



DEFENSE TECHNOLOGY MONITOR

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Related Categories: Cybersecurity and Cyberwarfare; Intelligence and Counterintelligence; Military Innovation; Science and Technology; Warfare; China; Russia; Taiwan; United States

CHINA AND RUSSIA SEEK UNHACKABLE COMMS

Historically, one method of intelligence collection has relied on the ability to intercept adversary communications across terrestrial transmission lines, tapping into undersea cables, or via satellite link. Now, scientists from China and Russia are attempting to permanently prevent any information leaks from communications carried out between the two nations by using quantum technology to encrypt information in transit. Using a quantum key distribution method, the two nations were able to send encrypted data across 2,360 miles from a ground station in Moscow, Russia to space, to a station in Urumqi, China via China's Mozi quantum satellite. The quantum communication method, which travels through space via laser, far exceeds distances that are possible via terrestrial optical fibers, which have a maximum 620-mile range. The breakthrough could pave the way for a nearly unhackable quantum communication network linking Russia and China, and potentially other members of the BRICS bloc as well. (*IOT World Today*, January 2, 2024)

CHINA'S TAIWAN PLANS INCLUDE AN ANTI-TANK ASSAULT

China's military modernization is being conducted with one eye toward the potential of a future conflict with Taiwan, and one eye on the lessons already learned from the current Russian war on Ukraine. A research team from the Hypervelocity Aerodynamic Institute of the China Aerodynamics Research and Development Center are developing hypervelocity kinetic energy weapons that can potentially defeat the advanced armor found on Taiwan's M1A2T tank. Based on Russian tank innovations made during the Ukraine war as well as improvements in hypersonic technology, simulations suggest that hypersonic projectiles can be an effective method to severely damage the interior of tanks despite their armor plating. China's progress in railgun technology, capable of firing multiple rounds rapidly, could exploit these armor inadequacies, threatening Taiwanese defense capabilities in a potential future conflict. (*Asia Times*, January 5, 2024)

MOVING TOWARD SUPER SEMICONDUCTORS

For years, computer processing power has been advancing at an incredible rate. But without advances in semiconductors, those rapid gains may soon taper off. Fortunately, researchers are developing new semiconductors that utilize the incredible properties of graphene — an achievement that was not previously possible — to develop chips that provide much faster computers. The incorporation of this new material, epitaxial graphene, allows electrons to move at terahertz frequencies, outpacing current silicon chips by a factor of 10. Impressively, researchers found a way to fuse graphene onto silicon carbide on these new chips in a process that can be incorporated into the manufacturing process at scale. Beyond enabling faster classical computing, further research will explore whether graphene can surpass existing quantum computing materials. (*Live Science*, January 8, 2024)

CHINA SIMULATES HYPERSONIC STRIKE

In any potential conflict with Taiwan, Chinese defense planners will likely have to contend with fortified U.S. aircraft carriers coming to the aid of the island nation. As part of the PRC's response, researchers at a military lab affiliated with the China Electronics Technology Group Corporation simulated an attack on a U.S. aircraft carrier strike group using a combination of hypersonic missiles and space-based electromagnetic weapons. The simulation showed a salvo of Chinese hypersonic anti-ship missiles being launched from over 700 miles away (assumed to be outside of the strike group's range for counter attack), while low-orbit electronic warfare satellites interfered with the U.S. SPY-1D radar systems aboard American ships. According to their simulation, a successful regional attack could be conducted with only two or three satellites, while a global assault could be completed with 28. The exercise points to the potential effectiveness of China's hypersonic weapons, like the YJ-21 "aircraft carrier killer," coupled with electronic warfare against modern naval defenses. (*South China Morning Post*, January 19, 2024)

POWERING FUTURE SOLDIERS BETTER

Modern network-centric warfare has led to a growing need for battery powered devices. Unfortunately, while technology has made great strides, the development of batteries has been significantly more modest. To address this disparity, the Army has awarded numerous contracts for the development of a Conformal Wearable Battery (CWB) that is easily integrated into body armor and minimizes discomfort, has no safety hazards, and is incredibly energy-dense. Companies like Inventus Power and Amprius Technologies have determined that a key innovation is using silicon anodes rather than conventional graphite anodes, allowing a much higher energy density of around 300 watt-hours for the 2.5 lb CWB. The CWB is engineered to withstand harsh conditions, including bullet impacts and extreme environmental exposure. It has improved operational capacity, allowing for 20 extra hours of use and requires a shorter recharge time. (*Popular Mechanics*, January 30, 2024)