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# समाचार पत्रों से चयित अंश Newspapers Clippings

A Daily service to keep DRDO Fraternity abreast with DRDO  
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मंगलवार, 05 जुलाई 2022

### अमेरिका ने किया था बेचने से इनकार, भारत ने घर में ही बनाया विनाशक हथियार, विदेशी मीडिया हैरान

भारत ने अपने घर में ही महाविनाशक ड्रोन तैयार कर लिया है और इस ड्रोन की चर्चा सिर्फ भारत में ही नहीं, बल्कि विदेशी मीडिया में की जा रही है और विदेशी मीडिया दावा कर रहा है, कि भारत अपने इस विध्वंसक हथियार को कहीं और नहीं, बल्कि चीन से लगती सीमा पर तैनात करेगा। वहीं, विदेशी मीडिया ने ये भी दावा किया है, कि भारत का ये महाविनाशक हथियार मानव रहित विमानों के विकास की दिशा में महत्वपूर्ण प्रौद्योगिकियों को साबित करने में एक प्रमुख मील का पत्थर है।



भारत ने बनाया महाविनाशक ड्रोन भारतीय रक्षा अनुसंधान और विकास संगठन (DRDO) ने एक जुलाई को घोषणा की है, कि कर्नाटक के चित्रदुर्ग में वैमानिकी परीक्षण रेंज में अपने ऑटोनॉमस फ्लाइंग विंग टेक्नोलॉजी डिमॉन्स्ट्रेटर का सफलतापूर्वक परीक्षण किया है। यानि, भारत ने अपने घर में स्वदेशी टेक्नोलॉजी से ड्रोन हथियार का निर्माण कर लिया है। भारतीय रक्षा मंत्रालय ने अपने एक बयान में कहा कि, 'ये ड्रोन हथियार पूरी तरह से ऑटोनॉमस है और इसका पूरी तरह से सफल परीक्षण किया गया है जिसमें टेक-ऑफ, वेपॉइंट नेविगेशन और एक स्मूथ टचडाउन शामिल है'। भारतीय रक्षा मंत्रालय ने



आगे कहा कि, 'इस तरह की रणनीतिक रक्षा प्रौद्योगिकियों में आत्मनिर्भरता की दिशा में एक महत्वपूर्ण कदम है'। स्टील्थ विंग फ्लाइंग टेस्टबेड प्रसिद्ध अखबार एशिया टाइम्स ने लिखा है कि, मानव रहित विमान, जिसे स्टील्थ विंग फ्लाइंग टेस्टबेड या SWIFT के रूप में भी जाना जाता है,

विदेशी आपूर्तिकर्ताओं पर अपनी निर्भरता को कम करने के लिए अपने सशस्त्र बलों को स्वदेशी बनाने के भारत के प्रयास में एक महत्वपूर्ण कदम है। भारतीय रक्षा मंत्रालय के अनुसार और रक्षा समाचार में रिपोर्ट के अनुसार, ड्रोन के एयरफ्रेम, अंडर कैरिज, फ्लाइंट कंट्रोल और एवियोनिक्स सिस्टम सभी स्वदेशी रूप से बने हैं। रिपोर्ट के मुताबिक, भारत का ये ड्रोन हथियार 3.96 मीटर लंबा, 4.8-मीटर पंखों के साथ और लगभग 1,043 किलोग्राम वजन का है। वहीं, अंतर्राष्ट्रीय रक्षा मामलों को कवर करने वाली वेबसाइट, डिफेंस न्यूज के मुताबिक, करीब 1 टन वजनी ये भारतीय ड्रोन एक रूसी NPO सैटर्न 36MT टर्बोफैन इंजन द्वारा संचालित है।

अभी लगा है रूसी इंजन इस ड्रोन में फिलहाल रूसी इंजन लगा हुआ है, लेकिन रिपोर्ट के मुताबिक, DRDO के गैस टर्बाइन रिसर्च एस्टाब्लिशमेंट (GTRE) द्वारा स्मॉल टर्बो फैन इंजन (STFE) रूसी निर्मित इंजन की जगह लेगा। डीआरडीओ ने अपनी टेक्नोलॉजी बुलेटिन में कहा कि, SWIFT घटक लड़ाकू ड्रोन का एक छोटा संस्करण है और इसका उद्देश्य स्वायत्त मोड में साइलेंट टेक्नोलॉजी और उच्च गति लैंडिंग का परीक्षण करना है। डीआरडीओ के एक अज्ञात वैज्ञानिक ने डिफेंस न्यूज में कहा कि, ड्रोन के पूर्ण उत्पादन के साथ आगे बढ़ने से पहले स्विफ्ट प्लेटफॉर्म के साथ दस और परीक्षण उड़ानों की आवश्यकता है। ये घातक ड्रोन, भारतीय नौसेना के लिए डीआरडीओ के वैमानिकी विकास प्रतिष्ठान (एडीई) द्वारा विकास के तहत डेक-लॉन्च संस्करण के साथ सटीक-निर्देशित युद्धपोतों को ध्वस्त करने में पूरी तरह से सक्षम होगा।

अमेरिका ने ड्रोन बेचने से किया था इनकार आपको बता दें कि, साल 2017 में अमेरिका ने भारत को ड्रोन बेचने से इनकार कर दिया था। इंडियन डिफेंस रिसर्च विंग की रिपोर्ट के मुताबिक, साल 2017 में अमेरिका ने भारत को एवेंजर जेट-संचालित लड़ाकू ड्रोन बेचने से इनकार कर दिया था और उसके बाद ही भारत ने अपना स्टील्थ ड्रोन कार्यक्रम शुरू किया था। अमेरिका के इनकार करने के बाद भारत को



कम रडार क्रॉस-सेक्शन वाले मानव रहित विमान के लिए अपनी आवश्यकता को पूरा करने के लिए स्वदेशी समाधान तलाशने के लिए मजबूर होना पड़ा। भारत द्वारा निर्मित इस स्वदेशी ड्रोन में काफी देर तक हवा में स्थिर रहने की क्षमता, खुफिया निगरानी करने की क्षमता होने के साथ साथ काफी तेज रफ्तार से हमला करने की क्षमता मौजूद है और इस ड्रोन के रिमोट के जरिए पिन-प्वाइंट निशाना लगाया जा

सकता है। इस ड्रोन को हाईस्पीड के साथ सटीक स्ट्राइक के लिए तैयार किया गया है। साथ ही हिमालय के वातावरण में सटीकता से काम करे, इस लिहाज से इसे बनाया गया है।

भारत ने बनाया 'घातक प्रोग्राम' एशिया टाइम्स ने भारतीय रक्षा अधिकारियों के हवाले से लिखा है कि, भारत ने अपनी वायुसेना की मारक क्षमता में इजाफा करने के लिए घातक प्रोग्राम को शुरू किया है, जिसके तहत इंडियन एयरफोर्स की स्ट्राइक कैपेबिलिटी में सुधार करना और उच्च जोखिम वाले मिशनों में सैनिक किसी खतरे में ना पड़े और हमला भी सटीकता के साथ हो जाए, इसे ध्यान में रखकर तैयार किया गया है। इस प्रकार फ्लाइंग विंग डिजाइन वाला ड्रोन भारत की आवश्यकताओं के लिए काफी महत्वपूर्ण समाधान साबित हो सकता है। वहीं, रूसी रक्षा वेबसाइट 'टॉप वॉर' के अनुसार, भारत ने जिस ड्रोन का निर्माण किया है, उसमें फ्लाइंग विंग डिजाइन है, जो उसे काफी तेज रफ्तार से उड़ान भरने में मदद करेगा और ये ड्रोन हथियार काफी नीचे की उड़ान भरने में सक्षम है, लिहाजा रडार के लिए इसे पकड़ना काफी मुश्किल है। वहीं, इस ड्रोन की देखने की क्षमता भी काफी तेज है, जबकि इस ड्रोन की सबसे खास बात ये है, कि इसकी कीमत काफी कम है और इसके रखरखाव में भी काफी कम पैसे खर्च करने पड़ेंगे।

