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रक्षा विज्ञान पुस्तकालय

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Wed, 08 Jun 2022

DRDO Develops 'Kautilya' Space Borne Elint System

DRDO has developed a series of antennas for various applications, Kautilya is a spaceborne ELINT system payload for Satellite platform to intercept ground-based radars across the globe. The system provides high accuracy in direction finding and location fixing of radar transmissions. It has been successfully launched and being exploited.

Two-Dimensional BLI Array

Two-dimensional Base Line Interferometric (BLI) array consisting of spiral and pyramidal horn antennas as radiating elements has been realised for space-borne ELINT system. The spiral BLI array working in the C-D band, has 7 elements mounted in orthogonal axes, one being common for vertical and horizontal BLI arrays for DF in two orthogonal directions, i.e., elevation and azimuth. The horn BLI array consists of four antennas mounted in slant 45° with different inter-element spacing. The slant 45° mounting enables the array to receive signals of both vertical and horizontal polarisation. Two such arrays, one vertically and another horizontally mounted, complete the 2-D BLI array subsystem. The vertical and the horizontal arrays give the angle of arrival in elevation and azimuth planes, respectively. Two sets of pyramidal horn arrays are employed to cover the E-G band and H-J band.

The surface of the horn antenna mounting bracket is covered with a magnetically loaded silicon rubber sheet to suppress surface currents and ensure smooth radiation patterns. All the material, components, and processes used in realising this 2-D array are space-qualified and have been subjected to stringent quality tests as per ISRO standards.

<http://www.indiandefensenews.in/2022/06/drdo-develops-kautilya-space-borne.html>



Wed, 08 Jun 2022

Big Make in India Milestone, As Hal's Basic Trainer Aircraft Gets Airworthiness Certification

CEMILAC nod paves the way for serial production of Hindustan Turbo Trainer (HTT), eliminates IAF need for foreign Stage-1 trainer. HTT-40, designed and developed to IAF requirements, has received airworthiness certification six years after first flight. In a big development milestone, the HTT-40 Basic Trainer Aircraft (BTA) was provisionally certified.

for airworthiness by the Centre for Military Airworthiness and Certification (CEMILAC) on June 6. The HTA-40 has been designed and developed by the Aircraft Research & Design Centre of Hindustan Aeronautics Limited (HAL) as per quality requirements specified by the Indian Air Force (IAF). The provisional certification he decks for the serial production of HTT-40 as the Stage-1 trainer for the IAF and eliminates the need for a foreign-supplied aircraft like the Pilatus PC-7 which is currently used by the IAF as the BTA for its rookie pilots.

The HTT-40 has received its certification six years after its first flight. The development cost has been about Rs 600 Crore (\$ 77.2 Million). “The Hindustan Turbo Trainer-40 (HTT-40) Basic Trainer Aircraft Designed & Developed by Aircraft Research & Design Centre, Hindustan Aeronautics Limited is hereby provisionally cleared for its airworthiness compliances by CEMILAC. “This Certificate is issued by Centre for Military Airworthiness and Certification (CEMILAC) based on extensive design evaluation, testing of aircraft systems and comprehensive flight testing carried out by HAL Flight Operations team along with pilots from IAF,” according to the statement of certification. The certification was handed to a group of senior technicians at a hangar at HAL Bangalore.

“6 years from first flight we have certified HTT now to PSQR and FAR 23 standards. Been blessed to have a team which delivered and management which trusted 600 crores on us. IAF fully supportive and am sure the future 40 years belong to HTT 40,” stated Prashant Bhadoria, HAL’s Deputy General Manager Design and project manager for HTT-40. “The project set a record as the fastest to reach certification from the first flight. HTT-40 is designed to PSQR issued by IAF & FAR 23 standards,” he added.

<http://www.indiandefensenews.in/2022/06/big-make-in-india-milestone-as-hals.html>

Defence News

Defence Strategic: National/International



पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Thu, 09 Jun 2022 11:40 AM

रक्षा मंत्री श्री राजनाथ सिंह ने 10 करोड़ अमेरिकी डॉलर की लाइन ऑफ क्रेडिट के तहत निर्मित तीव्रगति की 12 रक्षक नौकाएं वियतनाम को सौंपीं

यह 'मेक इन इंडिया, मेक फॉर द वर्ल्ड' दृष्टिकोण और भारतीय रक्षा निर्माण क्षेत्र की पेशेवर उत्कृष्टता का एक शानदार और सुनहरा उदाहरण है रक्षामंत्री ने वियतनाम को बड़े हुए सहयोग के माध्यम से भारत के रक्षा औद्योगिक परिवर्तन का हिस्सा बनने के लिए आमंत्रित किया

रक्षा मंत्री श्री राजनाथ सिंह ने 09 जून, 2022 को हाई फोग में हांग हा शिपयार्ड की अपनी यात्रा के दौरान तीव्रगति की 12 रक्षक नौकाएं वियतनाम को सौंपीं। इन नौकाओं का निर्माण वियतनाम को भारत सरकार की 10 करोड़ अमेरिकी डॉलर की लाइन ऑफ क्रेडिट के तहत किया गया है। शुरुआत की पांच नौकाएं भारत

में लार्सन एंड टुब्रो (एलएंडटी) शिपयार्ड में और सात अन्य नौकाएं हांग हा शिपयार्ड में बनाई गई थीं। इस समारोह के दौरान भारत और वियतनाम के वरिष्ठ सैन्य तथा असैन्य अधिकारी भी मौजूद थे।

