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DRDO Technology News



Press Information Bureau
Government of India

Ministry of Defence

Sun, 18 Oct 2020 1:12PM

BrahMos Supersonic Cruise Missile successfully test fired from Indian Navy's Stealth Destroyer, INS Chennai

BrahMos, the supersonic cruise missile was successfully test fired today from Indian Navy's indigenously-built stealth destroyer INS Chennai, hitting a target in the Arabian Sea. The missile hit the target successfully with pin-point accuracy after performing high-level and extremely complex manoeuvres.

BrahMos as 'prime strike weapon' will ensure the warship's invincibility by engaging naval surface targets at long ranges, thus making the destroyer another lethal platform of Indian Navy. The highly versatile BrahMos has been jointly designed, developed and produced by India and Russia.

Raksha Mantri Shri Rajnath Singh congratulated DRDO, BrahMos and Indian Navy for the successful launch.

Secretary DDR&D & Chairman DRDO Dr G Satheesh Reddy, congratulated the scientists and all personnel of DRDO, BrahMos, Indian Navy and industry for the successful feat. He stated that BrahMos missiles will add to the capabilities of Indian Armed Forces in many ways.

<https://pib.gov.in/PressReleaseDetail.aspx?PRID=1665630>





सुपरसोनिक क्रूज मिसाइल ब्रह्मोस का भारतीय नौसेना के स्टील्थ डेस्ट्रॉयर, आईएनएस चेन्नई से सफलतापूर्वक परीक्षण किया गया

सुपरसोनिक क्रूज मिसाइल ब्रह्मोस का आज अरब सागर में एक लक्ष्य को भेदते हुए भारतीय नौसेना के स्वदेशी तरीके से निर्मित स्टील्थ डेस्ट्रॉयर, आईएनएस चेन्नई से सफलतापूर्वक परीक्षण किया गया। मिसाइल ने उच्च-स्तरीय एवं अत्यधिक जटिल युक्तियों का प्रदर्शन करने के बाद सुनिदेशित सटीकता के साथ सफलतापूर्वक लक्ष्य को भेदा।

एक "प्रमुख मारक अस्त्र" के रूप में ब्रह्मोस में लंबी दूरी पर स्थित नौसेना के सतह के लक्ष्यों को पूरा करने के द्वारा युद्धपोत की अजेयता सुनिश्चित करेगा और इस प्रकार डेस्ट्रॉयर को भारतीय नौसेना का एक और घातक प्लेटफार्म बना देगा। उच्च बहुमुखी ब्रह्मोस को भारत और रूस द्वारा संयुक्त रूप से डिजाइन, विकास एवं निर्मित किया गया है।

रक्षा मंत्री श्री राजनाथ सिंह ने इस सफल प्रक्षेपण के लिए डीआरडीओ, ब्रह्मोस और भारतीय नौसेना को बधाई दी।

डीडीआरएंडडी के सचिव तथा डीआरडीओ के अध्यक्ष डॉ. जी सतीश रेड्डी ने इस बड़ी उपलब्धि के लिए वैज्ञानिकों तथा डीआरडीओ, ब्रह्मोस भारतीय नौसेना एवं उद्योग के सभी कार्मिकों को बधाई दी। उन्होंने कहा कि ब्रह्मोस मिसाइलें कई प्रकार से भारतीय सशस्त्र बलों की क्षमताओं में वृद्धि करेंगी।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1665644>



బ్రహ్మోస్ సూపర్ సోనిక్ క్రూయిజ్ క్షిపణి భారత నేవీ యొక్క రహస్య

విధ్వంసక నౌక ఐఎస్ఎస్ చెన్నై నుండి విజయవంతంగా పరీక్ష

బ్రహ్మోస్, సూపర్ సోనిక్ క్రూయిజ్ క్షిపణిని భారత నావికా దళం దేశీయంగా నిర్మించిన స్టీల్ట్ డిస్ట్రాయర్ (రహస్య విధ్వంసక నౌక) ఐఎస్ఎస్ చెన్నై నుండి విజయవంతంగా పరీక్షించారు, అరేబియా సముద్రంలో లక్ష్యాన్ని చేధించారు. క్షిపణి అధిక-స్థాయి మరియు చాలా సంక్లిష్టమైన పరీక్షా విన్యాసాల తర్వాత ఖచ్చితత్వంతో లక్ష్యాన్ని విజయవంతంగా చేధించింది. 'ప్రైమ్ స్ట్రక్ ఆయుధం' గా బ్రహ్మోస్ నావికాదళ ఉపరితల లక్ష్యాలను సుదూర పరిధిలో కేంద్రీకృతం చేయడం ద్వారా యుద్ధనౌక యొక్క అజేయతను నిర్ధారిస్తుంది, తద్వారా విధ్వంసక నౌక ద్వారా లక్ష్యాన్ని విధ్వంసం చేయగలిగే వేదికగా మారుతోంది భారత నేవీ.

అత్యంత బహుముఖ బ్రహ్మోస్ ను భారత్ రష్యా సంయుక్తంగా రూపకల్పన, అభివృద్ధి మరియు ఉత్పత్తి చేసింది. విజయవంతంగా ఈ క్షిపణిని ప్రయోగించిన డిఆర్డీఓ, బ్రహ్మోస్, భారత నావికాదళాన్ని రక్షణ మంత్రి శ్రీ రాజ్ నాథ్ సింగ్ అభినందించారు.

ప్రయోగం విజయవంతం చేసిన శాస్త్రవేత్తలు మరియు డిఆర్డీఓ, బ్రహ్మోస్, ఇండియన్ నేవీ మరియు పరిశ్రమల సిబ్బందిని డిడిఆర్-డి కార్యదర్శి, చైర్మన్ డిఆర్డీఓ డాక్టర్ జి సతీష్ రెడ్డి అభినందించారు. భారత సాయుధ దళాల సామర్థ్యాలకు బ్రహ్మోస్ క్షిపణులు మరింత జోడించాయని ఆయన పేర్కొన్నారు.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1665654>



Sun, 18 Oct 2020

Индия провела испытательный пуск ракеты BrahMos с корабля в Аравийском море India conducted a test launch of a BrahMos rocket from a ship in the Arabian Sea

*В Организации оборонных исследований и разработок сообщили,
что ракета успешно поразила цель с высокой точностью*

НЬЮ-ДЕЛИ, 18 октября. /ТАСС/. Индия провела в воскресенье успешные испытания сверхзвуковой крылатой ракеты BrahMos, которая была запущена с ракетного эсминца в Аравийском море. Об этом сообщает индийская Организация оборонных исследований и разработок (DRDO) на своем сайте.

"Сверхзвуковая крылатая ракета BrahMos была успешно испытана сегодня, 18 октября 2020 года, со стелс-эсминца ВМС Индии Chennai, поразив цель в Аравийском море. Ракета успешно поразила цель с высокой точностью", - говорится в сообщении.

Министр обороны Индии Раджнатх Сингх поздравил участников испытаний с успешным пуском.

Chennai - эскадренный миноносец типа Kolkata, построенный с использованием технологии "стелс".

BrahMos - сверхзвуковая крылатая ракета, которую производит совместное российско-индийское предприятие BrahMos Aerospace, разработана российским НПО машиностроения и индийской Организацией оборонных исследований и разработок (DRDO). Первый испытательный пуск ракеты состоялся в 2001 году. Различные версии ракеты стоят на вооружении всех трех видов ВС Индии: ВВС, ВМС и сухопутных сил.

<https://tass.ru/mezhdunarodnaya-panorama/9748307>

BrahMos missile test-fired from destroyer INS Chennai in Arabian Sea

The DRDO said the missile which was fired from INS Chennai in the Arabian Sea hit the target successfully with pin-point accuracy after performing high-level and extremely complex manoeuvres.

India on Sunday successfully test fired the BrahMos supersonic cruise missile from the indigenously-built stealth destroyer INS Chennai, with the weapon hitting a pre-designated target in the Arabian Sea, the defence ministry said in a statement.

The 290-km range missile --- an Indo-Russian joint venture --- has land, air and naval variants.

“The missile hit the target with pin-point accuracy after performing high-level and extremely complex manoeuvres. BrahMos as prime strike weapon will ensure the warship’s invincibility by engaging naval surface targets at long ranges, thus making the destroyer another lethal platform of Indian Navy,” it said.

The missile has a top speed of Mach 2.8 --- nearly three times the speed of sound.

Defence minister Rajnath Singh congratulated the Defence Research and Development Organisation, BrahMos and the Indian Navy for the successful launch.

India has test-fired a string of weapons during the last two months in the midst of the ongoing tensions with China in the sensitive Ladakh sector.

Sunday’s test came days after India test-fired an extended-range BrahMos supersonic cruise missile that can hit targets 400 km away. The range has been increased from the existing 290 km. The extended-range variant was tested from the Integrated Test Range at Balasore in Odisha on September 30.

The configuration of the existing missile --- the world’s fastest supersonic cruise missile --- has been tweaked to enhance its range. Increasing the missile’s range became possible after India’s induction into the Missile Technology Control Regime (MTCR) in June 2016.

Commissioned into the navy in November 2016, the 7,500-tonne INS Chennai incorporates new design concepts for improved survivability, stealth and manoeuvrability. The warship can carry 16 BrahMos missiles in two eight-cell vertical launch systems, besides other sophisticated weapons and sensors, officials said.

Other weapons recently tested by India include a new version of the nuclear-capable hypersonic Shaurya missile with a range of 750 km and the anti-radiation missile to take down enemy radars and surveillance systems.

<https://www.hindustantimes.com/india-news/brahmos-missile-test-fired-from-indian-navy-s-stealth-destroyer-hits-bull-s-eye/story-oX4wI0TNtgAv2WOnsuBzmL.html>

India successfully test-fires naval version of BrahMos from indigenous warship

While the missile has been in India's arsenal for long, it is continuously upgraded and updated with new hardware and software systems

By Sushant Kulkarni

A Naval version of the BrahMos supersonic cruise missile was successfully test-fired on Sunday from the Navy's indigenously built stealth destroyer INS Chennai, hitting a target in the Arabian Sea, said the Ministry of Defence.

The missile hit the target with pin-point accuracy after performing high-level and extremely complex manoeuvres, the MoD said in its official statement on Sunday.

It also said the BrahMos as the "prime strike weapon" will ensure the warship's "invincibility" by engaging naval surface targets at long range and making the destroyer a lethal platform.

While versions of the missile have been in India's arsenal for long, the weapon system is continuously upgraded and updated with new hardware and software systems. These upgrades necessitate periodic tests. Scientists from the Defence Research and Development Organisation (DRDO) said in every such test of a specific variant of the BrahMos, different parameters were examined. For each test, additional hardware and software systems were examined based on inputs from the user, and against more complex targets under different atmospheric conditions, they added.

Scientists also said test results and observations were crucial inputs not just for calibrating the system but also for advancement and upgrade. The present supersonic version could reach a speed of 2.8 times that of sound (2.8 Mach) and hit a target at the range of around 450 km, and a hypersonic version of the missile, capable of reaching a speed of 5 Mach was being developed.

Defence Minister Rajnath Singh congratulated DRDO, BrahMos and the Navy for the successful launch. Dr G Satheesh Reddy, chairperson of DRDO, congratulated scientists and all the personnel of DRDO, BrahMos, Navy and the industry. He said the BrahMos missile will add to the capabilities of the Armed Forces in many ways.

BrahMos as a 'standoff range weapon'

Cruise Missiles like the BrahMos are a type of system known as "standoff range weapons", which are fired from a range sufficient to allow the attacker to evade defensive fire from the adversary. These weapons are in the arsenals of most major militaries in the world. BrahMos Aerospace was set up in 1998 with the aim to build such missiles.

Commissioned in 2016, the indigenously designed Kolkata-class stealth-guided missile destroyer, the INS Chennai is designed to carry the BrahMos surface-to-surface missile system, thus giving the ship the capability to strike at shore-based and naval surface targets.

An amalgamation of the names of Brahmaputra and Moskva rivers, the BrahMos is designed, developed and produced by BrahMos Aerospace, a joint venture company set up by DRDO and Mashinostroyeniya of Russia. Various versions of the BrahMos, including those that can be fired from land, warships, submarines and Sukhoi-30 fighter jets, have already been developed and successfully tested in the past.

