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Scientists use acoustic tweezers to 'sew' fabric

London

Scientists have successfully used sound waves to levitate and manipulate multiple objects simultaneously for the first time, using the system to "sew" a thread into a piece of fabric. The system could be used to acoustically stitch up internal injuries or deliver drugs to target organs. Sound exerts a small acoustic force and by turning up the volume of ultrasonic waves, too high pitched for humans to hear, scientists create a sound field strong enough to move small objects.

Scientists from University of Bristol in the UK and Universidad Publica De Navarra in Spain attached two millimetric polystyrene spheres to a piece of thread and used the acoustic tweezers to "sew" the thread into a piece of fabric. The system can also simultaneously control the 3D movement of up to 25 of these spheres in air. "Now we have more versatility—multiple pairs of hands to move things and perform complex procedures, it opens up possibilities that just weren't there before," said Professor Bruce Drinkwater at University of Bristol in the UK. "We applied a novel algorithm that controls an array of 256 small loudspeakers—and that is what allows us to create the intricate, tweezer-like, acoustic fields," said Asier Marzo, from Universidad Publica De Navarra

.Acoustic tweezers have similar capabilities to optical tweezers, the 2018 Nobel prize winner, which uses lasers to trap and transport micro-particles. However, acoustic tweezers have the edge over optical systems when it comes to operating within human tissue. Lasers only travel through transparent media, making them tricky to use for applications within biological tissue. On the other hand, ultrasound is routinely used in pregnancy scans and kidney stone treatment as it can safely and non-invasively penetrate biological tissue. Another advantage is that acoustic devices are 100,000 times more power efficient than optical systems.

"Optical tweezers are a fantastic technology, but always dangerously close to killing the cells being moved, with acoustics we're applying the same sort of forces but with way less energy associated. There's lots of applications that require cellular manipulation and acoustic systems are perfect for them," said Drinkwater. The team is confident that the same methodology could be adapted to in-water particle manipulation in approximately one year. They hope that soon after, it could be adapted for use in biological tissue. "The flexibility of ultrasonic sound waves will allow us to operate at micrometre scales to position cells within 3D printed assemblies or living tissue. Or on a larger scale, to levitate tangible pixels that form a physical hologram in mid-air," he said.

<https://www.theweek.in/news/sci-tech/2018/12/24/scientists-use-acoustic-tweezers-to--sew--fabric.html>

Bureaucracy targets another military institution

Harsha Kakar

The Canteen Stores Department (CSD) had been established in 1948 alongside the Navy canteen services. The reason for its creation was to provide military personnel with their basic needs, despite remoteness of their location. It initially commenced with a few items in its inventory, which has grown to over 4,000 presently. Its profit in the last financial year, earned from mainly military personnel was Rs 1,253 crores. It is under the overall supervision of the defence minister but run by army HQs.

It was created solely for military personnel, which was subsequently extended to civilians paid from defence estimates in 1966, against military advice. Despite serious objections by the military community, this facility was subsequently extended to retired civilian staff too, thus adding 650,000 entitled personnel. Retired civilians had restrictions on some items of purchase for which they objected to the Defence Ministry (MoD). The MoD has been attempting to force service HQs to remove these restrictions, which they are resisting, as it would impact availability to genuine customers, the serving and veteran community, due to budgetary constraints. Restrictions pertain to costly items including cars etc. There are already limitations on procurement by military personnel, but if opened for all, it may become nigh impossible for military personnel to obtain these items or ensure long waits.

The General Manager and Chairman Board of Administration (GMBOA), responsible for the daily running of the entire CSD network was always a serving military officer of the rank of a Major General, appointed on contractual basis for three to four years. Last week, the MoD issued a notification appointing a Major General, posted in another appointment in Mumbai, on a temporary basis for a duration of six months or selection of a new GMBOA, whichever is earlier, as against a permanent appointment. The MoD, ignoring service HQs had unilaterally amended the gazette notification containing recruitment rules for the GMBOA in 2017, opening doors for a Joint Secretary-ranked bureaucrat to be appointed. This unilateral action angered the military and Air Chief Marshal Arup Raha, the then senior most chief, wrote to the defence minister, Arun Jaitley, on the subject. No action was taken.

In August this year, when the current air force head of the CSD moved on promotion, it became evident that the MoD was contemplating appointing their own. The three service chiefs jointly approached the defence minister in August, who temporarily stalled the action. Hence, a temporary appointment was announced. Based on the meeting, service HQs subsequently forwarded an official communication to the MoD, objecting to the unilateral amendment. This communique has been languishing in the MoD, without being processed.