रक्षा मंत्री ने अपने संबोधन में इस परियोजना को प्रधानमंत्री श्री नरेन्द्र मोदी द्वारा परिकल्पित 'मेक इन इंडिया, मेक फॉर द वर्ल्ड' का एक ज्वलंत उदाहरण बताया। उन्होंने कहा कि कोविड -19 महामारी के कारण उत्पन्न चुनौतियों के बावजूद इस परियोजना का सफल समापन होना भारतीय रक्षा विनिर्माण क्षेत्र के साथ-साथ हांग हा शिपयार्ड की प्रतिबद्धता एवं पेशेवर उत्कृष्टता का प्रमाण है। उन्होंने विश्वास व्यक्त किया कि यह परियोजना भविष्य में भारत तथा वियतनाम के बीच कई और सहकारी रक्षा परियोजनाओं के लिए अग्रदूत साबित होगी। श्री राजनाथ सिंह ने वियतनाम को बढ़ते हुए सहयोग के माध्यम से भारत के रक्षा औद्योगिक परिवर्तन का हिस्सा बनने के लिए आमंत्रित किया। उन्होंने जोर देकर कहा कि भारतीय रक्षा उद्योग ने प्रधानमंत्री के 'आत्मनिर्भर भारत' दृष्टिकोण के तहत अपनी क्षमताओं में काफी वृद्धि की है। उन्होंने जोर देकर कहा कि इसका उद्देश्य भारत को एक रक्षा विनिर्माण केंद्र बनाने के लिए एक घरेलू रक्षा उद्योग का निर्माण करना है, जो न केवल हमारी जरूरतों को पूरा करता है, बल्कि अंतरराष्ट्रीय आवश्यकताओं पर भी खरा उतरता है।

रक्षा मंत्री वियतनाम की तीन दिवसीय आधिकारिक यात्रा पर हैं। श्री राजनाथ सिंह ने 08 जून, 2022 को हनोई में अपनी यात्रा के पहले दिन वियतनाम के रक्षा मंत्री जनरल फान वान गियांग के साथ द्विपक्षीय वार्ता की। दोनों रक्षा मंत्रियों द्वारा आपसी रक्षा सहयोग बढ़ाने के उद्देश्य से 2030 तक के लिए भारत और वियतनाम रक्षा सहयोग हेतु संयुक्त दृष्टिकोण पत्र पर हस्ताक्षर किये गए। दोनों देशों के बीच पारस्परिक रूप से लाभकारी लॉजिस्टिक सहयोग में प्रक्रियाओं को सरल बनाने के लिए भी एक समझौता ज्ञापन पर हस्ताक्षर किए गए। रक्षा मंत्री ने वियतनाम के राष्ट्रपति श्री गुयेन जुआन फुक और प्रधानमंत्री श्री फाम मिन्ह चिन से भी मुलाकात की।

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1832536>



Thu, 09 Jun 2022

Defence Minister Rajnath Singh Hands Over 12 High-Speed Guard Boats to Vietnam

Defence Minister Rajnath Singh on Thursday handed over to Vietnam 12 high-speed guard boats built under a USD 100 million Line of Credit granted to the Southeast Asian country by India. The boats were given by Singh at a ceremony in the Hong Ha shipyard amid increasing maritime security cooperation between the two sides to deal with Beijing's increasing military assertiveness in the South China Sea region. The defence minister is on a three-day visit to Vietnam from June 8 to 10. "It gives me great pleasure to join this historic ceremony marking the successful completion of the project to build 12 high-speed guard boats under the USD 100 million defence Line of Credit by India," he said at the event. The initial five boats were

manufactured at the L&T Shipyard in India and the remaining seven were built in the Hong Ha shipyard."I am confident that this will be a precursor to many more cooperative defence projects between India and Vietnam," Singh said."This project is a glowing example of our 'Make in India — Make for the World' mission," he added.

The defence minister said India would be "greatly pleased" if "close friends like Vietnam" become part of the country's transformation in the defence manufacturing sector. He said the successful completion of the project, notwithstanding the COVID-19 pandemic, is a reflection of the commitment and professional excellence of the Indian defence manufacturing sector as also the Hong Ha shipyard. In his address, Singh asserted that the Indian defence industry has substantially increased its capabilities under the 'Aatmanirbhar Bharat' (self-reliant India) vision of Prime Minister Narendra Modi. He stressed that the objective is to build a domestic industry in order to make India a defence manufacturing hub that not only caters to domestic needs but also fulfils international requirements.

India and Vietnam on Wednesday inked a vision document to further broad-base the "scope and scale" of defence ties by 2030 and sealed a logistics support pact to allow their militaries to use each other's bases for repair and replenishment of supplies. The documents were signed after Singh and his Vietnamese counterpart General Phan Van Giang held "fruitful" talks. The Memorandum of Understanding (MoU) on mutual logistics support is the first such major agreement that Vietnam has signed with any country. The defence ministry said India and Vietnam continue to have the "most trustworthy relations in contemporary times with broader convergence of interests and common concerns." Vietnam, an important country of the ASEAN (Association of Southeast Asian Nations), has territorial disputes with China in the South China Sea region.

India has oil exploration projects in the Vietnamese waters in the South China Sea. India and Vietnam have been boosting their maritime security cooperation in the last few years to protect common interests. Relations between the two countries were elevated to the level of 'strategic partnership' during the visit of Vietnam's then Prime Minister Nguyen Tan Dung to India in July 2007. In 2016, during Prime Minister Modi's visit to Vietnam, bilateral relations were further elevated to a 'comprehensive strategic partnership'. Vietnam has become an important partner in India's Act East policy and the Indo-Pacific vision.

