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ThePrint

Fri, 12 Feb 2021

Drones, radars, remote cameras — Uttarakhand floods rescue effort is India's most hi-tech yet

Radars, remote cameras and antennae have been sourced from DRDO and CSIR, and start-ups were contacted for hi-tech drones

By Angana Chakrabarti and Ananya Bhardwaj

Chamoli/New Delhi: Drones, ground penetrating radars, remote cameras, sonar systems and VSAT antennae — the rescue teams on the ground in Uttarakhand are relying on a host of technologies as they search for nearly 200 people who remain missing since the floods struck Sunday.

A landslide at Ronti peak in Chamoli district triggered a sudden deluge of water and slush Sunday morning that left a trail of death and destruction in its wake. So far, 32 bodies, mainly of workers of the Tapovan Vishnugad Hydropower and the Rishi Ganga Hydropower plants, have been found.

“We have several tools (to assist the rescue operations). If required, we will use a sonar system, and other sensitive systems also,” said National Disaster Relief Force (NDRF) Commandant P.K. Tiwari at the site of the Rishi Ganga Hydropower Plant, where over 50 workers are reported to be missing.

“We have cutting and breaching devices. They (the teams) are working to detect bodies,” he added.

According to Tiwari, the rescue framework has undergone a massive change in the eight years since the 2013 Kedarnath floods.

“I was a commandant in the 19th battalion (ITBP) in 2013, when the Kedarnath floods happened. The disaster management structure was not as strong back in those days. But, now we have SDRF (State Disaster Response Force), NDRF (National Disaster Response Force) teams that are working very efficiently and the ITBP (Indo-Tibetan Border Police) team is also very experienced,” he said.

Aiding them in their efforts is the expertise of the Defence Research and Development Organisation (DRDO), the Indian Space Research Organisation (ISRO), and the Council of Scientific and Industrial Research (CSIR), and some start-ups.



Rescue operations to look for those missing since the Uttarakhand floods entered their fifth day Thursday | Suraj Singh Bisht | ThePrint



A drone deployed to help with the rescue operations in Uttarakhand | Suraj Singh Bisht | ThePrint

A difficult operation

The floods in Chamoli tore through the two hydropower projects and a bridge, burying dozens of workers under piles of slush and mud. At Tapovan, workers remain trapped inside two tunnels. The first responders, ITBP personnel, had managed to rescue 12 from one by Monday, and operations continue to find 34 others stuck in the second tunnel.

ITBP Deputy Commandant Nitesh Sharma said the workers in the second tunnel are stuck in a “bifurcation” that is difficult to access.

“The tunnel is 2.5 km, so it is not certain as to which part of the tunnel the personnel are trapped in exactly,” he added. “It will be clear only after we are able to dig through this tunnel.”

Three JCB machines stationed outside the tunnels are being used in turns to take out the slush and mud from inside. Additionally, the rescue teams have been intermittently sending in drones to scope out their depths.

As and when sections of debris are taken out, rescue teams equipped with “victim-locating cameras” — comprising a camera at the end of a long, extendable stick, a screen, a drill, and in-built speaker and receiver systems — are sent into the tunnel.

“They (the cameras) are very helpful. If there is a building or ditch, we have a breaching system that makes a hole in the wall and the rocks. When the inspection hole is made, we use the victim-locating camera to go inside and look for the victim,” said Lalit Kumar, a sub-inspector with the NDRF.

Tiwari pointed out that the camera is “extendable up to 10 feet, and rotates 360 degrees to take a view of all around”. “That way, this camera has proved essential during search operations,” he added. “Through the mic-headphone system, you can hear the sound of the victims trapped inside.”

In addition to this, the teams also have access to sonar systems that can trace people who have drowned, rescue radars to locate those alive and trapped inside tunnels or other closed spaces, and VSAT (Very Small Aperture Terminal) Quick Deployment Antennae.

Technology & coordination

While the radars, remote cameras and antennae were sourced from the DRDO and the CSIR, start-ups were contacted for hi-tech drones.

“To start with, we had our in-house technology of radars, cameras and drills. We then took assistance from drone start-ups who helped us with resources. Even IITians pitched in resources,” NDRF Director General S.N. Pradhan said.

“With the help of VSAT Quick Deployment Antennae, we could visually see the situation before our eyes, and it helped us plan operations in a more meticulous manner,” he added.

Using the antennae, the DRDO could survey the glacier where the landslide occurred, he said. ISRO assisted in the mapping efforts by providing the NDRF with before-and-after satellite images of the location.

“Moreover, helicopters of the CSIR flew over the disaster site along with radars, to give us a sense of where the sludge was in the tunnel and help us plan the operations better,” said Pradhan. “With their help, we were able to map the points that had the sludge, where people could be stuck.”

The radars were helpful in detecting air pockets under the dam and where the sludge was trapped, critical for mapping out “strategic points”.

Tiwari said the rescue operation currently under way is more “technical than manual”.

“During the 2013 floods, I was with ITBP mountaineering force... we had limited equipment,” he added. “This time, the NDRF has state-of-the-art equipment... that way, our disaster resilience and preparedness in respect to our country has achieved greater things, and we are better prepared to handle disaster,” he added.

The scenario (of disaster management infrastructure) has changed in the last few years, he said.

Pradhan added that, along with technology, “coordination between agencies plays a major role during such situations”. “Teams of ITBP, who are on the ground, along with NDRF, have been working tirelessly and here we are coordinating each operation at the highest level,” he said.

<https://theprint.in/india/drones-radars-remote-cameras-uttarakhand-floods-rescue-effort-is-indias-most-hi-tech-yet/603305/>



Fri, 12 Feb 2021

Govt to come out with policy on advanced battery tech to power EVs, India eyes No 1 slot: Nitin Gadkari

Nitin Gadkari made the remarks after chairing a high-powered meeting focussed on research and development in the area of alternative fuel. The meeting was held last night

New Delhi: The government will adopt an integrated approach and come out with a policy to make India self-reliant in the area of advanced battery technologies to power electric vehicles and other applications, Union Minister Nitin Gadkari said on February 11.