In December last year, DRDO, Air Force and BrahMos Aerospace conducted two separate successful tests, one each from land and air platforms. The one from the air platform was fired from the Sukhoi-30MKI fighter aircraft onto a sea target. In May last year, the Air Force successfully tested the missile against a land-based target in the Car Nicobar region.

<https://indianexpress.com/article/india/brahmos-supersonic-cruise-missile-test-fired-from-navys-stealth-destroyer-6771703/>

INS चेन्नई से ब्रह्मोस मिसाइल का सफल परीक्षण, अरब सागर में लक्ष्य पर लगाया सटीक निशाना

By Ashutosh Tiwari

नई दिल्ली, एएनआइ। भारतीय नौसेना (Indian Navy) ने ब्रह्मोस सुपरसोनिक क्रूज मिसाइल (BrahMos supersonic cruise missile) का सफल परीक्षण किया है। यह टेस्ट स्वदेशी स्टील्थ विध्वंसक आईएनएस चेन्नई (INS Chennai) से किया गया। इस दौरान मिसाइल ने अरब सागर (Arabian Sea) में मौजूद अपने लक्ष्य को पिन पॉइंट सटीकता के साथ सफलतापूर्वक हिट किया। भारतीय नौसेना ब्रह्मोस के जरिए लंबी दूरी पर मौजूद सतह के लक्ष्यों को युद्धपोत से भेदने में सक्षम हो गई है।

यह सुपरसोनिक प्रक्षेपास्त्र आवाज की गति से भी 2.8 गुना तेज गति से अपने लक्ष्य को भेदने की क्षमता रखता है। इससे पहले डीआरडीओ और रूस के वैज्ञानिकों के साझा प्रयास से निर्मित जमीन से जमीन पर मार करने वाले क्रूज मिसाइल ब्रह्मोस का सफलतापूर्वक परीक्षण किया गया था। प्रक्षेपास्त्र 8.4 मीटर लंबा और 0.6 मीटर चौड़ा है। इसका वजन 3000 किलोग्राम है। यह प्रक्षेपास्त्र 300 किलोग्राम वजन तक विस्फोटक ढोने और 300 से 500 किलोमीटर तक प्रहार करने की क्षमता रखता है।

ब्रह्मोस जमीन, हवा, पानी और मोबाइल लांचर से दागा जा सकता है। ब्रह्मोस मिसाइल एक दो चरणीय वाहन है, जिसमें ठोस प्रोप्लेट बूस्टर और एक तरल प्रोप्लेट रेमजेम सिस्टम है। ब्रह्मोस का पहला परीक्षण 12 जून, 2001 को आइटीआर चांदीपुर से ही किया गया था। बता दें कि कई दिनों से भारत नई-नई किस्म की मिसाइल के साथ पुरानी मिसाइलों का भी प्रायोगिक परीक्षण कर रहा है।



<https://www.jagran.com/news/national-brahmos-supersonic-cruise-missile-successfully-testfired-from-ins-chennai-20900960.html>

Prithvi-2 missile, capable of carrying nukes, blasts off from Odisha in user trial

Prithvi-2 surface-to-surface missile has a range of 250 km

By Shishir Gupta

New Delhi: India on Friday successfully conducted another night trial of its nuclear-capable Prithvi-2 missile as part of a user trial for the armed forces from a test range in Odisha coast. Friday evening's user trial was carried out by the Strategic Force Command, people familiar with the matter said.

The liquid-propelled Prithvi-2 has a range of 250 km and can carry a 1 tonne warhead. The 9-metre tall missile is the first to have been developed by DRDO under the Integrated Guided Missile Development Programme. It is India's first indigenous surface-to-surface strategic missile.

The trajectory of the missiles was tracked by a battery of long-range, multi-function radars and electro-optic telemetry stations at different locations.

This is the second night trial of Prithvi-2 in less than three weeks. The DRDO had quietly carried out another round of night trial of the nuclear missile on 27 September.

The flight test of the surface-to-surface missile is the 11th missile test by India's Defence Research and Development Organisation in 40 days. The last one hadn't ended very well and DRDO scientists had to abort the Nirbhay cruise missile that was launched from Odisha's test facility into the Bay of Bengal eight minutes later.

The Prithvi-2 missile met all parameters during the user trials conducted late on Friday, a top government official said. "The night trial was successful," the official said.

The state-of-the-art missile uses an advanced inertial guidance system with manoeuvring trajectory to hit its target.

In the past too, the Strategic Force Command of the armed forces has executed night trials under the watch of DRDO scientists as part of a training exercise. The missile has already been deployed.

<https://www.hindustantimes.com/india-news/prithvi-2-missile-capable-of-carrying-nukes-blasts-off-from-odisha-in-user-trial/story-EBEzXdoocz11h69gQhVFXK.html>



India successful test-fired its nuclear-capable missile Prithvi-II on Friday late evening as part of the strategic missile's night trials (File photo: DRDO)

India conducts successful night trial of nuclear-capable Prithvi-2 missile

India on Friday successfully conducted a night trial of the indigenously developed nuclear-capable Prithvi-2 missile as part of a user trial by the Army from a test range in Odisha

New Delhi: India on Friday successfully conducted a night trial of the indigenously developed nuclear-capable Prithvi-2 missile as part of a user trial by the Army from a test range in Odisha, defence sources said.

The state-of-the-art surface-to-surface missile blasted off around 7.30 pm from launch complex 3 of the Integrated Test Range (ITR) at Chandipur near Balasore and the trial was successful, they said.

The last trial of Prithvi-2, carried out after sunset on September 23 from the same base, was also successful.

The trial of the missile, which has a strike range of 350 km, was carried out from a mobile launcher, a Defence Research and Development (DRDO) official said.



Representative Image

"The missile trajectory was tracked by radars, electro-optical tracking systems and telemetry stations by the DRDO along the coast of Odisha," he said.

The missile was randomly chosen from the production stock and the entire launch activity was carried out by the Strategic Force Command (SFC) of the Army and monitored by scientists of the DRDO as part of a training exercise, defence sources said.

The downrange teams onboard a ship deployed near the designated impact point in the Bay of Bengal monitored the terminal events and splashdown.

The Prithvi-2 missile is capable of carrying 500-1,000 kg of warheads and is powered by liquid propulsion twin engines, the sources said.

The sophisticated missile uses an advanced inertial guidance system with a maneuvering trajectory to hit its target, they said.

Already inducted into the armory of Indian defence forces in 2003, the nine-metre tall 'Prithvi' was the first missile to have been developed by DRDO under the Integrated Guided Missile Development Programme (IGMDP).

(Only the headline and picture of this report may have been reworked by the Business Standard staff; the rest of the content is auto-generated from a syndicated feed.)

https://www.business-standard.com/article/defence/india-conducts-successful-night-trial-of-nuclear-capable-prithvi-2-missile-120101601207_1.html

चीन से विवाद के बीच भारत को एक और बड़ी कामयाबी, पृथ्वी-2 मिसाइल का सफल परीक्षण

By Ashutosh Tiwari

नई दिल्ली: भारत का चीन के साथ पिछले 5 महीनों से विवाद जारी है। इस दौरान कई बार दोनों देशों के बीच युद्ध की भी स्थिति बनी। वहीं दूसरी ओर पाकिस्तान भी अपनी नापाक हरकतों से बाज नहीं आ रहा है। इन सब चुनौतियों के बीच भारत को शुक्रवार को एक बड़ी सफलता मिली। जिसके तहत पृथ्वी-2 मिसाइल का सफल परीक्षण हुआ। ये मिसाइल आसानी से 250KM दूर स्थित अपने लक्ष्य को भेद सकती है।

1 टन विस्फोटक ले जाने में सक्षम पृथ्वी-2 मिसाइल पहले से ही स्ट्रैटेजिक फोर्स कमांड का हिस्सा है। जिस वजह से स्ट्रैटेजिक फोर्स कमांड ने शुक्रवार शाम ओडिशा के तट से इसका परीक्षण किया, जोकि पूरी तरह से सफल रहा। लिक्विड-प्रोपेलंड पृथ्वी -2 मिसाइल की रेंज 250 किलोमीटर है। साथ ही ये एक टन का वारहेड (विस्फोटक) ले जा सकती है। DRDO ने इस 9 मीटर



लंबी मिसाइल को इंटीग्रेटेड गाइडेड मिसाइल डेवलपमेंट प्रोग्राम के तहत विकसित किया था, जो सतह से सतह पर मार करने वाली भारत की पहली स्वदेशी मिसाइल थी।

40 दिन के अंदर 11वां टेस्ट तीन हफ्ते के अंदर ये पृथ्वी-2 का ये दूसरा सफल परीक्षण है। इससे पहले डीआरडीओ ने गोपनीय तरीके से 27 सितंबर की रात को इस परमाणु मिसाइल का सफल परीक्षण किया था। वहीं 40 दिनों के अंदर डीआरडीओ का ये 11वां सफल परीक्षण है। शुक्रवार को हुए परीक्षण को मल्टी-फंक्शन रडार और इलेक्ट्रो-ऑप्टिक टेलीमेट्री स्टेशनों से ट्रैक किया गया। इस दौरान मिसाइल हर मोर्चे पर खरी उतरी। सीमा विवाद के बीच इस मिसाइल के परीक्षण से दुश्मन देशों की चिंता बढ़ना लाजमी है।

रुद्रम का भी सफल परीक्षण भारत ने इससे पहले 8 अक्टूबर को एक और मिसाइल का सफल परीक्षण किया था। उस दौरान डिफेंस रिसर्च एंड डेवलपमेंट ऑर्गनाइजेशन (डीआरडीओ) के द्वारा विकसित एंटी-रेडिएशन मिसाइल रुद्रम ने अपने लक्ष्य को भेदा था। इस मिसाइल को पूर्वी तट पर सुखोई-30 विमान से दागा गया। इससे पहले 3 अक्टूबर को शौर्य मिसाइल का परीक्षण भारत ने किया था।

<https://hindi.oneindia.com/news/india/drdo-successfully-testfired-prithvi-2-ballistic-missile-in-odisha/articlecontent-pf318275-584713.html>



DRDO testfires its 11th missile - Prithvi-2

Prithvi-2 ballistic missile was testfired off the coast of Balasore, Odisha

New Delhi: India has successfully testfired the over 250 km strike range DRDO-developed Prithvi-2 ballistic missile off the coast of Balasore, Odisha. It is already a part of the Strategic Forces Command, which is the custodian of India's nuclear arsenal.

Earlier on September 30, BrahMos Extended Range Supersonic Cruise Missile was test-fired off the coast of Odisha. This missile can strike the target at a distance of over 400 km.

Prithvi-2 is the 11th successive missile launched by DRDO. Prior to Prithvi-2, DRDO launched the Nirbhay missile. DRDO started launching missiles from September 7. It began with the test of Hypersonic Technology Demonstrator Vehicle (HSTDV), which was followed by Laser-Guided Anti Tank Guided Missile (ATGM).



Representative Image

DRDO's efforts and achievements are a major step towards "self-reliance," that is, being 'Aatmanirbhar' even in the field of defence technology. Their efforts are highly praised by Prime Minister Narendra Modi and Defence Minister Rajnath Singh.

When DRDO tested India's first indigenous anti-radiation missile, New Generation Anti-Radiation Missile (Rudram-1) developed by DRDO for Air Force, Rajnath Singh praised the agency by calling it a 'remarkable achievement.'

Focusing on the need to boost indigenous defence production, Singh said, "From design to production, we are trying to make India one of the leading countries of the world in the Defence, Aerospace and Naval Shipbuilding sectors with the active participation of public and private sector."

The tests can also be seen as a reaction to China's mobilisation of troops and support elements in East Ladakh.

CRPF with IIT-Delhi, DRDO to create pool of 500 high-tech experts

By Rajnish Singh

New Delhi: Facing emerging challenges in conflict-torn and insurgency hit Jammu & Kashmir as well as Maoist-affected states, the CRPF has planned to create a pool of high technology experts "from among its officers" to update their skills in handling unprecedented situations.

The paramilitary force, which is the lead internal security force of the nation with its over three lakh personnel actively deployed in several theatres and regions across the country, in the process aims to train 500 officers having graduate degree in engineering.

A pioneer batch of 40 engineering graduate officers and subordinate officers of the Central Reserve Police Force (CRPF) with right aptitude and potential will undergo three to six months' certificate course under Indian Institute of Technology (IIT) Delhi's continuing education programme to achieve the goal.

