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# S&T NEWS BULLETIN

*The Latest in Science and Technology Research News*

## FEATURE ARTICLES

***Points of interest:***



### Will AI help save lives on the battlefield?

c4isrnet.com, 31May2018

After a while the buzzwords start to ring hollow. What's "artificial intelligence," in practical terms? An Orwellian nightmare that will control our every battlefield maneuver? Or a helpful tool to aid the war fighter?

Let's bring it down to Earth, make it tangible. AI can, for instance, scan a live video feed faster and more accurately than any human and then warn commanders of imminent danger.

At least that's the premise behind an ongoing project at the Air Force Research Laboratory at Wright-Patterson Air Force Base. "Video is captured with such velocity and volume [that] no individual or team of individuals can hope to analyze that data in a meaningful way," said Scott Clouse, senior research engineer at the Decision Science Branch.

AI offers a faster, smarter alternative. While video intelligence can be an invaluable resource, it's also a massive manpower suck. "In some instances, we are up to teams of 30 people looking at one video feed, just to make sure we don't miss anything," Clouse said.

"There is an immediate need to cut down the number of people on a single feed, maybe even to the point where we could have a single person looking at multiple feeds. It could dramatically reduce the workload on the force."

In late 2017 the AFRL research team hit a milestone in its work, winning the Large-Scale Movie Description Challenge at the 2017 International Conference on Computer Vision in Venice, Italy. In that competition, AI-driven systems were tasked with creating simple written descriptions of short clips taken from commercial film footage.

The techniques used here could in principal serve as the basis for an AI-driven situational awareness tool.

While the team kept its movie captions deliberately terse — "Someone looks up, someone reads a letter" — video interpretation on the battlefield could perhaps offer an even deeper dive into video intelligence.

*Air National Guardsmen set up a remote operational video enhanced receiver for video from overhead aircraft to provide situational awareness. Can artificial intelligence be trained to more quickly and accurately analyze the volume of video to warn of imminent danger?*

"On the battlefield you are not competing with the other audio, you are not competing with music in the background. You could deliver a more lengthy verbal description," said Vincent Velten, AFRL's Multi-Domain Sensing Autonomy Division Decision Science Branch technical advisor.

**The time factor**

For AI to interpret video data, the system must be told what to look for. Right now, programmers can set a simple system to identify specific shapes or colors or types of activity. Moving forward, they want the AI-driven system to cull more detailed information. In technical terms, the mechanism that enables this is called a recurrent neural net, or RNN.

The RNN adds the memory component to the process. "This is what gives you time, and time is what gives you context," Clouse said. "You see a person standing next to the truck and then you see a person sitting in

## FEATURE ARTICLE (CONT'D)

in the truck. You can intuit that person got into the truck. You start to see relationships in the sequences."

There's some urgency to this work, as the military comes to rely ever more heavily on video capture as a situational awareness tool. Velten pointed especially to the Air Force's use of video feeds from remotely piloted aircraft.

"The Air Force makes a lot of use of this stuff, and then there are also the small UAVs that are becoming more and more interesting. That is right now the principle motivation," he said.

The AFRL team needs about five more years to produce a battlefield-worthy version of its video scanning AI tool. To get to the finish line, researchers need to spend more time looking at actual intel and tackling specific military objectives.

Just as last year's movie competition had a specific tactical goal — caption five seconds of a movie — the researchers need to build their tools around specific ISR objectives. The AI is only as good at what you tell it to do, and they're still refining the process of writing those instructions for the machines to follow.

"We have a lot of data right now. What we need are concrete objectives to train the system," Clouse said.

"We need an operational setting where we have some data that is labeled or captioned appropriately that we can feed into the training mechanism, in order to train the systems on what to look for."

If it works, an AI-driven system could make it easier to pull the most important information from a video feed.

Watching video takes time, far more time than it would take to read a simple sentence or two the sums up the relevant action. "We want to efficiently translate all this video information into a semantic form that is efficient for people to use," Clouse said.

