emirati EDGE Group). Yet Iran is unlikely to be deterred, nor should it be expected to change its regional behavior **if it revives the 2015 nuclear deal** (**<https://www.washingtoninstitute.org/policy-analysis/three-presidents-three-flawed-iran-policies-and-path-ahead>**) with the United States.

Birth of a Drone Program

Despite the recent flurry of technical advances and news reports on the subject, Iran's "game of drones" has been long in the making—as long as the 1980s war of attrition with Iraq. In the middle of that conflict, the Islamic Revolutionary Guard Corps (IRGC) began a trial-and-error program from scratch to develop reconnaissance drones, partly to spark offensive momentum amid grueling stalemates, and also because many countries had put restrictions on dual-use exports to Iran, affecting its ability to acquire the necessary equipment and parts abroad. At the time, the regime barely had a UAV capability of its own apart from a few aerial target drones of American origin.

In addition to a generic reconnaissance role, Iran's early self-made prototypes were quickly weaponized by mounting simple rocket launchers under their wings for use against land and maritime targets. Although these rocket-launcher UAVs did not perform promisingly enough in tests to see operational deployment during the war, the idea of using drones as loitering munitions gained traction, and further development continued in the shadows.

Postwar Advances Change the Threat Picture

Following the war with Iraq, Tehran sought to enhance the surveillance and reconnaissance capabilities of its drones, but their range was initially limited to line of sight. To get past such technical hurdles, the regime brought the IRGC drone-maker Qods Aviation Industries and a new firm, Iran Aircraft Manufacturing Industries (HESA), together under the Ministry of Defense and Support of Armed Forces, which was formed after the Ministry of Defense and Ministry of IRGC merged in 1989. (Qods Aviation was based in a western suburb of Tehran and remains so today, while HESA is located in Shahin Shahr.) Yet the IRGC Air Force (later renamed the Aerospace Force) also continued to run its own extensive drone R&D program within its Shahed Aviation Industries, located at Badr Air Base south of Isfahan—a facility that shares a runway with the Army's Shahed Vatanpour Air Base.

The drone program progressed relatively quickly in subsequent years, in part due to its strong research-based nature and continuing academic support from industrial schools such as Sharif University of Technology (under U.S. sanctions since 2019 for its involvement in the regime's nuclear and missile programs). The IRGC also received a great deal of indirect foreign help by accident, when it recovered several high-tech Western UAVs that crashed in Iran. In addition, recovery of drone parts used by Iran-backed Houthi forces in Yemen suggested a **vast network of suppliers (<https://www.washingtoninstitute.org/policy-analysis/if-arms-ban-ends-implications-irans-military-capabilities>)** facilitated by Tehran, including China, Japan, and European countries. Domestically, recent years have seen high-tech Iranian startups with close ties to the IRGC and defense industry developing drones in various forms, including high-altitude long-endurance UAVs that run on solar power and are ideal for establishing persistent communication relays with proxies abroad.

Tehran has provided some of its proxy forces with direct access to drone capabilities as well. Naturally, Hezbollah was the first candidate for such assistance—as early as November 2004, reports surfaced of the Lebanese militia using so-called Mersad-1 UAVs over northern Israel. The Mersad was identical to the Ababil-2, an Iranian drone developed in the early 1990s by HESA in aluminum and composite versions. The benefits of drones to terrorist groups and other nonstate actors were already well known, but the appearance of Mersad over Israel was a wakeup call throughout the Middle East, as governments perceived a new threat trajectory that could undermine their traditional control of the air domain. In addition to developing specialized user-friendly DIY drones for various proxies, Iran later supplied a smaller derivative of the Ababil-2—called Qasef—to the Houthis, **who have used it extensively (<https://www.washingtoninstitute.org/policy-analysis/yemens-southern-hezbollah-implications-houthi-missile-and-drone-improvements>)** against Saudi Arabia and Yemeni government forces in recent years.

At Shahed Aviation, the IRGC produces suicide drones as well as the Shahed-141 to -191 series of flying-wing drones, which are modeled after the American RQ-170 Sentinel UAV that crash-landed in Iran in December 2011. The

vaunted Shahed-136 loitering precision-attack drone is also produced by that firm; during recent military exercises, the system was launched from a specially modified dump truck that carried five at a time. Over the past few years, Shahed-136 and its smaller sibling, Shahed-131, have been used in hostile operations against Saudi Arabia, Israeli-connected [cargo ships \(https://www.washingtoninstitute.org/policy-analysis/iran-israel-escalation-sea-need-international-coalition-response\)](https://www.washingtoninstitute.org/policy-analysis/iran-israel-escalation-sea-need-international-coalition-response), and U.S. bases in Iraq. The Houthis operate the long-range Shahed-136 under the name Waid; their Sammad series of long-range loitering munitions appears to have Iranian origins as well.



(/sites/default/files/2022-03/iran-shahed-aviation-industries-overhead-POL3585_0.jpg)

Aerial view of suspected drone facilities at Shahed Aviation Industries (Source: Google Earth).

Today, Iranian drones can reach almost anywhere in the Middle East by carrying more fuel and using satellite navigation. The regime achieved this capability by equipping drones with gyro-navigation devices developed by Sharif University, which enable flight endurance of up to five hours; later, it developed long-range radio relays for beyond-line-of-sight communication with drones up to 200 kilometers away. At least two drone types—Shahed-149 and Fotros—are also apparently equipped with satellite antennas, giving them an operational radius of 500 kilometers or more. The newer generation of Iranian drones reportedly have a range up to 1,000 kilometers and a flight endurance of twenty-four hours.

The drone program has passed several weaponization milestones as well. Currently, the majority of Iranian UAVs can carry miniature guided bombs, but they will soon be armed with missiles capable of reaching targets up to 8 kilometers away.

Conclusion

On several occasions over the past year, U.S. Central Command chief Gen. Kenneth McKenzie has made surprisingly frank public comments about allied vulnerability to Tehran’s multidirectional UAV threat. In April 2021 testimony before the Senate Armed Services Committee, he noted that the small and medium armed drones being proliferated by Iran and its proxies “present a new and complex threat to our forces and those of our partners and allies. For the first time since the Korean War, we are operating without complete air superiority. Until we are able to develop and field a networked capability to detect and defeat [UAVs], the advantage will remain with the attacker.”

The United States has been watching Iran’s drone program since at least 2002 and needs to maintain this vigilance. The regime will keep developing, expanding, and proliferating its armed UAV technologies—not just to Middle Eastern proxies, but also to countries further abroad who have indicated a willingness to buy them, most recently Ethiopia and Venezuela. Even if Washington and Tehran agree to mutually return to their commitments under the nuclear deal, U.S. authorities should continue aggressively sanctioning any Iranian entities and individuals involved in the drone program. This posture will be necessary so long as the regime refuses to abandon its hostile, destabilizing actions in the Middle East.

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