The CRPF said that the move is needed amid growing challenges and engagement with technology which entails that the force remains updated not just with most recent technologies and gadgets but also with the technical expertise required by its personnel.

"This will equip the CRPF personnel with unique skills, capabilities, and knowledge to tackle complex challenges, meet operational and strategic needs and enhance competitive advantage," CRPF DIG M. Dhinakaran told IANS.

Furthermore, the officer said, a few selected officers from this trained batch will undergo higher degree courses at IIT-D. "These trained officers will also act as tech advisors to the force."

The officers of CRPF trained by IIT-D will also be associated with joint research projects undertaken by Defence Research and Development Organisation (DRDO) and IIT-D in the field of defence and security tech solutions.

As per another officer, the force has made persistent efforts at keeping pace with the latest technologies by adopting them in its core functions.

The initiative is an effort to "create a pool of highly specialised technology experts from among its officers".

"And when it comes to technology, where to look other than the citadels of tech and research - IIT Delhi and DRDO."

To this end, a Memorandum of Understanding (MoU) was signed between CRPF and IIT-Delhi and DRDO on Saturday.

V. Ramgopal Rao, Director IIT-D and Dr A.P. Maheshwari, Director General CRPF along with senior officers of the paramilitary wing were present at the event where Prof Naresh Bhatnagar from IIT, Sudhir Gupta DG TM DRDO, Dr M.H. Rahaman, Director JATC (Joint Apprenticeship and Training Committee) and Nalin Prabhat, IG (Operations) CRPF signed the MoU at Senate Hall, IIT-Delhi campus.

The CRPF DG thanked IIT-D and DRDO for the collaboration and congratulated the force personnel on getting this valued platform to gain coveted tech expertise.

Maheshwari further said that this initiative "aims at capacity building for optimal utilisation of police technologies and will also help in integrating with DRDO labs for realistic indigenisation of technologies on internal security grid".

"The initiative will also provide operational feedback on futuristic technologies enabling IIT tech experts towards proactive Research and Development."

As more than 500 officers and security officers are holding degree in engineering, the initiative would provide the force with a wide scope to train them in varied field of technologies.

<http://www.daijiworld.com/news/newsDisplay.aspx?newsID=762048>



Sun, 18 Oct 2020

CRPF, IIT-Delhi and DRDO sign MoU

It will enable officers to undertake short-term specialised courses and also pursue research work

The Central Reserve Police Force (CRPF) has signed an agreement with the Indian Institute of Technology-Delhi and the Defence Research and Development Organisation (DRDO) to create a pool of officials who will work to find technology solutions for its operational challenges.

The about 3.25 lakh-strong force has about 500 officers and sub-officers who hold professional degrees in engineering and technology.

The Memorandum of Understanding will enable these officers to undertake short-term specialised courses at these institutions and also pursue research work.

“A batch of 40 engineering graduate officers and subordinate officers of the CRPF with right aptitude and potential will undergo a certificate course of about three to six months under IIT-Delhi’s continuing education programme”, a CRPF spokesperson said.

“This will equip them with unique skills, capabilities and knowledge to tackle complex challenges, meet operational and strategic needs and enhance competitive advantage”, he stated.

Tech advisors

A selected group of officers from this trained batch would undergo higher degree courses at IIT-Delhi. They would act as tech advisors to the force, he noted.

The chosen officials would be associated with joint research projects undertaken by the DRDO and IIT-Delhi in defence and security technology solutions. The first batch was expected to undertake courses and research work in ballistics, building and infrastructure, information technology and communication, he added.

CRPF Director General A P Maheshwari said, “The aim of inking the MoU with the two premier institutions is to build capacity for optimal utilisation of police technologies and to integrate requirements of the force with their research labs for realistic indigenisation of technologies on the internal security grid”.

<https://www.thehindu.com/news/national/crpf-iit-delhi-and-drdo-sign-mou/article32882903.ece>



Representative Image: The about 3.25 lakh-strong force has about 500 officers and sub-officers who hold professional degrees in engineering and technology. | Photo Credit: AP

Gaganyaan: ISRO's human spaceflight project launch set for August 2022

ISRO Chairman Dr K Sivan indicated that the Indian human space flight is set for August 2022, although some small shift may take place owing to disruptions due to the ongoing coronavirus pandemic

By Col Vinayak Bhat (Retd)

New Delhi: Indian Space Research Organisation (ISRO) has resumed its work on Gaganyaan - India's human space flight programme. ISRO chairman Dr K Sivan indicated that the Indian human space flight is set for August 2022, although some small shift may take place owing to disruptions due to the ongoing coronavirus pandemic.

The Gaganyaan mission aims to send a three-member crew to space for a period of five-seven days by 2022 when India completes 75 years of its Independence. India has chosen four members of the Indian Air Force for the mission and their training is in progress.

The Hindustan Aeronautical Limited and DRDO are helping the mission by providing technological support. The DRDO will provide human system support like space-grade food, crew healthcare and other systems.

The international space agencies are also assisting in the Gaganyaan preparations. While Russia is training the Indian astronaut-elects besides providing space suits, France is providing space medical technology and NASA too is involved in the mission.

The Gaganyaan is set to take off on a GSLV Mk III in August 2022.

India has signed 250 documents in the field of Space cooperation with 59 countries to advance India's capabilities and also to help other space-aspiring nations to benefit from space, said ISRO Chairman Dr K. Sivan.

Allan D Emil Memorial Award

On 14 October 2020, Dr Sivan was awarded the prestigious Allan D Emil Memorial Award from the International Astronautical Federation (IAF).

The IAF Vice President for Honours and Awards, Seishiro Kibe announced the prestigious award for 2020 in an online event on October 14, 2020. Dr Seishiro Kibe recognising the achievements and successes of ISRO Chairman Prof K Sivan presented him the Allan D Emil Memorial Award 2020.

The award is presented annually for an outstanding contribution to space science, space technology, space medicine or space law.

The award was presented at the closing ceremony of the CyberSpace Edition of 71st International Astronautical Congress, IAC 2020 held online due to Covid-19 restrictions.



The Hindustan Aeronautical Limited and DRDO are helping the mission by providing technological support.



(Col Vinayak Bhat (Retd) is a consultant for India Today. A satellite imagery analyst, he served in the Indian Army for over 33 years)

<https://www.indiatoday.in/science/story/gaganyaan-isro-human-spaceflight-project-launch-set-for-august-2022-1732672-2020-10-17>

THE TIMES OF INDIA

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Invest in futuristic tech: DRDO Chief

Hyderabad: The ninth convocation ceremony of Jawaharlal Nehru Technological University, Hyderabad, was held virtually on Friday. The event saw 38 students earning 53 gold medals.

This year, 78,395 undergraduate and postgraduate students were awarded degrees. In his convocation address as the chief guest, G Sathesh Reddy, chairman, Defence Research and Development Organisation urged institutions to excel itself into basic research to applied research in every field.

“Unless institutions invest in futuristic technologies, no research and development organisation will come forward to help in prototyping. The country can only be self-resilient in developing every component if academic institutions excel in applied research,” said Reddy. He said the DRDO has ties with 295 academic institutions in the country.

Reddy explained that the DRDO is investing Rs 1,000 crore in various academic institutions, including Indian Institute of Technology, Hyderabad and University of Hyderabad, to come up with futuristic technologies.

The graduates include 61,295 BTech students, 5,191 MTech students, 4,793 MBA students, 3,406 B Pharmacy students among others. University will be awarding 53 gold medals to students for their outstanding academics/research.

<https://timesofindia.indiatimes.com/city/hyderabad/invest-in-futuristic-tech-drdo-chief/articleshow/78709774.cms>



Dr. G Sathesh Reddy, director Research Centre, Imarat, Hyderabad at PSG Institute of Management in Coimbatore. Story-Komal Photo J Jackson

Army pushes ahead with plan to equip infantry soldiers with modern weapons

By Rajat Pandit

New Delhi: The Army is now firmly pushing ahead with its long-delayed roadmap to induct new assault rifles, close-quarter battle carbines and light machine guns to arm infantry soldiers after several setbacks over the last decade.

The overall requirement for these basic weapons for foot-soldiers, who are often forgotten in the race to acquire howitzers, tanks, missiles, helicopters and the like, is huge for the over 12-lakh strong force.

With over 380 infantry and 63 Rashtriya Rifles battalions, the Army requires around 9.5 lakh assault rifles, 4.6 lakh CQB carbines and over 57,000 light machine guns (LMGs).

“Some emergency procurements from abroad as a critical operational necessity are already underway. Bulk of the requirements will be met by ‘Make in India’ projects with foreign collaboration,” said a senior officer.

For starters, amidst the ongoing military confrontation with China, the contract for the second lot of 72,000 SiG Sauer assault rifles from the US is set to be inked by December.

The Army has already inducted 72,400 SiG Sauer rifles, which are 7.62x51 mm caliber guns with an effective “kill” range of 500-meter, for frontline troops under a Rs 647 crore fast-track procurement (FTP) deal inked in February last year.

Simultaneously, the Army wants the stalled ‘Make in India’ project to manufacture over seven lakh Kalashnikov AK-203 rifles, at the Korwa ordnance factory in Uttar Pradesh with Russian collaboration, to take off as soon as possible.

“The requirement for longer range assault rifles has been met through the over 1.4 lakh SiG Sauer rifles. We do not require the 7.62x51mm rifle prototype developed by the Ordnance Factory Board (OFB), which has time, quality and pricing issues,” said another officer.

“The 7.62x39 mm caliber AK-203 rifles (with an effective range of 300-meter) will take care of the remaining requirement,” he added.

The deliveries of 16,479 Israeli Negev 7.62X51 mm LMGs, in turn, will begin from January under a Rs 880 crore deal inked in March this year. “Four to five companies have already been shortlisted for the subsequent project to manufacture the rest of the LMGs here. The trials will begin early next year,” he said. It is also learnt that the OFB has also shown interest in this project.

The RFP (request for proposal) to manufacture 4.6 lakh CQB carbines in India will also be issued early next year. This comes after an earlier FTP procurement to buy 93,895 such carbines from UAE firm Caracal was scrapped recently. “Four to five foreign companies, including Caracal, have expressed interest. They can tie-up with OFB or private companies here,” he said.

All this, of course, will take a lot of doing. The contract to manufacture the AK-203 rifles through the JV between OFB and Rosonboronexport-Kalashnikov, which was set up in February 2019, for instance, is still stuck due to costing issues, as was reported by TOI earlier.

The Army had first asked for new assault rifles and CQB carbines way back in 2005, while the case for LMGs was initiated in 2009. But the long-drawn procurement projects were repeatedly scrapped due to graft allegations or unrealistic technical parameters as well as the lack of indigenous options for well over a decade.

<https://timesofindia.indiatimes.com/india/army-pushes-ahead-with-plan-to-equip-infantry-soldiers-with-modern-weapons/articleshow/78724797.cms>

TSG SundayGuardianLive

Sun, 18 Oct 2020

No lowering of guard at LoC during winters, says Army Chief

By Noor Ul Qamraim

Srinagar: While troops are being moved more on the LoC both in the Kashmir valley and Poonch, Rajouri sectors in Jammu region, Army Chief General Manoj Mukund Naravane on Thursday said that on the other side of the border, there are huge efforts to push more and more terrorists before snowfall and the winters.

Army commanders in the Kashmir valley recently told the media that they were watching all the developments and there would be no lowering of guard even after snowfall in the given circumstances. Additional troops have been seen by the locals moving to the border areas and most of the posts and bunkers would be kept operational even during the winters in the snow-bound areas of Kashmir borders.

On Friday, heavy border skirmishes started in the Poonch sector, while in Keran, Machil and Kupwara sectors, shelling has been reported in the past few days. The Army recently said that they thwarted BAT attempts in the Tangdhar sector, while reports of shelling are being reported in the media almost on a daily basis, from areas close to the LoC.

Latest media reports on Friday afternoon said that heavy firing and shelling on forward areas and posts along the Line of Control (LoC) was going on in Poonch district of Jammu. In the Mankote sector of Poonch, even the shells were coming to civilian areas, reports further said.

“Pakistani troops have violated ceasefire 18 times this month,” defense spokesman said in Jammu on Friday. On Thursday, a Junior Commissioned Officer (JCO) was injured in Pakistani shelling in the Sunderbani sector of Rajouri district.