"Fundamentally it means that you know what is going on and you know what has changed, without having to stare at every frame as it goes by." Tags: Artificial Intelligence, Feature

***"The techniques used here could in principal serve as the basis for an AI-driven situational awareness tool."***

# FEATURE ARTICLE

**Duelling AIs defeat facial recognition tech**

newatlas.com, 01JUne2018

Most of us probably don't like the idea of some stranger finding out who we are, based only on an online photo of us. Thanks to the facial recognition systems used by social media sites, however, such a thing is becoming increasingly possible. Scientists recently decided to do something about it, by turning a couple of artificial intelligence (AI) systems against one another.

At the University of Toronto, Prof. Parham Aarabi and grad student Avishek Bose started by designing two AI-based neural networks. One of these used the same techniques as existing facial recognition systems, to identify people in photos. The other network sought to thwart the first one, by slightly altering the aspects of those photos that were being used to identify the people.

"The disruptive AI can 'attack' what the neural net for the face detection is looking for," says Bose. "If the detection AI is looking for the corner of the eyes, for example, it adjusts the corner of the eyes so they're less noticeable. It creates very subtle disturbances in the photo, but to the detector they're significant enough to fool the system."

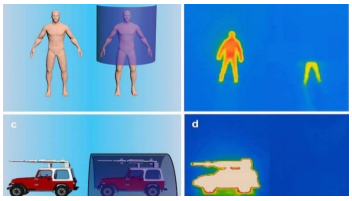
The two networks went back and forth for a while, each one learning what the other was doing and trying to compensate for it. What ultimately resulted was an algorithm that could be applied to photos of faces, making them nearly facial recognition-proof yet still recognizable to people who knew them.

Aarabi and Bose tested the system on the existing 300-W face dataset, which consists of photos of over 600 faces covering different ethnicities, lighting conditions and environments. Without the algorithm being applied to those images, a facial recognition system was able to accurately identify almost 100 percent of the people. Once it was applied, however, that rate dropped to 0.5 percent.

Tags: Artificial Intelligence, Feature

***"It creates very subtle disturbances in the photo, but to the detector they're significant enough to fool the system."***

# FEATURE ARTICLE



*A newly developed stealth sheet can hide hot objects like human bodies or military vehicles from infrared cameras. Credit: Hongrui Jiang*

***"You can intentionally deceive an infrared detector by presenting a false heat signature," says Jiang. "It could conceal a tank by presenting what looks like a simple highway guardrail."***

## 'Stealth sheet' hides hot objects from prying infrared eyes

phys.org, 21JUne2018

Infrared cameras are the heat-sensing eyes that help drones find their targets, even in the dead of night or through heavy fog.

Hiding from such detectors could become much easier, thanks to a new cloaking material that renders objects—and people—practically invisible.

"What we have shown is an ultrathin stealth 'sheet.' Right now, what people have is much heavier metal armor or thermal blankets," says Hongrui Jiang, the Lynn H. Matthias Professor and Vilas Distinguished Achievement Professor of electrical and computer engineering at the University of Wisconsin-Madison.

Warm objects like human bodies or tank engines emit heat as infrared light, and the new stealth sheet, described June 15, 2018, in the research journal *Advanced Engineering Materials*, offers substantial improvements over other heat-masking technologies.

"It's a matter of the weight, the cost and ease of use," says Jiang.

Measuring less than one millimeter wide—roughly the thickness of 10 paper pages—the thin sheet absorbs approximately 94 percent of the infrared light it encounters. Trapping so much light means that warm objects beneath the cloaking material become almost completely invisible to infrared detectors.

Importantly, the stealth material can strongly absorb light in the so-called mid- and long-wavelength infrared range, which is the type of light emitted by objects at approximately human body temperature.

What's more, by incorporating electronic heating elements into the stealth sheet, the researchers created a high-tech disguise for tricking infrared cameras.

