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समाचार पत्रों से चयनित अंश
Newspapers Clippings

डीआरडीओ समुदाय को डीआरडीओ प्रौद्योगिकियों, रक्षा प्रौद्योगिकियों, रक्षा नीतियों, अंतर्राष्ट्रीय संबंधों और विज्ञान एवं प्रौद्योगिकी की नूतन जानकारी से अवगत कराने हेतु दैनिक सेवा

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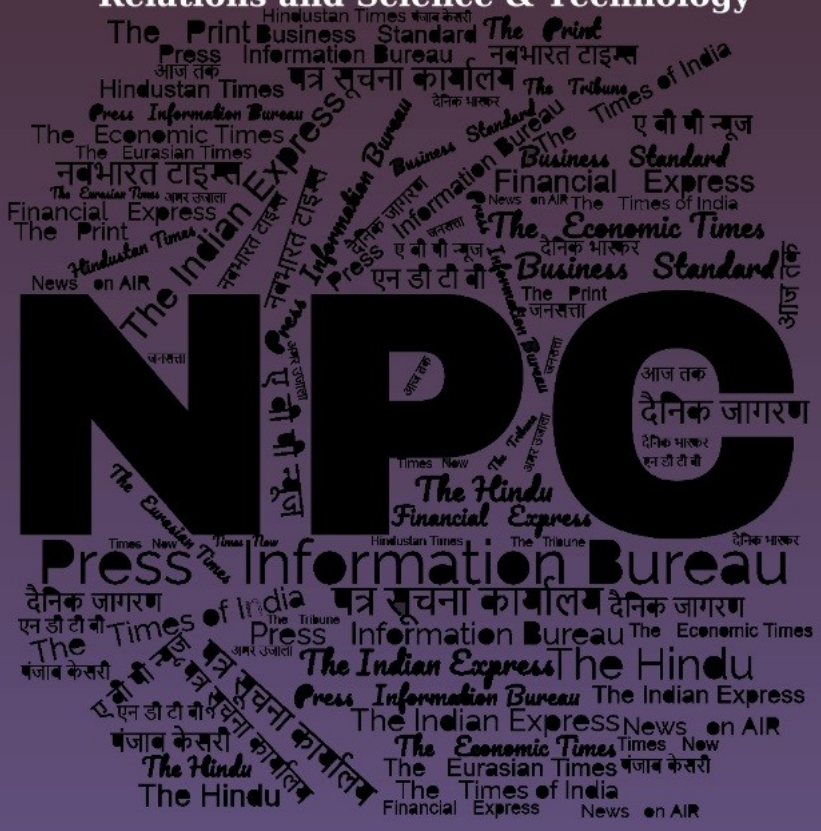

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Ministry of Defence

Tue, 02 July 2024

MoD inks MoU to set up testing facilities in Unmanned Aerial System, Electronic Warfare & Electro Optics domains in Tamil Nadu Defence Industrial Corridor

Ministry of Defence (MoD) has signed an MoU to establish three state-of-the-art testing facilities in Chennai under the Tamil Nadu Defence Industrial Corridor - one each in Unmanned Aerial System (UAS), Electronic Warfare (EW) and Electro Optics (EO) domains. The MoU, under the Defence Testing Infrastructure Scheme (DTIS), was exchanged between senior officials of MoD and Tamil Nadu Industrial Development Corporation Limited in the presence of Defence Secretary Shri Giridhar Aramane in New Delhi on July 02, 2024.

With an outlay of Rs 400 crore, the DTIS was launched by Raksha Mantri Shri Rajnath Singh in May 2020 to set up state-of-the-art testing facilities in collaboration with private industry and Central/State Government, promoting indigenous defence production, reducing military equipment imports and enhancing self-reliance. To provide impetus to the defence and aerospace sectors within the Defence Industrial Corridors, seven testing facilities were approved - four in Tamil Nadu and three in Uttar Pradesh. The MoU for three facilities in Tamil Nadu has been signed today.

The DTIS provides up to 75% government funding as ‘Grant-in-Aid’, with the remaining 25% funded by the Special Purpose Vehicle (SPVs), comprising Indian private entities and State/Central Governments.

For the UAS testing facility, Keltron, a government of Kerala undertaking, is the lead SPV member, with some private sector companies being the consortium members. Bharat Electronics Limited (BEL) and India Optel Limited (IOL) are the lead SPV members in the EW and EO testing facilities respectively.

Upon the completion of the project, they will provide advanced testing equipment and services to both government and private industry, thus giving a boost to ‘Aatmanirbharta’ in defence.

https://pib.gov.in/PressReleasePage.aspx?PRID=2030282

Press Information Bureau
Government of India

Ministry of Defence

Tue, 02 July 2024

Weapon Systems School Inaugurated By the Chief Of The Air Staff At Begumpet, Hyderabad

A new chapter has been introduced in the history of the Indian Air Force (IAF) with the inauguration of the Weapon Systems School (WSS) by Air Chief Marshal VR Chaudhari, Chief of the Air Staff (CAS), at Air Force Station Begumpet, Hyderabad on 01 July 24. This follows the approval of a new branch of officers in the IAF, the Weapon System (WS) branch in 2022. Aimed at recalibrating and transforming the Indian Air Force as a future-oriented force, the formation of this new training establishment is a gigantic leap for the Armed Forces in general, and Indian Air Force in particular.

The CAS was welcomed by Air Vice Marshal Premkumar Krishnaswamy. Commandant, Weapon Systems School. The inauguration ceremony was also graced by the presence of Air Marshal Nagesh Kapoor, Air Officer Commanding-in-Chief, Training Command, and other senior officers of the IAF including Commandant, Air Force Academy, Commandant, College of Air Warfare, Air Office Commanding, Air Force Station Hakimpet, and Station Commander, Air Force Station Begumpet.

The WSS will impart effect based training that is contemporary in nature and prepare officers of the newly formed branch in line with the requirements of the IAF. With inauguration of the WSS, Flight Cadets of WS Branch will undergo their second semester of training at this institute. The new branch will have four streams; Flying stream to operate the weapons and systems in airborne platforms like the Sukhoi-30 MKI and C-130J; Remote stream to operate Remotely Piloted Aircraft; Mission Commanders and operators for Surface to Air and Surface-to-Surface weapon systems, and Intelligence stream for handling space-based intelligence and imagery.

During the interaction, the CAS highlighted that with the creation of WS Branch, operators of ground based and specialist weapon systems will come under one umbrella, enhancing war fighting capabilities of the IAF significantly. He exhorted the instructors that being pioneers in a newly formed branch, they were the pillars on which the entire edifice of the envisioned training regime would stand firmly and deliver decisive air power. While complimenting the founding members of the School, the CAS urged all personnel to establish the School as a nodal centre for weapon systems training in the country.