Pitching for an integrated approach for developing indigenous fuel cells in the field of electric vehicles, he said India today stands at the cusp of becoming the world leader in this field as well as automobile manufacturing.

He made the remarks after chairing a high-powered meeting focussed on research and development in the area of alternative fuel. The meeting was held last night.

Central government’s Principal Scientific Advisor K. Vijay Raghavan, NITI Aayog CEO Amitabh Kant, Highways Secretary Giridhar Aramane and senior representatives from DRDO, ISRO, CSIR and IITs besides Minister of State for Road Transport and Highways V.K. Singh participated in the meeting.



Union Minister Nitin Gadkari. File | Photo Credit: PTI

“So far work is happening in silos in the area of alternative fuel. We will now work in an integrated and concerted manner bringing together the best technologies. We will also focus on economic viability...We need a policy in this regard and for it we have decided to take an integrated approach,” Mr. Gadkari told *PTI*.

He said scientists, academia and industry can together harness green hydrogen-based energy through water, for it being a cost effective and easily available mode in the country. He indicated towards the lowering costs of solar power in India, which can help energise other modes of fuels.

“Vast scope is there in the area of Lithium-ion battery too despite countries like China dominating in the sector. About 81 per cent of Lithium-ion battery components are available locally and India stands a very good chance for value addition at lower costs.

“Our mining entities could look for acquiring component assets globally and grab the opportunity as China has occupied 51 per cent but still 49 per cent scope is there,” Mr. Gadkari said.

Stressing the need for advanced and concerted planning the minister said this is one area where there is good scope for becoming the world leader as the automobile sector which has a turnover of ₹4.5 lakh crore is set to take it to ₹10 lakh crore in future.

The resultant employment generation will be huge and vehicle scrapping policy under which initially one crore vehicles will go for scrapping will result in availability of cheaper aluminium, copper, rubber, steel and other products which will reduce the price of the components.

After going through the presentations from different organisations on different technologies including Lithium-ion, metal-ion, Sodium Sulphur, Hydrogen, Iron Sulphur, Polymer Electrolyte Membrane Cell System, ZincGel, etc, Gadkari said, economic viability is the basis of any successful technology.

The Minister suggested taking ahead the suggestions put forth in the meeting by integrating industry experience in the field.

He assured the participants of his complete commitment in adopting best technologies.

He also urged various stakeholders including NITI Aayog, Indian Space Research Organisation (ISRO), Defence Research and Development Organisation (DRDO), CSIR, Ministries of Science and Technology, Heavy Industries, Commerce, Road Transport and Highways, IITs and private institutions to join hands in this regard.

Private sector has also worked in this regard.

DRDO in its presentation showed how technology transfer has resulted in manufacturing of 400 batteries of 120 MW by some institutes and added that mass production could reduce its prices.

NITI Ayog said it has collaborated with four IITs including Guwahati and Delhi for research in aluminium-ion battery.

Its CEO Amitabh Kant stressed that India should concentrate on lithium-ion alternative batteries and mining sector companies should explore opportunities abroad for acquiring assets in this regard.

Mr. Gadkari said next generation batteries will not only minimise vehicular pollution in India but make India a global supplier of EVs and added that two-wheeler makers like Bajaj, Hero Honda and TVS are already exporting 50 per cent of their production.

He said he would be launching a tractor on alternative fuel on Friday.

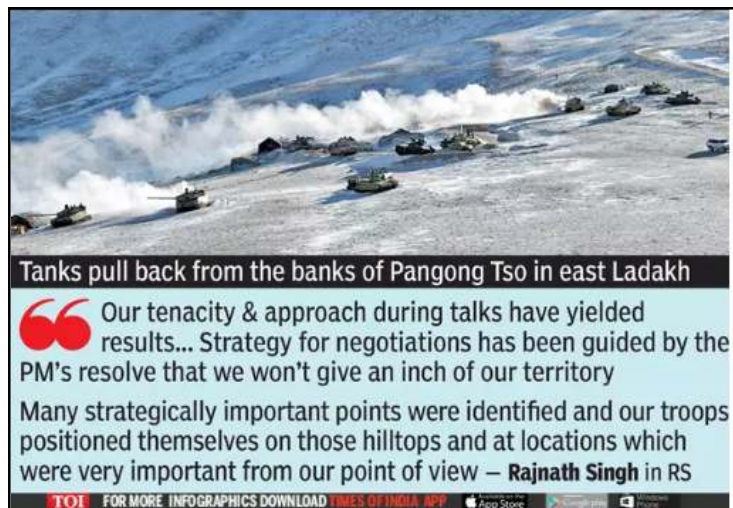
Alternative fuel promotion will result in economic growth and would bolster India's development, Mr. Gadkari said.

<https://www.thehindu.com/business/Industry/govt-to-come-out-with-policy-on-advanced-battery-tech-to-power-evs-india-eyes-no-1-slot-nitin-gadkari/article33809318.ece>

Indian troops on hill tops, we have edge in Ladakh: Rajnath

New Delhi: An agreement has been reached with China on disengagement on the north and south banks of Pangong Tso in east Ladakh, with identification of strategically important points and positioning of Indian troops on hilltops giving India the edge, defence minister Rajnath Singh said on Thursday.

In a statement in the Rajya Sabha detailing the disengagement that started on Wednesday after an intense military faceoff that began last May, Singh said an agreement was reached after a well-thought-out approach and sustained talks with the Chinese side. "It has also been agreed that the next meeting of the senior commanders will be called within 48 hours after complete disengagement in the Pangong Lake area so as to address and resolve all other remaining issues," he said.



The breakthrough, sources said, was significant as Indian troops would currently remain on the heights they command the south bank until a verified de-escalation. The bold manoeuvre on the night of August 29-30 by Indian troops gave India control of heights on the south bank, including Rezag La and Rezin La, effectively neutralising the Chinese advances in the Finger (spurs) area of the north bank.

