

VIVA INSTITUTE OF TECHNOLOGY

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HOW RUSSIA'S INVASION OF UKRAINE IS STRESSING THE NEON SUPPLY CHAIN

THE BESIEGED COUNTRY IS ONE OF THE LEADING SUPPLIERS OF TH<mark>E GAS, WHICH IS USED</mark>
TO MAKE SEMICONDUCTOR CHIPS.

BY SHREEYESH S.

Refuelling under cover of darkness, a massive formation of U.S. Air Force, Royal Air Force, and Australian Air Force aircraft prepared for combat.

Soon, cockpit displays in each aircraft began to light up and alarms sounded, indicating that the formation was being painted by multiple radar arrays tied to surface-to-air missiles and inbound fighters. Enemy fighters sporting the colour schemes of Russian Su-30s began to close in.

The aircraft we know today as the F-35 was built to meet the demands of multiple fighting forces with a single, highly capable aircraft.



Designed from the ground up to prioritize low-observability, the F-35 may be the stealthiest fighter in operation today. It uses a single F135 engine that produces 40,000 lbs. of thrust with the afterburner engaged, capable of pushing the sleek but husky fighter to speeds as high as Mach 1.6. The aircraft can carry four weapons internally while flying in contested airspace or can be outfitted with six additional weapons mounted on external hardpoints when flying in low-risk environments. The F-35A also comes equipped with an internal 4-barrel 25mm rotary cannon hidden behind a small door to minimize radar returns.

"The aeroplane that took that first flight back in 2006 may have looked identical on the outside, but it was a very different aircraft than the one we're flying today," Wilson says. "And the F-35 flying ten years from now is going to be very different from the one that we're flying today." The F-35 will also serve as a testbed for technologies that will become commonplace in the next generation of jets. Flying in coordination with AI-enabled drones will become a staple of any sixthgeneration fighter, and those new fighter tricks will likely first arrive in the form of the F-35. "I look at the most capable, most connected, most survivable aircraft on the face of the planet and what we're able to achieve with it today," Wilson says. "I can only imagine what tomorrow's F-35 is going to be capable of."

Today, over 500 F-35 Lighting IIs have been delivered to nine nations and are operating out of 23 air bases around the world. That's more than Russia's fleet of fifth-generation Su-57s and China's fleet of J-20s combined. With literally thousands more on order, the F-35 promises to be the backbone of U.S. air power.

THE CIA REPORTEDLY USED A 'FL<mark>YING GINSU'</mark> BLADED MISSILE TO KILL AL-QAE<mark>DA CHIEF</mark>

SUNNY MORE, STUDENT

Over the weekend, the U.S. killed a high-level figure in the terrorist group al-Qaeda and the man behind several attacks on the United States: Ayman al-Zawahiri. A U.S. Central Intelligence Agency (CIA) drone reportedly carried out the assassination in the Shirpur district of Kabul, the capital city of Afghanistan. The strike was likely another appearance of the CIA's Hellfire R-9X bladed missile, also known as the "Flying Ginsu." This innovative technology conclave has been inaugurated by Hon'ble Minister of State (Space) Dr. Jitendra Singh, in the presence of

The U.S. killed al-Zawahiri on Saturday, June 30, in a house he had been living in for one year, and which he had not left since he and his family had moved there. According to CNN, a support network for al-Zawahiri, as well as his family members, left a trail that U.S. intelligence backtracked to pinpoint his location.

Biden's desire to avoid civilian casualties, and the obvious lack of damage a conventional Hellfire warhead would inflict on a building, suggests the R-9X was used to assassinate al-Zawahiri. Still, the existence of the R-9X means the CIA is willing to innovate new assassination tools when necessary, and there might be an even newer version of the Hellfire missile. Given the existing weapon was the first missile to kill with a six-pack of swords, how a new weapon might work is anyone's guess.