"You can intentionally deceive an infrared detector by presenting a false heat signature," says Jiang. "It could conceal a tank by presenting what looks like a simple highway guardrail."

To trap infrared light, Jiang and colleagues turned to a unique material called black silicon, which is commonly incorporated into solar cells. Black silicon absorbs light because it consists of millions of microscopic needles (called nanowires) all pointing upward like a densely-packed forest—incoming light reflects back and forth between the vertical spires, bouncing around within the material instead of escaping.

Although black silicon has long been known to absorb visible light, Jiang and colleagues were the first to see the material's potential for trapping infrared, and they boosted its absorptive properties by tweaking the method through which they created their material.

"We didn't completely reinvent the whole process, but we did extend the process to much taller nanowires," says Jiang.

They make those nanowires by using tiny particles of silver to help etch down into a thin layer of solid silicon, which results in a thicket of tall needles. Both the nanowires and the silver particles contribute to absorbing infrared light.

The researchers' black silicon also has a flexible backing interspersed with small air channels. Those air channels prevent the stealth sheet from heating up too quickly as it absorbs infrared light.

Currently, Jiang and colleagues are working to scale up their prototype for real-world applications with assistance from the UW-Madison Discovery to Product (D2P) program. They received a U.S. patent in fall 2017 for the material's use in stealth, and the Wisconsin Alumni Research Foundation, or WARF—UW-Madison's patenting and technology licensing arm—is actively pursuing two additional patent applications.

Tags: Feature, Materials Science

# Advanced Materials

## Lightweight metal foam blocks blast wave, debris from high-explosive rounds

phys.org, 26March2018

*"In short, we found that steel-CMF offers much more protection than all other existing armor materials while lowering the weight remarkably..."*

New research from North Carolina State University and the U.S. Army's Aviation Applied Technology Directorate shows that stainless steel composite metal foam (CMF) can block blast pressure and fragmentation at 5,000 feet per second from high explosive incendiary (HEI) rounds that detonate only 18 inches away. "In short, we found that steel-CMF offers much more protection than all other existing armor materials while lowering the weight remarkably," says Afsaneh Rabiei, senior author of a paper on the work and a professor of mechanical and aerospace engineering … ***Article***

Tags: Advanced Materials, Materials Science

## Thin engineered material perfectly redirects and reflects sound

SpaceDaily.com, 11APR2018

*"The new design is the first to demonstrate complete, near-perfect control of sound waves and is quickly and easily fabricated using 3-D printers."*

Metamaterials researchers at Duke University have demonstrated the design and construction of a thin material that can control the redirection and reflection of sound waves with almost perfect efficiency.

While many theoretical approaches to engineer such a device have been proposed, they have struggled to simultaneously control both the transmission and reflection of sound in exactly the desired manner, and none have been experimentally demonstrated.

The new design is the first to demonstrate complete, near-perfect control of sound waves and is quickly and easily fabricated using 3-D printers. The results appear online April 9 in Nature Communications.

"Controlling the transmission and reflection of sound waves this way was a theoretical concept that did not have a path to implementation - nobody knew how to design a practical structure using these ideas," said Steve Cummer, professor of electrical and computer engineering at Duke. "We solved both of those problems. Not only did we figure out a way to design such a device, we could also make one and test it. And lo and behold, it actually works."

The new design uses a class of materials called metamaterials - artificial materials that manipulate waves like light and sound through their structure rather than their chemistry. ***Article***

Tags: Advanced Materials, Materials Science

## An elastic fiber filled with electrodes set to revolutionize smart clothes

phys.org, 25May2018

*"Our technology could be used to develop a touch keyboard that's integrated directly into clothing..."*

EPFL has developed tiny fibers made of elastomer that can incorporate materials like electrodes and nanocomposite polymers. The fibers can detect even the slightest pressure and strain, and can withstand deformation of close to 500 percent before recovering their initial shape, all of which makes them perfect for applications in smart clothing and prostheses, and for creating artificial nerves for robots.

