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Related Categories: Cybersecurity and Cyberwarfare; Democracy and Governance; Human Rights and Humanitarian Issues; Military Innovation; Science and Technology; Warfare; Russia

REVOLUTIONIZED RADAR

The U.S. military has just taken a major step forward in situational awareness, thanks to m-Widar. The new technology, developed by the National Institute of Standards and Technology (NIST), has a wide array of applications, ranging from tracking hypersonic weapons and speedy objects zipping through space to seeing through walls in urban combat. Older generations of radars function by using a single transmitter to send a signal toward an object, bouncing it off the object and then analyzing the return signal on one or more receivers to get an estimate of distance and speed. The newly developed m-Widar, however, utilizes multiple transmitters and a single receiver to perform a similar function, but at significantly higher speeds. Impressively, the new radar algorithm may be able to function in instances where it is imperative that an adversary not be aware that radar is being used. (*Defense One*, June 29, 2021)

RUSSIA'S NEW, MORE VERSATILE RIFLE

Russia's military has developed a rifle capable of being used both on land and in aquatic warfare. The "dual medium ADS assault rifle" has the ability to fire below and above the waves, and is currently being mass-produced in Russia. The development may seem trivial, but is potentially game-changing because it means soldiers will no longer have to carry separate weapons for land and sea combat operations. The rifle's magazine carries AK-74 bullets and a bullet of separate type but same size (5.45x39mm) for underwater firing. Having such a dual-use weapon is useful to protect against a variety of maritime threats, including amphibious enemy soldiers, dubbed "frogmen," trying to infiltrate a harbor by sea. (*Popular Science*, July 5, 2021)

HOW THE WORLD SHOULD APPROACH GENE EDITING

Back in 2018, Chinese scientist He Jiankui sparked a global debate about the ethics of human gene editing when he edited twin human embryos (see *Defense Technology Monitor* No. 39). That furor culminated in the creation of a World Health Organization Expert Advisory Committee to develop global standards for genome editing. At long last, the committee has now issued its guidelines, which support research and regulation of genome editing to cure genetic diseases such as cystic fibrosis or HIV, but highlight the ethical concerns of using this technology for human enhancement. The guidelines place special emphasis on equitable access to the technology and the need for strong reporting of malpractice or abuse. Notably, however, these guidelines are advisory rather than compulsory in nature, and carry no enforcement mechanism to compel states to abide by the standards they suggest. (*Bio News*, July 12, 2021)

A REPLACEMENT FOR TODAY'S TANKS

The U.S. Army is attempting to reinvent the wheel - or, in this case, the tank. Researchers at the Army Research Lab are designing vehicles with materials that can "degrade gracefully or self-heal," or potentially even allow bullets to pass through them. Dr. Scott Schoenfeld, an ARL senior scientist, stated that designs are not confined to tank structures, and may even take the shape of a coronavirus — a ball-shaped center with arms jutting out, allowing for vehicles to have the ability to roll around the battlefield and place themselves between soldiers and enemy fire and survive the beating. The team is taking a page out of the Navy's "distributed lethality strategy" (see *Defense Technology Monitor* No. 45) to disperse sensors and firepower across multiple mobile platforms. The goal of the program is to increase survivability with crewless technology that maintains the same fire power provided by today's tanks. (*Military Times*, July 15, 2021)

FORCE FIELDS FORTHCOMING?

The key difference between science fiction and fantasy, they say, is that sci-fi concepts could eventually become reality. As U.S. defense planners search for ways to contend with threats from ballistic missiles and hypersonic weapons, they may soon be able to rely on one such sci-fi concept: a directed energy force field. A recent Air Force Research Lab report notes that a [directed energy] "weapon creating a localized force field may be just on the horizon." However, rather than projecting a protective sphere around the target, as is typically portrayed in books and movies, the emerging technology in question involves a constellation of space-based weapons that use beams of energy to shoot down weapons within a target radius. According to the report, "[b]y 2060 a sufficiently large fleet or constellation of high-altitude [directed energy weapons] systems could provide a missile defense umbrella, as part of a layered defense system, if such concepts prove affordable and necessary." And while the report cites 2060 as a target date for technological maturity, it could actually come of age sooner; earlier this year, the U.S. Army unveiled its Tactical Ultrashort Pulsed Laser (UPSL) — which is highly capable against drones and missiles and will be prototyped in 2022 (see *Defense Technology Monitor* No. 63) — and adding this technology to space platforms could be a possibility in the coming years. (*Interesting Engineering*, July 23, 2021)