कुछ ही देशों के पास है ये टेक्नोलॉजी रूसी वेबसाइट की रिपोर्ट के मुताबिक, इतनी सारी मिश्रित विशेषताएं होने के बाद भी इस भारतीय ड्रोन में जर्मन हॉर्टन हो 229 प्रोटोटाइप फाइटर-बॉम्बर और यूएस बी 2 स्टील्थ बॉम्बर में फ्लाइंग विंग डिजाइन शामिल किया गया है। रिपोर्ट में कहा गया है कि, भारत के अलावा कई सैन्य शक्तियों ने अपने फ्लाइंग विंग ड्रोन डिजाइन किए हैं, जिसमें अमेरिका अपने RQ-170 सेंटिनल, रूस ने अपने Su-70 ओखोटनिक B



और चीन ने अपने Hongdu GJ-11 को संचालित किया है। एशिया टाइम्स की रिपोर्ट में कहा गया है कि, भारत का ये विध्वंसक ड्रोन चीन के HQ-9/P जैसे दुर्जेय हवाई सुरक्षा को दरकिनार करने के लिए एक खतकनवाक जवाब हो सकता है। रिपोर्ट के मुताबिक, भारत का घातक ड्रोन यूएस RQ-180 स्टील्थ ड्रोन की तरह हो सकता है, जिसे फोर्ब्स ने नॉर्थ्रॉप ग्रुम्मन द्वारा डिजाइन किए गए एक मानव रहित स्टील्थ बॉम्बर के रूप में वर्णित किया है, जो भारी बचाव वाले हवाई क्षेत्र में लंबी दूरी के गहरे-प्रवेश मिशनों के लिए अमेरिकी वायु सेना की आवश्यकता को पूरा करता है।

पाकिस्तान को भी मिलेगा करारा जवाब एशिया टाइम्स ने अपनी रिपोर्ट में कहा है कि, पाकिस्तानी वायुसेना ने चीन से ड्रोन हथियार खरीदकर अपनी वायुसेना की मारक क्षमता में विकास किया है, लिहाजा अपनी वायु रक्षा के आधुनिकीकरण करने के लिए भारत को अपना स्टील्थ ड्रोन विकसित करने के लिए प्रेरित होना पड़ा। अक्टूबर 2021 में, जेन्स ने बताया कि भारत के 2019 बालाकोट हवाई हमलों के जवाब में पाकिस्तान ने चीन निर्मित HQ-9/P लंबी दूरी की वायु रक्षा प्रणाली खरीदी थी। हालांकि, चीन के इस ड्रोन में कई खामिया हैं। चीन के

इस ड्रोन की सबसे बड़ी खामी ये है, कि ये सिर्फ सिंगल शॉट लगा सकता है और उसकी मारक क्षमता करीब 100 किलोमीटर होने की बात कही गई है, लेकिन क्रूज मिसाइलों के खिलाफ ये ड्रोन काफी कमजोर हो जाता है और क्रूज मिसाइलों को पता लगाने की इसकी क्षमता काफी कमजोर हो जाती है, वहीं मारक क्षमता घटकर सिर्फ 25 किलोमीटर रह जाती है। पाकिस्तानी वायु रक्षा प्रणालियों को हराने के अलावा, भारत का घातक ड्रोन हिमालय में चीन-भारत सीमा विवाद में समान भूमिका निभा सकता है। साल 2020 में, भारतीय समाचार आउटलेट द प्रिंट ने बताया कि चीन ने इस क्षेत्र में अपने वायु रक्षा नेटवर्क में अंतराल को बंद करने के लक्ष्य के साथ, चीन-भारत-नेपाल त्रि-सीमा क्षेत्र के अपनी तरफ एक सतह से हवा में मार करने वाली मिसाइल साइट का निर्माण किया था।

<https://hindi.oneindia.com/news/international/india-successfully-tested-new-stealth-swift-drone-after-us-refused-to-sell-eye-on-china-692212.html>

**ASIATIMES**

*Tue, 5 Jul 2022*

## **India's New Stealth Drone has an Eye on China**

India has successfully tested its Autonomous Flying Wing Technology Demonstrator at the Aeronautical Test Range at Chitradurga, Karnataka, as announced by its Defense Research and Development Organization (DRDO) in a media statement released on July 1. "Operating in a fully autonomous mode, the aircraft exhibited a perfect flight, including take-off, waypoint navigation, and a smooth touchdown. This flight marks a major milestone in proving critical technologies towards the development of future unmanned aircraft and is a significant step towards self-reliance in such strategic defense technologies," said the Indian Defense Ministry in a statement quoted by the Hindustan Times.

The unmanned aircraft, also known as the Stealth Wing Flying Testbed, or SWIFT, is a significant step in India's attempt to indigenize its armed forces to reduce its reliance on foreign suppliers. The drone's airframe, undercarriage, flight control and avionics systems are all indigenously-made, according to the Indian Ministry of Defense and as reported in Defense News. Times Now states the dimensions of the SWIFT drone as 3.96 meters long, with a 4.8-meter wingspan, and weighing approximately 1,043 kilograms. However, Defense News also notes that the 1-ton drone is powered by a Russian NPO Saturn 36MT turbofan engine, suggesting that India has not yet perfected the technology to manufacture small aircraft engines for drone use. However, Times Now reports that the Small Turbo Fan Engine (STFE) by DRDO's Gas Turbine Research Establishment (GTRE) based in Bangalore will replace the Russian-made engine.

The SWIFT is a scaled-down version of the Ghatak combat drone and aims to test stealth technology and high-speed landing in autonomous mode, said the DRDO in their Technology and Focus bulletin. An unnamed DRDO scientist said in Defense News states that ten more test

flights with the SWIFT platform are needed to iron out design issues before proceeding with full production of the Ghatak drone. The Ghatak will be able to fire precision-guided munitions with a deck-launched version under development by the DRDO's Aeronautical Development Establishment (ADE) for the Indian Navy.

Indian Defense Research Wing reports that India initiated its stealth drone program after the US refused to sell it Avenger jet-powered combat drones in 2017, forcing it to look for indigenous solutions to fulfill its requirement for an unmanned aircraft with low radar cross-section (RCS), high endurance and high speed for intelligence, surveillance, reconnaissance and precision-strike missions. The source also states that India initiated the Ghatak program to improve the Indian Air Force's (IAF) strike capabilities over hostile airspace and reduce human casualties in high-risk missions. A drone with a flying wing design may thus be the optimal solution for India's requirements.

According to the Russian defense site Top War, a flying wing design gives increased flight speed, lower drag and greater invisibility to radar but at the cost of flight stability, low maneuverability and loss of lift. Notwithstanding these mixed performance characteristics, the German Horten Ho 229 prototype fighter-bomber and US B2 stealth bomber featured the flying wing design. In addition, several military powers apart from India have designed their flying wing drones, with the US operating its RQ-170 Sentinel, Russia its Su-70 Okhotnik B, and China its Hongdu GJ-11.