On 1 October, an army jawan was killed and his colleague was injured in the Krishnaghati area of Poonch. There have been multiple infiltration bids in October so far, officials said in Srinagar.

Army commanders on the ground in Kashmir valley have said that there would be no lowering of guard even during the winters and after the snowfall, as they have reported that on the other side of the border, there are a lot of activities going on. Recent media reports have said that even the Chinese troops were visible on the other side of the border; however, senior army commanders have refuted such media reports and said that they have no such information so far.

The Army has carried out a lot of operations near the border and has busted a lot of hideouts where arms and ammunition were kept by terrorists. Most of such operations were carried out in the border areas of North Kashmir.

<https://www.sundayguardianlive.com/news/no-lowering-guard-loc-winters-says-army-chief>



Army Chief General Manoj Mukund Naravane

‘Integrated air defence may be difficult’: Former IAF Chief

At a time when things are heating up on the Line of Actual Control with China’s aggressive posturing, India needs to bolster its air power. Former IAF chief Arup Raha speaks to Soumyadip Mullick on how India’s air warriors need to up the ante.

Q. Is the induction of the Rafale aircraft adequate for the IAF to meet its present combat requirements when China has developed fifth-generation fighter aircraft (FGFA)?

A. The twin-engine Rafale fighter aircraft built by Dassault Aviation of France is one of the best and potent weapon platforms in the world. Its high-performance airborne interception AI radar combined with ‘Meteor’ advanced Beyond Visual Range (BVR) air combat missile provides it with the most formidable technological edge in aerial combat.

In attacking ground targets, the ‘Scalp’ long-range stand-off precision guidance weapon would prove to be devastating in performance. Its weapon carrying capacity, advanced electronic warfare capabilities and good radius of combat action would restore the technological edge IAF had enjoyed in the region, including China.

However, 36 Rafales may prove to be effective in winning a skirmish against our adversaries but they may not be enough to deter a full-scale conflict in the region. The IAF requires the full complement of 126 aircraft for air dominance as envisaged in the original MMRCA procurement project.

The draw-down of IAF combat fleet due to obsolescence has to be arrested with the induction of more MMRCA, preferably Rafale since most of the infrastructure cost has already been subsumed in the earlier contract. Inventory management and maintenance training would be more cost-effective compared to induction of new aircraft.

The airborne threat environment would evolve rapidly with the induction of FGFA, the J-20 which is being operationalised by the PLA Air Force. DRDO & HAL would have to compress timelines in the development of Indian FGFA, the AMCA (advanced multirole combat aircraft) in the next 7 to 10 years. It is necessary to ramp up the production of the Light Combat Aircraft and upgrade the Su-30MKI fleet for operational viability.

Q. India faces a two-front challenge from China and Pakistan. With insufficient squadrons what should IAF’s operational strategy be in present circumstances?

A: A collusive two front challenge cannot be ruled out. This subject has been uppermost in the minds of strategic security analysts and military leadership in India for a long time.

The narrative has been building up progressively with China determined to stymie the rise of India as another ‘Pole’ in Asia. The situation is unfolding rapidly after the outbreak of the virus in Wuhan and skirmishes in Ladakh.

China’s efforts in building military infrastructure, road/rail connectivity in Tibet Autonomous Region, large investments in the military-industrial complex and rapid development of military capability did not go unnoticed but India has been constrained by lack of funds and more importantly political will to build military power to mitigate the rising security challenges.

Though IAF’s combat strength has reduced due to obsolescence and retirement of vintage fleets, the backbone of IAF’s capability is the huge number of heavyweight Su- 30MKI fighters, upgraded

Mirage 2000 and Mig-29 aircraft. Induction of Rafale fighters with AI radars – Meteor BVR missile combination has changed the perspective on air operations in the region.

The IAF's operational strategy would perhaps be to contain the adversary in the North while dealing offensively with the western adversary. However, a full-scale conflict is not likely since it would be a loselose situation for all three nations.

The whole world would be worried to witness three nuclear-powered states in a conflict, an unthinkable situation. However, the belligerence of China towards India is not likely to reduce and India has to build military power to deter China from any misadventure.

Q. An integrated Air Defence Command is being set up for the first time in India, comprising members of Army, Navy and IAF. How necessary and efficient do you feel it will be as a decision making body for averting security threats in Indian airspace?

A. Air Defence of India's sovereignty over its aerospace, especially the frontiers is IAF's responsibility. It has layered defences with surveillance radars, integrated air command and control system (IAACS), surfaceto- air missiles, air defence (AD) aircraft, AWACS, AEW&C aircraft etc.

The Indian Army (IA) has an integral AD weapon system, both ack-ack guns and missiles which are deployed in the tactical battle area (TBA) especially with armoured forces. The Naval forces at sea have their own AD weapons and a system of effective independent control.

The IAF and Army have adequate and effective coordination to ensure air defence and offensive air operations are conducted with least hindrance in air engagements in TBA. An IDC may be a utopian concept, difficult to implement because of multiple factors which are relevant in the Indian context and needs consideration.

Firstly, the concept of operations of the IAF is quite different from the Army. Mobilisation and reservation requirements are very relevant for an Army commander to conduct operations effectively. The IAF practices rapid switching roles and theatres in the deployment of combat elements, especially fighter aircraft since mobilisation and reserves are not constraints.

These factors are intrinsic in the employment of airpower, exercising great flexibility and achieving maximum concentration of force through the concept of centralised Planning and decentralised Execution. Secondly, the IAF will find it difficult to distribute dedicated aircraft assets between AD command and Operational commands, especially scarce holdings.

Most aircraft are multi-role, switching roles as per the need of the day's operational objectives. The Su-30MKI, Mirage 2000, Rafale can perform dedicated air defence or strike missions, as well as both the roles in the same mission carrying bombs and missiles etc. Jaguars are the only dedicated strike aircraft, the rest of the fleet are truly multi-role.

Non-switching roles of air defence (AD) aircraft under Air Defence Command during lean periods would lead to sub-optimal utilisation of scarce resources. Thirdly the AWACS & AEW&C aircraft would be controlling both AD missions and strike missions; splitting these assets would be difficult with so few aircraft but more importantly, two independent commanders effecting control in the same airspace would add to the confusion, especially in the TBA.

However, some of these constraints may be overcome with excellent NCW capability, clear protocols in command, control mechanism between Commands and availability of adequate fighter assets and force enhancers like AWACS.

Q. With China quite apparently being advanced in technology, how prepared is IAF in 2020 for cyber and electronic warfare? Does IAF require more AWACS aircraft?

A. The Chinese Armed Forces, especially the PLAAF had been technologically poor till the late 1990s. In the last two decades, China has invested heavily in acquiring core technologies through R&D to bolster its indigenous weapon manufacturing capabilities.

It has a huge defence budget resulting from a booming economy as the manufacturing hub of the world. It has been able to close the technological gap vis-a-vis the US to a large extent in land,

maritime, aerospace, nuclear, cyber and electronic warfare domains. At the current rate, it is expected to catch up with the US in two decades or so.

It has made substantial progress in the use of artificial intelligence and cyber warfare techniques. Currently, the Indian Armed Forces can hold their own against Chinese warfighting capabilities, retaining a technological edge in weapon systems, and even in the future to deter conflict or win a skirmish like Galwan Valley, Balakot air strikes etc.

Budgetary support and dedicated effort from DRDO and DPSUs as well as “political will” would determine the outcome. China is rapidly pulling away, building a gap in warfighting capabilities including cyber and space domains. They are certainly ahead of India in these spheres.

AWACS is a force enhancer, multiplying the combat effectiveness of fighter fleets manifold both in air defence and offensive air operations. IAF definitely requires at least 10 additional AWACS and AEW&C aircraft to effectively conduct operations in a collusive two-front conflict.

Q. With winter coming, Ladakh will see tough visibility conditions. Also with China’s vast air fleet, how equipped should IAF be in engaging China Beyond Visual Range (BVR)?

A. Extreme weather conditions as experienced in Ladakh and Arunachal Pradesh in the high Himalayan ranges in winter are treacherous and life-threatening.

Conducting combat operations both for the Army and the Air Force are extraordinarily difficult, though the difficulties are similar for both sides in the mountains.

The IAF and the Army Aviation Corps have exceptional training and exposure to the elements of weather while operating round-the-year air maintenance missions in these sectors. The Siachen Glacier is the highest battlefield in the world while Daulat Beg Oldie is the highest airfield where IAF operates both fixed-wing and rotary-wing aircraft to support the deployed troops.

There is no other Air Force in the globe with the kind of challenges in terms of treacherous terrain and climatic conditions faced by the IAF in day to day operations. In extreme wintry weather conditions on the Himalayan border, the IAF possesses most of the trump cards except for numerical superiority in a conflict situation.

These are, firstly, that in Tibet most airfields would be snow-bound hindering intensive air operations (take-off and landing). Most of the IAF bases are in the plains where the weather would not be such a hindrance. All airfields in the Northern and Western sector were fully operational during the December 1971 conflict with Pakistan.

Secondly, IAF fighter aircraft would carry much greater weapon loads vis-a-vis PLAAF aircraft operating from TAR due to altitude effect. Thirdly, air defence capabilities are evenly matched. However, exposure, training, leadership and morale are factors in favour of IAF and the Army.

Fourthly, the fight will be between professionals (IAF) and conscripts (PLAAF). Fifthly, the ‘METEOR’ (BVR air to air missile) armed Rafale and the MICA (BVR missiles) armed Mirage - 2000 are superior to the PLAAF BVR missile capability. The PLAAF’s recently developed J-20 FGFA is yet to prove its operational capability claims in a conflict.

Sixthly, PLAAF air bases have limited infrastructure like hardened aircraft shelters etc. increasing their vulnerability manifold to air attacks. It is not so with IAF bases, outnumbering PLAAF bases in TAR. Numerical superiority will not play an important role since air bases in TAR are limited, restricting their deployment and the TBA would not be large enough to conduct large scale air operations.

Q. How crucial will be the role of IAF’s Jaguar with deep penetration strike capabilities, in a counter-attack against Chinese long-range strategic bombers?

A. The PLAAF possesses H-6 strategic bombers. Currently, a few of these are deployed at Kashgar and Hotan air bases in Tibet, both in depth airfields. H-6 aircraft is a license-built version of the vintage Russian TU-16 bombers. China has 120 such aircraft, optimised for multiple roles that are conventional bombers, nuclear bombers as well as air reconnaissance roles.

China is trying to manufacture a stealth bomber, H-20 similar to the famous US B-2 strategic bomber by 2025. The threat potential of H-20 would be substantial if and when operationalised with enhanced range and stealth features.

The H-6 bomber is subsonic with a very large radar signature and would be extremely vulnerable to the Indian Air Defence weapon systems in the contested airspace in Ladakh and eastern India. Hence, their deployment in Tibet is more for posturing than as a formidable threat.

In fact, the PLAAF would be better off using its SU-27 and Su-30 equivalents and Su-35 fighters than H6 bombers. The IAF does not possess any strategic or conventional bombers in its inventory after the Canberras were retired from service due to obsolescence several decades back.

Deep penetration strikes in the hinterland of a large country using bombers would be difficult to execute unless the adversary is no match for the attacker. An efficient network-centric air defence system would cripple such bombers.

The IAF's Su-30 MKI, Rafale and Mirage 2000 fighters with Air to Air refuelling could conduct deep penetration strikes to a reasonable depth but the risks of failure may outweigh the likely gains of such missions.

Currently, the IAF's capability in the tactical battle area like interdiction of logistics and supply lines, reinforcements of troops and equipment, command and control centres, communication hubs etc. as well as attacks on airfields, is more than a match for the PLAAF due to geographical, training and experience factors – all in favour of IAF.

Q. Do you feel the time is ripe for IAF to increase its operational capabilities in the Eastern Theatre airspace where it shares a considerable length of the LAC with China?

A. India has to contend with two live borders, LOC with Pakistan and LAC with China, both are nuclear powers. The legacy of unresolved borders inherited from the British has forced India to fight several conflicts against its wish to protect its sovereignty.

Till recent times, the entire nation, including the military had focused on Pakistan as the main adversary. However, the belligerence of China and its actions since the 1962 Indo-China conflict have been very proactive. Their hostility towards India would intensify progressively hence India has to prepare for a long haul to contain the Dragon, especially after Galwan Valley and Pongongtso clashes.

