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DEFENSE TECHNOLOGY MONITOR
The American Foreign Policy Council's Review of Developments in Defense Technology

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Related Categories: Arms Control and Proliferation; Cybersecurity and Cyberwarfare; Democracy and Governance; Human Rights and Humanitarian Issues; Military Innovation; Missile Defense; Science and Technology; Warfare; China; Israel; Russia

ISRAEL'S NEW SHOOTER DETECTION SYSTEM
Modern conflicts such as the war in Ukraine have highlighted the importance of protecting tanks and other armored vehicles from enemy firepower. Recently, developers at Israel Aerospace Industries (IAI), one of Israel's premier defense contractors, have created a gunfire detection system known as Othello-P, which is capable of identifying the precise location of incoming munitions. The system operates with 360 degree coverage using acoustic and visual sensor systems and an AI data evaluation process that detects and identifies threats. The benefits, company executives say, is greater operational capability and awareness in urban terrain settings – a significant need, given Israel's fraught relationship with the Palestinian Authority in the West Bank and its periodic clashes with Hamas, which controls the Gaza Strip. "We are able to operate in an urban area. This is very unique because the current traditional systems have a problem operating in an urban area," says IAI's Asher Abish. According to the company, the Othello-P system can also be mounted on vehicles, with acquired location data used to effectively target and eliminate the source of incoming fire. (*UnitedwithIsrael*, July 3, 2022)

BUILDING BLIMPS TO SEEK HYPERSONIC MISSILES
The rise of Russia and China's hypersonic missile programs continue to drive U.S. missile defense and surveillance innovation. One option that has emerged is the deployment of high-altitude hot-air balloon detection systems. The advantages are clear; blimps are significantly less expensive than satellites, and provide high vantage points for surveillance that terrestrial sensors cannot match. The Covert Long-Dwell Stratospheric Architecture (COLD STAR), a current military program, is a stealthy surveillance balloon with artificial intelligence, sensing technology, and renewable energy sources, which is shaped in a manner that avoids enemy radar detection. The Joint Land Attack Cruise Missile Elevated Netted Sensor System (JLENS), another system previously created as part of a surveillance balloon network, failed in an October 2015 test, but could potentially be revived. The timelines for development and deployment are not yet clear, but such platforms present a viable technology that could potentially be one to two orders of magnitude cheaper than satellite alternatives. (*Asia Times*, July 8, 2022)

A POST-QUANTUM WORLD IN CYBERSECURITY
The massive computational potential of quantum computers raises substantial concerns about the future of traditional data encryption. Quantum computers, being exponentially faster than conventional systems, could solve the complex mathematical problems that underlie our cybersecurity infrastructure with relative ease. However, the National Institute of Standards and Technology (NIST) has recently recognized several cryptographic methods that are believed to be resistant to quantum computer attacks. NIST is now focused on formulating and publishing specific application procedures for these methods by 2024. The newly recognized algorithms are still in their developmental phase, but highlight the rising importance of post-quantum cryptography. (*Nature*, July 8, 2022)

TOWARD SCIENTIFICALLY-INDUCED MORALITY?
Aggression and "everyday violence" are major contributors to social disorder. But what if our brains could be scientifically altered to suppress the thought patterns and neurological structures that motivate violence and hostility? Modern neuroscience offers multiple different ways of promoting such mental pacification. These include electrode neuromodulation, psychedelic drug therapies, and even gene manipulation via CRISPR technology. Each of these options has yielded some positive results, but all are still in the early stages of development. Moreover, aggression will still be difficult to treat, as it is an incredibly complex neuroscientific phenomenon involving a variety of different genes and convoluted neural structures. And even if such pacification becomes possible, researchers will need to grapple with the question of whether "moral enhancement" should occur. (*Neuroscience News*, July 9, 2022)

CHINA'S GOAL: AI TO MONITOR LOYALTY TO THE PARTY
China has heavily incorporated AI into its national security infrastructure, notably in combination with facial recognition software deployed for the surveillance of its Uyghur Muslim minority. Now, the PRC is claiming to have constructed a new "mind reading" AI system that is able assess loyalty to the Party by examining facial expression and evaluating brainwaves. The Comprehensive National Science Center in Hefei released a since deleted video and report in which researchers state that their new AI program could be used on CCP members to "further solidify their confidence and determination to be grateful to the party, listen to the party, and follow the party." While the specific claims are difficult to fully verify, multiple Chinese research institutes have previously been sanctioned by the U.S. Department of Commerce for participating in brain control research. (*Business Insider*, July 10, 2022)

3D PRINTING AT SEA
U.S. Navy warships, by their nature, can only bring a limited amount of equipment out to sea. With ships already carrying weaponry, basic supplies, and thousands of sailors, it is both physically challenging and costly to carry all of the necessary spare parts and replacement equipment for machinery on board. To address this challenge, the Navy has developed and deployed 3D printing technology aboard the *USS Essex*, a warship built for transporting Marines into battle. Some of the tasks completed by these printers included producing arms and replacement parts for drones. This year, the *Essex* received a significantly upgraded 3D printer that, according to a Navy press release, is capable of printing metal parts like, "heat sinks, housings, fuel adapters, bleed air valves, valve covers, and more." As the technology evolves, it is conceivable that all warships will eventually be outfitted with the capability to manufacture weapons and aircrafts onboard. (*Popular Mechanics*, July 12, 2022)