A stealthy drone such as the Ghatak may be the answer to bypassing formidable air defenses such as China's HQ-9/P. As such, India's Ghatak drone may be like the US RQ-180 stealth drone, which Forbes describes as an unmanned stealth bomber designed by Northrop Grumman to fulfill a US Air Force requirement for long-range deep-penetration missions in heavily defended airspace. Although judging by its dimensions, it may be more like the older RQ-170 Sentinel drone, which has the same task set as the RQ-180 but with comparatively limited capability due to its smaller dimensions. Pakistan's modernization of its air defenses may have prompted India to develop its stealth drone. In October 2021, Janes reported that Pakistan introduced Chinese-made HQ-9/P long-range air defense systems in response to India's 2019 Balakot airstrikes.

According to Janes, the HQ-9/P has an engagement range of 100 kilometers against cruise missiles and aircraft with a high single-shot kill probability. However, the source stated that the quoted range is only against aircraft, with detection ranges against cruise missiles and smaller targets being much shorter at 25 kilometers. Aside from defeating Pakistani air defense systems, India's Ghatak drone may play the same role in the China-India border dispute in the Himalayas. In 2020, Indian news outlet The Print reported that China had built a surface-to-air missile site on its side of the China-India-Nepal tri-border area, with the goal of closing gaps in its air defense network in the region.

<https://asiatimes.com/2022/07/indias-new-stealth-drone-has-an-eye-on-china/>

### Defence Strategic: National/International



**Press Information Bureau**  
**Government of India**

**Ministry of Defence**

*Tue, 5 Jul 2022 6:01PM*

### **CEO of French Aircraft Engine Maker SAFRAN Group Calls on Raksha Mantri Shri Rajnath Singh in New Delhi**

**The company announces plans to set up a Maintenance, Repair and Overhaul  
facility in India**

**RM invites SAFRAN for more such co-development & co-production projects  
in line with ‘Make in India, Make for the World’**

A high-level delegation of French company Safran Group led by its CEO Mr Olivier Andries called on Raksha Mantri Shri Rajnath Singh in New Delhi on July 05, 2022. Safran is one of the leading original equipment manufacturers of advanced aircraft engines for civil and fighter jets. During the meeting, the CEO of Safran briefed the Raksha Mantri of their company's plans to set up a Maintenance, Repair and Overhaul (MRO) facility in India for overhaul of LEAP-1A & LEAP-1B engines in use by Indian and foreign commercial airlines. The MRO facility through direct foreign investment of \$US 150 million in Hyderabad is expected to create 500-600 highly skilled jobs. The facility will be able to overhaul over 250 engines per year in the beginning.

The CEO also briefed Shri Rajnath Singh of their plan to inaugurate this week Safran Aircraft Engines and Safran Electrical & Power India Pvt Ltd. - both to come up in Hyderabad and Safran-HAL Aircraft Engines as a joint venture in Bengaluru. Safran aircraft engine, Hyderabad, with an investment of Euro 36 million and located on 10 acres land in the Hyderabad SEZ, will produce parts and components for advanced aircraft engines including rotating seals. Safran Electrical & Power India Pvt Ltd will produce harness for civil and fighter jets. The joint venture between Safran and HAL is for production of rigid piping for aircraft engines including helicopter engines. The joint venture is expected to hire 160 new highly skilled personnel.

The CEO of Safran outlined his company's long-term plan in co-development and co-production of advanced jet engines and transfer of technology as per existing policy of Government of India. He briefed Shri Rajnath Singh on capabilities of Safran in areas of technology beyond aircraft engine. The Raksha Mantri noted the great importance India attaches to the strategic partnership with France. He welcomed new facilities in Hyderabad and the joint venture in Bengaluru. He



invited Safran for more co-development and co-production projects in India, in tune with 'Make in India, Make for the World' and 'Aatmanirbhar Bharat' of the Government of India. "We are a big market. However, we are increasingly focused on making in India for addressing the needs in a competitive manner and supplying to friendly foreign countries. You can leverage all the competitive advantages India offers, including the cost advantages and availability of trained manpower," he said. The Raksha Mantri asserted that both countries can contribute to each other's capability building.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1839380>

## THE TIMES OF INDIA

*Tue, 5 Jul 2022*

### **Drone Startup Garuda Signs MoU with TIDCO for a Defence-Focussed Facility in TN**

Drone startup Garuda Aerospace has signed an MOU with the Tamil Nadu Industrial Development Corporation Limited (TIDCO) to jointly develop a facility focused on the defence sector. "We have been receiving a lot of interest from the Army, Airforce, CRPF, CISF, BSF and we have started designing drones keeping in mind our national security threats as we firmly believe that drones equipped with diverse payloads can support our forces in the borders," said Agnishwar Jayaprakash, founder-CEO, Garuda Aerospace. "This partnership with TIDCO involves joint development of a drone manufacturing facility focused on the defence sector and aims to create over 5,000 jobs for youth in Tamil Nadu alone," said a TIDCO official. TIDCO is the nodal agency for the Tamil Nadu defence corridor.

"The future of warfare is drones and Garuda Aerospace is attracting global technology partners post our recent funding round to speed up our defence aspirations," added Agnishwar Jayaprakash. Recently, Garuda Aerospace commenced its \$30 million Series A Round at \$250 million valuation and former Indian cricket team captain MS Dhoni invested into the company while also becoming Garuda's brand ambassador.

<https://timesofindia.indiatimes.com/business/india-business/drone-startup-garuda-signs-mou-with-tidco-for-a-defence-focussed-facility-in-tn/articleshow/92681288.cms>

*Tue, 5 Jul 2022*

## **Indigenous AI-Based Software Developed to Protect Defence Land from Illegal Encroachments**

The use of technology has once again proved to be a boon in the defence related matters of the country as Directorate General Defence Estates (DGDE) has developed an ‘Artificial Intelligence-based Change Detection Software’ which can automatically detect unauthorised constructions & encroachments on the defence land using Satellite Imagery. The AI-based software has been developed by Centre of Excellence on Satellite & Unmanned Remote Vehicle Initiative (CoE-SURVEI) established by Directorate General Defence Estates at National Institute of Defence Estates Management at Meerut Cantonment in Uttar Pradesh. Taking to Twitter, Principal Spokesperson of the Ministry of Defence A. Bharat Bhushan Babu said, “It facilitates better control on unauthorised activities, ensures accountability of field staff and helps in reducing corrupt practices.”

The Institute leverages latest technologies in survey namely satellite imagery, drone imagery and geo-spatial tools for effective land management and urban planning. Notably, the CoE was inaugurated by Defence Minister Rajnath Singh on December 16, 2021. The CoE-SURVEI along with with knowledge partner Bhabha Atomic Research Centre (BARC), has built the change detection software. Presently, the software uses National Remote Sensing Centre (NRSC) Cartosat-3 imagery with trained software. The changes are detected by analysing satellite imagery of different time periods. The Centre of Excellence on Satellite & Unmanned Remote Vehicle Initiative has also developed tools for vacant land analysis and 3D imagery analysis of hill cantonments for land management. By leveraging technology, it is trying to ensure optimum use of defence land through Geographic Information System (GIS)-based land management systems.

### **Understanding the AI-based software’s operation**

The AI-based Change Detection Software can automatically detect change on ground, including unauthorised constructions and encroachments in a time series using Satellite Imagery. The software has been used by the Centre of Excellence (CoE) in 62 Cantonments. Notably, the tool enables Chief Executive Officers (CEOs) of Cantonment Boards to identify alterations on ground that are of permanent nature, It then enables them to check if such changes are authorised or without due sanction of the competent authority.