The raising of the Mountain Corps by the Army based in Panagarh is one such step. The Border Roads Organisation (BRO) has been working hard to build roads, bridges etc. to improve the communication network in these remote Himalayan borders.

The IAF has already bolstered its operational infrastructure in the region by upgrading ALGs, runways, manoeuvring areas and other specific weapon system related assets. Several Su-30 MKIs squadrons, C-130 J Hercules, new surveillance radars etc have either been deployed or in the process of deployment. A lot more is in the pipeline for the Eastern Theatre to mitigate the threats envisaged.

<https://defenceupdate.in/integrated-air-defence-may-be-difficult-former-iaf-chief/>

3-4 Rafale fighter jets to join Indian Air Force in November first week

Amid the ongoing China border conflict, Indian Air Force's (IAF) offensive capabilities will get a boost as 3-4 Rafale fighter jets would be arriving at the Ambala airbase in Haryana by the first week of November

New Delhi: Amid the ongoing China border conflict, Indian Air Force's (IAF) offensive capabilities will get a boost as 3-4 Rafale fighter jets would be arriving at the Ambala airbase in Haryana by the first week of November.

This would be the second batch of these French-origin fighter jet aircraft as the first batch of five Rafales had arrived in India on July 28 and were officially inducted on September 10 by the Narendra Modi government.

“The second batch of 3-4 Rafale fighter jets would be arriving in India by first week of November from France and preparations are on for their arrival in the country,” government sources told ANI.

“With the induction of these aircraft, the IAF would have 8-9 fighter aircraft which will be operationalised within a few days in view of the ongoing situation,” they said.

The Rafale fighters have already been operationalised and have also been deployed in the conflict zone of Ladakh in the short duration of time they have been with the Air Force.

An IAF team headed by Assistant Chief of Air Staff (Projects) Air Vice Marshal N Tiwari in France for reviewing the project as part of the annual routine meeting.

The Indian pilots are training there in France and by March 2021, the Indian side is likely to complete the training phase there.

The IAF will deploy one squadron each of the Rafale combat aircraft at its airbases in Ambala in Haryana and Hashimara in West Bengal.

In September of 2016, India signed a deal with the French government and Dassault Aviation to acquire 36 Rafale fighter jets for over 7.8 billion euros to arrest the fall of combat squadrons and meet urgent requirements on the eastern and western fronts.

The first five fighter aircraft were inducted in Ambala in presence of the French Defence Minister Florence Parry and Indian Chief Of Defence Staff Gen Bipin Rawat along with the IAF Chief RKS Bhadauria.

<https://www.hindustantimes.com/india-news/3-4-rafale-fighter-jets-to-join-indian-air-force-in-november-first-week/story-YdnEZJOkxJBzAkHUfZCofM.html>



This would be the second batch of these French-origin fighter jet aircraft as the first batch of five Rafales had arrived in India on July 28 and were officially inducted on September 10 by the Narendra Modi government.(File photo for representation)

India's still waiting for a defence university that was proposed in 1967, while Pakistan has 2

The Indian Defence University was first proposed in 1967, and while a foundation stone was laid in Gurugram in 2013, nothing has materialised yet

By Amrita Nayak Dutta

New Delhi: A Pakistani strategic scholar's tweet and a former Indian Navy chief's quote tweet earlier this week have drawn attention to the fact that while Pakistan has two functioning defence universities, India has none yet, despite one being proposed 53 years ago.

Adil Sultan tweeted on 12 October that he had joined as dean/head of department at Islamabad's Air University, and the very next day, Admiral Arun Prakash (retd), the Indian Navy chief between 2004 and 2006, lamented that India's National Defence University, conceived in 1967, is only marked by a "forlorn foundation stone" in a field in Haryana.

Admiral Prakash's tweet was a reminder that in India, chronic delays in the realm of defence are not just limited to procurements, but include something as routine as a university.



Then-PM Manmohan Singh and other dignitaries at the foundation stone-laying ceremony for the Indian National Defence University in 2013 | Photo: Integrated Defence Staff (ids.nic.in)

History of IDU

The idea to set up a national defence university as an institution of national importance was first mooted by the Chief of Staff Committee in 1967. In 1982, it was endorsed by the in-house Lt Gen. Sethna Committee. In 1999, the Kargil Review Committee revived it, and the proposal was endorsed by a Group of Ministers (GoM) report.

On 23 July 2001, the Ministry of Defence appointed a Committee on the National Defence University (CONDU) under the chairmanship of K. Subrahmanyam, a retired civil servant and father of current Minister of External Affairs and former foreign secretary S. Jaishankar.

With the GoM approval and the CONDU's 2002 recommendations, Headquarters Integrated Defence Staff was tasked to process the case through the MoD for the establishment of the Indian National Defence University or INDU, later renamed to Indian Defence University or IDU.

The Union cabinet approved the proposal in May 2010, and the foundation stone was laid on 23 May 2013 by then-prime minister Manmohan Singh, at Binola, Gurugram, on land donated by the government of Haryana.

The final detailed project report (DPR) for the project was submitted in 2013, but no tangible infrastructure development has taken place since then, as no funds have been released for it.

The draft Bill was put online for public consultation in August 2016, and was subsequently submitted to the cabinet secretariat. The cabinet secretariat put forth certain observations, and after consultations with then-defence minister Arun Jaitley and other ministers, the bill was revised in December 2017, defence ministry officials said. This was also the time when the proposal was renamed from INDU to IDU.

Lt Gen. Satish Dua (retd), former Chief of Integrated Defence Staff, told ThePrint that the process of finalising the IDU was laborious, but was largely over by 2017.

"Getting the framework of the university approved, taking lessons from other universities and the inter-ministerial consultations were all done," he said. "In fact, we were hoping that by 2018, it should have been announced."

The Comptroller and Auditor General, in a report tabled in the Lok Sabha this year, noted that the bill was lying with the cabinet secretariat since then for approval.

The defence ministry had, in August 2019, informed the CAG that the draft bill was yet to be approved by the cabinet, and the detailed project report for the university could be finalised after the law was enacted.

The bill has been lying with the Prime Minister's Office for over a year and a half, sources told ThePrint.

Reports said there was a renewed push on the bill after General Bipin Rawat took over as the Chief of Defence Staff. A presentation was made before him in February 2020, but there has been no progress since.

Military-bureaucracy tussle

Top sources in the defence establishment told ThePrint that the primary hurdle is a civil-military tiff over who would head the IDU.

"There is a difference in opinion as to who should head the institution. Purely on the virtue of being a defence university, it was proposed that an officer from among the three services should be heading it," a source said.

"However, that has received some objections from certain corners who feel it should be headed by a bureaucrat instead," the source said.

The CAG had observed that the project cost had increased from Rs 395 crore in May 2010 to Rs 4,007.22 crore in December 2017. Stating that the university did not fructify even after the lapse of two decades in the absence of revised cabinet approval, the CAG had said: "This has deprived the nation of an educational institution excelling in the area of defence and national security."

While it was earlier proposed that the Union defence minister will be the chancellor of the university, the 2016 bill proposes that a services officer will be the vice-chancellor of the university.

As it stands now, the university will function under the Department of Defence, which is headed by the defence secretary.

In an article for ThePrint, Lt Gen. H.S. Panag (retd) had said the predominance of military personnel and the exclusion of bureaucracy in the management of the university does not reflect the desired civil-military synergy necessary for national security.

"The military and the bureaucracy must set aside the traditional rivalry to build a world-class institution dealing holistically with all aspects of national security," Panag had said.

What IDU seeks to do

As it stands, the proposed university seeks to promote higher education and research in national security studies, defence technology, defence management and allied areas, and assist policy making.

It also aims at providing a common platform between services, intelligence organisations, police organisations, bureaucrats, scientists, technocrats and industry working in the sphere of national security.

It has been proposed that military tri-services institutions such as the National Defence College, the College of Defence Management, National Defence Academy and the Defence Services Staff College would be affiliated to it.

Two-thirds of the students will be from the armed forces and remaining 33 per cent would be drawn from other civilian government agencies and the police.

There will also be students from friendly foreign countries in the university, whose number will initially be 500, and eventually go up 2,500.

Almost all major countries such as the United States, China and Russia have defence universities, and Lt Gen. Rakesh Sharma (retd), former commander of the Army's 14 Corps, told ThePrint that these universities are doing an "intense amount of research" and training functionaries of armed forces and those associated with national security in general.

“We need a university to commence research on future warfare and future geopolitical and geo-strategic environment,” Sharma said, adding that this is not happening with the required intensity.

Talking about the importance of the university, Lt Gen. Dua said that it is important to have a strategic culture in the country, and young people should be specifically trained as strategic experts, given that there are few genuine researchers at this point. The IDU will train such students, he said.

“There is a lot of ad hocism in place right now in some fields, where officials have to learn on the job. For instance, the defence university will have a separate vertical on acquisition to train students on the subject,” Dua said.

“There are several colleges under the armed forces which follow different methodology. The university will bring all of them under its aegis. It will improve education at higher levels of leadership and encourage knowledge in all specialised fields,” he said.

Air Vice Marshal Arjun Subramaniam (retd) had written in *The Hindu* that said the university must be the prime mover of intellectual capital in a reformed Indian military.

Rashtriya Raksha University

The defence and security establishment had been buzzing about the long-delayed IDU project even before Admiral Arun Prakash’s tweet brought it back into focus. This is because Parliament, in its last session, paved the way for a Rashtriya Raksha University in Gujarat — which sounds like it means the ‘national defence university’ — but is actually an institution for policing.

The Rashtriya Raksha University Bill, 2020, was cleared by the Rajya Sabha in the monsoon session, declaring the new university to be an institution of national importance and repealing the Raksha Shakti University Act, 2009.

“It was surprising because the word ‘*raksha*’ translates to defence. Given that the university is dedicated to policing, the new name was confusing for many,” a defence source said. “There is now a rethink over changing the name of IDU again.”

However, the mandates of the two proposed universities are quite different. The key objectives of the Rashtriya Raksha University include providing dynamic and high standards of learning and research, providing a working environment dedicated to advancing research, education and training in the domain of policing, and promoting and providing public safety.

<https://theprint.in/defence/indias-still-waiting-for-a-defence-university-that-was-proposed-in-1967-while-pakistan-has-2/525130/>



Sat, 17 Oct 2020

ADTL to build, run ₹753 cr. MiG-29 simulator centre for IAF

Signs contract with Ministry of Defence and Russia’s RAC MiG

By Mini Tejaswi

Alpha Design Technologies Ltd. (ADTL) said it has signed the first of two-phase defence contracts, together worth ₹753 crore, with the Ministry of Defence and Russia’s RAC MiG.

The Bengaluru-based company, that is involved in military aircraft, electronic devices for the military and satellite assemblies for ISRO, said it has been chosen by the two to build, own and maintain two types of simulators for fighter aircraft.

Pilots of the Indian Air Force will train on these simulators before flying the upgraded Russian-origin MiG-29 fighters.

Under the first contract worth ₹53 crore, Alpha Design would set up and run the MiG-29 simulator centre at the Adampur airfield near Jalandhar initially for two years. The second 18-year contract would be signed after two years, said ADTL CMD Col. (retd.) H.S.Shankar.

Alpha has hired former IAF pilots as trainers. Training on simulators can save up to 75% of the cost of fuel and wear and tear of flying an actual plane, he added.

<https://www.thehindu.com/business/adtl-to-build-run-753-cr-mig-29-simulator-centre-for-iaf/article32875402.ece>

THEWEEK

Sat, 17 Oct 2020

Make in India: Should Indian Navy's cancellation of 2 contracts cause concern?

NOPVs would have been the first Indian Navy ships to be built by a private shipyard

Last week, reports emerged that the Indian Navy had cancelled a contract worth Rs 2,500 crore with Reliance Naval and Engineering Ltd (RNEL) to build five naval offshore patrol vessels (NOPVs). This week, it was reported that the Indian Navy had scrapped a tender to build four large amphibious assault ships called landing platform docks (LPDs) that would have an estimated cost of Rs 20,000 crore.