"Many strategically important points were identified and our troops positioned themselves at those hilltops and at locations which were very important from our point of view. It is because of this great bravery of our armed forces in the face of harsh, adverse climatic conditions that we maintained the edge," the minister said.

"The Chinese side will keep its troop presence on the north bank area to east of Finger 8. Reciprocally, Indian troops will be based at their permanent base at Dhan Singh Thapa post near Finger 3. A similar action would be taken on the south bank area by both sides," Singh said. Of all friction points, the Finger area was seen as the most difficult to resolve with the Chinese moving considerable troops, equipment and infrastructure into the area.

It has been decided that as a temporary measure, pending resolution at the diplomatic levels, there will be no patrolling in the Finger area. Before the Chinese action, Indian troops would patrol up to Finger 8. However, massing of Chinese troops was intended to permanently alter the LAC and this has been reversed as per the agreement that requires them to withdraw to their original positions.

The next round of military talks will aim to stabilise the situation in the Pangong area and discuss restoring status quo at other points of friction along the LAC where heavily armed Chinese and Indian troops are in close proximity.

"I want to assure this House that in these talks, we have not conceded anything. The House should also know that there are still some outstanding issues with regard to deployment and patrolling at some other points along the LAC in eastern Ladakh. These will be taken up in further discussions with the Chinese side though the focus will be in ensuring the current disengagement concludes successfully," Singh said.

The agreement will see Indian and Chinese troops ceasing their forward deployments in a phased, coordinated and verified manner. As a first step, tanks and armoured vehicles have been moved back. Singh said the de-escalation, which comes almost 10 months since the neighbour amassed troops and armaments, will see the Chinese troop presence on the north bank restricted to east of Finger 8.

Sources said the winter deployment was difficult for both sides, but Indian troops were better trained to handle the rigours given their operational experience in theatres like Siachen. The Chinese side also did not anticipate a prolonged mobilisation or the Indian economic actions, all which underlined that there could be no business as usual if the border was disturbed. It was pointed out that the minister and government were guided by the professional advice of the forces and assured them their full support.

Singh added that as per the agreement reached with the Chinese side, any structures built by both sides since April 2020 in north and south bank areas will be removed and landforms restored. A temporary moratorium on military activities by both sides on the north bank has also been agreed upon, including suspension of patrolling to the traditional areas.

"Our approach and strategy for negotiations with the Chinese side has been guided at the highest level by the prime minister's resolve that we will not give even an inch of Indian territory. Our tenacity and approach during talks have yielded results," Singh told Rajya Sabha.

As per Singh, the Indian approach to engagement with China maintained three key principles: that both sides should strictly respect and observe the LAC, neither side should attempt to alter status quo unilaterally, and all agreements and understandings between the two sides must be fully abided by in their entirety.

Recapitulating the situation on the ground, Singh said China had illegally occupied approximately 38,000 sq km in Ladakh, mainly during the 1962 conflict. In addition, under the Sino-Pakistan 'boundary agreement' of 1963, Pakistan illegally ceded 5,180 sq km of Indian territory in Pakistan-occupied Kashmir to China.

<https://timesofindia.indiatimes.com/india/indian-troops-on-hill-tops-we-have-edge-in-ladakh-rajnath/articleshow/80870537.cms>

Drones future of warfare to take on tanks and artillery: Indian Army Chief

Indian Army Chief General MM Naravane, while speaking at a webinar, asserted how the use of disruptive technologies like drones is the future of warfare

By Abhishek Bhalla

New Delhi: Indian Army Chief General MM Naravane, while speaking at a webinar, asserted how the use of disruptive technologies like drones is the future of warfare.

Underlining the use of drones by Azerbaijan recently in Idlib and Armenia, he said the offensive technology has challenged the traditional prima donnas: the tanks, the artillery and the dug in infantry.

Indicating that India is also enhancing its drone warfare capabilities, he referred to Indian Army showcasing swarm drone offensive striking multiple targets during the Army Day Parade last month.

Calling it a message to India's adversaries he said, "The Indian Army is steadily inducting niche capabilities to enhance our combat proficiencies in Multi-Domain Operations."



Indian Army Chief General MM Naravane

He said swarm drones can overwhelm and effectively suppress an enemy's air defence capability, creating windows of opportunities for strike elements. "It is also no longer necessary to score a physical hit to destroy a target. Offensive capabilities in the digital domain can effectively neutralise satellites and networks, denying them at critical juncture to decisively alter the course of the conflict," he said.

General Naravane explained how disruptive technologies are now driving doctrinal cycles like never before. "It may not be inaccurate, therefore, to infer that technology itself is steadily emerging as a core combat capability," he pointed out.

"Large platforms which were once the mainstay of 20th century battlefield: the main battle tanks, fighter aircraft and large surface combatants, have been rendered relatively less significant in the face of emerging battlefield challenges in newer domains," the Indian Army Chief said.

Speaking of India's adversaries and hinting at China, he said. "As we fixed our gaze on building core capacities in land, sea and air, they took the battle to the newer domains of space, cyber, and informatics."

India has been looking at ramping up its drone capabilities and during the recent Aero India show several indigenous platforms were on display.

From striking deep behind the enemy lines without bringing pilots and fighter jets close to detection by radars to replacing mules with helicopter drones for providing ration to troops at icy heights in Ladakh, India is preparing for the next generation warfare building indigenous capacities for unmanned platforms.

Private Indian companies and public sector units are working on such platforms that will be the key in military combat in years to come.

Hindustan Aeronautics Limited (HAL) unveiled a blueprint of its plans to bring in such platforms during the ongoing Aero India show in Bengaluru.

