DEFENSE TECHNOLOGY MONITOR

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Related Categories: Democracy and Governance; Islamic Extremism; Military Innovation; Science and Technology; Warfare; Iran

AI SQUAD IMPROVEMENT GOALS
The Pentagon is hoping to improve soldier training by finding new ways to incorporate artificial intelligence (AI) into military readiness initiatives. The latest program, funded by U.S. Army Futures Command (AFC), is working to harness AI algorithms in synthetic training environments. According to Randall Spain, a research scientist at North Caroline State University's Center for Educational Informatics (CEI), the AI under development for the AFC will have two specific applications. "One tool is focused on assessing team-level communication, which is critical to mission success and soldier safety. The second tool is focused on identifying the most effective ways of providing feedback to trainees," Spain says. If the system is successful, an AI "coach" will be able to assess the communication effectiveness of individual soldiers and provide feedback and suggested improvements. (NC State University, October 2, 2019)

DIGITALLY MAPPING THE BATTLEFIELD
As threats continue to evolve, soldiers increasingly need to be able to both attack and defend densely populated urban centers in far away places. In order to accomplish this objective, troops are turning to training via 3D googles and computer systems. One World Terrain (OWT), the U.S. Army's synthetic training environment, allows warfighters to recreate cities and other environments at their home stations using geospatial sensors - and to gain familiarity with those places before ever deploying there. OWT allows a warfighter using just a drone and backpack to record footage of a large environment and convert it to a 3D file, simplifying a previously laborious process into one that can be completed in just a few hours.

The process offers clear advantages for troops who need to arrive in theater already situationally-aware. "You won't have to rely on pre-existing data or possibly older data," explains Kyle McCullough of the University of Southern California's Institute for Creative Technologies. "You can get brand new data when you're actually in a deployed environment, and so a commander would have access to the latest state of a battlespace." (*Army Recognition*, October 7, 2019)

IRAN DEVELOPS ANTI-TANK DRONE
After years of attempting to mitigate the impact of roadside bombs in environments like Iraq, the U.S. military developed effective countermeasures such as reinforcing the underbelly of tanks. Yet Iran - the principal supplier of such improvised explosive devices to insurgents in the Middle East in recent years - is innovating as well. The Iranian Army is said to be developing a small remote piloted ground vehicle, called the *Heidar-1*, that drives underneath enemy transports before detonating. These kamikaze drones, furthermore, are believed to employ explosively formed penetrators (EFPs) which spray molten hot copper capable of melting dense armor. (*Popular Mechanics*, October 9, 2019)

HOW FISH CAN HELP ENHANCE ARMOR
The U.S. military is expanding its research into processes that mimic Mother Nature in order to improve armor technology. The U.S. Air Force's Office of Scientific Research has funded a study at University of California, San Diego (UCSD) and University of California, Berkeley (UCB) which is exploring the properties of scales on the Arapaima (or pirrarcu) fish. Among the Arapaima's natural predators are piranhas, which has caused the fish to develop strong protective measures over time. Wen Yang, a UCSD materials scientist, notes that such overlapping scales are "tough and much lighter, without impeding body flexibility and locomotion." Their function can therefore be used to improve the effectiveness of armor plating, as well as aerospace design. (Reuters, October 16, 2019)

THE STATE OF BATTLEFIELD LASERS IS SOLID
Laser weapons are poised to make tanks much more difficult to hit in combat. The U.S. Army is planning on installing a new 50-kilowatt solid state fiber optic laser on Stryker combat vehicles in order "to protect maneuvering Brigade Combat Teams from unmanned aerial systems (UAS), rotary-wing aircraft, and rockets, artillery and mortar (RAM)." The new system is being billed as a "game changer" by military contractors and defense officials. "In the past, we used chemical lasers, which were dangerous," explains Mark Skinner of Northrop Grumman, the defense contractor spearheading the initiative. "Today, we operate with solid state fiber optic lasers, which gives us the ability to safely operate the system, and yet at a high efficiency we can convert electrical energy into photons." (military.com, October 16, 2019)