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Related Categories: Military Innovation; Science and Technology; SPACE; United States

NEW MATERIAL BENEFITS EVERYTHING FROM BODY ARMOR TO MICROCHIPS

For years, Kevlar was the gold standard in the construction of body armor for law enforcement and military use. However, thanks to researchers at the Delft University of Technology, a new material named Amorphous silicon carbide (a-SiC) may turn out to be a stronger alternative. Reportedly, the synthetic fiber is stronger than Kevlar by a factor of ten, and has exhibited characteristics that are imperative for vibration isolation, which is essential in microchips. In microchip-based material testing, a-SiC has been reported as easy to scale, particularly relative to robust materials like graphene and diamonds — which are difficult to mass produce. Impressively, the material's potential uses range from body armor to microchips to solar cells. (*Interesting Engineering*, November 4, 2023)

A DEARTH OF DATA FOR AI DEVELOPMENT

The past three years have seen a surge in AI development, as evidenced by advancements of large language model (LLM) AI systems like ChatGPT and Google's Deep Mind. To increase their capabilities, however, these systems need to be trained on massive amounts of data. Unfortunately, there are limits to the amount of training data available to LLM-based AI systems. Companies are creating AI systems that generate synthetic data that can be used in training, but some analysts warn that this sort of "AI-inbreeding" can have deleterious effects if not carefully constructed. AI companies like OpenAI have begun to strike data partnership deals to mitigate the problem, but the issue has yet to be resolved. (*Futurism*, November 11, 2023)

THE U.S. NAVY IS 3D PRINTING SUBS...

The Navy is suffering from a subpar manufacturing base — one that is affecting its ability to produce submarines in a timely fashion. Manufacturing challenges ranging from COVID-19 induced issues to a dwindling number of capable suppliers has helped erode relevant industrial capabilities. Now, to avoid continuously missing milestones, the Navy has turned to the Danville, VA based Additive Manufacturing Center of Excellence to utilize advances in 3D printing technology to ameliorate supply shortages. Over 100 metal parts have been identified as critical components have potential for 3D printing. Previously, 3D printing was confined to replacing smaller parts, but the new facility will be creating larger metal portions of the vessels. However while "progress is being made, it's still not a push-button technology where we can say: 'Make this part with this material and you'll get out what you need,'" notes Kevin Jurrens of the National Institute of Standards and Technology. (*Defense News*, November 6, 2023)

...AND UPDATING ITS CYBER DOCTRINE

Even as it continues to modernize its forces, the Navy is also adopting new non-kinetic strategies to ensure success in conflict. From a cybersecurity standpoint, the service has been quite adaptive over the past few years in identifying vulnerabilities and developing solutions. The new Navy cyber strategy, now in development, is inherently different, however. It operationalizes cyberwarfare as a core competency, and is expanded to cover offensive capabilities, new infrastructure, weapon systems, cyber operations, and warfighting ideas. According to experts, the initial groundwork for the new approach has already been laid. A plan for concrete implementation, however, is still in the works. (*Defense One*, November 22, 2023)

IS ZERO-FUEL SPACE TRAVEL FEASIBLE?

One of the biggest challenges to space exploration is the limitation imposed by fuel. But what if a spacecraft could transit space with a zero-fuel propulsion system? Space company IVO hopes to determine whether its Quantum Drive engine can break new ground when it is tested onboard a BARRY-1 cubesat, which was put into orbit by a SpaceX rocket. The engine, which uses "limitless power for propulsion from the Sun," reportedly was successful in producing small amounts of thrust during 100 hours of testing in vacuum. If successful in a real-world trial, the quantum drive would be a massive development for space travel. (*The Independent*, November 21, 2023)