Black Knight Transformer could become the army's first flying car.

WARFARE

When Cars Fly

Military "Transformer" vehicles move closer to takeoff

The idea of a car taking off like a helicopter sounds like science fiction. But four years after the Pentagon funded its vision for a "Transformer" military flying machine, the project has found solid footing. Two prototype designs, one by aerospace and defense giant Lockheed Martin and one by aerospace start-up Advanced Tactics, offer possible paths for the automated flying car to become a reality on future battlefields ruled by robots.

A flying car or similar vehicle could be useful in inserting U.S. Navy SEALs into enemy territory, evacuating wounded soldiers from urban locations inaccessible to helicopters or resupplying spread-out military units. The U.S. Defense Advanced Research Projects Agency also wanted a vehicle that an ordinary soldier could operate without pilot training—a crucial specification that highlights the need for an autonomous "brain" similar to those that may one day operate battlefield drones and robots.

DARPA recently gave the go-ahead for Lockheed Martin to build and fly a Transformer prototype, now known as the Aerial Reconfigurable Embedded System (ARES), by mid-2015. ARES is not, strictly speaking, a flying car: it is an unmanned vertical-takeoff-and-landing drone capable of picking up a light ground vehicle such as a dune buggy. This approach makes it possible for ARES to also carry cargo and medical evacuation pods, as well as sensors for battlefield surveillance and reconnaissance. ARES also comes with ducted fans rather than a helicopter's open-rotor design, so it can fly faster than a helicopter and operate without exposing soldiers to rotating blades.

A different prototype developed independently of the DARPA effort by Advanced Tactics, an aerospace start-up in El Segundo, Calif., is more of a recognizable flying car. The Black Knight Transformer is designed to fly up to 150 miles per hour, with a range of almost 290 miles. Its flying capability comes from eight small, open rotors that can be stowed close to the vehicle's body when it is driving on the ground. The vehicle can also ramp up to 70 mph, with the automotive suspension and drivetrain of an off-road truck, and it packs a payload capacity of more than 1,000 pounds (or five passengers).

Advanced Tactics envisions its Transformers having the brains to fly medical evacuation and cargo resupply missions on their own—humans would drive the vehicles only on the ground. It conducted driving tests with a Black Knight Transformer prototype in December 2013 and scheduled a test flight for early this year.

Even if flying cars don't pan out, the push for smarter software in autonomous flying vehicles is worthwhile, says Paul Scharre, project director for the 20YY Warfare Initiative at the Center for a New American Security. Flying car software capable of taking off, flying and landing on its own would pave the way for smarter drone and robot swarms operating under the direction of a few human soldiers. Or it could allow the U.S. military to turn manned helicopters and other vehicles into unmanned robots ready to enter the danger zone. —*Jeremy Hsu*

BY THE NUMBERS

2,000 (+/−45)

Strontium atoms in the JILA atomic clock.

COURTESY OF ADVANCED TACTICS, INC. (*top*); SOURCE: NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (*bottom*)