The bureaucracy appears to be planning to delay the case for six months, hoping for a change in defence minister or government, enabling them to push forth their agenda. The intention behind appointing a bureaucrat is to dilute CSD facilities by opening it to other central government organizations, making it almost redundant as also to amend rules on sharing profit earned by the CSD. Logically, if desired for others, a similar organization can be created, rather than dilute an existing one. CSD profits have already been used to fund the Sanskriti school in Delhi, which was created for children of bureaucrats. Most of the profit is kept by the government, the small portion which is returned to the armed forces is utilised for creating facilities and providing financial assistance to veterans.

The bureaucracy is seeking to grab every institution of the military that it can, despite having no role in the running nor even being entitled to it. It is now an open conflict between the bureaucracy and the military on controlling military assets. Evidently, the military is spending more time battling its own MoD and bureaucracy, which suddenly seems to have grown wings, rather than handling cross-border threats. At every stage, the bureaucracy seeks to delay, deny and prevent the armed forces from moving ahead. Surprisingly, this action appears to have the support of the defence minister, who permits it to act, either knowingly or unknowingly.

In addition, in a recent communique to Cantonment Executive Officers (CEOs) and Local Military Authorities (LMAs) responsible for the security and well being of cantonments, Minister Nirmala Sitharaman issued a clear warning. Open all roads ignoring security aspects or face the consequences. She ignored military security concerns. After her last directions, the army had already opened most roads keeping a few closed for security purposes. She is evidently following the philosophy that the armed forces interest 'come last, always and every time', the exact opposite of what her role as the defence minister should have been. With such a head at the MoD, there is no wonder that the ministry is working in a coordinated manner to denude the armed forces of every institution they have, including those on which a majority of the forces depend. Military hospitals are being opened to 'Modicare' and the CSD being taken over by the bureaucracy. Cantonments are already open. What could be next??

Never in the history of the country have the armed forces been pushed to such depths that they are forced to fight for their rights and dues. The defence minister can threaten the armed forces, as she did in the cantonment case, only because they are disciplined and respectful. But she cannot direct her own ministry not to cross limits in denuding the status and institutions of the armed forces. Is this the status and standing of the armed forces that PM Modi promised in his Rewari rally of 2013? Are his directions to her to break every military institution, degrade its status and lower its prestige? If these are not his directions, then she needs to be firmer with her MoD than the military. She must ensure that her bureaucracy does not cross limits. She should remember that as military institutions fall, anger against the government would only rise.

<https://www.thestatesman.com/opinion/bureaucracy-targets-another-military-institution-1502719059.html>



Wed, 26 Dec 2018

Army recovers copter stuck in Siachen snow

The Army has created a record of sorts as its pilots and technicians successfully recovered a helicopter which was stuck in snow at an altitude of 18,000 feet on Siachen Glacier in Jammu and Kashmir. The helicopter was brought back safely to the Siachen base camp with the help of infantry troops deployed there. According to sources in the Army, an ALH Dhruv chopper, on an air maintenance sortie in the 74-km-long Siachen Glacier, developed a snag and landed near a post called Khanda in January. Though the chopper landed safely, the overnight snow resulted in its falling sideways. Attempts were made to recover it, but there was no success .

Then in July, technicians and pilots of the Army ALH Squadron 203 in Leh managed to put new parts on the chopper and bring it back to the base camp. "I know the pilots and technicians who were involved in this operation... all I can say is that nothing is impossible for these men from Indian Army," former Army Aviation chief Lt. Gen. P.K. Bharali (ret'd) said on Tuesday.

Naval hospital ship Sandhani inducted

TN RAGHUNATHA

Indian Naval Hospital Ship, INHS Sandhani was on Monday commissioned at Naval Station Karanja at Uran in Raigad district at the hands of Vice Admiral Girish Luthra, Flag-Officer Commanding-in-Chief, Western Naval Command. Surgeon Vice Admiral Anup Banerji, DGMS (Navy) delivered the welcome address and Mrs. Preeti Luthra, President NWWA, Western Region, unveiled the commissioning plaque of the hospital. The Commissioning Warrant was read by the first Commanding Officer of the hospital, Surgeon Captain HBS Chaudhry.