NOPVs

The first NOPV ships, the Shachi and Shruti, were launched amid great fanfare in July 2017 at Pipavav shipyard in Gujarat. The NOPVs were intended to be patrol vessels that would "undertake surveillance of the country's vast Exclusive Economic Zone (EEZ) besides operational tasks such as anti-piracy patrols, fleet support operations, maritime security of offshore assets, coastal security operations and protection of shipping lanes. The NOPVs would increase the ocean surveillance and patrolling capabilities of the Indian Navy," The Indian Navy had said at the time of the launch of the Shachi and Shruti.



The first two NOPVs built by RNEL | Indian Navy

The NOPV contract was significant as these would have been the first Indian Navy ships to be built by a private sector shipyard in India.

PTI reported the contract was cancelled two weeks ago "due to the delay in the delivery of the vessels".

The Indian Navy signed the contract with Gujarat-based Pipavav Defence and Offshore Engineering in 2011 for the five NOPVs. Anil Ambani's Reliance Group had taken over Pipavav Defence and Offshore Engineering in 2015. Pipavav itself was facing heavy losses at the time of its sale.

The NOPV contract did not see smooth sailing as RNEL's financial woes increased. The five ships were originally intended for delivery between 2014 and 2016. In December 2018, the Indian Navy encashed bank guarantees from RNEL after the delivery of the first ship was delayed.

The ministry of defence requires vendors to provide bank guarantees worth 10 per cent of a contract's worth. *PTI* reported last week RNEL "has an outstanding debt of over Rs 11,000 crore".

RNEL is currently going through debt resolution process after lenders took the company to the National Company Law Tribunal over default in loan repayments.

As many as 12 companies submitted expressions of interest in taking over RNEL in August. However, the cancellation of the NOPV project has apparently cast a shadow over the bidding process.

LPDs

Unlike the NOPV project, the LPD project did not start construction, though the Indian Navy had launched the acquisition process almost seven years ago.

PTI reported the request for proposal for the project was triggered by the Indian Navy issuing new specifications for the LPDs.

LPDs are used to transport troops, land warfare assets such as tanks, helicopters and vessels into a warzone by sea. The LPDs were estimated to displace nearly 40,000 tonnes, making them as large as aircraft carriers. LPDs are useful not only for assaults on enemy beaches but also ferrying supplies and personnel to areas hit by natural disasters. China recently launched a large class of amphibious assault ships called the Type 075 class, which would displace around 40,000 tonnes.

Three private sector companies—RNEL Larsen & Toubro (L&T) and ABG Shipyard—were in the race initially for the mega project, but ABG was disqualified on account of poor financial health.

The shipyards were to offer designs developed with foreign shipyards for the Indian Navy contract. There had been speculation that the Indian Navy may cancel the tender given the financial woes of RNEL, which would have left it in a 'single bidder' situation.

Private shipyards' viability

The cancellation of the NOPV tender and the worries about the debt resolution process has sparked worries RNEL may meet the same fate as two other private shipyards: ABG Shipyard and Bharati Shipyard.

Both ABG Shipyard, with a debt of over Rs 19,000 crore, and Bharati Shipyard, with a debt of over Rs 13,000 crore, are already under liquidation, and lenders are likely to get less than Rs 800 crore and Rs 600 crore, respectively.

The cancellation of the two Indian Navy projects also offer a cautionary tale of the challenges facing private shipyards at a time the defence forces are embracing 'atmanirbharta'.

In August, the ministry of defence released its first list of 101 defence equipment that would not be imported. Number 22 on the list was offshore patrol vessels.

<https://www.theweek.in/news/india/2020/10/16/make-in-india-should-indian-navy-s-cancellation-of-2-contracts-cause-concern.html>

Indian Army vice-Chief to visit US ahead of 2+2 dialogue

Lt Gen SK Saini will also visit the Indo-Pacific Command headquarters in Hawaii, where different aspects of military cooperation and “furthering military-to-military engagement” will be discussed

Edited By Zara Khan

New Delhi: Days ahead of the planned 2+2 dialogue between the foreign and defence ministers of India and the US, the Indian Army’s vice-chief is set to visit the Hawaii-based Indo-Pacific Command to boost military cooperation between the two sides.

Lt Gen SK Saini, the vice-chief of the army staff, will visit the US during October 17-20, people familiar with developments said on condition of anonymity. The 2+2 dialogue is expected to be held in New Delhi during October 26-27, with secretary of state Mike Pompeo and defence secretary Mark Esper set to visit India for the talks.

“The vice-chief of the Indian Army will visit the US Army Pacific Command (USARPRAC), the army component of the Indo-Pacific Command, and extensively exchange ideas with the American military leadership,” said one of the people cited above.

“The vice-chief will also witness training and equipment capabilities of the US Army. The aim of the visit is to enhance military cooperation between the two armies,” the person said.

Saini will also visit the Indo-Pacific Command headquarters in Hawaii, where different aspects of military cooperation and “furthering military-to-military engagement, including procurements from the US, training in niche domains, joint exercises and capability-building” will be discussed, the person said.

The visit is expected to enhance the operational and strategic collaboration between the two armies. The people described this collaboration as robust, pointing out that India is going ahead with participation in two joint exercises with the US despite restrictions related to the Covid-19 pandemic.

These exercises are Yudh Abhyas, set for February 2021, and Vajra Prahar, set for March next year.

Cooperation for ensuring a free and open Indo-Pacific that is in line with a rules-based order is expected to be a focus area for both the vice-chief’s visit and the 2+2 ministerial dialogue, the people said.

The Indo-Pacific Command is the US military’s largest unified commands which covers an area of over 260 million sq km. Its name was changed from the Pacific Command to Indo-Pacific Command in 2018 to reflect the greater emphasis on South Asia, and especially India, in protecting American strategic interests.

<https://www.hindustantimes.com/india-news/indian-army-vice-chief-to-visit-us-ahead-of-2-2-dialogue/story-0nfFxA8vCg1ppOpJobuaI.html>



Lt Gen SK Saini.(Sourced)

Gaganyaan: Isro now in talks with NASA for key tech

Bengaluru: The Indian Space Research Organisation (Isro), which has already tied up with multiple countries to get help with various facets of India's first human spaceflight mission — Gaganyaan — is now in talks with the US' NASA, examining if it can gain access to some critical technologies relating to astronaut safety.

“Given that Covid-19 has already affected the timeline of the mission, we are hoping to expedite it by accessing some technologies that are already ready. NASA and Isro had been exploring a long-term partnership for the human spaceflight programme, and this could be a start,” a source said.

TOI reported earlier this month that Gaganyaan may miss the August 2022 deadline set by Prime Minister Modi because of the pandemic.

Isro chairman K Sivan, while confirming that the agency has initiated talks with NASA, however, said that they were in a very nascent stage and no decision on whether or not there would be a partnership has been made.

“We will still be developing things ourselves, but we are looking at accessing some of the technologies, like green propulsion, life-support systems and so on, given the tight schedule. Nothing has fructified so far,” Sivan said.

Isro, as reported by TOI earlier, had been in talks with space agencies from at least three countries including the US for astronaut training and finally decided to partner with Russia because of the tight schedule it had to meet for Gaganyaan.

If talks turn into a partnership then the US, which has been keen on partnering on Gaganyaan, would become the third country to be helping Isro launch India's first astronauts from Indian soil.

As on date, four Indian astronaut-elects are training in Russia as part of Isro agreement with Glavkosmos, a subsidiary of Russian space agency Roscosmos, which has been in talks with Isro for some life-support systems. Russia has also started production of customised space suits for the astronauts, while the French space agency has also partnered with Isro.

Sam Scimemi, director, International Space Station (ISS), Nasa headquarters, had told TOI in January: “We were in discussions, I think the Russians and Isro were prepared to move a lot quicker which I think was advantageous for the Indian space agency given the timeframe that you've been given to send humans into space.”

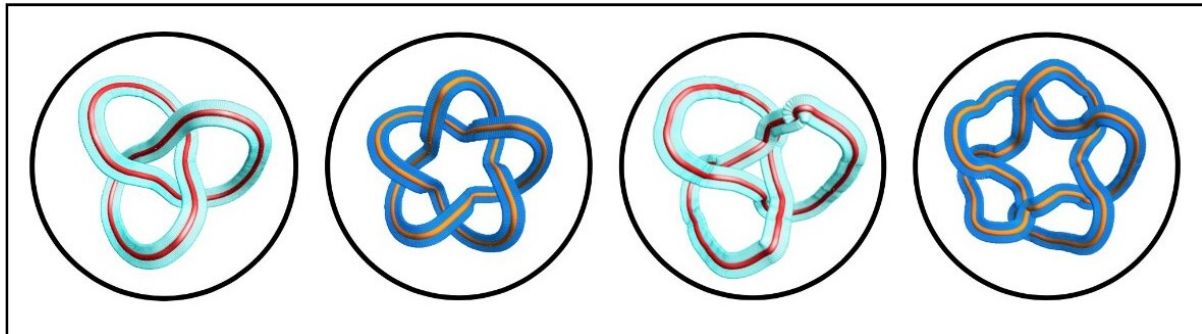
What expedited the Russia agreement was also the fact that India was slightly more familiar with Russian systems given that Rakesh Sharma had flown to space on a Soviet mission in 1984.

<https://timesofindia.indiatimes.com/india/gaganyaan-isro-now-in-talks-with-nasa-for-key-tech/articleshow/78713234.cms>



'Classified knots': Researchers create optical framed knots to encode information

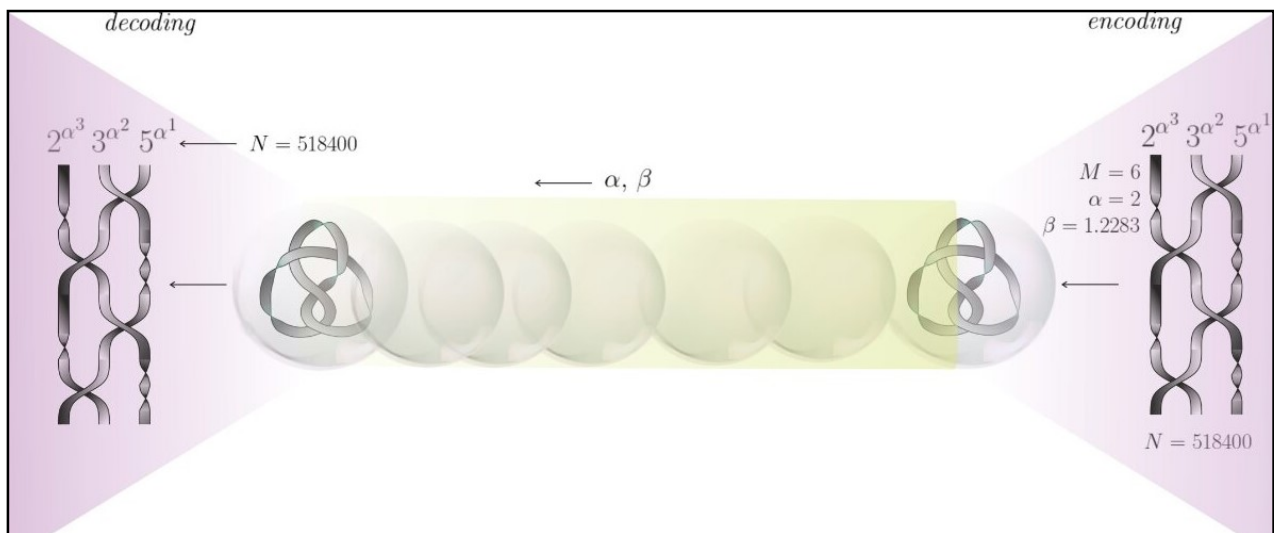
In a world first, researchers from the University of Ottawa in collaboration with Israeli scientists have been able to create optical framed knots in the laboratory that could potentially be applied in modern technologies. Their work opens the door to new methods of distributing secret cryptographic keys—used to encrypt and decrypt data, ensure secure communication and protect private information. The group recently published their findings in *Nature Communications*.



Top view of the framed knots generated in this work. Credit: University of Ottawa

"This is fundamentally important, in particular from a topology-focused perspective, since framed knots provide a platform for topological quantum computations," explained senior author, Professor Ebrahim Karimi, Canada Research Chair in Structured Light at the University of Ottawa.

"In addition, we used these non-trivial optical structures as information carriers and developed a security protocol for classical communication where information is encoded within these framed knots."