<https://www.indiatoday.in/india/story/drones-future-of-warfare-to-take-on-tanks-and-artillery-indian-army-chief-1768343-2021-02-11>

Present dangers cannot be ignored, says Army Chief

Army chief General Manoj Mukund Naravane on Thursday said that while the Indian Army is preparing for future conflicts, the “real and present dangers” on the country’s borders cannot be ignored

By Rahul Singh

New Delhi: Army chief General Manoj Mukund Naravane on Thursday said that while the Indian Army is preparing for future conflicts, the “real and present dangers” on the country’s borders cannot be ignored. His comments came on the day defence minister Rajnath Singh told Parliament that the Indian and Chinese armies were implementing a disengagement plan on the north and south banks of Pangong Tso to reduce military tensions in eastern Ladakh.

“Ongoing developments along our northern borders should cause us to ponder over ...the nature of our unsettled borders and consequent challenges with regard to the preservation of our territorial integrity and sovereignty. Without doubt there are newer threats on the horizon, but the hard reality is that the legacy challenges have not quite gone away,” Naravane said in

his inaugural address at a seminar on Multi-Domain Operations: Future of Conflicts, organised by the Centre for Land Warfare Studies.



Indian Army Chief General Manoj Mukund Naravane addressing a press conference. (PTI file photo)

Naravane said the challenges have only grown in scale and intensity.

Talking about multi-domain operations, the army chief said India needed to address the challenges posed by adversaries in stand-off deterrence. “We need to develop capacities to strengthen our own anti-access prowess as also develop proficiencies to overcome the anti-access capacities of the adversary to strengthen our defensive framework as also to add punch to our offensive poise.”

While stand-off deterrence refers to the capability to strike the enemy from far-off ranges, anti-access capacities are aimed at hindering the movement of the adversary in a theatre of operations.

He said platforms such as tanks, fighter jets and surface combatants, which were once the mainstay of 20th century battlefield, were rendered relatively less significant in the face of emerging battlefield challenges in newer domains.

“We have seen how the very imaginative and offensive use of drones in Idlib and then in Armenia-Azerbaijan challenged the traditional prima donnas: the tanks, the artillery and the dug-in infantry,” the army chief said. In Syria’s Idlib, Turkish forces had successfully used drones to carry out attacks against Syrian tanks, air defence systems and other assets. Also, Azerbaijan made extensive use of Kamikaze drones to target and inflict losses on Armenian forces in a conflict last year. “We have also seen how disruptive technologies are now driving doctrinal cycles like never before. It may not be inaccurate to infer that technology itself is steadily emerging as a core combat capability,” the army chief said. The concept these days is minimising direct contact warfare, said former Northern Army commander Lieutenant General BS Jaswal (retd).

“But you cannot dispense with infantry in a ground-holding capturing role. Also, artillery with its inherent capability of switching the arc of engagement with precision is going to assume importance. As far as armoured thrust goes, it is likely to suffer prohibitive casualties in multi-domain operations,” Jaswal added.

<https://www.hindustantimes.com/india-news/present-dangers-cannot-be-ignored-says-army-chief-101613067439290.html>

BHEL bags order to supply Super Rapid Gun Mounts for Indian Navy frontline ships

Synopsis

BHEL has indigenised these guns and has established dedicated, intricate manufacturing and inspection facilities at its Heavy Electrical Equipment Plant, Haridwar for production, installation & commissioning and lifecycle support of these guns, Bharat Heavy Electricals Ltd (BHEL) said in a statement.

New Delhi: State-run engineering firm BHEL on Thursday said it has bagged an order from the Indian Navy for supplying two Super Rapid Gun Mounts (SRGM), main guns standardised for all warships of the Indian Navy.

BHEL has indigenised these guns and has established dedicated, intricate manufacturing and inspection facilities at its Heavy Electrical Equipment Plant, Haridwar for production, installation & commissioning and lifecycle support of these guns, Bharat Heavy Electricals Ltd (BHEL) said in a statement.

Standardisation of these guns by the Indian Navy for all major warships has resulted in optimisation of cost and consolidation of expertise and self-reliance. BHEL is also working on an upgraded version of these guns, with enhanced range, to cater to future requirement of warships, it added.

The state-run engineering firm is a supplier of critical equipment and services in the Defence & Aerospace sector for over three decades.

Towards this, specialised manufacturing facilities and capabilities have already been set up with the aim of making a major contribution towards self-reliance in Defence equipment production and initiatives taken will be a driving force towards the AatmaNirbhar Bharat Abhiyan of Government of India, the company said.

In addition to the thermal power sector, BHEL offers a broad range of products for the major sectors of the Indian economy.

With focus on growth of non-coal based business, the company offers comprehensive solutions for Transportation, Transmission, Renewables, Energy Storage Systems and e-mobility, Water Management, Defence & Aerospace, Captive Power Generation and Mechanical & Electrical Industrial Products.

<https://economictimes.indiatimes.com/news/defence/bhel-bags-order-to-supply-super-rapid-gun-mounts-for-indian-navy-frontline-ships/articleshow/80847795.cms>



The state-run engineering firm is a supplier of critical equipment and services in the Defence & Aerospace sector for over three decades

Indian Navy's 'largest war game' under way in the Indian Ocean region to test combat preparedness

By Ravi Sharma

India's push to advance its strategic interests in the Indian Ocean region (IOR) got a morale boost when the Indian Navy began a mega war game involving almost all its operational assets, including warships, corvettes, submarines, fighter aircraft and maritime patrol aircraft, helicopters, and fast patrol boats. The gargantuan, biennial 'Tropex 21', or 'Theatre Level Operational Readiness Exercise', is spread over a vast geographical expanse in the Indian Ocean region, including its adjunct waters, and will see assets from the Navy's western and eastern fleets. The exercise seeks to test the Navy's combat and defence operational preparedness in the wider IOR.



As spelt out by Defence Minister Rajnath Singh during the recent Aero India 2021 air show, India sees for itself an increased role in the IOR, especially as a protector of the international order in the region, as a guardian maintaining open sea lanes and navigational freedom and also to safeguard its own national interests in the maritime domain. The exercise also includes units from the Indian Army, Indian Air Force and Coast Guard.