The creation of the WS branch was announced by the CAS during the Air Force Day Parade celebrations on 08 October 2022.

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Press Information Bureau
Government of India

Ministry of Defence

Tue, 02 July 2024

Indian Army Contingent Departs For India- Thailand Joint Military Exercise MAITREE

The Indian Army contingent departed yesterday for the 13th edition of India- Thailand joint military Exercise MAITREE. The exercise is scheduled to be conducted from 1st to 15th July 2024 at Fort Vachiraprakan in Tak Province of Thailand. Last edition of the same exercise was conducted at Umroi, Meghalaya in September 2019.

The Indian Army contingent comprising 76 personnel is being represented mainly by a Battalion of the LADAKH SCOUTS along with personnel from other arms and services. The Royal Thailand Army contingent also comprises 76 personnel mainly from 1st Battalion, 14 Infantry Regiment of 4 Division.

Aim of Exercise MAITREE is to foster Military Cooperation between India and Thailand. The Exercise will enhance combined capabilities in executing Joint Counter Insurgency/ Terrorist Operations in Jungle and Urban Environment under Chapter VII of United Nations Charter. The Exercise will focus on high degree of physical fitness, joint planning and joint tactical drills.

Tactical Drills to be practiced during the exercise will include Creation of a Joint Operation Centre, establishing an Intelligence & Surveillance Centre, employment of Drones and Counter Drone Systems, Securing of a Landing Site, Small Team Insertion & Extraction, Special Heliborne Operations, Cordon and Search Operations, Room Intervention Drills and Demolition of Illegal Structures.

Exercise MAITREE will enable the two sides to share their best practices in Tactics, Techniques and Procedures for conduct of joint operations. The Exercise will facilitate developing inter-operability, bonhomie and camaraderie between soldiers of both the countries.

https://pib.gov.in/PressReleasePage.aspx?PRID=2030153

THE ECONOMIC TIMES

Tue, 02 July 2024

Rafale’s India operations get a strategic push; Dassault establishes maintenance facility near Jewar Airport

Dassault Aviation is in the process of acquiring land near Jewar International Airport to set up a Maintenance, Repair, and Overhaul (MRO) facility for India’s Mirage 2000 and Rafale fighters as told to Hindustan Times. This step will pave the way for local manufacturing of the latest Rafale versions to fulfill the IAF's long-term requirement of approximately 100 twin-engine multi-role fighters over the next two decades, according to sources familiar with the matter.

"Make in India"Initiative with Local Production

Despite the political changes in France, the Emmanuel Macron government and Dassault Aviation have committed to manufacturing Rafale fighters in India under the "Make in India" initiative. This includes using locally sourced components to meet the IAF's demand. Additionally, engine maker Safran SA is planning an MRO facility for Rafale engines in Hyderabad, expected to be operational by 2025. Safran has also indicated readiness to manufacture M-88 engines in India if there is a substantial order from the IAF.

Strategic Needs and Benefits for India

With HAL's LCA Mark II, which will replace the Mirage 2000, not expected to be ready until the middle of the next decade, Rafale fighters will address India's immediate needs and potentially allow for exports. Dassault has started sourcing titanium parts from Indian companies and plans to expand its local supply chain. This manufacturing move is seen as a win-win for both nations, given Dassault's backlog of approximately 300 fighter orders from countries like Croatia, Greece, Serbia, Egypt, Qatar, UAE, and Indonesia.

Government's New Procurement Policy

The Indian government has shifted its defense procurement policy to acquire 114 Multi-Role Fighter Aircraft (MRFA) only from vendors willing to establish manufacturing units in India, including technology transfer and full production in collaboration with local partners. This policy shift, while expected to delay the MRFA acquisition, is aimed at strengthening India's defense manufacturing capabilities.

Global Competition for Indian Defense Contracts

The MRFA deal, valued at approximately $20 billion, is one of the world's largest defense contracts. Competitors include Dassault’s Rafale, Boeing’s Super Hornet F/A-18, SAAB’s Gripen, Lockheed Martin’s F-21, Russian MiG-35, and the Eurofighter Typhoon.

Existing Infrastructure and Future Plans

India's Air Force currently operates 36 Rafale fighters equipped with Hammer and SCALP missiles, and the Navy is negotiating the price for 26 Maritime Strike Rafales for the INS Vikrant aircraft carrier. India already has maintenance depots, repair facilities, and training simulators for Rafales at the Ambala air base.

The Modi government values France's stable licensing policy, which reassures long-term commitments similar to Russia's historical aircraft supplies to India since 1953. Safran is also prepared to enter a joint venture with an Indian company to manufacture engines for Indian Multi-Role Helicopters (IMRH), reducing dependency on third countries.

With increasing aggression from China, equipped with its fifth-generation J20 fighters and expanding force levels, India needs to bolster its Air Force. “India can ill afford to further delay the acquisition of advanced multi-role fighters as the Chinese challenge will increase by the day,” said a national security planner in the HT report.

Boost from GE Aerospace Collaboration

The Indian government has been encouraged by its success in getting US company GE Aerospace Defence and Systems to produce fighter jet engines in India in collaboration with state-owned Hindustan Aeronautics Ltd (HAL). According to a deal signed during Prime Minister Narendra Modi’s recent visit to the US, GE will transfer 80% of the technology for its F414 jet engines,

which will power the Mk2 version of India’s indigenously developed Light Combat Aircraft (LCA).

Increased FDI in Defense Sector

To further boost its defense manufacturing capabilities, the Indian government has increased the Foreign Direct Investment (FDI) sectoral limit in defense to 74%. This move aims to attract more foreign investments and make India a hub for defense manufacturing. India's strategic decision to bolster its defense capabilities through local manufacturing of Rafale fighters aligns with its "Make in India" initiative. This move not only meets the IAF's long-term needs but also positions India as a potential exporter of advanced fighters, enhancing its strategic and economic standing globally.

https://economictimes.indiatimes.com/news/defence/rafales-india-operations-get-a-strategic-push-dassault-establishes-maintenance-facility-near-jewar-airport/articleshow/111422777.cms

THE ECONOMIC TIMES

Tue, 02 July 2024

India-Mongolia joint military exercise 'Nomadic Elephant' to begin in Meghalaya tomorrow

The 16th edition of Joint Military Exercise 'Nomadic Elephant' between armies of India and Mongolia will be conducted in Meghalaya's Umroi from July 3-16, the Indian Army stated on Tuesday.

Additional Directorate General of Public Information, IHQ of MoD (Army) said that the exercise set to be conducted in Meghalaya aims to enhance interoperability between two armies in carrying out semi-conventional operations in semiurban/mountainous terrain.