<https://www.financialexpress.com/defence/defence-minister-rajnath-singh-hands-over-12-high-speed-guard-boats-to-vietnam/2554385/lite/>



Wed, 08 Jun 2022

Serving in Russia-Ukraine War Zone, 'Vector and Scorpion' Drone to Undergo Test Trial Along LAC

Serving in the war zone between Russia and Ukraine, the latest state-of-the-art "Vector and Scorpion" drone, which is India's longest-range drone with a 65-kilometre telemetric range, is all set to undergo test trials along the Line of Actual Control (LAC) in Ladakh in July, ahead of its possible induction into the armed forces. The two-in-one unmanned aerial system (UAS) is an intelligence, surveillance and reconnaissance (ISR) drone, providing capabilities to both the military and other security forces. It exceeds the performance of the current tactical UAS platforms in most services in difficult terrains and urban environments all over the world, representatives of the company that has manufactured the drone said on Tuesday.

“Between Russia and Ukraine, they (some countries) are flying these drones in that area (the battle zone). It will undergo a test trial on the LAC in Ladakh in July,” Kushagra Agrawal, vice-president, Roter Precision Instruments Private Limited, the firm that has manufactured the drone, told PTI. Giving further details, he said the “Vector and Scorpion” drone was introduced last year and was recently showcased at the North Tech Symposium 2022 at the Army’s Northern Command headquarters in Jammu and Kashmir’s Udhampur, drawing a huge response from the officers of various formations of the armed forces. “It is the first drone that has a telemetric range of 65 kilometres. For example, if I am sitting in Udhampur, the drone can give me live feed from Jammu,” Agrawal said. “No other Indian company can give you a 65-kilometre range,” he added.

Officials said it is an IP 66-rated drone. “That means it can fly during a drizzle. It can fly when it is snowing. It has already been tested 5,000 metres above the ground level. That makes it a fool-proof drone,” Agrawal said. The drone is being used by the US Marine Corps, the French police and the German police. The officials said the mathematical definition of a vector fits very well for the latest UAV from Quantum-Systems. “It can face any direction — upward, forward or down. That is exactly what the Vector from Quantum-Systems is capable of doing. A vertical take-off, energy efficient, long-range, fixed-wing flight and back to a vertical landing. All automatic, no pilot or operator input needed, just fly,” an official said. The Vector 2-in-1 vertical take-off reconnaissance UAV is flexible and enduring, provides flight and surveillance characteristics that exceed the performance of the current UAV platforms in service all over the world.

The officials said the ability to operate in the most difficult terrain (VTOL), combined with extremely low noise emission (motor off, silent mode) makes the Vector the perfect UAV for a wide range of non-invasive aerial operations. “An encrypted mesh IP link sends video streams up to a range of 15-plus kilometres. A flight time of up to 120 minutes speaks for itself. All combined in a compact and robust electric VTOL UAV,” the official said. The two-in-one system design opens up further applications with the “Scorpion” configuration — by removing the wings and attaching a separate set of copter arms, a dedicated multi-copter platform becomes available for an even wider variety of mission applications — the officials said. “Either use a VTOL fixed-wing or a conventional copter, in both cases you only need one system to train on and to deploy it on site,” an official said. The officials said the drone gets “mission ready” in less than two minutes. “The payload and all the general parts have the quick-lock mechanism without the need of any tools. It is a fibre-reinforced airframe with a shock-absorbing landing gear,” an official said.

<http://www.indiandefensenews.in/2022/06/serving-in-russia-ukraine-war-zone.html>



Thu, 09 Jun 2022

China Slams US General for Criticising its Military Build-Up at Sino-India Border as ‘Alarming’

China on Thursday termed the critical remarks by a top US General on its infrastructure build-up at the Sino-India border as a “despicable act” and criticised the attempts of some American officials to “add fuel to fire”, emphasising that Beijing and New Delhi have the “will and capability” to properly resolve their differences through talks. Chinese Foreign Ministry spokesman Zhao Lijian made the remarks during a media briefing here while replying to a question on the comments by US Army’s Pacific Commanding General Charles A Flynn, who

termed the situation in eastern Ladakh as “alarming.” “This border issue is between China and India (and) the two sides have the will and capability to properly resolve the issue through talks,” Zhao said.

Zhao said “some US officials are trying to add fuel to the fire and pointing fingers. This is a despicable act. We hope they will do more to contribute to regional peace and stability.” He reiterated that the situation at eastern Ladakh where the two sides had over two year-long military standoff is “stabilising”. “Now the situation there is stabilising on the whole and the frontline forces from both countries have realised disengagement in most areas along the western section,” Zhao said. Gen Flynn, who is on a visit to India, said on Wednesday that some of the defence infrastructure that is being created by China near its border with India in Ladakh is “alarming”, calling the Chinese activity in that region as “eye-opening”.

Flagging concerns over the Chinese infra build-up, the US General also said that the “destabilising and corrosive” behaviour of the Chinese Communist Party (CCP) in the Indo-Pacific region is simply not helpful. “I think it is worthy of us working together as a counterweight to some of those corrosive and corruptive behaviours that the Chinese do,” he told reporters. The Indian and Chinese troops have been locked in a tense border standoff in eastern Ladakh since May 5, 2020, when a violent clash between the two sides erupted in the Pangong lake area. Last month, it emerged that China is constructing a second bridge in an area held by it around the strategically key Pangong Tso lake in eastern Ladakh and this could help its military to quickly mobilise its troops in the region.