As spelt out in a statement from the Navy, Tropex 21, "the Indian Navy's largest war game, which commenced in early January is currently under way with participation of all operational units of Indian Navy, including ships, submarines, aircraft as well as units of the Indian Army, Indian Air Force and Coast Guard". The Navy said that the exercise which is being conducted in distinct phases would culminate by the third week of February. According to the spokesperson, "The various phases of Tropex 21 will also test the Navy's transition from peacetime to hostilities."

The Navy said that in the initial part of Tropex 21, the Navy along with other stakeholders had conducted a two-day mega drill in January covering the country's 7,516 km coastline and exclusive economic zone. The 'Sea Vigil' exercise between January 12 and 13 was billed as India's largest coastal defence drill and it was aimed at validating the coastal defence setup which was revamped after the 26/11 terror attack. "Valuable lessons emerging from the exercise are being incorporated in the existing procedures to further fine-tune the coastal defence architecture of the country," the Navy's statement added.

'Exercise Sea Vigil' was followed by a large-scale tri-service joint amphibious exercise AMPHEX-21, which was conducted in the Andaman and Nicobar group of Islands from January 21 to 25.

The Navy statement went on to state: "The amphibious Amphex 21 was aimed at validating India's capabilities to safeguard the territorial integrity of its island territories and enhance operational synergy and joint warfighting capabilities amongst the three services. The 'weapon workout' phase of Tropex 21, which concluded recently, witnessed multiple 'on-target' ordnance deliveries, including missiles, torpedoes and rockets, from frontline warships, aircraft and submarines and demonstrated the lethal firepower of the Indian Navy,"

The Navy's 'weapon workout' phase was an exercise to reaffirm its capability to carry out long range maritime strikes in the IOR, a capability that is central to meeting operational challenges and ensuring safe seas and secure coasts.

<https://frontline.thehindu.com/dispatches/indian-navys-largest-war-game-under-way-in-indian-ocean-region-to-test-combat-preparedness/article33810643.ece>

Strong Indian deployment at Depsang to remain; troops to withdraw 2 km each in Gogra and Galwan

With disengagement at Pangong Lake underway, the focus will now shift to pulling back troops from standoff points in Galwan valley and the Gogra post, both of which saw a substantial build-up since May last year after Chinese forces moved in.

After the Pangong process is completed, the two sides will move to implement the second stage of the disengagement plan by moving troops away from each other at these two locations, sources have told ET. At Galwan, where a deadly clash last June claimed heavy losses on both sides, the Chinese deployment at the moment is well beyond the contended Patrolling Point 15, but further retreat is set to take place. As per discussions, Indian and Chinese troops will pull back up to 2 km each from PP 15 and will suspend patrolling till further notice. Sources indicate that troops are positioned just over a kilometre away in the valley at present.



At Gogra post, where the Chinese moved in a substantial amount of armoured units close to an Indian post, a similar process will take place. A squadron of armoured combat vehicles are currently in a standoff with a similar Chinese force and the plan here is also to create a 4 km zone, with both sides retreating to their sides of the Line of Actual Control.

The creation of a four kilometre zone where patrolling will be suspended, sources said, is a temporary arrangement and is in no way admission to territorial claims. The Indian position is clear that normal patrolling will resume after further rounds of talks to defuse the current crisis.

Sources said that there have been no substantial discussion with China on the Depsang plains deployment where PLA has been blocking Indian troops from accessing three patrolling points on LAC. As per internal assessments, the situation at Depsang is stable and in India's favour, given a heavy deployment of tanks, armoured vehicles and soldiers that are more than a match for Chinese forces in the area.

<https://www.defencenews.in/article/Strong-Indian-deployment-at-Depsang-to-remain;-troops-to-withdraw-2-km-each-in-Gogra-and-Galwan-1033779>

Pakistan test-fires surface-to-surface cruise missile, third test in three weeks

The Babar missile 'is capable of engaging targets at land and sea with high precision,' the Army said, adding that the missile was launched from a state-of-the-art multi-tube launch vehicle

Islamabad: Pakistan on Thursday conducted a successful training launch of a surface-to-surface cruise missile which can strike targets up to 450 kilometres, the Army said, the country's third missile test in three weeks.

The Babar missile "is capable of engaging targets at land and sea with high precision," the Army said in a statement, adding that the missile was launched from a state-of-the-art multi-tube launch vehicle.

It said that the Babar cruise missile has a range of 450 kilometers.

Senior scientists and defence officials witnessed the training launch and acknowledged the standards of training and operational preparedness of the Army Strategic Forces.

Raza Samar, chief of National Engineering and Science Commission, said that the launch showed the "proficient handling of the weapon system in the field and fulfillment of all laid down training parameters".

President Dr Arif Alvi, Prime Minister Imran Khan, Chairman of the Joint Chiefs of Staff Committee General Zubair Mahmood Hayat and the services chiefs congratulated the participating troops on conducting the successful training launch of the missile, the Army added.

This is the country's third successful missile test in three weeks.

On February 3, the Pakistan Army successfully test-fired a nuclear-capable surface-to-surface ballistic missile which can strike targets up to 290 kilometres.

The launch of Ghaznavi missile was "culmination of Annual Field Training Exercise of Army Strategic Forces Command," according to a statement issued by the media wing of the Pakistani Army - the Inter-Services Public Relations (ISPR).

It said that the ballistic missile is capable of delivering nuclear and conventional warheads up to a range of 290 kilometres.

On January 20, Pakistan test-fired nuclear-capable surface-to-surface ballistic missile Shaheen-III which can strike targets up to 2,750 kilometres.