The fibers were developed at EPFL's Laboratory of Photonic Materials and Fiber Devices (FIMAP), headed by Fabien Sorin at the School of Engineering. The scientists came up with a fast and easy method for embedding microstructures in super-elastic fibers. For instance, by adding electrodes at strategic locations, they turned the fibers into ultra-sensitive sensors. What's more, their method can be used to produce hundreds of meters of fiber in a short amount of time. ***Article***

Tags: Advanced Materials, Materials Science

# Artificial Intelligence

***"...the authors also showed that they could use wireless signals to accurately identify somebody 83 percent of the time out of a line-up of 100 individuals. This ability could be particularly useful for the application of search-and-rescue operations..."***

## AI senses people's pose through walls

techxplore.com, 12June2018

X-ray vision has long seemed like a far-fetched sci-fi fantasy, but over the last decade a team led by Professor Dina Katabi from MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL) has continually gotten us closer to seeing through walls.

Their latest project, "RF-Pose," uses artificial intelligence (AI) to teach wireless devices to sense people's postures and movement, even from the other side of a wall.

The researchers use a neural network to analyze radio signals that bounce off people's bodies, and can then create a dynamic stick figure that walks, stops, sits and moves its limbs as the person performs those actions.

The team says that the system could be used to monitor diseases like Parkinson's and multiple sclerosis (MS), providing a better understanding of disease progression and allowing doctors to adjust medications accordingly. It could also help elderly people live more independently, while providing the added security of monitoring for falls, injuries and changes in activity patterns.

***Article***

Tags: Artificial Intelligence, Feature

# Conventional Prompt Strike

## Russia Unveils Katran Rotary-Wing UAV

uasvision.com, 05June2018

Russia unveiled its Katran rotary-wing unmanned aerial vehicle (UAV) during the Victory Day Parade in May. "The trials of the Katran UAV are scheduled for this summer [mid-2018]," a Russian aerospace industry source told *Jane's*.

The Katran is designed for fire support and reconnaissance missions, and carries a photo or TV camera, or a thermal imager. It features a co-axial rotor scheme and can land at unpaved airstrips.

The Katran has a normal take-off weight of 340 kg for best performance, but can accommodate a maximum take-off weight of 490 kg if necessary. The vehicle carries a 60 kg payload. It is powered by a 115-hp engine, which produces a climb rate of up to 12 m/s, a maximum speed of 130 km/h, and an endurance of 4 hours during flights with the normal take-off weight.

***Article***

Tag: Conventional Prompt Strike

***"Once you figure out the mathematical problems, then it's a simple matter of arming each of those small boats with rockets and missiles and sending them after a $1 billion cruiser. "***

## Robo-Boats Swarm in the South China Sea

uasvision.com, 05June2018

This video shows a swarm of 56 small, unmanned boats operating in the South China Sea. While a rudimentary demonstration, it mirrors similar exercises performed by U.S. Navy boats practicing — semi-autonomously — to defend harbours and intercept incoming vessels.

The Chinese robo-boats do not appear to be armed, but the company behind it — Yunzhou Tech Corporation — revealed an armed unmanned boat at a Beijing "Civil-Military Integration Expo" in July 2017.

The show focused on cutting-edge technologies that China believes could provide an "asymmetric" advantage in a conflict with the United States. Meaning, cheaper technologies and tactics that allow a weaker adversary to exploit unanticipated weaknesses in a more powerful opponent.

If the at-sea demonstration is any sign, those capabilities are developing.

***Article***

Tag: Conventional Prompt Strike

## Belarus developed drone kit for anti-tank rocket launcher

Defence-blog.com, 04June2018

On May 18, a unique unmanned aerial vehicle was shown at the Losvido training ground in the Vitebsk region, Belarus.

At the Losvido training ground, was conducted meeting with officers-operators of the Armed Forces under the leadership of the Deputy Chief of the General Staff of the Armed Forces – Chief of the Main Operations Directorate Major-General Pavel Muraveiko.