China has also been establishing other infrastructure such as roads and residential units in the border areas with India. India and China have held 15 rounds of military talks so far to resolve the Ladakh standoff. As a result of the talks, the two sides completed the disengagement process last year on the north and south banks of the Pangong lake and in the Gogra area. However, each side currently has around 50,000 to 60,000 troops along the Line of Actual Control (LAC) in the sensitive sector.

<https://www.financialexpress.com/defence/china-slams-us-general-for-criticising-its-military-build-up-at-sino-india-border-as-alarming/2554423/lite/>

ThePrint

Thu, 09 Jun 2022

US Approves USD 120 MLN Sale to Maintain Taiwanese Warships

Washington [US], June 9 (ANI): The United States has approved the sale of ship parts to Taiwan worth USD 120 million amid the increasing threat of Chinese invasion. China has warned the US against enhancing ties with the democratic island that Beijing regards as its island and threatens to overtake by force. Last month, 30 Chinese warplanes breached Taiwan’s air defence identification zone or ADIZ, while a US congressional delegation was on a surprise visit to Taiwan. After the approval of the sale, the US Defence Security Cooperation Agency delivered the required certification notifying Congress regarding the deal.

“Taipei Economic and Cultural Representative Office in the United States (TECRO) has requested to buy unclassified spare and repair parts for ships and ship systems; logistical technical assistance; U.S. Government and contractor representative technical and logistical support; and other related elements of logistical and program support. The total estimated program cost is USD 120 million,” the US Defence Security Cooperation Agency said in a

statement. This proposed sale serves US national, economic, and security interests by supporting the recipient's continuing efforts to maintain a credible defensive capability.

The US government said the proposed sale will help improve the security of the recipient and assist in maintaining political stability, military balance, and economic progress in the region. "The sale will contribute to the sustainment of the recipient's surface vessel fleet, enhancing its ability to meet current and future threats. The proposed sale will contribute to the recipient's goal of maintaining its military capability while further enhancing interoperability with the United States and other allies," the statement said. The recipient will have no difficulty absorbing this equipment and the proposed sale will not alter the basic military balance in the region, the statement said.

"The equipment will be sourced from approved US Navy vendors and/or US Navy stock. There is no prime contractor. There are no known offset agreements proposed in connection with this potential sale. Implementation of this proposed sale will not require the assignment of any additional US Government or contractor representatives," the statement said. The US Defence Security Cooperation Agency said there will be no adverse impact on US defence readiness as a result of this proposed sale.

<https://theprint.in/world/us-approves-usd-120-mln-sale-to-maintain-taiwanese-warships/989719/>



Thu, 09 Jun 2022

Next-Gen Air Force Fighter Moves to Critical Initial Stage

Last week, the Secretary of the Air Force, Frank Kendall, updated progress on the Air Force's highly classified and top secret fighter program is about to begin its most important engineering and manufacturing developmental phase. At a recent Heritage Foundation meeting, Kendall intimated that the Air Force had initially begun experimental prototyping on the Next Generation Air Dominance (NGAD) project in 2015. Kendall was the top acquisition official for the Pentagon at the time. Effectively, he says, this X-plane program aimed to specifically reduce and develop the new technologies they will need for the new NGAD production program. Since that time, Kendall notes, technology has made great strides. He goes to explain how the vision for the NGAD project has evolved into a "family of systems" that will incorporate many different elements. This list includes several autonomous drone aircraft that can accompany manned aircraft when flying in formation.

Typically, Air Force acquisition program projects take about seven years before progressing from EMD phase all the way to primary operating capability. In some ways then, the NGAD project is perfectly on track. However, while much work has been done, the fact that they only recently started the EMD phase, this project will definitely take a bit longer. Kendall explains, "The clock really didn't start in 2015; it's starting roughly now. We think we'll have the capability by the end of the decade."

That said, NGAD might be the most expensive aircraft development program in US history. Indeed, Kendall has also revealed that just one piloted aircraft manufactured through this program could cost a few million dollars each. As a matter of fact, the Air Force had initially requested \$1.7 billion for NGAD funding in the fiscal budget for 2023. This includes at least \$133 million for research, development, testing, and evaluation.

<https://www.defenseworld.net/2022/06/09/next-gen-air-force-fighter-moves-to-critical-initial-stage.html>

How to Decarbonise Defence: International Military Council Shares Guidelines

Only a handful of the 30 members of the North Atlantic Treaty Organization (NATO) share information on the carbon footprint from their defence activities, according to a new report. The lack of standardisation in data collection and assessment makes it difficult to calculate the greenhouse gas contributions from the sector, said the expert panel of the International Military Council on Climate and Security (IMCCS) in their report on the need to decarbonise defence agencies across the world. Much of this data can reveal sensitive information and so, the countries may be hesitant to give out all onsite and offsite information, said the authors of the report released June 7, 2022. This impacts data collection as well, they added.

The experts shared the risks, vulnerabilities that the recent war has re-exposed and the potential interventions that could be adopted for a greener military operations in Decarbonised Defence The Need For Clean Military Power In The Age of Climate Change. The risks posed by climate change towards security is realised by the security foreign policies body across the world, according to the findings. The world's defences are dominated by the use of fossil fuels, which serve as a reliable and efficient means to operate the forces across the world. But military fuel consumption does not only pose a problem in terms of operations but also involves high expenses and dependence on external suppliers, the report highlighted.

