Popular Mechanics

Report: Drones, 3D Printing, and A.I. Will All Create Deadly New Challenges for the U.S. Military

Kyle Mizokami

April 6, 2016

A report published by the libertarian think tank the Cato Institute warns that the fruits of technological innovation could mean a new range of unexpected threats to the United States. Terrorists and small states equipped with weapons that take advantage of new technologies could devastate U.S. forces abroad—and even strike the homeland.

T.X. Hammes, a retired U.S. Marine Corps infantry officer and expert on so-called "asymmetrical warfare"—warfare in which combatants avoid enemy strengths to strike weaknesses—warns that technologies such as 3D printing, nanotechnology, space and near-space travel, drones, and artificial intelligence could lead to cheap, inexpensive weapons with intercontinental reach, devastating lethality, and the ability to overwhelm U.S. defenses.

According to Hammes, the linchpin of these capabilities is additive manufacturing, or 3D printing. 3D printers could be used to print everything from complete flying drones, ready to fly, toexplosively formed penetrators—copper discs weighing only a couple of pounds that use explosions to transform themselves into high-velocity tank killers. Combine those two and you have a tiny tank hunter that can be difficult for tank crews to shoot down.

The portability of 3D printers is a big plus. Printers will be operated in battle zones, cranking out drones hours or even minutes before they are used. According to Hammes, they will be able to do so far more cheaply and quickly than other manufacturing processes, making them more attractive to groups such as the Islamic State. Given an Internet connection and materials, printers could quickly download and churn out new, improved designs as they become available.

Nanotechnology—particularly the field of nanoexplosives—promises the ability to pack a smaller, more devastating explosive payload into a drone. Hammes hints that nanoexplosive technology has apparently produced explosives with twice the energy as conventional explosives, and that further research into explosives has become a closely-held secret.

Meanwhile, America's minor foes could be launching their own satellites. Hammes points to recent advances in small satellites, which in a pinch could be substituted with high altitude balloons similar to those used by Google's Project Loon. These platforms could be used to image targets prior to attack, or provide positioning data independent of GPS (which can be shut off) for attacking drone swarms.

Finally, Hammes notes that drones themselves are becoming increasingly complex. Undersea and flying drones are breaking endurance records. Boeing's Echo Voyager can sail 7,500 miles on a single charge, and commercial flying drones can stay aloft for up to 40 hours—long enough to travel from one continent to another. These spectacular ranges will have implications not only for U.S. military forces but civilian targets inside the U.S. such as cities, commercial infrastructure, and government buildings and installations.

The U.S. and its Western allies won't stand still—already the U.S. Army is experimenting with using truck-mounted Hellfire and Sidewinder missiles to shoot down drones. Yet a single Multi-Mission Launcher can carry only fifteen missiles—and a smart enemy will not only program them with artificial intelligence to avoid missile defenses but swarm them so the defenders run out of missiles.

The picture, taken in total, is grim: 3D printing provides the ability to manufacture cheaply and in high volume. Drones provide the delivery system, space and near-space to scout out the target, AI the ability to defeat defenses, and nanoexplosives provide the payload.

The U.S. can and will exploit these new technologies. But smaller countries and terrorist movements will too, and will gain them new abilities previously out of reach. These technologies could enable smaller actors to have a precision strike ability, which right now is exclusive to large, modern, affluent states. Hezbollah might attack the seat of Israeli government with a swarm of precisely targeted drones. A five pound quadcopter could deter a 70 ton Abrams tank from entering the battlefield.

Thanks to the Internet, there's no holding these technologies back. As they are perfected they will go out into the wild, where they will be used for better—or worse. The U.S. military will then have to face these technologies, battling innovations that may only be days or even hours old. How it faces them is up to the Pentagon bureaucracy to decide.