At the time of the event was spotted the unique unmanned aerial vehicle, which is the anti-tank rocket launcher equipped with four engine as that of a conventional quadcopter.

The characteristics of the new flying anti-tank rocket launcher and the name of the manufacturer are not disclosed.

It is worth noting that an overall appearance of anti-tank rocket launcher reminds the RPG-26 Aglen, disposable anti-tank rocket launcher developed by the Soviet Union. It fires a single-stage rocket with jack-knife fins, which unfold after launch. The rocket carries a 72.5 millimeter diameter high explosive anti-tank single shaped charge warhead capable of penetrating 440 millimeters of armour, one meter of reinforced concrete or one and a half meters of brickwork.

Tag: Conventional Prompt Strike

# Cyber Security

***"When they are in range, IMSI catchers also can deliver malicious software to targeted devices for the purpose of stealing information stored on them or conducting longer-term monitoring of communications. "***

## Signs of sophisticated cellphone spying found near White House, U.S. officials say

Washingtonpost.com 01June2018

A federal study found signs that surveillance devices for intercepting cellphone calls and texts were operating near the White House and other sensitive locations in the Washington area last year.

A Department of Homeland Security program discovered evidence of the surveillance devices, called IMSI catchers, as part of federal testing last year, according to a letter from DHS to Sen. Ron Wyden (D-Ore.) on May 22. The letter didn't specify what entity operated the devices and left open the possibility that there could be alternative explanations for the suspicious cellular signals collected by the federal testing program last year. ***Article***

Tag: Cyber Security

# Imaging Technology

***"Every image has it own imperceptible noise statistics. When you manipulate an image, you actually move the noise statistics along with the content. "***

## Photo fakery nabbed via outsmarting technique

techxplore.com, 251June2018

Image manipulation detection is different from traditional semantic object detection because it pays more attention to tampering artifacts than to image content, which suggests that richer features need to be learned. We propose a two-stream Faster R-CNN network and train it endto-end to detect the tampered regions given a manipulated image. One of the two streams is an RGB stream whose purpose is to extract features from the RGB image input to find tampering artifacts like strong contrast difference, unnatural tampered boundaries, and so on. The other is a noise stream that leverages the noise features extracted from a steganalysis rich model filter layer to discover the noise inconsistency between authentic and tampered regions. We then fuse features from the two streams through a bilinear pooling layer to further incorporate spatial co-occurrence of these two modalities. ***Article***

Tag: Imaging Technology, AI

# Materials Science

***"At the same time the United States is using a greater range of materials, contributing to their scarcity, the country is also growing more reliant on foreign sources for those materials."***

## The risks facing the Pentagon's high-end electronics and radars

c4isrnet.com, 22May2018

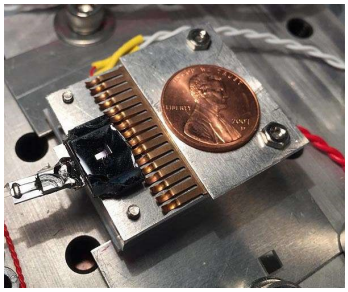
A new Pentagon report warns that the supply chain for high-end electronics and rare materials is increasingly at risk, likely putting radar and electronic warfare capabilities in danger as the Department of Defense relies more on these items.

Among the concerns highlighted by the annual industrial capabilities report from the Pentagon's Office of Manufacturing and Industrial Base Policy is how to make sure the supply of key electronics components is always available to meet department demands. The report was quietly released on a department website May 17.

Part of the challenge for the department is the reality that it has "limited leverage" to influence the electronics industry, as global military production represents only 6 percent of the overall market. ***Article***

Tag: Materials Science

# Quantum Science



*NIST's prototype chip for measuring important quantities such as length with quantum precision. The device works by using a laser to probe atoms to generate infrared light at a precise wavelength. The NIST chip packs a tiny cloud of atoms and structures for guiding light waves into less than 1 square centimeter. The penny is a scale reference.*

## Mini toolkit for measurements: New NIST chip hints at quantum sensors of the future

spacedaily.com, 11April2018

Researchers at the National Institute of Standards and Technology (NIST) have created a chip on which laser light interacts with a tiny cloud of atoms to serve as a miniature toolkit for measuring important quantities such as length with quantum precision. The design could be mass-produced with existing technology.