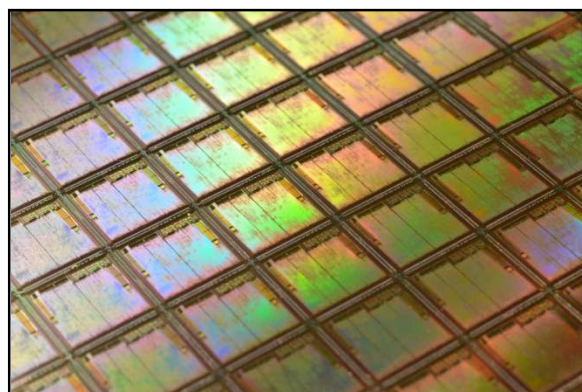
<https://www.newindianexpress.com/world/2021/feb/11/pakistan-test-fires-surface-to-surface-cruise-missile-third-test-in-threeweeks-2262698.html>

Wafer-scale production of graphene-based photonic devices

By *Fernando Gomollón-Bel*

Our world needs reliable telecommunications more than ever before. However, classic devices have limitations in terms of size and cost and, especially, power consumption—which is directly related to greenhouse emissions. Graphene could change this and transform the future of broadband. Now, Graphene Flagship researchers have devised a wafer-scale fabrication technology that, thanks to predetermined graphene single-crystal templates, allows for integration into silicon wafers, enabling automation and paving the way to large scale production.

This work, published in the prestigious journal *ACS Nano*, is a great example of a collaboration fostered by the Graphene Flagship ecosystem. It counted on the participation of several Graphene Flagship partner institutions like CNIT and the Istituto Italiano di Tecnologia (IIT), in Italy, the Cambridge Graphene Centre at the University of Cambridge, UK, and Graphene Flagship Associated Member and spin-off CamGraphiC. Furthermore, Graphene Flagship-linked third party INPHOTEC and researchers at the Tecip Institute in Italy provided the graphene photonics integrated circuits fabrication. Through the Wafer-scale Integration Work Package and Spearhead Projects such as Metrograph, the Graphene Flagship fosters collaboration between academia and leading industries to develop high-technology readiness level prototypes and products, until they can reach market exploitation.



Graphene Flagship researchers have devised a wafer-scale fabrication method that paves the way to the next generation of telecom and datacom devices. Credit: Unsplash

The new fabrication technique is enabled by the adoption of single-crystal graphene arrays. "Traditionally, when aiming at wafer-scale integration, one grows a wafer-sized layer of graphene and then transfer it onto silicon," explains Camilla Coletti, coordinator of IIT's Graphene Labs, who co-led the study. "Transferring an atom-thick layer of graphene over wafers while maintaining its integrity and quality is challenging" she adds. "The crystal seeding, growth and transfer technique adopted in this work ensures wafer-scale high-mobility graphene exactly where is needed: a great advantage for the scalable fabrication of photonic devices like modulators," continues Coletti.

It is estimated that, by 2023, the world will see over 28 billion connected devices, most of which will require 5G. These challenging requirements will demand new technologies. "Silicon and germanium alone have limitations; however, graphene provides many advantages," says Marco Romagnoli from Graphene Flagship partner CNIT, linked third party INPHOTEC, and associated member CamGraphiC, who co-led the study. "This methodology allows us to obtain over 12.000 graphene crystals in one wafer, matching the exact configuration and disposition we need for graphene-enabled photonic devices," he adds. Furthermore, the process is compatible with existing automated fabrication systems, which will accelerate its industrial uptake and implementation.

In another publication in *Nature Communications*, researchers from Graphene Flagship partners CNIT, Istituto Italiano di Tecnologia (IIT), in Italy, Nokia—including their teams in Italy and Germany, Graphene Flagship-linked third party INPHOTEC and researchers at Tecip, used this approach to demonstrate a practical implementation: "We used our technique to design high-speed graphene photodetectors," says Coletti. "Together, these advances will accelerate the commercial implementation of graphene-based photonic devices," she adds.

Graphene-enabled photonic devices offer several advantages. They absorb light from ultraviolet to the far-infrared—this allows for ultra-broadband communications. Graphene devices can have ultra-high mobility of carriers—electrons and holes—enabling data transmission that exceeds the best performing ethernet networks, breaking the barrier of 100 gigabits per second.

Reducing the energetic demands of telecom and datacom is fundamental to provide more sustainable solutions. At present, Information and communication technologies are already responsible for almost 4% of all greenhouse emissions, comparable to the carbon footprint of the airline industry, projected to increase to around 14% by 2040. "In graphene, almost all the energy of light can be converted into electric signals, which massively reduces power consumption and maximizes efficiency," adds Romagnoli.

Frank Koppens, Graphene Flagship Leader for Photonics and Optoelectronics, says: "This is the first time that high-quality graphene has been integrated on the wafer-scale. The work shows direct relevance by revealing high-yield and high-speed absorption modulators. These impressive achievements bring commercialisation of graphene devices into 5G communications very close."

Andrea C. Ferrari, Science and Technology Officer of the Graphene Flagship and Chair of its Management Panel added: "This work is a major milestone for the Graphene Flagship. A close collaboration between academic and industrial partners has finally developed a wafer-scale process for graphene integration. The Graphene Foundry is no more a distant goal, but it starts today."

More information: Marco A. Giambra et al, Wafer-Scale Integration of Graphene-Based Photonic Devices, *ACS Nano* (2021). [DOI: 10.1021/acsnano.0c09758](https://doi.org/10.1021/acsnano.0c09758)

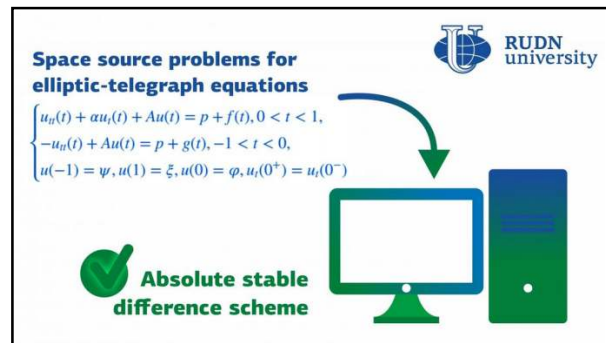
S. Marconi et al. Photo thermal effect graphene detector featuring 105 Gbit s⁻¹ NRZ and 120 Gbit s⁻¹ PAM4 direct detection, *Nature Communications* (2021). [DOI: 10.1038/s41467-021-21137-z](https://doi.org/10.1038/s41467-021-21137-z)

Journal information: [ACS Nano](https://doi.org/10.1021/acsnano.0c09758) , [Nature Communications](https://doi.org/10.1038/s41467-021-21137-z)
<https://phys.org/news/2021-02-wafer-scale-production-graphene-based-photonic-devices.html>

Mathematician suggests a scheme for solving telegraph equations

A mathematician from RUDN University suggested a stable difference scheme for solving inverse problems for elliptic-telegraph and differential equations that are used to describe biological, physical, and sociological processes. The results of the study were published in the *Numerical Methods for Partial Differential Equations* journal.