Importantly, it prompts the CEOs to identify if these action has been taken in time against unauthorised constructions or encroachments and if not, it leads to suitable legal action. Further, the AI-based software facilitates better control on unauthorised activities, ensures accountability of field staff and helps in reducing corrupt practices. It is pertinent to note that, it was known that out of 1,133 unauthorised changes detected, the action has already been taken in 570 cases. In the remaining 563 cases, wherever legal action is warranted, the same has been initiated by the Cantonment Boards after changes were detected by the software. The change detection tool has resulted in effective defence land management, further the efforts are on to fine tune and upgrade it to achieve higher accuracy.

The CoE has also partnered with a couple of other reputed organisations for improved AI interface with change detection tool so as to enhance the functionality of change detection software. This may specifically benefit DGDE and Services in management of defence land located in remote and inhospitable terrains.

<https://newsonair.com/2022/07/05/indigenous-ai-based-software-developed-to-protect-defence-land-from-illegal-encroachments/>



**Press Information Bureau**  
**Government of India**

*Tue, 5 Jul 2022 6:32PM*

## **Indian Navy's INS Satpura and P8i Participate in the Rimpac Harbour Phase**

Indian Navy's indigenous Frigate INS Satpura and P8i LRMRASW aircraft are at Pearl Harbour in Hawaii taking part in one of the largest multilateral Naval Exercises, the Rim of the Pacific exercise, also known as RIMPAC. While Satpura reached Hawaii on 27 Jun 22, the P8i aircraft arrived on 02 Jul 22. The harbour phase of the exercise saw participation in multiple symposiums, exercise planning discussions and sports competitions. The crew also visited the historic museum ship USS Missouri and paid homage to fallen soldiers who made the supreme sacrifice during World War II at USS Arizona Memorial.



INS Satpura and one P8i maritime patrol aircraft are participating in the exercise which spans over six weeks of intense operations and training aimed at enhancing interoperability and building trust among Navies of friendly foreign countries. 28 countries, 38 warships, 09 land forces, 31 unmanned systems, 170 aircraft and over 25,000 personnel are participating in the multi-dimensional exercise. The sea phase commences on 12 Jul 22 and will culminate with the closing ceremony on 04 Aug 22.



Indian Navy's P8i LRMRASW aircraft arrived at AFB Hickam, Joint Base Pearl Harbour, Hawaii, USA to participate in the 28th edition of the biennial Rim of Pacific (RIMPAC-22), the world's largest international maritime exercise. The P8i Detachment led by Cdr Puneet Dabas was received by Wg Cdr Matt Stuckless (RAAF), Head of MPRA operations from Hickam airfield. P8i will be participating in coordinated multinational, multiplatform advanced Anti Submarine Warfare operations along with 20 MPRAs from seven participating nations.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1839384>

## Indian Navy to Showcase Growing Strength of Country's Defence Manufacturing

India-based defence attaches of around 25 countries of the Indian Ocean Region have been invited by the Navy to a two-day conclave later this month to showcase the growing strength of the Indian defence industry and offer them solutions to their security requirement. A significant number of Indian defence attaches posted in countries with whom India has strong maritime cooperation are also attending the conclave on July 18 and 19 so that they can highlight capability of India's defence manufacturing to the countries of their postings, Indian Navy officials said.

Vice Chief of Naval Staff (VCNS) Vice Admiral SN Ghormade said that a roadmap for the Indian industry will be unveiled at the event so that both sides can enhance collaboration in developing various systems and equipment required by the force. "The unclassified version of the 'Unmanned Roadmap' will be unveiled during the event. This has been made specifically for the industry and gives the complete details (including numbers) of planned inductions along with timelines so that the industry knows where to focus their R&D efforts," Ghormade said at a media briefing. "This is something that the industry has been wanting for some time," he said. The Navy has already proposed to develop 75 new indigenous technologies to celebrate the 75th year of the country's independence. The Naval Innovation and Indigenisation Organisation (NIIO) is working in collaboration with several organisations on this ambitious project. "This endeavour is not about only a few products or even 75 products being launched. The vision of NIIO is much larger than that. We are actually trying to create an ecosystem and culture of innovation," Vice Admiral Ghormade said.

The two-day event is being organised to ensure deeper convergence among various stakeholders involved in the Indian defence manufacturing sector and highlight India's growing stature as a reliable supplier of defence equipment. Ghormade said the Navy has always believed in the idea of 'AtmaNirbhar Bharat' (self-reliant India), adding its commitment to indigenous platforms over the years have not only helped the Navy meet its own requirements, but also contributed to the national GDP in a major way. "The decision to construct warships indigenously, to take just one example, which was taken in the 1960s has created hundreds of thousands of jobs and given a boost not only to shipbuilding but also to ancillary industry and MSMEs," he said. "Since expertise in ship design was not available in the country in those days, the Navy not only tied up with premier academic institutes to start courses in naval architecture but also set up an in-house Directorate of Naval design," he said. "The fact that we are today designing and constructing complex warships including an aircraft carrier and nuclear submarines -- which very few countries have achieved bears testimony to the long term vision of the Navy," he added. Another



official said around 25 defence attaches of countries in the Indian Ocean Region have been invited to the two-day event.

<https://timesofindia.indiatimes.com/india/indian-navy-to-showcase-growing-strength-of-countrys-defence-manufacturing/articleshow/92681482.cms>

# The Tribune

Tue, 5 Jul 2022

## Rafale vs Super Hornet: Navy Awaits Trial Report

The Navy is looking at the French Rafale-M and US-origin Boeing F/A-18 Super Hornet as choices for aircraft carrier-based fighter jets. The two jets have completed a series of demonstration flights to show adaptability as per Indian conditions. The US and France use a launch mechanism for fighter jets called the catapult assisted take-off but arrested recovery. India uses a mechanism called the short take-off but arrested recovery. The two are vastly different from each other and exert different stress on the jet as it takes off from the deck. Navy Vice-Chief Vice Admiral SN Ghormade said on Tuesday, “Trials have been conducted. Once we have the trial report, we will hold staff evaluation and go in for an intergovernmental agreement.”

He was addressing a conference to brief on a forthcoming international seminar on innovation in naval engineering and how Indian products will be showcased to countries in the Indian Ocean Region. He said the choice between French and the US jets was a temporary arrangement as the Defence Research and Development Organisation was working on the twin engine deck-based fighter and till it’s ready, the Navy would have to rely on either Rafale-M or F/A-18.

<https://www.tribuneindia.com/news/nation/rafale-vs-super-hornet-navy-awaits-trial-report-409822#:~:text=The%20Navy%20is%20looking%20at,aircraft%20carrier%2Dbased%20fighter%20jets.&text=The%20two%20jets%20have%20completed,adaptability%20as%20per%20Indian%20conditions.>

# ThePrint

Tue, 5 Jul 2022

## Indian Navy to go for Govt-to-Govt Deal with US or France for Fighter Planes

The Indian Navy will enter into a government-to-government contract with either the US or French government for the purchase of over two dozen fighter aircraft, top Naval officers said Tuesday. Sources in the defence and security establishment told ThePrint that the Navy was in the process of expediting a trial report into the operational demonstration by Rafale M of French firm Dassault Aviation and F/A 18 Super Hornet of American company Boeing.

The sources also said that the report should be completed within two months and further clarifications could be sought from the two companies in contention. Following this, the Navy hopes to move the procurement proposal to the defence ministry by the end of 2022.