As described in Optica, NIST's prototype chip was used to generate infrared light at a wavelength of 780 nanometers, precisely enough to be used as a length reference for calibrating other instruments.

The NIST chip packs the atom cloud and structures for guiding light waves into less than 1 square centimeter, about one ten-thousandth of the volume of other compact devices offering similar measurement precision.

***Article***

Tag: Quantum Science

***"...physicists can track how often muons of different energies reach detectors placed around a target, and compare that with the expected rate without an obstacle, to build up a 3D profile of the density of the interior."***

## Muons: the little-known particles helping to probe the impenetrable

nature.com, 24May2018

The muon is going mainstream. The particle, a heavy version of the electron that rains down on every square centimeter of Earth, is little known outside particle physics — and last year it helped archaeologists to make a stunning discovery of a previously unknown chamber in Egypt's Great Pyramid[1].

Volcanologists and nuclear engineers are also finding new uses for the same technique, called muography, which harnesses muons to probe the innards of dense structures. The first companies are looking to cash in.

"The discovery in the pyramids last year has really put muography on the map," says David Mahon, a physicist at the University of Glasgow, UK, who co-organized an international a meeting called Cosmic-ray Muography, sponsored by the Royal Society and held on 14–15 May in Newport Pagnell, UK. ***Article***

Tag: Quantum Science

***"Long-sought evidence has been found of magnetism at the edges of graphene, a two-dimensional form of carbon. The findings might enable the development of the logic gates needed for quantum computers."***

## Spinning on the edge of graphene

Nature.com, 30May2018

The 2D form of carbon known as graphene has many potentially useful properties, but is usually not magnetic when pristine. However, theoretical predictions suggest that the edges of graphene sheets should become magnetic when they have a zigzag arrangement of carbon atoms[1]. Observing this effect has been challenging because of the difficulties of detecting the predicted minute magnetic signal and because it is hard to fabricate defect-free edges that have the required shape. In a paper in *Nature*, Slota *et al*.[2] report a method for making nanometre-wide graphene ribbons in solution, and thereby for producing nanoribbons with well-defined zigzag edges 'decorated' with organic radical molecules that bear electron spins — a quantum property of electrons that is associated with magnetism. The authors' results provide solid evidence of magnetism at graphene edges, and show that edge spins have potentially useful quantum dynamics. Magnetic forms of graphene would be useful for spintronics, a technology that forms the basis of today's magnetic data storage[3,4]. ***Article***

*The surface facility for the IceCube experiment, which is located under nearly 1 mile (1.6 kilometers) of ice in Antarctica. IceCube suggests ghostly neutrinos don't exist, but a new experiment says they do.*

## A Major Physics Experiment Just Detected a Particle That Shouldn't Exist

amp.livescience.com
01June2018

Scientists have produced the firmest evidence yet of so-called sterile neutrinos, mysterious particles that pass through matter without interacting with it at all.

The first hints these elusive particles turned up decades ago. But after years of dedicated searches, scientists have been unable to find any other evidence for them, with many experiments contradicting those old results. These new results now leave scientists with two robust experiments that seem to demonstrate the existence of sterile neutrinos, even as other experiments continue to suggest sterile neutrinos don't exist at all.