Elliptic equations are a class of differential equations in partial derivatives that are used, among other things, to model time-independent processes. Telegraph equations are presented in a nonstationary form. They were initially obtained for a telegraph communication line, but today they are also used to model the movement of insects, the flow of blood through veins, and the changes undergone by building materials. Moreover, they can be inverted, i.e. used to find a source of changes based on known process characteristics, for example, to identify a cause of material damage or to create an optic tomography image for the purposes of medical diagnostics. It is often difficult to obtain accurate solutions for problems like these; therefore, the initial problem is reduced to a system of simpler equations that provide an answer with a certain degree of approximation to the correct one. A mathematician from RUDN University suggested an algorithm to obtain inverse problem solutions for elliptic-telegraph equations using a computer.



A mathematician from RUDN University suggested a stable difference scheme for solving inverse problems for elliptic-telegraph and differential equations that are used to describe biological, physical, and sociological processes. Credit: RUDN University

It is often difficult to obtain accurate solutions for problems like these; therefore, the initial problem is reduced to a system of simpler equations that provide an answer with a certain degree of approximation to the correct one. A mathematician from RUDN University suggested an algorithm to obtain inverse problem solutions for elliptic-telegraph equations using a computer.

"The more complex a modeled system, the more unknown parameters it contains, and the more difficult are the calculations. However, despite the complexity of the task, modern computers can be used to search for approximate solutions to differential equations. We aimed to obtain absolute stable difference schemes for the approximate solution of the space identification problem for the elliptic-telegraph equations. Our work could help further implement these methods into the modeling of various processes," said Prof. Allaberen Ashyralyev, a Ph.D. in Physics and Mathematics from the Department of Higher Mathematics, RUDN University.

One way to obtain an approximate solution is to replace the initial problem with difference schemes. The studied area is turned into a grid with a given step size, and functions are replaced with node values. The mathematician suggested a difference scheme and then studied it both analytically and numerically. The first method was used to confirm the absolute stability of the scheme, and the second (a numerical experiment, i.e. an equation that the scheme was applied to)—to support the results of the analysis. The scientist managed to demonstrate that the scheme was absolutely stable and independent from the chosen calculation step size.

"Similar elliptic-telegraph equations are used to model biological systems, sociological phenomena, and engineering processes. An absolute stable difference scheme could help specialists better study these issues," added Prof. Allaberen Ashyralyev from RUDN University.

More information: Allaberen Ashyralyev et al, On the absolute stable difference scheme for the space-wise dependent source identification problem for elliptic-telegraph equation, *Numerical Methods for Partial Differential Equations* (2020). DOI: [10.1002/num.22561](https://doi.org/10.1002/num.22561)

<https://phys.org/news/2021-02-mathematician-scheme-telegraph-equations.html>

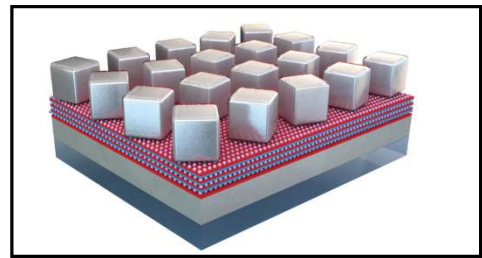
Capturing free-space optical light for high-speed Wi-Fi

Visible and infrared light can carry more data than radio waves, but has always been confined to a hard-wired, fiber-optic cable. Working with Facebook's Connectivity Lab, a Duke research team has now made a major advance toward the dream of ditching the fiber in fiber optics.

While working to create a free-space optical communication system for high-speed wireless internet, the researchers also show that speed and efficiency properties previously demonstrated on tiny, single-unit plasmonic antennas can also be achieved on larger, centimeter-scale devices.

The research appears online Feb. 11 in the journal *Optica*.

In 2016, researchers from Internet.org's Connectivity Lab—a subsidiary of Facebook—outlined a new type of light detector that could potentially be used for free-space optical communication. Traditionally, hard-wired optical fiber connections can be much faster than radio wave wireless connections. This is because visible and near-infrared light frequencies can carry much more information than radio waves (WiFi, Bluetooth, etc).



But using these higher frequencies in wireless devices is difficult. Current setups use either LEDs or lasers aimed at detectors that can reorient themselves to optimize the connection. It would be much more efficient, however, if a detector could capture light from different directions all at once. The catch is that increasing the size of an optical receiver also makes it slower.

This was also the case for the Connectivity Lab's design. A spherical bundle of fluorescent fibers captured blue laser light from any direction and re-emitted green light that could be funneled onto a small receiver. While the prototype was able to achieve rates of two gigabits per second, most fiber optic internet providers offer up to 10 Gb, and higher-end systems can push into the thousands.

Looking for a way to speed up their free-space optical communication designs, the Connectivity Lab turned to Maiken Mikkelsen, the James N. and Elizabeth H. Barton Associate Professor of Electrical and Computer Engineering and Physics at Duke. Over the past decade, Mikkelsen has been a leading researcher in the field of plasmonics, which traps light on the surface of tiny nanocubes to increase a device's speed and efficiency at transmitting and absorbing light by more than a thousand times.