"Exercise #NomadicElephant The 16th edition of Joint Military Exercise #NomadicElephant between #IndianArmy & #MongolianArmy will be conducted in Umroi, #Meghalaya from 03 Jul to 16 Jul 2024. The exercise aims to enhance interoperability between both Armies in conducting semi conventional operations in semi urban/ mountainous terrain under the #UN mandate," Additional Directorate General of Public Information, IHQ of MoD (Army) posted on X.

Exercise 'Nomadic Elephant' is an annual training event with Mongolia which is conducted alternatively in Mongolia and India. The 15th edition of the Joint Military Exercise 'Nomadic Elephant' was conducted in Mongolia's Ulaanbaatar, according to the Ministry of Defence's earlier press release. Soldiers of the Mongolian Armed Forces Unit 084 and Indian Army soldiers from the Jammu and Kashmir Light Infantry Regiment had participated in the exercise in 2023.

In May this year, the 12th Joint Working Group (JWG) meeting between the Defence Ministries of India and Mongolia took place in Ulaanbaatar on May 16-17 and reviewed the progress on various bilateral defence cooperation initiatives and identified means to further enhance cooperation between the two countries.

The meeting was co-chaired by the Joint Secretary (International Cooperation), Ministry of Defence Amitabh Prasad and State Secretary of Ministry of Defence, Mongolia Brigadier General Gankhuyag Davagdorj. India's Ambassador to Mongolia Atul Malhari Gotsurve also attended the meeting. During the JWG, both sides expressed satisfaction at the ongoing defence cooperation between the two countries.

"They reviewed the progress on various bilateral defence cooperation initiatives and identified means to further enhance cooperation in these areas, articulating steps in this direction," the Ministry of Defence said in a statement.

Moreover, both sides also exchanged views on the current geopolitical situation. Joint Secretary Amitabh Prasad highlighted the potential of the capacity and capability of the Indian defence industry and looked forward to a fruitful partnership with the Armed Forces of Mongolia.

The Mongolian side exuded confidence in the capacity and capability of the Indian industry. Both sides also acknowledged the growing ties between the two countries.

https://economictimes.indiatimes.com/news/defence/india-mongolia-joint-military-exercise-nomadic-elephant-to-begin-in-meghalaya-tomorrow/articleshow/111425784.cms

THE ECONOMIC TIMES

Tue, 02 July 2024

Chinese troops are going to stay at the disputed site along India border for longer period: US Report

Despite the world’s attention on other conflicts, the China-India border continues to be a hotbed of tension. The US Annual Threat Assessment, published earlier this year, pointed out that the disputed border remains a strain on bilateral relations. It noted, "While the two sides have not engaged in significant cross-border clashes since 2020, they are maintaining large troop deployments, and sporadic encounters between opposing forces risk miscalculation and escalation into armed conflict."

Nonetheless, the report assessed that "The shared disputed border between India and China will remain a strain on their bilateral relationship."

China-India Border Tensions: Strategic Studies Institute Report In April, the Strategic Studies Institute of the US Army War College published an in-depth report on PLA activities along the mountainous border in Aksai Chin during 2020-21. Dennis Blasko, a former US defense attaché inBeijing and Hong Kong, authored the report, examining the rapid deployment of PLA troops to the region following the Galwan Valley clash in June 2020.

He assessed, "Barring negotiations with the Indian military and government to withdraw out-of-area combat troops, the PLA appears ready to maintain its deployments near the LAC in Aksai Chin and on the border at Doklam indefinitely."

He continued: "In the case of Aksai Chin, due to the challenges of transporting large mechanized units over long distances, rotations of units into and out of the region will likely occur after a prolonged tour of duty (perhaps six months to a year or more). The situation has taken the form of PLA border operations against Vietnam following the 1979 war until 1987, albeit with fewer troops and less actual combat and artillery bombardment."

China-India Border Tensions: Logistical and Operational Challenges

Blasko's report highlighted the logistical challenges faced by the PLA in sustaining its deployments. Troops in Aksai Chin rely on supply depots over 1,600km away. The Western Theater Command, defending nearly half of China's landmass, manages these operations with a limited

number of troops. Blasko noted that the PLA's extended border reinforcement operations serve both political and military purposes, providing real-world operational and logistics experience.

Blasko made heavy use of Google Earth satellite coverage of the Aksai China area in his research for the US Army War College, and because some imagery is not up to date, he could not provide a reliable assessment of current deployments. He said, "Although China's state media continues to report on units on the 'front line' or in 'battle positions' in the Karakoram region (without specifying Aksai Chin), it has done so without revealing the total number of troops deployed or their exact locations."

China-India Border Tensions: Current Deployments and Infrastructure Development

Using satellite imagery, Blasko estimated that the PLA has constructed fortified positions to support a full division-size deployment—approximately 20,000 soldiers—in Aksai Chin. He stated, "This number may be higher during the period in which an out-of-area unit that has spent time on the LAC rotates out and is replaced by a fresh unit entering the area." The PLA has also been feverishly building infrastructure, including two bridges across Lake Pangong, to facilitate faster troop movements.

Furthermore, "This number may be higher during the period in which an outof-area unit that has spent time on the LAC rotates out and is replaced by a fresh unit entering the area. Nonetheless, the 20,000 figure is a considerably smaller estimate of PLA personnel deployed in the disputed region than the 40,000-60,000 frequently asserted in non-Chinese media."

Perhaps comfortingly, Blasko concluded that 20,000 troops scattered across such a broad front is "inadequate to conduct a large-scale offensive across the difficult terrain delineated by the LAC". Any offensive would necessitate a build-up of units and supplies if the PLA were to attempt a substantial incursion beyond the border. For defensive operations, PLA doctrine recommends a divisional front that is 15-20 km wide and 20-30 km deep. For offensive operations, that front would sharpen to be some 5-8km wide and 4- 8km deep. Obviously, the disposition of Chinese troops along the LAC is nowhere close to that at present and, even at the peak of tensions in mid2020, the front was in fact some 160km wide from Galwan Valley to Rechin La.

China-India Border Tensions: Challenges of Terrain

The rugged, high-altitude terrain of the region complicates large-scale armored or mechanized combat operations. Blasko remarked, "I just don't think they want to pack too many troops and vehicles into such bad terrain, because they'd just make lucrative targets if fighting actually starts." He explained that the terrain favors defensive operations and makes offensive maneuvers difficult without significant build-up of units and supplies.

China-India Border Tensions: Comparison with South China Sea Tactics

Blasko drew parallels between China's border activities with India and its actions in the South China Sea. He observed, "PLA units have been positioned to consolidate and hold territory, to conduct patrols and protect construction projects, and to create 'facts on the ground', similar to the reef expansion operations in the South China Sea a decade ago." Recent confrontations between the China Coast Guard and the Philippines highlight China's escalatory tactics.