That means there's something strange happening in the universe that is making humanity's most cutting-edge physics experiments contradict one another. ***Article***

Tag: Quantum Science

# Science Without Borders

***"Our clean fuel is fully compatible with existing engines, so it provides the transportation sector with a solution for significantly reducing emissions, either through blending or direct use. Our technology is scalable, flexible and demonstrated."***

## Pilot plant demonstrates low-cost conversion of CO2 into fuel

newatlas.com, 07June2018

Reducing carbon dioxide in the atmosphere is one of the most pressing concerns facing the world today. Cutting back the amount of CO2 that's newly pumped into the air is vital, but it might not be enough – we need to suck out some that's already up there. Direct air capture (DAC) systems have been discussed as a possibility for decades but it was, until recently, deemed too expensive to be practical. After running a pilot plant for three years, Canadian company Carbon Engineering (CE) has broken down the costs of a DAC system and shown it can be done much more cost-effectively than previously thought.

As the team notes, DAC technology itself is not particularly new. Last year, Swiss company Climeworks opened one of the first commercial DAC plantsnear Zurich, which is made up of a roof-mounted facility that captures CO2 from the air and pipes it into a nearby greenhouse. ***Article***

Tag: Science w/o Borders

# SENSORS

***"At DARPA, researchers are working on a project called Adaptable Navigation Systems that would rely on sensors to collect other signals, such as those from mobile networks or commercial satellites. "***

**GPS guidance can be fooled, so researchers are scrambling to find backup technologies**

techxplore.com, 23March2018

Five years ago, a team of researchers from the University of Texas at Austin boarded an $80-million yacht with the intent of trying to fool the vessel's navigation system and stealthily push it off course. Once the yacht was off the coast of Italy, the team—with the knowledge and permission of the vessel's owner, a wealthy individual who doesn't want to be named—used a briefcase-sized device to slowly drown out legitimate GPS signals and take control of the ship's guidance. It worked. Using the false signals, the team gradually turned the ship while its chart display continued to show it traveling in a straight line.

Since the U.S. developed the Global Positioning System, or GPS, in the 1970s, the nation has become increasingly reliant on this satellite-based method of determining position, time and velocity. ***Article***

Tag: Imaging Technology, Sensors

# STEM

*Summit is eight times more powerful than its predecessor.*

**World's most powerful supercomputer handles staggering 200,000 trillion calculations per second**

newatlas.com, 09June2018

The US Department of Energy's Oak Ridge National Laboratory (ORNL) has unveiled a computer capable of handling 200,000 trillion calculations per second (200 petaflops). Laying claim to the title of the world's most powerful supercomputer, Summit is eight times more powerful than ORNL's previous supercomputer, Titan, which came online in 2012 with a capacity of 27 petaflops.

Supercomputers have advanced so far and so fast that it's easy to forget that the computers called smartphones we carry around in our pockets could stroll past a state-of-the-art supercomputer of a generation ago without breaking a digital sweat. However, ORNL's Titan supercomputer was 200,000 times more powerful than a desktop computer, so why make one eight times more powerful than that? ***Article***

Tag: STEM

***"...these kinds of ultra-lightweight motors could do significant work towards offsetting the large weight figures of today's heavy lithium battery packs in electric vehicles. "***

**Magnax prepares to manufacture radically high-powered, compact axial flux electric motor**

newatlas.com, 30May2018

After nearly a decade in development, Belgian startup Magnax claims it has developed an ultra-high power, lightweight, compact axial flux electric motor with performance figures that blow away everything in the conventional radial flux world. Crucially, it says it's worked out how to manufacture them too.

It might not have the romance of combustion engine tuning, but it seems a bit of a battle is brewing to develop the kinds of high-performance motors that will power the electric cars, motorcycles, aircraft and industrial equipment of the future.

A week ago we wrote about Equipmake's spoke motor design, which allows it to pump out some 9 kilowatts per kilogram with exceptional cooling and continuous power production ability. ***Article***

Tag: STEM

The Office of Net Technical Assessment (ONTA)

ONTA's capability to perform technology watch and horizon scanning will help inform senior leadership on where best to invest resources in technology areas to maintain or regain global competitive advantage.

The primary objectives of the TW/HS branch are to identify and contextualize emerging disruptive technologies for senior leadership and to track global technology trends that challenge fundamental assumptions underpinning current operations and shaping the future of war.

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