“The trials are being done because the Navy requires aircraft which can take off from carriers. The report (trial report) is yet to come in on the operational demonstration. They will expedite the report and we will process it,” Navy Vice Chief Vice Admiral S.N. Ghormade said, while responding to a question during a press conference in the national capital.

He was referring to an operational demonstration carried out by the Rafale M and the Super

Hornets showcasing ski-jumps — a crucial take-off capability — from the shore-based test facility at INS Hansa in Goa, to demonstrate its ability to operate from Indian aircraft carriers. Ghormade also spoke about the government-to-government contract and added that the Navy was seeing how the Indian defence industry ecosystem can benefit from it.



ThePrint team | Rafale M jet (left) and Boeing's F/A-18 Super Hornet (right)

### **Numbers of aircraft undecided**

While the Navy was initially looking at procuring 57 aircraft, the number currently stands at 26. When asked how many aircraft the Navy was looking at procuring, Ghormade, however, said a final number would be decided in due course. The Vice Chief also said the Navy was keen on the twin engine deck based fighter (TEDBF) that the Defence Research and Development Organisation (DRDO) is working on.

The Navy currently operates the Russian MiG 29K aircraft from INS Vikramaditya. A second aircraft carrier will be commissioned by 15 August this year. Sources explained that the Navy was looking at only a minimum number of foreign aircraft to keep it operationally active while awaiting the delivery of TEDBFs. They also said that there are a lot of operational issues with MiG 29K and since some of them would be decommissioned over the next one decade, new fighters are needed.

### **‘Decent’ performance by both aircraft**

The sources, however, refused to divulge how Rafale and Super Hornets have performed and only said that both aircraft are “decent”. The final report is likely to give more details of both aircraft. They also said some clarifications would be needed from the companies and only then will the Navy select the fighter plane it wants. The sources further added that once the proposal is sent to the defence ministry, they will push for faster processing since this is a priority project. As reported by ThePrint earlier, the Navy is looking at procuring fighters on its own rather than with the Indian Air Force (IAF). In 2020, then Navy chief Admiral Karambir Singh had said that the force was trying to work with the IAF for a possible joint procurement.

<https://theprint.in/defence/indian-navy-to-go-for-govt-to-govt-deal-with-us-or-france-for-fighter-planes/1025631/>

# The Tribune

Tue, 5 Jul 2022

## Defence Ministry Issues Tender to Procure Over 29,000 'Night Sights' for Army's Assault Rifles

The Ministry of Defence (MoD) on Tuesday issued a tender to procure 29,762 'night sights' for the Indian Army's 7.62x51 mm assault rifles. 'Night sight' is an optical instrument that glows in low light so that the soldier can aim better. The tender said: "The MoD intends to procure quantity 29,762 Night Sight (II) for 7.62 x 51 mm assault rifles along with accessories for each assault rifle [lens cover, eye guard, cleaning kit, battery pack charger and quantity three sets of batteries (each set of batteries corresponds to number of batteries required to operate the night sight)]." As per the tender, 50 per cent of the content in the night sight will have to be Indian. The last date to submit the bid for this tender is September 27.

<https://www.tribuneindia.com/news/nation/defence-ministry-issues-tender-to-procure-over-29-000-night-sights-for-armys-assault-rifles-409774>



Tue, 5 Jul 2022

## Tibet was Never a Part of China, Says US Report: A Revisit of the India China Tibet Issue

*By Lt Gen P R Shankar (R)*

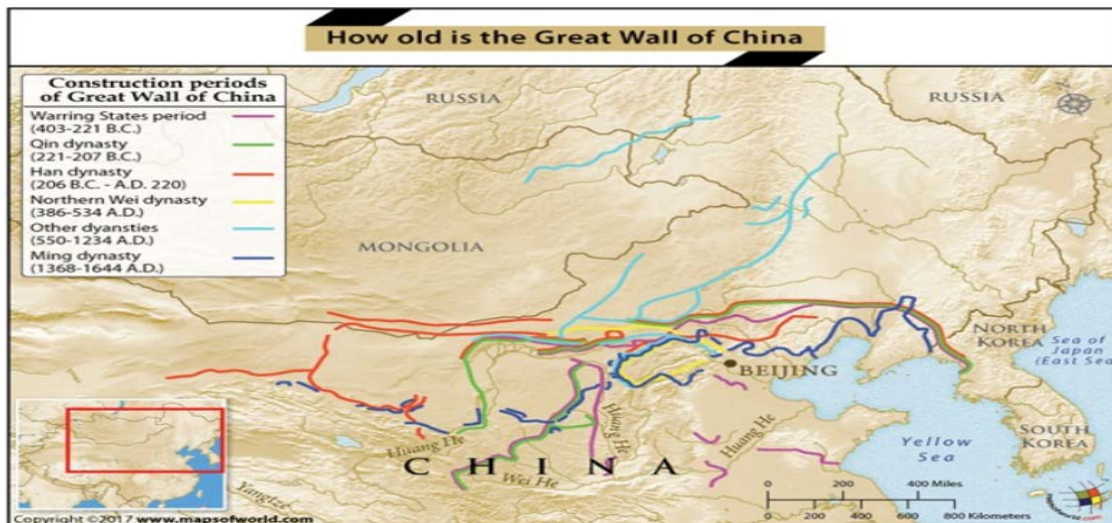
Pre -1949 official historical records completely discredit the Chinese claim to Tibet from ancient times as per a project report whose findings were presented on 23 Jun 22 at the US Congressional-Executive Commission on China. The report concludes that Tibet was never a part of China before the People's Republic of China (PRC) invaded it in 1950. Maps from the Ming and Qing dynasties were presented to prove that Tibet was never part of a Chinese empire. The PRC's claims to unify China by annexing Tibet are baseless. Its version of 'Chinese history' is very different from the actual 'Chinese history'.

This brings the India -Tibetan-China triangle into focus. If the historical records indicate that Tibet is occupied territory and taking into consideration the Sino-Indian border issues at play, there is reason for India to review its stand for further negotiations. In this connection it is necessary to step back into history and relook at issues involved from different perspectives. From a Chinese perspective, the outer frontiers of Imperial China were defined by the 'Great Wall'. It was built to keep outsiders at bay. Historically, The Great Wall defines the outer limits of China's boundaries. However there is no 'Single' Great Wall of China. There were a series of Walls raised by different dynasties depending on the extent of their empire and

what they considered China. Taking into consideration all the Walls, the areas outside these are definitely outside China. That includes Tibet, was never part of China till the PRC usurped it based on manufactured 'history'. From a Tibetan perspective, Songtsen Gampo (627-649) ruled Tibet as an independent kingdom in the 7th century.

He married a Chinese princess to establish relations with China. Buddhism entered Tibet from India around that time. Tibet remained independent till Mongols conquered and ruled China and Tibet in the 13th Century. When Mongols waned, the succeeding Ming dynasty (1368-1644) did not take over Tibet. The next (and last) imperial Qing dynasty (1644-1911), were Manchus. In 1720, political turmoil in Tibet enabled Manchus to intervene and restore order in Tibet. Thereafter, their Resident in Lhasa exercised control, till their own dynasty collapsed.