China-India Border Tensions: Potentialfor Future Conflict

Blasko suggested that further border confrontations are possible, especially as small units come into close proximity. He said, "Yes, I think there's a possibility of conflict, especially as small units come into close proximity with each other. There are probably a lot of low-level people on both

sides looking for a fight." This sentiment underscores the need for ongoing diplomatic efforts to prevent escalation.

Background on the Galwan Valley Clash

The clash in Galwan Valley on June 15-16, 2020, marked a significant escalation in China-India border tensions. This violent encounter resulted in casualties on both sides and led to increased troop deployments along the LAC. Since then, the PLA has established fortified defensive positions and continues to rotate units into and out of the region as part of the 506 Special Mission.

China-India Border Tensions: Acclimation Training

To support its troops, the PLA has been building infrastructure, such as bridges and roads, and has launched acclimation training programs for high-altitude deployments. According to Chinese media, these initiatives have improved troop readiness and allowed for quicker deployments. The PLA has even created "vegetable factories" at high altitudes to provide fresh produce for its border defense troops.

The PLA's sustained military activities and infrastructure development along the China-India border highlight the persistent tensions between the two nations. Diplomatic negotiations remain crucial to prevent further escalation and achieve a long-term resolution.

https://economictimes.indiatimes.com/news/defence/chinese-troops-are-going-to-stay-at-the-disputed-site-along-india-border-for-longer-period-us-report/articleshow/111423963.cms

THE ECONOMIC TIMES

Tue, 02 July 2024

A tell-tale sign that China could be preparing for war

A telling similarity has been noticed between what Germany was doing before it invaded Poland in September 1939 and what China is doing now - stockpiling resources and raw materials.

In the eastern Chinese port of Dongying, the start of 2024 has often seen several tankers docked simultaneously discharging Russian crude oil into a new 31.5 million barrel storage facility completed late last year, Reuters had reported in April.

Taders said it was all part of a concerted and deliberate Chinese effort to build up strategic stockpiles for a perhaps uncertain future. In a piece for international affairs and conflict blogging site "War on the Rocks" published April 17, Mike Studeman, former commander of the US Office of Naval Intelligence and intelligence and director of the US IndoPacific Command, argued that this was part of a much wider process.

"Xi Jinping is preparing his country for a showdown," he wrote, describing the Chinese leader as "militarising Chinese society and steeling his country for a potential high-intensity war."

Part of that, he suggested, included building up strategic stockpiles of essential goods and resources, protecting China against the kind of sanctions imposed on Russia after its Ukraine invasion - or, indeed, a militarily enforced blockade as part of a regional or global war.

Now more experts think China is stockpiling resources and raw materials to prepare itself for a war, most likely an invasion of Taiwan which can embroil it into a long-drawn war. The unusual stockpiling The US-China Economic and Security Review Commission (USCC), which was created by the United States Congress, conducted a hearing this month during which experts pointed at China's unusual stockpiling activities.

The Chinese central government stockpiling minerals is one potential indicator that it may be preparing to invade Taiwan, a report by the USCC said. The National Food and Strategic Reserves Administration oversees China's stockpile, which reportedly contains large volumes of minerals like aluminum, cobalt, and copper.

Three specific indicators that China may be stockpiling for strategic reasons, like an invasion of Taiwan, are (1) stockpiling when domestic mineral producers do not face profitability issues, (2) high apparent mineral consumption relative to real mineral consumption, and (3) spiking mineral imports. Indicators 2 and 3 also assess Germany's mineral stockpiling activities before it invaded Poland in September 1939. China does not disclose the list and quantity of minerals stockpiled, but its stockpile reportedly includes aluminum, antimony, cadmium, cobalt, copper, gallium, germanium, indium, molybdenum, rare earth elements, tantalum, tin, tungsten, zinc, and zirconium, the report said.

Parallels with World War II and the Cold War

The USCC report has drawn parallels between China's stockpiling activity and that of Germany and Japan during World War II as well as with Russia's during the Cold War. Germany stockpiled significant copper volumes in 1938 and 1939, and when it invaded Poland in September 1939, Germany had enough copper stocks to cover almost nine months of estimated wartime consumption, the report said.

Similarly, Japan began stockpiling minerals like tin after 1936, and when it launched attacks across the Pacific in December 1941, it had accumulated significant mineral stockpiles, including enough bauxite stocks to cover nine months of Japanese demand at 1941 consumption levels. During the Cold War too, mineral stockpiling by the Soviet Union and Warsaw Pact states was an indicator of possible preparation for a military attack. In 1979, the RAND Corporation said that the Soviet Union's preparation for war could include mineral stockpiling by both the military and industry, as well as spiking mineral imports.

The report says that along with monitoring China's mineral stockpiling, other mineral-related indicators should also be monitored to better inform whether China is preparing to invade Taiwan.

https://economictimes.indiatimes.com/news/defence/a-tell-tale-sign-that-china-could-be-preparing-for-war/articleshow/111436845.cms

FINANCIAL EXPRESS
Read to Lead

Tue, 02 July 2024

India successfully test-fires new generation anti-radiation missile 'Rudram-1'

India has successfully test-fired its first indigenous anti-radiation missile, the Rudram-1, developed by the Defence Research and Development Organisation (DRDO) for the Indian Air Force (IAF).

This significant milestone not only strengthens India's defense capabilities but also places it among a select group of nations with advanced anti-radiation missile technology.

Key Features of Rudram-1

Rudram-1 is integrated with the IAF's Sukhoi-30MKI fighter jets, serving as the launch platform. The missile features INS-GPS navigation and a Passive Homing Head for final attack, allowing it to accurately hit radiation-emitting targets. This precision is crucial for Suppression of Enemy Air Defence (SEAD) operations, enabling the destruction of enemy radars and communication sites from long standoff ranges.

Comparative Analysis with Global Counterparts

United States: AGM-88 HARM

The United States' AGM-88 High-speed Anti-Radiation Missile (HARM) has been in service for over three decades. It is designed to detect, attack, and destroy radar antennas or transmitters with minimal aircrew input. The AGM-88 HARM boasts a sophisticated seeker head and is used extensively by the U.S. Air Force and Navy for SEAD missions.

Russia: Kh-58

Russia's Kh-58 anti-radiation missile, with a range of 120 kilometers, is known for its versatility. It can be fitted with various seeker heads targeting specific air defense radars. The Kh-58 has been a key component of the Russian SEAD arsenal, providing flexibility and effectiveness in neutralizing enemy radar systems.

United Kingdom: ALARM

The British Royal Air Force uses the Air-Launched Anti-Radiation Missile (ALARM) to destroy enemy radars. Designed for SEAD missions, ALARM can loiter above the battlefield, waiting for enemy radars to activate before attacking. This capability allows for sustained suppression of enemy air defenses.