"The Connectivity Lab's prototype was constrained by the emissions lifetime of the fluorescent dye they were using, causing it to be inefficient and slow," said Mikkelsen. "They wanted to increase the efficiency and came across my work showing ultrafast response times in fluorescent systems. My research had only proven that these efficiency rates were possible on single, nanoscale systems, so we didn't know if it could scale up to a centimeter-scale detector."

All previous work, Mikkelsen explains, has been proof-of-principle demonstrations with a single antenna. These systems typically involve metal nanocubes spaced tens to hundreds of nanometers apart and placed just a handful of nanometers above a metal film. While an experiment might use tens of thousands of nanocubes over a large area, research showing its potential for superfast properties has historically cherrypicked just one cube for measurement.

In the new paper, Mikkelsen and Andrew Traverso, a postdoctoral researcher working in her laboratory, brought a more purposeful and optimized design to a large-area plasmonic device. Silver nanocubes just 60 nanometers wide are spaced about 200 nanometers apart, covering 17% of

the device's surface. These nanocubes sit just seven nanometers above a thin layer of silver, spaced by a coating of polymer that is jam-packed with four layers of fluorescent dye.

The nanocubes interact with the silver base in a way that enhances the photonic capabilities of the fluorescent dye, causing a 910-fold increase in the overall fluorescence and a 133-fold emission rate enhancement. The superfast antenna also can capture light from a 120-degree field of view and convert it to a directional source with a record-high overall efficiency of 30%.

"Plasmonic effects have always been known to lose a lot of efficiency over a large area," said Traverso. "But we've shown that you can take attractive ultrafast emission features of a nanoscale device and recreate it on a macroscopic scale. And our method is very easily transferrable to fabrication facilities. We can create these largescale plasmonic metasurfaces in under an hour with pipettes and Petri dishes, just simple liquid depositions on metal films."

The overall effect of the demonstration is the ability to capture light from a large field of view and funnel it into a narrow cone without losing any speed. To move forward with this technology, researchers would need to piece several plasmonic devices together to cover a 360-degree field of view and once again include a separate interior detector. While there is work to be done, the researchers see a viable path forward.

"In this demonstration, our structure acts to efficiently relay the photons from a wide angle into a narrow angle without losing speed," said Mikkelsen. "We didn't integrate a regular fast photodetector like the Connectivity Lab did in their original paper yet. But we solved the major bottleneck in the design and the future applications are very exciting!"

More information: Andrew Traverso et al, Low-loss, centimeter-scale plasmonic metasurface for ultrafast optoelectronics, *Optica* (2020). [DOI: 10.1364/OPTICA.400731](https://doi.org/10.1364/OPTICA.400731)

Journal information: [*Optica*](#)

<https://phys.org/news/2021-02-capturing-free-space-optical-high-speed-wi-fi.html>

New research finds most people are naturally armed against the Covid-19 coronavirus

The majority of the population can produce neutralizing antibodies against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in severe cases of coronavirus disease 2019 (COVID-19), according to a study published today (February 11, 2021) in the open-access journal *PLOS Pathogens* by Michael Mor of Tel Aviv University, and colleagues. Moreover, the results support the use of combination antibody therapy to prevent and treat COVID-19.

The COVID-19 pandemic, caused by SARS-CoV-2, has had a profound impact on global public health. Neutralizing antibodies that specifically target the receptor-binding domain (RBD) of the SARS-CoV-2 spike protein are thought to be essential for controlling the virus. RBD-specific neutralizing antibodies have been detected in convalescent patients – those who have recovered from COVID-19. Some of the recoverees tend to have robust and long-lasting immunity, while others display a waning of their neutralizing antibodies. The factors associated with an effective, durable antibody response are still unclear.

To address this gap in knowledge, Mor and colleagues used molecular and bioinformatics techniques to compare B-cell responses in eight patients with severe COVID-19 and 10 individuals with mild symptoms, 1.5 months after infection. Very ill patients showed higher concentrations of RBD-specific antibodies and increased B-cell expansion. Among 22 antibodies cloned from two of these patients, six exhibited potent neutralization against SARS-CoV-2.

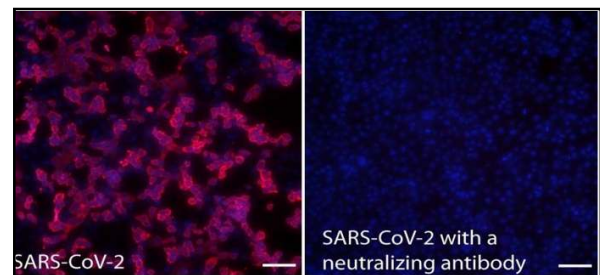
Bioinformatics analysis suggests that most people would be capable of readily producing neutralizing antibodies against SARS-CoV-2 in severe cases of COVID-19. Moreover, combinations of different types of neutralizing antibodies completely blocked the live virus from spreading. According to the authors, these antibody cocktails can be further tested in clinical settings as a useful means to prevent and treat COVID-19.

“Even with a vaccine at our doorstep, arming clinicians with specific anti-SARS-CoV-2 therapeutics is extremely important,” the authors add. “Combinations of neutralizing antibodies represent a promising approach towards effective and safe treatment of severe COVID-19 cases, especially in the elderly population or chronically ill people, who will not be able to so easily produce these antibodies upon infection or vaccination.”

Reference: “Multi-clonal SARS-CoV-2 neutralization by antibodies isolated from severe COVID-19 convalescent donors” by Mor M, Werbner M, Alter J, Safra M, Chomsky E, Lee JC, et al., 11 February 2021, *PLOS Pathogens*.

DOI: 10.1371/journal.ppat.1009165

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SARS-CoV-2 infected Vero cells untreated (left) and treated with neutralizing antibody (right). Credit: Mor M, et al., 2021, *PLOS Pathogens*, CC BY 4.0

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<https://scitechdaily.com/new-research-finds-most-people-are-naturally-armed-against-the-covid-19-coronavirus/>