With the steady expansion of Naval Station Karanja, over the last few decades, a need for a dedicated multi-specialty hospital was felt, in order to provide quality healthcare to more than 8,000 naval personnel and their dependents, who reside at the Karanja naval station. The commissioning of this 30-bedded hospital, with a team of specialists in the fields of Medicine, Surgery, Gynecology, Pediatrics, Anesthesia and Dental Sciences; will not only improve the quality and speed of healthcare delivery, but also obviate the need for patients, including those with critical ailments and emergency cases, to travel by sea to Mumbai.

<https://www.dailypioneer.com/2018/india/naval-hospital-ship-sandhani-inducted.html>



Defence PSU orders down 33% amid push to pvt sector

Vijay Mohan

DECLINING TREND

Year	Contracts	Value
2015-16	22	₹15,617.21cr
2016-17	8	₹12,374.05cr
2017-18	15	₹10,475.07cr



As the government gives an impetus to the private industry to manufacture equipment for the Armed Forces, the quantum of contracts awarded to Defence Public Sector Undertakings (DPSUs) has fallen by about 33 per cent over the past three years.

The value of capital contracts bagged by DPSUs in 2015-16 was Rs15,617 crore, which came down to Rs12,374 crore in 2016-17 and further fell to Rs10,475 crore in 2017-

18, according to information placed by the Ministry of Defence (MoD) in Parliament this month. On the other hand, the number of contracts awarded to DPSUs has flip-flopped from 22 in 2015-16 to eight in 2016-17 and 15 in 2017-18, the MoD data revealed. There are nine DPSUs in the country that function under the Department of Defence Production in the MoD that manufacture weapons, ammunition,

armoured vehicles, heavy vehicles, aircraft, helicopters, warships, submarines, missiles, electronic equipment, earth moving equipment and special alloys.

“The government is pursuing initiatives to achieve higher levels of indigenisation and self-reliance in the defence sector. This is sought to be achieved by harnessing the capabilities of both public and private sector industries in the country,” the ministry stated. Towards this end, the number of items requiring an industrial licence has been reduced. A total of 394 licenses have been issued to 239 Indian companies for manufacture of defence items since 2001. DPSUs and Ordnance Factories, which also function under the same department, have, as a policy, been outsourcing many of their requirements to medium and small-scale enterprises apart from large-scale industries.

However, based on Budget allocation to the Armed Forces for revenue expenditure, there has been a reduction in procurement of supplies by the services, which has resulted in proportionate reduction in procurement of input materials. Consequently, some supply orders placed in micro, small and medium enterprises have been cancelled or short-closed.

<https://www.tribuneindia.com/news/nation/defence-psu-orders-down-33-amid-push-to-pvt-sector/704093.html>



Wed, 26 Dec 2018

Only 616 border fencing light poles out of 2,061 functional

Out of the 2,061 Border Fencing Light poles along the international border in Gujarat's Bhuj and Gandhinagar Sector, only 616 are "functional", the BSF has told the CPWD, according to the minutes of an inter-departmental co-ordination meeting held in November. Border Security Force officers also informed the CPWD that out of 82 diesel gensets, only 38 are "functional", "affecting operational duties" by the troops on the sensitive international border, the minutes stated.

The meeting was held at BSF Headquarters in New Delhi, during which senior officers of BSF and CPWD, the government's largest construction agency, discussed several projects. BSF Director General Rajni Kant Mishra and Central Public Works Department DG Prabhakar Singh also attended the November 16 meeting. India's border with Pakistan runs through four states, Jammu and Kashmir (1,225 km, which includes 740 km of Line of Control), Rajasthan (1,037 km), Punjab (553 km) and Gujarat (508 km). "Out of 2,061 BFL poles, only 616 BFL poles are functional (along the international border in Bhuj and Gandhinagar Sector). Out of 82 DG sets, only 38 DG sets are functional." CPWD (was) requested to carry out necessary repair at the earliest as it is affecting operational duties performed by the troops deployed on the sensitive international border," stated the meeting's minutes prepared by the BSF and sent to the CPWD director general on December 12.

There have been several attempts of infiltration by terrorists who cut the border fences to enter India from the Pakistani side. BFLs are maintained by CPWD in Bhuj and Gandhi Nagar Sector. According to the minutes of meeting, the CPWD intimated that work of repairing of BFLs and DG sets in Bhuj and Gandhi Nagar Sector are in progress and will be handed over to BSF after proper rectifications. It also stated that in

Jammu, out of the 28 command posts in non-composite Border Output Posts, so far only three command posts have been completed and 17 are under-construction with "very slow progress" while work on eight have not yet started. It added that out of the 43 High Mast Lights in river-line gaps, so far work on 25 HML has been completed while three are under construction with "very slow progress" and 15 HML work has not started yet.