China: FT-2000

China's FT-2000 system, based on the HQ-9 (which itself is derived from the Russian S-300PMU), targets Airborne Early Warning (AEW) and Airborne Warning and Control System (AWACS) aircraft. This system exemplifies China's approach to developing anti-radiation missiles tailored to counter high-value, radar-emitting targets.

Iran: Hormoz-2

The Iranian Hormoz-2 anti-radiation missile is a ballistic missile capable of striking targets at sea with a range of approximately 300 kilometers. It highlights Iran's focus on extending its anti-radiation capabilities to maritime environments, providing strategic flexibility.

Brazil: MAR-1

Brazil's MAR-1 missile, developed by Mectron, has been exported to countries like Pakistan. It demonstrates Brazil's capability to produce competitive anti-radiation missiles for the global market. The MAR-1 is designed to suppress enemy air defenses by targeting radar systems effectively.

Strategic Implications for India

The successful test of Rudram-1 marks a significant advancement in India's defense capabilities. With China and Pakistan posing ongoing security challenges, India's development of indigenous

anti-radiation missiles enhances its strategic deterrence. The missile's integration with Su-30MKIs allows the IAF to conduct SEAD operations deep within enemy territory, neutralizing critical air defense installations.

Technological Edge and Operational Flexibility

Rudram-1's INS-GPS navigation and Passive Homing Head provide a technological edge, enabling accurate targeting over a wide range of frequencies. The missile can be launched from varying altitudes, ranging from 500 meters to 15 kilometers, and has a range of up to 250 kilometers depending on the launch conditions. This flexibility allows the IAF to adapt to different operational scenarios, enhancing its combat effectiveness.

Regional Defense Dynamics

India's induction of Rudram-1 into its arsenal is a noteworthy development in regional defense dynamics. While China and Pakistan have their own anti-radiation missile capabilities, Rudram-1 adds a new dimension to India's strategic toolkit. The missile's capability to suppress enemy air defenses from long standoff ranges reduces the risk to Indian aircraft, providing a significant operational advantage.

In joining the ranks of nations with indigenous anti-radiation missile capabilities, India has demonstrated its growing defense technology prowess. Rudram-1 enhances the IAF's ability to conduct SEAD operations, ensuring air superiority in contested environments. As geopolitical tensions persist, India's focus on strengthening its defense capabilities through indigenization continues to be a crucial aspect of its national security strategy.

https://www.financialexpress.com/business/defence-india-successfully-test-fires-new-generation-anti-radiation-missile-rudram-1-3541569/

FINANCIAL EXPRESS
Read to Lead

Tue, 02 July 2024

Pakistan, China and Border Security focus areas for Defence Budget

Border tensions with China and Pakistan have been a significant driver of India's defence budget allocations. The historical and ongoing disputes with these neighbours necessitate robust defence preparedness, with specific budgetary allocations aimed at enhancing border security and military capabilities. This article examines how these tensions influence India's defence budget, highlighting key allocations and their implications for national security.

Historical Context of Border Tensions

India shares long and contentious borders with both China and Pakistan. The Line of Actual Control (LAC) with China spans approximately 3,488 kilometers, while the Line of Control (LoC) with Pakistan extends around 740 kilometers. These borders have been the sites of numerous conflicts and skirmishes, including the Sino-Indian War of 1962 and the Kargil War of 1999. The recent clashes in the Galwan Valley in 2020 further underscore the volatility of these borders and the need for heightened security measures.

Defence Budget Overview

India’s defence budget has seen consistent growth over the years, driven by the necessity to counter threats from both China and Pakistan. In the fiscal year 2023-24, the defence budget was increased to ₹5.94 lakh crore ($72.6 billion), marking a significant rise from previous years. This increase is reflective of the ongoing efforts to modernize the armed forces and enhance border security.

Allocations for Border Security

A substantial portion of the defence budget is allocated to improving infrastructure and capabilities along the borders with China and Pakistan.

Infrastructure Development: To ensure rapid troop mobilization and sustained supply chains, significant investments are being made in constructing roads, bridges, and tunnels in border areas. The Border Roads Organisation (BRO) has been instrumental in these efforts, with several projects aimed at improving connectivity in the Himalayan region.

Surveillance and Reconnaissance: Enhancing surveillance capabilities is crucial for monitoring border activities. The defence budget allocates funds for acquiring advanced drones, satellite imagery, and electronic surveillance systems. These technologies are vital for real-time monitoring and intelligence gathering, which are essential for pre-empting and responding to incursions.

Military Modernization: Modernizing the armed forces is a key priority, with a focus on acquiring advanced weaponry and equipment. Budgetary allocations are directed towards procuring new fighter jets, tanks, artillery, and missile systems. The induction of the Rafale fighter jets and the development of the indigenous Tejas aircraft are part of these modernization efforts.

Specialized Forces and Training: The budget also emphasizes the need for specialized forces capable of operating in the challenging terrains of the Himalayas. Allocations are made for training programs and the establishment of mountain warfare schools. These specialized units are trained to handle high-altitude combat and adverse weather conditions.

Strategic Preparedness and Diplomacy

India’s defence budget not only focuses on immediate military needs but also on long-term strategic preparedness. The aim is to maintain a credible deterrence posture while ensuring that the armed forces are well-equipped to handle any potential escalation.

Impact of Galwan Valley Clash

The Galwan Valley clash in June 2020, which resulted in the deaths of 20 Indian soldiers, marked a significant turning point in India’s defence strategy. In response to this incident, the government increased the defence budget allocation, prioritizing the procurement of critical equipment and the enhancement of border infrastructure. The incident highlighted the importance of being prepared for sudden escalations and the need for a robust defence mechanism.

Allocations Towards Indo-Pak Border Security

While the focus on the Indo-China border has intensified, the threat from Pakistan remains a significant concern. The defence budget addresses the need for vigilance and readiness along the LoC.

These include:

Counter-Infiltration Measures: Investments in advanced surveillance and anti-infiltration systems are crucial for preventing cross-border terrorism. The defence budget includes funds for deploying sophisticated radars, night-vision devices, and thermal imaging systems along the LoC.

Strengthening Border Outposts: Enhancing the security of border outposts (BOPs) is essential for maintaining a strong defence posture. The budget allocates funds for upgrading existing BOPs and establishing new ones, ensuring that they are well-equipped and strategically located.

Indigenous Defence Production: Promoting indigenous defence production is a key aspect of the budget. The aim is to reduce dependency on foreign imports and develop self-reliance in defence manufacturing. Initiatives such as 'Make in India' and the establishment of defence corridors are part of this strategy.

https://www.financialexpress.com/budget/pakistan-china-and-border-security-focus-areas-for-defence-budget-3541096/

Tue, 02 July 2024

Reshuffling command: Changes under new Indian Army Chief General Upendra Dwivedi

With General Upendra Dwivedi taking over as the new Chief of the Indian Army, significant changes have been made across various command positions. These strategic appointments aim to bolster the Army's operational capabilities and streamline command structures.