5 WEAPONS YOU'LL SEE ON THE BATTLEFIELD OF THE FUTURE, INFLUENCED BY RUSSIA'S WAR IN UKRAINE

SWASTIK THAKUR STUDENT

The Russian invasion of Ukraine in February 2022 has demolished the expectations of military experts worldwide. Some staples of war, like tanks, fighter jets, and howitzers, have proven surprisingly vulnerable over the course of the conflict, while rocket artillery, drones, and anti-tank weapons have punched above their weight. Others, like lasers that could protect cities and weapons that home in on radio signals, are urgently needed, but are yet to be developed.

Defensive Lasers: Russia's war has involved both "dumb" unguided weapons and "smart" precision-guided weapons, in the form of mortars, howitzers, multiple-launch rocket systems, and land-attack cruise missiles. Russia expends up to 60,000 artillery shells and rockets a day, raining destruction down on both military and civilian targets. Moscow has used these weapons on both military and civilian targets—and the latter is a clear war crime under international law.

Anti-Radiation Weapons: Russia's war has involved both "dumb" unguided weapons and "smart" precision-guided weapons, in the form of mortars, howitzers, multiple-launch rocket systems, and land-attack cruise missiles. Russia expends up to 60,000 artillery shells and rockets a day, raining destruction down on both military and civilian targets. Moscow has used these weapons on both military and civilian targets—and the latter is a clear war crime under international law.

Guided Rocket Artillery: Russia's war has involved both "dumb" unguided weapons and "smart" precision-guided weapons, in the form of mortars, howitzers, multiple-launch rocket systems, and land-attack cruise missiles. Russia expends up to 60,000 artillery shells and rockets a day, raining destruction down on both military and civilian targets. Moscow has used these weapons on both military and civilian targets—and the latter is a clear war crime under international law.

Small Battlefield Drones: Russia's war has involved both "dumb" unguided weapons and "smart" precision-guided weapons, in the form of mortars, howitzers, multiple-launch rocket systems, and land-attack cruise missiles. Russia expends up to 60,000 artillery shells and rockets a day, raining destruction down on both military and civilian targets. Moscow has used these weapons on both military and civilian targets—and the latter is a clear war crime under international law.









TO PIT OR NOT TO PIT: HOW FI'S RED BULL RACING MAKES SPLIT-SECOND, MID-RACE DECISIONS

PAURAS RAUT STUDENT

At a critical point in the Formula 1 Canadian Grand Prix race in June—with fan-favorite Max Verstappen's Red Bull Racing car slightly leading Carlos Sainz Jr., who drives for Ferrari— Verstappen's team had a key decision to make. Just eight laps in, the virtual safety car came out to slow the race cars down, leading to the pivotal question: to pit, or not to pit? In Formula 1 races, it's mandatory for drivers to take at least one pit stop. The real question is when to take it. If Red Bull pitted under the virtual safety car, it could reduce time lost during a stop. On the other hand, it would force the team to give up the lead, and keeping Verstappen out on the track could also introduce the risk of deteriorating tires later in the race.

"If we pit under the virtual [safety] car, we'd give up the lead, but the simulations were confident we would get the lead back again," Will Courtenay, chief race strategist for Red Bull Racing, tells Popular Mechanics. "We took the pit stop, Sainz stayed out. Now we are 10 or so seconds behind, but then as the simulations correctly predicted, Sainz struggled on tires, and we got the lead back later in the race." Verstappen won the Canadian Grand Prix on June 19, continuing his lead in the 2022 F1 standings, the same standings he dominated in 2021. (Teammate Sergio Pérez remains in third). Verstappen's latest win, the Hungarian Grand Prix on July 31, was also thanks in part to some smart decision-making on which tires to choose.

Courtenay says the power of simulations, due to the new partnership with Oracle, has given the Red Bull team access to more data and better decision-making, both before and during a race. Red Bull went on a search for a cloud-based solution with a global reach, leading to Oracle joining the team in 2021. The partnership went so well that Oracle became a title partner in 2022. That continues to lead to beneficial results, both on the engineering side and in race strategy, according to Zoe Chilton, head of partnerships for Oracle Red Bull Racing (the full name Red Bull is currently competing under).

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