<https://www.dailypioneer.com/2018/india/only-616-border-fencing-light-poles-out-of-2-061-functional.html>

THE ECONOMIC TIMES

Wed, 26 Dec 2018

Rafale row bombs defence ministry's big plans on policy changes

By Manu Pubby



The defence ministry has been unable to implement groundbreaking changes in policies on production and offsets, despite a budgetary speech promise and detailed inputs by the industry that saw the proposed amendments as key enablers. Hit by the Rafale controversy, the defence ministry has not moved to amend its offsets policy since May this year, when a draft was presented for comments.

(The opposition has targeted proposed offsets to Reliance Defence in the Rafale deal.) A new defence production policy that was promised in 2018 has met a similar fate, with limited forward movement since the draft was issued in March. The proposed changes would have allowed the establishment of a fund regulated by the Securities and Exchange Board of India (Sebi) to promote startups to meet the offsets obligations of foreign vendors that are worth billions of dollars.

<https://economictimes.indiatimes.com/news/defence/rafale-row-bombs-defence-ministrys-big-plans-on-policy-changes/articleshow/67250408.cms>

Wed, 26 Dec 2018

SpaceX deploys US GPS satellite into orbit

Billionaire Elon Musk SpaceX has successfully launched and deployed a powerful next-generation GPS navigation satellite into orbit, making it the company's first-ever US government-sanctioned national security space mission. A SpaceX Falcon 9 rocket climbed into orbit on Sunday with the GPS 3 satellite designed to beam higher-power positioning, navigation and timing signals around the world. It was SpaceX's fifth attempt following technical and weather delays. "On Sunday, SpaceX successfully launched the US Air Force's first Global Positioning System III space vehicle (SV) from Space Launch Complex 40 (SLC-40) at Cape Canaveral Air Force Station, Florida," the company said in a statement. The satellite was deployed to its intended orbit approximately one hour and 56 minutes after lift-off.

Due to mission requirements, SpaceX did not attempt to land Falcon 9's first stage after launch. "The most important thing is that we get that rocket up safely and securely and it achieves its mission," said US Vice President Mike Pence, also Chairman of the US National Space Council. "I know this bird is going to fly and when it flies, it's going to make a difference for the security and prosperity of the American people," Pence said. The \$529 million GPS 3 satellite is the first of 10 being built by Lockheed Martin. The satellite would provide data for use by devices ranging from smartphones to automobiles, commercial aircraft and virtually all sectors of the transportation industry. "Multiple data streams will enable receivers in aircraft, for example, to compensate for atmospheric effects that might otherwise reduce accuracy," the report said. SpaceX won an initial contract to launch the first GPS 3 satellite in 2016.

<http://zeenews.india.com/science-environment/musks-spacex-successfully-deploys-us-gps-satellite-into-orbit-2165564.html>

THE ASIAN AGE

Wed, 26 Dec 2018

Novel AI can find gender, age of people on videos

Scientists have developed an artificial intelligence (AI) system that can identify people on video, detecting their age and gender more quickly and accurately. The development has already become the basis for offline detection systems in Android mobile apps, according to researchers from Higher School of Economics in Russia. Modern neural networks detect gender on videos with a 90 per cent accuracy. The situation with age prediction is much more complicated. Traditional neural networks consider discrete values of age.

In each of the video frames, the network estimates the probability of the person in the image being of a certain age. For example, if in 30 per cent of the frames the top prediction of the network is a person's age

as 21 years, and in 10 per cent as 60 years, its conclusion will be as follows: with a probability of 30 per cent this person is 21, and with a probability of 10 per cent, he or she is 60. Due to various conditions of observations or even slight head rotation, prediction of the same person's age in different video frames varies in the range of 5 years, plus or minus. Researchers found a way to optimise neural networks' operations.

They implemented a novel method to aggregate confidence levels produced by the neural network for each frame. The software systems of facial recognition analysis usually include several separate neural networks. One of them identifies the person, another one determines the gender, etc. An effective neural network with several outputs has been developed. It solves several tasks at a time: predicts age and gender, and produces a set of 1,000 numbers that uniquely attribute each person and allows them to be distinguished from other people. According to researchers, this solution will work even on low-performance smartphones.