The Russian army attack on a fuel storage facility in Odessa in southern Ukraine in April 2022, for instance, crippled the Ukrainian troops fighting the Russians near the Mikolayev front, the report cited. The IMCCS panel recommended high technology innovations such as use of bio-fuel, could help to shift them to low-carbon alternatives thus evolving the modernisation process. Another recommendation comes to bring hybrid vehicles or alternative fuel technologies to reduce reliance on fossil energy. The report suggests that concerted move in such a direction to combat climate change by phasing out use of fossil energy can also work as weapon against Russia in its war against the Ukraine.

NATO's stand

In 2010, NATO acknowledged the link between climate change and security for the first time in its report Strategic Concept. The Allied forces have prioritised adaptation to the drawbacks of climate change on various aspects of the military such as its installations, equipment, force readiness and operations, it noted. Reducing the reliance on fossil fuels considering the vulnerabilities and frequent attacks on NATO fuel supplies has been the major driving force for such considerations, the report added. The recent risks and the commitments of the United States and the European Union to become carbon neutral by 2050 and the recent conflict have compelled the western international organisations and the European Union (EU) to accelerate the process of military decarbonisation, the IMCCS report noted.

NATO strongly believes that decarbonisation can be achieved by initially introducing innovations and sustainable solutions in sectors of operating buildings, facilities, short and medium distance vehicles, equipment and energy consumption. It also recommends collaborations with private entities to use drones, 3D printing technology and others through R&D and reduce carbon emissions.

The other hurdle faced is that there is no common consensus among NATO Allies to measure and report on carbon emissions as the provisions under the Kyoto Protocol and the Paris Agreement to the UNFCCC allows an exemption from reporting obligations. NATO does not hold power to impose or even enact binding on emission reduction targets for its Allied member nations. “NATO is not a first responder to climate change. This role is played by other international bodies, in particular those who can set limits on CO2 emissions,” said Michael Rühle, head of climate and energy security section at NATO.

NATO instead seeks to become “the leading international organization when it comes to understanding and adapting to the impact of climate change on security,” the NATO 2030 agenda stated in 2021. Even though the Alliance does not seek to position itself as a “first responder to climate change,” it nevertheless has a range of tools in its toolbox that can support Allied emissions reduction efforts, both directly and indirectly, the document pointed out. However, NATO in its Brussels Summit in June 2021, expressed interest to draw up a methodology to assist Allies measure their carbon emissions from military operations. The process to compile the best practices is underway to enable Allies to map and derive models to best understand carbon emissions, the intergovernmental body noted. NATO Secretary-General Jens Stoltenberg is already working to formulate a realistic target and find feasible solutions for its allied militaries to achieve carbon natural emissions by 2050, it said.

<https://www.downtoearth.org.in/news/energy/how-to-decarbonise-defence-international-military-council-shares-guidelines-83221>

The Tribune

Fri, 10 Jun 2022

China Moves a Step Closer to Launching Its Biggest Carrier

China is a step away from launching ‘Type 003’, its largest and most advanced aircraft carrier so far. The launch would be followed by a series of outfitting and tests. It could take up to two years before the carrier is made operational. An aircraft carrier is the biggest warship in the fleet of any navy and it can launch fighter jets from its deck while floating mid-sea. Satellite imagery accessed by US think-tank Center for Strategic and International Studies (CSIS) and put out in public domain showed the warship was currently positioned to launch at the Jiangnan shipyard. China has two operational carriers. In December 2016, China announced its ‘arrival’ when its first carrier, the CNS Liaoning, carried out its first exercise. Three years later in December 2019, it commissioned one more carrier, the CNS Shandong.

A US Department of Defence report, ‘Military and Security Developments Involving the People’s Republic of China 2021’, says, “People’s Republic of China continues to build a multi-carrier force. The PLA’s next generation of carriers will have greater endurance and a catapult system.” The carrier set for launch will have greater endurance and a catapult launch system capable of launching various types of fighter jets and early warning planes to be launched from its deck. India is set to commission its second carrier, the INS Vikrant, by August 2022, the first being the INS Vikramaditya. Besides India and China, Japan and South Korea are adding carriers to their fleets. The Japanese have the JS Izumo, a 248-metre-long warship, which can fly fighter jets. Its adding another one, the JS Kaga. South Korea has a plan to launch by 2030 a large-deck amphibious-warfare ship that will have the ability to handle fighter aircraft from its deck.

<https://www.tribuneindia.com/news/nation/china-moves-a-step-closer-to-launching-its-biggest-carrier-402525>

The Tribune

Thu, 09 Jun 2022

Drones Add New Dimension to Air Warfare

The fact remains that the capabilities of the enemy drone assets need evaluation before countering them through anti-drone measures and other means. Any air war, more so in the context of the subcontinent, would involve an entire array of aerial operations and combat air support campaigns. It's naive to contemplate an air war based on the Nagorno-Karabakh conflict or the Ukraine-Russia war. There has been some hand-wringing on social media about the alleged procurement of Turkish Bayraktar drones by Pakistan. Though the numbers are unknown, one machine has apparently been picked up by satellites at Murid Air Base located in Chakwal. Even assuming that the open-source "intelligence" is valid, let us take it for granted that drones would be a part of any future war anywhere. We have already seen the use of a quad copter-kind of platform, sporting two IED warheads over the Jammu Air Force Station technical area on June 27, 2021, clearly a trial run by our adversaries.