Tibet always retained its own official and legal system in this period. The Qing's did not attempt to formalise Tibet as a Chinese province. This nebulous relationship was termed as 'Chinese Suzerainty' by the Britishers. In 1904, when Col Younghusband's expedition entered Lhasa, Chinese influence started waning. In 1912, Chiang Kai Shek's Nationalist Government declared Tibet as part of China. In February 1913, the 13th Dalai Lama declared the independence of Tibet and expelled all Chinese. This created a de-facto independent Tibet with its own flag, army, government, language, currency and border control. The British presence forced the Chinese out of the area. As the British power waned after India's independence, the Communist Party, in 1949, instigated the Panchen Lama to appeal to them to liberate Tibet. In 1950, the PLA invaded Tibet through this ruse and the rest is History. The long and short of it is that Tibet was forced to amalgamate into China. It was never an integral or sovereign part of China as often claimed by the PRC. The relationship between Tibet and China was of only suzerainty periodically. All this is now buttressed by the Report to the US Congressional committee. Another important legal angle is that after invading Tibet in 1950, China forced Tibet to sign a 17 Point Agreement illegally on 23 May, 1951.



The Agreement gave complete control of Tibet to the PRC. It was signed on behalf of Tibet by a person devoid of authority. However it is reported that the very opening paragraph of the main statement admits Tibet's status as a separate entity where words to the effect that "China did not enjoy any effective control for over the last hundred years and more" have been mentioned in that Agreement. If this is correct, it is an unexploited legal loophole. It proves by self-admission that Tibet was not part of China. It needs greater investigation.



From an Indian perspective, Tibet was not recognized as part of China till the 2003 agreement was reached. The 2003 agreement reads “The Indian side agrees to designate Changgu of Sikkim state as the venue for border trade market; the Chinese side agrees to designate Renqinggang of the Tibet Autonomous Region as the venue for border trade market”. It is only this paraphrasing which establishes recognition of Tibet as part of China and Sikkim as part of India. Nathu La pass is mentioned as an entry and exit point and hence is treated as the border by common understanding. In 2003, it was never contended by China that the Tibet Autonomous Region extended South of the Mac Mahon Line.



The common understanding was that Tibet was generally North of the Mac Mahon Line even if the line was itself in dispute at some places. Chinese claims on Arunachal Pradesh as South Tibet started after 2003. In claiming so, the Chinese have actually violated their commitments of 2003. Further, China has violated all Sino-Indian agreements in their 2020 aggression in Eastern Ladakh. In view of just these facts, it is perfectly legal that India does not recognise Tibet as part of China.

When the Chinese, Tibetan and Indian historical perspectives are viewed along with the latest Report, it emerges that Tibet is legally not part of China. Further, the Tibet, India recognised in 2003 is also now in dispute due to additional claims into Arunachal Pradesh and their violation of all agreements during their 2020 aggression. Is there a case for India to change its position and negotiating stance with the Chinese?

<https://www.financialexpress.com/defence/a-revisit-of-the-india-china-tibet-issue/2583480/>

*Tue, 5 Jul 2022*

## **Portugal Aims for Aerospace and Defence Hub; To Host Biggest Air Summit 2022 in Ponte De Sor**

Portugal is getting ready for its biggest air show in the region—the Portugal Air Summit 2022 to be held at Ponte de Sor. The Summit builds upon the ambitious and futuristic roadmap for Portugal, building upon a new military programming law in 2019 with forecasted expenditure until 2030 at approximately \$5.3 billion. The country is primarily focused in enhancing its defense capabilities to secure its maritime borders, develop its cyber warfare capabilities and reinforce its assets to better support the missions where Portugal is involved under NATO, UN or EU mandates. Portugal has a massive mandate being the frontier of Europe. “Our area of surveillance includes the entire Atlantic Ocean which is as big as the Continent itself,” said Air Force Chief General Joao Guilherme Cartaxo Alves in an interaction with the author in Lisbon.

The Portugal Air Summit is now the largest aviation summit on the Iberian Peninsula and brings together the industry’s leading entities and personalities to discuss and analyze the potential and future of aviation, aeronautics, space, and defense. More than 650 speakers have already attended the event, debating hundreds of topics in more than 280 conferences with a cumulative audience of more than 60,000 visitors. Around 700 B2B and B2C meetings were held, and 3000 contacts were made with a business conversion rate of 10%. In its 6th edition, Air Show will be held from October 12th to 15th, 2022. Talking about the theme of the Air Show, Rogerio Alves, Vice President, Ponte de Sor Municipality said, “Flying for a World of Opportunities” is the central theme. “This will undoubtedly be the largest edition of the Portugal Air Summit ever,” Rogerio further remarked. With a unique show in Portugal, the Air Show is full of adrenaline, action, light, and a lot of speed. “The skies of Ponte de Sor will be full of excitement with airplanes performing breath-taking acrobatics,” Rogerio highlights the vibrancy of the show. Besides the thrill of the air show, Ponte de Sor is famous for its culture, food and wine

He said more than 650 speakers have already attended the event, debating hundreds of topics in more than 280 conferences with a cumulative audience of more than 60,000 visitors. Rogerio adds that it is an event that brings together the most relevant entities and personalities in the industry to debate and analyse the potential and future of aviation, aeronautics, space and defence and is a meeting point for the sector’s stakeholders. “The Portugal Air Summit has already established itself



Tekever AR3 for maritime surveillance

as one of the most relevant aeronautical events in Europe. We are proud to be able to contribute for it to gain dimension also in the space sector. It is, therefore, an honor for the Portuguese Space Agency to organize the second edition of the first European rocket competition, the EuRoC, in parallel with the PAS,” said Ricardo Conde, Portuguese Space Agency President.

## Portugal Aerospace and Defence Industry

The aerospace and defense industry in Portugal has a small but strong industrial base in several areas including engines, air traffic infrastructures, aircraft, cabin interiors, electronics, tools and support technologies, structures, material, and production, among others. The aviation maintenance sector is also important and recognized internationally in both civil and military aircrafts. The Aerospace, Defense and Space (AED) cluster continues to be a priority and was labeled as a “Strategic National Competitiveness Cluster” by the Portuguese Government. “Under the current process of implementation of the national strategy for space, “Portugal Space 2030”, fields of focus are: Earth Observation, Space Safety, Space Transportation, and Telecommunications, including related downstream activities, working towards the vision for Portugal – an Atlantic nation, with a rich and global maritime tradition – to be recognised, by 2030, as a global authority in the science and economics of Space-Earth-Climate-Oceans interactions for the benefit of society and economy,” explained Ricardo Conde, President, Portugal Space Agency.

AED Portugal cluster, created in 2016, currently has more than 80 entities which export around 87% of its production generating a turnover of more than 1.72 billion euros. “The result has been exciting” said the AED Clusters Board President, Jose Neves. “Starting from drones to space, our entities like Tekever, Luso Space and Critical Software are breaking boundaries,” Jose further elaborates. Portuguese drone manufacturer Tekever has been awarded contract by the European Maritime Agency (EMSA) to deploy remotely piloted aircraft for maritime surveillance—a first such project awarded by EMSA. Another space entity based in Lisbon, LusoSpace which specializes in microsystems, augmented reality, highly critical & complex systems, has led many breakthroughs in the field of aerospace and aviation industry. The national space strategy, Portugal Space 2030, sets new targets for the development of the sector. In 2019, the government created “Portugal Space” (the Portuguese Space Agency), a private, non-profit organization to promote and strengthen Space in Portugal, its ecosystem and value chain, for the benefit of society and economy in the country and worldwide. Portugal Space acts as a business and development unit for universities, research entities and companies, as stated in the Portugal Space 2030 Strategy, approved in 2018. The U.S. has been traditionally an important supplier of aerospace and defense equipment and components, competing directly with other countries like Israel and EU countries like Italy, Austria, and Spain. U.S. manufacturers are well-positioned to benefit from a growing market where defense imports are expected to increase over the next couple of years with the recent acquisition of the KC-390 from Embraer and other planned strategic acquisitions.



