‘Star Wars’ no longer fiction

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An artistic interpretation of a future battle in which both artificial intelligence and directed energy are used. The Air Force Research Lab’s Directed Energy Directorate is based at Kirtland Air Force Base. (Tyrell Etsitty/Air Force Research Laboratory)

Force fields protecting us from drones and missiles.

Guns that shoot lasers instead of firing bullets.

Rock ’em Sock ’em Robots zapping at each other on the battlefield.

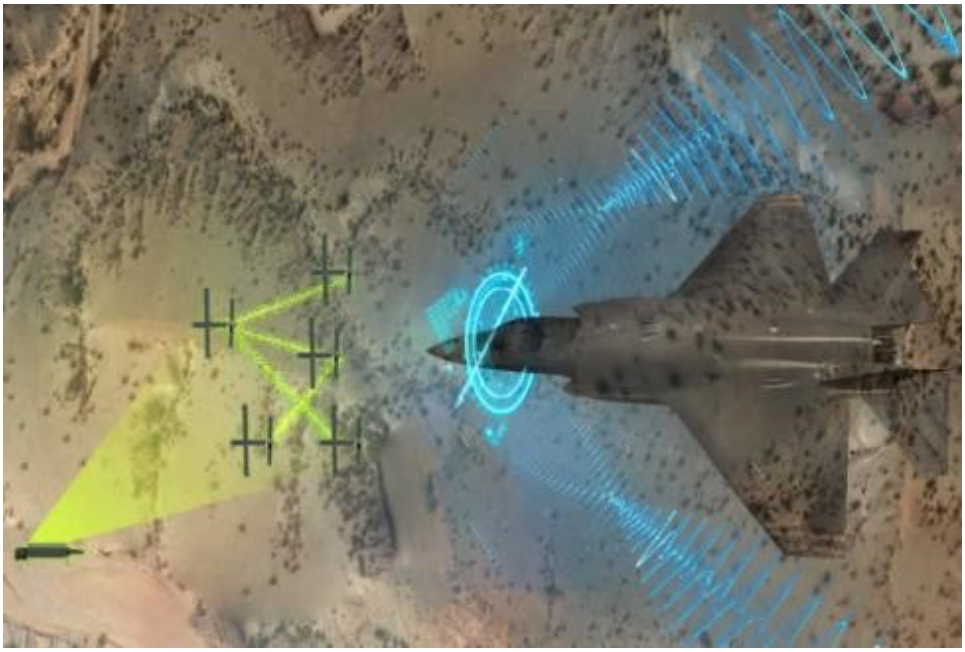
A new report by the Air Force Research Laboratory titled Directed Energy Futures 2060 describes the sorts of “directed energy” weapons that may

come to exist in the next 40 years. And the expected technology – much of which may be researched and developed in Albuquerque – is like something out of a science fiction movie.

Officials from multiple Department of Defense entities, partners with the North Atlantic Treaty Organization and other experts came together to write the report, which says the world is at a "tipping point."

Soon, the report says, harnessing directed energy power will be critical for military success. The report's authors make the case that in order for America to stay competitive in the field with rival nations such as China and Russia, more investment in the research and development of directed energy and educating a future directed energy workforce is needed.

"We're seeing a lot more directed energy capabilities in the military space. People are using them for weapons worldwide," said Jeremy Murray-Krezan, the assistant chief scientist of AFRL's Directed Energy Directorate and one of the report's authors. The directorate is based at Kirtland Air Force Base.



A conceptual drawing of future warfare where directed energy power is deployed. A recent report on directed injury said the world is at a "tipping point," and soon directed energy weapons will be critical to military success.(Courtesy Raytheon Technologies)

Directed energy weapons convert different frequencies of electromagnetic waves and light into a high-power pulse to shoot at a target. And such weapons already exist.

AFRL, for instance, is currently in late-stage testing of the Tactical High-power Operational Responder, or THOR, which can shoot microwaves to destroy drones. The idea is that the weapon can protect military bases.

Murray-Krezan said the Air Force has also developed mounted guns that shoot laser beams instead of bullets.

Similar weapons are being created in other countries. Murray-Krezan noted that all of the top 10 militaries in the world have some sort of directed energy program.

“It may not be at the scale of the Cold War,” he said, “but I think we might already be seeing something of an arms race.”

Center of research

If the arms race for directed energy indeed takes off, much of the action could take place in Albuquerque.

Both on and off KAFB, Albuquerque in the past 40 years has become a mecca of sorts for that type of science, said Edl Schamiloglu, a distinguished professor in the University of New Mexico’s School of Engineering, who specializes in directed energy.

UNM is preparing to launch a Directed Energy Center, which will make the university one of a handful in the country with a center dedicated to that type of research and the only one that has expertise in both lasers and microwaves, he said.

“Albuquerque, New Mexico, is the epicenter of directed energy research in the United States,” Schamiloglu said. “In addition to the activity that goes on

at AFRL internally, AFRL supports research at Sandia National Labs and Los Alamos (National Laboratory). And there are dozens of companies that support directed energy … in town. So I think directed energy research and development will be an important component in economic development in the city and the state for decades, for sure."

Future technologies

In 1983, President Ronald Reagan proposed a Strategic Defense Initiative, which came to be known as Star Wars. It was the height of the Cold War, and the conservative icon imagined an array of satellites that could shoot X-rays to stop nuclear weapons from reaching the country's borders.

Despite billions of spending on the effort, the project remained science fiction until it was significantly narrowed by President Bill Clinton in 1993, according to Politico.

The recent directed energy report revisits the idea.

Murray-Krezan said technology used in the THOR project could be applied to a fleet of satellites that could, in theory, bring the "Star Wars" defense shield into reality.

"Today we could say that we could make a force field to protect against (drones)," he said in an interview. "The fact that we're seeing these things fielded, these aren't just laboratory experiments anymore. They are making their way out to the military. … In the next 10 years, we might see a huge proliferation of those. Eventually … you might want to get to a whole missile shield, in a sense."

Directed energy also could be used to make a weapon that shoots laser beams. The technology already exists. Schamiloglu said the Navy ship USS Ponce has had a mounted laser weapon for several years.

The advantage of a laser over a missile or other kinetic weapon, such as a

traditional gun, is not having to reload as often, Murray-Krezan said.

“Imagine you’re a group who’s charged to defend a military base, and you have a battery of Patriot missiles,” he said. “Instead of having to rearm your battery of 12 Patriot missiles with more missiles, if you had a directed energy weapon you could just keep firing as long as you have power.”

There’s also a possibility that in the coming decades the military will combine artificial intelligence and directed energy weapons, creating fast-paced battlefields that Murray-Krezan compared to Rock ’em Sock ’em Robots, the classic toy that has players manipulating simple robots to fight one another.

He envisioned some type of mobile robot – perhaps a drone – that is armed with a directed energy weapon that could shoot microwaves at first, which could destroy electronics. But it also has a laser, which could shoot a more lethal pulse if the situation escalates.

“So you might imagine an artificial intelligence behind the robots battling each other – and this isn’t such a far-fetched concept. We use electronic warfare in the military today,” Murray-Krezan said. “It’s definitely taking it a step farther.”