Now whilst analysing such plausible aerial threats, where the platform is located, is secondary and inherent operational parameters become more relevant. Whether the Pakistan Air Force, or for that matter China's PLAAF, would embark on any aerial excursion into Indian territory employing drones alone or in concert with conventional air power and missiles is a moot point. But the fact remains that the capabilities of the enemy drone assets need evaluation before countering them through anti-drone measures and other means available to an air force touted to be a leading exponent of air power orchestration historically and generally accepted as such. Any air war, more so one in the context of the sub-continent, would involve an entire array of aerial operations ranging from counter air to counter-surface force, air defence, strategic, air transport, maritime and an entire panoply of combat support air campaigns. So, it is naive to contemplate a future air war based on the Nagorno-Karabakh conflict or the ongoing Ukraine-Russia war.

The drone in question, the Bayraktar, is a Turkish-made platform which has had some (media-hyped) kill successes against armoured vehicles recently. Capable of carrying four laser-guided Hellfire-class of air-to-ground missiles a la the acclaimed Predator/Reaper variety of American drones, the Bayraktar has an operating range of around 300 km, speed around 200 kmph and an operational ceiling of around 27,000 ft. Though statedly not GPS-dependent for navigation to its target, it still has a communication link for ground-controlled manoeuvring, which would be susceptible to electronic interference and other electronic combat. Though parameters such as radar cross-section are as yet perhaps unknown, the Bayraktar does not appear to be a stealth drone by any standard and could thus be intercepted by a conventional subsonic fighter and trainer-type aircraft. Besides of course, advanced stand-off missiles on Rafale, Mirage or MiG-29 class of interceptors and the newly inducted S-400 systems could pick them off the skies like flies. The relative cost factor of the drone and the countering platform or missiles would be important considerations for the operational planner.

The intention here is not to tell our eminently capable air force its job, but to indicate to some of our newsmongers the nuances of air power employment. Be that as it may, it is a given that unmanned technology would increasingly show itself in the battle space in all domains of aerial, sea and surface warfare. Counters would also evolve all right, as drone capabilities reach even more advancedUCAV (Unmanned Combat Air Vehicle) levels. Recently, a drone in the USA is reported to have even launched an air-to-air missile. So that is where we stand in terms of the

technology itself in today's and tomorrow's context. Suffice to state that a balanced air force as the IAF would more than be able to pull off a successful air campaign against any adversary, once other intangibles such as realistic training and innovative mindset are in place.

India's own offensive drone capabilities are known to be developing well under agencies such as Mahindra Aviation enterprise and along with technology coming in from the USA (such as the IN Predators), we should be in a good space soon enough. Living in a dangerous neighbourhood as we do, the priority has to be to ensure that our defence spending is ample enough to provide all round tri-service military wherewithal and any adversarial move by awkward neighbours could be countered in a befitting manner. Let us not forget that the Bayraktar drone company's co-owner is President Erdogan's son-in-law and hence the possible hype surrounding their alleged out-of-proportion battle-worthiness.

Military technology would keep evolving and reciprocal counters would evolve too but in the business of war fighting, doctrines and training are the real key areas to focus on if success is to be ensured. One small drone is not going to change the military equation between India and her adversaries. But yes, factor in we must the practicality of the emerging threat and have in hand counter measures as any professional arm would do. And as for media hypes about overstated capabilities, there is no cause to fret over it more than what is realistically called for. China too would be looking at employing drones against India; over time, developing even more capable drones to operate across the Himalayan terrains in the north perhaps. Employability at higher altitudes or mountainous valleys could be suspect for most of these drones, which do not have the altitude and weaponry combination of most UAVs such as the Global Hawk class. But once again, the counter would be found in a credible air defence posture comprising sensors, weapons and training, such that we do not get surprised. The advent of private players into the modern battlefield, such as Musk's "Star Link" over Ukraine and other commercial imaging corporate entities such as Maxar, European Space Imaging and Galileo would also be factors shaping the battlefield in any future war across the globe.

<https://www.tribuneindia.com/news/comment/drones-add-new-dimension-to-air-warfare-402488>



Fri, 10 Jun 2022

Iran Removing 27 Surveillance Cameras: UN Nuclear Watchdog

The head of the UN's nuclear watchdog agency said Thursday that Iran is removing 27 surveillance cameras from nuclear sites in the country, raising the risk of its inspectors being unable to track Tehran's advances as it enriches closer than ever to weapons-grade levels. Rafael Mariano Grossi, the director-general of the International Atomic Energy Agency, made the comments at a suddenly called news conference in Vienna, standing next to an example of the cameras installed across Iran. Grossi said the move poses a "serious challenge" to its efforts, warning that in three to four weeks, it would be unable to maintain a "continuity of knowledge" about Iran's programme.

"This would be a fatal blow" to negotiations over Iran's tattered nuclear deal with world powers, Grossi said. "When we lose this, then it's anybody's guess," he added. Iran did not immediately acknowledge it was removing the cameras, though it threatened Wednesday to take more steps amid a yearslong crisis that threatens to widen into further attacks across the Mideast. Grossi said that would leave "40-something" cameras still in Iran. The sites that would see cameras removed

include its underground Natanz nuclear enrichment facility, as well as its facility in Isfahan, Grossi said. “We are in a very tense situation with the negotiations over the (nuclear deal) at a low ebb,” Grossi added. “Now we are adding this to the picture; as you can see it's not a very nice one.”

On Wednesday, Iran said it shut off two devices the IAEA uses to monitor enrichment at Natanz. Grossi acknowledged that, saying that among the devices being removed was the Online Enrichment Monitor and flowmeter. Those watch the enrichment of uranium gas through piping at enrichment facilities. Iran's decision comes as the IAEA's board censured Tehran over what the agency calls the Islamic Republic's failure to provide “credible information” over man-made nuclear material found at three undeclared sites in the country. The IAEA earlier Thursday said Grossi told members that Iran informed the agency that it planned to install two new cascades of the IR-6 at Natanz. A cascade is a series of centrifuges hooked together to rapidly spin uranium gas to enrich it.