New Appointments and Their Backgrounds

General Dwivedi's elevation to Army Chief has led to the appointment of Lieutenant General NS Raja Subramani as the new Vice Chief (Co-Chief). Previously, General Dwivedi held this position. Lieutenant General Subramani, formerly the Commanding-in-Chief of the Central Command in Lucknow, brings a wealth of experience and deep understanding of operations along the Western (Pakistan) and Northern (China) borders. His expertise will be crucial in his new role at the Army Headquarters in South Block.

Lieutenant General Devendra Sharma has been appointed to lead the Army Training Command (ARTRAC) in Shimla. Previously, he served as the Chief of Staff in the Western Command at Chandimandir. General Sharma, an officer from the Scindia Horse of the Armoured Corps, has a distinguished career that includes an instructor role at the National Defence College (NDC). His leadership comes at a pivotal time as the Army plans to experiment with the Integrated Battle Group (IBG) under the Agneepath scheme.

Key Command Changes

The Lucknow-based Central Command will now be under the leadership of Lieutenant General Anindya Sengupta. He previously served as the General Officer Commanding-in-Chief of the 'Fire and Fury' (14th) Corps in Leh (Ladakh) and as the Chief of Staff of the Northern Command in Udhampur. General Sengupta will oversee the deployment of a full corps under the Central Command, which is tasked with the responsibility of monitoring the Line of Actual Control (LAC) adjoining China in Himachal Pradesh and Uttarakhand.

In Jaipur, the South-West Command (Sapt-Shakti) will be led by Lieutenant General Manjinder Singh, who was formerly in charge of the Army Training Command. This command was previously

under Lieutenant General Dheeraj Seth, who has now taken over the Pune-based South Command. General Seth replaces Lieutenant General AK Singh, who has retired.

Looking Ahead

These strategic changes reflect the Indian Army's focus on enhancing operational readiness and adapting to evolving security challenges. The reshuffle is expected to bring fresh perspectives and renewed vigour to the Army's command structure. Additionally, further changes in the Chief's Principal Staff Officer (PSO) at the Army Headquarters are anticipated, indicating a comprehensive approach to optimizing leadership across all levels.

The new appointments underline the Army's commitment to strengthening its defensive and strategic capabilities, ensuring that the Indian Army remains well-prepared to address both current and future challenges.

https://www.financialexpress.com/business/defence-reshuffling-command-changes-under-new-indian-army-chief-general-upendra-dwivedi-3541206/

Hindustan Times

Tue, 02 July 2024

What ails India's aero defence modernisation

India's military strategy needs to conform to its national posture of strategic autonomy. India has always been loath to military treaties or alliances, and its military engagement with friendly foreign countries are aimed at building partnerships, learning from each other's best practices, ensuring interoperability, and the ability to partner and assist during humanitarian assistance and disaster relief (HADR) missions.

India has earned global recognition for its swift response to disasters. However, the country realises that it has to be on its own to resolve its boundary disputes and other intractable issues with its neighbours. Military capability, therefore, should be its primary focus.

The government must continue with the self-reliance policy to galvanise domestic industry to meet the needs of the armed forces. Research and development, ease of doing business, strategic partnerships for the transfer of critical technologies, indigenous manufacturing, and defence exports need greater attention.

With the phasing out of the Mig 21 and Mig 27 aircraft, the Indian Air Force (IAF)'s fighter aircraft inventory is down to 30 squadrons against an authorised strength of 42 squadrons. While the IAF is fully invested in the Tejas programme, its production needs to be scaled up to meet the promised timelines. A critical lacuna in the development of the Tejas Mk II and the Advanced Medium Combat Aircraft (AMCA) is the lack of an indigenous aero-engine.

Collaboration with GE or Safran for indigenous development of the engine needs to be pursued in earnest. This would take time to fructify and, in the interim the Multi Role Fighter Aircraft (MRFA) can't be ignored. Its induction would be the fastest way to build up combat capability while the indigenous Tejas Mk II and AMCA programmes run concurrently. The IAF must be involved as a stakeholder at the highest level for the programme to succeed.

The acute shortage of Airborne Warning and Control Systems/Airborne Early Warning and Control (AWACS/AEW&C) has an adverse effect on the combat capability of the IAF. With four old Airbus

A321 aircraft having been transferred to the IAF inventory, the Cabinet Committee on Security has accorded the design and development of two aircraft.

The programme for indigenous development has to be prioritised and put on fast track with appropriate budgetary allocations. In addition, the procurement of six aircraft for AEW&C has to be fast-tracked. The Acceptance of Necessity (AoN) for Flight Refuelling Aircraft was accorded on February 16, many years after the requirement of the same had been projected by the IAF. The limited availability of these combat enablers affects the training status of IAF personnel.

The capital acquisition procedure is not in sync with the emergent requirements of the armed forces. While the need for procedures and probity is well understood, the timelines leave much to be desired. The Defence Acquisition Procedure (DAP) 2020, which gives thrust to indigenous design and development, also lays down ambitious timelines that are often not met. The delays can be attributed to incessant observations from the finance ministry and the lack of accountability to meet the desired timelines. There exists an urgent need to review the DAP for faster execution. To give an example, the requirement of an Integrated Perimeter Security System (IPSS) that was felt after the January 2016 Pathankot terror attack took more than seven years to be implemented. The MRFA has been languishing with no clarity in sight.

The private sector is gradually rising to meet the requirements of indigenous production. The Defence Public Sector Undertakings (DPSUs) on the other hand are behemoths with a sense of entitlement that have an entrenched work culture, rarely delivering what is promised. The need to corporatise DPSUs is the need of the hour. In addition, a private-public partnership model needs to be evolved with the DPSUs outsourcing more and more to the private industry.

With aerospace power being critical for future conflicts, it becomes imperative for the nation to focus on this important tool of national power. Military modernisation is a continuous process, and capability takes years to build; it needs commitment, resolve, and financial outlay. Conflicts, on the other hand, rarely knock before they happen.

If they do, the time available may not be enough for an appropriate response. Investment in military capability cannot be ignored if deterrence has to succeed and also because wars will invariably get costlier. Reform, transform, and perform or perish should be the mantra for the new government in the military domain.

https://www.hindustantimes.com/opinion/what-ails-india-s-aero-defence-modernisation-101719934681923.html

JANES

Tue, 02 July 2024

India issues RFI for underwater-launched autonomous vehicle

The Indian Navy has issued a request for information (RFI) for an autonomous underwater vehicle (AUV) that can be launched from undersea platforms.

Dubbed as the underwater-launched autonomous underwater vehicle (ULAUV) project, the RFI seeks information on systems that can undertake intelligence, surveillance, and reconnaissance (ISR) and mine-countermeasures (MCM) deception operations.

