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Related Categories: Cybersecurity and Cyberwarfare; Military Innovation; Science and Technology

NEW NAVAL WEAPON USES ECHOES TO INSTILL CONFUSION

The U.S. Navy has long used sound propagation, via sonar, to detect range or navigation. But recently, the service has devised a method to use sound waves to create a non-lethal (but annoying) weapon. Naval Surface Warfare researchers have developed the acoustic hailing and disruption (AHAD) device, which has the ability to echo an adversary's words back at them. The sound is transmitted back to the speaker in a narrow beam that only he or she can hear, fostering a sense of confusion. The patent details how "a target's speech is directed back to them twice, once immediately and once after a short delay. This delay creates delayed auditory feedback (DAF), which alters the speaker's normal perception of their own voice... the speaker's concentration is disrupted and it becomes difficult to continue speaking." In addition to a feedback echo, the patent explains that strategic use of the device "can also project sound to the target surface such that audio appears to originate from the target." (*Interesting Engineering*, September 2, 2021)

CHINA DESIGNING HYPERSONIC EMP...

The hype surrounding China's speedy, maneuverable weapons is massive, and poised to get even bigger. EMP weapons traditionally rely on a nuclear detonation to send pulsed energy toward a target (see *Defense Technology Monitor* no. 29), but engineers at the China Academy of Launch Vehicle Technology have designed a chemical-based explosion weapon to achieve the same effect. Sun Zheng, an engineering scientist at the Academy, explained that when detonated the EMP waves would "cause the effective burnout of key electronic devices in the target information network within a range of 2km" — as the chemical explosion would convert the energy upon impact into bursts of microwaves. Impressively, the missile would fly undetected as it used the extreme heat during flight to charge capacitors to fuel the detonation, while also utilizing plasma generators to shield the weapon. Researchers stated, "the active stealth electromagnetic pulse weapon based on energy regeneration conforms to the current development trend of rapid warfare, strong confrontation, and full-dimensional information damage." While the weapon is still in its planning stages, it could provide an incredible tactical advantage in a regional conflict if deployed. (*South China Morning Post*, September 26, 2021)

...WHILE U.S. PAINTS TARGETS TO DEFEND THEM

EMPs are bursts of electromagnetic energy, occurring either naturally or through a nuclear detonation, and constitute a real threat to any unshielded electronic infrastructure, military or civilian. While not a new issue, economic solutions to the problem posed by EMP have been hard to come by. Most involve using faraday cages, metal enclosures of thick copper or aluminum boxes around critical equipment. A much more cost friendly, and potentially effective, option, however, is to use a conductive paint to help dissipate the energy of EMP exposure. When reviewed by the U.S. Air Force Research Laboratory, a few coats of SmartPaint offered the same level of against an EMP as using a half-inch aluminum/steel plate. Paints that are made with graphene have also yielded positive results. Additional tests are needed to verify effectiveness across the spectrum of microwave frequencies, but if advancements in this arena are made it could constitute a game changer in the way the United States shields its sophisticated hardware and infrastructure from potential disruption. (*Forbes*, September 27, 2021)

BATTLE BLIMPS ON THE HORIZON?

Persistent coverage and long dwell times are buzzwords that military officials often use to discuss the need to maintain surveillance on a target in a conflict zone. Constellations of low orbiting satellites often have gaps in coverage because they rotate so quickly around Earth, while satellites in geostationary orbits (rotating Earth in a fixed position relative to the ground) are so far away they don't offer great sensing fidelity. As a result, the U.S. military considers blimps to be a significant alternative, because they can remain high in the atmosphere out of sight and weapons range, yet have higher sensor fidelity than satellites and remain in a near fixed position for long periods of time.

As part of the Helios program, NASA engineers and contractors have developed methods to extend flight time by creating blimps with hybrid power systems consisting of solar and fuel cells. Utilizing this technology, companies have developed blimps capable of remaining on station for long periods with payloads of telephone and internet switching equipment. There is also the potential to increase the number of solar cells to accommodate the power requirements for radar and laser designators and weapon systems in the future. (*Popular Mechanics*, September 23, 2021)