LusoSpace\_ Space Rider is Europe’s first reusable spaceplane planned to be launched in 2023. The experiments in its cargo, among others, include satellites inspection and Earth observation.

In addition, the Portuguese Air Force is now responsible for all aerial firefighting operations and management including leasing the necessary aircrafts ranging from light helicopters to amphibious waterbombers needed to combat wildfires. The last tender to lease aerial firefighter was launched in 2019 for the period 2020-2023. The Portuguese Air

Force is also assessing its current fleet of aircrafts to upgrade or acquire new equipment that can be used in aerial firefighting.

Portugal Air Summit presents will unfold opportunities for collaboration and exports in sectors in advanced technologies in commercial aircraft, business jets, turboprops, helicopters, UAVs, structures, propulsion systems, subsystems for aerospace vehicles; military aircraft, air defense systems, spacecraft, launch systems, communications systems; access control, identity management, integrated systems, security services.

<https://www.financialexpress.com/defence/portugal-aims-for-aerospace-and-defence-hub-to-host-biggest-air-summit-2022-in-ponte-de-sor/2583489/>

## Science & Technology News



पत्र सूचना कार्यालय  
भारत सरकार

विज्ञान एवं प्रौद्योगिकी मंत्रालय

मंगलवार, 05 जुलाई 2022 1:02 अपराहन

### एक नई सामग्री की खोज की गई है जो इन्फ्रारेड प्रकाश को नवीकरणीय ऊर्जा में परिवर्तित कर सकती है

वैज्ञानिकों ने एक ऐसी नई सामग्री की खोज की है जो उच्च दक्षता के साथ इन्फ्रारेड प्रकाश का उत्सर्जन, खोज और संशोधन करके इसे सौर और थर्मल ऊर्जा संरक्षण तथा ऑप्टिकल संचार उपकरणों के लिए उपयोगी बना सकती है। विद्युत चुम्बकीय तरंगों नवीकरणीय ऊर्जा स्रोत हैं, जिनका उपयोग बिजली उत्पादन, दूरसंचार, रक्षा और सुरक्षा प्रौद्योगिकियों, सेंसरों और स्वास्थ्य सेवाओं में किया जाता है। वैज्ञानिक ऐसी विशेष सामग्रियों का इस्तेमाल तरंगों में सटीक रूप से परिवर्तन करने के लिए उच्च-तकनीकी विधियों का उपयोग करते हैं। इनके आयाम मानव बालों की तुलना में हजारों गुना छोटे होते हैं। विशेष रूप से इन्फ्रारेड प्रकाश की सभी वेबलेंग्थ (विद्युत चुम्बकीय तरंगों) का उपयोग करना आसान नहीं है क्योंकि इसका पता लगाना और संशोधित करना बहुत



मुश्किल है। इन्फ्रारेड प्रकाश अनुप्रयोगों के लिए बौद्धिकक्षमता और अत्याधुनिक सामग्रियों की जरूरत होती है जो उच्च क्षमता के साथ वांछित स्पेक्ट्रल रेंज में उत्तेजना, मॉड्यूलेशन और खोज को सक्षम बना सकती हैं। कुछ मौजूदा सामग्रियां इन्फ्रारेड स्पेक्ट्रल रेंज में लाइट मैटर क्रियाओं के लिए होस्ट के रूप में काम कर सकती हैं, हालांकि ऐसा बहुत कम क्षमता के साथ होता है। ऐसी सामग्रियों की परिचालन स्पेक्ट्रल रेंज भी औद्योगिक रूप से महत्वपूर्ण लघु वेबलैंग्थ इन्फ्रारेड स्पेक्ट्रल रेंज को कवर नहीं करती है।

बैंगलुरु स्थित जवाहरलाल नेहरू सेंटर फॉर एडवांस्ड साइंटिफिक रिसर्च (जेएनसीएएसआर), जो विज्ञान प्रौद्योगिकी विभाग (डीएसटी) का एक स्वायत्त संस्थान है। एक महत्वपूर्ण घटनाक्रम में इस संस्थान के शोधकर्ताओं ने सिंगल-क्रिस्टेलाइन स्कैंडियम नाइट्राइड (एससीएन) नामक नई सामग्री की खोज की है जो उच्च दक्षता के साथ इन्फ्रारेड प्रकाश का उत्सर्जन, खोज और संशोधन कर सकती है।

इस संस्थान के सी.मौर्य और उसके सहकर्मियों ने पोलरिटोन उत्तेजन नामक एक वैज्ञानिक विधि का उपयोग किया है, जो अनुरूप सामग्री में होती है इसमें प्रकाश या तो सामूहिक मुक्त इलेक्ट्रॉन दोलनों से या ध्रुवीय जाली कंपन के साथ हल्के रूप में जुड़ जाते हैं। उन्होंने यह सफलता हासिल करने के लिए पोलरिटोन (एक अर्ध-कण) को उत्तेजित करने के लिए भौतिक गुणों को सावधानीपूर्वक नियंत्रित किया है और इन्फ्रारेड प्रकाश का उपयोग करके सिंगल-क्रिस्टेलाइन स्कैंडियम नाइट्राइड में मजबूत प्रकाश-पदार्थ इंटरैक्शन प्राप्त किया।

एससीएन में ये असाधारण पोलरिटोन का उपयोग सौर और थर्मल ऊर्जा संरक्षण में किया जा सकता है। स्कैंडियम नाइट्राइड की तरह यह सामग्री एक ही परिवार से संबंध के कारण गैलियम नाइट्राइड (जीएएन) के रूप में आधुनिक कॉम्प्लिमेंट्री-मैटल-ऑक्साइड-सेमीकंडक्टर (सीएमओएस) या सी-चिप तकनीक के साथ अनुरूप है इसलिए ऑन-चिप ऑप्टिकल संचार उपकरणों के लिए इसे आसानी से एकीकृत किया जा सकता है।

"इलेक्ट्रॉनिक्स से लेकर स्वास्थ्य सेवा, रक्षा और सुरक्षा से ऊर्जा प्रौद्योगिकियों तक इन्फ्रारेड स्रोतों, उत्सर्जक और सेंसरों की बहुत मांग है। स्कैंडियम नाइट्राइड में इन्फ्रारेड पोलरिटोन पर हमारा काम ऐसे कई उपकरणों में इसके अनुप्रयोगों को सक्षम बनाएगा। यह बात जेएनसीएएसआर में सहायक प्रोफेसर डॉ. बिवास साहा ने कही। जेएनसीएएसआर के अलावा भारतीय विज्ञान संस्थान (आईआईएससी) के नैनो साइंस एंड इंजीनियरिंग केंद्र के शोधकर्ताओं और सिडनी विश्वविद्यालय के शोधकर्ताओं ने भी वैज्ञानिक पत्रिका नैनो लेटर्स में प्रकाशित इस अध्ययन में भाग लिया।

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1839329>



## New Material Discovered Can Convert Infrared Light to Renewable Energy

Scientists have discovered a novel material that can emit, detect, and modulate infrared light with high efficiency making it useful for solar and thermal energy harvesting and for optical communication devices. Electromagnetic waves are a renewable energy source used for electricity generation, telecommunication, defence and security technologies, sensors, and healthcare services. Scientists use high-tech methods to manipulate such waves precisely -- in dimensions that are thousands of times smaller than the human hair, using specialized materials. However, not all the wavelengths of light (electromagnetic waves) are easy to utilize, especially infrared light, since it is difficult to detect and modulate.