Besides detecting surface and subsurface targets, the ULAUV should be able to relay target information to another underwater platformusing an acoustic communication link, according to details in the RFI that was released by the Indian Navy on 1 July.

“It should be capable of recording acoustic and visual data of targets for analysis. It should have homing features to home on to the distress frequency of disabled underwater platform,” the RFI added, which suggests that the ULAUV would also be used to detect distressed submarines.

With regard to performance parameters, the ULAUV should have a maximum speed of at least 5 kt in nil currents condition and an endurance of more than 24 h when operated at cruising speeds.

It should be propelled by an electric motor system with low acoustic noise and guided by inertial navigation system and differential GPS with anti-jamming features.

In addition, systems submitted in response to the RFI should adhere to Indian Telecommunication Engineering Centre's (TEC's) standards for ruggedisation, specifically for underwater environments.

The RFI will run till 16 July and the Indian Navy has indicated that all correspondence made in response to the exercise should be directed to India's Defence Research and Development Organisation (DRDO).

https://www.janes.com/osint-insights/defence-news/sea/india-issues-rfi-for-underwater-launched-autonomous-vehicle

The EurAsian Times

Tue, 02 July 2024

Russia Claims Breakthrough With ATACMS; Says Decoded ‘Complex’ U.S. Missiles Haunting The Military

Russian experts have reportedly comprehensively analyzed the intricate structure of the American Army Tactical Missile System (ATACMS) missile — a discovery that may have significant consequences for the current conflict in Ukraine.

The Russian media outlet Ria Novosti, citing an unnamed weapons expert, claimed that the structure of the ATACMS missile had been fully analyzed, leaving “no secrets left” regarding its functionality.

The United States began supplying Ukraine with the mid-range variant of the ATACMS missiles last fall. The long-range version, capable of hitting targets up to 300 kilometers away, was sent to Ukraine in April.

Since their deployment, the ATACMS missiles have been highly effective, targeting and destroying key Russian assets, including logistics hubs and advanced defense systems like the S-400.

A few days ago, Moscow began an in-depth study of this weapon, aiming to uncover its critical capabilities and potential countermeasures.

On July 2, Russian state media pointed out that specialists had fully examined the complex and multi-component fuse of the missile. The outlet also published a video for the first time showing the internal structure of the ATACMS rocket.

The expert explained, “This warhead was developed for an anti-ship missile and later installed on the ATACMS. We neutralized the fuse. An intermediate detonator is installed on it.”

He elaborated that the fuse case, once opened, reveals a sophisticated mechanism capable of various settings based on mission requirements.

The expert added that the fuse is set to a firing position, marked by the letter ‘A’ visible in a special window. It employs a long-range cocking mechanism with a movable pendulum that activates itself after a certain period.

“Also, in the inner part, there is a rotary engine, which closes the internal circuit of the fuse. The system is duplicated. Four detonator primers were installed. The main way to start the mechanism is on magnetic elements,” the expert explained.

This complex design is intended to ensure the missile’s safe use. Russian experts have thoroughly studied the fuse, and according to one weapons expert, “There are no secrets left for us in it.”

In addition to the fuse, Russian specialists have reportedly, for the first time, gained access to the ATACMS flight guidance and correction system.

The warheads feature a guidance system with three laser ring gyroscopes, which maintain the missile on a precise ballistic trajectory. The system is equipped with a GPS antenna that adjusts the missile’s trajectory at the beginning and end of its journey.

Will It Help To Counter ATACMS?

This detailed understanding of the ATACMS missile could potentially alter the dynamics of the battlefield, providing Russia with the knowledge needed to counter one of Ukraine’s most effective long-range weapons.

Russian experts believe that a study of the missile allows them to identify its critical capabilities. For instance, analyzing the missile’s maneuvering abilities will help determine which anti-aircraft missiles it can evade and which it cannot.

This study could also provide insights into the missile’s accuracy and how it might be affected by electronic interference. By understanding these aspects, Moscow can figure out how to alter the missile’s performance, potentially causing errors that prevent it from reaching its intended target. The objective was to pinpoint these essential details to assess their impact on the trajectory of the missile.

Viktor Litovkin, a retired Russian Army colonel and military analyst, told the state-owned news agency, “Firstly, [Russian] designers will analyze the whole bulk of data and find out how the missile flies… how it is directed to the target, whether it is guided by GPS, satellites, or heavy drones…They will find out its weaknesses and strengths.”

After analyzing the situation, Russian specialists will offer suggestions to the military on enhancing interception tactics using anti-aircraft missile systems or improving electronic warfare capabilities to disrupt the missile. Specifically, they might advise on methods to disrupt the missile’s communication or disable its GPS.

Litovkin also suggested that this analysis would enable the Russian military to detect launch sites and missile locations more quickly. He stressed that the West should recognize the superiority of Russian weapons and countermeasures over Western military technology.

“The West should know that all its efforts have been in vain, that Russian weapons and Russian countermeasures are much more effective than its tanks, missiles, and guns. This is a signal to the

whole world, not just the West, that Western weapons are no match for Russian arms," the retired Russian colonel concluded.

The coming weeks may reveal how this newfound information will impact the ongoing conflict.

https://www.eurasiantimes.com/russia-claims-breakthrough-with-atacms/

THE TIMES OF INDIA

Wed, 03 July 2024

Ukraine eyes AI as weapon against Russia, ushering in age of killer robots

In a field on the outskirts of Kyiv, the founders of Vyriy, a Ukrainian drone company, were recently at work on a weapon of the future. To demonstrate it, Oleksii Babenko, 25, Vyriy's CEO, hopped on his motorcycle and rode down a dirt path. Behind him, a drone followed, as a colleague tracked the movements from a briefcase-size computer. Until recently, a human would have piloted the quadcopter.

No longer. Instead, after the drone locked onto its target - Babenko - it flew itself, guided by software that used the machine's camera to track him. The motorcycle's growling engine was no match for the silent drone as it stalked Babenko. If the drone had been armed with explosives, and if his colleagues hadn't disengaged the autonomous tracking, Babenko would have been a goner.

Vyriy is just one of many Ukrainian companies working on a major leap forward in the weaponisation of consumer technology, driven by the war with Russia. The pressure to outthink the enemy, along with huge flows of investment, donations and govt contracts, has turned Ukraine into a Silicon Valley for autonomous drones and other weaponry.

What the companies are creating is that makes human judgment about targeting and firing increasingly tangential. The widespread availability of off-the-shelf devices, easy-to-design software, powerful automation algorithms and specialised artificial intelligence microchips has pushed a deadly innovation race into uncharted territory, fuelling a potential new era of killer robots.

The most advanced versions of the technology that allows drones and other machines to act autonomously have been made possible by deep learning, a form of AI that uses large amounts of data to identify patterns and make decisions. Deep learning has helped generate popular large language models, like OpenAI's GPT-4, but it also helps make models interpret and respond in real time to video and camera footage.

