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Related Categories: Cybersecurity and Cyberwarfare; Military Innovation; Missile Defense; Science and Technology; Warfare; Russia; Ukraine

MILITARY ROBOT DOGS, TODAY AND TOMORROW

Not that long ago, robot dogs in the hands of the military or law enforcement bodies were the stuff of scary dystopian futures. Today, however, such platforms are playing a growing number of functions for the U.S. armed forces. Robotic dogs can be used for "reconnaissance, target acquisition, confined space and subterranean inspection, mapping, EOD safety, wireless mesh networks, perimeter security, and other applications where they [the U.S. military] want a better option than tracked and wheeled robots that are less agile and capable," says Jiren Parikh of Ghost Robotics, which manufactures such platforms. However, while the potential uses have expanded, the four-legged drones are still limited by their power, payload capacity, and endurance.

Sam Bendett, an unmanned systems expert at the Center for Naval Analyses, believes robot dogs are still in their infancy, and will not be lethal systems in the near term. According to him, "the easiest way to use such a system isn't in combat, where a situation is chaotic or unpredictable, but as a logistical tool to ease the burden for soldiers at the tactical level." But Peter Singer of the New America Foundation cautions that "the armed role is coming... It's the same thing that happened with unmanned aerial systems... The Predator drone started out with just a camera and now it has Hellfire missiles." (*Task and Purpose*, March 1, 2023)

REPURPOSING THE REAPER

For years, U.S. special operators have relied upon the notorious MQ-9 Reaper UAV to conduct intelligence and surveillance operations in numerous conflict zones, notably in Afghanistan and Iraq. Today, Air Force Special Operations Command (AFSOC) would like to augment the unmanned platform to serve as a mobile hub capable of itself deploying a swarm of autonomous drones. According to AFSOC spokeswoman Lt. Col. Rebecca Heyse, "in contested or denied environments, AFSOC is shifting from multiple operators controlling a single MQ-9A to a single air commando directing a family of systems..." The expanded MQ-9 units "will leverage multiple platforms and incorporate autonomy and eventually Artificial Intelligence technologies" to deliver new capabilities – including cyber and electronic warfare – to special operators, the Air Force, and other elements, Heyse lays out. The result will be a massive expansion of capabilities in contested environments: "[the innovation] will increase the number of platforms AFSOC operators can manage by an order of magnitude, and through those systems, cover more terrain and prosecute more targets across the spectrum of operating environments." (*Defense One*, March 6, 2023)

TOWARD A MUTANT MISSILE

The U.S. Air Force is seeking new and innovative methods to engage highly maneuverable adversary missile threats. Researchers at the Air Force Research Laboratory may have hit upon a solution for the increasingly vexing problem: an advanced air-to-air missile interceptor known as Missile Utility Transformation via Articulated Nose Technology (MUTANT). In a simple analogy, the nose or front portion of the MUTANT missile would be like the smaller section of a bendable straw. As a target missile changes flight paths, the articulating nose of the MUTANT missile would more easily bend and realign with the target to quickly correct course for intercept. While promising, the system still faces some hurdles – among them designing the articulating components to withstand high temperatures associated with traveling at supersonic speeds. (*The Drive*, March 9, 2023)

RUSSIA TESTING NUKES WITH LASERS

Maintaining a large nuclear stockpile without testing the weapons in it poses an administrative challenge. Russia has relied on consistently replacing the plutonium "pits" of weapons to ensure that they are active and operable, while the U.S. has utilized a combination of lasers and supercomputers to remain nuclear capable. However, it appears that Russia is now developing the largest high-energy laser in the world to test its nukes. In lasers, size matters because large lasers translate to higher energy and more effective nuclear material testing, which in turn leads to a better understanding of nuclear degradation and more accurate simulations of the explosive results of a full warhead detonation. However, Russia's laser development is being hampered by real world constraints, as the war in Ukraine has created a massive – and ongoing – "brain drain" of scientific talent. (*Wired*, March 10, 2023)

EELS ENGAGE IN UNDERGROUND WARFARE

In 2019, West Point's Modern War Institute published a wish list of attributes to increase competency in subsurface warfare, with better maneuverability in underground cavities a principal desired feature. Fast forward some four years, and today the DoD is moving to borrow a technology developed by NASA to explore foreign planets for use in military applications. Specifically, the Exobiology Extant Life Surveyor (EELS) is a robotic snake-like tool with a communication and sensor suite capable of operating in extreme environments and through all terrain (ex. water, rock, sand). EELS could be utilized in tunnel warfare operations ranging from traversing tunnels and caves that house nuclear weapons to those sheltering enemy combatants. (*National Defense*, March 14, 2023)