For infrared light applications, intelligent and cutting-edge materials are required which can enable excitation, modulation, and detection at desired spectral range with high efficiencies. Only a few existing materials can serve as hosts for light-matter interactions in the infrared spectral range, albeit with very low efficiencies. The operational spectral range of such materials also does not cover industrially important short wavelength infrared (SWIR) spectral range.

In a significant development, researchers from Bengaluru's Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), an autonomous institute of Department of Science and Technology (DST) have discovered a novel material called single-crystalline scandium nitride (ScN) that can emit, detect, and modulate infrared light with high efficiencies.

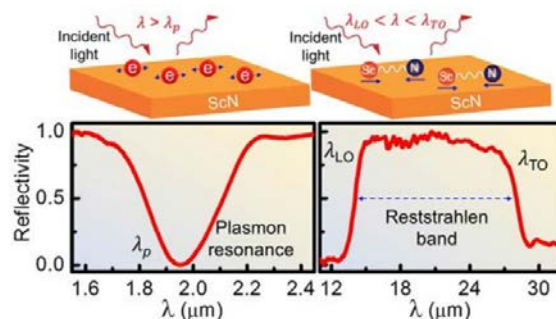


Figure: Light manipulation via charge carriers (electric dipole) of material including collective free electron oscillation (plasmon) and lattice oscillation (optical phonon) at the nanoscale dimension.

K. C. Maurya and co-workers have utilized a scientific phenomenon called polariton excitations that occur in tailored materials when light couples with either the collective free electron oscillations or polar lattice vibrations to achieve this feat. They have carefully controlled material properties to excite polaritons (a quasi-particle) and achieve strong light-matter interactions in single-crystalline scandium nitride (ScN) using infrared light.

These exotic polaritons in the ScN can be utilized for solar and thermal energy harvesting. Also, belonging to the same family of materials as gallium nitride (GaN), scandium nitride is compatible with modern complementary-metal-oxide-semiconductor (CMOS) or Si-chip technology and, therefore, could be easily integrated for on-chip optical communication devices.

“From electronics-to-healthcare, defense and security-to-energy technologies, there is a great demand for infrared sources, emitters and sensors. Our work on infrared polaritons in scandium nitride will enable its applications in many such devices,” said Dr. Bivas Saha, Assistant Professor at JNCASR. Apart from JNCASR, researchers from the Centre for Nano Science and Engineering from the Indian Institute of Science (IISc.) and the University of Sydney also participated in this study published recently in the scientific journal Nano Letters.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1839314>



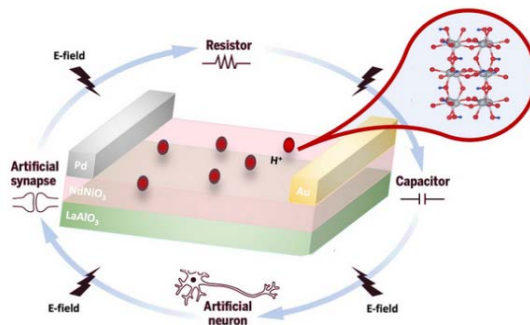
Tue, 05 Jul 2022

## Computer Chips That Imitate the Brain

A new microelectronics device can program and reprogram computer hardware on demand by using electrical pulses. What if a computer could learn to rewire its circuits based on the information it receives?

A multi-institutional collaboration, which includes the U.S. Department of Energy's (DOE) Argonne National Laboratory, has created a material that can be used to create computer chips that can do just that. It achieves this by using so-called “neuromorphic” circuitry and computer architecture to replicate brain functions. Purdue University professor Shriram Ramanathan led the team.

“Human brains can actually change as a result of learning new things,” said Subramanian Sankaranarayanan, a paper co-author with a joint appointment at Argonne and the University of Illinois Chicago. “We have now created a device for machines to reconfigure their circuits in a brain-like way.” With this capability, artificial intelligence-based computers might do difficult jobs more quickly and accurately while using a lot less energy. One example is analyzing complicated medical images. Autonomous cars and robots in space that might rewire their circuits depending on experience are a more futuristic example. The key material in the new device consists of neodymium, nickel, and oxygen and is referred to as perovskite nickelate ( $\text{NdNiO}_3$ ). The team infused this material with hydrogen and attached electrodes to it that allow electrical pulses to be applied at different voltages.



“How much hydrogen is in the nickelate, and where it is, changes the electronic properties,” Sankaranarayanan said. “And we can change its location and concentration with different electrical pulses.” “This material has a many-layered personality,” added Hua Zhou, a paper co-

author and Argonne physicist. “It has the two usual functions of everyday electronics — the turning on and blocking of electrical current as well as the storing and release of electricity. What’s really new and striking is the addition of two functions similar to the separate behavior of synapses and neurons in the brain.” A neuron is a single nerve cell that connects with other nerve cells via synapses. Neurons initiate sensing of the external world.

For its contribution, the Argonne team carried out the computational and experimental characterization of what happens in the nickelate device under different voltages. To that end, they relied on DOE Office of Science user facilities at Argonne: the Advanced Photon Source, Argonne Leadership Computing Facility, and Center for Nanoscale Materials. The experimental results demonstrated that simply altering the voltage controls the movement of hydrogen ions within the nickelate. A certain voltage concentrates hydrogen at the nickelate center, spawning neuron-like behavior. A different voltage shuttles that hydrogen out of the center, yielding synapse-like behavior. At still different voltages, the resulting locations and concentration of the hydrogen elicit the on-off currents of computer chips.

“Our computations revealing this mechanism at the atomic scale were super intensive,” said Argonne scientist Sukriti Manna. The team relied upon the computational horsepower of not only the Argonne Leadership Computing Facility but also the National Energy Research Scientific Computing Center, a DOE Office of Science user facility at Lawrence Berkeley National Laboratory. Confirmation of the mechanism came, in part, from experiments at beamline 33-ID-D of the Advanced Photon Source.

“Over the years we have had a very productive partnership with the Purdue group,” Zhou said. “Here, the team determined exactly how atoms arrange within the nickelate under different voltages. Especially important was tracking the material’s response at the atomic scale to the movement of hydrogen.” With the team’s nickelate device, scientists will work to create a network of artificial neurons and synapses that could learn and modify from experience. This network would grow or shrink as it is presented with new information and would thus be able to work with extreme energy efficiency. And that energy efficiency translates into lower operational costs. Brain-inspired microelectronics with the team’s device as a building block could have a bright future. This is especially so because the device can be made at room temperature by techniques compatible with semiconductor industry practices. Argonne-related work was funded by the DOE Office of Basic Energy Sciences, as well as the Air Force Office of Scientific Research and National Science Foundation.

**Reference:** “Reconfigurable perovskite nickelate electronics for artificial intelligence” by Hai-Tian Zhang, Tae Joon Park, A. N. M. Nafiul Islam, Dat S. J. Tran, Sukriti Manna, Qi Wang, Sandip Mondal, Haoming Yu, Suvo Banik, Shaobo Cheng, Hua Zhou, Sampath Gamage, Sayantan Mahapatra, Yimei Zhu, Yohannes Abate, Nan Jiang, Subramanian K. R. S. Sankaranarayanan, Abhronil Sengupta, Christof Teuscher and Shriram Ramanathan, 3 February 2022, *Science*. [DOI: 10.1126/science.abj7943](https://doi.org/10.1126/science.abj7943)

<https://scitechdaily.com/computer-chips-that-imitate-the-brain/amp/>