Encryption scheme of a framed braid within a framed knot. The knot along with a pair of numbers can be used to recover the encrypted braid by means of a procedure relying on prime factorization. Credit: University of Ottawa

The concept

The researchers suggest a simple do-it-yourself lesson to help us better understand framed knots, those three-dimensional objects that can also be described as a surface.

"Take a narrow strip of a paper and try to make a knot," said first author Hugo Larocque, uOttawa alumnus and current Ph.D. student at MIT.

"The resulting object is referred to as a framed knot and has very interesting and important mathematical features."

The group tried to achieve the same result but within an optical beam, which presents a higher level of difficulty. After a few tries (and knots that looked more like knotted strings), the group came up with what they were looking for: a knotted ribbon structure that is quintessential to framed knots.

"In order to add this ribbon, our group relied on beam-shaping techniques manipulating the vectorial nature of light," explained Hugo Larocque. "By modifying the oscillation direction of the light field along an "unframed" optical knot, we were able to assign a frame to the latter by "gluing" together the lines traced out by these oscillating fields."

According to the researchers, structured light beams are being widely exploited for encoding and distributing information.

"So far, these applications have been limited to physical quantities which can be recognized by observing the beam at a given position," said uOttawa Postdoctoral Fellow and co-author of this study, Dr. Alessio D'Errico.

"Our work shows that the number of twists in the ribbon orientation in conjunction with prime number factorization can be used to extract a so-called "braid representation" of the knot."

"The structural features of these objects can be used to specify quantum information processing programs," added Hugo Larocque. "In a situation where this program would want to be kept secret while disseminating it between various parties, one would need a means of encrypting this "braid" and later deciphering it. Our work addresses this issue by proposing to use our optical framed knot as an encryption object for these programs which can later be recovered by the braid extraction method that we also introduced."

"For the first time, these complicated 3-D structures have been exploited to develop new methods for the distribution of secret cryptographic keys. Moreover, there is a wide and strong interest in exploiting topological concepts in quantum computation, communication and dissipation-free electronics. Knots are described by specific topological properties too, which were not considered so far for cryptographic protocols."

The origins

The idea behind the project emerged in 2018, during a discussion with Israeli researchers at a scientific meeting in Crete, Greece.

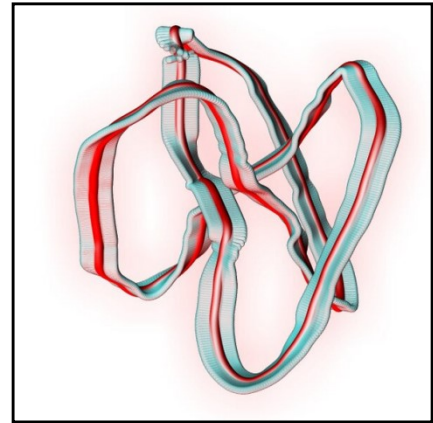
Scientists from Ben-Gurion University of the Negev and Bar-Ilan University, in Israel, developed the prime number encoding protocol.

The project then crossed the Mediterranean Sea and the Atlantic Ocean before ending up in Dr. Karimi's lab located in the Advanced Research Complex at the University of Ottawa. That's where the experimental procedure was developed and conducted. The resulting data were then analyzed, and the braid structure extracted through a specially devised program.

The applications

"Current technologies give us the possibility to manipulate, with high accuracy, the different features characterizing a light beam, such as intensity, phase, wavelength and polarization," said Hugo Larocque. "This allows to encode and decode information with all-optical methods. Quantum and classical cryptographic protocols have been devised exploiting these different degrees of freedom."

"Our work opens the way to the use of more complex topological structures hidden in the propagation of a laser beam for distributing secret cryptographic keys."



Rendition of the reconstructed structure of a framed trefoil knot generated within an optical beam. Credit: University of Ottawa

"Moreover, the experimental and theoretical techniques we developed may help find new experimental approaches to topological quantum computation, which promises to surpass noise-related issues in current quantum computing technologies," added Dr. Ebrahim Karimi.

The paper "Optical framed knots as information carriers" was recently published in *Nature Communications*.

More information: Hugo Larocque et al, Optical framed knots as information carriers, *Nature Communications* (2020). [DOI: 10.1038/s41467-020-18792-z](https://doi.org/10.1038/s41467-020-18792-z)

Journal information: [Nature Communications](https://www.nature.com)
<https://phys.org/news/2020-10-optical-encode.html>



Sat, 17 Oct 2020

Research team discovers uniquely quantum effect in erasing information

Researchers from Trinity have discovered a uniquely quantum effect in erasing information that may have significant implications for the design of quantum computing chips. Their surprising discovery brings back to life the paradoxical "Maxwell's demon," which has tormented physicists for over 150 years.

The thermodynamics of computation was brought to the fore in 1961 when Rolf Landauer, then at IBM, discovered a relationship between the dissipation of heat and logically irreversible operations. Landauer is known for the mantra "Information is Physical," which reminds us that information is not abstract and is encoded on physical hardware.

The "bit" is the currency of information (it can be either zero or one) and Landauer discovered that when a bit is erased there is a minimum amount of heat released. This is known as Landauer's bound and is the definitive link between information theory and thermodynamics.

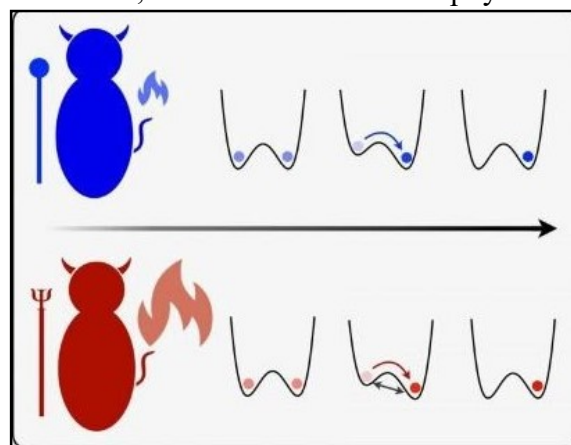
Professor John Goold's QuSys group at Trinity is analyzing this topic with quantum computing in mind, where a quantum bit (a qubit, which can be zero and one at the same time) is erased.

In just-published work in the journal, *Physical Review Letters*, the group discovered that the quantum nature of the information to be erased can lead to large deviations in the heat dissipation, which is not present in conventional bit erasure.

Thermodynamics and Maxwell's demon

One hundred years previous to Landauer's discovery people like Viennese scientist, Ludwig Boltzmann, and Scottish physicist, James Clerk Maxwell, were formulating the kinetic theory of gases, reviving an old idea of the ancient Greeks by thinking about matter being made of atoms and deriving macroscopic thermodynamics from microscopic dynamics.

Professor Goold says: "Statistical mechanics tells us that things like pressure and temperature, and even the laws of thermodynamics themselves, can be understood by the average behavior of the atomic constituents of matter. The second law of thermodynamics concerns something called entropy which, in a nutshell, is a measure of the disorder in a process. The second law tells us that



A bit of information can be encoded in the position of a particle (left or right). A demon can erase a classical bit (blue) by raising one side until the particle is definitely on the right. A quantum particle (red) can also tunnel under the barrier, which generates more heat. Credit: Trinity College Dublin

in the absence of external intervention, all processes in the universe tend, on average, to increase their entropy and reach a state known as thermal equilibrium.

"It tells us that, when mixed, two gases at different temperatures will reach a new state of equilibrium at the average temperature of the two. It is the ultimate law in the sense that every dynamical system is subject to it. There is no escape: all things will reach equilibrium, even you."

However, the founding fathers of statistical mechanics were trying to pick holes in the second law right from the beginning of the kinetic theory. Consider again the example of a gas in equilibrium: Maxwell imagined a hypothetical "neat-fingered" being with the ability to track and sort particles in a gas based on their speed.

Maxwell's demon, as the being became known, could quickly open and shut a trap door in a box containing a gas, and let hot particles through to one side of the box but restrict cold ones to the other. This scenario seems to contradict the second law of thermodynamics as the overall entropy appears to decrease and perhaps physics' most famous paradox was born.

But what about Landauer's discovery about the heat-dissipated cost of erasing information? Well, it took another 20 years until that was fully appreciated, the paradox solved, and Maxwell's demon finally exorcised.

Landauer's work inspired Charlie Bennett—also at IBM—to investigate the idea of reversible computing. In 1982 Bennett argued that the demon must have a memory, and that it is not the measurement but the erasure of the information in the demon's memory which is the act that restores the second law in the paradox. And, as a result, computation thermodynamics was born.

New findings

Now, 40 years on, this is where the new work led by Professor Goold's group comes to the fore, with the spotlight on quantum computation thermodynamics.

In the recent paper, published with collaborator Harry Miller at the University of Manchester and two postdoctoral fellows in the QuSys Group at Trinity, Mark Mitchison and Giacomo Guarnieri, the team studied very carefully an experimentally realistic erasure process that allows for quantum superposition (the qubit can be in state zero and one at same time).

Professor Goold explains: "In reality, computers function well away from Landauer's bound for heat dissipation because they are not perfect systems. However, it is still important to think about the bound because as the miniaturization of computing components continues, that bound becomes ever closer, and it is becoming more relevant for quantum computing machines. What is amazing is that with technology these days you can really study erasure approaching that limit.

"We asked, 'What difference does this distinctly quantum feature make for the erasure protocol?' And the answer was something we did not expect. We found that even in an ideal erasure protocol—due to quantum superposition—you get very rare events which dissipate heat far greater than the Landauer limit.

"In the paper, we prove mathematically that these events exist and are a uniquely quantum feature. This is a highly unusual finding that could be really important for heat management on future quantum chips—although there is much more work to be done, in particular in analyzing faster operations and the thermodynamics of other gate implementations.

"Even in 2020, Maxwell's demon continues to pose fundamental questions about the laws of nature."

More information: Harry J. D. Miller et al. Quantum Fluctuations Hinder Finite-Time Information Erasure near the Landauer Limit, *Physical Review Letters* (2020). [DOI: 10.1103/PhysRevLett.125.160602](https://doi.org/10.1103/PhysRevLett.125.160602)

Journal information: [*Physical Review Letters*](#)

Provided by [Trinity College Dublin](#)

Order up! AI finds the right material

By Madison Brewer

Engineers are always looking for materials with very specific properties for their projects. Unfortunately, there are way too many options for researchers to simply guess-and-check until they find what they're looking for. Even if they were to simulate materials, instead of testing them in the lab, it would take far too long to find a suitable material.

Luckily, researchers have created algorithms using artificial intelligence that will find the right material for any project. In a recently published paper, a team of Carnegie Mellon University and University of Calgary researchers have improved on one of these algorithms, allowing researchers to find materials with desired properties quickly and accurately.

"Since the space of materials is so huge, it is very difficult to experimentally and computationally characterize the material properties," said Amir Barati Farimani, an assistant professor of mechanical engineering at CMU. "So we're creating algorithms, or models, that can rapidly predict the material properties."

To use artificial intelligence, or AI, researchers must first train the algorithm using known data. Then, the algorithm learns to extrapolate new ideas from that information. Barati Farimani and his team trained the algorithm with data about the chemical makeup of materials. In particular, they included information about the role electrons play in determining material properties. This chemical data has created a new material descriptor for the algorithm, according to Barati Farimani.

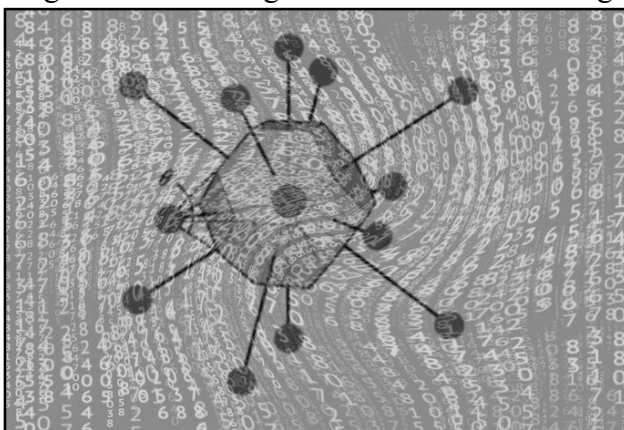
Since this algorithm can predict the properties of a large range of materials, it has many applications. For example, the algorithm could find a material with thermal properties suited for solar panels. Additionally, it could identify materials for making drugs and batteries. To use this algorithm, a researcher can simply have the pre-trained deep learning models find the property they are looking at.