An IR-6 centrifuge spins uranium 10 times as fast as the first-generation centrifuges that Iran was once limited to under its nuclear deal with world powers. As of February, Iran already had been spinning a cascade of IR-6s at its underground facility at Fordo, according to the IAEA. Iran earlier said it planned to install one cascade of IR-6s at Natanz. The IAEA said it “verified” the ongoing installation of that cascade Monday, while the newly promised two new cascades had yet to begin. Iran and world powers agreed in 2015 to the nuclear deal, which saw Tehran drastically limit its enrichment of uranium in exchange for the lifting of economic sanctions. In 2018, then-President Donald Trump unilaterally withdrew America from the accord, raising tensions across the wider Middle East and sparking a series of attacks and incidents.

Talks in Vienna over Iran's tattered nuclear deal have been stalled since April. Since the deal's collapse, Iran runs advanced centrifuges and has a rapidly growing stockpile of enriched uranium. Nonproliferation experts warn Iran has enriched enough up to 60% purity - a short technical step from weapons-grade levels of 90% - to make one nuclear weapon should it decide to do so. Iran insists its programme is for peaceful purposes, though UN experts and Western intelligence agencies say Iran had an organised military nuclear programme through 2003. Building a nuclear bomb would still take Iran more time if it pursued a weapon, analysts say, though they warn Tehran's advances make the programme more dangerous. Israel has threatened in the past that it would carry out a preemptive strike to stop Iran - and already is suspected in a series of recent killings targeting Iranian officials.

Iran already has been holding footage from IAEA surveillance cameras since February 2021 as a pressure tactic to restore the atomic accord. The Atomic Energy Organisation of Iran, which runs its civilian nuclear programme, published video it said showed its workers turning off both regular and backup battery power for two IAEA cameras on Wednesday. The censure resolution at the IAEA meeting in Vienna, sponsored by Germany, France, the UK and US, passed with the support of 30 of 35 governors. Russia and China voted against, Russian ambassador Mikhail Ulyanov wrote on Twitter. India, Libya and Pakistan abstained. After the vote, a joint statement from France, Germany, and the UK and the US said the censure “sends an unambiguous message to Iran that it must meet its safeguards obligations and provide technically credible clarifications on outstanding safeguards issues.”Iran's Foreign Ministry meanwhile criticised the censure as a “political, incorrect and unconstructive action”.

<https://www.dailypioneer.com/2022/world/iran-removing-27-surveillance-cameras--un-nuclear-watchdog.html>



Thu, 09 Jun 2022

New Insights into Neutron Star Matter: Combining Heavy-Ion Experiments and Nuclear Theory

Combining heavy-ion experiments, astrophysical observations, and nuclear theory. When a massive star explodes in a supernova, if it isn't completely destroyed, it will leave behind either a black hole or a neutron star. These enigmatic cosmic objects are especially mysterious because of the crushing internal pressures resulting from neutron stars' incredible density and the perplexing properties of the nuclear matter they are made of. Now, an international team of researchers has for the first time combined data from heavy-ion experiments, gravitational wave measurements, and other astronomical observations using advanced theoretical modeling to more precisely constrain the properties of nuclear matter as it can be found in the interior of neutron stars. The results were published on June 8, 2022, in the journal *Nature*.

Throughout the Universe, neutron stars are born in supernova explosions that mark the end of the life of massive stars. Sometimes neutron stars are bound in binary systems and will eventually collide with each other. These high-energy, astrophysical phenomena feature such extreme conditions that they produce most of the heavy elements, such as silver and gold. Consequently, neutron stars and their collisions are unique laboratories to study the properties of matter at densities far beyond the densities inside atomic nuclei. Heavy-ion collision experiments conducted with particle accelerators are a complementary way to produce and probe matter at high densities and under extreme conditions.

New insights into the fundamental interactions at play in nuclear matter

“Combining knowledge from nuclear theory, nuclear experiment, and astrophysical observations is essential to shedding light on the properties of neutron-rich matter over the entire density range probed in neutron stars,” said Sabrina Huth, Institute for Nuclear Physics at Technical University Darmstadt, who is one of the lead authors of the publication. Peter T. H. Pang, another lead author from the Institute for Gravitational and Subatomic Physics (GRASP), Utrecht University, added, “We find that constraints from collisions of gold ions with particle accelerators show a remarkable consistency with astrophysical observations even though they are obtained with completely different methods.”

Recent progress in multi-messenger astronomy allowed the international research team, involving researchers from Germany, the Netherlands, the US, and Sweden to gain new insights to the fundamental interactions at play in nuclear matter. In an interdisciplinary effort, the researchers included information obtained in heavy-ion collisions into a framework combining astronomical observations of electromagnetic signals, measurements of gravitational waves, and high-performance astrophysics computations with theoretical nuclear physics calculations. Their systematic study combines all these individual disciplines for the first time, pointing to a higher pressure at intermediate densities in neutron stars.

