



DEFENSE TECHNOLOGY MONITOR

The American Foreign Policy Council's Review of
Developments in Defense Technology

Defense Technology Monitor: No. 23

December 6, 2017 **Richard M. Harrison, Andrew Greenman**

Related Categories: Cybersecurity and Cyberwarfare; Military Innovation; Missile Defense

CHINA'S CYBERFORCE SET TO SURGE

During a recent congressional hearing, General Joseph Dunford, the Chairman of the Joint Chiefs of Staff, named China the biggest future threat to American national security. The reasoning behind the designation is very likely tied to the potent cyber threat that is already posed by China's military and private hackers. But Beijing has publicly announced plans to massively expand their numbers. Currently, according to Chinese internet conglomerate Tencent, private sector demand for cybersecurity professionals in China massively outweighs the number of graduates from Chinese universities by more than 23:1, and this gap may be widening. However, the PRC has made plans to address this shortfall over the course of the next decade by establishing elite cybersecurity educational institutions across China. This Fall, seven schools were chosen to carry out the state sponsored pilot programs with a mix of civilian and military-affiliated institutions. The official plan will fast-track top graduates to the PLA's cyber wing, known as the Strategic Support Force. (*Asia Times*, October 2, 2017)

THE MARINES EMBRACE ADDITIVE MANUFACTURING

Additive manufacturing, otherwise known as 3D printing, is increasingly being embraced by the U.S. military. This year alone, the Navy experimented with 3D printing a submersible hull (see *Defense Technology Monitor* No. 21) and the Army with 3D printing a functional grenade launcher (see *Defense Technology Monitor* No. 16). Now, the Marines are getting in on the action. With the help of the technical team in the U.S. Army Research Lab, this Fall the Marines have begun testing 3D printed projects such as small unmanned aerial systems like remote-controlled drones. Under the service's emerging capabilities, 3D manufactured quadcopters could be selected from a portfolio of designs, tailored for a specific mission, and produced and available for use within a day. (Marines.mil, October 3, 2017)

HOW COAL MAY FUEL A DEFENSE TECH BOOM

Rare earth minerals are vitally important to the manufacturing of lasers, batteries, high-end aerospace alloys, and computer parts. Sarma Pisupati, a professor at Penn State University, has been researching effective ways to extract these metals from coal byproducts. If Professor Pisupati and his partners in industry can successfully scale up the production of rare earth minerals from Pennsylvania coal, it would provide an alternative source for these minerals. This development is critical for U.S. national security because currently the U.S. is almost entirely dependent on foreign sources of rare earth elements, and 85 percent of the global supply comes from China. A reliable domestic supply would alleviate strategic concerns about American military manufacturing in the event of a potential standoff with China. (*Penn State News*, October 17, 2017)

A FACELIFT FOR U.S. EW TECHNOLOGY

The United States Army is in the market for new drone-mounted precision electronic warfare technology. To combat remotely detonated IEDs, soldiers in Iraq and Afghanistan have been equipped with vehicle-mounted and portable jamming systems. The problem with current U.S. systems, however, is that they jam incoming detonation signals by overpowering them with a stronger signal, thus making themselves highly detectable in the process. But the Army's Rapid Equipping Force (REF), which seeks to identify technologies nearly ready for battlefield use, says U.S. electronic warfare capabilities can be quickly improved with stronger signals, better software, and upgraded hardware (some of which is already available and being used to collect signals intelligence). REF director Col. John Lanier also warned that the U.S. has been left behind by Russia's electronic warfare and that quick, simple improvements are needed to close the gap. (*Defense Systems*, October 19, 2017)

THOSE OTHER DIRECTED ENERGY WEAPONS

While lasers are perhaps best known in the sphere of defense because of their high-profile nature, other directed energy systems have no less military potential. In one example, U.S. Air Force researchers are working on high power microwave applications for the non-lethal degradation of electronics. According to Erin Pettyjohn, Deputy Division Chief of the High Power Electromagnetics Division of the Air Force Research Laboratory (AFRL) Directed Energy Directorate, high power electromagnetic (HPEM) technology is "designed to affect only electronics while also being safe to humans. It will provide a capability to enable low collateral damage, as it will not physically destroy infrastructure nor affect personnel health." The experiments will investigate applications of the technology across a range of electronic warfare applications, including missile defense and disrupting energy grids, as well as investigating integration with existing Air Force high-energy microwave projects based at Kirtland Air Force Base in New Mexico. (*Israel Homeland Security*, October 23, 2017)