That means software that once helped a drone follow a snowboarder down a mountain can now become a deadly tool. In more than a dozen interviews with Ukrainian entrepreneurs, engineers and military units, a picture emerged of a near future when swarms of self-guided drones can coordinate attacks and machine guns with computer vision can automatically shoot down soldiers. More outlandish creations, like a hovering unmanned copter that wields machine guns, are also being developed.

For Ukraine, the technologies could provide an edge against Russia, which is also developing autonomous killer gadgets. The systems raise the stakes in an international debate about the ethical and legal ramifications of AI on the battlefield. Human rights groups and UN officials want to limit

its use for fear that they may trigger a new global arms race that could spiral out of control. In Ukraine, such concerns are secondary to fighting off an invader. "We need maximum automation," said Mykhailo Fedorov, minister of digital transformation, who has led Ukraine's efforts to use tech startups to expand advanced fighting capabilities. "These technologies are fundamental to our victory."

https://timesofindia.indiatimes.com/world/europe/ukraine-eyes-ai-as-weapon-against-russia-ushering-in-age-of-killer-robots/articleshow/111446972.cms

Science & Technology News

The Indian EXPRESS

Wed, 03 July 2024

India has large gap to bridge in quantum capabilities

India may have done the right thing by launching a Rs 6,000 crore-worth National Quantum Mission to develop some of the most sought-after technologies for the future, but it would have to overcome a significantly large gap that currently exists between its capabilities and those of other leading countries in these areas like the United States and China, a new assessment of India's potential in quantum technologies has revealed.

The assessment by Itihaasa, a non-profit that studies the evolution of technology and business domains in the country, shows that India was just one among 17 countries to have a dedicated government programme to back research in quantum technologies, and one of the 12 to have committed separate investments for the purpose. But several countries were much ahead of India, not just in terms of committed funding for research and development but also in their current capabilities.

India's Rs 6,000 crore translates to about USD 0.75 billion over five years. China, on the other hand, was estimated to be spending USD 15 billion for developing quantum technologies. The United Kingdom (USD 4.3 billion), the United States (USD 3.75 billion), Germany (USD 3.3 billion) and South Korea (USD 2.35 billion).

India was far behind of the United States and China in terms of patents obtained in quantum technologies till now, and in publications in top journals. "It is commendable that India is among the 17 countries with formal national quantum missions, and is among the top 12 countries in terms of committed investments. At the same time, we must recognise that India is lagging the global leaders in quantum technologies, and needs to ramp-up both R&D and translational aspects to catch up with them," the assessment said.

Quantum technologies exploit the extremely weird and counter-intuitive — but very special nonetheless — properties of sub-atomic particles like an electron to develop processes and devices with capabilities and efficiencies that are impossible to achieve with classical, non-quantum, systems. A quantum computer, for example, can perform certain tasks that a normal computer, however fast or powerful it may be, might not be able to finish in any useful amount of time.

Quantum technologies, once they mature, will probably cause a disruption in almost every field, but some of the areas that are expected to be impacted first, and gain the most, happen to be computing, communications, cryptography, cybersecurity, and healthcare. Most of the technologies are still under development, with scientists still to gain full control over the quantum behaviour of the sub-atomic particles in a way that could be used to extract useful work.

India's National Quantum Mission, launched last year, aims to develop capabilities in four areas – quantum computing, communications, sensors and metrology (the science of measurements), and materials. Abhay Karandikar, Secretary in Department of Science and Technology which is executing the quantum mission, said in at least two of these areas, communications and sensing, India had a very realistic chance of joining the global leaders in about five years' time.

"We already have fairly advanced capabilities in these areas (quantum communications, and sensing). We even have a few start-ups doing very good work. With a little push, we should be in the global lead. With other technologies, including quantum computing, we would have to work a lot more harder. But we are not starting at zero in any of these areas. We would be among the top-five, top ten or top 15 everywhere," he said.

Principal Scientific Advisor Ajay Sood said the gap between India and other leading countries was not such that it could not be bridged. "In some areas we are may be one year behind. In some others, we might be four to five years behind. In some areas we are at par with the best in the world. We have to work hard for the next few years, because the fruits of these technologies are going to be transformational," Sood said.

The assessment report found about 110-145 Indian researchers, at the principal investigator level, already working on quantum technologies at major laboratories and institutions. About 75-100 Post-docs and 300-400 PhD students were working with them. In addition, there were about 50-100 MTech students in different areas related to quantum technologies.

Incidentally, India was producing the highest number of graduates in areas related to quantum technologies, the assessment found. These included subjects like biochemistry, chemistry, physics, electronics and chemical engineering, mathematics and statistics. More than 82,000 students were graduating in these subjects every year. Only European Union, taken as a whole, had higher number of students in these areas.

"These graduates will still need focused training on different aspects of quantum technologies to make them a relevant workforce in the field," the assessment said. It said that the government should explore the possibility of facilitating a dedicated science and technology cadre in each of the four areas identified for National Quantum Mission, similar to the dedicated cadres in India's space and nuclear sectors.

https://indianexpress.com/article/technology/science/india-gap-bridge-quantum-capabilities-report-9429549/

The Indian EXPRESS

Tue, 02 July 2024

ISRO's Aditya-L1 completes first halo orbit around Sun-Earth L1 point

India's first solar mission Aditya-L1 spacecraft completed its first halo orbit around the Sun-Earth L1 point on Tuesday, ISRO said.

The space agency said its station-keeping manoeuvre on Tuesday ensured its seamless transition into the second halo orbit.

The Aditya-L1 mission, which is an Indian solar observatory at Lagrangian point L1, was launched on September 2, 2023 and was inserted in its targeted halo orbit on January 6, 2024.

According to ISRO, Aditya-L1 spacecraft in the halo orbit takes 178 days to complete a revolution around the L1 point.

During its travel in the halo orbit, Aditya-L1 spacecraft will be subjected to various perturbing forces that will cause it to depart from the targeted orbit, the space agency said.

“Aditya-L1 underwent two station-keeping manoeuvres on February 22 and June 7, respectively, to maintain this orbit. Today’s third station-keeping manoeuvre has ensured that its travel continued in the second halo orbit path around L1,” ISRO said.

The agency explained that Aditya L1’s journey around Sun-Earth L1 Lagrangian point involves modeling of complex dynamics.

The understanding of various perturbing forces acting on the spacecraft helped in determining the trajectory accurately and planning precise orbit manoeuvres, it added.

“With today’s manoeuvre, the state-of-the-art flight dynamics software developed in-house at URSC-ISRO for the Aditya-L1 missions stands fully validated,” ISRO said.

https://indianexpress.com/article/technology/science/isro-aditya-halo-orbit-sun-earth-9429032/