Data of heavy-ion collisions included

The authors incorporated the information from gold-ion collision experiments performed at GSI Helmholtzzentrum für Schwerionenforschung in Darmstadt as well as at Brookhaven National Laboratory and Lawrence Berkeley National Laboratory in the USA in their multi-step procedure that analyses constraints from nuclear theory and astrophysical observations, including neutron star mass measurements through radio observations, information from the Neutron Star Interior Composition Explorer (NICER) mission on the International Space Station (ISS), and multi-messenger observations of binary neutron star mergers. The nuclear theorists Sabrina Huth and Achim Schwenk from Technical University Darmstadt and Ingo Tews from Los Alamos National Laboratory were key to translating the information gained in heavy-ion collisions to neutron star matter, which is needed to incorporate the astrophysics constraints.

Including data of heavy-ion collisions in the analyses has enabled additional constraints in the density region where nuclear theory and astrophysical observations are less sensitive. This has helped to provide a more complete understanding of dense matter. In the future, improved constraints from heavy-ion collisions can play an important role to bridge nuclear theory and astrophysical observations by providing complementary information. Especially experiments that probe higher densities while reducing the experimental uncertainties have great potential to provide new constraints for neutron star properties. New information on either side can easily be included in the framework to further improve the understanding of dense matter in the coming years.

<https://scitechdaily.com/new-insights-into-neutron-star-matter-combining-heavy-ion-experiments-and-nuclear-theory/amp/>



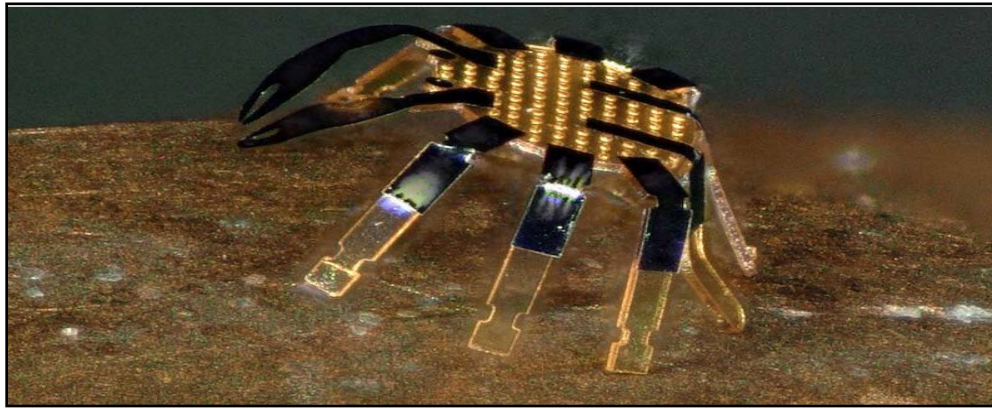
Thu, 09 Jun 2022

This Tiny ‘Crab’ is the World’s Smallest Remote-Controlled Robot

Engineers at Northwestern University have built a half millimeter-wide remote-controlled robot that can bend, twist, crawl, walk, turn and jump. What’s more, the crab-shaped robot does all of this without any actuators, motors, hydraulics or electricity. The world’s smallest remote-controlled robot is controlled using lasers. The engineers built it using a special shape-memory alloy that transforms into a particular shape in its “memory” when heat is applied. The research was documented in an article titled, “Submillimeter-scale multimaterial terrestrial robots,” published in the journal Science Robotics.

“Those joints are initially in a bent configuration like a bent knee. When we locally heat up that shape memory alloy at that joint, it will spontaneously move to recover that initial flat planar geometry,” John Rogers, who led the experiment, told indianexpress.com over a video call. Rogers is the Louis Simpson and Kimberly Querrey Professor of Materials Science and Engineering, Biomedical Engineering and Neurological Surgery at Northwestern University’s McCormick School of Engineering. “The trick is to figure out how to make it go back into that deformed shape. What we do is, we coat the limb in a thin layer of glass. When the alloy cools back down to room temperature, the elastic resilience of that thin glass coating causes it to bend back to that original bent shape,” added Rogers.

The researchers use a focused laser beam to apply localised heat to different parts of the tiny robot in a particular sequence. Due to the properties of the alloy and the small shape of the robot, each “limb” cools down really fast after heat is no longer applied. As the shape of different limbs changes due to this heating and cooling, the robot moves in a particular way, depending on the sequence in which the laser is applied. To manufacture the crab, the team first fabricated an initial structure with a flat geometry and then bonded it to a slightly stretched layer of really thin glass. When the stretched layer relaxes, it causes a controlled buckling which shapes the structure into the chosen three-dimensional form. The researchers also created robots inspired by other creatures including inchworms and grasshoppers. The researchers now want to make such robots capable of carrying out different tasks.



The robot moves without any electronics, motors or hydraulics.

“The robots need to be able to do something besides move around. In the future, you could perhaps use these robots in diagnostic and surgical interventions. For example, to remove plaque in clogged arteries or something of that sort. But there can also be different non-surgical and non-medical applications for such tiny robots,” said Rogers. The researchers are also looking for ways to “communicate in a more meaningful way” with the robot. Currently, the focused laser beam can be thought of as a form of communication with the robot. It can be used to control the robot in different ways, make it walk in different directions and speeds etc. What would be even more valuable, would be the ability to “hear back” from the robot. But that would require the integration of complex sensors and some form of wireless communication parts.

But according to Rogers, the manufacturing techniques used to build these robots are similar to those used in the integrated circuits industry. This should mean that there could be a way to build different types of electronic circuits and radios directly into the bodies of the robots in the future.

If and when that happens, Rogers imagines a swarm of these devices operating in a coordinated way, communicating with each other and with the operator, to complete complex tasks.

<https://indianexpress.com/article/technology/science/this-tiny-crab-is-the-worlds-smallest-remote-controlled-robot-7960466/>

