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Related Categories: Cybersecurity and Cyberwarfare; Military Innovation; Science and Technology; Warfare

DIRECTED ENERGY EXTENDS UAV AIRTIME...
The U.S. military is constantly exploring ways to extend the time that drones engaged in surveillance and combat missions can remain aloft. To date, however, such systems have suffered from severe limitations to the amount of "airtime" they can engage in, due to constraints on the capacity of their associated batteries. Since non-contact wireless charging methods like the wireless charging stations now being implemented by the U.S. Navy for underwater systems (See *Defense Technology Monitor* No. 22), are not feasible for airborne UAVs, the U.S. Army has developed an alternative wireless charging method. Using a ground-based laser at a range of over 1,600 feet, Army researchers are working to transfer energy to a drone in flight via a laser beam targeting its photovoltaic cell.

If the technology is successful, it will allow a drone to fly almost indefinitely. Reportedly, the largest impediment to the alternative fueling method is maintaining tight beam control that ensures the laser is targeting the precise charging location - necessary because excess heat on the wrong area of the drone can cause serious system malfunction. While the technology remains in its nascent stages, there is hope for a working prototype to come online in 2020. (*Digital Trends*, September 5, 2018)

...AND SO DOES 3D PRINTING
Thanks to a new 3D printing process that uses metal instead of plastic, the makers of UAV components are now able to design and construct mechanical devices on a small scale that significantly increases efficiency. On some UAVs, electrical power is generated through the use of a turbine and generator. These systems are exposed to extremely high temperatures, but unlike their larger counterparts smaller turbines are not able to easily dissipate heat — which can lead to component failure. However, researchers at Southwest Research Institute (SwRI) have used a 3D printing selective laser to create tiny channels in small UAV turbines that allow hot air to escape efficiently without compromising any power production. The game-changing process allows small UAV turbines previously capable of producing only hundreds of hours electricity to last exponentially longer. (*Science Daily*, September 4, 2018)

DARPA TAKES AIM AT HYPERSONIC WEAPONS
U.S. military leaders rightfully worry about the threat posed by hypersonic weapons, since not many good options currently exist to track or counter the threat posed by such weapons. The Pentagon's brain trust, however, is working on a potential solution. While details haven't yet been released, the Defense Advance Research Projects Agency (DARPA) is known to be working on a project called "Glide Breaker" which is designed to build up defenses against hypersonic weapons. The program will focus on "component technologies" needed for multiple systems, including a "hard-kill" interceptor designed to intercept fast-moving missiles. (*The Drive*, September 6, 2018)

REINTEGRATING SUPER SOLDIERS
Science fiction is progressively becoming reality as advancements in technology increasingly allow soldiers to seamlessly integrate with computer systems to pilot drones, participate in cyber defense, and manifest superhuman-like abilities. Recently, breakthroughs in gene therapy have been utilized to cure blindness in children and adults, paving the way for the use of genetic enhancements for military applications. However, as various types of human augmentation become possible, the Pentagon will need to ponder a new and novel challenge: how to reintegrate super soldiers back into society, post-conflict. DARPA's newest augmentation project, the Next-Generation Nonsurgical Neurotechnology (N3) program, is designed to ensure that the effects of brain alterations associated with augmentation are short-term and reversible. This and similar initiatives are being developed to find ways for augmentation to be temporary, and to help balance the need to keep pace with adversaries on the battlefield while simultaneously ensuring that soldiers have a good and fair life afterward. (*Popular Mechanics*, September 25, 2018)