The way these algorithms are improved is by becoming faster and more accurate. If the algorithm isn't accurate enough, the results will be unusable. If the algorithm is too slow, researchers will never be able to access the results. Currently, the team has found that their algorithm is better than other leading algorithms.

"You can use this algorithm and train a deep learning model and predict them in a fraction of second," Barati Farimani said. "The essence is to prove that it's predicting for different kinds of materials with high accuracy—then every industry can use it."

Their paper was published in *Physical Review Materials*. CMU post-doctoral scholar Mohammadreza Karamad, Ph.D. student Rishikesh Magar, and researcher Yuting Shi were also listed as co-authors. Other authors include Samira Siahrostami and Ian D. Gates from the University of Calgary.

More information: Mohammadreza Karamad et al. Orbital graph convolutional neural network for material property prediction, *Physical Review Materials* (2020). DOI: [10.1103/PhysRevMaterials.4.093801](https://doi.org/10.1103/PhysRevMaterials.4.093801)
<https://phys.org/news/2020-10-ai-material.html>



Material representations that are compatible with machine learning models play a key role in developing models that exhibit high accuracy for property prediction. Credit: College of Engineering

Coronavirus | Ensure speedy access to vaccine, says Narendra Modi

Focus on cold storage chains, distribution network and monitoring mechanism, Prime Minister directs officials

New Delhi: Prime Minister Narendra Modi on Saturday called for full preparedness to ensure speedy access to COVID-19 vaccines for every citizen.

Chairing a meeting to review the pandemic situation in the country, Mr. Modi directed that every step in the logistics, delivery and administration of the vaccine should be put in place rigorously and it must include advanced planning of cold storage chains, distribution network, monitoring mechanism, advance assessment and preparation of ancillary equipment such as vials and syringes, according to a release issued by the government.

The Prime Minister's instructions came on a day India reported an active caseload of below 8 lakh for the first time after one-and-a-half months.

"The positive cases are 7,95,087 while 70,816 patients have recovered and been discharged in the last 24 hours whereas the new confirmed cases are 62,212. Maharashtra contributes more than 13,000 to the single day recoveries followed by Karnataka with more than 8,000. 837 case fatalities have been reported in the past 24 hours. Of these, nearly 82% are concentrated in 10 States/UTs with Maharashtra reporting the maximum — 306," said the Health Ministry.

The PM, on Saturday, reviewed the pandemic situation and the preparedness of vaccine delivery, distribution and administration at a meeting attended by Union Health Minister Harsh Vardhan and officials.

The meeting noted that three vaccines are at advanced stages of development in India, of which two are in Phase II and one is in Phase-III.

"Indian scientists and research teams are collaborating and strengthening the research capacities in neighbouring countries viz., Afghanistan, Bhutan, Bangladesh, Maldives, Mauritius, Nepal and Sri Lanka. There are further requests from Bangladesh, Myanmar, Qatar and Bhutan for clinical trials in their countries. To help the global community, the Prime Minister further directed that we should not limit our efforts to our immediate neighbourhood but also reach out to the entire world in providing vaccines, medicines and IT platforms for the vaccine delivery system," said the release.

It said the national expert group on vaccine administration for COVID-19 (NEGVAC) in consultation with State governments and all stakeholders has presented a detailed blueprint of vaccine storage, distribution and administration. The Expert Group in consultation with the States is working actively on vaccine prioritisation and distribution.

The PM has further directed that India should make use of experience of successful conduct of elections and disaster management.



Prime Minister Narendra Modi. File | Photo Credit: PTI

“The Prime Minister said that in a similar manner vaccine delivery and administration systems should be put in place. This should involve the participation of States/UTs/district level functionaries, civil society organisations, volunteers, citizens and experts from all necessary domains. The entire process should have a strong IT backbone and the system should be designed in such a manner as to have a lasting value to our healthcare system.”

Two pan-India studies on the Genome of SARS CoV-2 (COVID-19 virus) conducted by the ICMR and the Bio-Technology (DBT) have now suggested that the virus is genetically stable and there is no major mutation.

The Prime Minister also cautioned against complacency in efforts to contain the pandemic. He insisted on continued social distancing, appropriate behaviour such as wearing the mask, regularly washing hands and sanitation etc. especially in the wake of the upcoming festival season.

<https://www.thehindu.com/news/national/coronavirus-pm-modi-directs-full-preparedness-for-vaccine-distribution/article32881214.ece>



Sat, 17 Oct 2020

Scientists identify common vulnerabilities in COVID-19 and other lethal coronaviruses

By Amy Huxtable

Scientists from the University of Sheffield are working with almost 200 researchers from around the globe to identify vulnerabilities in three lethal coronaviruses—including SARS-CoV-2 responsible for the COVID-19 pandemic.

The international team of experts from 14 leading institutions has studied SARS-CoV-2, SARS-CoV-1 and MERS-CoV to identify commonly hijacked cellular pathways and detect promising targets for broad coronavirus inhibitors with high barriers to resistance. This important research paves the way in identifying a successful treatment for COVID-19.

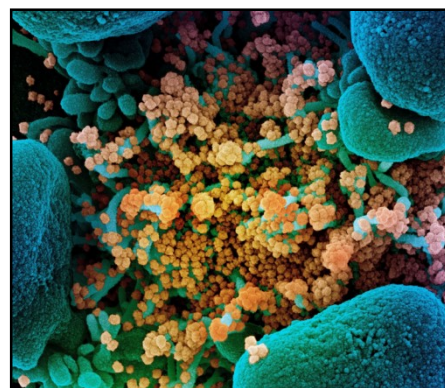
Using the molecular insights from the study, the researchers also analyzed medical records of approximately 740,000 patients with COVID-19 to examine drugs which are already approved for use and successful in treating other medical conditions and could be deployed rapidly to help the clinical outcomes of these patients.

The findings, published in the journal *Science*, demonstrate how molecular information can be translated into real-world implications for the treatment of COVID-19, an approach that can ultimately be applied to other diseases in the future.

Dr. Andrew Peden, from the University of Sheffield's Department of Biomedical Science and one of the lead authors, said: "The new insights from this groundbreaking study have revealed potential targets that will help develop a first-of-its-kind therapy across all coronaviruses.

"In Sheffield we were able to bring our broad expertise, as well as the use of our world-class imaging facilities towards a common research goal to desperately find an effective treatment for COVID-19. This study truly demonstrates what can be achieved over a relatively short period of time when scientists openly share ideas, facilities and work for the common good."

Dr. Peden's team used their expertise in cell biology and advanced microscopy to localize every major viral protein encoded by SARS-CoV-2, SARS-CoV-1 and MERS-CoV inside human cells.



Colorized scanning electron micrograph of a dying cell (blue) heavily infected with SARS-CoV-2 (yellow), the virus that causes COVID-19. Credit: NIAID Integrated Research Facility, Fort Detrick, Maryland.

They found that many of the conserved proteins have similar localizations suggesting that they hijack the same cellular processes.

In addition, they also identified that the viral protein Orf9b is localized to mitochondria and alters the levels of Tom70, a key protein which helps cells identify if they have been infected by viruses.

This research, in collaboration with work performed in Freiburg, Paris and San Francisco provides a molecular framework which in the longer term will help in the development of new antiviral therapies which are desperately needed to treat COVID-19.

Dr. Andrew Peden, Dr. Dan Williams and Miss Amber Shun-Shion and are funded by grants from the Biotechnology and Biological Sciences Research Council (BBSRC). All of the imaging studies for this investigation were performed at the Wolfson Light Microscopy Facility at the University of Sheffield.

Professor Colin Bingle from University of Sheffield's Department of Infection, Immunity and Cardiovascular Disease, said: "This systematic cell biology paper used a functional genetic screening approach using real world patient data, to identify potential drugs that can be investigated as treatments for COVID-19. The multinational collaborative nature of this study exemplifies the way that the biomedical community has come together to fight this deadly pandemic."

More information: "Comparative host-coronavirus protein interaction networks reveal pan-viral disease mechanisms," *Science* (2020). [science.sciencemag.org/lookup/.../1126/science.abe9403](https://www.sciencemag.org/lookup/.../1126/science.abe9403)

Journal information: [Science](#)

Provided by [University of Sheffield](#)

<https://phys.org/news/2020-10-scientists-common-vulnerabilities-covid-lethal.html>



Sat, 17 Oct 2020

New research: Anti-ulcer drug shows promise in suppressing coronavirus

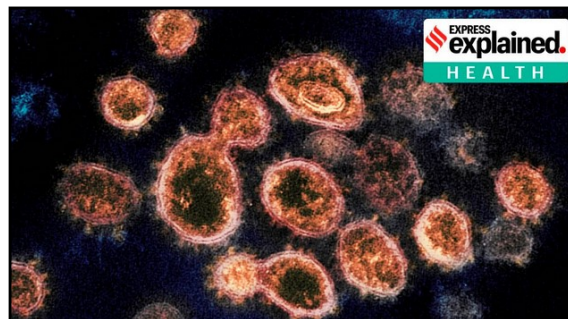
Generally, metal compounds are used as anti-microbial agents, but their antiviral activities have rarely been explored, the researchers said

New Delhi: Researchers from Hong Kong have reported a novel antiviral strategy for treatment of Covid-19. They have found that a class of existing drugs, which are currently used in the treatment of other infectious diseases, can suppress replication of SARS-CoV-2 and relieve Covid-19 symptoms in an animal model.

Their findings are published in *Nature Microbiology*.

These are metallodrugs, which consist of metal compounds. Generally, metal compounds are used as anti-microbial agents, but their antiviral activities have rarely been explored, the researchers said.

Their findings now provide a new therapeutic option for treatment of Covid-19. The researchers screened metallodrugs and related compounds including ranitidine bismuthcitrate(RBC), a commonly used anti-ulcer drug which contains the metal bismuth.



This 2020 electron microscope image shows SARS-CoV-2 virus particles which causes Covid-19, isolated from a patient in the US, emerging from the surface of cells cultured in a lab. (NIAID-RML via AP)

They identified RBC as a potent anti SARS-CoV-2 agent. RBC targets a protein called Nsp13, which is essential for SARS-CoV-2 to replicate.

The experiments showed that RBC reduces viral loads by over 1,000-fold in SARS-CoV-2-infected cells.

In a golden Syrian hamster, RBC was found to suppress SARS-CoV-2 replication and reduce viral loads by 100-fold in both the upper and lower respiratory tracts, and to mitigate virus-associated pneumonia. *Source: Hong Kong University*

<https://indianexpress.com/article/explained/new-research-anti-ulcer-drug-shows-promise-in-suppressing-coronavirus-6758360/>



Sat, 17 Oct 2020

Pfizer, Bharat Biotech, AstraZeneca: Latest Covid-19 vaccine developments

*As soon as a safety milestone is achieved in the third week of November,
the company is likely to apply for emergency use in the US*

Edited By Susmita Pakrasi

New Delhi: Prime Minister Narendra Modi on Thursday held a review meeting to assess the progress of research and vaccine development ecosystem to fight coronavirus disease (Covid-19). The meeting was attended by Union health minister Harsh Vardhan, NITI Aayog member (health), principal scientific advisor, senior scientists, and other officials.

PM Modi said be it testing, vaccine and medication, the solution has to be cost-effective, easily available and scalable.

Know all the latest updates on coronavirus vaccine:

1. Pfizer Inc said on Friday it would apply for emergency use in the United States of its Covid-19 vaccine candidate being developed along with Germany's BioNTech SE as soon as a safety milestone is achieved in the third week of November.

2. Bharat Biotech, which is developing an indigenous vaccine in collaboration with Indian Council of Medical Research (ICMR), is conducting its second phase trial, the results of which are expected soon.

3. The results of phase three of Oxford-AstraZeneca Covid-19 vaccine could be available by November-end or early December, the Niti Aayog announced on Tuesday.

4. India is expected to have a Covid-19 vaccine in a few months and the country should be in the process of delivering it to people in the next six months, Union Health Minister Harsh Vardhan said on Thursday.

5. The government has started making logistical arrangements for procurement, storage and distribution to ensure the uninterrupted delivery of a vaccine, when one becomes available.

<https://www.hindustantimes.com/india-news/pfizer-bharat-biotech-astrazeneca-latest-covid-19-vaccine-developments/story-QL88WlQeYF8h9ftSoAyDCI.html>

